UK GREEN BUILDING COUNCIL

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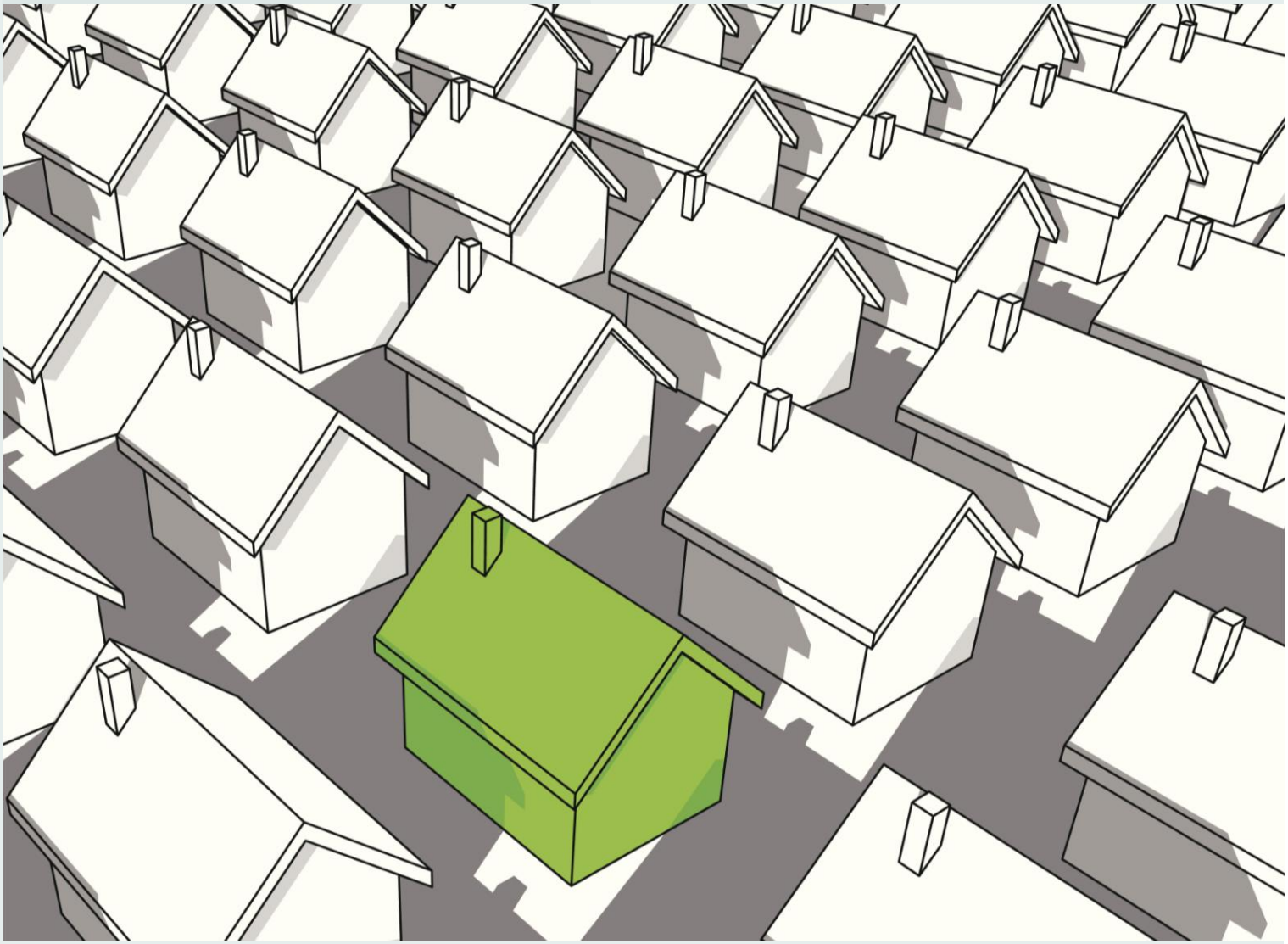
Task Group Report

Retrofit Incentives

Boosting take-up of energy efficiency measures in domestic properties



CAMPAIGN FOR A SUSTAINABLE BUILT ENVIRONMENT

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1. EXECUTIVE SUMMARY

Retrofitting the UK's poorly insulated and energy inefficient housing stock offers enormous opportunities, in both economic and environmental terms. In 2010 Government suggested that a radical overhaul in the energy efficiency of homes and small businesses could catalyse some £7 billion of investment annually and create up to 250,000 jobs by 2030[1].

Yet the scale of the challenge is equally large. It is estimated that an average of one home retrofit per minute will need to be carried out between now and 2050 if the UK is to meet its legally binding climate change target of reducing emissions by 80 per cent mid-way through the century[2]. Unfortunately, the Committee on Climate Change recently reported that the UK was some way off meeting the targets set in its carbon budgets, in part because emissions from the building stock remain stubbornly high[3].

At the heart of the Government's efforts to encourage energy efficiency is the Green Deal, the Coalition's flagship climate change policy, which officially launched in January 2013. Central to the policy is a finance mechanism which allows consumers to install energy efficiency measures at no up-front cost, instead paying for the measures from the savings on energy bills.

The UK Green Building Council (UK-GBC) has long been a supporter of this market mechanism for encouraging domestic energy efficiency – from its inception as 'Pay As You Save' under the previous Government through to the Coalition's implementation of the policy as the Green Deal. The scheme has real potential to tackle key market barriers, helping to underpin a retrofit revolution across the UK - cutting carbon, reducing energy demand, stimulating the construction sector and protecting against rising energy bills. However, as long ago as 2009, UK-GBC recommended that the scheme would only really succeed if there were sufficient incentives in place to encourage take-up.

Government anticipated the Green Deal would support the retrofit of 14 million homes by 2020[4], yet the first official statistical release on 27 June 2013 revealed that only 245 households had so far agreed a Green Deal Plan to finance energy efficiency improvements[5]. Although true that the scheme is still very much in its infancy, and that a number of logistical issues have so far held back demand, the figures are still worrying and would appear to endorse the thinking that additional incentives are needed in order to encourage retrofit on the scale required.

UK-GBC convened a Task Group of members in late 2012 to investigate a range of different incentives for stimulating the market. They set out to address the simple question: 'How do we create demand for retrofit measures?' It is important to recognise that Green Deal finance is clearly not the only way to finance retrofit and therefore the starting point was how to incentivise take-up across the board, in the knowledge that Green Deal would provide one option for delivery for those who wished to access it.

[1] Government projections from 2010 on the impact of the Green Deal: *https://www.gov.uk/government/news/green-deal-to-create-green-jobs*
[2] Energy Saving Trust and Centre for Low Carbon Futures: *http://www.superhomes.org.uk/wp-content/uploads/2012/01/Retrofit_Challenge_2011.pdf*
[3] Meeting Carbon Budgets – 2013 Progress Report: *http://www.theccc.org.uk/publication/2013-progress-report/*
[4] Greg Barker speech, June 2011: *https://www.gov.uk/government/speeches/greg-barker-speech-green-deal-and-big-society-event*
[5] DECC statistical release on Green Deal and ECO, June 2013: *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209097/Statistical_Release_-_Green_Deal_and_Energy_Company_Obligation_in_Great_Britain_-_Mid-June_2013.pdf*

As described below, the Task Group examined a long list of various possible incentives, before focussing in on three in particular: variable Stamp Duty Land Tax; variable Council Tax; and an energy efficiency "Feed-in-Tariff". Economic modelling was commissioned to assess the possible impact of these incentives on the retrofit market. The results make for essential reading for policy-makers and all those with an interest in ensuring the UK tackles its retrofit challenge.

Assessing the long list of options

The Task Group compiled a list of possible incentives, some of which had already been proposed elsewhere in one form or another. These were narrowed down and each one researched by Task Group members to assess their potential.

The following is a brief appraisal of each of the options considered in this first phase (see the full report for further detail):

Cashback and grants

Grants have historically been used by policy-makers as a powerful driver for action, and are currently being used for the Green Deal in the form of Cashback. Under the Cashback scheme householders planning to install certain measures can apply for a voucher which will be redeemed once work is completed. However, such schemes tend to be short-lived and do not provide confidence to industry for planning long-term investments. They also represent a direct cost to Government, which is challenging in the current economic climate.

Variable Council Tax and rebates

Council Tax could be used to encourage retrofit either by linking rates to the energy efficiency of a property, or alternatively by offering a rebate when measures are installed. The former, while placing an extra administrative burden on councils, and requiring all affected properties to have a valid Energy Performance Certificate (EPC) in place, could have a very significant impact on the market while retaining revenue neutrality for Government. The latter rebate scheme would be less disruptive, though would be likely to have a smaller impact on demand, and would have a potentially large impact on council budgets. As variable rates and rebates were deemed to be very different mechanisms, they were assessed and scored separately.

Variable Stamp Duty

Stamp Duty Land Tax could similarly be linked to the energy efficiency of a property. Stamp Duty is a highly lucrative tax and viewed as very cost effective by Government, who may be reluctant to alter it unless assured of the outcome. On the other hand, such an incentive would have the key advantage of impacting at the point of sale - a time at which retrofit is often undertaken - and could quite conceivably feed through into property value if implemented successfully. To further utilise this trigger, the system could be designed to allow buyers to claim a rebate on Stamp Duty if they undertook energy efficiency work within a given period of purchasing. As with a variable Council Tax scheme, it could also be fiscally neutral for Government.

Consequential Improvements

One of the incentives that was not carried forward even to this initial stage was so-called 'Consequential Improvements' regulation. Extensive work has already been done, including Government's own Impact Assessment, so the Task Group decided that a compelling case already existed for Government to introduce Consequential Improvements, even alongside other demand measures.

Minimum energy efficiency standards for the owner occupied sector

Minimum energy performance standards – regulation that enforces improvements to home energy efficiency - are currently planned for the private rented sector (PRS) from 2018 and could in theory be extended to the owner occupied sector. Although this would effectively guarantee uptake of retrofit there would likely be a high degree of political hesitance to introduce this type of regulation for owner-occupiers, fearful of a media backlash and perceived unpopularity.

Low interest loans

Some form of low interest loans for energy efficiency measures, including a reduced interest rate for the Green Deal, could help to make retrofit more attractive by reducing the overall cost to the householder. Although this may allow more measures to be installed in each Green Deal package, it is unlikely to be attractive enough on its own and additional incentives may still be required to stimulate demand. It is also likely to come at a significant direct cost – or financial risk - to Government.

Salary sacrifice scheme

A salary sacrifice scheme – whereby employers provide tax free loans that are paid back through employees' salaries - could fund energy efficiency measures, in a similar way to the 'Cycle to Work' scheme. This innovative incentive could help to make retrofit more appealing, affordable and accessible. However, there is a concern that this type of scheme may not finance extensive packages of energy efficiency measures and would only be offered to employees by bigger and better resourced companies. It would also create a direct cost to Government through reduced income tax receipts.

Reduced VAT for energy efficiency

A range of energy efficiency measures are already eligible for a reduced VAT rate of 5 per cent, but this rate could be extended to a larger set of measures and the cost of installation to further reduce the cost of retrofit. In the case of the Green Deal, reducing VAT would mean a greater range of measures or packages could meet the Golden Rule. However, the ongoing dispute between the Government and the European Commission over reduced VAT for energy efficiency, and the reduction in receipts from lowering VAT further, render this incentive highly unlikely.

Energy efficiency Feed-in-Tariff

Rewarding consumers for generating their own energy has already proved successful, and a similar system of payments to encourage reductions in energy use has huge potential to encourage retrofit. How these payments are funded would pose a major question, as the direct cost would be significant. There may be reluctance to fund through general taxation and there would be concerns about further levies on consumer bills. But the recent consideration of demand reduction measures under the Electricity Market Reform programme demonstrates the interest that currently exists in this kind of scheme. And if payments could be linked to actual rather than deemed energy savings it would have the potential to promote on-going energy savings.

Comparative Analysis

In order to decide which incentives to take through to the next stage of more in-depth research, the Task Group then conducted a high-level comparative analysis of the options, which included a scoring system based on weighted criteria.

Comparison Criteria

- Is it politically/publicly acceptable?
- Will it drive uptake in owner occupied housing?
- Will it drive uptake in private rented housing?
- Will it drive uptake in social housing?
- Could it positively influence the value of efficient homes?
- Can it be cost neutral to Government?
- Is it socially equitable?
- Will it provide confidence in the retrofit market for the industry and investors?
- Has it got relevant past or international precedents?
- Will it address fuel poverty?
- Could it be designed to have low administrative burden?
- Does it provide long-term incentives for improving energy efficiency/saving?
- Will it encourage whole house retrofit?
- Is it likely to be compatible with other policies/mechanisms?
- Does it incentivise retrofit outside the Green Deal?

The complete set of scores is available in the full report, but four proposals achieved significantly higher scores than the other options. These were: variable Stamp Duty, variable Council Tax, an energy efficiency Feed-in-Tariff and minimum energy efficiency standards.

After extensive discussion, it was decided not to investigate minimum standards any further for two key reasons. Firstly, the political difficulty of introducing such regulation was seen as very significant. Secondly, it was considered unlikely that such regulation would be brought in until after it had been trialled in the private rented sector – meaning a potentially long delay before the incentive would be in place.

The Task Group therefore set out to further develop the three shortlisted proposals into more robust models. Economic modelling was used to gain a better understanding of their potential impacts on demand, GDP, Government spending and carbon reductions.

KEY PROPOSALS

Variable Stamp Duty

Implementation: A system of variable Stamp Duty rates would see house buyers receive a discount if a property is above a given energy efficiency standard, or pay a higher rate if its performance is poor. Based on homes' SAP (Standard Assessment Procedure) ratings, it would be relatively straightforward to develop a model that was revenue neutral. A key element of such a system would see a rebate offered for any household that undertook energy efficiency work within twelve months of purchasing a property.

Variable Stamp Duty is a strong option for incentivising retrofit because it impacts at the point of sale – a time when renovation often takes place. A home that attracts lower stamp duty is a more attractive proposition for buyers, and could potentially sell faster, which in time could strengthen the link between energy efficiency and property prices.

The group examined potential concerns around whether this scheme would be deemed to be fair across society – particularly whether it would result in a flow of money from low performance, low value homes to high performance, high value homes. It found that existing policies, in particular the introduction of the Green Deal and the Energy Company Obligation (ECO),

mitigated most of these concerns. However, key design features would also be important, including an appropriate cap on the size of the benefit that could be received, particularly for those in the highest Stamp Duty bands.

Further concerns also existed around altering what is considered an easy tax to administer and collect. A simple, web-based system was therefore proposed which would ensure minimal impact on conveyancing solicitors, home-buyers and HMRC.

Impact: Analysis suggests that a variable Stamp Duty based scheme could deliver between 135,195 and 270,402 additional retrofits per year, with annual carbon savings of between 208,538 and 417,088 tCO_2. Such a scheme could also contribute £404m-£807m to GDP a year with a near zero annual direct cost to Government.

Variable Council Tax

Implementation: As with Stamp Duty, Council Tax rates could be varied according to the energy efficiency of a property, with discounts for high performance properties and increased rates for those with poor energy efficiency. Such a design would allow the scheme to be revenue neutral. While the variable rates and baseline would be set centrally, it would be possible for individual councils to adjust the model to ensure that it reflected their particular housing stock (and therefore remained revenue neutral).

Due to the broad impact of Council Tax and its unpopularity, such a system has the potential to be a significant incentive for driving retrofit. This could also be magnified by its possible role in linking energy efficiency to house prices.

One significant implementation challenge would be the requirement for all homes to have a valid EPC, which are currently only required for properties at the point of sale or rent. The Task Group proposed that this could be overcome through a gradual introduction of discounts and penalties, including "assumed" EPC ratings for those without certificates. The assumed rating would be tightened over time to encourage households to undertake an assessment, with support in place to help poorer households cover the cost.

The Task Group discussed concerns about the impact of this incentive on vulnerable households and harder to treat homes, but concluded that the current policy framework – for example, the Green Deal, ECO and existing Council Tax exemptions - would offer protection to most of those who might otherwise be negatively affected.

Impact: Analysis suggests that a variable Council Tax based scheme could deliver between 517,739 and 1,480,935 additional retrofits per year, with annual carbon savings of between 812,192 and 2,231,594 tCO_2. Such a scheme could also contribute £1.5bn-£4.4bn to GDP a year with a near zero annual direct cost to Government.

Energy efficiency Feed-in-Tariff

Implementation: Just as renewable energy Feed-in-Tariffs make regular payments to households for producing clean energy, an energy efficiency Feed-in-Tariff would reward households for installing measures which would reduce their energy demand.

Initially, payments would be proportional to the deemed (estimated) energy savings from the measures. An immediate payment (50 per cent of the total) would be made to the householder following installation. This would be followed by smaller annual payments over a number of years (the remaining 50 per cent). Spreading payments over time would provide households with

an on-going reminder of the benefits of energy efficiency, which could motivate them to install additional measures.

Over time, it may also be possible to transition to payments for measured (as opposed to deemed) energy savings with the rollout of smart meters. Payments could then be calculated against a household baseline and reflect actual reductions in energy use, creating an ongoing driver for behaviour change and – unlike the tax-based incentives - absolute reductions in energy demand. It was proposed that such a scheme would benefit from a gradual transition from the deemed payments to measured payments, with households initially 'opting in' to the measured scheme.

Unlike Council Tax and Stamp Duty based schemes, an energy efficiency Feed-in-Tariff would also require additional funding. Various options were proposed for meeting this cost, including payments through the capacity market, an expansion of or change to ECO, or the use of carbon tax/EU ETS receipts. While no new outlay of this kind would be immediately popular with Government, the increased tax revenue from higher rates of retrofit would help to offset the cost, which itself would represent a lower cost of carbon abatement than the current ECO scheme.

Impact: Analysis suggests that an energy efficiency Feed-in-Tariff could deliver between 64,598 and 169,464 additional retrofits a year with annual carbon savings of between 96,961 and 254,364 tCO_2. Such a scheme could also contribute £193m-£506m to GDP a year, but with an estimated direct cost of £52m-£273m to Government or consumers.

Comparative impacts of the three incentives

	Variable Stamp Duty Land Tax	Variable Council Tax	EE FiT
Annual increase in number of retrofits	135,195– 270,402	517,739– 1,480,935	64,598 – 169,464
Annual net effect on GDP	£404m-£807m	£1,520m-£4,421m	£193m - £506m
Annual direct cost of subsidy*	Near zero**	Near zero**	£52m - £273m
Annual carbon saving (tCO_2)	208,538– 417,088	812,192– 2,231,594	96,961 - 254,364

* In the case of Government funding, this excludes any resulting increases in tax revenue.
** For these incentives, the model was built specifically to be revenue neutral. In each case, this was achieved to within a relatively small margin (less than £300k).

CONCLUSION

The case for introducing additional incentives to stimulate demand for retrofit in our existing homes has been compelling for some time. However, the most recent statistics on poor uptake of the Green Deal demonstrate a real urgency for Government to act.

This report identifies three of the most promising options for encouraging wider uptake of energy efficiency measures. Whilst each option has distinct challenges, none of these appear insurmountable if the political will is there.

Economic modelling finds that the number of retrofits undertaken, the potential economic contribution and level of carbon savings could be dramatically increased with the application of any one of these incentives. Moreover, in the case of the two tax-based incentives these benefits could be achieved in a fiscally neutral way for Government.

None of the three is a silver bullet, and the implementation of any incentive should ideally be as part of a wider package of measures, potentially including low interest loans, minimum standards and Consequential Improvements regulations. These, in turn, should fit within a wider, coherent and long-term framework of energy efficiency policy.

The aim of this report has not been to come down on the side of one single incentive, but to analyse various options available and develop proposals from which Government can take forward the necessary consultation and policy development.

The next step is for Government to work with industry to consider these options further and decide which can be most practically and urgently implemented.

2. INTRODUCTION

The domestic sector represents 24 per cent of total emissions in the UK. The UK's housing stock is among the most inefficient in Europe yet at least 80 per cent of the homes that will be standing in 2050 have already been built. Improving the energy efficiency our existing homes will therefore play a significant role in ensuring the UK's 2050 climate change targets are met.

Retrofitting the UK's poorly insulated and energy inefficient housing stock offers enormous opportunities for the UK, in both economic and environmental terms. Government research[6] suggests that a radical overhaul in the energy efficiency of homes and small businesses could catalyse some £7billion of investment annually and create up to 250,000 jobs by 2030. In addition, reductions in domestic energy demand not only have the potential to reduce household bills in the face of rising energy costs, but will also help to avoid costly investment in additional energy infrastructure.

Yet the scale of the challenge is equally large. It is estimated[7] that an average of one home will need to be retrofitted every minute between now and 2050 if the UK is to meet its legally binding climate change targets of reducing emissions by 80 per cent mid-way through the century.

Moreover, UK-GBC's Low Carbon Existing Homes[8] report in 2008 identified a range of barriers to the take-up of low carbon retrofit which will need to be addressed in order to meet this objective. These include the 'hassle factor' of having the builders in; the lack of available finance; uncertainty over appropriate measures to install; and an unprepared supply chain.

The current policy framework of Green Deal aims to overcome many of these barriers but there remains a key question which will be critical to their success: how do we create demand for retrofit measures? Recent experiences under CERT and CESP have demonstrated how hard it can be to encourage energy efficiency improvements; despite offering low-hassle measures that achieve big energy savings at a highly subsidised price (often for free) take-up by households has tended to be surprisingly low.

This report investigates a range of potential financial incentives aimed at increasing demand for domestic retrofit. It offers proposals for the three most promising incentives: Stamp Duty, Council Tax and an energy efficiency Feed-in-Tariff; and assesses their possible impact on the market. These proposals are intended to offer three viable options which, implemented individually or collectively, would supplement the existing policy framework by increasing uptake of energy efficiency measures. Quantitative analysis carried out as part of this report finds that the number of retrofits undertaken and the potential economic contribution of energy efficiency could be dramatically increased with appropriate use of these incentives.

Policy context

At the heart of the Government's efforts to encourage energy efficiency is the Green Deal. The scheme officially launched in January 2013 and is touted as one of the Coalition's flagship energy

[6] DECC https://www.gov.uk/government/news/green-deal-to-create-green-jobs
[7] Energy Saving Trust and Centre for Low Carbon Futures http://www.superhomes.org.uk/wp-content/uploads/2012/01/Retrofit_Challenge_2011.pdf
[8] UK-GBC, Oct 2008 http://www.ukgbc.org/resources/publication/uk-gbc-report-low-carbon-existing-homes

and climate change policies. It establishes accreditation, assessment and finance mechanisms under an innovative market based scheme which has the potential to drive a retrofit revolution.

Central to the policy is the pay-as-you-save finance mechanism that allows consumers to install energy efficient improvements, such as loft insulation or a new boiler, at no up-front cost, instead repaying for the measurers through their energy bills. Private companies which offer these improvements also recoup their costs through a charge in instalments on the energy bill.

Box 1: The Great British Refurb - Attitudes to the Green Deal

In 2010, the Great British Refurb Campaign conducted a consumer research project looking at attitudes to the Green Deal. While the report found that attitudes to the Green Deal were, in principle, largely positive, it also found that take-up of the scheme would be highly dependent on the interest rate offered. Almost a third of respondents anticipated they would take up the Green Deal with an interest rate of 2 per cent, but less than one in ten (7 per cent) envisaged taking up the scheme at an interest rate of 6 per cent.

However, unlike earlier schemes, the Green Deal is far from being a financial "no-brainer" to most customers. The scheme's "Golden Rule" is designed to ensure that, at least in the early years of a Green Deal Plan, repayments are almost as big as any energy bill savings achieved. And while its predecessors were largely focussed on individual, basic measures, the Green Deal is intended to drive uptake of packages of measures which could be complex and disruptive.

Such issues mean that the Green Deal proposition simply may not be compelling enough to stimulate a retrofit market at scale. Although it has been designed to help overcome one of the main barriers to consumer demand – lack of up front finance and the long paybacks associated with many measures – there are concerns over the level of demand this alone is likely to create.

This has led to Government attempting to kick-start the scheme with a "cash back" offer, totalling £125 million. These grants should provide an initial boost, but such time-limited offers will not embed energy efficiency into the public psyche, nor will it offer industry the confidence it needs to invest in new product development and long-term delivery capacity. To achieve this, there needs to be a driver which avoids creating a short term demand 'bubble', and instead helps to stimulate a sustainable retrofit market.

The Government anticipated the Green Deal would support the retrofit of 14 million homes by 2020. Yet six months in, only 245 consumers have agreed a Green Deal Plan to finance energy efficiency improvements, emphasising that in its current form the scheme is not incentivising retrofit on the scale intended. If the Green Deal and the wider domestic energy efficiency market are to deliver, additional incentives are required to encourage the installation of these measures.

Process

This project sets out to re-examine, update and build-upon the previous work looking at financial incentives for domestic retrofit. It aims to take into account new thinking and ideas, and consider the impact of the challenging political, economic and social climate in which we find ourselves. In doing so, it aims to identify the three most promising options for driving the retrofit market, and to provide policy-makers with a detailed analysis of their pros and cons and practical implications.

It is not designed to identify a single "winner", but instead to present Government with the information it needs to choose from the three most promising incentives. As each incentive will impact the market in different ways, this will allow Government to develop and implement whichever incentive best meets its particular policy goals.

The project was divided into two phases; the first compared a range of incentives to identify the three best options, and the second sought to work up detailed proposals for these three incentives.

Phase 1: Identifying the incentives

Given the large number of potential incentives that could have been considered, it was not possible to undertake a full analysis of every single option. Therefore, the project began with a literature review to identify a long-list of options, from which three "winners" would be selected to be developed further. A paper was prepared for each of the long-listed incentives in order to gain a better understanding of how it would operate and impact on the market.

The papers were then used to help analyse and rank each incentive against an agreed set of criteria. These criteria covered issues including impacts on different housing sectors, political acceptability, net cost and administrative complexity. By ranking the incentive against these wide ranging criteria, it was possible to compare the relative strengths and weaknesses, and gain a better understanding of their potential for success. The three incentives which were judged to have performed the best in this comparison were then taken forward into Phase II.

Phase 2: Developing the proposals

Phase 2 sought to explore the three short-listed incentives further. For each, the outstanding issues and major obstacles to implementation were identified to help form the basis of robust final proposals. The proposals aim to draw out the specific impacts and benefits of each option in order to help inform Government's decision process.

Alongside the worked proposals, economic modelling was undertaken to investigate the potential impacts of the incentives. Projected figures around the possible impact on take-up, tax receipts, GDP and carbon savings would provide further evidence or how the incentives may impact the market.

Further work

Consumer research has been commissioned to gauge the public perceptions of the three final incentives. It was agreed that this would complement the incentive proposals and economic modelling by providing evidence of consumer preferences. The results of this research are due to be published later in the summer of 2013.

3. IDENTIFYING THE OPTIONS

In recent years, a wide range of options for stimulating demand for energy efficiency measures have been proposed by stakeholders. With such a large number to choose from it is not possible to undertake a full analysis of each and every option so the first task of the group was to conduct a literature review of previous research in this area and identify a long-list of potential incentives. During Phase I, papers outlining a 'straw man' of each long-listed option were developed to provide a better understanding their strengths, weaknesses and potential impacts (see section 4).

The long-list for consideration in the first round of research was narrowed down to the following eight options[9]:

1. Cash-back and grants
2. Variable Council Tax and rebates
3. Variable Stamp Duty Land Tax
4. Minimum energy efficiency standards (for the owner occupied sector)
5. Low interest loans
6. Salary sacrifice scheme
7. Reduced VAT rate for energy efficiency
8. Energy efficiency Feed-in-Tariff (FiT)

A number of options were immediately obvious, given their long history in the debate and the frequency with which they are cited in discussions around the Green Deal. Foremost amongst these were cash-back – the chosen focus of the current scheme – and incentives linked to Council Tax and Stamp Duty. Others that were clear contenders included an extension of minimum energy performance standards to the owner-occupied sector[10], and reduced VAT for the installation of energy-saving measures. International experience, particularly the frequently-cited example of Germany's KfW (See section 4.7) also made it impossible to ignore the option of using low interest rates as a stimulus for take-up of retrofit.

The final entries to the long-list were more recent ideas that build upon the success of other schemes, both within and beyond the retrofit arena. The first of these put forward was a salary sacrifice scheme, akin to those already used to support child care and increase the level of cycling amongst commuters (the Cycle to Work scheme). The second, a natural progression given the success of the renewable energy Feed-in-Tariff was to investigate the possibility of creating an equivalent scheme for energy efficiency.

The decision was taken not to further explore Consequential Improvements regulations in this report, since their possible introduction has already been the subject of considerable analysis and debate in recent years, including on how they would work in practice and what impact they could have in terms of creating demand for retrofit measures.

[9] A full list of incentives that the group decided not to take forward for consideration can be found in Annex A.
[10] Following on from the Government's decision to enforce these in the private rented sector (PRS).

Ranking criteria

In order to select three "winners" from the long list a high-level comparative appraisal was undertaken of the long-listed options. The Group therefore agreed upon a set of wide-ranging criteria against which each incentive could be ranked and then compared. A draft list of criteria was initially drawn up with the long-list, but the final criteria were also informed and refined by the process of analysing the incentives throughout Phase 1.

Central to these criteria were considerations of how powerful each might be in driving uptake of retrofit measures, but other important factors such as an incentive's costs to Government, its potential impact on the housing market, and its effect on vulnerable households were quickly identified as being critical to their chances of success. Alongside these technical criteria were equally important (and linked) political and psychological criteria such as how the public and press may react to an incentive (their "acceptability"), and the extent to which they may provide confidence to businesses involved in the retrofit market ("their credibility").

Following considerable discussion and refinement throughout Phase 1, the final list of agreed criteria was as follows[11]:

1. Is the incentive likely to be politically/publicly acceptable?
2. Will it drive uptake in owner occupied housing sector?
3. Will it drive uptake in private rented housing sector (PRS)?
4. Will it drive uptake in the social housing sector?
5. Does it have the potential to positively influence the value of efficient homes?
6. Can it reasonably be designed cost neutral to Government?
7. Does it minimise adverse distributional effects?
8. Will it provide confidence in the retrofit market for the industry and investors?
9. Has it got relevant past or international precedents?
10. Will it have positive effects on fuel poverty?
11. Could it be designed to have low administrative burden?
12. Does it provide long-term incentives for improving energy efficiency/saving?
13. Will it encourage whole house retrofit?
14. Is it likely to be compatible with other policies/mechanisms?
15. Does it incentive retrofit outside the Green Deal?

[11] For further descriptions of these criteria see Annex B

4. EXPLORING THE LONG LIST OF OPTIONS

4.1 Cash-back and grants

The easiest place to start when considering possible incentive measures is with grant payments, due to the fact that this model (in the form of a "cash-back" scheme), is already being used to support the early years of the Green Deal.

The use of grants and rebate schemes has a long pedigree in policy-making as a means of driving demand for particular products. During the early part of the current economic downturn, a number of countries – including the UK, the US and a number of other EU states – incentivised the purchase of new cars with discounts and rebates. While a few of these schemes were focussed solely on stimulating economic activity, the majority were conditional on the customer purchasing a fuel efficient vehicle – achieving considerable success. In the Netherlands, for example, this increased the market share of low emissions vehicles from 9.8 per cent to 19.3 per cent in a single year[12].

Around the same time, the UK's boiler scrappage scheme was used to encourage the installation of new, A-rated boilers. It offered vouchers with a value of £400 per household to be used as part-payment towards the up-front cost. In many cases the value of the voucher was matched by installers to give a combined discount of up to £800. Take-up of the scheme was significant, with a total of 125,000 vouchers given out (of which about 95 per cent were cashed in).

Other examples in the field of domestic retrofit include the "Retrofit for the Future" programme, through which some social housing residents were given a "disruption payment" or in-kind benefits (such as white goods and holidays) to encourage take up of the scheme. Also, in the years preceding the introduction of the Feed-in-Tariff, many local councils offered grants to those installing renewable energy technologies[13].

More recently, towards the end of the CERT scheme, households have been offered cash-back in reward for the take-up of basic energy efficiency measures such as loft and cavity insulation. These inducements helped a number of energy companies accelerate the take-up of measures as the scheme's compliance deadline approached.

How could a cash-back scheme create demand for energy efficiency measures?

There are a variety of ways in which grants or cash-back could be applied to the take-up of household energy efficiency measures. However, for obvious reasons it makes sense to focus on the design of the cash-back scheme currently being used as the mechanism for dispersing the £125m allocated to support the early years of Green Deal.

Under the current regime, customers are eligible for cash-back if they use the Green Deal architecture[14] to install qualifying energy-saving measures. Each Green Deal measure is associated with a cash-back sum, with packages comprised of multiple measures attracting potentially significant amounts (see Table 1). One key attraction of the scheme's integration

[12] King Review of Low carbon cars Part 2 recommendations for action, 2008.
[13] A trend that has continued with central Government's Renewable Heat Premium Payment scheme.
[14] Customers are required to have a Green Deal Assessment, and to have the measures installed by accredited Installers under the supervision of a Green Deal Provider, but are not required to use the Green Deal finance mechanism if they so wish.

with the Green Deal is that it allows for easy verification that measures have been installed (via the Green Deal Provider).

However, while the scheme is designed specifically to drive the Green Deal, there is no particular reason why it could not be adjusted to incentivise the uptake of retrofit outside the confines of the scheme. The key to this would be to find a similarly straightforward verification process, for example Energy Performance Certificates. Under such a scheme, payments could instead be made according to the improvement in building performance proven by "before and after" EPCs. This would allow for a greater degree of flexibility as to how savings were made, while still supporting the Green Deal for those wishing to use it. It would, however, be likely to require appropriate access to be given (to the scheme administrators) to the Landmark EPC register.

Table 1: Cash-back amounts offered under the current scheme

Measure	Cash-back
Loft insulation (inc. top up)	£100
Cavity Wall Insulation	£250
Solid Wall Insulation	£650
Floor insulation	£150
Hot water cylinder insulation (top up)	£10
Draught proofing	£50
Heating controls (roomstat and/or programmer & time/temperature zone controls)**	£70
Condensing oil boiler from non-condensing oil heating or other	£310
Flue Gas heat recovery (condensing combi boiler) only alongside replacement boiler	£90
New or replacement storage heaters	£150
Double/Triple Glazing (old single to A)	£20 per m^2

What are the major pros and cons of cash-back and grant schemes?

In several studies, cash-back incentives are widely considered to have the potential to be a powerful driver for action. Key to this is the fact that they can easily be designed to offer a clear, tangible, and immediate reward to customers:

> *"Humans perceive 'cash-back' as having a higher value even if the value of the 'savings' and 'cash-back' are identical."*
>
> Field and Tunna, 2009[15]

This is supported by research from the Great British Refurb Campaign (2010) which found a grant/cash-back scheme to be the most popular potential option for incentivising the Green

[15] Field and Tunna *Sustainability - Driving Behavioural Change: is it as easy as we believe?* (2007)

Deal[16]. Importantly for Government, as well as being appealing to the public, such schemes also tend to be relatively cheap and simple to administer.

There are, however, some important disadvantages. Perhaps most important is the fact that these schemes represent an on-going and significant cost to the Government. The more successful the scheme is, the greater the burden it places on the Treasury (notwithstanding any increases in tax revenues etc.). One answer to this, of course, is to do as the Government has currently done and make the incentive time-limited. The danger then is that this will lead to the creation of a "bubble" of demand that may collapse when it is withdrawn.

It is possible to counter the negative effects on industry by gradually reducing the value of the payments, but the consequence of this approach over time would still be a declining impact on demand for measures. Another drawback of this type of incentive is that, by virtue of its immediacy, it does not tend to reward on-going changes to behaviour or attitudes. Similarly, grants and cash-back schemes do not, in themselves, have the effect of placing a value on energy efficient homes.

[16] Compared to stamp duty and council tax. *http://www.greatbritishrefurb.co.uk/images/pdfs/gbr-greendealmarketresearch.pdf*

4.2 Variable Council Tax and rebates

Tax-based incentives have long been used to drive behaviour and purchasing decisions. In relation to domestic energy efficiency, a commonly cited candidate for driving retrofit is to make use of the Council Tax system. In the most extensive study to date[17], a Council Tax discount was identified as being the most promising fiscal incentive to explore, in large part due to its broad impact in the market. Further papers from the Energy Saving Trust have also proposed Council Tax as a potentially significant driver[18].

Recognising this appeal, a number of councils across the UK have put theory into practice and have offered Council Tax rebate schemes[19] as part of their energy efficiency programmes. A few of these have been run in partnership with the private sector, most notably those supported by British Gas. The Energy Saving Trust predicted in 2005 that if, at a minimum, the success of the British Gas scheme were replicated in all 408 Energy Conservation Authorities across Britain, then 159,120 households per year would benefit, with carbon savings of 0.11m tCO_2 per year in 2010, and lifetime consumer energy bill savings of £1.2bn.

How could a Council Tax-based scheme create demand for energy efficiency measures?

There are two key forms that a council tax-based incentive could take:

(a) A Council Tax rebate/discount for households that install energy efficiency measures

Or

(b) Variable rates of Council Tax which rewarded/penalised more/less efficient homes.

The first of these options, as described above, has tended to be the focus of discussion, research and trials up to this point. In this form, it essentially becomes a locally administered form of cash-back scheme, albeit aided by the *perception* of a tax-saving. In order to qualify, households would simply need to demonstrate that they had installed qualifying measures (for example by providing receipts or the sign-off document from their Green Deal Plan), or had achieved a given level of SAP[20] improvement ("before and after" EPCs), in return for which they would receive the rebate. A more generous level of rebate could be offered to correspond to greater improvements or more expensive measures.

Under the second option, individual councils would need to use appropriate local property data to establish a baseline level of energy efficiency. Properties above a given point (i.e. those that are more energy efficient) could be given a percentage discount on their Council Tax bill, while properties below the baseline would have a percentage added. Households making energy efficiency improvements would simply supply evidence (again, potentially in the form of an updated EPC) to demonstrate the change, and to apply for a reduction in their Council Tax going forward.

Done in this way, the incentive could be constructed to be made revenue neutral (with total penalties matching total discounts), with the potential for councils to revise the baseline over

[17] Dresner and Ekins, *Whole House Fiscal Measures to Encourage Consumers to Improve the Energy Efficiency of their Homes* (2004),
[18] *How can whole house fiscal measures encourage consumers to improve the energy efficiency of their homes?* (2005); *Changing Climate, Changing Behaviour: Delivering household energy saving through fiscal incentives* (2005)
[19] Well-known examples include the schemes in Braintree and South Cambridgeshire, as well as the Energy Saving Trust trial with Fenland Council.
[20] Standard Assessment Procedure.

time as the average standard of the housing stock improved. Should it prove politically unpalatable for councils to penalise those properties that were below the baseline, it would theoretically be possible to make the incentive "one-sided" (i.e. – only offering discounts to those above the chosen standard), though not without placing a potentially significant burden on council budgets.

Box 2: A two stage approach to Council Tax Incentives

ACE's working paper of October 2012 explored the use of variable Council Tax rates in some detail. It proposes a two-stage process, with a lead-in period based on rebates eventually transitioning to the use of variable rates. In Stage One, it proposes that all households would need to get an EPC (ideally for free), with the data being shared with the council. Households improving their properties during this phase would be offered a one-off council tax rebate. In Stage Two, councils would then adopt new Council Tax bandings (based on a combination of EPC ratings and existing bandings). Householders making improvements after this point would submit their updated EPC information to the council in order to have their Council Tax band adjusted.

According to ACE, using a two-stage process would be beneficial for a number of reasons: It would give households time to respond to the prospect of future Council Tax changes; The one-off rebate during Stage One offers an incentive to improve the property even if they don't think they'll still be living in it in Stage Two, and for others to improve their properties sooner rather than later.

What are the major pros and cons of a Council Tax-based incentive?

There are a number of important advantages to using Council Tax to drive energy efficiency, which have been well reported in previous studies. One of the most significant is the fact that Council Tax is paid regularly and is applied to a large proportion of the housing stock – meaning that it has the *potential* to have a faster and wider influence than most other approaches. Consumer perceptions also work in its favour, with Council Tax generally considered to be one of the most unpopular taxes, and one that people would be pleased to reduce or avoid[21]. However, it should be noted that its wide impact also brings with it the need for all affected properties to have EPCs in place in order to calculate the baseline and the penalties/discounts. Not only could this be administratively complicated but also add to the costs of operating the scheme.

Experience from previous trials has shown that Council Tax rebate schemes can be relatively cheap and easy to administer. But as a rebate system could not be made cost neutral, this would have the major disadvantage of placing an on-going financial burden on councils – something that would be particularly problematic in the current budgetary climate. A system based on variable tax rates, conversely, would require a greater level of administration, but (if implemented as described above) could be made to be revenue neutral. In using such an approach, however, significant effort would be required to ensure that vulnerable households were protected against potential negative impacts, either by provisions within the scheme or by complementary policies.

The major advantage of variable Council Tax rates over rebates is that the former offers an on-going advantage benefit to living in an energy efficient home. It is reasonable to assume that, over time, this would feed through to property prices.

[21] This was reported as a key factor in the success of the British Gas Council Tax rebate trial.

4.3 Variable stamp duty

Another widely discussed candidate for driving home retrofit is to build an incentive around the Stamp Duty Land Tax (SDLT) system. This option has been most closely examined in papers by Dresner and Ekins (2005)[22], and ACE (Oct 2011)[23].

Unlike for Council Tax, there are no direct precedents in the UK for the use of land taxes to drive retrofit. However, SDLT has been linked to domestic energy efficiency with reductions attached to zero carbon new homes.

In addition, tax-based energy efficiency measures have been used in other areas of the economy, for example in the introduction of graduated Vehicle Excise Duty (VED) and reforms to company car tax regulations. Although it is difficult to disaggregate the extent of the separate impacts of increased fuel prices and non-fuel taxes as motivators, an HMRC assessment in 2006 calculated that average emissions fell by 15g/km (about 8 per cent)[24] by 2004 due to the company car tax reform introduced in 2002. The transformational effect of these measures on the market can also be seen in the increased prominence of vehicles' fuel consumption performance in the advertising campaigns of car-makers.

The appeal of using land taxes tax system is starting to lead to serious discussion of how it could be done in practice. For example, the Scottish Executive recently consulted on how their proposed Scottish Land and Buildings Transaction Tax could be used to incentivise energy efficiency. At the time of writing, resulting proposals are under consideration by the administration.

How could a Stamp Duty-based scheme create demand for energy efficiency measures?

Similar to the Council Tax-based incentive, it is envisaged that SDLT could be varied according to the energy efficiency of the property. For example, an energy-adjusted SDLT could be reduced by a small percentage for every SAP point a property achieved above a Treasury announced standard, with an *additional* percentage paid for those properties achieving scores *below* this level. This calculation could be performed, as it is currently, by the purchaser's solicitor, with the payment then made to the Treasury.

In order to drive action amongst the new owners of the home (with renovations undertaken in a newly purchased home seen as a critical "trigger point"[25] for retrofit), it would be sensible for the scheme to also allow for rebates to be made to any household that undertook energy efficiency improvements to the property within a set period after moving in. Again, this could be demonstrated through submitting an updated EPC. As rebates would negatively impact tax receipts, the cost would need to be factored into the overall variable rate calculation.

Like a variable Council Tax regime, the possibility of having discounts for better-than-average properties alongside a premium for those performing less well would allow the system to be revenue neutral to Treasury. If constructed in this way, it appears to be straightforward to re-calculate the baseline every year to reflect the improving standard of the housing stock over time – providing on-going improvement and offering an ever-increasing incentive to improve the

[22] *Whole House Fiscal Measures to Encourage Consumers to Improve the Energy Efficiency of their Homes*, 2004
[23] *Fiscal Incentives - Encouraging Retrofit* (Oct 2011)
[24] Report on the evaluation of the Company Car Tax Reform: stage 2, HMRC, 22 March 2006
[25] The purchase of a home is considered to be one of the key trigger points at which homeowners are most likely to make improvements to their home, including to its energy efficiency.

worst performing homes (as well as encouraging the development of high performance new homes).

A simpler system could use A-G EPC bands rather than SAP scores, though this has the potential to introduce distortions at the boundaries between bands[26]. Another possible variation on the theme would be to make the discount a one-off, and simply reward new owners with a Stamp Duty rebate for any improvements that they make within the first 12 months of ownership (i.e. with no on-going discount). However, this would limit the impact such an incentive might have on the housing market, and remove the possibility of achieving revenue neutrality.

Box 3: Variable Stamp Duty - Worked Examples

Property buyer A buys a property for £200,000. Normally the stamp duty would be £2,000, but the property has an SAP score of 65 against the centrally set standard of 50. As such the buyer receives a discount of £150 (15 x 0.5% x £2,000), leaving a final SDLT bill of £1,850.

Property buyer B buys a property for £300,000 with a SAP score of 45, paying stamp duty of £9,225 (£9,000 plus a premium of 5 x 0.5% x 9,000). However, in the six months after the purchase, they undertake improvements that take it up to a score of 70. They obtain a new EPC and apply for a rebate of £1,125.

What are the major pros and cons of a Stamp Duty-based incentive?

There are some very strong arguments for the use of an SDLT-based incentive for driving retrofit. As with Council Tax it is paid very begrudgingly - at a time when expenses are considerable - and is therefore something that people will naturally seek to avoid or reduce. While the size of the discounts are small relative to overall property transaction costs, the example of vehicle excise duty goes to show that taxes do not necessarily need to change by much in order to generate very significant changes in a market[27]. Over time, it is also reasonable to assume that a Stamp Duty based incentive would start to influence property prices and place a premium on energy efficient homes.

Another potentially helpful feature for this option is that Stamp Duty, in contrast to Council Tax, would not immediately require all UK properties to have EPCs available. Only those on the market would need them – something that is already required by law. As discussed above, in impacting at point of sale, an SDLT-based incentive would also benefit from applying at a key trigger point for retrofit.

The potential to make the incentive revenue neutral is also attractive. Although it might still face criticism that it would have little impact on those buying lower value properties (some of which would pay very little, if any, SDLT), it can be countered that this could serve as a reasonable proxy of ability of those households to pay for retrofit. Once functioning effectively, the Green Deal and ECO would also help to provide a means through which improvements could be made at little or no up-front cost – mitigating a barrier faced by poorer households wishing to take advantage of the scheme.

[26] For example, properties near the top of a band could receive a discount or rebate for making only minor improvements, while other properties may undertake significant works and yet remain in the same band.
[27] Particularly where the effect would be magnified by higher energy bills that ultimately the owner would pay on an inefficient property.

The major criticism of using a SDLT is that it has more limited reach in the market. While this does mean that it may take longer for such an incentive to drive the retrofit of every property, it would also ensure that any negative impact on vulnerable households would be more easily managed. It would also fail to have a significant impact on privately rented properties, and the social housing sector although there are other policies that drive action in these sectors[28].

Perhaps a more important barrier is the fact that SDLT is seen as a hugely lucrative and cost-effective tax by Government, and one which they may be reluctant to change if at all possible. However, it should be pointed out that, by annually adjusting the baseline, HMRC could avoid the steady reduction in revenue that has been seen as a result of the changes to vehicle excise duty[29].

[28] E.g. Minimum energy performance standards for the private rented sector which are due to come into force in 2018.
[29] A similar proposal has been made for setting a setting a CO_2 pivot point, recalibrated annually, for VED to ensure the revenue take remains constant as the average emissions fall (see Cutting emissions and making car cheaper to run. Centre:Forum Tim Leunig 2012)

4.4 Salary Sacrifice

A slightly more innovative fiscal incentive would be to make use of the income tax system to drive the take up of energy efficiency measures via a salary sacrifice scheme. While using an income- rather than property-based tax may at first seem incongruous and politically sensitive, such a suggestion should be seen in the light of other salary-sacrifice based schemes – a number of which have achieved significant success in driving purchasing decisions and supporting policy objectives.

Two of the best known examples of such scheme are Childcare Vouchers and the Cycle to Work scheme, both of which have seen significant take-up. The latter, now in its 14th year, encourages employers to loan bicycles and cycling safety equipment to employees as a tax-free benefit. To date over 400,000 people have taken advantage of the scheme, which involves over 2,220 bike retailers and 15,000 employers.

According to the Cycle to Work Alliance[30], the scheme has achieved notable success, with 61 per cent of people reporting that they did not cycle to work before they signed up to the scheme. The financial benefits provided by the scheme were also reported as being central to its success in delivering behavioural change, with 73 per cent of respondents declaring that the savings they were offered through the scheme were the most important factor in their decision to take part. Amongst employers, 89 per cent believed that the scheme has been an important way to improve employee engagement, and 90 per cent thought that the scheme is an important way to reduce their carbon footprint.

A more direct precedent in the energy efficiency policy arena is the Landlord's Energy Saving Allowance (LESA). LESA allows residential landlords to claim tax relief on the installation of certain energy saving measures – up to a maximum of £1,500 per year. However, it is estimated to have been taken up by less than 1 per year of landlords.

How could a salary sacrifice scheme create demand for energy efficiency measures?

One of the most straightforward ways to approach this would be to offer a scheme under which employees of a company could purchase vouchers which they could then use to pay for the installation of packages of approved retrofit measures. As with other schemes, repayment for the vouchers would then be taken from the employee's pre-tax income. This would offer an effective discount on retrofit works of over 20 per cent for basic rate taxpayers, and 40 per cent or more for those in higher rate brackets.

A salary sacrifice scheme could potentially integrate with the Green Deal process, while providing an alternative means of payment. In principle, it may be possible for Green Deal Providers to offer customers the option of making repayments via their salary instead of via their energy bills[31]. In doing so, it might be expected that financiers could also offer lower rates of interest - reflecting the reduced credit risk associated with salary-based repayments. This could, in turn, increase the level of work that could be undertaken while still satisfying the Green Deal's Golden Rule[32].

[30] Cycle to Work Alliance *Behavioural Impact Analysis* (Feb 2011)
http://www.cycletoworkalliance.org.uk/images/BehaviourImpactAnalysisFeb2011.pdf
[31] Although in doing so, they may lose the option to pass on the repayments to future occupiers.
[32] The Green Deal's "Golden Rule" states that repayments can be no more than the expected savings over a given period.

What are the major pros and cons of salary sacrifice-based incentive?

Precedents suggest that, if designed well, a salary sacrifice scheme *could* be a significant driver of demand for energy efficiency measures. The effective level of discount it offers is considerable and could make retrofit much more appealing and affordable, particularly given the potential to make repayments over an extended period of time.

In addition, this approach would have low set-up and infrastructure costs by using employers as an immediate delivery channel. It would also be able to make use of employers' influence over, and engagement with, their staff, as well as helping organisations meet their own social and environmental goals.

However, it also faces some considerable limitations. It is unclear how many employers would be inclined to offer the scheme to their employees, and within those how many of their staff would take it up. Despite some notable successes, not all tax beneficial schemes have seen a great response. Of particular concern would be the disproportionate demands it could place on smaller businesses, and the general lack of awareness that often exists amongst smaller businesses about such opportunities. It is likely that a scheme would be predominantly used by larger, better resourced companies who might still struggle to offer vouchers at a value that would pay for any significant proportion of a package of retrofit measures. As such, the scheme may only end up applying to a relatively small number of households, or to relatively basic measures.

Of course, should a salary sacrifice scheme prove successful, the cost to the treasury could be large – particularly if the value of the vouchers/relief per taxpayer was high. The Grass Roots Group estimated that the tax forgone, based on 650,000 users per year and a retrofit package of only £300, was £182.52m. From an equity perspective, such a system may also have the disadvantage of offering the biggest benefits to those in higher income brackets, although this could be offset by capping benefits in a similar way to Childcare Vouchers[33].

[33] From 2013, Childcare Vouchers for all users are capped at the 20% level of basic rate tax.

4.5 Reduced VAT for energy efficiency

A final tax-based incentive comes in the form of an extension of reduced rates of Value Added Tax (VAT). Reduced (or zero) rates of VAT are often applied to goods and services that are considered to be essential or of social benefit. This includes most food and drink, medical services and energy supplies. With the standard rate of VAT currently at 20 per cent, its effect on the final price of goods and services paid by households is significant, with a drop from 20 per cent to 5 per cent equating to a 12.5 per cent discount overall (assuming that the supplier passes on the full saving).

In construction and retrofit, VAT of 5 per cent already applies to, amongst other things, commercial to residential conversion work and renovations to residential properties which have been empty for more than two years. It is also currently applied to the installation[34] of certain energy-saving (and generating measures), from insulation, draught-proofing and heating controls to air source heat pumps (ASHPs) and solar photo-voltaic panels[35]. A reduced rate also applies to the installation of certain heating appliances under grant-funded schemes aimed at improving the homes of "qualifying people"[36].

A key study in this area, by the Cut the VAT Coalition (2011), has suggested that the effect of reducing VAT on the labour element of *all* domestic repair and maintenance from 20 per cent to 5 per cent could stimulate an additional £1.45 billion of spending on energy efficiency measures by 2020, saving up to 393,600 tonnes of CO_2 over the period to 2020. They reported that this would result from over 163,000 extra homes installing double glazing, insulation and energy efficient boilers over the period.

How could a reduced rate of VAT create demand for energy efficiency measures?

Normally, works which are carried out to an individual's private residence are subject to VAT at 20 per cent. However, as noted above, two VAT reliefs currently overlap with the Green Deal: the installation of certain energy saving (and generating) measures and the installation of certain heating appliances to qualifying people. In order to stimulate demand for retrofit Government could extend the 5 per cent VAT rate to cover a wider range of measures, potentially covering all Green Deal eligible measures. This could be achieved by extending both the list of energy saving measures under Group 2 of Schedule 7A (e.g. to include double glazing) and the definition of ''Qualifying Persons'' under Group 3 of Schedule 7A[37] (e.g. to include the installation of boilers to all households).

What are the major pros and cons of a VAT-based incentive?

From the perspective of the Green Deal, any extension in the lower rate of VAT could have helpful effects in ensuring that a greater range of measures or packages meet the Golden Rule, or limiting the amount of up-front contribution that would need to be made by customers. While the precise impact this may have on demand is unpredictable, it would certainly be positive and would help add more weight to the scheme's potential to offer retrofit at "no up-front cost". Of

[34] The use of the word installation is important, since in order to qualify for the lower rate measures must be installed. If someone sells energy-saving materials without installing them, then they are standard-rated (20%).
[35] Those found in Group 2 of Schedule 7A of the Value Added Tax Act 1994
[36] Defined as someone aged 60 or over, or receives one or more of the following benefits: child tax credit (other than the family element),council tax benefit, disability living allowance, disablement pension, housing benefit, income-based job seeker's allowance, income support, war disablement pension, or working tax credit.
[37] Group 3 which covers grant funded installation of heating equipment or security goods or connection of gas supply. This would mean that boilers and heating appliances would fall within the scope of the 5% rate.

course, the positive impact would extend beyond the Green Deal, adding to the appeal and cost-effectiveness of investing in retrofit.

Political arguments in favour of a reduced rate for energy efficiency measures have traditionally centred on the iniquity of taxing energy saving at a higher rate than energy consumption. The appeal of this argument remains strong, particularly as energy prices are politically sensitive and therefore it is unlikely that the VAT rate on energy would be increased.

However, there is a very major barrier to this incentive being put in place, in the form of the current dispute between the European Commission and the HMRC. In the summer of 2012, the Government received reasoned opinion from the Commission claiming that the current reduced rate on the installation of energy savings materials were in breach of the VAT Directive. Taken alongside the direct impact that a further reduction would have on VAT receipts, this on-going dispute makes it seem unlikely that – for the time-being at least – any further changes to VAT will be made to support energy efficiency.

Furthermore, while there is certainly likely to be a demand boost linked to a wider application of the reduced rate of VAT for retrofit, it may reasonably be suggested that it is an incentive that would encourage those already considering undertaking works to go ahead, rather than attracting a large number of new people to the market. As such, it is an incentive that, if applied, would work best in conjunction with another demand-boosting measure. Unlike Council Tax and Stamp Duty, it would also lack the potential to directly impact the market for energy efficient properties.

4.6 Minimum standards

Beyond fiscal incentives there is also the potential to make use of direct regulation to drive the retrofit of the UK's homes. Minimum standards are widely used both in the UK and beyond to regulate the market for goods by outlawing negative characteristics. In recent times, this practice has been particularly common in relation to energy performance, where mandatory Minimum Energy Performance Standards (MEPs) have been applied to products ranging from fridges and washing machines through to light bulbs, air conditioning units and solar water heating. These MEPS are not usually fixed, and are revised over time to reflect improvements in technology and to drive on-going innovation.

From the perspective of homes, Building Regulations have long been in place to set standards for both new properties and the renovation of existing buildings, including minimum standards for energy efficiency. This kind of regulation has recently been taken a step further in the UK, where the Energy Act (2011) put in place the legal basis for the imposition of minimum energy efficiency standards restricting the rental of both private domestic and non-domestic properties. While it is still unclear precisely how these standards will be implemented in practice, they are expected to make it illegal to rent properties with an EPC rating of F or G after 2018. In Scotland, the Government has recently consulted on proposals for creating a new energy efficiency standard for social housing (EESSH).

How could minimum standards be used to create demand for energy efficiency measures?

UK-GBC would like to see Government put in place legislation which extends the minimum standards for the private rented properties to sales in the owner occupied sector. Over time, these new standards could be progressively and predictably increased in line with the improving overall state of UK properties, improvements to technology, and the Government's energy and climate objectives.

If necessary, in order to soften the impact, it would be possible to introduce exceptions related to the cost-effectiveness of improving the properties, and to protect the most vulnerable in society. This is currently the case for the private rented sector, it is expected that the former will be achieved by allowing properties to be rented if all Green Deal-able measures have been installed.

What are the major pros and cons of imposing a minimum standard for the owner-occupied sector?

The obvious advantage of regulation is the strength of the impact it would have on the market. If minimum standards were applied to all properties, it would ensure that a significant level of retrofit was undertaken in order to address the worst performing properties. If it was only applied to sales rather than to all properties, it would be relatively gradual and, like a Stamp Duty-based incentive, would apply around a critical point at which home improvements are made[38]. It would also be likely to drive activity amongst those who had no plans to move in the near future, yet who wished to maintain the value of their properties.

The degree to which such regulations would drive significant change would hinge to a great extent on what exemptions (or other "get-outs") were included as part of the legislation. For example, some properties might have relatively few Green Deal-able measures applicable

[38] As many households undertake improvements to their properties prior to marketing them in order to make them more attractive to potential buyers.

despite being relatively inefficient. As mentioned earlier, there is also the advantage of being able to ramp-up minimum standards over time to reflect new conditions in the market.

One technical concern – which also applies to some of the other incentives too - is around the use EPCs as the tool for measuring energy efficiency. EPCs are not always consistent in their production, and are not enormously sophisticated. While this may matter relatively little if they are used to adjust tax rates, it would become much more important if they limited homeowners' ability to sell their properties.

However, the biggest barrier to the use of minimum standards in the owner-occupied sector is political. It seems incredibly unlikely that any Government would be keen to take on the public and the press in order to develop legislation of this kind, particularly given how many properties it would be likely to affect. It is perhaps more conceivable that they could be applied to the social housing sector, where there is already a high level of regulation as to the standard of homes that can be offered to tenants.

However, the same would surely have been said about standards for the private rented sector until only very recently – so it should not necessarily be assumed that this will never happen, especially given the potential for the Green Deal (and ECO) to allow homeowners to undertake improvements at little or no up-front cost.

4.7 Low interest loans

Access to finance is consistently cited as one of the major barriers to the retrofit of domestic properties. As such, policy-makers have put considerable effort into developing mechanisms in this area. Chief amongst these is the well-known German "Kreditanstalt für Wiederaufbau" bank (KfW).

The success of the KfW is consistently put forward as an example to other countries wishing to expand retrofit activity. Between 2006 and 2009 alone, the Bank's low interest energy efficiency loans (see Box 4) are estimated[39] to have saved €1 billion per year in heating costs, and to have reduced CO_2 emissions by as nearly 4m tCO_2/year. Recognising this success, other, similar schemes have also been trialled in various countries. The 'Thermal Modernisation Fund' was highly successful in Poland only after the interest rates were reduced and the administration process was significantly improved. In France, interest free loans have been offered in certain regions, co-financed by Local Authorities and banks.

From a Green Deal perspective, interest rates are likely to have a big impact on the scheme. Not only do they necessarily provide a limit to the amount of finance (and, therefore, the range of measures) that can be offered while still meeting the Golden Rule, but they also have an important psychological effect on prospective customers. As reported above, research by the Great British Refurb Campaign (2010) found that only 7 per cent of homeowners would be interested in taking up the Green Deal if the interest rate was greater than 6 per cent[40]. As such, it might be expected that finding ways to reduce interest rates will be critical to the scheme's success.

Box 4: The German KfW experience

In Germany, the KfW offers Government subsidised loans for single measures or entire retrofits (up to €75,000) at interest rates as low as 1%. The scheme was started in 2001, since which time 2.1million housing units having received finance[41].

The evaluation of KfW programmes for the funding years 2005 to 2009 have shown very positive results, not only in terms of investment, energy savings, CO_2 reduction and employment, but also a positive net impact on public budgets[42]. Taken together, the additional revenue and reduced costs of public expenditure (on unemployment and social benefits) add up to as much as EUR 7.2 billion. It is estimated that the funding has led to the creation or safeguarding of 350,000 jobs in 2010[43].

[39] *The KfW experience in the reduction of energy use in and CO_2 emissions from buildings: operation, impacts and lessons for the UK* UCL Energy Institute, University College London and Communities, and London School of Economics, November 2011

[40] Currently, interest rates within the scheme are expected to be in excess of 7.5%. At this level, Green Deal customers would pay back £22,000 on a £10,000 loan if repaid over 25 years.

[41] Renovate Europe conference presentation, March 2012.

[42] Impact On Public Budgets Of Kfw Promotional Programmes In The Field Of „Energy-Efficient Building And Rehabilitation", Kfw Bankengruppe, Oct 2011.

[43] KfW press release, 27th Oct 2011.

How could low interest loans be used to create demand for energy efficiency measures?

There are a number of different routes which could be used to deliver low-cost finance for retrofit. Focussing on the Green Deal, one option would be for Government to underwrite Green Deal finance. By providing this extra element of security to Green Deal Plans, the reduced risk may make it possible to offer a fixed rate below the current 6.9 per cent available through the Green Deal Finance Company.

To bring down rates yet further, Government could also take a similar approach to the KfW and directly subsidise the interest rates offered by Green Deal Providers and the Green Deal Finance Company. The latter has been shown to be highly cost effective in Germany – creating an increase in GDP which far outweighs the cost of the subsidy.

Of course, the provision of subsidised loans would not have to be limited to the Green Deal. While the scheme offers a helpful infrastructure through which cheap finance can be channelled, there is no reason why loans could not be extended to allow households to undertake retrofit work independently. In this instance, households would simply need to provide proof that works had been undertaken in order to qualify for the reduced rate. In either case – whether work was delivered independently or through the Green Deal – it would potentially be helpful to offer lower rates for deeper retrofits as a means of encouraging greater ambition.

A final – and possibly complementary – option for Government would be to work directly with banks and other mortgage lenders to expand the provision of "green" mortgages. Although not currently underwritten by Government, a number of lenders[44] currently offer loans and mortgages specifically targeted at supporting retrofit activities by homeowners. In a number of cases, interest rates are tiered according to the level of energy efficiency improvement achieved in the borrower's property. Driving further activity in this area could simply require Government encouragement, particularly given its current direct involvement in the sector, and could potentially be achieved without Government subsidy should banks prove willing.

What are the major pros and cons of this approach to incentivising retrofit?

As stated previously, access to capital is considered to be one of the major barriers to the take-up of energy efficiency measures by households. Creating a scheme that offered low-cost and easily accessible finance could therefore offer a considerable boost to the market. From a Green Deal perspective, steps to bring down the interest rate would potentially make the scheme more attractive to households, as well as significantly increasing the size of packages that would meet the scheme's Golden Rule. The establishment of the Green Investment Bank also offers an ideal vehicle through which this kind of scheme could be delivered by offering cheap finance directly to householders.

However, a number of commentators have suggested that offering low cost finance will play a greater role in releasing existing demand rather than creating a great deal of new demand. As stated by Rezessy and Paolo Bertoldi (2010) *"financing is not a panacea in itself and further enabling policies are needed"*[45] as part of a package of solutions. The Green Deal goes some of the way in this respect - by providing a delivery framework through which the finance can be put to work - but alone it may not provide a strong motivator for action even with low interest rates in place.

[44] For example, the Ecology Building Society

[45] "*Financing Energy Efficiency: Forging the Link Between Financing and Project Implementation*" report prepared by the Joint Research Centre of the European Commission, Silvia Rezessy and Paolo Bertoldi, May 2010

From a Government revenue perspective, it is clear that the direct cost of subsidising loans could be significant. In Germany, the KfW programme was supported with federal funds of €1.4 a year between 2008 and 2011[46]. While it has been shown that such a scheme is likely to boost GDP over time, there may be reluctance from Government to commit to the short term cost of the subsidy in today's economic climate.

From an equity point of view, there is generally considered to be a resistance amongst poorer households to taking out large loans, even where interest rates are low and the final outcome may be cheaper bills. Under the Green Deal, the fact that the charge is attached to the property rather than the person will help in this respect, but it is still likely that any other loan scheme would be dominated by middle- and high-income households.

[46] *The KfW experience in the reduction of energy use and CO2 emissions from buildings* Schroder and Ekins et al (Nov 2011)

4.8 Energy efficiency Feed-in-Tariff (FiT)

One of the more recent policy developments related to the incentivisation of retrofit measures has been the introduction of Feed-in-Tariffs and other similar schemes. These have been used extensively, particularly in the field of small scale renewable generation, and have been highly successful in driving take-up.

In the UK, the renewable energy Feed-in Tariff provides an on-going payment to those who install a range of qualifying low carbon energy generation measures, including solar photovoltaic (PV) panels and wind turbines. Households installing these measures receive a payment for each unit of electricity that they generate, and a further amount for any "unused" electricity that they export to the grid. Introduced in 2010 and underpinned by the Energy Act 2008, the UK FiT led to an explosion in the rate of installation of micro-renewables, particularly PV panels. In fact, take-up was so high that the Government has since had to rapidly reduce the value of the tariff and introduce an on-going cost control regime that will further cut the payments over time.

The success of the UK FiT - which mirrors the impact of similar regimes internationally, including in Germany and Spain – has encouraged the introduction of a similar scheme for the generation of renewable heat via the Renewable Heat Incentive. Reinforced by growing demands for policy in this area, the positive experience with FiTs also encouraged Government to consult on how some form of payment scheme might be implemented to incentivise domestic and non-domestic electricity demand reductions as part of its Electricity Market Reform programme.

Bertoldi et al (2009) highlight a number of international examples of where payments were made to households reducing their energy usage over time. These include a scheme in Ontario that successfully offered rebates to those achieving year on year reductions in electricity use of 10 per cent or more, and a pilot project in Norway which rewarded households with payments for every kWh they consumed below a pre-agreed level.

How could a Feed-in-Tariff be used to create demand for energy efficiency measures?

Recent proposals by the Green Alliance and WWF have focussed on electricity demand reduction and using payments to create demand for energy (electricity) efficient products[47]. For administrative simplicity, it has been suggested that such an incentive would need to be measures based, providing a payment to households for the replacement of existing appliances with more efficient models. These payments – which it is estimated would need to be three to four times the value of the electricity savings alone in order to drive demand - would be "deemed" and paid either as one-off or spread over an extended period of time. Reflecting the potential cost to Government of working at an individual household level, it has also been proposed that such a scheme might be operated via third-party aggregators (see Box 5).

While these proposals have so far been focused on electricity, there seems to be no reason why a payment system couldn't be used to incentivise retrofit, and in fact the fixed (fabric) nature of energy saving measures such as insulation, windows and boilers may avoid some of the risks associated with a scheme focused solely on highly portable appliances. In order to be distinct from a simple system of grants/cash-back (as outlined above), payments would be spread over the lifetime of the measure, or the package of measures. This information could be easily taken from a Green Deal plan and/or from a pre- and post-installation EPC.

[47] *Creating a market for electricity savings*, Green Alliance and WWF (Oct 2012)

Rather than being measures-based, an alternative would be to reward people based on reductions in total billed energy use against a given baseline, or some other measure of energy use. Taking this approach has the advantage of rewarding actual energy savings rather than simply the installation of measures (i.e. avoids problems associated with the rebound effect). However, it also brings with it a level of complexity associated with generating meaningful baselines and measuring genuine savings achieved[48]. As a compromise, it may be possible to build a system which combines a measures-based payment with an additional discount penalty based on a simple measure of actual reductions achieved[49].

What are the major pros and cons of an energy efficiency Feed-in-Tariff?

Experience has shown that Feed-in-Tariffs can be a very effective incentive for retrofit, at least in the renewables market. Not only do they have the potential to drive demand for measures, but they also – should a means be found to reward actual rather than deemed (calculated) energy savings - have the potential to promote on-going energy saving. In addition, if payments were associated with the property rather than the original customer, they may provide some positive influence for energy efficiency on property prices.

However, there are some significant barriers that would need to be addressed. Not least amongst these would be the need to find some way to pay for such a scheme, the direct cost of which could be significant. Government may be reluctant to fund payments through general taxation without a high degree of certainty that it would see an resultant increase in other revenues and there is genuine controversy over paying for similar schemes through potentially regressive general levies on consumer bills. The regressive nature of such a scheme could be magnified by the fact that such schemes are likely to be dominated by the able to pay (though the latter may be mitigated by the Green Deal and ECO).

Working in favour of this type of scheme is the tendency for Governments to use similar mechanisms across different areas of energy policy. The Government's recent consideration of electricity demand measures under Electricity Market Reform programme demonstrates the interest that currently exists in this kind of scheme. It is not unreasonable, therefore, that it could be persuaded to examine the possibility of a broader energy efficiency FiT.

[48] For example, this would need to account for the effect of weather, or changes to occupancy.
[49] I.e. does not use a complex system of baselines.

5. A COMPARATIVE ANALYSIS OF THE OPTIONS

The final stage of Phase 1 was to use the "straw man" incentives from Section Four to rank against the range of criteria agreed in Section Three. Each option was discussed in turn by the group, and scores were assigned only once consensus was reached. A representation of the scores across each incentive is shown in Table 2 below.

On the strength of these scores, four candidates achieved significantly higher scores than the other options for incentivising domestic retrofit: variable Stamp Duty, variable Council Tax, an energy efficiency Feed-in-Tariff and minimum standards. These were therefore the leading candidates to be explored further. It was important to note that among them none were – in their straw man form at least – without specific criteria against which their scores were relatively low. Together with the initial research in Section 4, these offered a guide as to where focus should be placed as more detailed proposals were developed.

While Minimum Energy Performance Standards made it through this first stage of analysis, a decision was made by the group not to investigate the option further for two key reasons. As noted above, introducing regulation of this kind would exceptionally difficult in the current political and economic climate. Even if the political will was there, it also seems likely that Government would wait to see proof of concept in the Private Rented Sector before it introduced similar measures for the owner-occupied sector. As such, it is conceivable that regulations of this kind would not be introduced until well after 2018 – much too late to meet the urgent need to boost domestic retrofit.

It was also noted that low-interest loans, which scored relatively poorly in the comparison, would nonetheless still be useful for supplementing the impact of the final three incentives. It was not taken through to Phase 2 as it would not, on its own, significantly increase in demand for energy efficiency. But it would help reduce the cost of retrofit packages and possibly encourage more works to be undertaken by householders who are driven to act by other incentives.

Accordingly, the short-listed options to be further developed in Phase II were agreed as variable Stamp Duty, variable Council Tax and an Energy Efficiency Feed-in-Tariff.

The literature review had shown that a large body of work already existed around the option for variable Stamp Duty, demonstrating the view that there was a lot of promise in using this incentive. As well as being cost-neutral, it could be implemented with relatively little administrative burden by adding a simple addition to existing tax calculations. It also had the greatest potential to directly reflect energy efficiency in property prices.

Variable Council Tax also had similar advantages of using an existing calculation mechanism. Additional complications would be encountered in requiring EPCs for every household and needing to vary rates according to the housing profile of each Local Authority to maintain revenue neutrality. But as an annual reminder of energy efficiency, it has immense potential to have an immediate and far-reaching impact on demand for retrofit.

With the precise model of an Energy Efficiency Feed-in-Tariff still unclear, a large number of questions remained unanswered around this incentive. And as it could not be made cost neutral, such a scheme would require direct subsidy. However, the significant potential benefits of an EE FiT were still clear: it rewards households which act on energy efficiency but does not penalise

those unable to; and it would utilise a proven policy mechanism from micro-generation to encourage energy efficiency.

In Phase 2, the three short-listed incentives were developed further to create comprehensive proposals for each. These focused on the major issues and outstanding concerns in order to develop robust models. Economic modelling was also used in order to gain a better understanding of their potential impacts on take-up, GDP, tax receipts and carbon reductions.

Table 2: Incentive ranking against criteria

See Annex C for full table outlining scores and weightings.

	Variable stamp duty	Council tax rebate	Variable council Tax	Energy Efficiency FiT	Low interest loans	Grants/ cash-back	Minimum standards	Salary sacrifice	Reduced VAT
Political acceptability									
Drives uptake in owner occupied sector									
Drives uptake in PRS sector									
Drives uptake in social housing sector									
Potential to impact house prices									
Can be cost neutral (to treasury)									
Minimises adverse distributional effects									
Provides confidence to industry									
Has past or international precedents									
Potential to reduce fuel poverty									
Low administrative burden									
Encourages whole house retrofit									
Compatible with other policies									
Incentivises retrofit outside the GD									

6. REFINING THE INCENTIVES: STAMP DUTY

The aim of this chapter is to develop the basic model for variable Stamp Duty Land Tax (SDLT) set out in Phase 1. In doing so it seeks to address some of the outstanding issues and critical challenges to an effective scheme.

In the Phase 1 assessment, Stamp Duty emerged as a very strong contender for incentivising retrofit. Of particular importance is the potential for a Stamp Duty-based incentive to not only significantly boost take-up, but also to strengthen the link between property prices and energy efficiency. Vitally, it was also shown to be likely that such an incentive could be designed so as to have little or no impact on overall SDLT receipts.

However for all these advantages, the initial analysis also posed some critical questions as to how the incentive could be made to work in practice, and its implications for the market. The first and perhaps most important question is whether Stamp Duty has the potential to drive retrofit at a rate commensurate with the scale of the challenge. The second is whether it could be rolled out in a way that would be perceived as fair: avoiding any significant negative social or economic consequences. The last is whether the system could be constructed to avoid endangering the status of Stamp Duty as one of the most straightforward and lucrative taxes collected by HMRC.

Can a Stamp Duty-based incentive work fast enough?

One commonly cited criticism of a Stamp Duty-based incentive for retrofit is that it would not act fast enough. Stamp Duty, of course, is only paid at the point of purchasing a property. As such, a related incentive would only impact on the relatively small number of homes which are sold each year. However, it is important to put this in context. Even in the recent, depressed market, nearly 900,000 properties have been transacted annually (in 2011). If it were possible for an incentive to drive uptake of retrofit measures in even 20 per cent of these properties, we would see nearly 180,000 additional properties improved.

But is it reasonable to expect that the 20 per cent figure could be reached? The answer is quite probably yes. The most popular points at which home renovations are undertaken are either immediately before or immediately after moving house. For prospective sellers, the prospect of being able to sell an energy efficient home faster, or potentially even for a higher price (should the incentive realise its obvious potential to impact property prices) could be a significant driver for making improvements as part of a general refurbishment of the property prior to sale. This effect would strengthen over time as the incentive started to have a general effect on property prices, and may actually lead to householders including energy efficiency measures as part of their general efforts to add to the value of their property during their tenure.

Similarly it has been widely reported that a high proportion of property buyers undertake some renovation/upgrade works in a newly purchased property. An incentive which allows purchasers to obtain a rebate for retrofit work undertaken within a year of moving could provide a very strong incentive for households to include an element of – potentially Green Deal and ECO-funded – energy efficiency in their wider renovations. This is backed up by a recent study by

Chryssochidis and Wilson (2013)[50] which found that households are more likely to undertake a retrofit project if it is combined with other planned improvements such as kitchen and bathroom renovations. A further advantage of an incentive which acts at this critical time is that any work undertaken is likely to be delivered at lower cost – either increasing the net savings to households of a given set of measures or allowing them to undertake a more ambitious energy-saving project (see Box 5).

Box 5: Integrating retrofit with other home improvements

Some energy saving measures are most commonly installed soon after a household moves in to a new home – including double glazing and new boilers. There are also various examples of retrofit becoming cheaper and easier when it is integrated with general home improvements. These include insulating under floors or installing under-floor heating at the same time as laying new floorboards or laminate flooring; and installing internal wall insulation at the same time as installing a new kitchen or undertaking a general internal redecoration (painting, plastering etc).

This "nudge" to the buyers and sellers would also provide some motivation to those who were staying in their current home but simply wanted to add to its value. And all these effects would be likely to be magnified by other actors in the market: estate agents would have an incentive to learn about energy efficiency and to provide advice to their clients on how costs associated with buying and selling properties would be affected by their energy efficiency[51]; and for solicitors involved in conveyancing it would quickly become good practice to inform clients about how their SDLT had been calculated (see Box 6 below), and how a rebate could be obtained by making improvements.

Of course a further issue is that for many people the relative size of the incentive, compared to the overall costs involved in buying a house, is relatively small. However, as stated in Section One, experience from Vehicle Excise Duty suggests that, when applied at critical points, financial nudges do not need to be huge in order to achieve significant impact. Tax-based incentives in particular are likely have an powerful effect on behaviour due to the perceived opportunity to "get one over on the taxman".

Some of these psychological factors are hard to quantify, but our analysis shows that even with relatively conservative assumptions, an appropriately designed incentive of this kind could lead to an extra 270,402 retrofits being undertaken each year, with little or no impact on SDLT receipts, adding up to £807m to UK GDP (see Table 3/Annex D).

[50] Chryssochidis and Wilson (2013). An easier life at home: "selling" the Green Deal to UK households.
[51] It would also act as an incentive for Estate Agents to be more pro-active in displaying and otherwise promoting properties' EPC scores.

Table 3: Economic modelling summary for Stamp Duty Land Tax			
Annual additional retrofits	**Annual GDP benefit**	**Annual CO_2 saving (tCO_2)**	**Annual net effect on SDLT revenue (£m)**
135,195- 270,402	£404m-£807m	208,538- 417,088	Near zero*

* For SDLT, the model was built specifically to be revenue neutral. This was achieved to within a relatively small margin (less than £200k).

Would a Stamp Duty-based incentive be "fair"?

While the idea of a "fair" policy can be quite subjective, the Task Group highlighted the issue of fairness as being critical for a Stamp Duty-based incentive. While the main – and intended – effect of the incentive would be to see money from the poorest performing properties transfer to those that perform better, it is essential that this does not create any unintended, excessive (and unmitigated) transfers of money from:

- Low value to high value homes
- Rural communities to urban
- Older people to the rest of society
- Large families to the rest of society

The key for each of these areas was to use quantitative modelling to examine the flows of money within the system, and to test these against theoretical case studies to see how different social groups and housing types are affected in practice. In addition, the group considered whether the incentive could have any adverse effect on the health of the housing market itself – something that it is essential to avoid in the current economic climate.

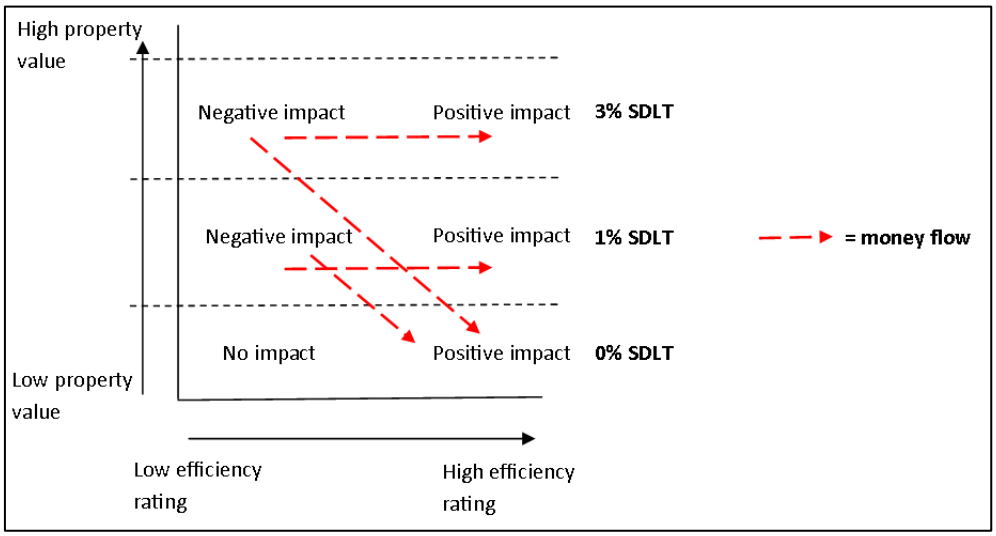
Protecting the poorest

To mitigate any potential negative effects on the poorest households, the Task Group proposed that the incentive be designed so that properties in the 0 per cent SDLT band were not penalised for poor performance, but were given a benefit if they chose to move into better performing properties or if they chose to undertake improvements subsequent to moving into a new home. This is easy to integrate into the revenue neutral model, and can be shown to significantly mitigate the possibility of money flowing from low value to high value homes as a result of the scheme.

A further means of limiting the relative impact is by introducing an appropriate cap on the size of the benefit that could be received[52] (particularly those in the highest SDLT bands). Such a cap would ensure that there was a natural limit to the size of any net flows from low performance, low value homes to high performance, high value homes, without removing the incentive for those at the upper end of the market to take action.

[52] For example, our modelling introduced a maximum discount/rebate of £10,000. This was shown to immediately mitigate significant wealth transfers from low value to high value households.

Fig 1: Financial flows between types of properties under a Stamp Duty-based incentive



Safeguarding rural communities

Framed differently, the challenge here is ensuring that money does not flow disproportionately to easy-to-treat properties from hard-to-treat properties that, in many cases, are off the mains gas grid. These latter hard-to-treat properties, of which there are a relatively larger number in rural communities, are generally more costly to retrofit and therefore could be faced with a greater possibility of a Stamp Duty penalty.

However, wider Government policies would play an important role in mitigating this effect. Firstly, the Carbon Saving element of the Energy Company Obligation is largely targeted at hard-to-treat properties, and is therefore likely to benefit rural, off-grid properties – making it easier for these households to make improvements. Secondly, the relatively high energy costs in these properties will increase the measures that can be funded under the Green Deal's Golden Rule. As such, it should generally be possible to improve poorly performing properties at little or no up-front cost[53].

Avoiding unfair costs to older people

It is important to note in this instance that SDLT is only paid when a property is purchased, not while an occupier is in situ. As such, older people who continue to live in their existing home would not be affected. Should these households choose to move, many are likely to downsize to smaller, lower-priced properties. While in principle these properties may themselves have a poor energy performance, the purchaser would have the option of choosing one that is more efficient and paying a lower rate of SDLT. In doing so, it would also have the potential to reduce the risk of fuel poverty in this group, by encouraging people to purchase homes that were cheaper to heat.

[53] This is likely to be further enhanced by the Community Carbon Saving Obligation element of ECO, and other policies such as the forthcoming renewable heat incentive, which will be more easily applied to rural properties.

Box 6: Worked Examples

The following examples are based on a "mid-point" for the calculations set at a SAP rating of 62. The maximum reduction/rebate is set at £10,000. "Nudge factors" (the discounts penalties associated with each SDLT bracket) are as follows:

Property Value	SDLT Bracket	"Nudge Factor"
£0-125,000	0%	2.0
£125,001-250,000	1%	1.8
£250,000-500,000	3%	1.3
£500,000-1,000,000	4%	1.0
£1,000,001-2,000,000	5%	0.6
Over £2,000,000	7%	0.5

Property A (1 bed flat, electrically heated)	
Sale Price	£120,000
Discount/penalty factor	2.0% per SAP point
EPC rating at time of purchase	73(C)
SDLT paid at purchase (with/without incentive)	£0/£0
Potential rebate (with specified measures)	£216 with efficient, fan assisted storage heaters and upgrade to low energy lighting.
Property B (new build home)	
Sale Price	£465,000
Discount/penalty factor	1.3% per SAP point
EPC rating at time of purchase	84 (B)
SDLT paid at purchase (with/without incentive)	£11,955/£13,950 (-14%)
Property C (1970s 4 bed detached)	
Sale Price	£280,000
Discount/penalty factor	1.3% per SAP point
EPC rating at time of purchase	55 (D)
SDLT paid at purchase (with/without incentive)	£9,164/£8,400 (+9%)
Potential rebate (with specified measures)	£928 with new boiler and cavity wall insulation
Property E (luxury large Victorian semi)	
Sale Price	£2,750,000
SDLT Band	7%
Discount/penalty factor	0.5% per SAP point
EPC rating at time of purchase	40 (E)
SDLT paid at purchase (with/without incentive)	£213,675/£192,500 (+13%)
Potential rebate (with specified measures)	£10,000 with Solar PV, SWI, new boiler

Limiting the burden on larger families

One possible effect of this incentive is that it would place a greater burden on large families who typically live in larger, more expensive properties – particularly at the point when they are "up-sizing" to accommodate new members. While this is an issue, it would be mitigated by the Green Deal to a significant extent. Larger families in bigger properties would potentially have a larger range of measures financeable under the scheme's Golden Rule, and would also have a greater level of confidence that predicted savings would be met due to their relatively high occupancy-

related energy demand. The "nudge" provided by differential Stamp Duty rates may also help to encourage these households to purchase homes that are less costly to heat in the first place.

Keeping the market moving and attracting first time buyers

Lastly, there is nothing to be gained if an effect of this incentive would be to choke the housing market – but there seems no reason to suspect that would be the case. The revenue neutral design of the scheme makes it reasonable to assume that any negative impact on demand for some houses (the energy inefficient) could be offset by the additional demand created for others (those that are more efficient). In either case, as stated above, the financial value of the incentive relative to the total cost of the purchase would be small and would not be likely to have a significant impact on affordability.

From a Government perspective, there is an added bonus that the system would act as an incentive for would-be purchasers to consider buying new homes (which are typically more efficient) – thus driving income and employment in that sector. As with other groups, first time-buyers would also be encouraged to buy efficient homes that were cheaper to run, therefore potentially helping to protect them from the risk of default on mortgage payments.

Keeping it Simple and maintaining revenue

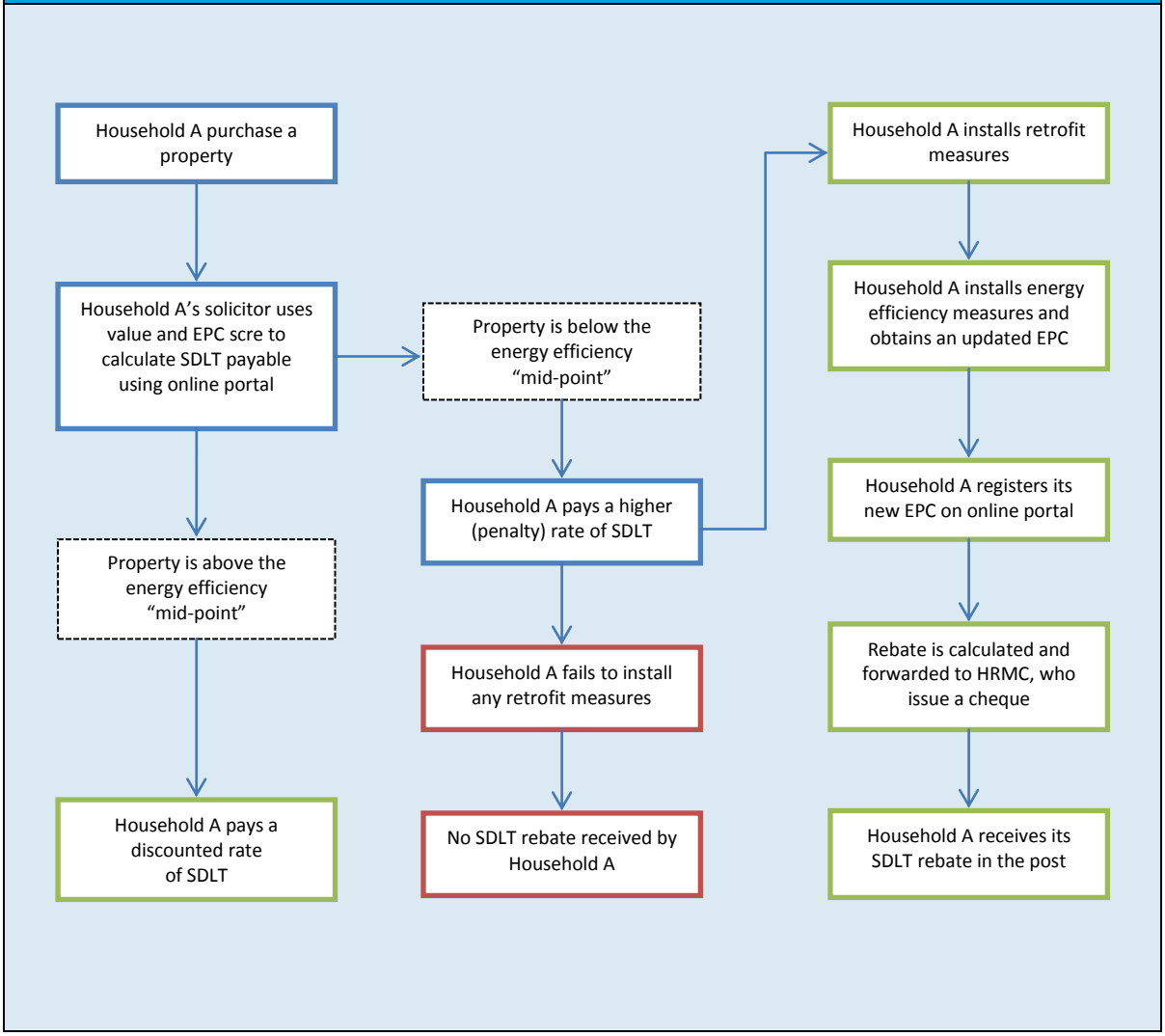
A final key challenge is to ensure that a Stamp Duty-based incentive does not become onerous to administer and, in particular, have a negative impact on the ease with which Stamp Duty is collected by HMRC. As it stands SDLT is collected by conveyancing solicitors, and paid directly to HMRC. Any complex additions to this could increase transaction costs and may therefore reduce the overall level of receipts. Any design should therefore seek to avoid this effect as far as possible.

In Section One, it was suggested that solicitors would have access to a tool with which they could calculate the new level of Stamp Duty following the introduction of the incentive. Done in this way, the extra step would add no additional costs or hassle to the process save for the costs involved in developing and updating the calculation tool, and providing guidance to solicitors – which, if the tool was well designed, should be minimal.

However, this does leave the potential for costs and complications associated with rebates being administered by the conveyancing solicitor. To avoid these, it is suggested the rebate system is also automated via an online process which would be integrated with both the initial SDLT calculation tool and, ideally, the Landmark EPC register.

At the time of purchase, the conveyancing solicitor would access the system to calculate the Stamp Duty payment via an online portal, based on both the property's value and its EPC rating. This would then be paid to HMRC as normal. Should the purchaser then undertake a retrofit, they could then log onto the portal and enter the reference number of their new EPC and address details. This would automatically retrieve the details of the initial EPC rating and Stamp Duty payment, and calculate the rebate. The results would be forwarded directly to the relevant administration unit at the HMRC, who would automatically issue a cheque. The latter point provides a further plus point for the system, since there would be a significant talking point for the householder by the receipt of a cheque in the post from the taxman and it is possible this would help to multiply the awareness of the incentive by word of mouth.

Box 7: The process



Having identified a solution to minimising administration costs, there is also the question of how a reduction in (direct) Treasury revenues can be avoided. Experience from Vehicle Excise Duty shows that there are risks to revenues should a system such as this become too successful, and this must be avoided if it is to be economically sustainable.

As set out above, it is straightforward to develop a model, based on knowledge of predicted property transactions and EPC data, which is revenue neutral to the exchequer[54]. This would be set centrally, and adjusted annually in order to maintain neutrality, reflecting the ever-improving state of the nation's housing stock. Should these advance calculations result in SDLT revenues that are lower than expected in a given year, this could be reflected in the calculation of the following year's model in order to make up the lost revenue[55]. It would also be possible to

[54] For more detail on the final cost-neutral model, see Annex D
[55] And vice-versa in the case of receipts exceeding the expected value.

set up the model in such a way that it generated sufficient additional income each year to cover the costs of administration, audit and enforcement[56].

Summary

While it is clear that the number of households that would be affected on day one of a Stamp Duty-based incentive is relatively low, there are strong reasons to suggest that the creation of such a system could create just the sort of long, steady demand push that is required in the owner occupied sector. From our analysis, it can be seen that its impacts on take-up may be slightly lower than for its Council Tax-based equivalent, yet in some ways this may be advantage, particularly when considered in the context of its relative simplicity. And it is entirely possible that our figures under-estimate the impact an SDLT incentive could have on the market, due to the difficulties associated with reliably capturing the impact on demand that may result from its influence on property prices[57].

The modelling undertaken has also demonstrated that it is very much possible to create a cost neutral model. Allied with the potential to put in place a system that would have relatively low administration costs, an SDLT-based system could also be of significant value at a time when Government finances are limited. In fact, when the wider macroeconomic benefits of the incentive are considered, the net effect of introducing the incentive could be a significant economic stimulus.

[56] It is not expected that the audit and enforcement costs would be significant given how closely they would tie in with existing requirements related to the use of EPCs, and their future part in the 2011 Energy Act Minimum Energy Performance Standards regulations.

[57] As stated above, it can reasonably be assumed that over time the incentive may place a premium on the price of properties which are energy efficient. However, without robust evidence on what the magnitude of this effect might be, it was excluded from the analysis.

7. VARIABLE COUNCIL TAX

As explained above, there are some powerful arguments for using the Council Tax system to incentivise retrofit. It has the potential to be hugely impactful due to its broad reach and the lengths that households may be prepared to go to in order to avoid paying such an unpopular tax. Also, like Stamp Duty, the fact that it is a property tax means that it is likely to, over time, embed energy efficiency property values.

However, as shown in the preceding analysis, while the ability to reach the majority of households is an obvious benefit, it also brings with it a number of critical challenges. First, unlike Stamp Duty, it potentially requires all properties to have an EPC from day one. Second, this broad impact means that it will inevitably have implications for vulnerable households that need to be managed. Perhaps as important as these issues is the need to ensure that the system is designed in a way that does not disadvantage the Local Authorities that would be required to implement it, both in terms of the impact on their tax revenues and the administrative costs associated with the management of the scheme.

Developing and introducing the model

It is vital that any model developed for the purposes of incentivising retrofit is simple to administer, easy to understand (for both Councils and residents) and most importantly of all can be made revenue neutral to each Council.

Creating a model based on SAP scores rather than EPC ratings (A-G) potentially avoids adverse discontinuities[58], but potentially creates a more complex system – particularly when it comes to communicating the scheme to households, and the general administration of the scheme by Local Authorities. Consultation with a number of Local Authorities suggests that the latter may be more important than the former, and as such it may be necessary in practice to sacrifice a degree of functionality in order to ensure buy-in.

Whichever option were chosen, the principles remain the same[59]. All properties with an energy efficiency rating above the chosen standard would receive a reduction in their bill (larger for those in better bands), while those below the standard would pay a penalty (again, larger for the worst performing properties). While the chosen standard would be set centrally to reflect the overall standard of the housing stock, the size of the discounts and penalties could be easily adjusted locally to ensure revenue neutrality is maintained for each authority in each given year, and over time (as the properties improved)[60].

[58] i.e. the potential for all actions, however small, to be rewarded; and avoiding the potential for those just above/below thresholds to make relatively harder/easier jumps up the scale.
[59] It should be noted that for the purposes of the quantitative analysis, the model was built assuming that the system was based on SAP scores rather than EPC bands. It practice it may be necessary to introduce a hybrid, that broke down bands into a number of sub-bands, for example C+, C and C-, or similar.
[60] It is assumed that the data required by each council to adjust their rates could be obtained from Landmark, and that this could be automated to reflect improvements made to properties and where previously unrated properties have an EPC.

Box 8: Worked examples

The following examples all assume a nudge factor of 0.5%. The neutral point has been varied in order to make the initiative as close to revenue neutral as possible:

Council Tax band	Average Council Tax paid (£)	Neutral point
A	800	51
B	900	51
C	1,000	51
D	1,200	51
E	1,400	51
F	1,800	52
G	2,000	54
H	2,200	54

Property A (1 bed flat, electrically heated)	
Council tax band	A
Discount/penalty factor	0.5% per SAP point
EPC rating at time of purchase	75 (C)
Annual CT paid (with/without incentive)	£752 /£800
Potential saving with specified measures installed	£6 with efficient, fan assisted storage heaters and upgrade to low energy lighting.
Property B (new build home, semi detached)	
Council tax band	E63
Discount/penalty factor	0.5% per SAP point
EPC rating at time of purchase	87 (B)
Annual CT paid (with/without incentive)	£1,274 / £1,400
Property C (1970s 4 bed detached)	
Council tax band	D
Discount/penalty factor	0.5% per SAP point
EPC rating at time of purchase	56 (D)
Annual CT paid (with/without incentive)	£1,185 / £1,200
Potential saving with specified measures installed	£63 with new boiler and cavity wall insulation
Property E (luxury large Victorian semi)	
Council tax band	H
Discount/penalty factor	0.5% per SAP point
EPC rating at time of purchase	47 (E)
Annual CT paid (with/without incentive)	£2,277 / £2,200
Potential saving with specified measures installed	£165 with Solar PV, SWI, new boiler

Phasing in the scheme

Potentially vital to this system, of course, is for all homes to have an EPC rating, something that is currently true of only a relatively small proportion of households. While there are relatively straightforward ways to use a subset of the data to accurately estimate create the calculation model, EPC scores would be required to calculate the payments to be made by each home. A "hard start" (whereby the new Council Tax bands would be introduced overnight) based on EPC scores would be impossible unless, in advance of the launch of the scheme, all properties could

be mandated to have EPC assessments. Even if this were possible, there would be significant capacity issues in the assessment sector. Should these, in turn, be overcome, the abrupt introduction of the scheme could be met with significant resistance from councils, households and the press.

These factors all suggest that a phased introduction – which did not require all properties to have EPCs from day one - would be beneficial. As shown in Box 9, this can be achieved in a way that encourages households to gradually seek EPCs for their homes over the early years of the scheme, while also offering an extended period of time over which poorly performing homes could be improved, and allowing Councils could get used to managing the scheme across their local area.

Under this approach, the scheme would be launched with an initial year in which there were no penalties or discounts to those that were in low or high efficiency properties. Households would simply receive information on how the scheme, at a high level, was due to work. Following this, the level of energy efficiency above/below which households were rewarded or penalised would be progressively tightened. Those properties without EPCs would initially be assumed to be of average efficiency, but as the scheme progressed this would also be tightened to apply an ever decreasing rating to uncertified properties. Over this period, therefore, households could choose whether to stick with their assumed rating, or to have an EPC survey.

Box 9: A Proposal for a phased roll-out

Year 1

- A period of marketing and information provision prior to the introduction of the new rates

Year 2

- Dwellings better than band E pay a reduced Council Tax bill, with A, B, C and D-rated properties receiving a respectively smaller discount.
- EPC band E dwellings are the baseline and receive no discount /penalty
- All other properties pay a small penalty, as if all were in band F (this includes both those assessed as being below F, and those without a rating)

Year 3

- Dwellings better than band E pay a reduced Council Tax bill, with A, B, C and D-rated properties receiving a respectively smaller discount.
- EPC band E dwellings are the baseline and receive no discount /penalty
- EPC band F dwellings pay a small penalty on their Council Tax rate.
- All other properties pay slightly larger penalty rate, as if all were in band G (this includes both those assessed as below G, and those without a rating)

Year 4 and beyond

- The system continues as per year 3 but relative discounts and penalties are adjusted over time to reflect an ever diminishing number of properties below E, and therefore the relatively decreasing advantage of being an A, B, C or D. Revenue neutrality is maintained accordingly. If required, the baseline could be adjusted to become D, then C, and eventually B.

Avoiding unintended consequences

As noted above, the broad reach of a Council Tax-based incentive means that there will necessarily be some impacts on vulnerable households which would need to be mitigated, and similarly on properties which for one reason or another are harder to treat. However, it is important to remember that this scheme would not exist in a vacuum. Many policies are already in place that would help to protect the vulnerable, which would help its implementation.

Firstly, it should be noted that many of the poorest in society pay little or no Council Tax, and would therefore be unaffected by the scheme. Those that fall outside this bracket would fall inside three groups – those that are in social housing, those in private sector rented housing, and owner occupiers. The effects on the first of these groups would be partially mitigated by the generally higher standard of properties in the sector, with the remainder hopefully protected by a combination of the Carbon Saving Obligation under ECO, and ECO's Community Obligation.

Those in privately rented accommodation would be protected in various ways. Firstly, these properties are due to be covered by the forthcoming private rented sector minimum standard regulations, under which landlords cannot "reasonably refuse" a Green Deal (from 2016), and properties below a minimum standard[61] cannot be rented after 2018. In addition, privately rented properties also provide the ideal market for the Green Deal[62], with landlords also currently incentivised to undertake energy efficiency improvements under the Landlord's Energy Saving Allowance (LESA) scheme.

For vulnerable people living in owner-occupied properties the main protection would be access to Green Deal and ECO funding. These schemes would help to ensure that a significant proportion of people could make significant improvements to their homes at little or no up-front cost. Those in homes that were the hardest and most expensive to treat would be those that receive the lion's share of the total ECO funding pot.

Box 10: Paying for EPCs

One further issue to consider is how affected households, particularly those in the poorest sections of society, might pay for an EPC. In this respect there appear to be two obvious options.

The first of these could be to require energy companies to pay for assessments, perhaps with some eligibility requirement to ensure that these free assessments were only received by those in need. To encourage this, the Government could consider allowing Suppliers to claim a small credit under ECO for each assessment delivered.

An alternative would to allow councils to take a cut out of the discount pot in the early years of the scheme. This could be used to create a fund to pay for assessments for the poorest households.

[61] Expected to be an EPC rating of E.
[62] Since landlords are able to pass some or all of the cost of improvement onto their tenants under the scheme, who would in principle – due to the Golden Rule – be left at least as well off as they were before the works.

Summary

An incentive based on variable rates of Council Tax has clear potential to be a far-reaching driver for retrofit. As well as impacting on the majority of the UK's households, Council Tax, due to its regular payment regime, would provide an ever-present reminder to households of the financial benefits of living in a more energy efficient property. This latter point is vital, since it is this feature that would also be likely to speed up its impact on property prices.

Table 4: Economic modelling summary for Council Tax

Annual additional retrofits	Annual GDP benefit	Annual CO_2 saving (tCO_2)	Annual net effect on CT revenue (£m)
517,739 – 1,480,935	£1,520m-£4,421m	1,123,716– 2,231,594	Near zero*

* For Council Tax, the model was built specifically to be revenue neutral. This was achieved to within a relatively small margin of error (less than £200k).

The quantitative analysis (see Table 4 and Annex D) clearly shows that the impact of the incentive on the rate of uptake of retrofit could be extremely substantial. Estimates suggest that it could lead to as many as 1,480,935 additional retrofits each year, with an economic benefit of £4.421bn. The potential for the system to be revenue-neutral means that these benefits would not be diminished by creating a burden on Government revenues.

As described above, the creation of such an incentive does not come without its complications. It would require a revenue neutral model to be created and annually updated and maintained, as well as EPCs to be undertaken for all properties[63]. But it seems clear that none of these problems are insurmountable and that a clear and simple system is possible. There is the possibility of public disapproval, but the combination of a phased introduction, a relatively simple and transparent scheme, and other policies to mitigate potentially harmful effects should all help to reduce the likelihood of this preventing effective implementation.

It has previously been assumed that such a system would have adverse implications for a range of groups in society. However, it can be seen that the currently policy framework is well suited to protecting the vast majority of those that might otherwise be negatively affected. The small number of people that fall outside these groups may require additional protection, but that seems more an argument for additional support for the fuel poor, for example, than one against the implementation of a Council Tax-based incentive.

Finally, such a scheme has the additional advantage of its local administration lending itself well to testing via a small number of pilots. These could be undertaken in specific Local Authorities, or even target areas within those authorities. This would allow proof of concept, and facilitate the longer-term, nationwide roll-out. In the context of current local authorities current financial and administrative issues, this could play a key role in smoothing its long-term nationwide roll-out.

[63] While a barrier, this would also be a hugely beneficial outcome in itself, providing data which could be used to design more accurately targeted policies.

8. ENERGY EFFICIENCY FEED-IN-TARIFF

Of the short-listed options, the idea of creating an "Energy Efficiency Feed-in-Tariff" (EE-FiT) could perhaps be the most innovative. The success of the Feed-in-Tariff for renewable energy has demonstrated the potential of such a mechanism to drive consumer interest and demand. At the same time, the imminent introduction of the Renewable Heat Incentive (RHI) and the recent announcement of a new electricity demand reduction mechanism clearly signal that the Government continues to support schemes of this kind as a means of achieving policy goals.

Perhaps one key advantage of a Feed-in Tariff in comparison to the other options is that, if designed appropriately, it would have the potential to motivate absolute reductions in energy use, and to inspire behavioural change in recipient households. This feature would help Government to mitigate the risk of energy efficiency savings creating a "rebound effect". And unlike the two tax-based incentives, an EE-FiT would be purely positive – providing benefits to efficient households without penalising those that are in poorer performing properties.

However, these attractive features do not come without their own complications. To fully exploit its ability to motivate on-going energy savings, an EE-FiT would *ideally* need to be based on measured (actual) rather than deemed (estimated) energy savings, which would be no small undertaking. And of course having an "up-side only" incentive places an immediate cost burden on Government to fund the scheme. This means that it is ever more important to demonstrate that direct costs to Treasury would be offset by overall macroeconomic benefits.

How would tariff payments be calculated and paid?

As outlined above, the primary issue with an EE-FiT is establishing whether payments should be based upon deemed or actual energy savings. Depending on the option chosen, this would have a large impact upon the way the scheme is administered, and the potential effects it could have on householder behaviour and domestic energy use. Looking at existing/planned schemes in the UK, both approaches are used. The Renewable Heat Incentive (RHI) is based on deemed energy savings for the specified technology, with quarterly cash payments, while the renewable energy Feed-in-Tariff is based on continual metering of generated and exported electricity.

As discussed in above, the main advantage of taking a deemed approach is its simplicity. There is no need for complex base lining (see below). Payments are simply determined by the expected savings from the package of measures using EPCs undertaken before and after installation. However the downside is that a system of deemed payments loses the connection with on-going energy savings. One suggested way to mitigate this in part would be to spread the payments over time. This would, at least, provide households with an on-going reminder of why they were receiving the money, and perhaps encourage them to install additional measures over time.

In contrast, a measured approach would retain the on-going incentive to reduce energy use but bring with it a host of issues. In particular, there would be significant challenges in creating and maintaining a baseline against which savings are measured. Historical energy use provides a starting point, but then falls down whenever there are significant changes to the household – including, for example, if a couple had an additional child, or if a family member leaves home. Without finding a way to adjust the baseline for these occurrences, an EE-FiT could easily end up over- or under-rewarding recipients. In addition, it is likely that the measurement and verification of each recipient's annual energy use could be time-consuming and costly for the scheme's administrator unless a way can be found to make the system highly automated.

Where EE-FiT has been used in practice it has generally been for commercial customers who are smaller in number and have much more substantial, stable and predictable energy use. Accordingly Cowart and Neme (2011)[64] suggest that, in spite of the benefits of a measured approach, a system based on deemed savings is necessary to ensure that the benefits of the scheme exceed the costs. At the same time however, there are examples of measured schemes operating successfully[65], showing that the perceived issues may not be insurmountable if a scheme is designed appropriately.

Phasing in a measured approach

While in the short term an EE-FiT scheme based on measured energy use seems problematic, it seems possible that there could be a gradual transition in that direction. The Green Deal cash-back scheme, in its current form, is due to expire in 2014 and at that point it could be re-launched as an EE-FiT.

Initially the main difference would be that the payment would be split into two components: a fixed up-front sum, and a further payment made at regular intervals over five years. The total value would be determined by the deemed energy (or carbon) savings that would result from the installation of the retrofit measures, as evidenced by a "before and after" EPC. The payments would ideally be in the form of a cheque rather than being netted-off the energy bill of the household. Taking this approach would increase the visibility of the reward and encourage recipients to discuss their participation in the scheme with friends, family and their wider community.

Box 11: Smart meters and an EE-FiT as complementary policies

From the Autumn of 2012, every household in the UK will be offered a smart meter system. The systems installed in each home will comprise both an electricity meter and a gas meter, along with an in home display (IHD) with an integral consumer access device (CAD). This will allow consumers to easily track their own energy consumption, and potentially to link the system to wireless devices and smart phones. The CAD will also allow for communication through a broadband connection so that third parties can access data.

Initial discussions with both the Government team leading the roll-out, and other industry experts suggest that the outputs from the systems could potentially be used both to derive and update baselines, and to automatically monitor household savings. The former would require software to be developed which flagged changes in consumption which could not reasonably be explained by the climatic variables or other day-to-day variations (which could then be checked by the scheme administrators).

DECC anticipate a high level of uptake for the programme, since Energy Suppliers will be allowed to charge for bill reading for those that don't have smart meters installed. This would provide a potentially wide customer base for a measured EE-FiT.

[64] Cowart and Neme (2012). Energy Efficiency Feed-in-Tariff: Key Policy & Design Considerations. (RAP report.)
[65] Frankfurt Green City: *http://www.frankfurt-greencity.de/en/environment-frankfurt/climate-protection-and-energy-supply/what-we-are-doing/*

In the longer-term, the roll-out of smart meters (see Box 11) means that it is reasonable to assume that both the base-lining process, and the reporting and verification of recipients' households' energy use would become more straightforward. New applicants to the scheme who have smart meters would be offered the opportunity receive the annual payment element based on actual, measured energy use (with the up-front payment still based on deemed savings). This would encourage them to change their energy using behaviour in order to obtain a higher level of payment and, of course, could help to encourage households to have smart meters installed.

Mirroring the Green Deal, it is suggested that payments would remain with the electricity meter, with a requirement. Under a measured approach, this would require new inhabitants of a recipient home to submit data to allow their bespoke baseline to be established. At the end of the payment period, there is no reason why a household couldn't apply to re-join the scheme, but they would do so in the knowledge that they would from that point on be measured against a new, tougher baseline.

Box 12: Worked example

The inhabitants of Household A, a three bed semi-detached property, decide to have three retrofit measures installed: external wall insulation (EWI), loft insulation, and a new boiler.

Measure	Cost	Annual CO2 saving (Kg)	Assumed lifetime* (years)	Lifetime carbon (KgCO2)
EWI	£9,400	1,800	20	36,000
Loft insulation	£300	1,114	20	22,280
New boiler	£2,300	1,200	12	14,400

According to their before and after EPC, the total lifetime CO_2 saving associated with the package of measures is 72,680 Kg. With the EE-FIT set at £0.036/KgCO_2, the household would receive a total of £2,616.48 (equivalent to 22% of the cost of the measures). This would be paid two parts: an up-front payment of £1,308.24 (50% of the total) and an annual payment on each of the following five years of £261.65 (the remaining 50%).

With the introduction of smart meters, these fixed on-going payments could be foregone in favour of payments made on the basis of measured energy use. In this case, Household A would receive a lower amount each year if it failed to achieve the expected savings, but would stand to gain additional sums if, thanks to behavioural changes, it exceeded them.

How could it be funded?

Unlike the other two short-listed incentives which can be constructed to be cost neutral, an EE-FiT would require an external source of funding. Various options have been suggested for how this could happen. One would be to make use of a mechanism similar to those proposed in the Energy Bill 2013. For example, as part of the capacity market, organisations would be paid for commitments to reduce energy demand and, as proposed by the Green Alliance (2011)[66], there is the potential to use this or a similar approach to fund an EE-FiT with the potential for third party aggregators to play a role as intermediaries.

[66] *Decarbonisation on the cheap: how an electricity efficiency feed-in tariff can cut energy costs*, Green Alliance Policy Insight (Oct 2011)

An alternative solution would be to amend the Energy Company Obligation (or any successor to the scheme) so that a proportion of suppliers' carbon reduction targets could be met through the implementation of an EE-FiT. Since an EE-FiT can be neutral as to the measures involved in achieving savings, it seems probable that the costs to energy companies – and, therefore, the impacts on consumer bills – could be lower, thus making it a potentially attractive option. Of course making use of this option would raise the issue of whether a recipient of the EE-FiT could also benefit from the subsidies provided for specific measures. While it is possible that a solution could be found to compensate for this overlap, the complexity involved may make it an unattractive option for Government, Energy Companies and households.

In the absence of funding secured from Energy Companies, the remaining alternative would be to fund the scheme from general taxation. Although under the current economic conditions this may seem unlikely to find favour with the Treasury, our analysis shows that the scheme could have a net economic benefit of £506m per year (excluding administrative costs – see Table 5 and Annex D for further details). It could also increase annual Government revenues from taxation by over £26m, which could help to offset some of this expenditure. As proposed by the Energy Bill Revolution campaign, revenues from carbon taxation such as the EU ETS and the Carbon Floor Price could be hypothecated for the purposes of funding such a scheme[67].

Table 5: Economic modelling summary for EE-FiT

Annual retrofits above BAU	Annual GDP benefit	Annual CO_2 saving (tCO_2)	Annual gross cost of scheme	Annual additional tax revenue to treasury*
64,598 - 169,464	£193m - £506m	969,613 - 2,543,648	£52m - £273m	£10m - £26m

*i.e. from additional VAT

It is anticipated that an EE-FiT could be designed to have relatively low administration costs. As with the current cash-back scheme, it would be possible for the deemed phase of the scheme to be administered by Green Deal Providers, with monitoring and verification integrated with that which is already due to be in place for the Green Deal itself. As the scheme progressed towards a measured approach, the main costs would be to put in place the automated systems that allow for the recording of energy use, the adjustment of household baselines, and the calculation/ distribution of payments. Further savings in transaction costs could potentially be generated by allowing aggregators to enter the market (as has been used in the USA[68]), and by limiting annual deemed/measured payments to those households that install a minimum level of measures (i.e. those installing the most basic measures would receive all of their payment up-font.

Summary

The analysis shows that an Energy Efficiency Feed-in-Tariff could provide a significant driver for the installation of energy efficiency measures, as well as providing an important economic stimulus. While such a scheme would not be likely to impact the housing market (i.e. property prices) in the way that Stamp Duty or Council Tax might, it has a key advantage of having the potential to drive on-going reductions in domestic energy demand, and fitting with the general

[67] *Energy Bill Revolution Campaign Report* (Feb 2012)
[68] For example by OPower and Greenbox. See *Green Alliance Policy Insight* (October 2011).

trend both in the UK and overseas for policies of this kind. While some concerns have previously been raised as to the practicality of a scheme based on measured energy use, the existing plans to roll out smart meters in the UK presents an opportunity to overcome many of the most commonly cited problems, particularly some of the issues with setting baselines and the day-to-day administration of the scheme (much of which could be automated).

Linking the scheme with the roll-out of smart meters, and transitioning towards a measured approach would have a number of benefits. The potential for an EE-FiT to help encourage households to have smart meters installed may prove an attractive feature for Government. As a secondary effect, it is conceivable that it could also encourage the development of better, more advanced meters and building control systems.

9. CONCLUSIONS: THE NEXT STEPS

The case for introducing additional incentives to stimulate demand for retrofit in our existing homes has been compelling for some time. We are seeing a rapid decline in our electricity generation capacity in the UK, alongside an ever-shrinking window of opportunity to meet our legally binding carbon targets. At the same time, the transition from the old subsidy model to the new, market-led model of the Green Deal has seen the number of installations of basic efficiency measures such as loft and cavity insulation fall significantly, with a commensurate number of redundancies in those industries. All of these factors point to a political, economic and environmental imperative to create an urgent boost to the demand for retrofit.

Indeed, the most recent statistics on poor uptake of the Green Deal demonstrate a real urgency for Government to act. With only 245 Green Deal plans agreed after over 38,000 assessments, this represents an extremely disappointing start for the Government's flagship energy efficiency policy[69]. There are good reasons for this slow start: the re-financing from the Green Deal Finance Company has held back the ability of Providers to offer customers Green Deal Plans; and any new and innovative scheme like this was always going to take time to find time to find its feet. But even if all assessments undertaken were converted, this equates to a Green Deal market of around 100,000 retrofits per year – far short of the number required.

Table 6: Comparative impacts of the three incentives

	Variable Stamp Duty Land Tax	Variable Council Tax	EE FiT
Annual increase in number of retrofits	135,195- 270,402	517,739- 1,480,935	64,598 – 169,464
Annual net effect on GDP	£404m-£807m	£1,520m-£4,421m	£193m - £506m
Annual direct cost of subsidy*	Near zero**	Near zero**	£52m - £273m
Annual carbon saving (tCO_2)	208,538- 417,088	812,192- 2,231,594	96,961 - 254,364

* In the case of Government funding, this excludes any resulting increases in tax revenue.

** For these incentives, the model was built specifically to be revenue neutral. In each case, this was achieved to within a relatively small margin (less than £300k).

Even when considered alongside complementary policies such as the prospective Minimum Standards legislation for the private rented sector, and the Energy Company Obligation, we will fall massively short of the levels we need to meet our climate, energy and economic goals. As such, the case for putting in place further measures to stimulate demand in the long-term is surely compelling.

[69] DECC statistical release on Green Deal and ECO, June 2013

Due to the broad impact of Council Tax and its unpopularity, such a system has the potential to be a significant incentive for driving retrofit. This could also be magnified by its possible role in linking energy efficiency to house prices. Using Council Tax in this way would require careful engagement with Local Authorities to ensure buy-in but if implemented properly could create a far-reaching and rapid boost to demand.

A Feed-in Tariff-style incentive has the potential to drive retrofit and encourage behaviour change, as well as complementing the introduction of smart meters. It would follow a general trend both in the UK and internationally for policies of this kind, but would require some hard decisions to be made on how to fund the payments. Over time it may also be possible to transition to payments for measured energy savings with the rollout of smart meters. Payments could then be calculated against a household baseline and reflect actual reductions in energy use, creating an ongoing driver for behaviour change and absolute reductions in energy demand.

Lastly, using the Stamp Duty regime could create a steady push of demand, targeted at households who find themselves at a well-established "trigger point" for retrofit. A home that attracts lower stamp duty is a more attractive proposition for buyers, and could potentially sell faster, which in time could strengthen the link between energy efficiency and property prices. An incentive of this kind, appropriately designed could be cost-neutral, fair, administratively simple, and – like its Council Tax counterpart – could truly start to embed energy efficiency into the housing market.

Each option has challenges, but none of these appear to be insurmountable if the political will is there. The macroeconomic analysis demonstrates that each has the potential to create jobs and growth that will more than offset any costs.

Box 13: Key features of each incentive

Stamp Duty Land Tax

- Will provide a slow, steady push to the market, without the risk of over-heating. Estimated to increase the annual number of retrofits by between 135,195 and 270,402.
- Influences households at a key trigger point, and has the potential to embed energy efficiency into property prices
- Can be designed to minimise adverse impacts, maximise simplicity, and to achieve revenue neutrality.

Council Tax

- Potentially far-reaching effect on the market due to the broad impact of council tax. Estimated to increase the annual number of retrofits by between 517,739– 1,480,935.
- Well-suited to a phased introduction, with the possibility of local trials and a regime that is strengthened over time as data is improved (esp. the availability of EPCs).
- Though requiring all households to have an EPC, this could be achieved at a steady rate over the early years of the scheme, with additional benefits to policy-making.
- Can be designed to be revenue neutral.

Box 13 (continued): Key features of each incentive

Energy Efficiency Feed-in Tariff

- Would provide a significant boost to the level of retrofit, increasing the annual number of retrofits by an estimated 64,598 – 169,464.
- A natural progression to the existing cash back scheme which aligns with a general trend for policies of this kind (i.e. the renewable energy FiT and the RHI).
- Once based on measured savings, could help to drive both improvements to homes' energy efficiency and behavioural savings.
- While it would require up-front funding, it is likely to more than pay for itself through its positive overall impacts on GDP and increased tax revenues.

None of the three incentives is a silver bullet, and implementation should form part of a wider suite of domestic energy efficiency policies. Many of these are already up and running or under development, including the Green Deal, ECO, minimum standards regulations for PRS and fuel poverty policies. Although low interest rates were not developed as a stand-alone incentive in this report, there would be considerable merit to lowering the cost of Green Deal finance and other retrofit loans. This would be a valuable means of meeting the demand created by one of the three structural incentives as it could shorten repayment periods and potentially increase the size of each retrofit package. It is also our view that Government should urgently reconsider the decision not to introduce Consequential Improvements legislation alongside one of the incentives outlined in this report, as part of package of measures to boost demand in this market.

The aim of this report is not to recommend what form such an incentive should take. Instead the Task Group set out to analyse the options, and develop proposals which Government could study and pick from according to what, precisely, it wanted to achieve. The preceding analysis shows there are a number of feasible options for creating a long-term driver for retrofit, each with its unique set of benefits and challenges. The next step is for industry to work with Government to consider these options, to weigh up which of them best meets Government's objectives, fits the political and economic context, and can be most practically and urgently implemented.

ANNEX A – INCENTIVE OPTIONS NOT CONSIDERED FOR FURTHER INVESTIGATION

- **"Consequential Improvements" Regulations** – were not considered for analysis in the project primarily due to their extensive and recent discussion elsewhere as part of the recent Government consultation.

- **Rising block tariffs** – considered to have too long a history of resistance from successive Governments, based on their potentially negatively effect on fuel poor households.

- **Direct regulation of energy companies** (i.e. providing targets for delivery of the Green Deal) – was not considered due to its "supply side" nature, and the obvious overlap with the Energy Company Obligation.

- **Personal carbon allowances** – were discounted due to their complexity, and how unlikely it is that such a policy would be pursued.

- **Variable income tax rates** – although a potentially powerful driver, income taxes were considered too politically sensitive.

- **Social bonds** – although an increasingly popular idea, social bonds were thought to be more a way of funding other approaches rather than being an incentive in themselves.

- **Relaxed planning requirements** (for energy efficient homes) – this option was put aside largely due to the inherent contradiction in allowing uncontrolled development as a quid pro quo for energy efficiency.

- **Carbon tax recycling** – again, this was considered to be more a means of funding other incentive options than being a demand driver in itself.

ANNEX B – CRITERIA AND WEIGHTING FOR PHASE ONE ANALYSIS

Below is the list of comparison criteria used in Phase I with further explanations of each. The weightings used in scoring the incentives are listed in brackets.

In the original discussions, two further criteria were included related to legislative complexity and compliance with EU law. Discussions with legal experts and the wider group suggested that none of the incentives faced significant barriers in either of these respects with the exception of VAT (due to on-going EU discussions). As such, these criteria were subsequently removed from the scoring matrix. Removing these scores had no effect on which incentives were in the top four of the rankings.

1. **Is the incentive likely to be politically/publically acceptable?**
   Is the incentive going to be acceptable to politicians, the public and the press? This was considered to be amongst the most important of the criteria (3).

2. **Will it drive uptake in owner occupied housing sector?**
   To what extent is the incentive likely to drive demand for retrofit amongst owner occupiers? With a number of drivers already in place in other sectors of the market, this was considered to be the most important of the "uptake" criteria and was therefore given a high weighting (3).

3. **Will it drive uptake in private rented housing sector (PRS)?**
   To what extent is the incentive likely to drive demand for retrofit in privately rented properties? Due to existing drivers in this sector, and the relative focus of the project on the owner-occupied market, this criterion was given a relatively low weighting (1).

4. **Will it drive uptake in the social housing sector?**
   To what extent is the incentive likely to drive demand for retrofit in social housing? Again, due to existing drivers in this sector, and the relative focus of the project on the owner-occupied market, this criterion was given a relatively low weighting (1).

5. **Does it have the potential to positively influence the value of efficient homes?**
   Does the incentive have the potential to put a value on energy efficient properties? This was given high relative importance due to the fact that reaching a point where property prices reflected energy efficiency is generally considered to be something of a "Holy Grail" for energy efficiency policy (3).

6. **Can it reasonably be designed cost neutral to Government?**

Can the incentive reasonably be constructed so as to have a zero (or near zero) *direct*[70] impact on Government revenues? In the light of the current constraints to Government spending, set against the potential for effective incentives to increase overall tax revenues and GDP, led to a medium weighting being assigned to this criterion (2).

7. **Does it minimise adverse distributional effects?**
   Is the incentive progressive, avoiding disadvantaging poorer households, or disproportionately benefitting richer households? This was considered to be of medium importance compared to other criteria (2).

8. **Will it provide confidence in the retrofit market for the industry and investors?**
   Does the incentive provide confidence to the market that there will be significant and long-term demand for retrofit? Given the scale of retrofit required, the need to drive investment was considered of upmost importance (3).

9. **Has it got relevant past or international precedents?**
   Are there examples of this incentive working in practice in the UK or internationally? While helpful to provide proof of concept to policy-makers, this was not considered to be vital (1).

10. **Will it have positive effects on fuel poverty?**
    Is the incentive likely to reduce the level of fuel poverty? This was considered to be of medium importance due to the existence of other policies in this area (2).

11. **Could it be designed to have low administrative burden?**
    Is the incentive likely to have low administrative cost? In light of the current administration's focus on minimising red-tape, and "small government", this was given a medium weighting (2).

12. **Does it provide long-term incentives for improving energy efficiency/saving?**
    Does the incentive provide an incentive to households to keep improving their homes, or continue saving energy? In light of the need to incentivise on-going reductions household energy use, this was assigned a medium weighting (2).

13. **Will it encourage whole house retrofit?**

[70] I.e. excluding secondary effects on GDP and increases to tax revenues.

Does the incentive encourage households to undertake whole-house retrofits? In the light of climate and energy goals, driving the uptake of packages of measures was considered vital (3).

14. **Is it likely to be compatible with other policies/mechanisms?**
    Does the incentive fit easily within the existing policy landscape? Ensuring that options are easily compatible is important, but was not considered to be a major barrier if unachievable (1).

15. **Does it incentive retrofit outside the Green Deal?**
    Could the incentive be structured to provide incentives to undertake retrofits outside of the Green Deal framework? This was considered of medium importance due to the fact that not all households would wish to use the Green Deal mechanisms, for a variety of reasons, and yet should still be incentivised to take action (2).

ANNEX C: SCORING MATRIX FOR PHASE ONE COMPARATIVE ANALYSIS

Criteria / Incentive	Weighting	Variable stamp duty	Council tax rebate	Variable council Tax	Energy Efficiency FiT	Low interest loans	Grants/ cash-back	Minimum standards	Salary sacrifice	Reduced VAT
Political acceptability	3	7	8	3	8	8	7	1	8	1
Drives uptake in owner occupied sector	3	6	7	9	7	3	9	10	4	6
Drives uptake in PRS sector	1	3	1	4	4	3	4	0	1	3
Drives uptake in social housing sector	1	1	3	3	6	2	8	5	1	5
Potential to impact house prices	3	8	1	9	3	0	0	5	0	0
Can be cost neutral (to treasury)	2	10	7	9	5	0	0	10	0	0
Minimises adverse distributional effects	2	6	8	4	5	6	5	5	2	8
Provides confidence to industry	3	9	3	9	7	3	3	8	2	7
Has past or international precedents	1	5	10	5	5	8	9	5	9	9
Potential to reduce fuel poverty	2	5	8	2	4	3	3	5	3	3
Low administrative burden	2	8	9	2	5	8	7	2	6	9
Encourages whole house retrofit	3	8	3	8	8	8	7	10	4	7
Compatible with other policies	1	9	8	8	5	10	7	9	8	8
Incentivises retrofit outside the GD	2	10	7	10	8	6	8	10	8	7
Total		220	170	202	191	139	156	203	115	146
Rank		1	5	3	4	8	6	2	9	7

ANNEX D – ECONOMIC MODELLING: RESULTS AND KEY ASSUMPTIONS

The detailed models and analysis underlying this report were developed by Sweett Group (Council Tax and Stamp Duty), and Verco (Energy Efficiency Feed-in Tariff)

Overall Results

Incentive	Stamp Duty Land Tax	Council Tax	EE-FiT
Additional retrofits p.a.	135,195 – 270,402	517,739- 1,480,935	64,598 – 169,464
Additional GDP p.a.	£404m-£807m	£1,520m-£4,421m	£193m - £506m
Additional CO_2 saved p.a.(tonnes)	208,538 – 417,088	812,192- 2,231,594	96,961 - 254,364
Additional MWh saved p.a.	928,447 – 1,856,965	3,746,858 – 10,464,388	173,000 – 455,000
Annual gross benefit / cost to treasury*	£7,247 - £104,934	-£290,705 – £179,286	-£52m – -£273m
Annual additional tax revenue to treasury**	£21m-£41m	£78m-£226m	£10m - £26m

* positive number represents benefit

** i.e from additional VAT etc

- For Council Tax these results are total impacts. In practice, there would be differing impacts at the individual local authority level.
- As EE-FiT employs uses payments over a number of years, the economic modelling looked at the impacts of the incentive over a 10 year period. The annual results used here are taken as an average over the 10 years.
- For both Council Tax and Stamp Duty Land Tax the possible effect that the incentive might have on the householder's property value was not included in the returns because there was no reliable data to propose what this impact might be. However, it is reasonable to assume that it is likely to increase take-up
- For Stamp Duty Land Tax, these results do not reflect a "trigger point effect" – i.e. that household's willingness to retrofit was likely to be higher just before or soon after they move. Again this is likely to have a positive impact on the rate of uptake.

Council Tax assumptions

Sample size	
Lower	Higher
13,672,855 *	21,363,836**

* 64% figure only includes households in the owner occupied sector.

** Higher figure based on England and Wales for all occupied houses.

Discount rate (of benefit from nudge over 10 years)	
Lower	Higher
7%	20%

Nudge factor data								
Council tax band	A	B	C	D	E	F	G	H
Nudge factor	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Neutral point	51	51	51	51	51	52	54	54
Nudge reduction above NP	50%	50%	50%	50%	50%	50%	50%	50%

Other Council Tax assumptions:

- Amount of council tax paid per band
- Distribution of population across different council tax bands based on best reasonable estimate.
- as per the following:

Cost of works increase per CT band							
A	B	C	D	E	F	G	H
100%	100%	120%	130%	135%	140%	150%	160%

Distribution of ECO funding								
	A	B	C	D	E	F	G	H
B	0%	0%	0%	0%	0%	0%	0%	0%
C	0%	0%	0%	0%	0%	0%	0%	0%
D	10%	10%	0%	0%	0%	0%	0%	0%
E	50%	50%	40%	30%	20%	10%	0%	0%
F	80%	80%	80%	80%	70%	60%	50%	40%
G	90%	90%	90%	90%	80%	70%	60%	50%

Stamp Duty Land Tax assumptions

Sample size	
Lower	Higher
1,643,500	3,287,000

SDLT band*	0%	1%	3%	4%	5%	7%
Nudge factor	2.0%	1.8%	1.3%	1.0%	0.6%	0.5%
Neutral point	51	51	52	55	57	57
Nudge reduction above NP	50%	50%	50%	50%	50%	50%

*Value of property assumed to be mid-point of each SDLT band

Increase in cost of work per SDLT band					
1%	3%	4%	5%	6%	7%
100%	120%	130%	135%	140%	150%

ECO funding distribution						
EPC band	1%	3%	4%	5%	6%	7%
B	0%	0%	0%	0%	0%	0%
C	0%	0%	0%	0%	0%	0%
D	10%	10%	0%	0%	0%	0%
E	50%	50%	40%	30%	20%	10%
F	80%	80%	80%	80%	70%	60%
G	90%	90%	90%	90%	80%	70%

Overall assumptions common to both Council Tax and Stamp Duty Land Tax

Split of EPC bands across housing stock	
Energy Rating Band	%
A	0.04%
B	5.16%
C	23.30%
D	38.97%
E	23.33%
F	7.13%
G	2.07%
Source: Land registry	100.00%

- Cost of works, total energy and carbon savings taken from Sweett Group / ACE Research / WRAP 'HERRE (Housing Energy Retrofit and Resource Efficiency) Tool.

- Probability of uptake based on DECC methodology for relationship between subsidy rates and consumer demand for insulation measures source: Final Stage Impact Assessment for the Green Deal and ECO, 2012.

  Both axes of this graph have been extrapolated to investigate the uptake when the subsidy significant outweighs the cost.

- Assumed that EPC bands E – G comprise properties with solid walls (all other EPC bands contain properties with cavity walls).

- Seven dwelling types (assumed to represent the housing stock) were modelled. These were:
  - House – detached
  - House – end terrace
  - House – mid terrace
  - House – semi detached
  - Flat – converted
  - Flat – non residential
  - Flat – purpose built

Dwelling type split across total housing stock	
Dwelling type	Percentage
House - Det	22%
House - ET	11%
House - MT	19%
House - SD	29%
Flat - Converted	4%
Flat - Non-residential	<1%
Flat - Purpose built	15%
Source: English housing survey	100%

The percentage split shown in the table above was applied to the total number of dwellings (21,363,836) to determine the number of each property type affected. Note – further assumptions were made as to the number of each dwelling type within each EPC / CT band.

- Energy savings assumed to increase at DECC central scenario (i.e. per annum). Value of savings discounted at 7%.

- The model applies factors to value the amount of rebate versus penalty (e.g. on the assumption that people prefer to avoid a penalty than attain the equivalent amount as a rebate). The model assumes that the penalty is worth twice the benefit (**Source:** Dolan *et al* 2010)

Energy Efficiency Feed-in-Tariff methodology and assumptions

1 Summary

This analysis has been undertaken by Verco on behalf of the UK Green Buildings Council. It models the predicted increase in uptake of the Green Deal in the UK following the introduction of an Energy Efficiency Feed-in-Tariff (EE-FiT). Subsidies modelled represent a value of between 10% and 50% of the total energy bill savings generated by taking a green deal loan.

The EE-FiT value has been calculated at a percentage of total capital expenditure so that the potential uptake could be derived using information provided in DECC's latest impact assessment. A summary of the final results are shown in Table 1 1.

Table 1.1: Summary of results

Scenario	Annual uptake above BAU (# homes)	Annual carbon savings at the end of year 10 (tCO2/year)	Annual cost to treasury (£m)	Total additional cost to treasury (£m) over full 10 year programme	Cost of additional carbon abatement above base case (£/tCO2)
Base case	-	-	£ -	£ -	£ -
10%	24,589	369,075	£13	£132	£18
15%	64,598	969,613	£52	£520	£27
30%	169,464	2,543,648	£273	£2,730	£54
50%	292,379	4,388,603	£785	£7,851	£89

2. Methodology

2.1 EE-FiT financial modelling

The energy efficiency feed-in-tariff modelled here assumes that a household undertaking the green deal will receive an additional payment which is proportional to the predicted green deal lifetime energy bill savings. The value of this grant is modelled at 10%, 15%, 30%, and 50%. Assuming a Green Deal lifetime of 20years, the total value of the payment would be X% of the annual savings multiplied by 20 years. Half of the grant would be provided upfront and the remainder is split over the first 5 years of the green deal period. This is illustrated in Table 2 1.

Table 2.1: EE-FiT

Scenario	CAPEX	Upfront grant	Annual saving	Annual tariff (years 1-5)
Base case	£ 3,050	£ -	£ 268.51	£ -
10%	£ 3,050	£ 268.51	£ 268.51	£ 53.70
15%	£ 3,050	£ 402.76	£ 268.51	£ 80.55
30%	£ 3,050	£ 805.52	£ 268.51	£ 161.10
50%	£ 3,050	£ 1,342.53	£ 268.51	£ 268.51

The value of this payment is then converted to a Net Present Value (NPV) in order to determine the proportion of capital funding that it being provided. A discount rate of 7% is assumed, no allowance is made for energy price inflation. The two principal scenarios are those where the subsidy is worth between a quarter and a half of the capital costs of the works.

Table 2 2: Calculation of percentage subsidy

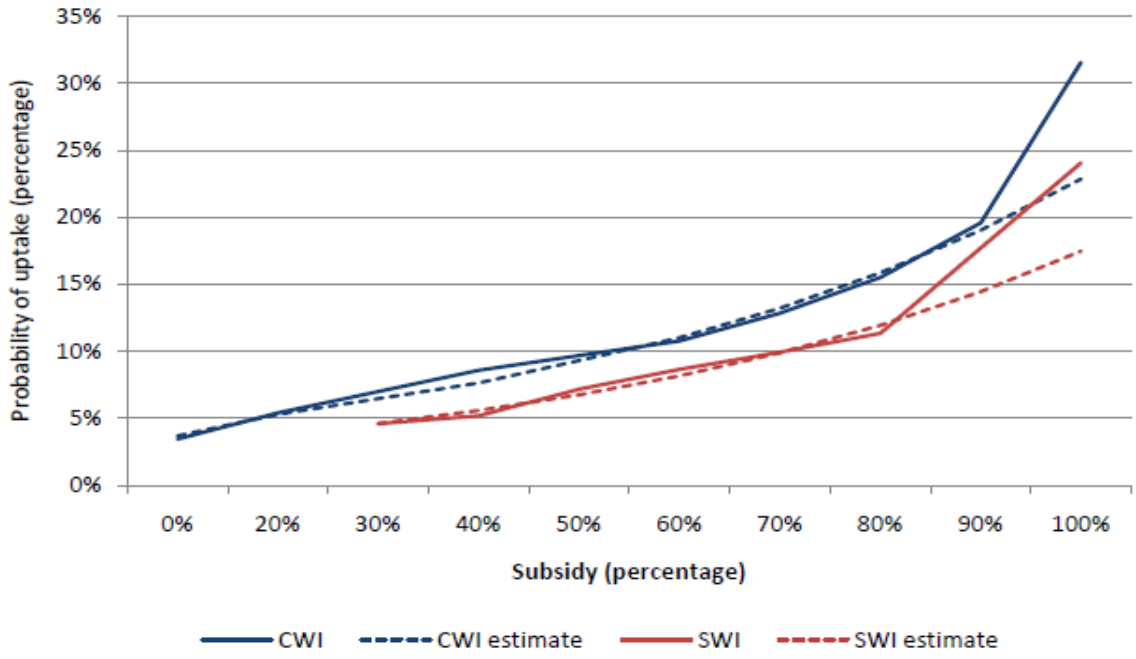
Scenario	CAPEX	NPV (discount rate 7%)	NPV % subsidy
Base	£ 3,050	£0.00	0%
10%	£ 3,050	£488.69	16%
15%	£ 3,050	£733.04	24%
30%	£ 3,050	£1,466.08	48%
50%	£ 3,050	£2,443.46	80%

2.2 Calculating uptake rates

The final impact assessment released by DECC[71] contains results of a consumer preference survey which was used to evaluate the relationship between subsidy rates and consumer demand for insulation measures. Results were presented as probability of uptake against the percentage of the subsidy awarded; the results are shown in Figure 2 1.

Figure 0-1 Figure 34 from the DECC Impact Assessment: Relationship between subsidy rates and consumer demand for insulation measures.

Figure 34 Relationship between subsidy rates and consumer demand for insulation measures



By comparing the actual results with a prediction based on the lower rates of subsidy the following relationship was established.

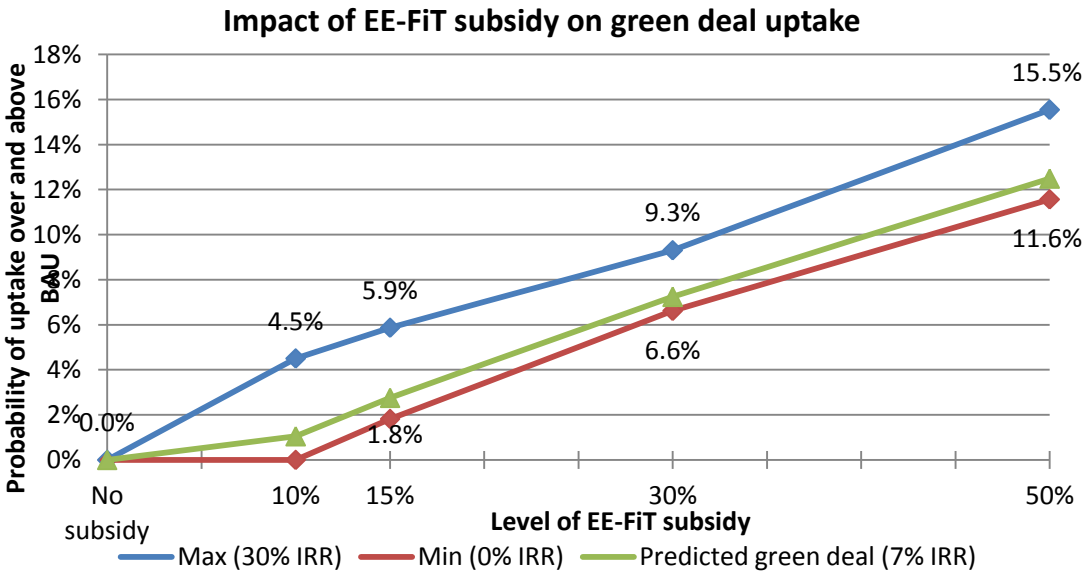
The EE-FiT grant was then converted to an NPV, the proportion of the NPV compared to the upfront capital cost has then been equated to the percentage subsidy in the results presented in Figure 2 1. The graph shows two different types of insulation measure:

1. Cavity wall insulation, a low-hassle measure with an expected internal rate of return of approximately 30% (shown in blue)
2. Solid wall insulation, a high-hassle measure with an expected internal rate of return of approximately 0% (shown in red).

[71] Final Stage Impact Assessment for the Green Deal and Energy Company Obligation; November 2011

As the average green deal package is expected to be a mixture of high and low hassle projects, with a rate of return of 7% or higher, a new line was added to this curve to approximate probability of uptake of the green deal for a range of percentage subsidies. This new line was then used to inform the results of this analysis.

Figure 0-2: Estimating the impact of EE-FiT subsidy on green deal uptake



3 Results

Table 3 1 and Table 3 2 show the expected uptake rates that would be associated with an energy efficiency feed-in-tariff. Results are presented both for year one and for a ten year programme.

Table 3.1 Expected uptake rates and carbon savings

Scenario	Uptake probability for Green Deal (at 7% IRR)	Annual uptake above BAU (# homes)	Uptake above BAU over 10 years (million homes)	Annual carbon savings at the end of year 10 (tCO_2/year)	Expected lifetime carbon savings (total between years 0 and 30) ($MtCO_2$)
Base case	0.0%	-	-	-	-
10%	1.1%	24,589	0.25	369,075	7
15%	2.8%	64,598	0.65	969,613	19
30%	7.2%	169,464	1.69	2,543,648	51
50%	12.5%	292,379	2.92	4,388,603	88

Table 3.1 displays the uptake probability for the green deal as derived using the proportional value of the NPV subsidy and the uptake curve predicted in Figure 2 2.

A 50% EE-FiT subsidy represents an 80% subsidy to the homeowner in the typical Green Deal scenario modelled here. 292,379 homes annual represents 24,365 homes per month. In 2012, the number of recorded cavity wall insulation installations was approximately 45,000; these installations were mostly completed using high levels of CERT and CESP funding, often with 100% funding. Considering that the green deal installations are likely to have a higher hassle factor and the NPV subsidy is lower, the results of this study are plausible.

The results in Table 3 2 show the cost to treasury whilst Table 3 3 summarise the costs and benefits for the two principal scenarios As EE-FiT represents a direct grant, the figures will not be revenue neutral to Treasury in the same way that council tax or stamp duty subsidy mechanisms could be. However around 10-20% of the EE-FIT costs could be recovered through increases in VAT based on a rate of 5%. Furthermore, the macroeconomic benefits far outweigh the cost of the incentive with annual GDP benefits 2-4 times greater than the cost as a result of expenditure within the supply chain and the reduced expenditure on imported fuels.

Table 3.2 Expected total cost to treasury and cost of carbon abatement			
Scenario	Annual cost to treasury (£m)	Total additional cost to treasury (£m) over full 10 year programme	Cost of additional carbon abatement above base case (£/tCO_2)
Base case	£ -	£ -	£ -
10%	£13	£132	£18
15%	£52	£520	£27
30%	£273	£2,730	£54
50%	£785	£7,851	£89

Table 3.3 Summary of costs and benefits						
Incentive	**Additional* retrofits p.a.**	**Additional GDP p.a.**	**Additional MtCO2 saved p.a. after 10 year programme**	**Additional kWh saved p.a. after 10 year programme**	**Annual gross cost (to treasury)**	**Annual additional tax revenue to treasury (i.e. from additional VAT)**
EE-FiT (15% tariff; 24% NPV subsidy)	64,598	£193m	1.0	173m	£52m	£10m
EE-FiT (30% tariff 48% NPV subsidy)	169,464	£506m	2.5	455m	£273m	£26m

4 Key assumptions

Using information derived from the analysis undertaken for the Energy Bill Revolution, the following assumptions have been made:

Average capital cost of a green deal package (£)	£3,050
Annual energy bill savings (£/year)	£268.51
Annual carbon savings/property (kgCO2/property/year)	1,501
Green Deal lifetime (years)	20

To extrapolate the final results, the total number of homes in England and Wales has been taken as 24.5 million. This is derived from the following sources:

England [72]	23.1m
Wales[73]	1.4 m
Total	**24.5m**

[72] 31st March 2012: https://www.gov.uk/government/publications/dwelling-stock-estimates-in-england-201
[73] 31st March 2012: http://wales.gov.uk/topics/statistics/headlines/housing2013/dwelling-stock-estimates-2011-12/?lang=en

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ACE
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