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North London Sub-regional Housing Stock Analysis and Business Plan

climatechangesolutions

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Glossary

Asset backed or securitised bonds – similar to ordinary bonds but have specific assets whose revenues pay the interest and principal. An ordinary bond's payments are generally guaranteed by the company that issues them. In asset backed or securitised bonds a set of revenue generating assets are put into a special purpose company and these assets pay the bond holder their interest and principal.

Bonds – can variously be described as IOUs, loans or debts. They are similar to bank loans, but generally last longer (from one year to over 30 years). When institutions, companies, governments and other entities want to raise long term finance but do not want to dilute their shareholdings (or, indeed, cannot issue share capital), they turn to the bond markets. The biggest investors in the UK are the insurance companies and pension funds. They buy bonds to generate return, offset their liabilities, generate income or diversify their portfolios.

Corporate Finance – debt provided by banks to companies that have a proven track record, using "on-balance sheet" assets as collateral. Most mature companies have access to corporate finance, but have limited total debt loads and therefore must rationalise each additional loan with other capital needs.

Cost of Capital – the weighted average of a firm's costs of debt and equity, in turn linked to risk involved in the underlying project or company. From an investment perspective, to be worthwhile, the expected return that an investor receives for putting money at risk must be greater than the cost of capital.

Credit ratings – there are three major rating agencies, Moody's, Standard and Poor's (S&P) and Fitch. They all have similar rating categories, which reflect the likelihood of default or a rating changing.

Debt – securities such as bonds, notes, mortgages and other forms of paper that indicate the intent to repay an amount owed. A cash payment of interest and/or principal is made at a later date. This is in contrast to an equity investment where there is an exchange of shares of common stock, or ownership of the company.

Debt to Equity – this ratio simply indicates the amount of debt from banks and the amount of equity from the various sources in a given project. Owners will generally want to introduce debt into a renewable energy project to reduce the overall cost of funds and enhance their returns, given that debt is cheaper than equity as it takes a lower risk position.

Discount rate - The discount rate is used to convert all costs and benefits to 'present values', so that they can be compared. The discount rate which is used in financial calculations is usually chosen to be equal to the Cost of Capital.

Equity – an investment in exchange for ownership of a company entitled to the earnings of a company after all other investors (e.g. debt-holders) have been paid. Gilt – a bond issued by the UK Government

Institutional Investors – includes insurance companies and pension funds, which tend to invest large amounts of money over a long time horizon with lower risk appetite.

Internal Rate of Return (IRR) – is used for each potential project as a key tool in reaching investment decisions. It is used to measure and compare the profitability of investments. Funds will generally have an expectation of what IRR they need to achieve, known as a hurdle rate. The IRR can be said to be the earnings from an investment, in the form of an annual rate of interest.

Junior debt - Debt that is either unsecured or has a lower priority than that of another debt claim on the same asset or property, also called Subordinated Debt.

Mezzanine finance – as its name implies, this type of lending sits between the top level of senior bank debt and the equity ownership of a project or company. Mezzanine loans take more risk than senior debt because regular repayments of the mezzanine loan are made after those for senior debt; however, the risk is less than equity ownership in the company. Mezzanine loans are usually of shorter duration and more expensive for borrowers, but pays a greater return to the lender (mezzanine debt may be provided by a bank or other financial institution). A renewable energy project may seek mezzanine finance if the amount of bank debt it can access is insufficient: the mezzanine loan may be a cheaper way of replacing some of the additional equity that would be needed in that situation, and therefore can improve the cost of overall finance and thus the rate of return for owners.

Net Present Value (NPV) - NPV is a central tool in discounted cash flow (DCF) analysis, and is a standard method for using the time value of money to appraise long-term projects. The NPV of a time series of cash flows, both incoming and outgoing, is defined as the sum of the present values (PVs) of the individual cash flows.

Non-recourse Project Finance or Limited Recourse Finance – debt is borrowed for a specific project, the amount of debt made available will be linked to the revenue the project will generate over a period of time, as this is the means to pay back the debt. This amount is then adjusted to reflect inherent risks, e.g. the production and sale of power. In the case of a problem with loan repayment, rather like a typical mortgage, the banks will establish first "charge" or claim over the assets of a business, as described above. The first tranche of debt to get repaid from the project is usually called "senior debt".

Private Finance Initiative (PFI) – is a way of creating "public private partnerships" (PPPs) by funding public infrastructure projects with private capital. Developed initially by the Australian and United Kingdom Governments, PFI projects aim to deliver infrastructure on behalf of the public sector, together with the provision of associated services such as maintenance.

Public-Private Partnership (PPP) – a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. PPP involves a contract between a public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project.

Refinancing – this is where a project or a business has already borrowed money but decides, or needs, to replace existing debt arrangements with new ones, similar to refinancing a mortgage. Reasons for refinancing include: more attractive terms becoming available in the market (perhaps as lenders become more familiar with the technology, meaning more money can be borrowed against the asset); or the duration of the loan facility, e.g. loans are often structured to become more expensive over time because of the increasing risk of changes to regulation or market conditions. One of the results of the financial crisis was that banks became extremely reluctant to lend for more than six or seven years, which "forced" projects that required longer-term loans to refinance in the future, and take the risk of the terms available at that time.

Securities - A security is generally a fungible, negotiable financial instrument representing financial value. Securities are broadly categorized into debt securities and equity securities. They include shares of corporate stock or mutual funds, bonds issued by corporations or governmental agencies, stock options or other options, limited partnership units, and various other formal investment instruments that are negotiable and fungible. Commercial enterprises have traditionally used securities as a means of raising new capital. In recent decades, securities have been issued to repackage existing assets.

Special Purpose Vehicle (SPV) – a discrete business created around a project, in a legal form, to permit lending and equity investments, disconnected from other obligations or activities of a company. For example, a utility forming a joint venture with a partner will use an SPV as a clean legal structure for the enterprise. From a bank perspective providing project finance into an SPV can ensure it has uncontested rights over the assets, an equity investor will invest into an SPV often restricting its obligations to that SPV company and not linking it to the ownership of other activities of the investor.

Underwriting and Syndication – A lead bank agrees to provide a large bank debt facility to a client for a particular project, but the loan will be larger than the bank itself can provide on its own for the long term. The bank receives a fee from the client for providing, or underwriting, the whole facility at the outset and taking the risk that it can "sell" pieces of the agreed loan to other lenders required ("syndication"), on terms and pricing already agreed with the client. The underwriting bank takes the risk that it has achieved the right balance of risk and return to attract enough other lenders into the transaction.

Executive Summary

Introduction

A consortium of six London Boroughs[1] has been created as part of DECC's Local Carbon Framework Pilot (LCF) to develop a cross-borough retrofit partnership. Camco has been appointed to develop an understanding of the technical potential and the investment opportunity for an area-based housing retrofit programme to help achieve the ambitious medium and long term CO_2 reduction targets set within the sub-region.

Our approach has been first to analyse the CO_2 reduction potential at dwelling level for the predominant archetypes in the sub-region. This has largely focussed on fabric energy efficiency measures and heating system upgrades that are potentially eligible measures for financing through the Green Deal. Two distinct retrofit packages have been analysed for each archetype – an optimised and an advanced package. Within the optimised package, all measures pay for themselves over 25 years through the savings on the energy bill. A minimum project internal rate of return of 7% has been set. Within the advanced package, measures are added to the optimised package that are less cost effective but do further reduce CO_2 emissions. Priority dwellings (high, medium and low) have been defined based on parameters such as absolute CO_2 savings, capital costs, and the cost of abating a tonne of CO_2. Priority areas for intervention have then been defined taking into account the coverage of priority dwellings within the area, socio-demographic profile and current status in terms of basic energy efficiency measures being installed. For each of the archetypes, discounted cash flow analysis has then been carried out to assess the financial viability of investing in energy upgrade packages.

The pros and cons of alternative delivery models have been appraised and indicative rates of return for the alternative options have been modelled. Feedback has been sought from sub-regional local authorities and from policy makers as well as potential Green Deal investors and providers. The main risks and barriers to implementation have been considered. Desktop research on customer take-up rates, skills and supply chain development in the sub-region has additionally been carried out. An action plan has then been developed that outlines the strategy, financial forecasts and outcomes from a 10 year programme, along with a procurement and marketing strategy for delivering such an initiative.

Maximum technical potential for CO_2 reduction from existing housing stock

It was found that there is substantial technical potential for cost effective CO_2 reduction under Green Deal. If optimised cost-effective energy efficiency packages were installed in every home in North London then emissions could be reduced by 27% in the housing sector.

If advanced energy efficiency packages were installed in every home then emissions could be reduced by 39%. In general these packages would not be expected to payback. The property types with high Green Deal potential are pre-1980 terraced and semi-detached gas heated properties with either solid or cavity wall construction that have not had even basic energy efficiency measures (e.g. loft and cavity wall insulation) installed to date, and pre-1980 electric heated solid wall flats again with no energy efficiency measures installed. These property types typically offer absolute CO_2 savings of more than 2tCO_2 per annum from the optimised package (or a saving over 50% against baseline emissions).

The property types with medium Green Deal potential are pre-1980 gas heated solid and cavity wall flats without basic energy upgrade measures installed, pre-1980 electric heated cavity wall flats without basic energy measures installed, and pre-1980 electric heated solid wall flats with basic CERT measures installed. These property types typically offer absolute CO_2 savings of 1-2 tCO_2 per annum from the optimised package (or a saving of 30-50% against baseline emissions).

The distribution of this opportunity across the study area shows that there are substantial opportunities in all six boroughs with particularly strong coverage in Haringey and Camden.

[1] Camden, Hackney, Haringey, Islington, Newham and Waltham Forest. Originally, the sub-regional approach focussed on the six official local authorities in North London. However, Newham has subsequently been included in the study area and therefore reference to North London sub region is deemed to include Newham and exclude Enfield.

For the whole sub-region, total carbon savings from the optimised package, applied to each dwelling, results in an annual carbon saving of nearly 730,000tCO_2. With the advanced package, the annual carbon savings are over 1 million tCO_2. The capital cost associated with implementing the optimised package for all dwellings is over £1.8bn, and over £8.2bn for the advanced package.

The weighted average cost of the optimised package across all dwelling types in the sub-region is approximately £3.6k per dwelling. However, if only the dwelling types with 'high' and 'medium' Green Deal potential were considered, the average cost of the optimised package is around £6.2k per dwelling.

Financial viability of energy efficiency packages

The optimised packages are designed to deliver an IRR of 7%. In contrast, the advanced packages do not offer a return on investment for a number of property types (typically those that have had some basic energy efficiency measures already installed) or a marginally positive IRR in case of others. The weighted average IRR for the high and medium priority dwellings is about 0.2%. This provides an indication of the funding gap required to deliver the deep cuts in CO_2 emissions targeted at the sub-regional and national level.

Uptake rates

On the basis of evidence on customer willingness to pay, the base case customer uptake rates are likely to be around 10% for optimised packages and 5% for advanced packages. It should however be noted that to date there has been only limited market testing of the likely consumer response to Green Deal type packages. The most comprehensive study published to date was undertaken by Quadrangle in April 2009 for the Energy Saving Trust & Department for Energy & Climate Change, entitled 'Willingness to Pay'[2]. The headline findings were generally supported by a second smaller exercise undertaken the Great British Refurb Campaign, entitled 'Green Deal – public appetite market research', undertaken in August 2010[3].

At an IRR of 7%, these uptake rates will deliver housing sector CO_2 reductions of 4% for the high and medium priority dwellings at a total capital investment of around £575m.

Without local authority intervention, it is estimated that private sector investment will target projects with the greatest rate of return (IRR over 10%). This would mean that the package of measures funded through Green Deal will be smaller and limited to more simple energy efficiency measures. For the high and medium priority dwellings, it is estimated[4] that CO_2 reductions will drop to around 2.6% assuming the uptake rates mentioned above. However uptake rates under this scenario may also drop as many households may not want to pay a higher interest rate.

Under an optimistic scenario with local authority investment, the uptake rates for private housing could double whilst social housing uptake could increase to 50% for optimised packages and 20% for advanced packages. This will require resolution of consent issues being discussed by the DECC Maximising Energy Efficiency in Buildings: Social Housing sub-group. The level of capital investment would increase to ~£1.6bn in both the private and social housing and deliver housing sector CO_2 reductions of 11%. This suggests a clear need for LA role in housing refurbishment in order to deliver CO_2 reduction targets, in particular around facilitating access to low cost finance.

Overall, a broad mix of measures and initiatives (including easy wins such as cavity and loft insulation plus other low cost upgrade measures, renewables financed through FITs and RHI) combined with the progressive decarbonisation of the grid will deliver around 18% reduction in CO_2 emissions for the

[2] *Quadrangle, 'Willingness to Pay – Full Project Debrief', Commissioned by Energy Saving Trust / Department of Energy and Climate Change, April 2009* http://www.energysavingtrust.org.uk/About-us/Media-centre/Library/Publications-and-reports/Exploring-consumer-willingness-to-pay

[3] *Great British Refurb Campaign; Grand Designs, 'Green Deal – Public Appetite Market Research', 21 September 2010* http://www.greatbritishrefurb.co.uk/images/pdfs/gbr-greendealmarketresearch.pdf

[4] *The percentage CO_2 reductions have been estimated based on the assumption that the cost of carbon abatement is similar for both with and without LA intervention scenarios.*

housing sector compared to the current baseline under the realistic scenario. For the optimistic scenario, this increases to 25% reduction in CO_2 emissions in the housing sector.

Springboard for growth

In order to deliver this, the development of skills within the sub-region would be an important consideration. Estimations of job creation potential suggest that in the base case scenario, around 600 FTE jobs could be retained or created, rising to around 1050 jobs for the optimistic scenario. These are 'direct jobs' associated purely with installation of the measures and it is expected that retrofit measures will create additional associated jobs (such as administration, energy advice, manufacture and retail of products) which are likely to be supported elsewhere in the supply chain. With regard to training, a new approach is needed that takes the whole house into consideration as the household energy efficiency industry and trades have traditionally operated separately from each other. We recommend that partnerships are established with local providers of skills training to ensure that demand for both existing and new courses can be met.

Additional benefits could be the reduction in resident energy bills by £2.8m per annum for the base case scenario (or around £370/yr on an average per dwelling), rising to £5.3m for the optimistic scenario.

Local Authority Role in delivering Green Deal

The role of local authorities in delivering Green Deal initiatives will depend on a range of factors including the availability of finance and internal resources, appetite for risk, and the degree of control desired to realise social and environmental benefits, among others. The key advantages of local authority involvement are

- Their focus on delivering wider social, economic and environmental benefits, such as mitigating fuel poverty, promoting local jobs and skills, and maximising CO_2 savings. Such a focus would help develop local supply chains and related green jobs, thereby creating a positive multiplier in the area and delivering multiple benefits. It will also demonstrate community leadership in tackling social and environmental problems, with the local authority seen to taking an active rather than a passive approach.
- A clear social agenda when developing an investment portfolio, thereby creating a more balanced portfolio with potential to reinvest the benefit from high Green Deal potential properties (or other initiatives) to more hard to treat/ fuel poor properties. Where left entirely to the market, there is a risk of private sector cherry picking the most 'optimal' properties.
- Ability to deliver area-based programmes. Evidence from similar schemes suggests that this will help both to reduce the capital cost of work packages as well as encourage uptake rates.
- Lower expectations on financial return which in turn will translate into lower interest rates for consumers and will further drive uptake rates.

Alternative delivery models

Four models have been examined covering a range of risk and reward for the LAs. Each has been compared with reference to an 80,000 home 10 year refurbishment programme. The public sector discount rate has been assumed to be 6% and quoted NPV figures are pre-tax. The weighted average capital cost of measures is assumed to be £6.2k per household with Green Deal repayments of £500 per annum for 25 years.

Summary of advantages and disadvantages of alternative delivery models		
Delivery model	**Advantages**	**Disadvantages**
Model A- Public Sector Development Company or project	- Small LA investment (revenue funding to cover staff time and marketing materials) could lever substantial capital receipts plus private sector investment - High replicability - Model can support a range of initiatives - Flexibility regarding financing structure (on or off balance sheet)	- Gives least control over the delivery of project objectives - Need to balance trusted advice and sales - Requires strong rights to projects - Need partnering with Green Deal provider to ensure smooth follow up - Grant rules around recycling revenue
Model B - First Loss Guarantee Fund	- Borrowing secured against the guarantee fund - Reduces cost of capital and increases uptake - Maximses leverage of private sector debt finance - Potentially minimises balance sheet burden for LA - As payments are made, fund revolves	- Requires acceptance from high street banks to see lower interest rates - Needs clear framework to manage risks downstream - Generates modest income for LA - Less 'hands on' than other models
Model C - Public Sector Ownership of Assets through Special Purpose Vehicle	- Ring-fenced risk - Effective way to pool resources - SPV investment cost wrapped into vehicle - Gives clear exit strategy – SPV can be re-financed but will require bundling - Approach similar to PFI projects and highly replicable	- Minimum £20m transaction - Higher finance costs than on-balance sheet - Requires heavy-duty due-diligence - Supports investment in discreet tangible assets owned by SPV
Model D - Public Sector Ownership of Assets on balance sheet	- Lowest cost finance - Low set-up costs - Flexibility on type and scale of initiatives - Relatively less lead-in time to get initiatives running on ground - High replicability for LAs own-assets	- Maximises public sector borrowing - Burdens local authority balance sheet - Applicability limited by gearing covenants - EIB requires intermediary - min £100m - EIB Requires match-funding and can only support private housing - Less suited to private housing

Model A (development model) focuses on front end customer acquisition with the LA using its trusted position to educate the public, explain how Green Deal will work, provide common information across the borough and generate leads through door-knocking and customer advice. This model gives least control over the delivery of project objectives including CO_2 reduction, job creation etc, and does least to help the market with public sector investment over the long term at low interest rates. There is a risk with this model that the Green Deal providers will cherry pick investments with the highest rate of return in order to meet private sector target returns on investment. It would require LA investment of ~£43m and could deliver an IRR of 7%. It is relatively low risk but will rely on private sector Green Deal providers picking up substantial leads in order to cover the LA costs.

Under Model B (guarantee fund), the LA establishes a first loss guarantee fund to underwrite the risk of non-repayment from Green Deal contracts, and to lever in bank debt to fund measures. The bank would use the fund as security – effectively viewing the fund as an equity investment into the project. This model potentially provides good leverage on public sector money but in practice project risks will still need to be managed and therefore the fund management costs could be similar to those of an SPV. Its high gearing with private sector capital is most likely to be possible once the market matures and banks understand the true costs, benefits and risks. Until this point, the bank interest rates could remain relatively high therefore there will again be a tendency to cherry picking investment with the greatest return.

Local authority investment would be £58million over 10 years. The model suggests an IRR of 6-7% would be achievable. At a discount rate of 6% the Net Present Value would be up to £3.9m.

Model C (SPV) is the classic project finance structure where a Special Purpose Vehicle is established to channel investment and manage risk. Banks will typically provide non-recourse project finance for up to 70% of the project value with the remaining 30% equity and/or junior debt investment coming from LAs. The model provides a clear exit strategy for the LA, with the project activities carried out within a clearly defined legal entity that would likely sit off balance sheet and could readily receive private sector investment. However, high set up and due diligence costs (the order of £1-2m) suggest a need for scale. Because the bank has limited recourse in the event of project failure, the interest rates will be higher than other routes.

Two versions of this model have been created. The first is for a public sector SPV where bank debt is provided at public sector rates over 25 years. The second is for a commercial SPV where bank debt is provided at commercial rates over 15 years. In both cases, local authority direct investment (excluding bank debt) is £177m over ten years. For the public sector SPV, the model suggests an IRR of 10% would be achievable. At a discount rate of 6% the Net Present Value would be £53m.

For the commercial SPV, the model suggests an IRR of just over 6% would be achievable. At a discount rate of 6% the Net Present Value would be £7.5m. The lower NPV is due to higher bank charges and the shorter term.

Under Model D (on balance sheet investment) Local Authorities fund measures on their own balance sheet through their own reserves or prudential borrowing from the Public Works Loan Board (PWLB), which potentially could be matched with grants or other sources of low cost finance (such as from the European Investment Bank). This approach is simple to implement, has the lowest set-up costs and benefits from low cost funding from PWLB. On the downside, the model maximises public sector borrowing, burdens the LA balance sheet and is arguably harder to refinance unless the contracts have been set up around future funders' needs.

Local authority investment is £587m over ten years. The model suggests an IRR of 6.5% would be achievable. At a discount rate of 6% the Net Present Value would be £20m.

Market testing with banks and investors has indicated a preference for the SPV model (Model C) in order to receive private sector investment. Projects developed on balance sheet must be established with the needs of the banks in mind should it be desirable to secure private investment at a later date. Levels of gearing under the guarantee fund model would be an important consideration, especially under current market conditions with a minimum 10% equity requirement.

Market testing with potential Green Deal providers has suggested a preference for Model A largely due to the Local Authority brand value that it brings. Discussions have however highlighted the need to partner early on in the process with Green Deal providers to ensure the customer journey is smooth and the contracts can be closed with minimal time lag. The other reason cited for early partnering approach was that Model A would require a commercially astute front-end function to push sales, which is currently not attributed to LA culture. Secondly, the discussions have stressed the need for clarity around procurement rules, for instance, where potential leads are passed on to the private sector to ensure that quality and customer satisfaction is not compromised.

Risk and barriers

There are a number of important areas of risk that need to be managed.

Green Deal Policy

One of the biggest areas of uncertainty is policy risk surrounding the Green Deal. Although primary legislation was entered into the Energy Bill laid before Parliament at the end of 2010, secondary legislation is still being drafted, with Royal assent expected at the end of 2011. Green Deal as a finance mechanism is expected to be in place from the end of 2012 and there is substantial work remaining to resolve important details. The definition of eligible measures will affect the scope of works, the packages to be offered and the priority houses to target. The calculation method for Green Deal payments will affect the financial appraisal including the ability to link payments to inflation. The quality assurance and accreditation process will affect the set up process and associated costs whilst the timing of the Green Deal legislative programme and subsequent launch will affect the amount of work to be done in advance

in preparation. Again, the level of incentives offered for different tenures will impact uptake rates. In order to mitigate these risks it will be important to maintain a flexible strategy that can accommodate changes in policy. Funding should be sought for ongoing preparation and development work and there should be a continuous dialogue with DECC.

Industry appetite

From our market testing is clear that the potential Green Deal providers have yet to settle on a preferred business model including whether or not to provide finance as well as install measures. This will affect the importance of LAs providing funding for projects and programmes. There is uncertainty surrounding their target market which will affect their suitability for partnering with the LAs to deliver their objectives. In order to mitigate these risks it is important for the LAs to settle on their own preferred role in Green Deal delivery and then procure their partners as appropriate. It will be important to maintain some flexibility for the business model to evolve as the Green Deal policy framework is settled and the industry's response becomes clearer.

Customer appetite and uptake rates

There is a significant risk that without effective incentives in place, the customer appetite for Green Deal will be low and take up rates will fail to match LA expectations. There are Green Deal working groups looking at this topic however it is currently not clear what incentives, if any, will be put in place to drive the market. The impact of this risk is that LA investment in set up and development costs could fail to deliver a pipeline of tangible investments with the associated return for the LAs whether through referral fees or return on capital invested directly into projects. There is also a risk that the programme will not deliver its expected contribution to meeting carbon emission reduction targets. In order to mitigate these risks it is important to adopt an area-based approach to increase uptake rates and select strong delivery partners to make this happen. It is also advised to track policy developments closely to understand what incentives are being considered more broadly at the national level and what local incentives would best compliment these. It will also be important to implement an effective marketing plan as outlined in this report.

Finance and costs

There is significant risk attached to the capital cost of implementing Green Deal measures. There are reference figures that have been used for the analysis in this report however there is also evidence from pilot projects[5] that there can be substantial hidden costs in any domestic refurbishment costs. Every house is different and refurbishment projects can be complex and require the resolution of technical problems on site during works. This can lead to price uncertainty and threaten payback periods established through theoretical models. In order to mitigate this risk it will be important to establish fixed price contracts with Green Deal providers and ensure that the energy assessment process is considered and reliable.

A separate but equally important consideration is the degree to which energy price inflation and other inflation –linking (indexation) of Green Deal payments can take place. This has a significant effect on the return on investment for those paying for capital measures and will therefore have an important effect on the viability of the business models examined in this report. This risk can be mitigated by staying close to policy developments and evolving the business model accordingly. For example if index linking is limited then it will be important to prioritise projects with the greatest return.

Other financial risks include the ability to fix long term borrowing rates for money invested into Green Deal projects; the levels of defaults on Green Deal payments and risks associated with the acute budget pressures in the public sector. The impact of these risks is that, depending on the model adopted, the LA may be exposed to first losses on repayments and interest rate risks, leading to lower returns than expected. To mitigate these risks it will be important to fix long term costs of finance for onward investment in projects, choose the projects with a good IRR and maximise the attraction of ECO subsidy and other grant funding.

[5] *Radian Group, Retrofit South East*

Action Plan

In order to deliver this, a programme has been developed that would allow the boroughs to begin with common, low investment, low risk activities that prime the market and maintain future options for delivery as the market evolves. There are some key benefits of sub-regional local authorities working together to deliver this – achieving economies of scale through joint procurement; sharing and pooling of resources to reduce overhead costs; sharing knowledge, and generating the required scale of investment opportunity, for instance, for an SPV or a guarantee fund.

Initial work should focus on data gathering, education and customer awareness. An estimated budget for these activities would be £500k over 12-18 months.

The authorities should then focus on acquiring customers for initial pilot projects within priority areas. There are a number of options for how this could be done, potentially through an extension to the LDA's RE:NEW programme.

This will involve partnering with operating companies to deliver works. For those authorities that have access to capital and the appetite to invest, pilot projects should be funded directly from LAs in order to reduce setup costs, simplify customer relationships and bring important anchor investment to a new market at low interest rates.

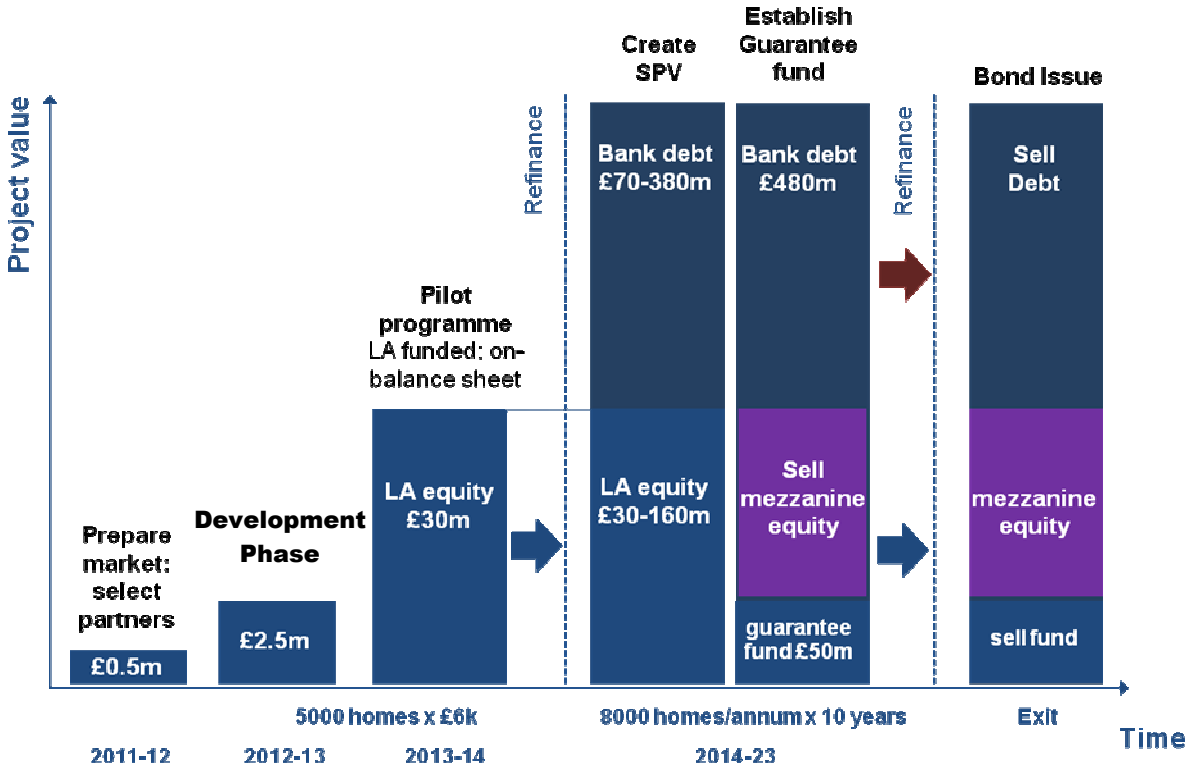
For those authorities without the resources or appetite for doing this, they should either partner with the GLA or a neighbouring authority to carry out this service or identify a private sector Green Deal provider who would also provide or arrange investment capital at an appropriate price.

Projects established on balance sheet should be structured in such a way that they could then be moved into an off balance sheet SPV to bring in private sector investment in the form of either debt or equity. This would allow the programme to scale up and ring fence project risks and liabilities.

In time, the LAs could then ramp down their investment by selling their equity stakes to other public or private sector investors. Short term project debt from banks could be replaced with bond issues.

A detailed procurement strategy, timeline and marketing strategy is set out within the report.

Figure 1 Overview of the proposed strategy



1 Introduction

A consortium of six London Boroughs has been created as part of DECC's Local Carbon Framework Pilot (LCF) to develop a sub-regional retrofit partnership. The aim of the LCF pilot is to understand the extent to which CO_2 emissions reduction can be achieved by working together at sub-regional level. The sub-regional approach was adopted with the objective of generating a scale of investment opportunity that is capable of attracting private sector investment and supports the development of the local supply chain to serve this sector. Originally, the sub-regional approach focussed on the six local authorities in north London. However, Newham has subsequently been included in the study area and therefore reference to North London sub region is deemed to include Newham and exclude Enfield.

Camco has been appointed to develop an understanding of the technical potential and the investment opportunity to deliver an area based retrofit programme to help achieve the ambitious medium and long term sub-regional CO_2 reduction targets. To inform this, our approach has been first to analyse the CO_2 reduction potential at dwelling level for the predominant archetypes in the sub-region. This has largely focussed on fabric energy efficiency measures and heating system upgrades that are potentially eligible measures for financing through the Green Deal. Two distinct retrofit packages have been analysed for each archetype – an optimised and an advanced package. Priority dwellings have been defined based on parameters such as absolute CO_2 savings, capital costs, and cost of abating a tonne of CO_2, Priority areas for intervention have then been defined taking into account the coverage of priority dwellings within the area, socio-demographic profile and current status in terms of basic energy efficiency measures being installed . For each of the archetypes discounted cash flow analysis has then been carried out to assess the financial viability of investing in energy upgrade packages. The results are summarised in Sections 2 and 3 along with a sensitivity analysis of key variables affecting financial performance.

Section 4 summarises the research on customer take-up rates, skills and supply chain development, which in turn informs the action plan in Section 6.

A range of delivery models have been discussed in Section 5. Feedback has been received from sub-regional local authorities and from the market testing discussions with potential Green Deal partners, investors, installers and policy makers. The main risks and barriers to implementation have been considered.

Section 6 then outlines the action plan for delivering a sub-regional retrofit programme that can capture the opportunities whilst navigating and mitigating risks. This section further outlines the procurement and marketing strategy for delivering such an initiative.

2 CO_2 reduction potential from existing housing stock in the sub-region

2.1 Dwelling level analysis - Our approach to technical modelling and defining packages of work

Our approach to technical modelling has been defined by the overarching objectives of this study, which are to:

- Ascertain the technical potential for existing housing stock to deliver the sub-regional CO_2 reduction targets.
- Identify the investment opportunity for delivering large scale retrofitting of existing housing.

The approach has also been informed by the emerging policy framework, in particular Green Deal policy proposals. Green Deal is an innovative financing mechanism proposed to be introduced in autumn 2012, which allows consumers to pay back the capital investment in energy improvement measures through savings in their energy bills (refer Section 3.1.1 for details). For the purpose of this study, the Green Deal mechanism has been used for assessing the investment opportunity for energy improvement works in individual properties.

The housing stock in the region has been classified into different archetypes determined by key property attributes (refer section 2.1.1 below). Two distinct work packages have been defined for the predominant archetypes in the region, each consisting of a mix of fabric energy efficiency measures and in some cases improvements to heating system and controls (including air source heat pumps for electric heated dwellings):

- An optimised package which has measures added to it incrementally to deliver an Internal Rate of Return (IRR) of 7%. This is deemed to be the threshold at which investment becomes viable.
- An advanced package of measures that demonstrates the maximum technical potential for CO_2 savings for that archetype irrespective of the financial rate of return.

For the sub-regional analysis, the number of each archetype in the sub-region and therefore the potential for CO_2 savings from the optimised and advanced packages has been calculated. This is based on housing datasets provided by each local authority. The datasets varied considerably in terms of coverage within an LA and range of variables they covered, with a much larger coverage of social housing compared to other tenures. The key limitations of the base housing data used for the sub-regional analysis is discussed in Section 2.3.

2.1.1 Identifying and classifying main archetypes in the region

The study uses the assumptions behind the Energy Saving Trust (EST) Housing Energy Model to estimate the viable refurbishment potential for a range of generic dwelling types across the region. The study identifies 18 relevant dwelling types, based on three main characteristics: age and wall construction, size and main heating fuel. The characteristics and options are summarised in the following tables.

Age	Explanation
Pre 1980 Solid	Dwellings built pre 1980 that have solid wall construction. Assume any dwellings built pre 1919 have solid wall construction.
1919-1980 Cavity	Dwellings built between 1919 and 1979, with cavity wall construction.
1980 Onward	Dwellings built from 1980 onwards. Assumed to have cavity wall construction and other improved energy efficiency values.

Table 1: Age and wall construction characteristic

Fuel	Explanation
Gas	Dwellings with primary gas heating.
Electric	Dwellings with primary electric heating.
Other	Dwellings with other forms of primary heating such as oil, biomass and community heating. This option has not been modelled (minority of stock).

Table 2: Primary heating fuel characteristic

Size	Explanation
Semi / Detached	Semi-detached and detached dwellings.
Terraced	Terraced housing.
Flats	Flats and maisonettes.

Table 3: Size characteristic

Based on these characteristics, the different archetypes are outlined in the following table (for relevant dwellings). These 18 archetypes represent around 87% of the total stock.

Number	Age	Wall construction	Fuel	Size
101	Pre 1980	Solid	Gas	Terraced
102	Pre 1980	Solid	Gas	Semi / Detached
103	Pre 1980	Solid	Gas	Flats
104	Pre 1980	Solid	Electric	Terraced
105	Pre 1980	Solid	Electric	Semi / Detached
106	Pre 1980	Solid	Electric	Flats
107	Pre 1980	Cavity	Gas	Terraced
108	Pre 1980	Cavity	Gas	Semi / Detached
109	Pre 1980	Cavity	Gas	Flats
110	Pre 1980	Cavity	Electric	Terraced
111	Pre 1980	Cavity	Electric	Semi / Detached
112	Pre 1980	Cavity	Electric	Flats
113	1980 Onwards	Cavity	Gas	Terraced
114	1980 Onwards	Cavity	Gas	Semi / Detached
115	1980 Onwards	Cavity	Gas	Flats
116	1980 Onwards	Cavity	Electric	Terraced
117	1980 Onwards	Cavity	Electric	Semi / Detached
118	1980 Onwards	Cavity	Electric	Flats

Table 4: Dwelling Archetypes

These archetypes are further classified into 'Good' and 'Poor' depending on condition. Parameters used for this classification are summarised in Table 5 below. A property was deemed to be 'Good' or 'Poor' where the property attributes satisfied more than two of these parameters.

Condition	Glazing	Wall insulation	Loft insulation
Good	Double / triple	Filled cavity, internal or external wall insulation	100mm and over
Poor	Single	No wall insulation	Under 100mm insulation

Table 5 'Good' and 'Poor' distinction

For each archetype, two work packages were modelled, and are discussed in more detail in the following sections.

2.1.2 The optimised package

Each priority archetype has been modelled to determine baseline energy consumption and carbon emissions ('pre-measures scenario'). The effects of energy efficiency measures are modelled on each relevant dwelling archetype with the implementation sequence of measures based on their marginal abatement potential (prioritising the most cost effective measures) and what is realistically feasible and most appropriate for each dwelling archetype.

The technical savings interact with a simple finance model (using discounted cash flow analysis) based on capital costs of the package of measures installed, and the resulting annual energy savings, which are treated as revenue. Extra measures are added incrementally to the model without resulting in the Internal Rate of Return (IRR) dropping below a target of 7%. The measure are prioritised based on their cost-effectiveness and ease of implementation, and vary by property type. This results in an 'optimised' packaged of energy efficiency measures for each dwelling archetype that is deemed cost-effective and financially viable to provide an IRR above 7%. The following methodology diagram illustrates this process with a 'feedback loop' required from the technical modelling and financial analysis to provide the optimised package.

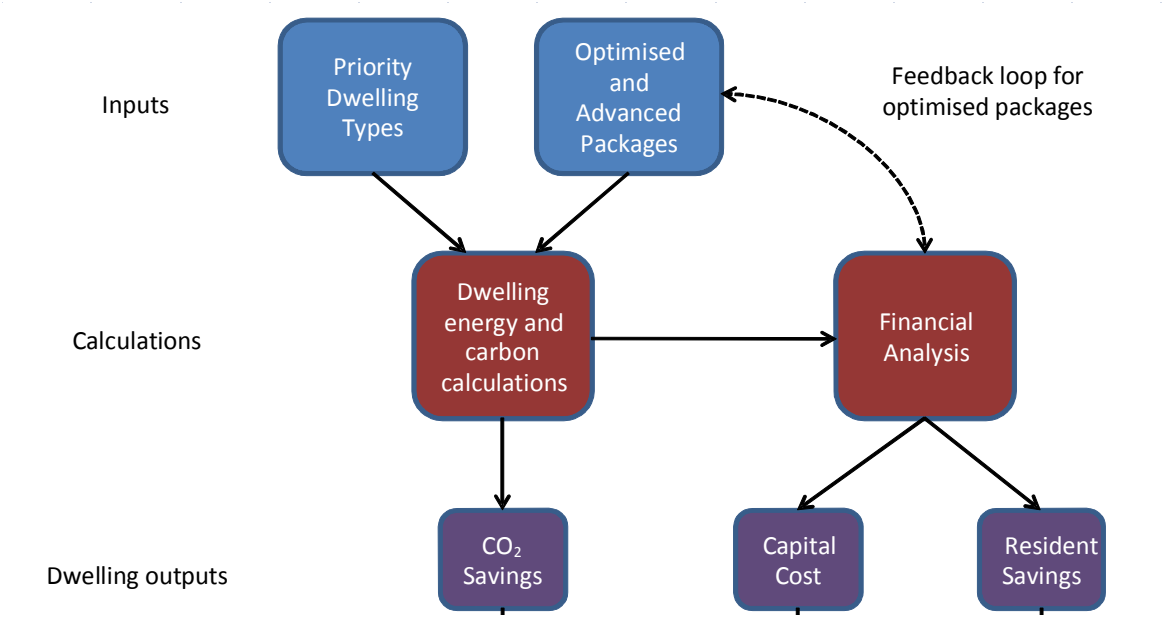


Figure 2: Methodology diagram

The following tables demonstrate the impact of the optimised package for one of the priority dwelling types: **107 Pre 1980 Cavity, Gas and Terraced dwelling.**

Where the property is in 'Good' condition the optimised package is summarised in Table 6.

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	N/A
Loft insulation (Poor - 60mm)	No	N/A
Loft insulation (Good - 165mm)	Yes	£336
Internal Insulation	No	£0
External insulation	No	£0
Floor Insulation	No	£0
Insulated doors	No	£0
Primary Pipework insulation	Yes	£101
Double glazing	No	N/A
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Re	No	£0
Draught proofing - to 10m³/m².h	No	N/A
Heat Recovery	No	£0
Low energy light bulbs	Yes	£20
Heating controls	No	N/A
Foam insulated DHW cylinder	No	N/A
Condensing boiler replacement (gas)	No	N/A
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£697**

Table 6: Measures for optimised package for dwelling 107 (Good)

Table 7 summarises the results achieved.

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO_2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO_2)
14,027	£804	3,414	4%	9%	8%

Table 7 Performance of optimised package for dwelling 107 (Good)

This optimised package, costing nearly £700, includes simple measures such as low energy light bulbs and top up loft insulation, which results in an energy bill reduction of 9% and carbon reduction of 8%.

In 'Poor' condition for dwelling 107, the optimised package is summarised in the following table.

Measure	Yes / No	Capital cost
Cavity Wall insulation	Yes	✓ £206
Loft insulation (Poor - 60mm)	Yes	✓ £410
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	No	✗ £0
External insulation	No	✗ £0
Floor Insulation	Yes	✓ £1,675
Insulated doors	Yes	✓ £500
Primary Pipework insulation	Yes	✓ £101
Double glazing	Yes	✓ £2,540
Triple glazing	No	✗ £0
Reduced infiltration A - to 5m³/m².h	Yes	✓ £240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat F	No	✗ £0
Draught proofing - to 10m³/m².h	Yes	✓ £101
Heat Recovery	No	✗ £0
Low energy light bulbs	Yes	✓ £20
Heating controls	Yes	✓ £398
Foam insulated DHW cylinder	Yes	✓ £400
Condensing boiler replacement (gas)	Yes	✓ £2,500
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£9,092**

Table 8 Measures for optimised package for dwelling 107 (Poor)

The table below summarises the results achieved.

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO_2)
10,039	£645	2,640	62%	54%	57%

Table 9 Measures for optimised package for dwelling 107 (Poor)

This optimised package, costing over £9,000, includes simple measures and more extensive measures, such as double glazing, floor insulation and boiler replacement, which results in an energy bill reduction of 54% and carbon reduction of 57%.

2.1.3 The advanced package

To reach the ambitious carbon reduction targets, more extensive refurbishments are required, that will lead to more significant carbon savings. The advanced package involves modelling all feasible energy efficiency measures for the relevant dwelling types. The financial results are still accounted for, but there is no consideration of selecting only cost-effective packages, thus many of the advanced packages are not considered economically viable, and will need some sort of additional funding / subsidy to be feasibly implemented.

The following table demonstrates the impact of the advanced package for one of the priority dwelling types in a 'poor' condition: **101 Pre 1980 Solid, Gas and Terraced dwelling.**

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	£0
Loft insulation (Poor - 60mm)	Yes	£410
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	No	£0
External insulation	Yes	£5,189
Floor Insulation	Yes	£1,675
Insulated doors	Yes	£500
Primary Pipework insulation	Yes	£101
Double glazing	No	£0
Triple glazing	Yes	£4,572
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	Yes	£3,740
Draught proofing - to 10m³/m².h	Yes	£101
Heat Recovery	No	N/A
Low energy light bulbs	Yes	£20
Heating controls	Yes	£398
Foam insulated DHW cylinder	Yes	£400
Condensing boiler replacement (gas)	Yes	£2,500
No secondary electric heating required post r	Yes	£0
Thermal bridging improvement	Yes	£0
Heat Pump	No	£0
Total		**£19,847**

Table 10 Measures for advanced package for dwelling 101 (Poor)

The table below summarises the results achieved.

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO_2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO_2)
7,753	£572	2,250	73%	62%	66%

Table 11 Measures for advanced package for dwelling 101 (Poor)

This advanced package, costing over £19,800, includes extensive measures such as triple glazing, external wall insulation and reducing infiltration rate, which results in an energy bill reduction of 73% and carbon reduction of 66%.

The following sections outline the key assumptions and limitations of the modelling.

2.1.4 Key assumptions and limitations

Our approach and assumptions for the energy and carbon modelling for dwellings is as follows:

- The technical modelling is in line with SAP 2005 methodology, which in turn is based on BREDEM (BRE Domestic Energy Model) calculations. One of the limitations of the SAP approach is that it does not take into account the regional variation in heating degree days. Also, the SAP methodology only accounts for regulated energy uses, which includes space heating, hot water, ventilation and lighting. For this study, we have used the NHER Plan Assessor software (also based on BREDEM), which allows us to take specific weather data for London into account when calculating space heating demand. The software has additionally been used to calculate energy and CO_2 emissions associated with unregulated energy uses, such as appliances and cooking.
- Baseline parameters, dwelling dimensions and areas for each dwelling type are consistent with those used by the Energy Saving Trust Code guidance and referenced from CERT house data summary.
- The range of measures include improvements to the fabric (including insulation, A rated windows, insulated doors and air-tightness), improvements to the heating system (such as primary pipework insulation, hot water cylinder insulation, controls, and boiler upgrade for 'poor' condition dwellings only. Heat pumps have been considered for electric heated dwellings only.
- For the purpose of this study, measures that influence energy consumption for appliances or cooking (e.g. A rated white goods) have not been included.

The following sections outline the results from the modelling work, and how dwelling types have been prioritised.

2.2 Ranking and prioritising dwelling archetypes

Table 12 illustrates the carbon emissions of each modelled dwelling archetype (base, optimised and advanced), the capital cost for each package and the percentage carbon savings.

Archetype		Carbon emissions (Kg CO_2)			Capital costs		Carbon savings (Kg CO_2)		Carbon savings (%)	
Identifier	Description	Existing emissions (dwelling)	Optimised package	Advanced package	Optimised Package	Advanced Package	Optimised Package	Advanced Package	Optimised Package	Advanced Package
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	10,996	3,844	3,071	£17,593	£29,673	7,152	7,925	65%	72%
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	9,567	3,685	3,071	£14,137	£30,282	5,881	6,495	61%	68%
101 Pr	Pre 1980 Solid Gas Terraced Poor	6,586	2,872	2,250	£10,248	£19,847	3,714	4,336	56%	66%
107 Pr	Pre 1980 Cavity Gas Terraced Poor	6,076	2,640	2,250	£9,092	£20,053	3,436	3,827	57%	63%
106 Pr	Pre 1980 Solid Electricity Flats Poor	4,768	2,224	2,151	£7,343	£11,241	2,544	2,616	53%	55%
112 Pr	Pre 1980 Cavity Electricity Flats Poor	4,247	2,319	2,143	£5,589	£15,099	1,928	2,104	45%	50%
109 Pr	Pre 1980 Cavity Gas Flats Poor	3,691	2,170	1,865	£3,527	£14,200	1,521	1,826	41%	49%
106 Gd	Pre 1980 Solid Electricity Flats Good	4,061	2,657	2,245	£4,358	£14,880	1,404	1,817	35%	45%
103 Pr	Pre 1980 Solid Gas Flats Poor	3,990	2,713	1,851	£2,630	£14,082	1,278	2,139	32%	54%
115 Pr	1980 Onwards Gas Flats Poor	3,317	2,084	1,865	£3,248	£14,200	1,233	1,452	37%	44%
103 Gd	Pre 1980 Solid Gas Flats Good	2,922	2,190	1,851	£2,087	£13,583	733	1,071	25%	37%
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	5,337	4,933	3,055	£735	£29,075	404	2,282	8%	43%
101 Gd	Pre 1980 Solid Gas Terraced Good	4,677	4,302	2,240	£1,197	£19,273	374	2,436	8%	52%
107 Gd	Pre 1980 Cavity Gas Terraced Good	3,696	3,414	2,264	£697	£19,273	282	1,432	8%	39%
113 Gd	1980 Onwards Gas Terraced Good	3,354	3,093	2,236	£697	£19,273	261	1,118	8%	33%
115 Gd	1980 Onwards Gas Flats Good	2,338	2,202	1,855	£351	£13,583	136	483	6%	21%
109 Gd	Pre 1980 Cavity Gas Flats Good	2,378	2,242	1,855	£351	£13,583	136	523	6%	22%
112 Gd	Pre 1980 Cavity Electricity Flats Good	3,064	2,974	2,140	£250	£14,880	89	924	3%	30%

Table 12: Summary of optimised and advanced package for relevant dwelling types

The archetypes are ranked in terms of savings from the optimised package. The archetypes are grouped into three categories (high, medium or low) for likely Green Deal potential, depending on the savings and capital cost requirements for the optimised packages. This is summarised in Table 13.

Green Deal Potential	Optimised Savings (tCO_2)	Optimised savings (%)	Cost of carbon abatement for advanced package £/tCO_2	Capital cost of optimised package (£)
High	Greater than 2t CO_2	Greater than 50%	Less than £250	Over £6,000
Medium	Between 1t and 2t CO_2	Between 30% and 50%	Between £250 and £400.	Between £2,100 and £6,500
Low	Less than 1t CO_2	Less than 30%	£300 to £1,200.	Less than £2,100

Table 13: Ranking of dwellings based on likely Green Deal potential

The results of the technical and financial modelling demonstrate the wide range of optimised energy efficiency packages that could be suitable for relevant dwelling types. The greatest carbon (and energy bill) savings that have 'high' Green Deal potential are generally from terraced and semi-detached/detached dwellings in a poor condition. For these dwellings, cost effective savings are achievable, with modelled savings over 50%, but capital costs are also high, over £6k. For the few dwelling types (102 Pr and 108 Pr) with modelled savings over 5.5 tCO_2 with optimised packages, the capital costs are above £14k.

Poor flats dominate the dwellings considered to have 'medium' Green Deal potential, where savings are 30-50% and packages cost under £6,500. As expected, flats and houses in a good condition are considered to have 'low' Green Deal potential because the most cost effective measures (such as loft and cavity wall insulation) have already been installed thus leaving the more difficult energy efficiency measures, which have higher carbon abatement costs (such as external wall insulation and ambitious air tightness levels). For these 'low' dwelling types, the savings are mainly from 3-8% and capital costs under £2k.

For the advanced packages, all dwelling types achieve greater than 20% carbon savings and have capital costs above £11k. Dwellings with 'high' Green Deal potential with advanced packages have savings over 55%, but the costs increase too (over £29k for dwelling types 102 Pr and 108 Pr). For dwellings with 'medium' Green Deal potential, the advanced packages have savings of 45-55%, with capital costs ranging from £14k-£16k. For dwellings with 'low' Green Deal potential, the advanced packages have savings of 20-55%, with capital costs ranging from £13k-£30k.

The following figures illustrate the emission reductions from the optimised and advanced packages, and the costs associated with both packages. For these graphs the following shorthand initials have been used to describe the dwelling type.

Age	Shorthand
Pre 1980 Solid	PS
Pre 1980 Cavity	PC
1980 Onward	On

Size	Shorthand
Semi / Detached	SD
Terraced	T
Flats	F

Fuel	Shorthand
Gas	G
Electric	E

Size	Shorthand
Good	Gd
Poor	Pr

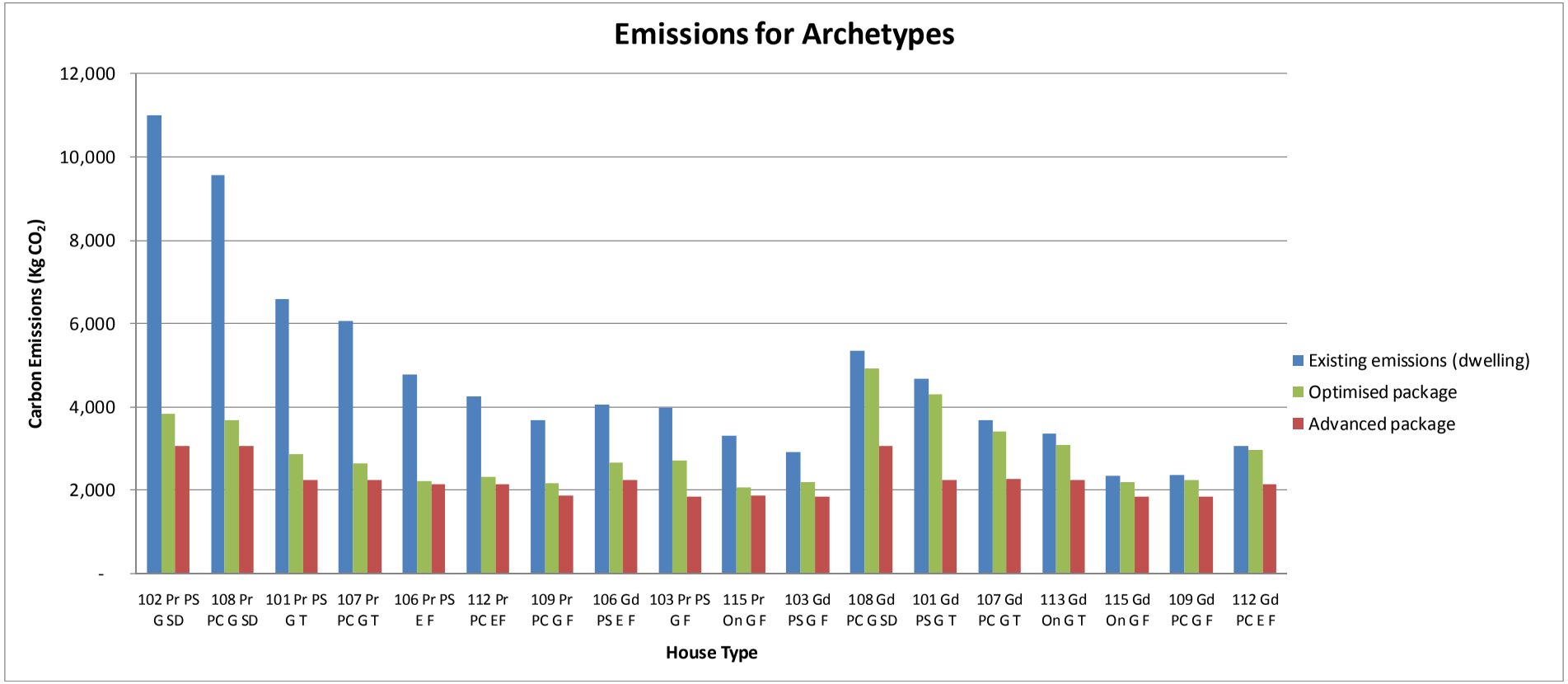


Figure 3: Baseline CO_2 emissions for each archetype and emissions after optimised and advanced package of measures have been applied

Figure 3 illustrates the modelled emissions for the relevant archetypes. The blue bars show base emissions (i.e. with no energy efficiency measures applied). The green bars show emissions after the optimised package is applied, and the red bars show emissions after the advanced package is applied. The graph shows the wide range of base emissions, and how the optimised packages reduce emissions to under tCO_2 and the advanced package approximately under 3.5 tCO2 for all dwelling types. The 'poor' homes dominate the left hand side of the graph, illustrating the carbon reduction potential from the optimised packages.

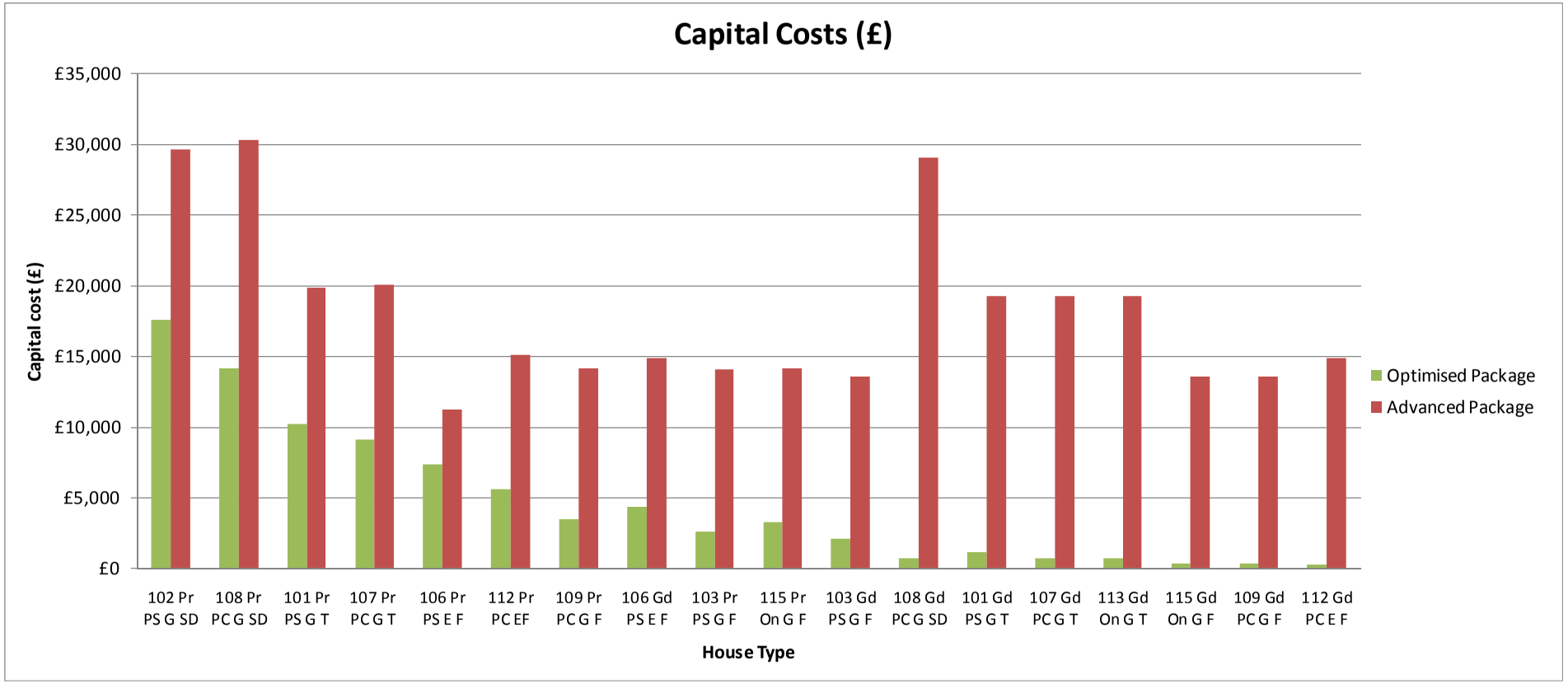


Figure 4: Capital costs for the retrofit packages

Figure 4 illustrates the capital costs of the optimised and advanced packages for the relevant dwelling types. The graphs shows the decreasing cost of the optimised package, which is in line with the reduction in energy and emission reduction from the optimised package shown in Figure 3. For the advanced packages, the costs for detached / semi-detached dwellings are the most expensive, all above £28k. The advanced packages for the terraced dwellings are all over £19k and for the flats over £10k. This trend is in line with some of the costs of energy efficiency measures being based on the size of the dwelling. For example, the cost of external wall insulation is dependent on the amount of exposed wall area, and this is highest in the semi-detached / detached dwellings, and least in flats.

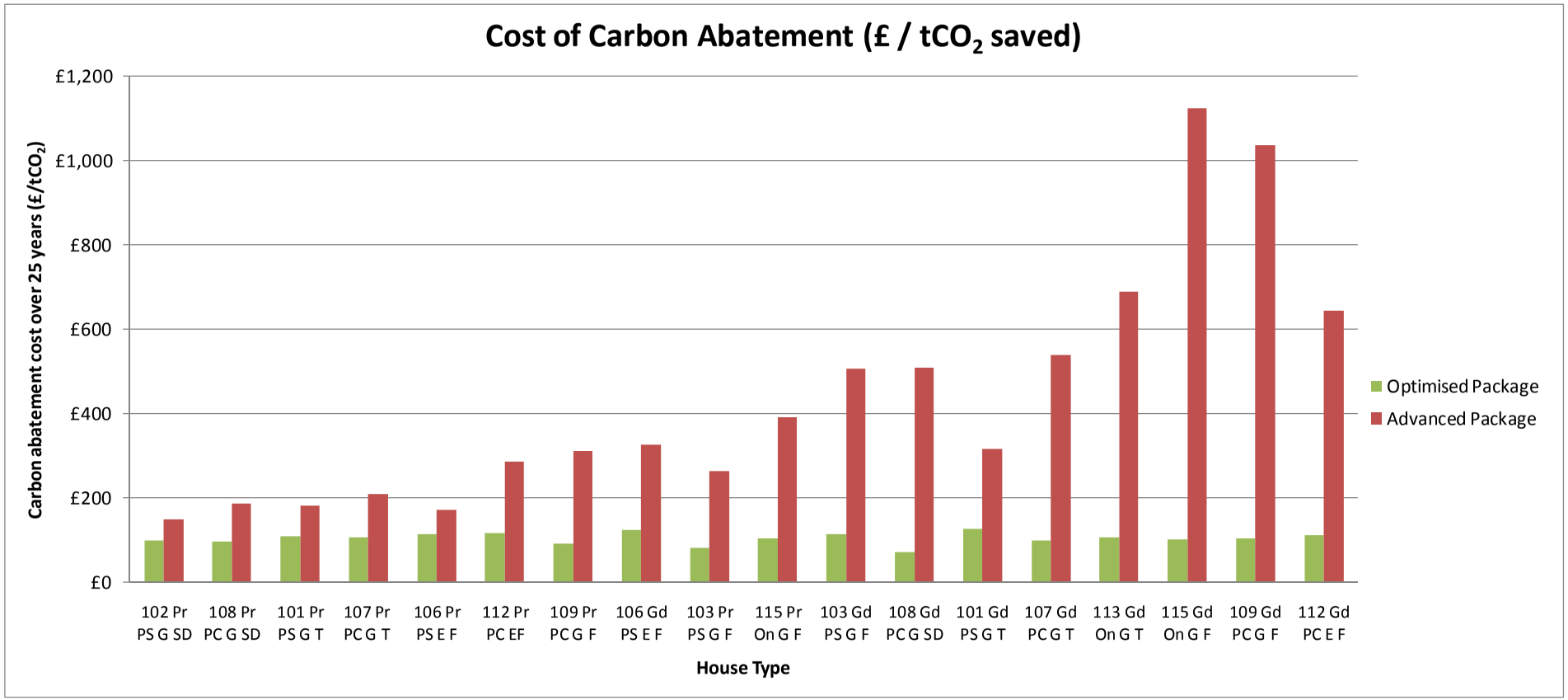


Figure 5 Cost of carbon abatement for the retrofit packages

Figure 5 demonstrates the cost of carbon abatement for the optimised and advanced retrofit packages. This is calculated by taking the capital cost of the package and dividing it by the annual carbon savings multiplied over a period of 25 years. This is a simple calculation for lifetime savings (in line with the assumed Green Deal contract term of 25 years) yet various energy efficiency measures proposed have lifetimes beyond this period (e.g. external wall insulation has a lifetime of over 40 years). All optimised packages have a cost of carbon abatement under £130 per tonne of CO_2 saved. The cost of carbon abatement ranges from £80 to £130; in line with the packages being cost effective (i.e. all have an internal rate of return as close to and above 7%). There is a much more significant spread of carbon abatement costs for the advanced packages, ranging from £150 to over £1,000 per tonne of CO_2 saved. There is a general pattern of carbon abatement costs rising (from left to right on the graph), which follows the reasoning of the poorer homes benefitting from low carbon abatement costs for simple measures.

To put these figures into context, the cost of carbon abatement under other policy instruments is: £80- £90t/CO_2 based on the current price of ROCs (Renewable Obligation Certificates), £12/tCO_2 for allowances to be issued under CRC and then a floating market price, £20tCO_2 as subsidy for CERT and £120/tCO_2 for CESP (UKGBC figures).

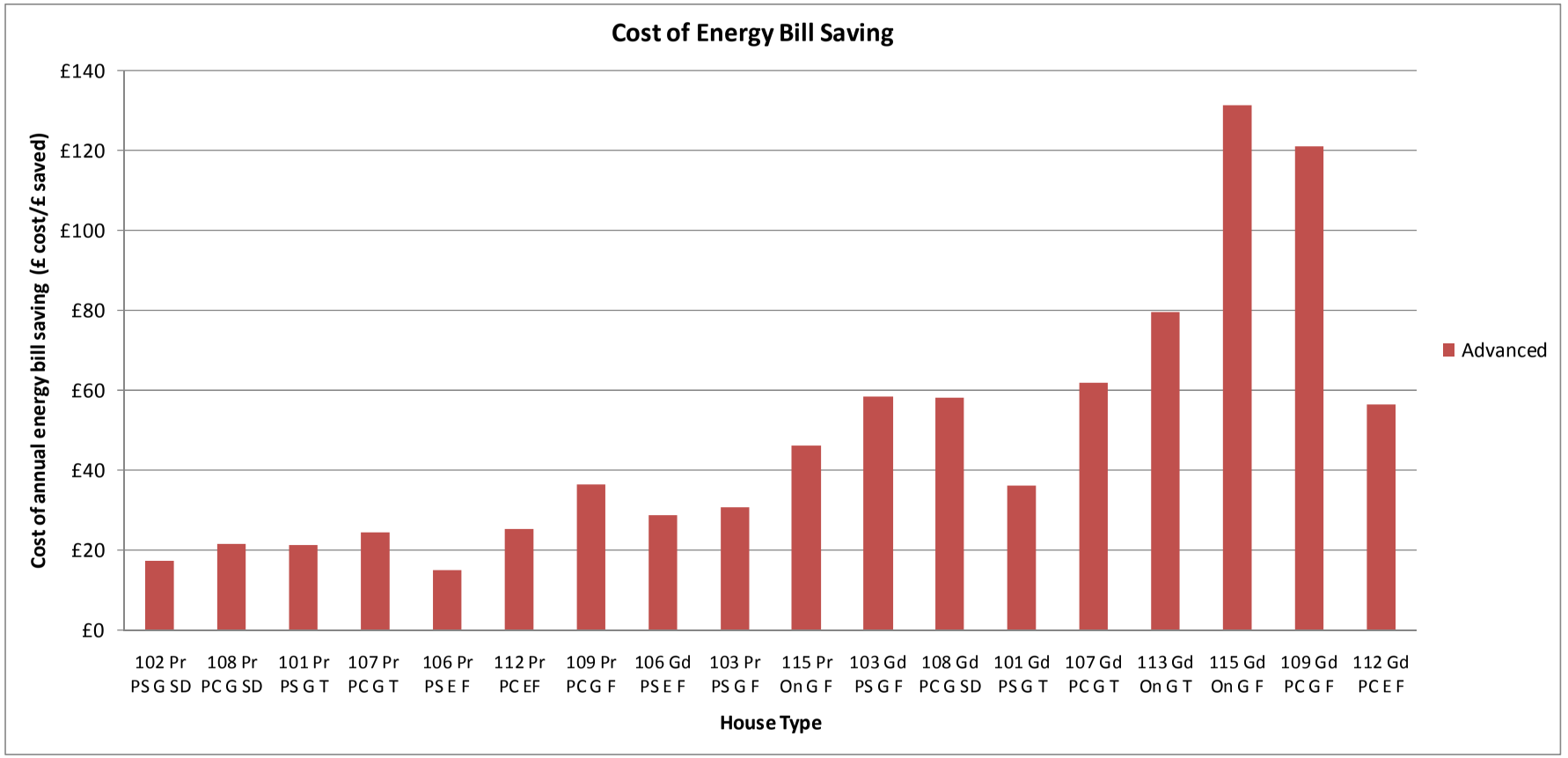


Figure 6 Cost of energy bill saving for the advanced package

Similar to the cost of carbon abatement, Figure 6 shows the cost of saving one pound on the annual energy bill with the advance package. For most of the 'poor' dwellings it works out at less than £50 spent on the advanced package should result in a £1 saving on the annual energy bill. For the 'good' dwellings, this cost can be over £120 per £1 saving. This illustrates the high capital cost of such packages, and highlights how they will not be cost effective without additional funding or significant cost reductions. For the optimised package, the range is between £6 and £12 spent to save £1 on the annual energy bill (similar spread as the cost of carbon abatement).

2.3 Sub-regional potential for CO_2 savings

Table 14 below illustrates the results of the dwelling analysis for the whole North London sub-region. The number of dwellings per archetype is calculated with the information collated from all the LAs plus extrapolated figures. The approach taken to arrive at these and data limitations are outlined in Section 2.5. The total modelled archetypes account for over half a million dwellings, which covers 87% of total North London stock coverage (estimated to be just over 580,000).

Archetype		North London	Existing emissions and savings tCO_2			Total Cost	
Identifier	Description	Number of dwellings	Existing emissions (aggregated)	Savings from optimised Package	Savings from advanced Package	Optimised Package	Advanced Package
103 Pr	Pre 1980 Solid Gas Flats Poor	80,948	323,017	103,431	173,164	£212,910,571	£1,139,932,036
101 Pr	Pre 1980 Solid Gas Terraced Poor	48,388	318,667	179,702	209,799	£495,902,774	£960,347,364
109 Pr	Pre 1980 Cavity Gas Flats Poor	62,337	230,094	94,842	113,815	£219,861,246	£885,179,953
103 Gd	Pre 1980 Solid Gas Flats Good	67,470	197,175	49,426	72,273	£140,796,484	£916,432,091
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	17,452	191,910	124,823	138,307	£307,045,863	£517,862,728
109 Gd	Pre 1980 Cavity Gas Flats Good	78,208	185,970	10,611	40,926	£27,435,338	£1,062,282,535
101 Gd	Pre 1980 Solid Gas Terraced Good	37,599	175,831	14,074	91,607	£44,988,293	£724,631,243
107 Pr	Pre 1980 Cavity Gas Terraced Poor	17,548	106,628	60,298	67,148	£159,541,225	£351,881,854
107 Gd	Pre 1980 Cavity Gas Terraced Good	21,970	81,202	6,198	31,465	£15,303,083	£423,425,611
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	7,064	67,580	41,547	45,883	£99,864,954	£213,919,693
115 Gd	1980 Onwards Gas Flats Good	20,831	48,703	2,836	10,070	£7,307,490	£282,942,335
115 Pr	1980 Onwards Gas Flats Poor	13,821	45,849	17,042	20,068	£44,890,464	£196,257,572
113 Gd	1980 Onwards Gas Terraced Good	12,395	41,580	3,238	13,859	£8,633,965	£238,895,786
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	4,894	26,121	1,975	11,170	£3,595,718	£142,305,592
106 Pr	Pre 1980 Solid Electricity Flats Poor	4,237	20,200	10,777	11,085	£31,110,188	£47,626,593
112 Gd	Pre 1980 Cavity Electricity Flats Good	5,907	18,097	528	5,459	£1,476,679	£87,894,271
106 Gd	Pre 1980 Solid Electricity Flats Good	3,436	13,954	4,825	6,242	£14,972,858	£51,124,856
112 Pr	Pre 1980 Cavity Electricity Flats Poor	1,544	6,557	2,976	3,248	£8,629,431	£23,314,040
TOTAL / Average		506,049	2,099,133	729,150	1,065,590	£1,844,266,625	£8,266,256,153

Table 14 Summary of retrofit packages for North London sub-region

Please note that the existing CO_2 figures above and the savings are derived from SAP modelling as outlined in Section 2.1.4.

The dwellings are ranked in terms of aggregated existing emissions for each archetype. For the whole sub-region, total carbon savings from the optimised package, applied to each dwelling, results in an annual carbon saving of nearly 730,000tCO_2. With the advanced package, the annual carbon savings are over 1 million tCO_2. The capital cost associated with implementing the optimised package for all dwellings is over £1.8bn, and over £8.2bn for the advanced package.

Existing emissions for dwelling type 103 Pr (Pre 1980 flat with solid wall construction and gas heating in a 'poor' condition) are the greatest (over 320,000tCO_2 annually). Despite individual emissions for this dwelling type being under 4tCO_2, there are over 80,000 of this type in the sub-region, thus the aggregated amount contributes to over 15% of modelled existing emissions for the sub-region. Dwelling type 101 Pr (Pre 1980 terrace with solid wall construction and gas heating in a 'poor' condition) also contributes over 15% of modelled existing emissions, despite there being under 50,000 of this type in the sub-region. Furthermore, because this dwelling type has a 'high' Green Deal potential, the emission savings from the optimised package are the greatest (nearly 180,000tCO_2 annually, which is equivalent to over 25% of the total savings from the optimised package.

The weighted average cost of the optimised package is approximately £3.6k per dwelling, and £6.2 per dwelling just considering dwellings that have 'high' and 'medium' Green Deal potential.

The following graph (Figure 7) illustrates the regional profile of the top ten archetypes based on aggregate baseline CO_2 emission. The graph also shows the impact on aggregated emissions with the impact of optimised and advanced packages.

The graph illustrates the importance of tackling the 'poor' dwellings first, with the gap between the baseline and optimised aggregated emissions being the greatest. With this high concentration of flats in the sub-region, dwelling types 103 Pr and 109 Pr are important for aggregated emissions savings from the optimised and advanced packages. Yet, the greatest savings from the optimised packages come from 'poor' terrace (103 Pr) and 'poor' semi-detached / detached (102 Pr). This is In line with the individual dwelling modelling, where the greatest carbon savings result in the optimised packages for larger dwellings, and offers insight into which dwelling types should be prioritised for the sub-region in terms of Green Deal applicability.

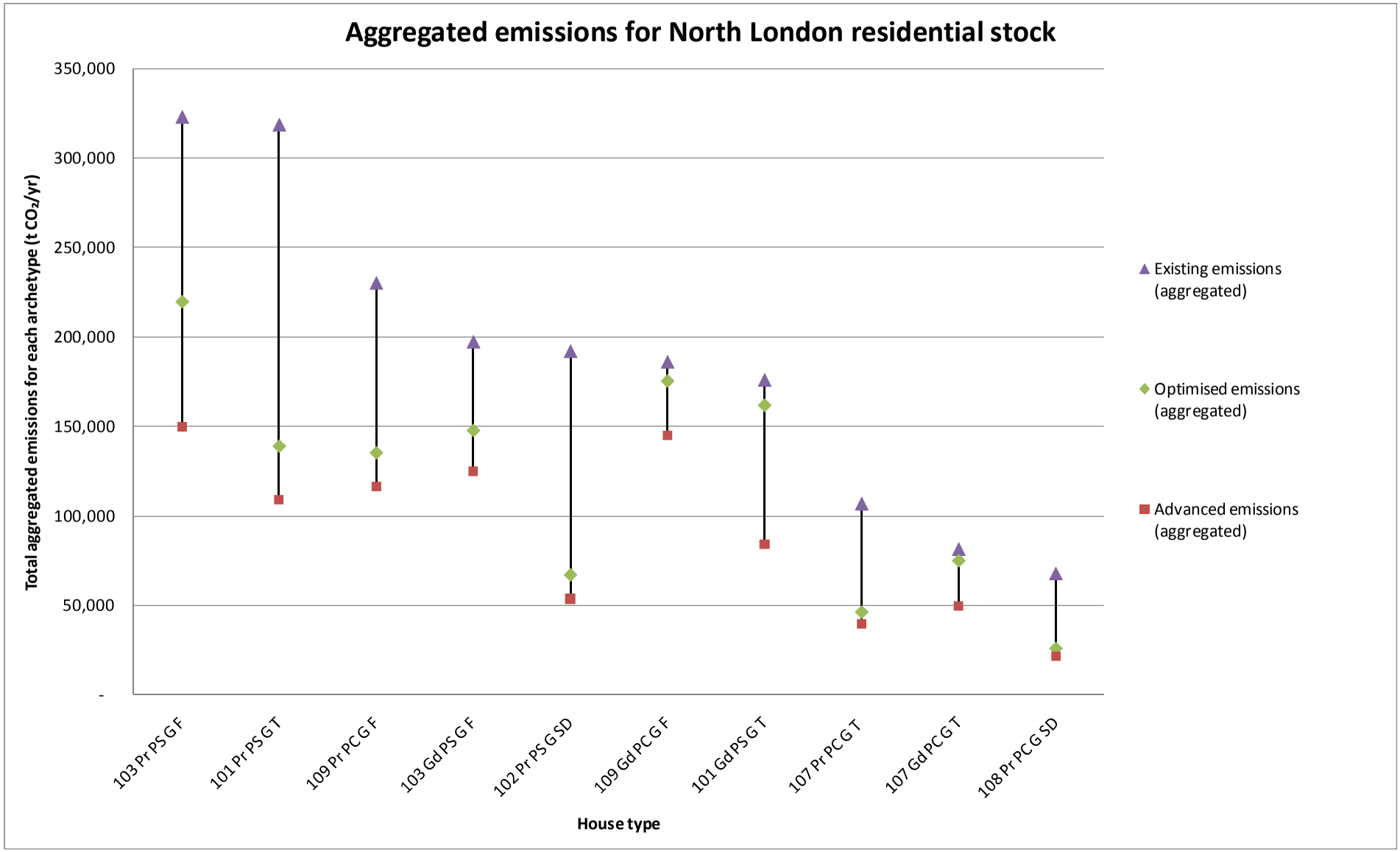


Figure 7 Aggregated emissions for the top-ten archetypes in the sub-region

To assess the impact of these modelled savings on actual residential emissions for the sub-region, the following table highlights baseline emissions data for residential stock for each LA[6] and target reductions required by 2020 and 2050 (against 2005 emissions baseline). Please note that the total 2020 target for the sub-region assumes that a 40% target applies to all individual boroughs as an approximation for the study area. This is also largely consistent with the 2025 CO_2 reduction targets in the London Plan. The 2050 target is in line with the national UK target for CO_2 emissions reduction, although the national target is against the 1990 baseline.

Actual LA emission data	2005 (tCO_2)	2008 (tCO_2)	2020 target: 40%. (tCO_2)	2050 target: 80%. (tCO_2)
Haringey	535,740	519,300	321,444	107,148
Camden	421,770	420,460	253,062	84,354
Islington	400,550	397,050	240,330	80,110
Hackney	424,900	421,020	254,940	84,980
Waltham Forest	492,880	485,050	295,728	98,576
Newham	466,710	464,940	280,026	93,342
Total	**2,742,550**	**2,707,820**	**1,645,530**	**548,510**

Table 15 Breakdown of LA emissions and targets

Using the baseline emissions data for 2008 as an estimate for 2010 baseline emissions for the sub-region, Figure 8 illustrates the impact of applying the optimised and advanced retrofit packages across all relevant dwelling types. It demonstrates the potential savings from the optimised and advanced packages, if applied across all relevant dwelling stock by 2020. This relates to a 27% carbon saving for the optimised package and 39% carbon saving from the advanced package (using 2008 baseline emissions as a proxy for 2010 emissions). The savings from the advanced package would technically meet the 2020 carbon saving for the sub-region, which is 40% calculated against 2005 baseline emissions.

[6] *DECC, (2011). Summary data supporting the indicator (National Indicator 186: Per capita CO_2 emissions in the LA area), sector and fuel details. Accessed from http://www.decc.gov.uk/en/content/cms/statistics/indicators/ni186/ni186.aspx*

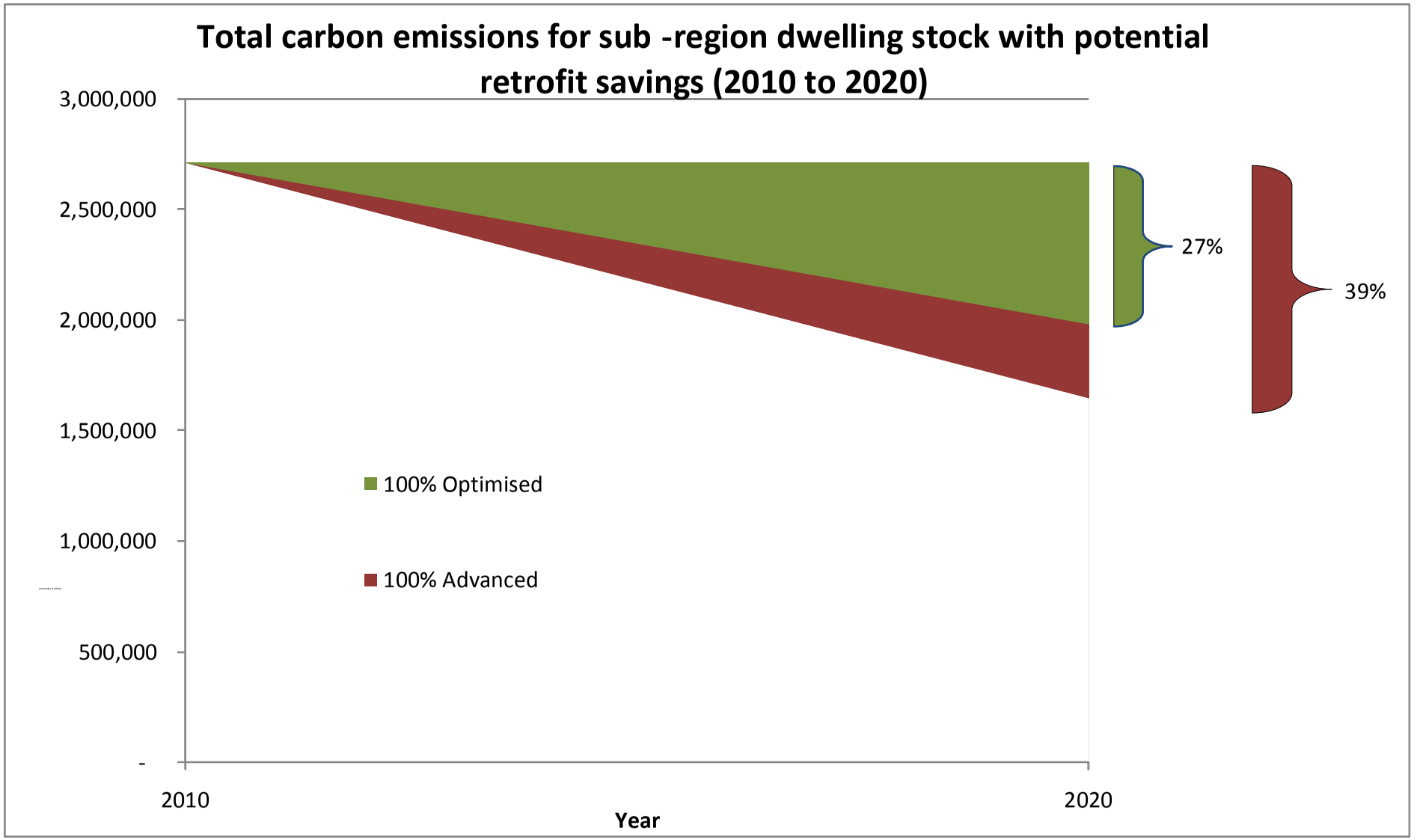


Figure 8 Potential impact of optimised and advanced retrofit packages on domestic sector emissions for sub-region

2.4 Priority areas for intervention

Our approach to identifying priority areas builds on the analysis carried out in Section 2.2 above. For this analysis, the dwelling level data provided at borough level was mapped in GIS. The relative proportion of the type and number of each archetype within a Census Output Area (COA) was then worked out from these existing datasets.

ue to **data protection issues:**

Figure 9 below shows the potential for absolute CO_2 savings at COA level based on the optimised packages defined for each archetype. Targeting the dark shaded areas first will contribute most to delivering the sub-regional 2020 targets.

Discussions with the cross-borough working group and other representatives from the six LAs have highlighted additional drivers for creating a sub-regional retrofit partnership, in particular, fuel poverty and local economic regeneration. Priority areas have therefore been identified taking into account two main criteria

- The percentage coverage of high, medium and low priority dwellings within each COA. Figure 10 shows the high, medium and low priority areas generated using this approach. The areas classified as high priority are those that have >50% of high priority dwellings, a medium priority area is one that has >50% of high and medium priority dwellings, and a low priority area is one with >50% of low, medium and high priority dwellings. HEED (Home Energy Efficiency Database) data provided by BRE was further used to filter out areas where a significant proportion of dwellings have had basic energy improvement measures installed (that is, areas where either more than 50% of dwellings with cavity fill or loft insulation).

  Figure 11 shows a variation of the map overlaid with conservation areas, which are likely to present constraints for implementing certain measures such as solid wall insulation. There are a significant proportion of high and medium priority COAs in conservation areas in Haringey, Camden and Islington.

- Proportion of households in fuel poverty with each LSOA. These are based on sub-regional fuel poverty data for 2008 published by DECC and are shown in Figure 12 below.[7] For the six boroughs typically the percentage of households in fuel poverty ranges between 10-15%. We have mapped areas that have >15% of households in fuel poverty within an LSOA.

When the two criteria are overlaid together (see Figure 13), the priority areas reflect COAs with poor energy performance and higher incidence of fuel poverty. Targeting these areas will contribute to alleviating fuel poverty in the north London sub-region.

The following figures have been removed from the public document due to data protection issues:

Figure 9: CO_2 saving potential at COA (Census Output Area) level

Figure 10: Map identifying priority COAs for intervention defined by coverage of high, medium and low priority dwellings

Figure 11: Map showing conservation areas overlaid over priority COAs for intervention

Figure 12: Proportion of households in fuel poverty (Source: DECC, 2008)

Figure 13: Priority areas for targeting fuel poverty

Figure 14: Priority areas for targeting fuel poverty overlaid with conservation areas

[7] Source: http://www.decc.gov.uk/en/content/cms/statistics/fuelpov_stats/regional/regional.aspx

2.5 Approach and Data limitations

The housing analysis is based on existing housing data provided by each local authority. These include datasets managed by ALMOs, RSLs (Registered Social Landlords), NI187 surveys, HEC (ESTs Home Energy Checks) and data from schemes such as Warmfront, HEEP, British Gas, and Osborne Energy. The datasets varied considerably in terms of coverage within an LA and range of variables they covered. The key limitations were

- very limited coverage for some LAs
- a much larger coverage of social housing compared to other tenures. On an average, social housing has marginally better energy performance compared to other tenures (based on SAP ratings in English House Condition Survey). This would suggest that overall the baseline energy consumption, baseline CO_2 emissions and potential savings are under-estimated.
- variation in the level of confidence for data from different sources. For instance, a proportion of HEC data relies on the householder providing information and therefore certain parameters such as wall type may not be accurately recorded.
- Lack of standardised referencing system to identify properties across datasets (such as UPRNs) and lack of consistency in address formats, thereby making it impossible to assess the level of duplication across datasets.

Table 16 shows the data coverage in each local authority area and Table 17 shows the data coverage by social housing and other tenures (owner occupied, private rental) and unknown, excluding data for Newham, which was not available at the time of the analysis.

Table 16 Data coverage by local authority

Total dwellings in the database							
	Camden	**Hackney**	**Haringey**	**Islington**	**Waltham Forest**	**Newham**	**Total in Sub-region**
Semi/ Detached	454	2,407	4,408	144	1,852	2,765	12,030
Terraced	1,795	277	4,463	3,359	5,758	21,980	37,632
Flats	33,742	22,331	17,885	31,453	7,979	30,102	143,492
Total	35,991	25,015	26,756	34,956	15,589	54,847	193,154
Coverage of Sample							
	Camden	**Hackney**	**Haringey**	**Islington**	**Waltham Forest**	**Newham**	**Total in Sub-region**
Semi/ Detached	8%	45%	35%	4%	10%	21%	20%
Terraced	20%	1%	14%	22%	14%	47%	23%
Flats	41%	31%	33%	42%	22%	72%	40%
Total	37%	26%	27%	37%	16%	54%	**33%**

Table 17 Coverage of data by tenure in each local authority area

Local Authority	Social Housing	Other
Camden	96%	5%
Hackney	73%	1%
Haringey	93%	14%
Islington	94%	5%
Waltham Forest	54%	6%
Newham	No data available	

Camco's approach to housing analysis is as outlined below.

To address the issue around very limited coverage for some LAs, the sub-regional analysis is based on the combined dataset for all six local authorities. This combined dataset is then used to extrapolate the number of dwellings of each archetype in the sub-region. However, analysis and figures at borough are also re-produced in Appendices C t o H of this report.

In the combined dataset, each property was assigned to one of the 36 archetypes based on the property attributes such as age, wall type, main heating system and condition as described in Section 2.1.1. Detailed look-up tables were created to cover the range of nomenclatures used to describe these parameters in the individual datasets provided. For instance, there were over 100 ways of describing the range of heating systems in the approximately193,000 properties in the combined dataset and around 140 different nomenclatures for wall construction.

The total number of dwellings and the breakdown by property type (detached, semi-detached, terraced, flats) in the boroughs were taken from Census 2001 data. A more updated set of figures for the total number of dwellings in each borough were taken from National Statistics 2009. However, this data did not provide a breakdown of number of dwellings by type. So using the total number of properties in the 2009 data, the breakdown of properties by type was derived using the relative proportion in the 2001 Census data. Using Census 2001 data for the breakdown of dwelling by type does mean however that the data does not reflect the proportion of homes converted into flats from 2001 onwards.

'Scaling factors' were then derived based on the actual number of each property type (as indicated by the 'adjusted' 2001 Census data above) and the records in the combined dataset. These scaling factors were then used to work out the number of each archetype in the sub-region.

To address the issue of a much larger coverage of social housing compared to other tenures, a similar approach could potentially have been taken. However, the key limitation was the absence of data that provided the actual breakdown of the number of properties of each type and of certain tenure (e.g. how many detached houses currently have social tenants and how many are private rented or private owned).

For the mapping of priority areas, the relevant MSOA, LSOA and COA was assigned to each address in the combined dataset. From this the number of records in the database of a specific archetype within a COA could be calculated. The actual number of properties in a COA was then taken from Census 2001 data (further broken down by property type – detached, semi-detached, terraced and flats). For each COA, database records were then extrapolated based on the actual number of detached, semi-detached, terraced and flats in the COA.

For COAs where a property type was not represented within the database (but the Census 2001 data indicates that the property type exists within the COA), the breakdown of this property type by archetype estimated at LSOA level was used to determine the relative numbers of each archetype at COA level.

A database tool has been developed for each of the local authorities that allows data from different sources to be integrated by standardising the nomenclature. It also creates a system for data to be prioritised depending on the source. For instance, if data for a property is available from two different data sources, it will pick up attributes from the data source assigned a higher confidence level. For the tool to be fully functional, a common referencing system (such as UPRN's) is however required.

3 Financial appraisal of technical work packages

3.1 Review of alternative funding mechanisms and financing structures

3.1.1 Overview

In this section of the report we set out some of the funding mechanisms and financing structures for supporting low carbon refurbishment projects. Although the focus of the project is on energy efficiency measures that are potentially supported through Green Deal, we also describe here some of the other mechanisms that could be relevant, including those to support small scale renewable energy projects.

3.1.2 Funding streams and anticipated policies

Feed- in-Tariffs

The UK has to generate up to 40% of its electricity from renewable sources by 2020 to meet the EU targets, which represents a ten-fold increase in the next ten years. As part of reaching this target, it is planned that 2% of electricity will be generated from small-scale renewables by 2020. FITs came into effect on 1 April 2010 and apply to a range of small scale renewable energy technologies of <5MW: wind, hydro, anaerobic digestion, micro CHP and PV. Although the FITs are established in law, rather than coming from the government, the tariffs are actually paid by the energy suppliers, via a levelisation process, who pass on the cost of the FIT scheme to all their electricity customers.

FIT gives three financial benefits:

- Generation tariff: a set rate for every kWh of electricity produced, even if it is not used entirely on site, which varies according to the technology installed. Technologies should become cheaper over time, so a degression is applied to PV tariffs, and therefore this rate will change each year for new participants. However, it will remain the same once participants have joined the scheme, so that they are effectively 'locked in'. Tariffs are intended to provide a return of around 5-8% for PV, and are index-linked to inflation. Support for PV will be provided for 25 years, whilst most other technologies will receive support for 20 years.
- Export tariff: an additional bonus payment for each kWh of electricity exported into the grid. This is paid over and above the generation tariff, either at a guaranteed flat rate of 3p/kWh or at the open market value. Domestic participants will have their export deemed at 50% until smart meters are rolled out.
- Energy bill savings: a saving in electricity costs, from using the renewable energy generated on site.

Due to a much greater than expected up-take of FIT especially those >50kW in size (PV installations accounted for 94% of FIT payments by number of installations as of 26th January this year), the government announced in February the start of the first review of the FIT scheme, which will consider all aspects of the scheme including:

- Tariff levels
- Degression rates and methods
- Eligible technologies
- Arrangements for exports
- Administrative and regulatory arrangements
- Interaction with other policies
- Accreditation and certification issues

The review will be completed by the end of 2011, with tariffs remaining unchanged until April 2012 (unless the review reveals a need for greater urgency).

The Renewable Heat Incentive (RHI)

The Renewable Heat Incentive was announced in March 2011, and is due to be introduced in July 2011. It promises a fixed level of financial support for generators of renewable heat, and is believed to be the first scheme of its kind in the world.

The RHI is a tariff-based scheme with payments made to the generators of renewable heat per unit of heat output. It will be available for all scales of installation within industrial, public and commercial sectors from July 2011. The scheme will be extended to the domestic sector in 2012 with an interim arrangement ('RHI Premium Payment') put in place to provide around £15m of grants for renewable heat installations, equivalent to around 25,000 homes. According to the Government's figures, the RHI will save 44 million tonnes of carbon dioxide by 2020.

Unlike the FIT mechanism, the RHI will be paid from general taxation rather than a pass through to consumer energy bills. The RHI is designed to deliver a return of 12% on the marginal cost over a gas alternative for all technologies except solar thermal which gets a lower return of 5% due to its greater maturity. This is higher than the intended range for the FIT (5-8%) - a result of the generally greater complexity and risk associated with renewable heat projects.

The extension of the scheme to the domestic sector in 2012 is aligned with the introduction of the Green Deal funding scheme for low carbon housing refurbishment. To address concerns expressed at the consultation stage, the 'RHI Premium Payments' will be primarily targeted at off gas grid properties and only provided to those that meet minimum standards of energy efficiency, as demonstrated by Energy Performance Certificates. Recipients of the grants will also be required to provide feedback on monitored performance data.

The scheme will support a range of renewable heat producing technologies including solar thermal up to 200kW, as well as biomass and ground source heat pumps. Large solar thermal is currently excluded as further work on costs is proposed; however, this may be included in 2012.

Green Deal

The Green Deal is designed to encourage energy efficiency improvements paid for by savings from energy bills without the need for up-front finance from the customer. Under the scheme, home owners, private landlords and businesses are able to enter into very long financing arrangements to pay for energy efficiency improvements to homes. The Energy Bill introduced in Parliament in December 2010 will create a new legal mechanism allowing the obligation to repay the costs of energy efficiency measures to attach to the energy bill at a property, rather than to an individual. As the loan for the improvement stays with the home, this enables contract lengths to be considerably longer than would normally be possible, given that home owners move on average every 12 years. Green Deal will mean they only pay whilst they remain at the property enjoying the benefits.

The core principle is "The Golden Rule", meaning that the instalment payment for the energy saving measures should not exceed the projected associated cost savings on an average bill for the duration of the Green Deal Finance arrangement, which could be for as long as 25 years.

The key provisions likely to be included in the Green Deal are

- Ensuring an accurate and accredited assessment takes place as the first step to a Green Deal, so consumers have confidence that the measures are right for their property;
- Ensuring only accredited measures are installed, by appropriately-qualified installers, giving consumers confidence that the measures are high-quality;
- Limitations over how much finance can be attached in this way, to ensure that only packages of measures which are likely to pay for themselves over time are included;
- Consumer protection measures;
- Requirement for energy suppliers to collect Green Deal payments, and pass these onto the finance provider;
- The liability to make Green Deal Payments to rest with the person who pays the energy bill for the property; and

- That people are informed of whether there is a Green Deal Finance arrangement in place (before assuming responsibility for paying energy bills for a particular property).

The domestic Green Deal model will be supplemented by a new Energy Company Obligation from the end of 2012 (see below). The secondary legislation and guidance is intended to be produced by first half of 2012 with the intention of launching the scheme in the second half of 2012.

3.1.3 Financing structures

In a credit-constrained world, the availability of capital on the right terms (duration, interest rate, etc) is of great importance and a rather limited resource. In particular, it can be difficult to secure finance for new project types, small projects, long term investments and those backed by new or uncertain revenue streams (such as energy efficiency). These all pose significant challenges to securing finance for low carbon retrofit projects which are typically small scale, using a mix of familiar and innovative technologies and that payback over 25 years or more.

Conventional project financing options

Corporate finance (where the bank lends direct to the project promoter at the organisational level) will often require the project promoter to provide guarantees and/or significant levels of equity to reduce the bank's risk. Different forms of securities are offered up and the bank assesses the credit rating of the organisation. For example, it is often possible for Registered Providers (RPs) to secure 20-30 year loans, on the basis of their strong credit ratings and their potential to offer security, such as un-mortgaged properties.

Non-recourse project finance is an alternative approach that limits the project promoter's liabilities to the project itself (typically through creation of a Special Purpose Vehicle). As a consequence, banks will charge a higher interest rate to reflect their greater exposure to project risk. Project finance is normally available for a shorter duration, typically 15-20 years.

The cost of capital is a term that refers to the weighted average of the interest payments on debt and the expected returns for equity investors after considering project risks. For a project to be viable, the internal rate of return (IRR) must be greater than the weighted average cost of capital. Equity investors are typically seeking a 10-15% return on their investment, whereas commercial banks may currently be able to offer low risk corporate finance at around 5.5% interest rate (or greater for non-recourse project finance). For long payback measures, a low cost of capital dramatically enhances the viability of projects and hence the volume of CO_2 emission reductions that can be delivered. Some of the potential routes for accessing low cost finance are discussed below.

Debt finance

- **Prudential borrowing**

Similar to the way corporate finance works, local authorities (and Greater London Authority) requiring loans for capital purposes can borrow from the Public Works Loan Board (PWLB). The prudential capital system was one of the flexibilities introduced in the Local Government Act 2003. Local authorities are free to borrow for capital investment plans so long as they can afford to service the debt from revenue and other source of income. Prudential borrowing enables councils and their partners to invest in key local priorities. The security for money borrowed by a local authority, together with interest, is charged indifferently on all its revenues; all securities created rank equally without any priority. The interest rate is currently set to 1% above UK government gilts.

- **European Investment bank (EIB)**

There is an opportunity to access low cost finance from EIB for retrofitting social housing provided there is a viable business model. EIB loans are available in large blocks of minimum £75-100m and at low rates of interest (typically 4.5% at present) to be lent on a 50% basis for environmentally sustainable initiatives.

A number of smaller initiatives may need to be packaged up in a project portfolio to ensure the minimum threshold is achieved.

EIB always invests its money through an intermediary body with a good credit rating, such as a bank, a utility or a local authority. EIB loans can be provided on either a fixed or variable basis (the latter known as EIB Variable Cost of Funds). Loans are typically 20 year interest-only (like endowment mortgage) or 30 years amortization (fixed annual payments on principal + interest on outstanding amount). For a 25 year project (such as a PV installation) there would be a great advantage in introducing 30 year EIB funding into the overall portfolio funding for an RP. The long duration of the term is typically even more valuable than the percentage point advantage on interest rates.

Being a development bank, EIB is very interested in social and environmental benefits. Measurement is also really important so proposals for before and after monitoring need to be included.

- **European Energy Efficiency Facility (EEE-F)**

This new facility dedicated to sustainable energy is expected to be launched in the second quarter of 2011 and will take the form of an investment fund complemented by technical assistance (TA) and awareness raising. The EEE-F will invest in energy saving, energy efficiency and renewable energy projects. Sustainable energy investments promoted by local, regional and (where justified) national public authorities, could include:

- energy saving measures in public and private buildings;
- investments in combined heat and power (CHP), including micro-cogeneration and district heating/cooling networks;
- investment in decentralised renewable energy sources, including micro-generation;
- clean urban transport;
- the modernisation of infrastructure, such as street lighting and smart grids,
- investment in sustainable energies with a potential for innovation and growth

The EU will contribute about EUR 146 million to the facility – about EUR 125 million to the fund and about EUR 20 million to TA (technical assistance). The European Investment Bank will invest up to EUR 75 million, resulting in an initial fund volume of at least EUR 200 million. Other financial institutions at Member State level have been invited and could also join the fund. The fund, which will be operated by a professional fund manager, will cover a large range of financial products such as senior and junior loans, guarantees or equity participation.

Funds will have to be allocated to investment projects, project development services and technical assistance during a period of 3 years, which will end on 31st March 2014.

Equity

- **Local Authority/ GLA reserves**

Given the recent cuts to public spending and the savings that most LAs have to deliver in the near future, the potential for capital investment from LA reserves is likely to be limited. In most instances, these would be prioritised for key priorities and/or retaining the quality of front-end services.

- **Private sector equity through an ESCo structure**

ESCo (Energy Services Company) finance provides a method of supporting the deployment of sustainable energy measures that are deemed cost-effective – i.e. has a positive net present value so investment is profitable. ESCos can finance or assist in arranging financing for the operation of an energy system by providing a savings guarantee. Generally ESCo finance is used to support long term investments in shared community energy infrastructure, e.g. district heating and CHP. ESCo finance will generally cover a proportion of the capital cost with the remainder to be funded by the developer or building owner / project sponsor.

Typical ESCo contracts are for 25-40 years, normally covering some or all of the design, supply, installation, commissioning, operation and maintenance of the energy system, including the sale of heat

and sometimes power direct to customers. Typical commercial ESCo hurdle rates are 12-15% project IRR. Finance may be a mixture of debt (~70%) and equity (~30%) so that the overall 'hurdle rate' is kept down for the project. Therefore ESCo finance is generally only going to be suited to the very best projects with low risk and good project returns. The PV rent-a-roof models are a good example of this type of project finance.

Financial modelling would be carried out by the ESCo, leading to a financial proposal. In some cases this is tendered competitively. The preferred ESCo partner is selected and appointed through a Heads of Terms Agreement to develop further the business case based on project details and agreement on risk share. An Energy Services Agreement is then concluded. The ESCo would enter into a Consumer Agreement with each household; this would define the payment terms in return for the delivery of the energy service. In some instances, debt recovery risk would be carried by the landlord or management company.

Grants

- **Energy Company Obligation**

The new Energy Company Obligation (ECO) will replace CERT and CESP programmes when they expire at the end of 2012. ECO is expected to work in conjunction with the Green Deal policy by focusing on those households who need support over and above Green Deal finance – in particular fuel poor homes and households in expensive to treat properties, such as those with solid walls, which have not benefitted much from previous schemes. The additional ECO support will be able to be combined with Green Deal finance as one package for consumers. As of date, the policy details for ECO are yet to be defined and the level of subsidy likely to be available is not clear.

- **European Regional Development Fund (ERDF)**

The European Regional Development Fund (ERDF) is aimed at economic regeneration projects promoted primarily by the public sector. ERDF helps projects which offer substantial benefits that meet the needs of the region and its local areas. The rest of the funding, known as 'match funding', comes from other sources such as: local authorities, government schemes, other public bodies and the private sector. Between 2007 and 2013, €3.2bn from the European Regional Development Fund (ERDF) is being invested in the English regions. Around £1.4bn remains available to applicants.

Local authorities have traditionally received considerable financial support through the ERDF.

The London Green Fund being is being set up by the LDA to provide repayable loan and equity investments in climate change infrastructure projects across London. The London Green Fund is made up of contributions of £50 million from the London European Regional Development Fund Programme, and therefore effectively is another route for accessing ERDF money. It is supported through the JESSICA (Joint European Support for Sustainable Investment in City Areas) initiative – a financial instrument that promotes sustainable regeneration in Europe's cities.

The £50m Energy Efficiency Urban Development Fund (UDF) forms part of this £100 London Green Fund. The UDF will invest initially in energy efficiency in public and voluntary sector buildings and social housing; although the understanding is that it will focus initially on non-housing projects.

Development funding

- **ELENA**

ELENA is a European Facility offering technical assistance to help public authorities develop bankable energy investment projects, normally above EUR 50million. It aims to support regional or local authorities in accelerating their investment programmes in the fields of energy efficiency and renewable energy sources. Projects within the following areas are supported:

- energy efficiency in public and private buildings
- integration of renewable energy sources (RES) into the built environment
- investments into renovating, extending or building new district heating/cooling networks,
- urban transport to support increased energy efficiency and integration of renewable energy

sources

- local infrastructure including smart grids, information and communication technology infrastructure for energy efficiency, energy-efficient urban equipment, inter-modal transport facilities and refuelling infrastructure for alternative fuel vehicles.

Up to 90% of the eligible costs necessary to prepare, implement and finance the investment programme may be funded. These could include, for instance, feasibility and market studies, structuring of programmes, business plans, energy audits, preparation of tendering procedures and contractual arrangements and project implementation units. The minimum 'Leverage Factor' (that is, the ratio between technical assistance and investment programme) is 1:20.

Note, the London Development Agency / Greater London Authority has already secured substantial funding through this mechanism as match funding to the London Green Fund (as well as a second application to support the development of CHP/district heating). Therefore the ability to draw down further support for projects in London may be limited.

- **KfW ELENA**

The KfW ELENA facility is similar to the one above, providing technical assistance of less than EUR 50million.

- **EU Technical Assistance - MLEI (Mobilising Local Energy Investments)**

Development funding is available from the European Commission to support to develop energy project concepts into 'bankable projects'. It covers the development process (such as legal costs, surveys, staff time) but does not provide capital funding. It is targeted at Local Authorities (effectively you need 200,000 inhabitants) and pays for 75% of the eligible costs, with a minimum €400,000 of eligible TA cost. The project needs to achieve a minimum leverage ratio of 15 – so €6m of actual spending. If no investment spending happens (after 3 yrs) then there is claw-back, so this needs to be considered seriously. A simple '2 pager' expression of interest has been submitted by Haringey on April 8th. It will be notified later in April whether a full bid is to be submitted by the closing date of May 11th or 12th. Successful projects should e notified in November and contracts negotiations completed between December 2011 and February 2012. This is the first year of the programme.

3.2 Financial payback of work packages

3.2.1 Our approach to financial modelling

As described in section 2.1, the various energy efficiency packages have been modelled using discounted cashflow analysis to determine an optimum set of measures that passes a threshold of viability. We describe here some of the financial assumptions underpinning this analysis.

Assumptions for the financial modelling

- The model assumes capital costs used for the EST Housing Energy Model. No uplifts in capital costs for London have been added.

  Appraisal of previous energy efficiency programmes has suggested that capital costs in London may be higher than in other regions. The report by GLA (Lagging Behind – Insulating Homes in London, December 2008) looks into the reasons behind a lower installation rate of CERT funded measures in London and cites more expensive operating conditions as one of the many reasons. Difficult operating conditions refer to the need to work nights and weekends to catch Londoners at home, commuting time between jobs and parking charges. However, as suggested in the report and corroborated by London Warm Zone, parcelling jobs up into area lots and combining the door knocking with other programmes would reduce many of these issues.

  Also, the lack of empirical evidence for the percentage increase in costs makes it difficult to reflect these in the modelling in any meaningful way.

- The government is intending that finance for Green Deal will be available from the wholesale capital markets (e.g. bond market or pension funds) at an interest rate of around 5%-7% over 25 years. Therefore assuming a mid-point value of 6% and a 1% margin for the Green Deal provider, the model assumes an IRR threshold of 7%.
- A 25 year repayment term.
- Annual price increase of 2% in line with the Government's inflation target.
- Energy tariff of 12p/kWh for electricity and 4p/kWh for gas.
- In order to drive this market, it will be important to offer some annual savings on the household energy bill to the energy user, therefore the value share assumption is that 10% of energy bill savings go to the occupier, and the Green Deal investment is then repaid from the residual 90% of energy savings.
- Currently, the financial modelling assumes no contribution from supplier obligation schemes such as ECO.

Limitations

There are a number of limitations with the model.

- 25 year Green Deal payment term: The financial model assumes that the measures have an average lifetime of 25 years whereas in practice lifetimes may be longer or shorter than this. For instance, fabric insulation measures will have a much longer service life (typically 40 years) while air-tightness measures will typically have a life of around 12 years.
- Modelled versus real energy savings and carbon reductions: There are various limitations with using SAP software to calculate real energy and carbon savings. Results from pay-as-you-save pilot projects[8] demonstrate how there is a significant difference between theoretical and actual energy and carbon savings, which can be much lower than predicted. This highlights an important issue of using SAP software and assumptions to predict actual energy and carbon savings, which may be a poor indicator of actual savings. This combined with comfort take can have a significant impact on overall savings. Although details of the Green Deal assessment tool are not known at this stage, allowing for variations in occupancy and heating patterns to predict energy savings for a household may help bridge the gap between modelled and real savings.
- No comfort take assumed: All potential energy carbon savings are counted in the modelling of maximum potential. This assumes that all measures installed will secure carbon savings and none are lost as increased comfort, which is unrealistic. This is a particularly acute problem in social housing stock, with the higher proportion of occupants living in fuel poverty. However, an allowance has been made for a 10% value share, which would have a similar effect on IRR as 'comfort take'. Please refer to section 3.3 for a more detailed analysis on the impact of variation in capital costs and value share on financial performance.

  Initial reports from pilot projects suggest actual energy and carbon savings may only be 50% of predicted savings due to the limitations of SAP methodology and issues of comfort take. These suggest that awareness and education may go hand-in-hand with work packages to ensure that the CO_2 and financial savings are realised.

3.2.2 Results

Table 16 summarises the internal rate of return (IRR) for the modelled archetypes. In the case of optimised packages the IRR varies from 7 -17%. The proportional weighted average IRR based on the number of these archetypes in north London is 9%, and 8.7% for only the high and medium priority dwellings. It is pertinent to add that while the optimised packages were designed to deliver an IRR of 7%, the variation in IRR merely reflects the fact that adding any single additional measure to the current package would have dropped the IRR below 7%.

Most of the advanced packages do not give a positive IRR apart from certain properties in 'poor' condition, that is, those with no basic energy efficiency measures installed currently.

[8] *Gentoo Green (2010), Retrofit Reality*

Table 18: Capital costs, carbon savings and IRRs for optimised and advanced packages

Archetype	Capital costs		Carbon savings (%)		IRR	
Description	Opt Pkge	Adv Pkge	Opt Pkge	Adv Pkge	Opt Pkge	Adv Pkge
Pre 1980 Solid Gas Flats Poor	£2,630	£14,082	32%	54%	10%	-0.5%
Pre 1980 Solid Gas Terraced Poor	£10,248	£19,847	56%	66%	7%	2.3%
Pre 1980 Cavity Gas Flats Poor	£3,527	£14,200	41%	49%	9%	-1.6%
Pre 1980 Solid Gas Flats Good	£2,087	£13,583	25%	37%	7%	-
Pre 1980 Solid Gas Semi / Det Poor	£17,593	£29,673	65%	72%	8%	4.0%
Pre 1980 Cavity Gas Flats Good	£351	£13,583	6%	22%	10%	-
Pre 1980 Solid Gas Terraced Good	£1,197	£19,273	8%	52%	9%	-1.6%
Pre 1980 Cavity Gas Terraced Poor	£9,092	£20,053	57%	63%	7%	1.2%
Pre 1980 Cavity Gas Terraced Good	£697	£19,273	8%	39%	11%	-
Pre 1980 Cavity Gas Semi / Det Poor	£14,137	£30,282	61%	68%	8%	2.2%
1980 Onwards Gas Flats Good	£351	£13,583	6%	21%	10%	-
1980 Onwards Gas Flats Poor	£3,248	£14,200	37%	44%	7%	-3.1%
1980 Onwards Gas Terraced Good	£697	£19,273	8%	33%	10%	-
Pre 1980 Cavity Gas Semi / Det Good	£735	£29,075	8%	43%	17%	-
Pre 1980 Solid Electricity Flats Poor	£7,343	£11,241	53%	55%	9%	5.2%
Pre 1980 Cavity Electricity Flats Good	£250	£14,880	3%	30%	10%	-
Pre 1980 Solid Electricity Flats Good	£4,358	£14,880	35%	45%	8%	0.0%
Pre 1980 Cavity Electricity Flats Poor	£5,589	£15,099	45%	50%	9%	1.0%

The above analysis does not factor in ECO (Energy Company Obligation) subsidy that will be available to those on low income or for expensive to treat properties, such as those with solid walls. The level of subsidy that may be available for each property is not known at this stage. The table below summarises the amount of subsidy that will be required for the advanced packages of measures to deliver an IRR of 7%, that is, the current funding gap for these packages to meet the 'Golden Rule'[9].

Table 19 Funding gap between optimised and advanced packages

Green Deal priority archetypes	Funding gap / ECO subsidy required (£)	Funding gap as percentage of capital costs
High	£8,282	36%
Medium	£8,844	61%
Low	£14,284	81%

3.3 Sensitivity analysis of household-level financial models

Table 20 below shows the impact of variation in capital costs and value share on financial performance. For the financial calculations, the value share component also works as a proxy for comfort take. 'Comfort take' is the proportion of energy saved from energy efficiency measures that would instead we used by residents to improve thermal comfort in the dwelling (for instance, by increasing the duration the heating system operates). If an allowance for 'comfort take' was to be made in the Green Deal calculation methodology (e.g. for fuel poor homes), it would reduce the total energy savings realised from the

[9] The 'golden rule' under the |Green Deal policy means that the expected financial savings must be equal to or greater than the costs attached to the energy bill.

package and therefore the value of the Green Deal payment. Similarly, if the value share component was increased, the amount of the instalment paid back to the investor would be reduced. Both these parameters would affect the IRR in the same way. The cell highlighted in red shows the base-case scenario.

The sensitivity analysis shows that where economies of scale can reduce the capital costs of packages by say 20%, the portfolio of projects may still be viable (that is, weighted IRR >7%) if the residents were offered as much as 40% share of the energy savings made. This could drastically improve customer uptake rates. On the other hand, any increase in capital costs of more than 20% will make the project portfolio unviable. Please refer to Section 4 for a more detailed discussion on likely uptake for the modelled packages.

Weighted average IRR across all archetypes for Optimised packages as function of value share and variation in capital cost						
	Capital cost:	80%	100%	120%	140%	160%
Value Share/ Comfort take	**10%**	11.7%	9.0%	7.1%	5.6%	4.4%
	20%	10.3%	7.8%	5.9%	4.5%	3.3%
	30%	8.7%	6.4%	4.7%	3.3%	2.3%
	40%	7.1%	4.9%	3.3%	2.1%	1.1%
	50%	5.3%	3.3%	1.9%	0.7%	-0.3%

Table 20: Sensitivity analysis on financial performance

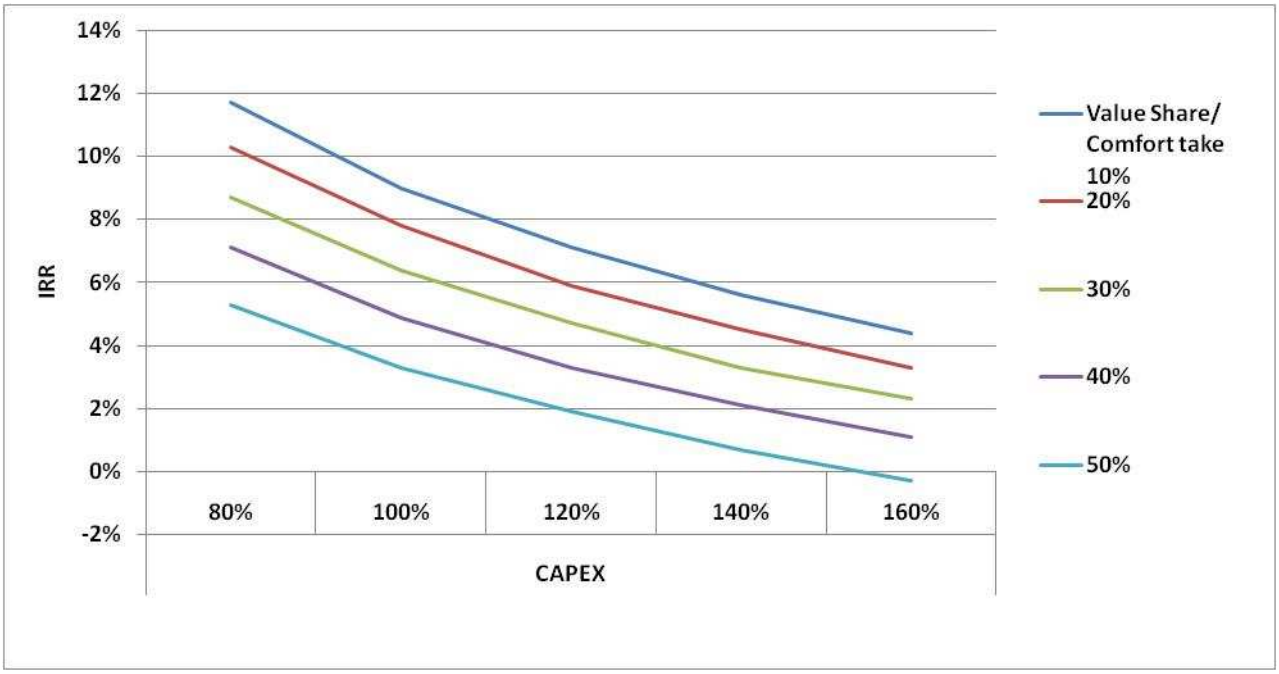


Figure 15 Sensitivity analysis of IRR as a function of capital cost variation and value share attributed to resident

The above sensitivity analysis assumes a 2% rate of inflation in line with the government's target rate. In reality energy price inflation is expected to be higher. Table 21 below shows the variation in weighted IRR for the sub-regional housing stock across for higher rates of inflation. At present, it is however unclear how Green Deal policy will address indexation of Green Deal payments to reflect energy price inflation or general inflation. The impact of indexation, i.e., linking Green Deal payments to inflation is discussed in more detail in Section 5.2.5

Weighted average IRR across all archetypes for Optimised packages as function of rate of inflation	
Rate of inflation	**IRR**
2%	9.0%
2.5%	9.5%
3%	10.0%
3.5%	10.5%
4%	11.0%

Table 21 Weighted average IRR as a function of rate of inflation

4 Customer take-up, capacity and skills

4.1 Customer take-up

To date there has been only limited market testing of the likely consumer response to Green Deal type packages. The most comprehensive study published to date was undertaken by Quadrangle in April 2009 for the Energy Saving Trust & Department for Energy & Climate Change, entitled 'Willingness to Pay'[10]. The headline findings were generally supported by a second smaller exercise undertaken the Great British Refurb Campaign, entitled 'Green Deal – public appetite market research', undertaken in August 2010[11]. It is however worth noting that the 'Willingness to Pay' study was undertaken before the Green Deal concept was introduced, and was based more closely on the previous Government's PAYS scheme. The research focused on a more traditional loan structure that homeowners would have to continue paying for even after they moved out. For that reason, longer payback periods were often dismissed because the homeowner didn't intend to stay in the property that long.

These research findings have been scrutinised in relation to the known characteristics of the Green Deal packages proposed for the North London Sub-Region. A summary of this analysis is presented in the Appendix. The findings suggest a customer take-up rate across the sub-region of up to 15% for the Optimised packages, and up to 5% for the 'Advanced' packages.

It is recommended that further research and market testing is carried out in North London sub-region to provide more conclusive indications on likely uptake rates. Our view is that it is important to pay attention to the feedback of market testing and use this to establish realistic expectations for customer take-up at an early stage. There are also a number of factors that will affect uptake rates, in particular, incentives attached to the Green Deal, if any. Again community based programmes are expected to drive participation and LA's are well positioned to support this.

Our current conclusions on uptake rates are based on the following factors:

The relatively high price of many of the packages – the 'Willingness to Pay' research found that, regardless of overall savings and monthly repayments, the overall package price has the greatest effect on customer take up, with a sharp drop off in interest in packages costing more than £4,000.

The 25 year payback period – the research found that the payback period of the loan is also a vital decision-making attribute for a large number of homeowners. Some automatically discard options with long payback periods, even when the saving is greater than the amount being paid back.

The 7% interest rate - homeowners are attracted by options that are interest free, or with low (e.g. 2%) interest rates. Take-up was much lower at an interest rate of 7%. Although this option was presented as a personal loan from the bank rather than repayment through the energy bill, the findings suggest that some consumers may be put off by the appearance of a high interest rate, in a similar way to the payback period.

[10] *Quadrangle, 'Willingness to Pay – Full Project Debrief', Commissioned by Energy Saving Trust / Department of Energy and Climate Change, April 2009* http://www.energysavingtrust.org.uk/About-us/Media-centre/Library/Publications-and-reports/Exploring-consumer-willingness-to-pay

[11] *Great British Refurb Campaign; Grand Designs, 'Green Deal – Public Appetite Market Research', 21 September 2010* http://www.greatbritishrefurb.co.uk/images/pdfs/gbr-greendealmarketresearch.pdf

It is also important to note that there is a large portion of the general public who simply are not attracted to a Green Deal type offering. The Great British Refurb market research found this number to be 44%. The 'Willingness to Pay' research found that even for a package where the incentive actually exceeded the total cost of the measures by £500 (in other words homeowners were effectively being paid to take up this package), only 53% of customers indicated they would take it up – leaving 47% who would not. This was for a package considerably more attractive (shorter paybacks, lower overall price, lower interest rate) than the packages proposed for the NLSR, and might be considered to provide an 'upper limit' for customer take-up, even in the presence of a substantial subsidy. The Great British Refurb research found that of the remaining customers who would at least consider the Green Deal, only 13% found it 'very attractive'.

Finally it must be remembered that historically, even for relatively 'quick win' energy efficiency measures such as cavity wall and loft insulation, which cost consumers just a few hundred pounds and pay back in a few years, and which have received heavy subsidy and promotion under CERT, levels of take-up have been low. It is important to be realistic about the likely response from consumers for offerings which are more technically and financially complex, have longer term implications for the house and less subsidy attached.

Experience from the RE:NEW programme, which primarily focussed on easy energy efficiency measures, suggests that, on an average, penetration rates for home visits was about 24% (ranging from 7% to 35%)[12] of the total homes that received marketing. Uptake of measures (such as cavity and loft insulation) in homes that received marketing was 3% on an average, ranging from 0.2 to 11% among different local authority areas[13]. Higher penetration rates generally correlated with operating in smaller, ward-sized, areas where momentum and recognition grew as a result of community awareness, brand presence and neighbourhood recommendations. This was undoubtedly also helped by these boroughs also having an established environmental profile in the area, suggesting that coordinated messages increase the receptiveness of residents to new schemes. Emerging data from Muswell Hill LCZ (Low Carbon Zones) where major measures are being tested, has indicated that personal recommendation from a neighbour (through door knocking) plus Council endorsement on external contractor has been instrumental in influencing uptake rates.

Difference by age, gender, socio-economic group and property type

Generally interest in the Green Deal appears to be fairly consistent across the public, with the following slight differences found:

Age – generally younger consumers (aged 25- 44) more interested than older members of the public (55+).

Gender – broadly there is little difference, with male consumers showing a slightly higher uptake than females

Socio economic group – again there is little difference, with consumers of higher social grades (ABC1) showing slightly higher uptake than C2DEs.

Property type – homeowners in smaller properties (flats/maisonettes, bungalows, terraced housing) show slightly more interest than those in semis or detached houses.

Sufficient data was not available to further refine the customer uptake levels based on these findings (for instance while census data is available at Lower Super Output Area it does not combine age, gender and social economic group at the individual property level). However these findings could be used to inform the delivery of marketing messages in the communication strategy.

Again, there was insufficient data to refine uptake rates by tenure. However, it is realised that in case of social housing , the ongoing relationship of RSLs and ALMOs with the tenant, the multiple channels of communication that can be used to get the message across and the level of community engagement that can be achieved, will help drive uptake rates in the sector.

[12] Please note that these were demonstration projects looking at different aspects of the RE:NEW model, hence the range in penetration and uptake rates.

[13] Not all homes were suitable for measures. Of the homes that received an initial, an average of 49% were referred to have measures installed (range 13 -79%). An average of 26% were converted into actual installations (range 4 -44%). Therefore installation of further measures in homes that received a visit was on an average 12% (range 1- 31%).

Supply chain and technology specific considerations

Given the levels of customer take-up suggested by the 'Willingness to Pay' research, it is unlikely that supply chain capacity will be a limiting factor in terms of materials and products within the sub-region, since the majority of these will be imported from outside the region. However, it is possible that skills shortages could be experienced at the sub-regional and local level and these are considered more in the next section.

It is currently not clear how pre-payment meters will be dealt with in Green Deal policy. However, this may represent another constraining factor in terms of overall uptake rates in the sub-region.

4.2 Capacity and skills at regional level

Assuming the levels of customer uptake outlined above, the number of direct full time equivalent (FTE) jobs likely to be created over the 10 year implementation period of the programme has been calculated for each of the key measures. The calculations are based on the estimated number of person days required to install each measure on site multiplied by the total number of measures that can potentially be installed in the sub-region (assuming 100% uptake) based on 235 working days in a year. The estimates on number of person days for each measure are derived from reports published by CSE[14] and ACE[15], as well as Camco experience from other projects. The figure is then translated into FTE jobs generated over 10 years for the relevant uptake rates. These are shown in Figure 16 below. In total we estimate that at least 182 direct FTE jobs are likely to be created by delivery of the Optimised Packages, while a further 354 may be created through the Advanced Packages. This gives a total of 537 direct FTE jobs. Although uptake of the Advanced Packages is expected to be lower, the employment creation potential is relatively higher due to the prominence within these packages of more labour intensive measures like external wall insulation.

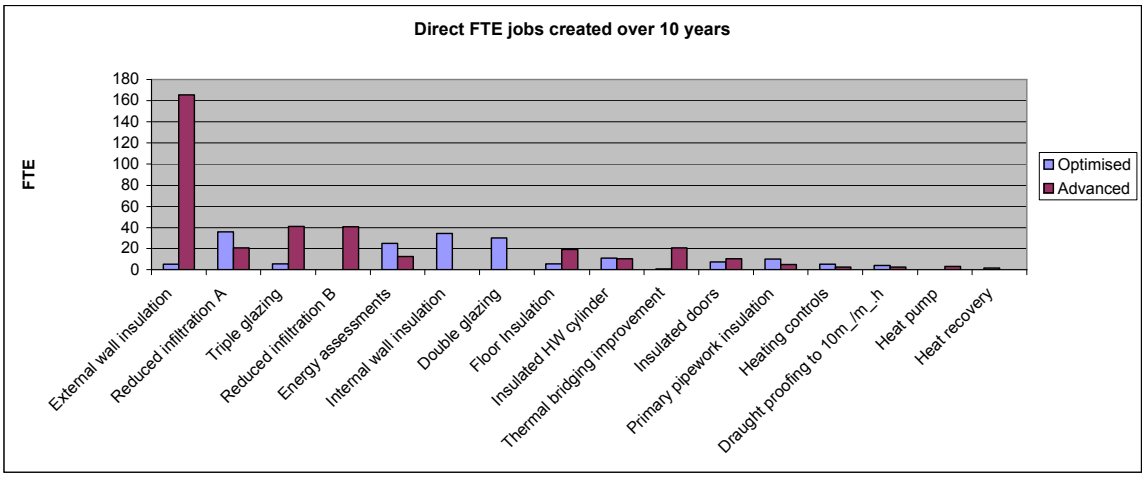


Figure 16: Estimate of direct FTE jobs created over 10 year period by Optimised and Advanced packages

In order to simulate these 'additional' jobs for the sub-region, employment associated with the installation of cavity wall insulation, loft insulation and boiler replacements have been excluded. Loft and cavity insulation are already key components of the energy suppliers existing CERT programmes and are subject to a government target that all should be filled by 2015, and it is assumed that employment at this current rate will simply continue under a Green Deal programme. Boiler replacement is typically dominated by natural replacement cycles and while some of the Green deal packages may stimulate earlier replacement, this is likely to be offset by other activity (such as draught-proofing) which may have happened anyway (for instance as part of London's RE:NEW household energy efficiency programme). However, measures currently being implemented under CERT might not be delivered at all once the subsidy is withdrawn, and so the proposed Green Deal Initiative will play a role in retaining existing jobs

[14] *CSE, ACE & Dr Richard Moore, Retrofitting the Existing Housing Stock in the South East, 2008*
[15] *ACE, Warm Homes, Green Jobs: The economic impacts of the Climate Change (Scotland) Act in the residential sector, October 2009*

in the sector. Delivery of the Optimised & Advanced packages at the expected take-up rate would support the retention of at least 52 jobs related to loft, cavity insulation and boiler replacement.

As mentioned above, the numbers of FTE jobs shown are 'direct jobs' associated purely with installation of the measures, and do not reflect associated jobs (such as administration, energy advice, manufacture and retail of products) which are likely to be supported elsewhere in the supply chain. While some of these associated jobs will fall outside the sub-region (such as manufacture), others (such as administration and retail) will reflect in more local employment figures. Furthermore the job figures assume a perfectly even delivery of measures over time, which in practice is unlikely to occur. In practice more people are likely to be needed within the work force to install the measures, and once qualified (e.g. for internal wall insulation), may find motivation to up-sell their existing services to customers elsewhere, outside of Green Deal type packages. Thus there are a number of ways in which these theoretical FTE jobs are likely to under estimate the real effect of employment growth in the sub-region.

While certain areas of the industry like window replacement are likely to expand to meet this enhanced demand relatively easily, other areas like internal and external wall insulation, and reduced infiltration (i.e. air tightness improvements) are likely to require more support to acquire the necessary knowledge and skills. The market for these services has historically been very low in the UK and consequently the general levels of knowledge and skills surrounding these areas within the industry are still very poor.

In a review of the availability and delivery of skills for the household energy efficiency industry, the Energy Efficiency Partnership for Homes (EEPfH)[16] found that:

While new and specialised skills and knowledge will be required, there is good potential to build on the skills of existing trades. It is the application of *knowledge* (e.g. an understanding fundamentals of energy flows, building fabric heat loss, air tightness, vapour permeability, etc), and *up-skilling* which will be important in these cases. Flexible 'top up' training for those already in work will therefore be an essential component.

For insulation, the application of existing skills to the use of new materials and approaches is required, with a focus on harder to treat properties. General installation skills are required to prevent manufacturers limiting use of their products to installers who have undergone product specific training.

A new approach is needed that takes the whole house into consideration. The household energy efficiency industry and trades have traditionally operated separately from each other. A greater level of industry integration will require more focus on multi-skilling. All trades need to have a common appreciation of how their work fits into the bigger picture of whole house eco-renovation.

There is a lack of clarity within the energy efficiency industries on the range of qualifications and certification schemes that exist, making it difficult for installers to know which is appropriate for their needs, or where to access appropriate training.

There is likely to be an issue with capacity for appropriate training courses as demand increases. Therefore one objective must be to ensure there are enough trainers and organisations able to deliver this training.

We recommend that partnerships are established with local providers of skills training to ensure that demand for both existing and new courses can be met, and that clear signposting is provided to potential installers towards available and recommended courses as part of this programme. It is worth noting that the majority of household RMI (Repair, Maintenance and Improvement) work is undertaken by small and medium enterprises (SMEs) with between 1-5 employees who often find it difficult to justify taking time off work to complete training, even when the course itself is provided free. In order to ensure take-up of this training subsidised delivery should be considered alongside flexible approaches such as modular evening or weekend courses.

Examples of best practice for up-skilling schemes and initiatives were found by the EEPfH Review to include:

- Training Centres – schemes such as the 'British Gas Green Skills Training Centre' and the 'Renewable Energy Installer Programme' where dedicated training centres have been established which offer specialist advice and offer practical learning facilities.

[16] *Energy Efficiency Partnership for Homes, "Household Energy Efficiency Skills Review", April 2010.*

- Live Demonstrator Projects – living demonstrators such as the 'Centre of Refurbishment Excellence' are considered a user friendly way of up-skilling within the industry, where workers can visit and see how technologies are applied in real life. These projects raise awareness of new technologies and methods, and subsequently raise demand for training.
- Online and Internet Based Training – online and internet training provision can be undertaken at the learner's own convenience, which can be especially attractive to SMEs who often struggle to make time to attend fixed training sessions.

A good example of integrating initiatives to support local jobs with retrofit schemes is the 'Retrofit South East project'. In 2009, Radian Group was successful in securing significant European Regional Development Funding (ERDF) via the South East England Development Agency (SEEDA) for this region-wide project. The project ran from September 2009 to March 2011, and involved a range of capacity building and demonstration activities to support and stimulate the market for low carbon retrofit in the region, including provide targeted business assistance to SMEs and other key organisations. This free assistance was offered to up to 85 SMEs in the South East region, and focussed on helping them to develop their knowledge and ability to provide new services and up-sell existing services for eco-retrofit. The target group included plumbers, carpenters, electricians, plasterers, architects, energy assessors and other interested professionals in the industry.

Another initiative, the Gateway to Suscon project used ESF (European Social Fund) financing to deliver training to the construction industry in the South East. The project ran from September 2009 to March 2011, although the Suscon concept continues. SusCon is a sustainable construction training and research centre in Dartford that offers accredited courses for those working in the construction industry. As of November 2010, 325 small and medium enterprises have signed up; 980 participants have been recruited (against a target of 1,250), of which 405 were unemployed (against a target of 400).The scheme has now been awarded the national ESF champion in the category of Sustainable Development Mainstreaming Leader (Specialist Project).

Birmingham Energy Savers (BES) is a not-for-profit organisation launched by Birmingham City Council. It is a city-wide energy efficiency and renewable energy scheme that aims to create around 270 new jobs and reduce CO_2 emissions by 60% by 2026. Where possible, BES is working with local companies to help create jobs and apprenticeships in the sector. Gearing people up to take up the new jobs has required some re-skilling. The council has worked closely with the Skills Sector Council and South Birmingham College, which had photovoltaic panels installed as part of Phase 1 of the programme. A social enterprise called the Jericho Foundation has also helped train long- term unemployed people to respond to new job opportunities. Boosting local supply chains through market access for small- and medium-sized businesses is a core objective of the scheme. Training programmes in local colleges are supporting demand for installation skills[17].

The FLASH programme, led by the Institute for Sustainability, is providing business support to London-based small and medium enterprises (SMEs) working in construction or other built environment industries, technologies and professions. The project, part-funded by ERDF, is designed to help SMEs seize the commercial opportunities arising from the move towards a low carbon economy. SMEs will have access to 12 hours of free support over the next year through seminars and workshops, one to one support, networking events and online information.

It is interesting that the LDA's 'Low Carbon Employment & Skills Programme'[18] excludes consideration of general household refurbishment trades in its consideration of potential for the sector. Instead it focuses on the narrower version of the definition of 'low carbon sectors' used by the Department for Business Innovation and Skills (BIS) report 'Low Carbon and Environmental Goods and Services: an industry analysis' which is much more focused on technology-led approaches. We recommend that a broader consideration of 'low carbon skills' is used for the purposes of planning for delivery of the packages proposed by this study, which extends to include the whole Repair, Maintenance and Improvement (RMI) sector, covering all the general construction trades who are likely to play a vital role in delivery of this programme.

[17] *Extract from a report being written by APSE for a leading trade union.*
[18] *London Development Agency, "Skills for a Low Carbon London", June 2010.* http://www.lda.gov.uk/projects/low-carbon-employment-and-skills/index.aspx *and* http://www.lda.gov.uk/Documents/Green_Expectations_Londons_low_carbon_job_prospects_9743.pdf

5 Appraisal of alternative delivery models, risks and barriers

5.1 The Role of Local Authorities

This section explores the role that Local Authorities (LAs) could potentially play in delivering such a sub-regional programme. The options tie is very closely to what is seen as the overall vision and ambition of the scheme (for instance reduction in CO_2 emissions, generating monetary value, ensuring wider social benefits), and how closely aligned LAs are with regard to this long term vision. The role of LAs in delivering an area based retrofit programme will depend on several factors:

- Internal resources (people and time)
- Availability of finance
- Appetite for risk
- Expertise and track record in delivering similar schemes
- Government policy and incentives
- Aims and aspirations

We have explored three role options, entitled:

- Local Authority lead
- Local Authority light touch
- Somewhere in the middle

For each option we have set out a potential vision for what could be delivered in 10 years' time. We have highlighted the main advantages and disadvantages of the different levels of involvement that LAs can have in delivering an area based retrofit programme.

Local Authority lead

Vision

The LAs have built a reputation for leading from the front on low carbon agenda with LA credited for retrofitting thousands of properties. They have a growing order book of projects with all financial investment secured. They have established a local supply chain, with local economy boosted as a result. They have managed to ensure the market develops in an equitable way, which achieves community benefits beyond purely cost effective carbon reductions. They can sell off a successful proven business model, if they so wish.

Advantages

- Demonstrates community leadership, which falls under local authority remit.
- Credited with emission reductions across housing stock, which will contribute to regional and national targets. Helps achieve 40% CO_2 reduction target by 2020 which Haringey, Camden and Islington have signed up to.
- If carbon budgets were to be devolved to local authorities or regions, gives the local authority/ region a substantial advantage in meeting that budget.
- Retains the financial benefits from projects, which can be used to reinvest to achieve other objectives (e.g. tackle fuel poverty).
- Able to target wider stock rather than cherry picking 'optimal' properties. Able to share benefits with community (e.g. via community bonds and shares). Private sector is unlikely to have the same focus.
- Helps develop a mature market with local supply chains (and related green jobs), creating a positive multiplier in the area and delivering multiple benefits.

- Maximises value of their own assets
- Improves energy security of area, making area less dependent on uncertain and volatile imports

Disadvantages

- Resources required cannot be underestimated. The time and effort, especially with major managerial input may be difficult if internal budgets are being cut. A significant level of grant funding will be required to support initiatives.
- Political risks - LA lead may not completely align with national Government's emphasis on market led initiatives.
- Policy risks – Success of project reliant on overarching national government policy framework. Policy uncertainty (in particular, with regard to details of Green Deal, and future tariff structures for FITs and RHI) may mean a lot of upfront investment in a market that may not be fully supported in the future.
- LAs saddled with all project risks (planning, development, construction, operational and maintenance).
- Need to secure capital resources upfront
- Financial risk, with uncertain revenue streams and potentially low returns.
- If projects fail to deliver economic and environmental benefits, LAs will be blamed for failure, resulting in loss of faith and trust from local communities.
- May struggle to compete with private entities entering market (especially national private utilities), which may specialise in particular services and products.
- The smaller LA areas in London may mean that a number of LAs will have to pool resources to get economies of scale. This could lead to governance issues.

Local Authority light touch

Vision

Low carbon retrofit work has been left to the 'Market.' LA input and investment is minimal, allowing resources to focus on other pressing issues and delivery of basic services. LA focuses on specialising on traditional areas of service delivery, rather than entering new and complex markets.

Advantages

- Much lower risk with lower resource requirement.
- Optimised allocation of scarce resources and finance at a time when councils are facing the significant budget cuts.
- In line with current Government principles, that allows the 'Market,' to deliver solutions. Can still be involved with influencing market (information and awareness), building on existing experience and expertise.
- May help drive community led initiatives (yet this is debatable).

Disadvantages

- Less control on the overall agenda may mean that an area based approach is not delivered by the private sector, as they are likely to cherry pick the best projects.
- Unlikely to meet ambitious carbon reduction targets, without LAs shaping the way that the market develops. This is a key issue and a major risk. Can be seen as doing nothing.
- If carbon budgets were to be devolved to local authorities or regions, this would mean that the local authority / region would have uncertainty about the value of the projects in meeting that budget, due to the lack of control mentioned above;

- If LAs wait too long to contribute to this market, they will be left with more expensive and complex measure, as all the 'easy wins,' will be delivered by private firms.
- Public may lose trust in LAs if they cannot ensure equitable market develops that benefits the most vulnerable.

Somewhere in the middle

In this approach the LAs will sit somewhere in the middle of the 'lead,' and 'light touch,' approach both in terms of the degree and length of involvement. Important considerations for the balanced approach are:

- The need to optimise risk and reward.
- Balancing commercial viability with other social benefits
- Providing input at the initial stage when its most needed i.e. LAs can support initial pilot projects and community enterprises, helping to kick start retrofit activity.
- Ensuring the programme continues to deliver against the vision and mission. The need to map out what needs doing, and what other Government intervention is required.

There are a number of examples of local authority and other public sector organisations deciding to take an active role in delivering environmental initiatives. A good example of this is Thameswey Ltd., an Energy and Environmental Services Company or EESCO wholly owned by Woking Borough Council. The company was set up in 1999 with the aim to deliver its energy and environmental strategies and targets, and has since successfully delivered a range of initiatives. A number of other LAs have taken a public-private partnership approach to delivery energy services in their area such as Southampton City Council, London Borough of Tower Hamlets, and Nottinghamshire County Council, among others.

The next section examines a range of alternative delivery models that can be considered. Specific examples of initiatives where these models have been adopted are included in Appendix C.

5.2 Alternative Delivery Models

Four alternative delivery models have been examined representing a spread of risk, reward and influence. Each represents a potential role for the LAs to act either individually or collectively in bringing something to the retrofit market that will help to make it take shape in a way that would not happen through market forces alone. Case study examples have also been identified in the Appendix to demonstrate how similar models have been adopted elsewhere.

5.2.1 Model A - Public Sector Development Company or project

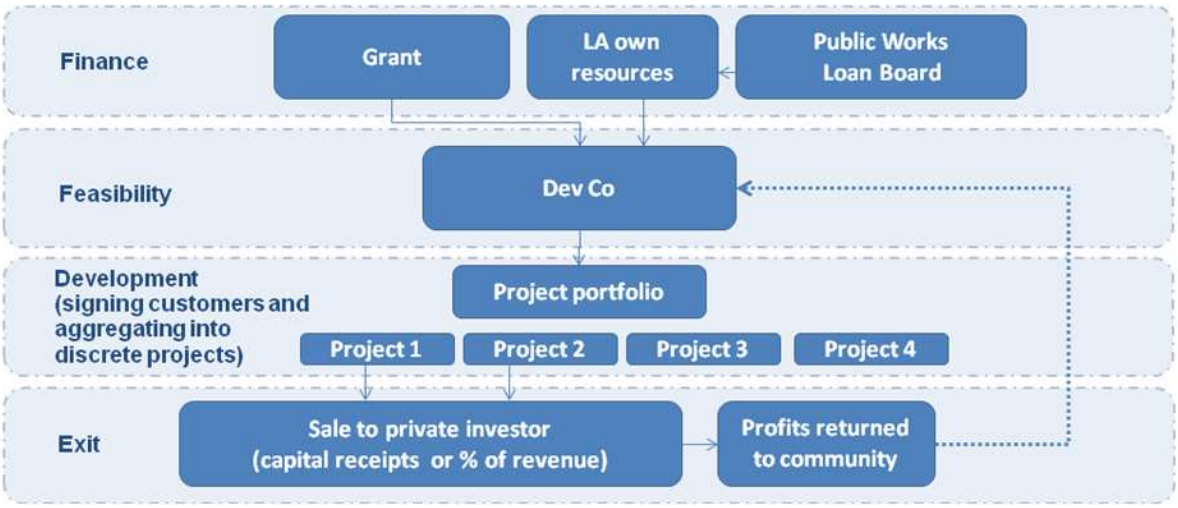


Figure 17 Overview diagram for Model A

The first approach is for the local authorities to focus on front end customer acquisition for Green Deal providers. The LA uses its trusted position to educate the public, explain how Green Deal will work, provide common information across the borough and generate leads through door-knocking and customer advice. The LA would use the intended standardised method and process to carry out a Green Deal assessment, identifying technical opportunities for cost effective low carbon refurbishment for a home owner or tenant, talking through the extent of measures that can be financed under the Golden Rule and establishing whether there is genuine interest in carrying out works. Should there be interest in proceeding further, the householder would consent to their details being passed to a Green Deal Provider and the local authority would collect a finder's fee to cover its costs. Any surplus generated would be returned to the authority to continue the work.

This model could either be done directly by the local authorities (singly or collectively) or through the establishment of a Development Company which could, for example, be established as a Community Interest Company. The main advantages of this model are that it requires relatively modest amounts of revenue funding to cover staff time and marketing materials but wouldn't require access to major capital resources since the Green Deal Provider would be responsible for funding and installing energy efficiency measures. The approach can support a range of initiatives including FIT, RHI and ECO Subsidy projects as well as levering other benefits such as fire, benefits and health and safety checks for vulnerable residents.

The main disadvantages are uncertainty around the uptake rates and the finder's fees that can be attracted and the best way to manage the relationship between the local authority and the Green Deal Provider so that high levels of trust can be maintained with the resident.

The London RE:NEW programme works in a similar way although the customer visit is carried out by the contractor who also installs the energy efficiency measures as appropriate. Emerging data from Muswell Hill LCZ in Haringey where major measures are being tested has suggested that Council endorsement on external contractor (along with personal recommendation from a neighbour) has been very successful.

An example financial model has been produced for a programme leading to the retrofit of 80,000 homes over 10 years. The cost of per home of running the programme is assumed to be £500/home with a finder's fee of £575/home. This has been based on experience of RE:NEW where the average costs for operations and marketing (excluding the installation of easy measures themselves) are £100/home and an uptake rate of 12% for the homes visited. The assessor spends 2 hours with the home owner to assess the potential to install simple measures. We assume the uptake rates for Green Deal in North London will be nearer 10% and the assessment process will take longer due to the complexity of the assessment required, the need to explain Green Deal and the need to carry out a financial appraisal within strict quality control guidelines. Finder's fees have been set based on the need to cover average costs with a reasonable but not excessive margin.

The modelled cash flows are shown below. Since the LA is taking development risk on finding suitable candidates for Green Deal, there will be a time delay between costs and revenues. It shows how there will be an initial outlay of working capital of up to £4.3m for the first year's activities. Once finder's fees flow this will cover operating costs for the subsequent year, and so on, until the end of the ten year programme, the final year's payments would generate an equivalent profit.

Total LA investment would be £43m over 10 years. The model shows an Internal Rate of Return of 7% but this will be highly dependent on the exact costs and fees that result. If costs increase then there may be the potential for fees to rise accordingly but ultimately this will need to be a more cost effective and successful way to generate opportunities than could be achieved by the Green Deal Provider on its own.

Summary of advantages and disadvantages of Model A	
Advantages	**Disadvantages**
Small LA investment could lever substantial capital receipts plus private sector investment	Need to balance trusted advice and sales
High replicability	Requires strong rights to projects
Model can support a range of initiatives	Need partnering with Green Deal provider to ensure smooth follow up
Flexibility regarding financing structure (on or off balance sheet)	Grant rules around recycling revenue

Table 22:Summary of advantages and disadvantages of Model A

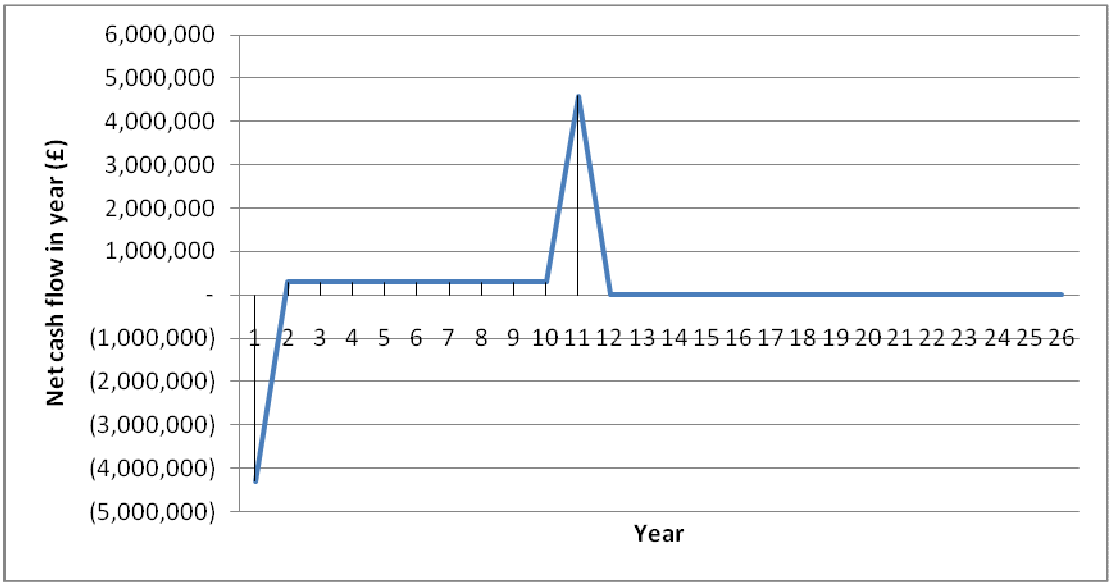


Figure 18: Cash flow analysis for Model A

	IRR	Finders Fee		
	7%	**525**	**575**	**625**
	450	8%	18%	28%
Acquisition cost	**500**	-2%	7%	16%
	550	-11%	-2%	6%

	NPV	Finders Fee		
	£37,380	**525**	**575**	**625**
	450	58,740	414,738	770,737
Acquisition cost	**500**	-318,619	37,380	393,378
	550	-695,977	-339,979	16,020

Table 23: Sensitivity analysis for Model A

Table 24 Evaluation criteria for Model A

Evaluation criteria for Model A	
Resources required per LA	
Start-up costs	£50k as share of co-ordinated sub-regional activity. Could be higher if done separately by each LA.
Development funding	£0.7m working capital for first year, self-sustaining thereafter
Capital funding	None required. All capital investment made by Green Deal investor via Green Deal provider
Risks carried by LA	
Consumer uptake	This is the main risk carried by the LA. It will be paid upon results.
Consumer credit selling	This is an important area of risk to manage in accordance with Green Deal codes of practice to be developed. Likely to be in accordance with the Consumer Credit Act therefore strict safeguards must be in place to avoid mis-selling. Potential for long term liability as was witnessed with selling of Payment Protection Insurance.
Capital cost of works	The main risk here is that the LA must be in a position to quote prices that reasonably match those to be finally offered by the Green Deal provider. The Green Deal provider will ultimately be responsible for managing construction costs within budget.
Construction risks	This risk resides with the Green Deal provider
Technical performance	This risk resides with the Green Deal provider
Revenue – first loss	This risk resides with the Green Deal provider
Revenue – all losses	This risk resides with the Green Deal provider
Potential rewards per LA	
Internal Rate of Return	7%
Net saving on resident energy bills	£300k per annum
% CO2 emissions reduction	2.6%
Lifetime tCO2 reduction	267,000 tCO2
Fuel poverty mitigation potential	Low
Job creation (FTE)	65
Certainty of outputs	Low
Indicators	
Leverage of public money	High
Scalability of model	High
£ invested by LA/lifetime tCO2	27
£ invested by LA/FTE job	11,026
Exit Strategy	
Exit points	Should the business model fail to perform then operations could stop and the business be wound up
Liabilities	Set up costs are relatively low compared with other models. Expenditure is therefore largely incremental with each house visited. Maximum unpaid work in progress considered to be less than £500k.

5.2.2 Model B - First Loss Guarantee Fund

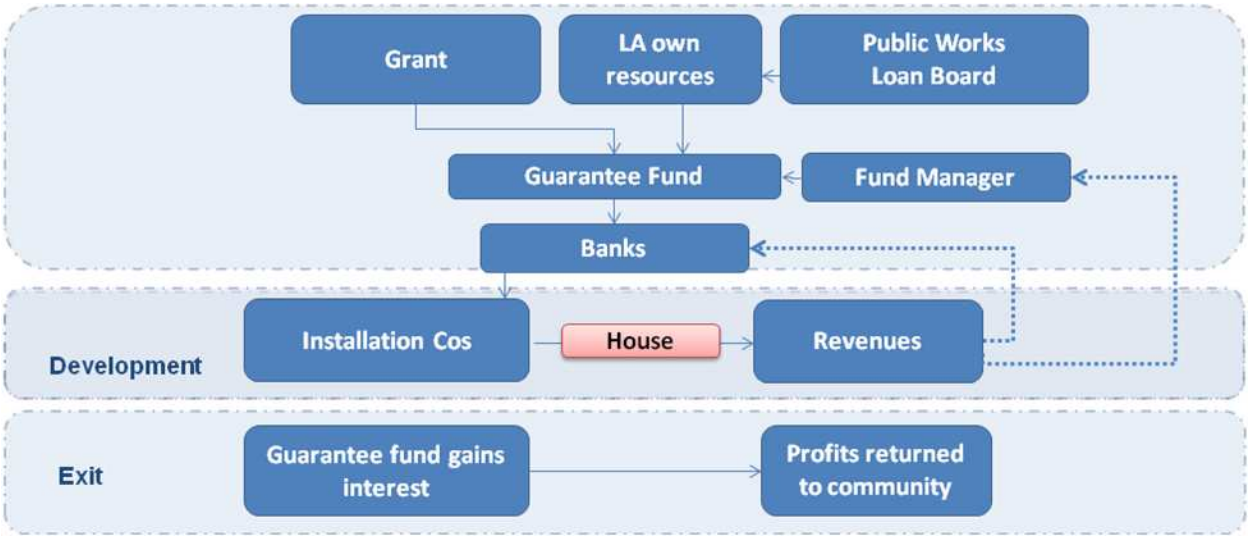


Figure 19 Overview diagram for Model B

The second approach is for the Local Authorities to establish a first loss guarantee fund to underwrite the risk of non repayment from Green Deal contracts. The fund would be established to lever in bank debt to fund measures. The bank would use the fund as security – effectively viewing the fund as an equity investment into the project. This first loss equity would help to reduce the cost of capital, partly through taking the cost of default off the books of the green deal investor, and partly through the way the fund would be managed and allowed to be used. Simple credit approval processes would be established so that the fund could be used by banks and Green Deal Providers where the project meets certain risk profiles conditions.

The main advantages of this model are the high leverage that could be gained on local authority money which drives down the cost of capital from banks. It also offers social benefits by its ability to integrate systems to manage defaults. In case of a default, the resident would have a period of time before the bank loan is terminated during which period the guarantor can engage with the resident with a view to get the loan re-payments back on schedule.

The main disadvantages relate to the degree of control that would still be required to manage the fund effectively and the risk that the whole 100% investment in the home would be seen as a contingent liability sitting on the local authority's books. In the current economic climate it is also likely that banks would be seeking additional levels of equity to reduce their exposure. Its high gearing with private sector capital is most likely to be possible once the market matures and banks understand the true costs, benefits and risks. Until this point, the bank interest rates could remain relatively high therefore there will again be a tendency to cherry picking investment with the greatest return.

There are many ways in which such a facility could be used. It has initially been modelled as a 10% equity layer levering 90% bank debt[19]. This is the maximum leverage rate that market testing has told us would be possible at present. Since the fund management tools would need to manage the overall project risks in a similar way to the other delivery models, the financial appraisal shows the overall project finances including both debt and equity.

As shown in Figure 20, a 10 year programme to retrofit 80,000 home would generate negative cashflows of up to £4m/annum in the first ten years whilst projects are being developed and bank debt payments are greater than revenues from household Green Deal contracts. These would peak in Year 26 before tailing off as payments from the first projects stop.

[19] A variation on the model is being developed by GESB for Radian Group as part of the Retrofit South East project. Fund design is due to take place during 2011/2012. Once complete the may lead to different results.

Local authority investment would be £58million over 10 years. The model suggests an IRR of 6-7% would be achievable. At a discount rate of 6% the Net Present Value would be up to £3.9m.

Figure 20 Cash flow analysis for Model B

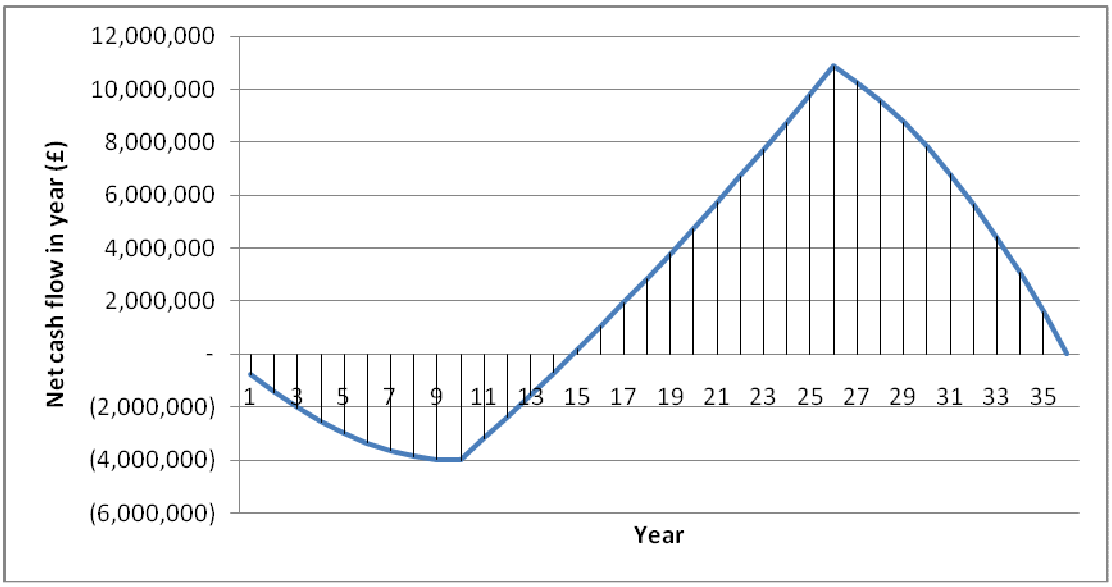


Table 25 Summary of advantages and disadvantages of Model B

Summary of advantages and disadvantages of Model B	
Advantages	**Disadvantages**
Borrowing secured against the guarantee fund	Requires acceptance from high street banks to see lower interest rates
Reduces cost of capital and increases uptake	Needs clear framework to manage risks downstream
Maximises leverage of private sector debt finance	Generates modest income for LA
Potentially minimises balance sheet burden for LA	Less 'hands on' than other models
As payments are made, fund revolves	High gearing with private sector capital is most likely to be possible once the market matures and banks understand the true costs, benefits and risks.

Table 26 Evaluation criteria for Model B

Evaluation criteria for Model B	
Resources required per LA	
Start-up costs	£85k as share of co-ordinated sub-regional activity. Could be higher if done separately by each LA.
Development funding	£35k per annum share of operating costs per annum
Capital funding	£1m per annum capital investment into the fund. Residual capital investment into measures made by Green Deal investor via Green Deal provider

Risks carried by LA	
Consumer uptake	If uptake rates are less than anticipated then fund management costs would be covered by bank interest accrued on the fund
Consumer credit selling	This risk resides in the first instance with the Green Deal provider and then with the Green Deal Investor. Clarity would be needed regarding any liabilities that would reside with the guarantee fund regarding selling under the Consumer Credit Act.
Capital cost of works	This risk resides with the Green Deal provider
Construction risks	This risk resides with the Green Deal provider
Technical performance	This risk resides with the Green Deal provider
Revenue – first loss	This is the main risk that resides with the LA. The fund would be established with rules regarding the purposes for which it could be used and the circumstances under which it could be accessed to draw down funds.
Revenue – all losses	Residual revenue risk resides with the Green Deal provider
Potential rewards per LA	
Internal Rate of Return	6-7%
Net saving on resident energy bills	£385k per annum
% CO2 emissions reduction	3%
Lifetime tCO2 reduction	333,000 tCO2
Fuel poverty mitigation potential	Medium
Job creation (FTE)	83
Certainty of outputs	Medium
Indicators	
Leverage of public money	High
Scalability of model	High
£ invested by LA/lifetime tCO2	29
£ invested by LA/FTE job	11,717
Exit Strategy	
Exit points	Should the business model fail to perform then operations could stop and the fund be wound up
Liabilities	Set up costs are relatively low compared with other models. Expenditure is therefore largely incremental with each house visited. Liability limited to cumulative investment into the fund plus any statutory responsibilities for investors in Green Deal.

5.2.3 Model C - Public Sector Ownership of Assets through Special Purpose Vehicle

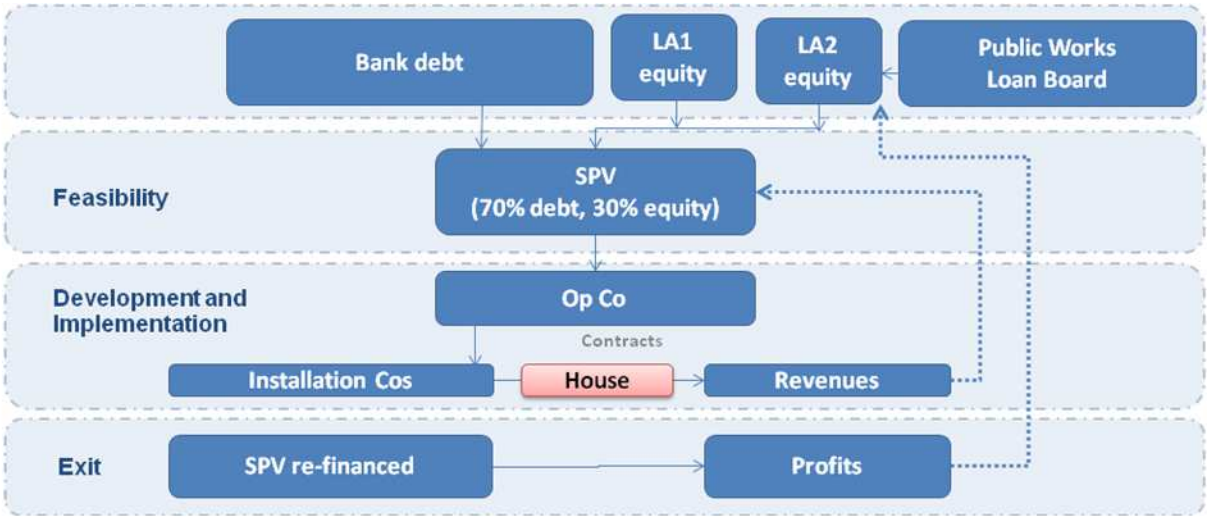


Figure 21 Overview diagram for Model C

The third approach is to establish a Special Purpose Vehicle (SPV) to channel investment and manage risk. This is the classic project finance structure where banks will typically provide non-recourse project finance for up to 70% of the project value with the project sponsors – in this case the local authorities – providing the remaining 30% as equity and/or junior debt. The LA stake could be provided from its own resources or borrowed from the Public Works Loan Board and reinvested. Project debt could come from commercial banks or potentially the European Investment Bank, although the latter may limit its application to social housing.

The SPV would then be responsible for delivery of the retrofit programme and managing risks accordingly. It would enter into contracts with an Operating Company that would be responsible for customer acquisition and delivery of works to North London homes. Revenues from Green Deal payments would be returned to the SPV. The point of exit for the local authorities would be to sell the debt or equity to third parties, either in whole or in part, with profits returned to the authorities.

The main advantages of this approach are that risk is ring fenced, the debt would sit off balance sheet and the exit strategy is clear. It levers in private finance so that it doesn't overly burden the local authority balance sheet with debt at a time of constraint on the public purse.

The main disadvantages are the high set up and due diligence costs (the order of £1-2m) which suggest a need for scale. Because the bank has limited recourse in the event of project failure, the interest rates will be higher than other routes. For the SPV to sit off balance sheet it will be important to demonstrate that the investors do not individually have overall control.

A financial model has been created for a ten year 80,000 home project with 25 year repayments. Two versions of this model have been created. The first is for a public sector SPV where bank debt is provided at public sector rates (100bps over gilts) over 25 years. The second is for a commercial SPV where bank debt is provided at commercial rates (275bps) over 15 years. In both instances, during the first ten years of the project there are negative cash flows as investment is being places into projects and bank debt is being services. Positive cash flows then increase to a peak in year 26 before falling to year 35.

Local authority direct investment (excluding bank debt) is £177m over ten years. For the public sector SPV, the model suggests an IRR of 10% would be achievable. At a discount rate of 6% the Net Present Value would be £53m.

For the commercial SPV, the model suggests an IRR of just over 6% would be achievable. At a discount rate of 6% the Net Present Value would be £7.5m. The lower NPV is due to higher bank charges and the shorter term.

Figure 22: Cash flow analysis for Model C public sector SPV

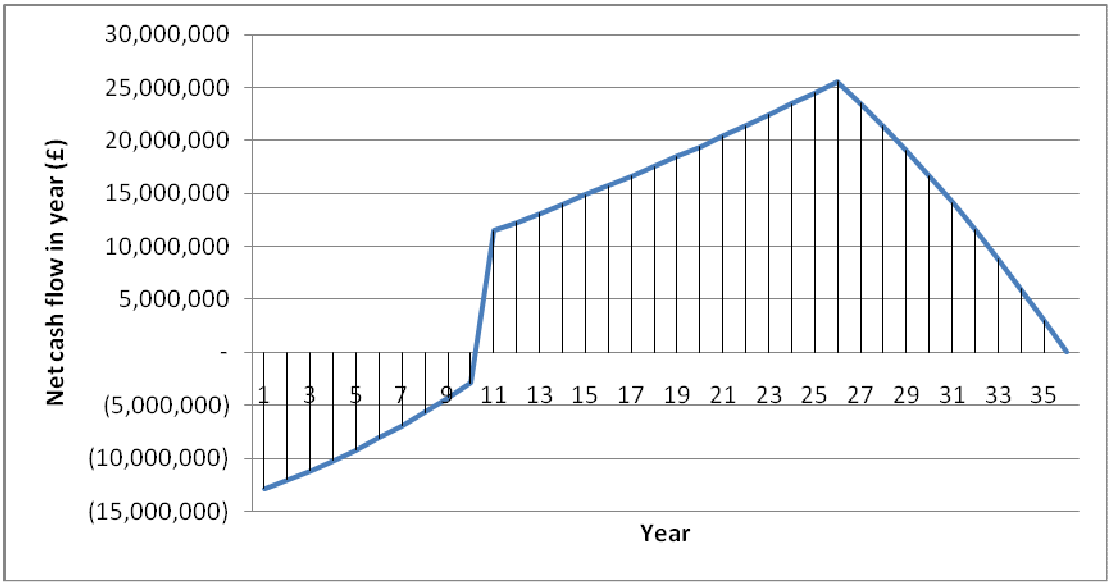


Figure 23 Cash flow analysis for Model C commercial SPV

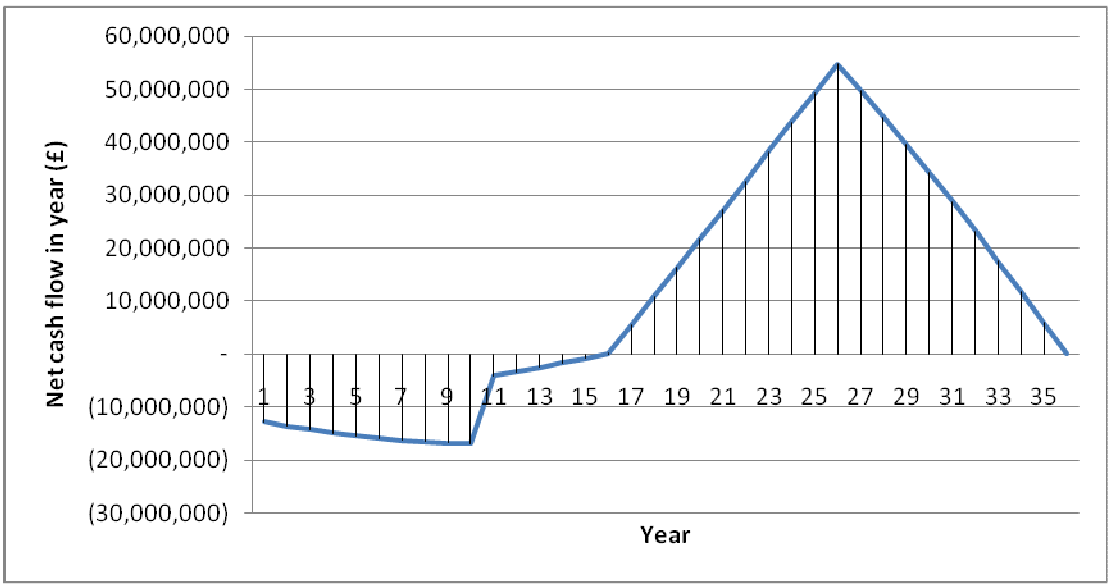


Table 27Summary of advantages and disadvantages of Model C

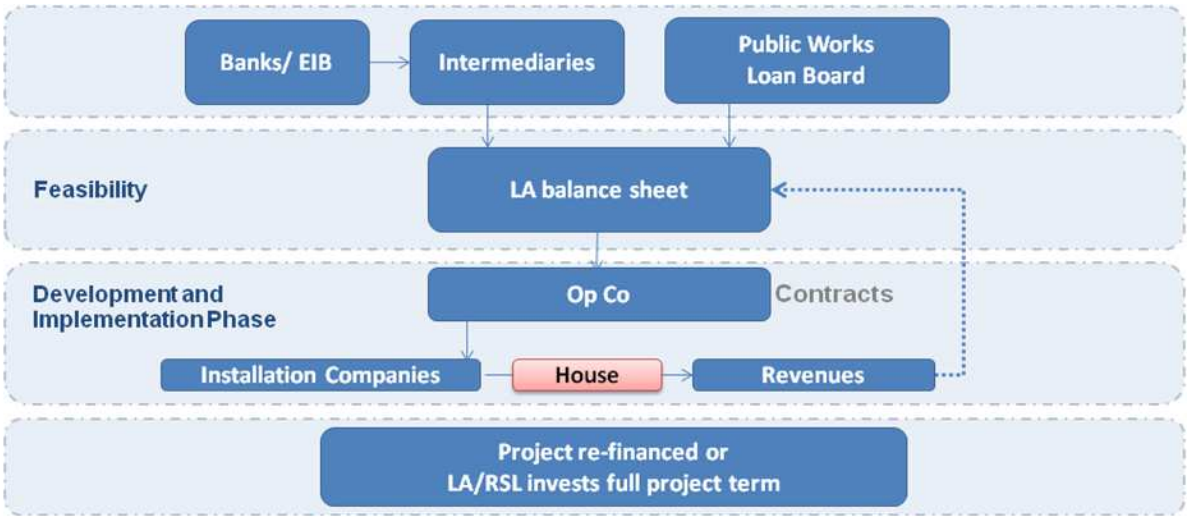
Summary of advantages and disadvantages of Model C	
Advantages	**Disadvantages**
Ring-fenced risk	Minimum £20m transaction
Effective way to pool resources	Higher finance costs than on-balance sheet
SPV investment cost wrapped into vehicle	Requires heavy-duty due-diligence
Gives clear exit strategy – SPV can be re-financed but will require bundling	Supports investment in discreet tangible assets owned by SPV (such as PVs, as against developing projects at risk)
Approach similar to PFI projects and highly replicable	

Table 28 Evaluation criteria for Model C

Evaluation criteria for Model C	
Resources required per LA	
Start-up costs	Significant start-up costs including, legal fees and due diligence advice. £215k per LA as share of co-ordinated sub-regional activity. Could be higher if done separately by each LA. Bank arrangement fees are extra but rolled into annual debt repayments.
Development funding	£35k per annum share of operating costs per annum.
Capital funding	£3m per annum capital investment into the SPV as 30% stake. Residual capital investment secured through 70% bank debt.
Risks carried by LA	
Consumer uptake	Consumer uptake rates are a major area of uncertainty that would need to be managed by the SPV. The Op-co partner would be responsible for customer acquisition but the costs would be borne by the SPV.
Consumer credit selling	This risk resides with the SPV. The Op Co would be responsible for managing this process either under contract to the SPV or directly through its investment in the SPV and allocation of staff to the new joint venture.
Capital cost of works	This risk resides with the SPV. The Op Co would be responsible for managing this process either under contract to the SPV or directly through its investment in the SPV and allocation of staff to the new joint venture. Experience from PAYS/Green Deal pilot projects suggests that there is great variation in the technical solution and the capital cost of works from house to house. Therefore the accurate quotation of costs is critical at the point of Green Deal assessment and financial contracting with the customer.
Construction risks	This risk resides with the SPV. The Op Co would be responsible for managing this process either under contract to the SPV or directly through its investment in the SPV and allocation of staff to the new joint venture. There is significant construction risk associated with Green Deal since every house is unique, opportunities for standardisation of work are limited e works will often be carried out with occupants in situ; this raises construction risks.
Technical performance	This risk resides with the SPV. The Op Co would be responsible for managing this process either under contract to the SPV or directly through its investment in the SPV and allocation of staff to the new joint venture. There is significant technical performance risk associated with Green Deal since every house is unique and there would be a systemic roll out of new technologies (e.g. solid wall insulation) with limited track record and uncertain warranty terms. Furthermore, demonstrating technical performance in practice will be challenging due to the difference between regulated and unregulated energy uses, occupant behaviour, etc. This can be mitigated by adhering to standard assessment methodologies, planned codes of practice and adopting the most mature, insurance-backed measures.
Revenue – first loss	This risk resides with the SPV. Default rates are unknown but could be similar to energy contracts. The LAs could be liable for losses equivalent to their equity investment (30% of value).
Revenue – all losses	Residual revenue risk would reside with the bank or other debt providers.
Potential rewards per LA	
Internal Rate of Return	6-10%
Net saving on resident energy bills	£467k per annum
% CO2 emissions reduction	4%
Lifetime tCO2 reduction	400,000 tCO2
Fuel poverty mitigation potential	Low (Commercial SPV) – High (Public sector SPV)
Job creation (FTE)	100

Certainty of outputs	High, relative to other models.
Indicators	
Leverage of public money	Medium
Scalability of model	Medium
£ invested by LA/lifetime tCO2	73
£ invested by LA/FTE job	29,500
Exit Strategy	
Exit points	Should the business model fail to perform then operations could stop and the business be wound up without further capital investment being made. Should the SPV be successful but the LA wishes to exit then it could sell its equity stake to a new investor or the SPV assets (i.e. Green Deal contracts) could be sold on to a third party.
Liabilities	Set up costs are relatively high compared with other models. Capital expenditure is largely incremental with each house investment. Should the SPV fail then at the point of exit primary liabilities are cumulative investment into the SPV less any revenue contracts that could be sold. Bank arrangement fees would be payable of £137k per LA incurred on the whole facility. There may be contingent liabilities associated with any statutory responsibilities for investors in Green Deal (e.g. insurance schemes). Further detailed work would be required as part of the SPV design and set up process, due diligence, etc.

5.2.4 Model D - Public Sector Ownership of Assets on balance sheet



The fourth approach is for the Local Authorities to fund measures on their own balance sheet. Resources could be secured through prudential borrowing from the Public Works Loan Board (PWLB). Potentially it could be matched with grants or other low cost finance, such as from the European Investment Bank, for investing in social housing. The Local authorities would then contract with an Operating Company that would be responsible for customer acquisition and delivery of works to North London homes in a similar way to the SPV model. Because the project is fully financed by the authorities, it is a matter for them how they deliver the works. They could undertake them all directly, using their own employees. Alternatively, they could contract with the private sector for the works to be carried out, in which case the contract would be covered by the EU procurement regime.

A further alternative would be for the establishment of an operating company by the authorities. If this is only undertaking work for the authorities themselves, then it may rely on the Teckal exemption (i.e. be regarded as an in-house company) and not be subject to the EU procurement rules. However, if the

company is to undertake wider work (as seems likely) then it will be not be able to do so, and the procurement rules will need to be observed in the awarding of contracts for delivery.

However, if it was seen as an important part of the exit strategy to sell the business activities in the future, then the operating company would need to be established with due regard to the requirements of future lenders.

The main advantages of this approach are the simplicity, the lowest set up costs and access to low cost funding from PWLB. It gives flexibility on the type and scale of initiatives supported although PWLB may impose a cap on the amount of funding available and current pressures on public sector borrowing may also pose a constraint.

The disadvantages are that the model maximises public sector borrowing, burdens the LA balance sheet and is arguably harder to refinance unless the contracts have been set up around funders' needs. This includes rights to novation and assignment, selection of strong counterparties as partners and investment into projects of the right risk profile.

A financial model has been created for a ten year 80,000 home project with 25 year repayments. It has been assumed that there is no bank debt or equivalent (i.e. funded through the local authority's own resources) hence cash flows begin negative but increase steadily as there is no bank debt to service, rising to a peak in year 26 before falling to year 35.

Local authority investment is £587m over ten years. The model suggests an IRR of 6.5% would be achievable. At a discount rate of 6% the Net Present Value would be £20m.

Table 29 Summary of advantages and disadvantages of Model D

Summary of advantages and disadvantages of Model D	
Advantages	**Disadvantages**
Lowest cost finance	Maximises public sector borrowing
Low set-up costs	Burdens local authority balance sheet
Flexibility on type and scale of initiatives	Applicability limited by gearing covenants (that is, ability to borrow against assets)
Relatively less lead-in time to get initiatives running on ground	EIB requires intermediary - min £100m
High replicability for LAs own-assets	EIB Requires match-funding and can only support private housing
	Less suited to private housing

Figure 24: Cash flow analysis for Model D

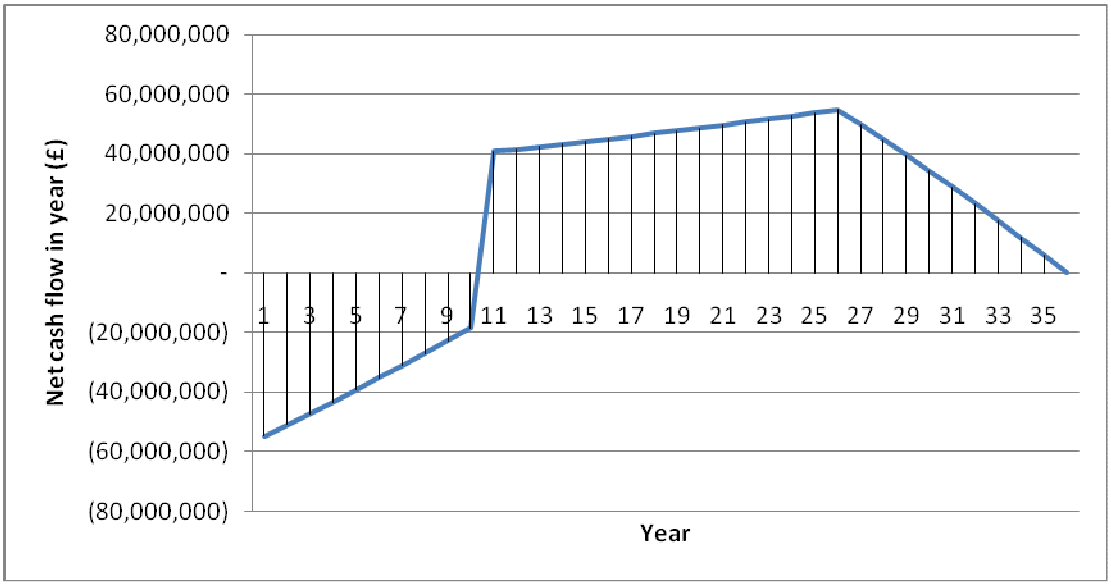


Table 30 Evaluation criteria for Model D

Evaluation criteria for Model D	
Resources required per LA	
Start-up costs	There could be significant start-up costs including, legal fees and due diligence advice if the programme was being designed to potentially move into an SPV at a later date. These costs could be £215k per LA as share of co-ordinated sub-regional activity. Could be higher if done separately by each LA.
Development funding	£35k per annum share of operating costs per annum.
Capital funding	£10m per annum capital investment.
Risks carried by LA	
Consumer uptake	Consumer uptake rates are a major area of uncertainty that would need to be managed by the LA. The Op-co partner would be responsible for customer acquisition and may take some performance risk. However some costs would be covered by the LA.
Consumer credit selling	This risk ultimately resides with the LA. The Op Co would be responsible for managing this process under contract to the LA but failure of the Op Co would open up the possibility of customer recourse to the LA for mis-selling.
Capital cost of works	The Op Co would be responsible for managing this process under contract to the LA. Experience from PAYS/Green Deal pilot projects suggests that there is great variation in the technical solution and the capital cost of works from house to house. Therefore the accurate quotation of costs is critical at the point of Green Deal assessment and financial contracting with the customer. It will be important to structure the contract between the Op Co and the LA such that the Op Co carried the majority of this risk as it is best placed to manage it.
Construction risks	This risk resides with the Op Co in the first instance but there could be recourse from project failures back to the LA. The Op Co would be responsible for managing this process under contract to the LA. There is significant construction risk associated with Green Deal since every house is unique, opportunities for standardisation of work are limited and works will often be carried out with occupants in situ; this raises construction risks.
Technical performance	This risk resides with the Op Co in the first instance but there could be recourse from product failures back to the LA, particularly in the long term when products warranties may have ended. There is significant technical performance risk associated with Green Deal since every house is unique and there would be a systemic roll out of new technologies (e.g. solid wall

	insulation) with limited track record and uncertain warranty terms. Furthermore, demonstrating technical performance in practice will be challenging due to the difference between regulated and unregulated energy uses, occupant behaviour, etc. This can be mitigated by adhering to standard assessment methodologies, planned codes of practice and adopting the most mature, insurance-backed measures.
Revenue – first loss	This risk resides with the LA. Default rates are unknown but could be similar to energy contracts. The energy companies would be responsible for chasing bad debt within national codes of practice, however once these avenues had been exhausted, the green deal investor (in this case the LA) would carry the losses.
Revenue – all losses	Residual revenue risk would reside with the LA.
Potential rewards per LA	
Internal Rate of Return	6.5%
Net saving on resident energy bills	£467k per annum
% CO2 emissions reduction	4%
Lifetime tCO2 reduction	400,000 tCO2
Fuel poverty mitigation potential	Medium
Job creation (FTE)	100
Certainty of outputs	High, relative to other models.
Indicators	
Leverage of public money	Low
Scalability of model	Low
£ invested by LA/lifetime tCO2	242
£ invested by LA/FTE job	97,833
Exit Strategy	
Exit points	Should the business model fail to perform then operations could stop and the business be wound up without further capital investment being made. Should the model be successful but the LA wishes to exit then it could potentially sell the Green Deal contracts on to a third party. However, for this to be possible, it is important that they are structured with this outcome in mind (e.g. with novation rights in place, etc).
Liabilities	Set up costs are relatively high compared with other models. Capital expenditure is largely incremental with each house investment. Should the model fail then at the point of exit primary liabilities are cumulative investment less any revenue contracts that could be sold. Bank arrangement or early redemption fees may be payable if the LA has secured funding through prudential borrowing on its balance sheet (e.g. PWLB). There may be contingent liabilities associated with any statutory responsibilities for investors in Green Deal (e.g. insurance schemes). Further detailed work would be required as part of the SPV design and set up process, due diligence, etc.

5.2.5 Green Deal indexation and bank margins

Sensitivity analysis shows the importance to the financial models of linking Green Deal payments to inflation. The household models assume that energy price inflation of 2% can be accounted for within the Golden Rule calculation of repayments. Within each of the delivery models B, C and D we have examined the impact of higher and lower levels of inflation. The effect is quite significant as shown in Table 31 below.

This highlights the critical importance of understanding the 'rules of the game' on Green Deal before committing significant capital funds and also emphasises the strategic impact that this could potentially have on the choice of options. Further discussion with DECC over the coming months will be important for understanding how inflation is likely to be treated under Green Deal.

Table 32shows the combined impact of varying bank margin and Green Deal indexation. This illustration is for the commercial SPV model. With low cost money (0.5% margin is equivalent to rates from EIB) and high indexation (3%), the IRR could be 10%. With commercial bank rates (2.75% margin) and Green Deal indexation, the IRR could be 4%. This shows how sensitive the financial model is to these two parameters; however, both could be fixed at the outset to minimise these risks.

Table 33 shows the impact of default rates on IRR for Models C and D. The Green Deal Impact Assessment published by DECC[20] indicates that the domestic energy bill cost of default is around 1.5% of gross revenue. It is not entirely clear at this stage where the risk of default will lie. However, the indications are that the Green Deal investor would be expected to price in the default rates within their business plan. The financial analysis in the preceding sections is based on a default rate of 2%. Although no regional data on default rates is available, given than around 12.7% of households in the sub-region are in fuel poverty compared to 15.6% nationally (2008 data published by DECC Feb 2011), there is no reason to assume that default rates in the sub-region will be higher than the national average because of fuel poverty issues.

Typically an increase in default rates from 2% to 5% reduces the IRR by 1% for the public sector SPV model and around 0.5% for commercial SPV. The trend is largely similar where uptake rates are reduced from 10% down to 4% (reducing the number of homes that would have GD measures installed from 8,000 down to 3,200) as shown in Table 34. This assumes that the percentage margin on cost of acquisition remains the same.

Table 31: Sensitivity analysis on Green Deal indexation

	IRR	Equity proportion		
		Model B - first loss fund	Model C - SPV commercial	Model D - on balance sheet
		10%	30%	100%
Green Deal Indexation	1.0%	4%	5%	6%
	2.0%	6%	6%	6%
	3.0%	9%	8%	7%

Table 32: Sensitivity analysis on Green Deal indexation and bank margin for commercial SPV model

	IRR	Green Deal Indexation		
	6%	1%	2%	3%
Bank margin	0.5%	7%	9%	10%
	1.0%	6%	8%	10%
	2.75%	4%	6%	8%

Table 33 Sensitivity analysis on default rates for Green Deal payments

	IRR	Model C - SPV public	Model C - SPV commercial	Model D - on balance sheet
Default rates	1%	10.4%	6.5%	6.6%
	2%	10.1%	6.3%	6.5%
	3%	9.7%	6.1%	6.4%
	4%	9.4%	5.9%	6.3%
	5%	9.1%	5.7%	6.2%

[20] *http://www.decc.gov.uk/assets/decc/legislation/energybill/1002-energy-bill-2011-ia-green-deal.pdf*

Table 34 Sensitivity analysis on uptake rates for Green Deal packages

	IRR	Model C - SPV public	Model C - SPV commercial	Model D - on balance sheet
Uptake rates	6%	9.0%	5.7%	6.2%
	9%	9.6%	6.0%	6.4%
	12%	9.9%	6.2%	6.4%
	15%	10.1%	6.3%	6.5%
	18%	10.2%	6.4%	6.5%

5.3 Joint working arrangements

Governmental policy has for some time now been stressing the need to work collaboratively. Before the financial crisis of 2010 this was promoted as an efficiency measure; since the financial crisis and in the face of substantial cuts, it can be seen as a potential economy issue too. In some ways, local authorities cannot afford not to work together on any matters that they can, as the shared costs of such working will achieve financial economies that can be used elsewhere in a hard pressed financial landscape.

In this particular context, some of the key benefits of sub-regional local authorities working together are:

- Achieving economies of scale through joint procurement
- Sharing and pooling of resources to reduce overhead costs
- Sharing knowledge, for instance, where some LAs have had experience of large PFI contracts, feedback from the RE:NEW pilot programmes, decentralised energy initiatives and others.
- Generating the required scale of investment opportunity, for instance, for an SPV or a guarantee fund. Even where establishing the SPV may not be the first step, a consistent approach early on may mean that all LAs are working to a common programme and transitioning to an SPV is therefore easier.

There are various ways in which joint working can operate, but in legal terms, these all reduce to three basic methods, which are: a contractual arrangement; an administrative arrangement; or a corporate structure. The aims and aspirations of the six LAs and their level of involvement need to be considered, so that the right method can be tailored for any potential sub regional group.

The three options differ in relation to their set up and establishment, their operational requirements and their costs. It is therefore important to consider carefully what the group is trying to achieve, before trying to find a model that will deliver this.

The essential characteristics are as follows:

- The contractual model – the parties agree by contract to do something together;
- The administrative model – the parties agree to work together as public bodies under administrative powers;
- The corporate model – the parties set up a wholly new legal entity which they have an interest in.

The circumstances may change over time, for example an administrative arrangement can work for now, with a corporate model following on at some stage in the future. There can also be a mix of models, for example an administrative arrangement to give a function political steer and democratic accountability, but with a corporate structure below for the delivery.

5.3.1 The Contractual Model

Here there is essentially a contract between the different LAs, which forms the agreement on what is to be done. Contracts are readily understandable and as such this is a normal way of doing things.

However, there are downsides, not least that a contract is fixed in time and it is cumbersome to make changes. The number of parties to a contract is also a relevant matter.

The Contractual Model	
Advantages	**Disadvantages**
The law is settled, clear and relatively simple	each local authority manages its own relationship
the concept is easily understood	can be inflexible - changes need a variation order
no new legal entity is created	will involve procurement and therefore the EU regime may be involved
the market accepts this model	the specification needs to be clear or there will be problems
you can call it a “partnership”	it is difficult to incorporate joint decision making into the contractual model
you can have secondment of staff under the contract model	multi parties make a contractual arrangement complicated
you may use the Local Authorities (Goods and Services) Act 1970 or other powers to contract	
financial issues are understandable	

Table 35 Overview of the contractual model

For example, Warwick City Council and Warwickshire County Council have made contractual arrangements whereby they share legal services. The arrangement is based on a *contract* between the two Councils.

5.3.2 The Administrative Model

Some LAs have entered administrative arrangements regularly, to good effect; others are less supportive of them. Powers exist in the Local Government Act 1972 to join together to perform functions, normally via a lead authority. There is no reason why such arrangements cannot work well, if properly set up. However, they can be bureaucratic if not established and run properly.

The Administrative Model	
Advantages	**Disadvantages**
flexibility - no variation order is required	the market prefers a single contact
no separate new entity created	cannot be documented fully as it is a delegation of a function
preserves the integrity of public sector joint working	basis for membership may change, e.g. political changes
can have a policy direction element	uncertain as to the application of EC rules, but likely not to apply provided not construed as a contract
no EU procurement as itl isnot a contract	can be onerous, detailed and bureaucratic
keeps it within the local government “family”	need a ‘lead’ authority and no one wants to do it as that is onerous and may involve liability
very ‘public sector’ in nature	possibly may be awkward for multi party arrangements
no VAT/tax issues	
can have delegation to a joint committee or another authority; may involve secondment of staff	

Table 36 Overview of the administrative model

For example, Dorset County Council and Weymouth Council have entered into an *administrative arrangement* under s101 of the Local Government Act 1972, whereby they will share back office services, including sharing a Chief Executive and management team between the two authorities. Dorset is the lead authority and employs the Chief Executive but the model works at all levels. Other authorities could join in due course, because this is an administrative, rather than contractual, arrangement and so is not covered by procurement rules.

5.3.3 The Corporate Model

This model has a chequered past, with some corporate entities that were set up having been declared ultra vires (unauthorised). However, companies and other corporate bodies are now mainstream in local government.

The Corporate Model	
Advantages	**Disadvantages**
limited liability means organisations can ring fence risks	legal uncertainty on powers to establish a company
the law is settled	cost and complexity of set up of a company
flexible for multi party arrangements	would involve a procurement and EU regime and contract
can be joined with other models for flexibility, e.g. with the collaborative model, with a joint committee above	no delegation is permitted in public law to a company
the market likes a single face	staffing issues can be disadvantageous - TUPE/secondment etc
can accrue value in a company and subsequently sell it as an asset	there may be problems understanding this, eg separate legal entity
a separate legal entity is created	Part V of the Local Government and Housing Act 1985 still applies for propriety rules
the Teckal exemption may apply for the EU procurement rules if it is an in house company	reputational risk is still on the local authority
	can't trade more widely or involve third parties if Teckal is to apply
	there may be difficulties in using a corporate model for some services

Table 37 Overview of the corporate model

South Holland and East Lindsey District Councils have set up a company to deliver shared back office services to both Councils. This is a *corporate* arrangement, called Compass Point Services (East Coast) Ltd, which benefits from the application of the Teckal exemption from procurement (ie it is an in-house company). The authority has also had to take advice on the implications of Part V of the Local Government and Housing Act 1989 and arranged director training as part of this work. The two Councils have also established a trading company for external work too.

5.3.4 Summary

The first step is to outline what the key aims and objectives for this project are for each LA. Long term involvement at minimum cost and keeping the bureaucracy to a minimum might suggest a joint arrangement might be the best option. If the aim is to test the market and then have a greater private sector involvement, then a corporate structure might be best in the longer term. If there is uncertainty at the start and flexibility is to be preserved then a joint arrangement would be best to start with. There is also a clear link here to the procurement route chosen, as indicated in Section 6.7.

5.4 Summary of feedback received from sub-regional local authorities

This section summarises the feedback received during the workshop session organised on the 14th March that included attendees from sustainability and finance teams with the participating boroughs (excluding Hackney). During the first half of the workshop session, alternative options for delivery routes and the relative advantages and disadvantages of each route were presented. Feedback was sought with regard to the following criteria: key drivers, availability of finance, appetite for risk, hurdle rate and payback period for investment, initiatives to be targeted and internal resources currently available to deliver these initiatives. The key issues raised during the discussions are presented below

5.4.1 Drivers

CO_2 savings, fuel poverty alleviation, improving local skills, generating green jobs and facilitate economic regeneration were the main drivers, not necessarily in that order. The relative emphasis on each and the absolute priorities differed to some extent across individual LAs though fuel poverty alleviation and job creation seemed to be feature on a par (if not higher) than CO_2 savings for many LAs. Generally, there seemed to be consensus that a project or initiative attracting significant amount of public sector investment would potentially need to tick most of those boxes.

5.4.2 Availability of finance

Not surprisingly, almost all LAs agreed that the availability of capital was limited, especially in the light of recent budget cuts. There was little or no headroom for borrowing from PWLB for some, such as Newham and Waltham Forest, while others such as Haringey were more open to considering that route. Largely, around £5m per year of capital investment appeared to a notional upper limit, in particular during the early years of roll-out when the wider benefits of the initiative being proposed were yet to be proven.

5.4.3 Delivery models and appetite for risk

During the discussions it was recognised that the models are not mutually exclusive and different models/ combinations could potentially be used for different initiatives. Overall the feedback was that given the capital pressures, Model A (and potentially Model B) may be more feasible. For Model A, the relatively shorter timescales for both mobilising this option on ground and for return on investment was seen as a positive, as this would allow revenue/profits to be channelled into other options or initiatives. For LAs with experience of delivery PFI schemes, the feedback on Model C was less than positive, primarily due the its complexity and high upfront costs for setting up the SPV. It was also suggested that Model C did not necessarily have a lower risk profile than Model D. For Islington, Model D was a potential option for LA owned stock, again subject to a strong business case.

5.4.4 Hurdle rates and payback periods

Historically, Local Councils investment has focussed on schemes that are critical/essential activities (e.g. new schools, maintaining roads) as against activities that may be considered investment opportunities beyond LA legal responsibilities. The variation in responses therefore reflects the degree to which LAs have been involved in non-essential investments. Haringey seemed to suggest that the decision to pursue certain initiatives wasn't necessarily dependent on the financial return it offered but on the wider social benefits it brings when compared with other projects competing for the same investment. Camden and Islington suggested that a 6 -7% rate of return was reasonable for Model A and was comparable to the rate of return form decentralised energy (DE) projects, for instance. Model C, however, would require a higher return due to its risk profile. In terms of payback period, there was preference for models that can release value early, especially where significant amount of investment is required. The funding period coinciding with the election cycle was seen to be critical in terms of demonstrating tangible benefits and/ or payback from an initiative. However, Islington's view was that for smaller sums of money, a 20 year timeframe for payback would be acceptable as is the case for DE projects.

5.4.5 Initiatives to be targeted

For most LAs considering an active intervention beyond council owned stock will be a relatively new agenda. The feedback suggested that initiatives targeted could potentially span the broad spectrum of climate change mitigation measures. In particular, there was interest in technologies attracting feed-in-tariffs (FITs) such as photovoltaics both for LA owned domestic and non-domestic stock.

5.4.6 Resources

It was largely the view that while Model A could potentially be delivered within the current resources, additional resources would be required for more ambitions initiatives that require resources for the entire project cycle. The current availability of resources to support a retrofit programme varied from one LA to another. Newham currently has an in-house surveying team that could support data collation. Homes for Haringey are currently re-structuring property services and may have some capacity going forward. Waltham Forest has a newly opened construction training and skills centre, although are generally more constrained than others. The initial observation is that there may be complimentary resources across the consortium of LAs and a sub-regional programme could potentially benefit from pooling of resources, subject to further investigation.

5.5 Summary of findings from market testing

The following summarises the findings from market testing of potential Green Deal investors and providers. The organisations chosen represent a mix of public sector agencies and banks that are likely to fund Green Deal measures, utilities that could potential fund measures via ECO (Energy Company Obligation) and act as Green Deal providers, private and other not-for-profit companies as potential Green Deal providers (e.g. those that are actively participating engaged in discussions with DECC) and wider stakeholders such as the Local Government Group. These notes were prepared by Camco therefore do not represent official view of the organisations concerned. Due to commercial sensitivity, some of the discussions have been anonymised.

London Development Agency

The LDA's RE:NEW programme has found that trust in energy companies is low and that LAs are important for getting them through the door. It focuses on acquiring customers for simple energy efficiency measures. It has Chief Executives of some London Boroughs on the project board. It is a three year programme. Year 1 had three demonstration projects; year 2 had 9 trials (900 homes). Year 3 will see roll out to 55,000 homes. A maximum access rate of 25% has been achieved for free or heavily subsidised loft and cavity wall insulation with a conversion rate of 13%. The cost has been around £100/home including customer acquisition, marketing and visit by the assessor who spends 2 hours (excluding the cost of installing measures). An area-based route has been found to be important for education including face to face advice with consistent trusted information.

Opportunities for ELENA funding may be limited in London as LDA is close to securing its second round of funding. Under new legislation, GLA can borrow against its receipts so may be able to raise capital for investment. GLA/LDA would be interested in playing a role in structuring a pan-London investment/delivery vehicle for Green Deal and may be able to invest in set-up costs.

Local Government Group

The right approach for any local authority will depend on its appetite for risk. The LA Green Deal working group is discussing four potential roles for an LA: Green Deal Provider, Green Deal Partner, Green Deal Supporter/Facilitator, Green Deal Recipient.

When a group of local authorities come together, banks will look for one lead LA which is provider for the others. Finance can be hosted by one but delivered to the others. This can create a tension if one council puts in less but has more of the Green Deal demand.

Government is interested in how Green Deal providers could form partnership with other services providers, e.g. fire, disabilities, waste. This could help if project returns are below the hurdle rate for private investors or if councils become Green Deal providers. It is possible that utilities and retailers would only want provide Green Deal services to their existing target customer base.

Councils could potentially get referral fees for finding properties that qualify for ECO subsidy.

Potential Green Deal Investors

Input was gained from the debt capital markets and social infrastructure teams of a well known bank with an international presence. The bank will generally lend short term 5-6 year money and do long term (30 year) bond issues but not provide 15-25 year project finance. It was noted that others in the market such as state owned banks probably would do the project finance. Comments and observations were gathered on the four potential models:

Model A –development. The IRR for this model was expected to be lower than for those where capital is also invested as, given the tight margins on Green Deal, it is likely that the front end customer-acquisition stage would be squeezed by the rest of the supply chain looking to take a margin.

Model B – guarantee fund. The maximum possible gearing (that is, ability to borrow against the guarantee fund) would probably be 90%. For a bank to use the facility they would want to understand the mix of borrowers and risk profile. They would then probably view the investment as equivalent to lending to a utility. The guarantee fund looks a bit like a credit wrap. It was considered that there would likely be large set up and administrative costs associated with a guarantee fund that are not much lower than for an SPV as you would still need to administer a fund and manage the investment risks, like for an SPV.

Model C – SPV. It was questioned how many participants would be required for the SPV to sit off balance sheet. If it was just controlled by LAs then would it still count as public sector borrowing? The LA investment would sit on the each local authority's balance sheet; the important thing is to make sure that the bank debt didn't too. It was thought that if necessary, an additional private sector investor could help to demonstrate that the SPV should be treated as off balance sheet.

The quality of the contractors (e.g. Op Co) will be important for obtaining credit. If in future, bank debt was swapped for bonds then the bond market will want a credit rating, especially as the Green Deal model is untested and there are no precedents. Counterparties like the LAs and Op Co will be key to the credit rating. The bond would be issued by the SPV in place of the bank debt. The main differences would be tenor, risk appetite and risk management approach. Banks might fund higher risk projects over a shorter term (15 years) and would carry out their own due diligence. Bonds would be longer term (30 years), want lower risk and a credit rating. Bonds would also want to see some remaining equity or equivalent debt service coverage (e.g. the NPV is 1.3 times greater than the bond value). If the LAs wanted to exit entirely then they could sell the equity portion of the SPV, too, to a third party. It is possible to make an inflation linked bond such that inflation builds on the coupon and the principle. This would then be sold to investors. This approach would require inflation-linked Green Deal payments to be made by the home owner.

Model D – on-balance sheet. The Public Works Loan Board (PWLB) can lend for a variety of durations. It used to lend at 11bps (basis points over[21]) over gilts so public bodies always used it. Now it is lending at 100bps over gilts so private money could possibly be cheaper. PWLB lending is not secured as public bodies cannot go bust. It will generally cap the total amount that can be borrowed by an LA and there are heavy early redemption fees. Prudential borrowing counts as public sector net debt so this was seen as working against the current trend to reduce public sector borrowing.

If LAs are investing in the projects in this way they could be taking part of their return through social outcomes (e.g. job creation) so long as they pass their hurdle rate, too. If the LAs want to pass the business activities and Green Deal contracts into an SPV at a future date then it will be important that the contracts entered into are acceptable for private finance from the outset, including those relating to counterparty risk, default rates, recourse, security and cover. The activities should be structured as if in an SPV or else you would have to go back and re-write the contracts or obtain a wrap. There would also have to be novation and assignment provision including step-in rights for future funders.

Discussions were also held with a large fund/ asset managing company. Comments were obtained on the role of private equity investment in the models being considered.

The view was that private sector hurdle rates will depend on the client, the technology and their perceptions of risk. Given the pressure on the public purse, they would not generally see LAs themselves as a source of capital but would be interested in whether they could unlock structural funds such as ERDF. Banks like to see equity. There are changing financial rules that mean that any arrangement over

[21] One basis point is .01%, or one one-hundredth of a percent of yield

1 year may be treated as on balance sheet – this would need careful investigation. Venture Capital Trusts will generally use a model with multiple SPVs to stay within government rules.

Potential Green Deal Providers

Construction Sector Company –

Input on the alternative delivery options and potential the role of the private sector in the wider role out of Green Deal type mechanisms was sought from the head of the energy and carbon team.

Three main areas for LA support were seen as access to low cost finance, ensuring access to eco-subsidy and warranties/ underwriting risk.

Model A – The attractiveness of the model was seen to be dependent on how the 'portfolio sale to private sector' is structured, and how the process is designed to ensure that quality is maintained. LA reputation is potentially at risk if the Green Deal Provider does not perform. LAs would also need to develop a consistent methodology when approaching potential customers, carrying out detailed surveys and recommending suitable package of measures. It may be that Green Deal Providers would still want to repeat the exercise to reduce their risk, as they are likely to be held liable under legislation for end performance. There is therefore a clear advantage for Green Deal Providers to be involved early in the process to avoid duplication and to enable them to build a relationship with the customer. Again, performance standards would be required for the percentage of leads that do translate into contracts. Where only a small proportion of leads translate into contracts (for instance, their experience suggests that 25- 30% of leads for cavity fill are not feasible), this model may not be seen to add much value. Model A was overall seen to be quite attractive for social housing stock as it would help potential green deal providers to develop a long term relationship with the social housing provider/ ALMO.

The decision to participate in the development phase partly at risk will be largely determined by the scale of the initiative and the number of homes being targeted. However, the idea to share risk between private and public sector at each stage was seen as a positive thing. Where a RE:NEW type framework is procured for the development phase, it would be seen as much more attractive if it did not end at the end at the development phase but would lead onto something more substantial.

Costs for initial surveys were estimated to be in the region of around £200/ property for 3 visits – an initial visit followed by the energy survey and then a follow-on visit.

Model B- It was the view that any defaults should stay entirely within the energy company and be socialised in the way defaults on energy bills are currently dealt with.

Model C- Under this option, they could potentially take on the function of an OpCo held within a SPV. The timescales for setting this up are the same as for the Green deal policy, so around 18 months. This option was also perceived as being less risky for LAs.

One of the barriers for Green Deal was seen to be around access to ECO-subsidy for all companies involved in Green Deal implementation, in the absence of which the market could end up being dominated by energy companies.

Installation Company

Model A – On the positive side, this model was seen to be the most adoptable and could get on the ground relatively quickly. However, it would require a 'sales focussed' and commercially astute front end function which is not currently attributed to LA culture. Both public and private sector could benefit from a joint branding to take advantage of the local authority's local knowledge and brand and the private sector's commercial skills. This model was seen as a perfect fit for this organisation to operate and contribute, for instance, as part of the procurement consortia. The expertise they bring to the table is project managing the whole process, providing support to maximise sales, and helping to create a brand. There was some scope to get involved at risk in lieu of future rewards.

An alternative role could be acting as a managing agent for the Green Deal portfolio of projects. That would involve coordinating installers to ensure that customer satisfaction and loyalty is maintained. It was felt that take-up of Green Deal measure will come through good PR and will gain momentum over time. Front end acquisition was seen to be only as good as the implementation phase.

Model B – This was seen as an attractive funding model and offers financial incentives for Green Deal providers.

Mode C - This is similar to their existing business, and was more suited to bigger businesses (compared to for example Model A that would suit local businesses). They could consider equity investment as access to low cost capital will mean that they get a better return on their equity share.

Utility -

Discussions were held with the regional energy team within this utility.

With regard to uptake rates for Green Deal type measures, a 25% access rate was regarded as really good. Previous experience suggests that the access rates have been substantially better than this for schemes where existing infrastructure and/or regeneration works are being carried out, or alternatively for projects that have a significant element of local engagement to achieve particular energy goals (such as the Green Streets programme). One of the strengths of LAs was seen to be their awareness of local issues and ability to engage with the community.

There was a particular interest in area-based approaches (similar to CESP) to exploit economies of scale. For instance, external wall insulation for a row of terraces could reduce capital cost per property by 10-20%.

Model A – Conceptually, there seemed to be no problems with this model. The plus points for LAs were seen to be experience of running area-based schemes, knowledge of local area and trust in their brand. The flow of data and leads, plus the number of steps involved in the process was however seen to be critical. This model will require good project management and consistent data. A smooth transition from the development phase to the implementation phase was also considered critical. Previous experience (e.g. from Canadian national energy audits programme) has indicated the need to close deals early to improve uptake rates, without the homeowner having to undergo a further loop to choose their preferred Green Deal provider . The solution to this could be to procure the Green Deal provider early in the process. A RE:NEW style audit and referral model could also potentially work well. The key steps would be to define geographically bounded marketing activities initially, determine how many properties could be upgraded and what economies of scale could be achieved, and then pass on the project portfolio to Green Deal providers.

Model B – Eco-subsidy contribution from the utility company was not seen as an issue for this Model. However, investment of their own funds would require a strategic tie-up. This model would require a managing agent to be procured, a role that most Green Deal Providers would be interested in. In principal, some sort of performance criteria would be attached to the managing agent role, although the difficulty in baselining and the issues around comfort take may mean that performance may be difficult to guarantee.

Model C- This is similar to the solar PV rented roof model. It can however be quite complicated set –up and also when re-financing. Credit rating was seen as an issue for fuel poor homes. Again, there were no obvious issues with working as a partner or injecting Eco-subsidy under this model. Equity stake will be depend on the rate of return from the portfolio of projects (typically >10%).

Model D – This approach could potentially work well on a small scale and may not be suite for private sector housing.

Regarding Green Deal being used as a catalyst for creating local jobs, the concern was that this may push the cost of delivery up where the expectation would be to have, for instance, a certain percentage of employees form the area. Sub-contracting to local organisations was however not an issue.

Retailer 1 –

Discussions were held with the retailer's energy team.

The retailer has not yet confirmed its role within Green Deal. For them, it is critical to first understand that the right framework is in place to enable GD to be commercially feasible.

Model A- The level of return from GD initiatives is an issue and it is currently not clear at what level of margins companies would want to operate in this area. However, most organisations would have limited resources to operate, and there will be a time lag to get the mechanism operational (e.g. getting qualified assessors). It will require a high initial investment with regard to IT, training etc, Therefore, organisations will have to be in it for the long term (10 -15 years) to ensure they get a return on their investment. It is therefore highly likely that Green Deal Providers may only want to focus on high return projects.

It was seen as important that LA selects an organisation to partner with that delivers quality. This may not necessarily mean lowest costs. It is critical to demonstrate to the customer that the savings are being delivered.

For this retailer, involvement in GD initiatives should be seen to add value to the rest of the business and hence maintaining their brand identity will be important. If they did opt to become GD providers, their focus will be to build long-term relationship with the customer. Social housing was not seen to be a particular focus area. Their strategy would be to get the right balance and blend of projects, some being LA led with others as their own private sector initiatives as certain services will attract a higher return. They are quite keen to work at community level. Again, decision to partner on area based programmes will depend on how it adds to their brand and the geographical spread of their installer base.

Model B- One of the potential downsides of this model was the risk of GD providers cherry-picking the best opportunities. The attractiveness of the model depends on the cost of capital it will be able to offer. This is currently a big area of uncertainty and the cost of capital may increase from now to when the GD kicks in.

Model C- This model was perceived to be both complex and expensive. It may be seen to be detracting from local authority's role as a facilitator to one that is competing with commercial businesses.

Retailer 2 -

Discussions were held with the retailer's environmental team.

Model A- Preference for a partnership approach, either as a sole GD provider for a borough, or as part of a framework. The former approach will enable them to lever the most advantageous deals to consumers. They can bring marketing spend, a network of exemplar homes, experience of direct marketing to consumers, and experience of managing an existing network of sub-contracted installers (currently for kitchens and bathrooms). The performance of installers is monitored based on a rating system and in case of poor ratings the installer is removed from the list.

The model raises concerns for the SME sector as they will find it challenging to compete with some of the national players and their ability to access ECO subsidy.

Model B – The cost of capital to GD providers will determine the viability of this model. Even with an interest rate of 4 -5%, it may be quite difficult to deliver Green Deal measures.

5.6 Analysis of risk and barriers

There are a number of important areas of risk that need to be managed, as summarised in the sections below.

5.6.1 Green Deal Policy

One of the biggest areas of uncertainty is policy risk surrounding the Green Deal. Although primary legislation was entered into the Energy Bill laid before Parliament at the end of 2010, secondary legislation is still being drafted, with Royal assent expected at the end of 2011. Green Deal as a finance mechanism is expected to be in place from the end of 2012 and there is substantial work remaining to resolve important details. The definition of eligible measures will affect the scope of works, the packages to be offered and the priority houses to target. It is also not clear how Green Deal will work for properties with pre-payment meters. The calculation method for Green Deal payments will affect the financial appraisal including the ability to link payments to inflation. The quality assurance and accreditation process will affect the set up process and associated costs whilst the timing of the Green Deal legislative programme and subsequent launch will affect the amount of work to be done in advance in preparation. In order to mitigate these risks it will be important to maintain a flexible strategy that can accommodate changes in policy. Funding should be sought for preparation and development work and there should be a continuous dialogue with DECC.

With regard to social housing sector that tends to have a high proportion of homes in multi-occupancy, e.g. block of flats, consent for Green Deal packages is an important consideration. Current government proposals on the issue state that consent from all relevant parties with an interest in the property (so, tenant, leaseholder or freeholder) will be required. From the landlord's perspective, this will ensure that

the Green Deal package is not a maintenance liability and does not create asset management problems. However, specific provisions are required so as to enable social landlords to gain the tenant's/ leaseholder's consent to carry out Green Deal on their properties .The tenant should not be able to unreasonably refuse the Green Deal work or refuse to pay the Green Deal charge if the landlord or majority of tenants (e.g.in a block of flats) request it. This would also help achieve the scale required to deliver the work packages most economically.

5.6.2 Industry appetite

Private sector organisations represented on Green Deal working groups are likely to some of the key players in the market. There may be number of other regional or local level organisations that may see Green Deal as a potential opportunity. From our market testing it is however clear that the potential Green Deal providers have yet to settle on a preferred business model including whether or not to provide finance as well as install measures. This will affect the importance of LAs providing funding for projects and programmes. There is uncertainty surrounding their target market which will affect their suitability for partnering with the LAs to deliver their objectives. In order to mitigate these risks it is important for the LAs to settle on their own preferred role in Green Deal delivery and then procure their partners as appropriate. It will be important too, to maintain some flexibility for the business model to evolve as the Green Deal policy framework is settled and the industry's response becomes clearer.

5.6.3 Customer appetite

There is a significant risk that without effective incentives in place, the customer appetite for Green Deal will be low and take up rates will fail to match LA expectations. There are Green Deal working groups looking at this topic however it is currently not clear what incentives, if any, will be put in place to drive the market. The impact of this risk is that LA investment in set up and development costs could fail to deliver a pipeline of tangible investments with the associated return for the LAs whether through referral fees or return on capital invested directly in projects. There is also a risk that the programme will not deliver its expected contribution to meeting carbon emission reduction targets. In order to mitigate these risks it is important to adopt an area-based approach to increase uptake rates and select strong delivery partners to make this happen. It will also be important to implement an effective marketing plan.

5.6.4 Finance and costs

There is significant risk attached to the capital cost of implementing Green Deal measures. There are reference figures based on national level estimates that have been used for the analysis in this report (please refer to section 3.2.1). However, appraisal of previous national level energy efficiency programmes has suggested that capital costs in London may be higher than other regions although there is little empirical evidence to suggest what the likely uplift in capital costs might be. There is also evidence from pilot projects[22] that there can be substantial hidden costs in any domestic refurbishment costs. Every house is different and refurbishment projects can be complex and require the resolution of technical problems on site during works. This can lead to price uncertainty and threaten payback periods established through theoretical models. In order to mitigate this risk it will be important to establish fixed price contracts with Green Deal providers and ensure that the energy assessment process is considered and reliable.

A separate but equally important consideration is the degree to which energy price inflation and other inflation –linking of Green Deal payments can take place. This has a significant effect on the return on investment for those paying for capital measures and will therefore have an important effect on the viability of the business models examined in this study. This risk can be mitigated by staying close to policy developments and evolving the business model accordingly. For example if index linking is limited then it will be important to prioritise projects with the greatest return.

Other financial risks include the ability to fix long term borrowing rates for money invested into Green Deal projects; the levels of defaults on Green Deal payments and risks associated with the acute budget pressures in the public sector. The impact of these risks is that, depending on the model adopted, the LA may be exposed to first losses on repayments and interest rate risks, leading to lower returns than expected. To mitigate these risks it will be important to fix long term costs of finance for onward

[22] *Radian Group, Retrofit South East. Also results from Affinity Sutton's FutureFit programme due to published this autumn suggests similar issues.*

investment in projects, choose the projects with a good IRR and maximise the attraction of ECO subsidy and other grant funding.

Summary of risks and mitigation			
Risk Area	**Risk**	**Impacts**	**Mitigation**
Green Deal Policy	Eligible measures Calculation method QA, accreditation Inflation-linking timing	Scope of measures / packages and application Set up process and costs	Maintain flexible strategy Seek funding for development work Dialogue with DECC
Industry appetite	Provision of finance Target market Business model	Requirement for LA funding Suitability of partners to achieve LA objectives	Choose preferred LA role Procure partner as appropriate Allow flexibility for business model to evolve
Customer appetite	Uptake rates not met	Poor return on setup costs CO2 targets not met Sunk costs	Adopt area based approach to increase take up Strong delivery partners Marketing plan
Finance and costs	Capital costs Inflation linking Default rates Interest rates Budget pressures	Breach of Golden Rule Achieve less First losses Interest rate risk	Fixed price contracts with partner Maximise ECO subsidy Choose highest IRR investments Flexible finance strategy Fix interest rates

Table 38 Summary of risks and mitigation

6 Strategy and Action Plan

In response to the risk and opportunities presented by Green Deal, we have proposed a strategy that maintains flexibility and mitigates risk. Each of the delivery models will tackle differing levels of risk within a project as illustrated in the figure below to a point where the private sector is willing to invest, whether that investment is development effort, capital investment or the provision of measures and a Green Deal service. However, in taking on these risks themselves the LAs must also be confident that that the risks are understood and quantified, that they are in a position to manage them, and that the rewards outweigh the residual risks that remain.

6.1 The strategic role of the local authority

In order to create a successful environment for Green Deal investment it will be necessary to mitigate risk and perceptions of risk. Figure 25 illustrates how each of the four models mitigates risk to a varying degree, as indicated by the amount to which the private sector would be willing to invest. In Model D, all risks are managed by the local authority and the private sector provides no direct investment. In Model C, the banks provide debt into the programme and would therefore need to feel sufficiently confident that their loans would be repaid. However, the public sector is still providing 30% of the capital and taking all the development risk. In Model B, the private sector is bringing bank debt and equity with the public sector investment limited to the first loss guarantee fund. In Model A, the private sector considers that projects are sufficient sound for it to make all the capital investment; the role of the public sector is then to orchestrate the assembly of investible projects through early stage development work.

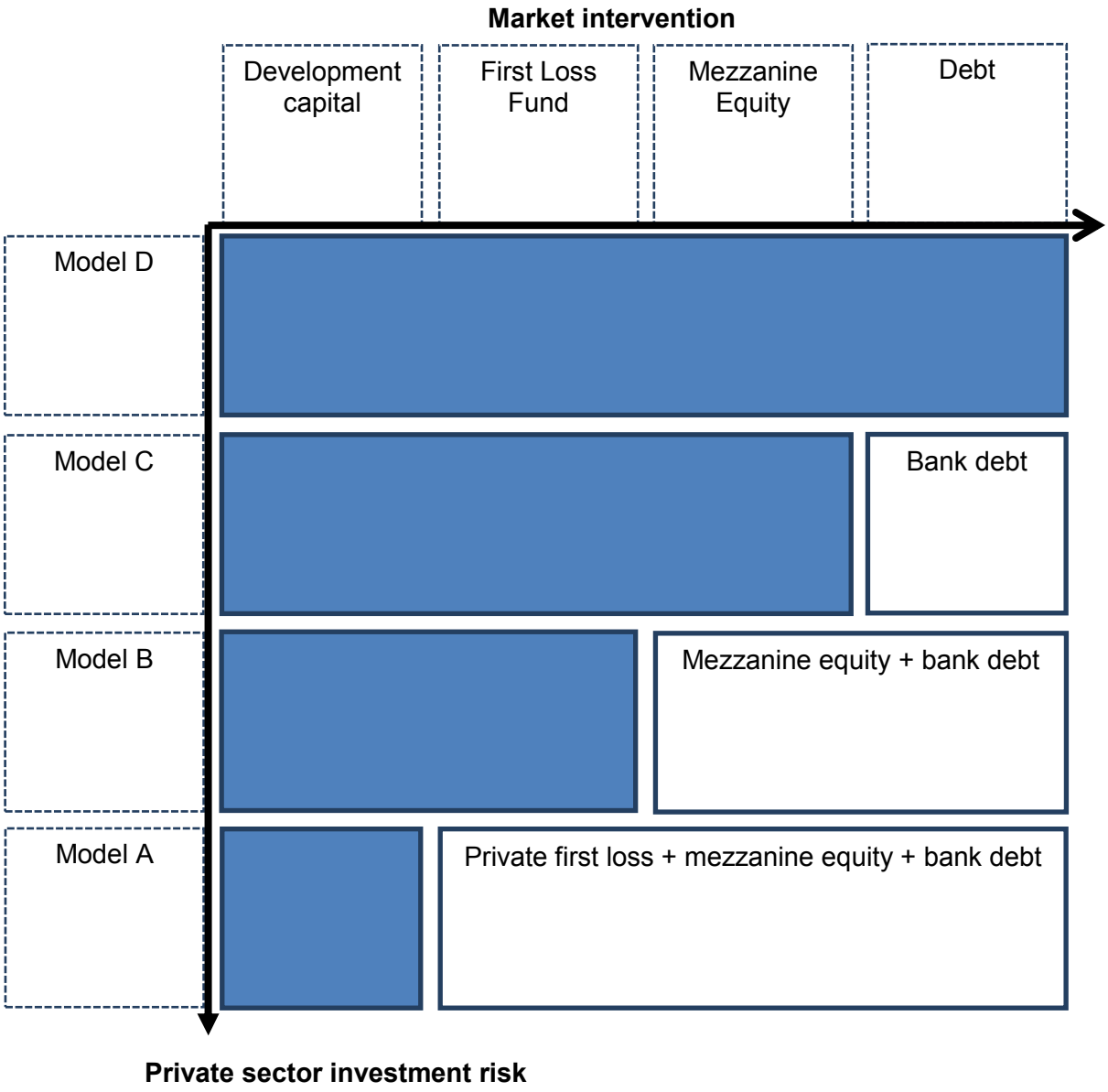
The choice of model for the public sector is governed by a combination of internal factors (such as political philosophy, internal resources, capital reserves and required outcomes) as well as external factors such as the degree to which the private sector is willing to invest. There are reasons to believe that at this stage of Green Deal market development, the risks are sufficiently great as to require a high level of public sector intervention in order to build investor confidence[23].

For example, there are successful examples of Model C being used for PV development under the Feed in Tariff, yet this is for simple, mature technology that can be fitted easily on a wide range of properties with standard designs, delivering index-linked 25 year payments at an attractive rate of return. PV systems are widely understood and generally liked by the general public as they are easy to install, give free daytime electricity and are a tangible and visible investment. Even then, it has taken some of the leading PV developers over 12 months to complete the due diligence exercises required from the banks and to secure investment from a range of banks.

In contrast, green deal involves a wide range of technologies of varying maturity and complexity and immature supply chains. Since every house is unique, there are no standard designs, the disruption to the householder can be significant and there is a high risk of consequential works and associated costs. The incentives are currently unclear and customer uptake is expected to be low in the early years. Energy savings are hard to predict and therefore there is a risk that consumers may feel that the selling process is not clear. For all these reasons, investors are likely to want to see the practical, technical issues managed by established Green Deal providers with substantial balance sheets and recognised quality management processes. They will want also take great comfort from local authorities underwriting some of the investment risks of Green Deal projects in their area. This may come through the injection of capital varying from first loss guarantee, through greater equity to the full weight of their balance sheets.

[23] *This has been acknowledged by government's concession that the Green Investment Bank may yet have a role to play, perhaps in building the scale of activity required to mobilise the wholesale capital markets.*

Figure 25 Market intervention to mitigate risk



6.2 Selecting the most appropriate model for each LA

In order to decide which model best fits each LA, the following steps are proposed.

1. Review model characteristics and evaluation criteria

Begin by reviewing the model descriptions in section 5.2. These include the overall description of how the models works, the organisational structures involved, the summary advantages and disadvantages and the potential cashflows. Review the evaluation criteria in particular, that set out the risks, rewards, indicators and exit strategies. These are summarised below in Table 39. Figures are for the six boroughs combined unless otherwise stated.

Table 39 Comparison of models

Comparison of models				
Risks primarily carried by LA	**A**	**B**	**C**	**D**
Start-up costs				
Consumer uptake	√		√	√
Consumer credit selling	√		√	√
Capital cost of works			√	√
Construction			√	√
Technical performance			√	√
Development funding	£43m		√	√
Capital funding	0	£58m	£177m	£587m
Revenue – first loss		√	√	√
Revenue – all losses				√
Rewards				
Internal Rate of Return	7%	6-7%	6-10%	6.5%
Saving on resident energy bills	£1.82m pa	£2.3m pa	£2.8m pa	£2.8m pa
% CO2 emissions reduction	2.6%	3%	4%	4%
Lifetime tCO2 reduction	1.6m	2.0m	2.4m	2.4m
Job creation (FTE)	390	495	600	600
Certainty of outputs	Low	Medium	High	High
Indicators				
Leverage of public money	High	High	Medium	Low
Scalability of model	High	High	Medium	Low
£ invested by LA/lifetime tCO2	27	29	73	242
£ invested by LA/FTE job	11,026	11,717	29,500	97,833
Residual Uncertainties				
Exposure to policy risk	Medium	Low	High	Medium
Investor (bank) confidence	Low	Medium	Medium	High
Exposure to changing Green Deal provider models	Low	Low	High	Medium
Risk of conflicting with role of Green Investment Bank	Low	Medium	High	High

2. Choose which models fit your corporate and political requirements

Next identify significant corporate requirements that may rule out particular models, for example the need for all investments to be off balance sheet or the need to limit capital investment only to delivering statutory required services. Also identify major political considerations such as degree to which the authority should be 'leading from the front' or letting the market lead. Refer to Section 5.2 that summarises the potential role of the Local Authority to identify where the authority sits.

3. Evaluate whether you have the required resources

Then evaluate the extent of internal resources and the ability to cover project requirements including start-up costs, development (revenue) costs and capital investment requirements. Focus on the amount required per year per authority as the majority of costs are incurred on a gradual basis rather than as a large up-front investment. A number of potential grant support programmes have been identified that may be able to cover start-up costs and operating costs in the first few years, therefore the main focus should be on long term cost coverage. Identify separately the availability of capital and revenue budgets and how these may change through time. Compare the authority's resources against the indicative sums stated for each model, focussing on orders of magnitude rather than specific amounts. The programme size could increase or reduce depending on the availability of funds although a significant reduction in programme size would obviously reduce the potential outcomes in terms of jobs, CO_2 reduction, etc. If funds are limited it would be better to focus on a model that gives greater leverage on LA investment or once that readily allows shared investment across authorities.

4. Weigh risks against the potential rewards

Next determine whether the potential rewards are acceptable. This includes measuring the financial returns against the authority's hurdle rate, following consideration of project risks. If the returns need to be greater then it may be necessary to cherry pick the most viable projects. The potential CO_2 reductions should also be compared against other projects and programmes to decide whether the scale of impact is suitably attractive. Similarly, the economic and employment outcomes should be considered alongside other programmes and tested politically with elected members. In the absence of internal measures, benchmarking should be carried out against the ERDF programmes. It is also important to recognise the relative levels of certainty of outputs with different models. For examples, those with greater LA intervention give greater control of market growth and job creation than do those with lower LA involvement. Remember that even those with relatively high certainty of outcome still carry a series of risks that need to be managed and some external risks (such as policy risk and investor attitudes) that cannot easily be managed.

5. Decide whether the return on investment is sufficient

The range of potential risks and rewards need to be weighed up to determine which models give and acceptable overall return on investment (social, economic and environmental). This assessment should give greater weight to political priorities (e.g. job creation first before CO_2 reduction). The assessment should also decide whether any of the models is preferable to a 'do nothing' of 'wait and see' strategy.

6. Evaluate the exit strategy

Each of the models should then be reviewed against their exit strategies, both the points of exit and the financial consequences.

7. Choose preferred model

Finally the evaluation for each model should be compared against the others to determine which gives the overall best fit. Table 40 provides a decision checklist to help do this.

Table 40 Decision checklist for selecting preferred model

Decision checklist for selecting preferred model				
	A	B	C	D
Which models best meet your corporate needs?			√	√
Do you have the required resources?	√	√	√	√
Can you manage the risks?		√	√	√
Are the potential rewards acceptable?		√	√	√
Do the indicators suggest good a return on investment			√	
Are you comfortable with the exit points?			√	
PREFERRED MODEL				

6.3 A flexible strategy

In order to deliver this, a programme has been developed that would allow the boroughs to begin with common, low investment, low risk activities that prime the market and maintain future options for delivery as the market evolves. LAs would need to agree the most preferred joint working arrangement. An administrative body as a strategic decision maker with representatives from each of the LAs will provide democratic accountability and is the most flexible of the arrangements for the short term. If this model were adopted, the formative period of the arrangements could be easily accommodated (as such arrangements can be easily changed). If this period confirms that the local authorities are committed to moving their joint working to the next stage, then this could be coupled with a corporate delivery arm that implements the key decisions.

6.3.1 Common activities

Initial work should focus on data gathering, education and customer awareness. An estimated budget for these activities would be £500k over a 12-18 month period. This should include further analysis of the potential project delivery risk covering a number of areas:

- Customer up-take – carry out market research to improve the evidence base for market demand. Look at the work being done by DECC on incentives and customer engagement.
- Construction costs – review the results of recent trial programmes such as Affinity Sutton's FutureFit, Radian's Retrofit South East and others. Engage with potential Green Deal providers to determine how these risks will be managed
- Financial risks – continue discussions with banks and institutional investors to determine the required investment structures in order to satisfy credit rating agencies. Track Green Deal policy development in this regard.

6.3.2 Model A

For those authorities pursuing Model A, activity should then focus on acquiring customers for initial pilot projects within priority areas. There are a number of options for how this could be done, potentially through an extension to the RE:NEW programme. This will involve partnering with operating companies to deliver works. For those authorities without the resources or appetite for doing even Model A, they should consider either partnering with a neighbouring authority to carry out this service or identify a private sector Green Deal provider who would also provide or arrange investment capital at an appropriate price.

6.3.3 Model B

For those authorities pursuing Model B, a fund would need to be designed and established with reference to banks, equity investors and Green Deal providers. Design would need to set out the terms of the fund, investment criteria and the limits of liability. Funds may be available from European or other sources although these might place restrictions on the purposes and operation of the fund.

6.3.4 Model C

For those authorities pursuing Model C, a collective approach will be required, either within the sub-region or on a pan-London basis. This will help to ensure that bank debt will sit off balance sheet whilst sharing the SPV set-up costs between a number of authorities. There would be an advantage in ensuring that there was some consistency of approach between the London SPV and others being established across the country so as to maximise the chances of being able to securitise Green Deal contracts at a large scale at a later date. In time, the LAs could then ramp down their investment by selling their equity stakes to other public or private sector investors. Short term project debt from banks could be replaced with bond issues.

6.3.5 Model D

For those authorities that have access to capital and the appetite to invest, pilot projects should be funded directly from LAs in order to reduce setup costs, simplify customer relationships and bring important anchor investment to a new market. It is suggested that in the first instance these should be properties owned by the LAs themselves in order to justify the level of risk exposure and also to mitigate this though securing ECO funding or other financial support. This should increase the political acceptability of early investment since it will be improving council property, drawing in funding to the boroughs and providing a learning environment before moving into the private rented or owner occupied markets.

Projects established on balance sheet should be structured in such a way that they could then be moved into an off balance sheet SPV to bring in private sector investment in the firm of either debt or equity. This would allow the programme to scale up and ring fence project risks and liabilities.

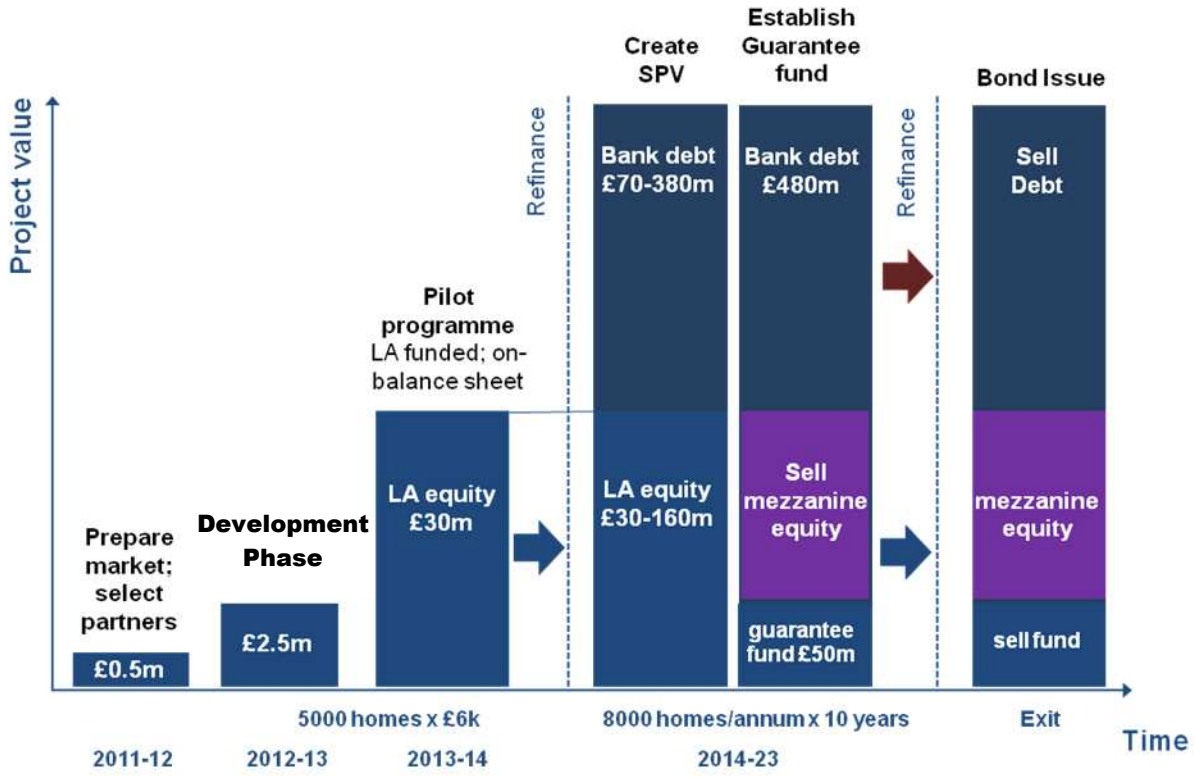
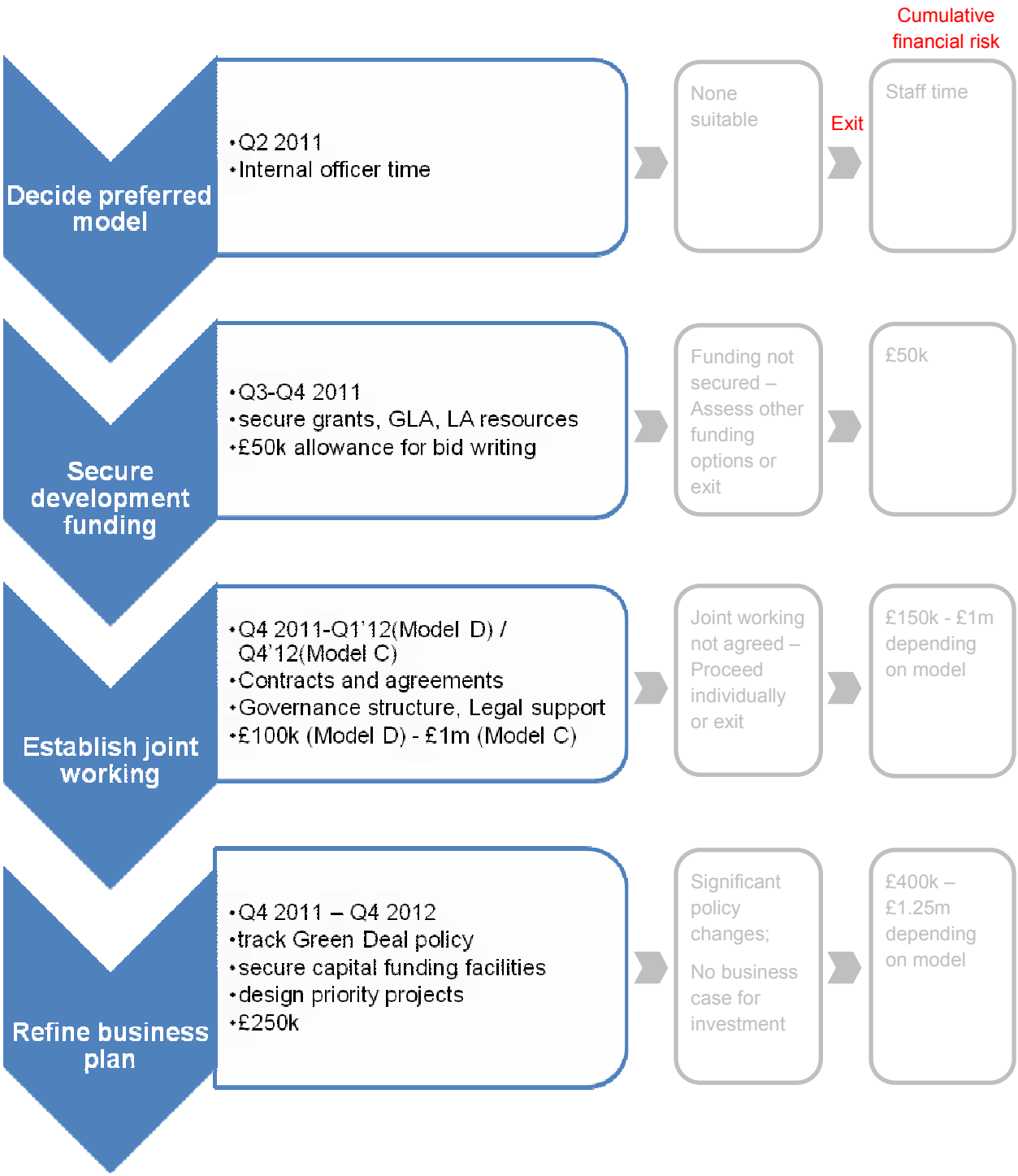


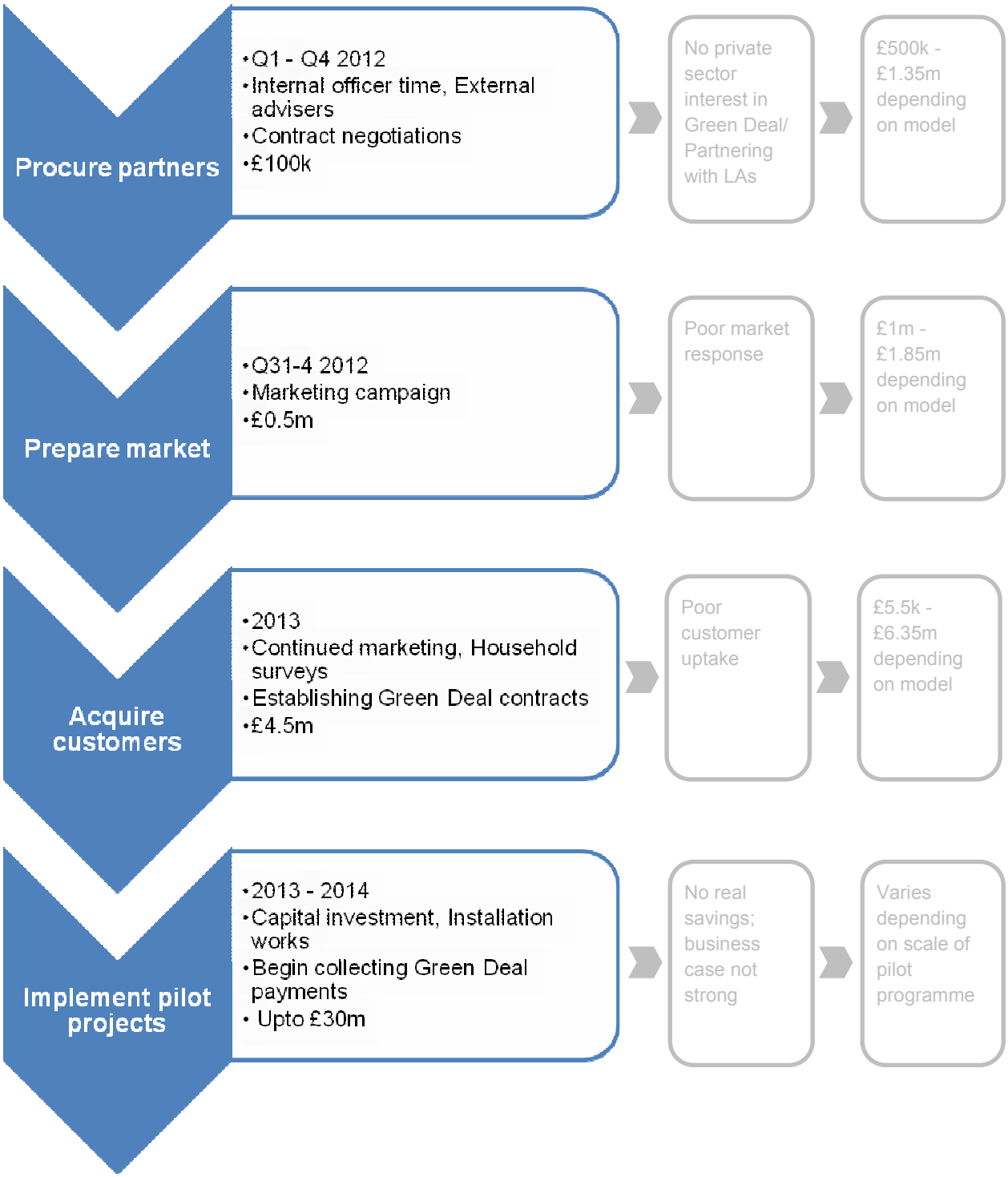
Figure 26 Overview of the proposed strategy

As discussed previously, the key perceived benefits of joint working for sub-regional LAs are economies of scale through joint procurement, sharing of resources to reduce overhead costs, sharing knowledge, and most critically generating the required scale of investment opportunity, for instance, for an SPV or a guarantee fund.

The section below provides a more detailed timeline and breakdown of costs for the first four years.

6.4 Timeline and financial forecast




Procure partners
•Q1 - Q4 2012
•Internal officer time, External advisers
•Contract negotiations
•£100k
No private sector interest in Green Deal/ Partnering with LAs
£500k - £1.35m depending on model
Prepare market
•Q31-4 2012
•Marketing campaign
•£0.5m
Poor market response
£1m - £1.85m depending on model
Acquire customers
•2013
•Continued marketing, Household surveys
•Establishing Green Deal contracts
•£4.5m
Poor customer uptake
£5.5k - £6.35m depending on model
Implement pilot projects
•2013 - 2014
•Capital investment, Installation works
•Begin collecting Green Deal payments
• Upto £30m
No real savings; business case not strong
Varies depending on scale of pilot programme

6.5 Outcomes from a 10 year programme

6.5.1 CO_2 outcomes

Realistic scenario to 2020

Figure 28 illustrates emissions reductions from the Green Deal mechanism and other low carbon measures across the residential stock in the sub-region, using realistic uptake scenarios. The following assumptions are used for this scenario, which are accompanied with insights into how emissions are impacted upon:

- Actual emissions from the sub-region for 2008 are used as a proxy for 2010[24] (starting year for model).
- Grid decarbonisation of the electricity grid (from 0.48kgCO_2/kWh in 2010 to 0.37kgCO_2/kWh in 2020)[25]. This is based on DECC forecasts from now to 2050. Even if nothing is done to the housing stock, over 7% reduction is achieved through grid decarbonisation, which reduced emissions from electricity use. There are, however, concerns whether these ambitions levels can be achieved in the timescales and regarding the actual trajectory of grid decarbonisation from now to 2020.
- 50% uptake of optimised packages for dwellings considered to have 'low' Green Deal potential (capital cost under ~£2k) will be undertaken by 2020. These cost effective packages are unlikely to require a Green Deal financing arrangement given the low capital costs (include measures such as low energy lighting and top up of loft insulation. It is anticipated that these would either be self-financed by householders or funded through other mechanisms. This results in an additional 1.5% saving.
- 10% uptake optimised packages for dwellings considered to have 'medium' and 'high' Green Deal potential, and 5% uptake for advanced packages for dwellings across all tenures. These assumptions present the realistic potential for uptake of such retrofit packages on the basis of evidence on customer willingness to pay outlined in Section 4.1 . It should however be noted that to date there has been only limited market testing of the likely consumer response to Green Deal type packages, and more detailed market testing would be required to provide conclusive evidence on uptake rates at sub-regional level. The combined Green Deal packages would require a capital investment of ~£575m and will provide approximately 4% additional carbon savings.
- For 'poor' dwellings that do not receive optimised or advanced packages. Loft insulation and cavity wall insulation are assumed to be implemented, where suitable. The average savings from these measures are taken on per dwelling based on the latest CERT reduction matrix[26]. This results in an additional ~4.5% carbon saving.
- The savings from Feed-in tariffs (FIT) have been taken from a comprehensive study on renewable energy potential in London conducted by Camco and Buro Happold for the Greater London Authority (GLA). This assumes cost-effective solar PV systems are applied across the residential stock for the relevant LAs, with a realistic deployment rate up to 2020. The deployment rates are derived from the German PV market experience. This results in an additional ~1% carbon saving.
- The savings from Renewable Heat Incentive (RHI) assumes cost-effective air source heat pumps are applied across the residential stock for the relevant LAs, with a realistic deployment rate up to 2020. The deployment rates are again derived from the study on renewable energy potential in London for the GLA. This results in an additional 0.5% saving.

[24] *DECC, (2011). Summary data supporting the indicator (National Indicator 186: Per capita CO_2 emissions in the LA area), sector and fuel details. Accessed from http://www.decc.gov.uk/en/content/cms/statistics/indicators/ni186/ni186.aspx*
[25] *DECC (2010), Valuation of energy use and Greenhouse Gas emissions for appraisal and evaluation, Table 1: Electricity emissions factors to 2100, kgCO_2/kWh. Accessed from http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx*
[26] *Carbon Emission Reduction Target (CERT, (2011) Carbon Reduction Matrix spreadsheet used in the calculation of non-standard measures for CERT program..*

The 2020 target is a 40% reduction from annual carbon emissions from 2005 for the sub-region[27], demonstrated in Table 15. For the purpose of the projection graphs, emissions in 2008 are used as a proxy for emissions in 2010.

All the low carbon measures and policies mentioned above will result in a carbon saving ~18%. This leaves a 21% reduction required to meet the 2020 target for the sub-region, as illustrated with the grey wedge. This graph highlights how savings from Green Deal will only amount to 4%, if the uptake rates are limited to only 15% (optimised and advanced) of all dwellings. The greatest saving comes from grid decarbonisation, which is nearly 200,000 tCO_2 by 2020.

Without local authority intervention

Figure 27 shows the scenario without public sector intervention. Under this scenario, it is estimated that private sector will target projects with the greatest rate of return (IRR over 10%). This would mean that the package of measures funded through Green Deal will be smaller and limited to more simple energy efficiency measures. For the high and medium priority dwellings, it is estimated[28] that CO_2 reductions will drop to around 2.6% assuming the uptake rates mentioned above. However uptake rates under this scenario may also drop as many households may not want to pay a higher interest rate.

Optimistic scenario to 2020

Figure 29 shows the emissions projection to 2020 with more optimistic assumptions on uptake with local authority intervention.

This projection differs to the realistic scenario with the following assumptions:

- For private housing (which makes up 66% of the sub-region dwelling stock), we assume 20% uptake of optimised packages for dwellings considered to have 'medium' and 'high' Green Deal potential, and 10% uptake for advanced packages. Both are double the percentages used under the previous 'realistic' scenario (which is across all tenure types), but can be feasible if Green Deal is marketed and delivered in a way to incentivise owner occupiers and landlords to participate in the program. The combined Green Deal packages for private housing will provide approximately 5% additional carbon savings at a cost of approximately ~£755million.
- For social housing (which makes up 34% of the sub-region dwelling stock), we assume 50% uptake of optimised packages for dwellings considered to have 'medium' and 'high' Green Deal potential, and 20% uptake for advanced packages. These ambitious percentages reflect the potential that the social housing sector has to lead and shape this market. Given the high concentration of social housing stock in the sub-region, the impact on emission reductions from this sector is significant. The combined Green Deal packages for social housing require a capital investment of ~835million and provide approximately 6% additional carbon savings.
- The savings from Feed-in tariffs (FIT) have been taken from cost effective solar PV installations for residential stock with an optimistic deployment rate, which is double the savings from the realistic scenario. This results in an additional ~1.5% carbon saving.
- The savings from Renewable Heat Incentive (RHI) assumes air source heat pumps that are applied across the residential stock for the relevant LAs, with an optimistic deployment rate, which is double the savings from the realistic scenario. This results in an additional 0.7% saving.

Carbon savings from all the optimistic uptake assumptions result in a total saving of ~25%. This now only leaves a 14% reduction required to meet the 2020 target for the sub-region, as illustrated with the grey wedge. The gap presents the limitations of the policies modelled (Green Deal, FIT and RHI) but also presents the opportunity for further low carbon policies and measures to be implemented and ensure the sub-region will meet its carbon reduction target for the residential sector. Such measures could include district heating, smart metering and behavioural measures etc.

[27] *DECC, (2011). Summary data supporting the indicator (National Indicator 186: Per capita CO_2 emissions in the LA area), sector and fuel details. Accessed from http://www.decc.gov.uk/en/content/cms/statistics/indicators/ni186/ni186.aspx*

[28] *The percentage CO_2 reductions have been estimated based on the assumption that the cost of carbon abatement is similar for both with and without LA intervention scenarios.*

Realistic scenario to 2050

Figure 30 shows the emissions projection to 2050 if the carbon savings every year, under the realistic scenario, are just carried forward for the next 4 decades. Assuming the same level of annual carbon savings from 2010 to 2020 under the realistic scenario, carried forward to 2050, then only a 7% additional reduction is required to meet the 2050 carbon reduction target of 80% from 2005 baseline emissions. This high level snapshot illustrates how meeting a 40% target in the space of 10 years may be more challenging than meeting a further 40% reduction over the space of 30 years.

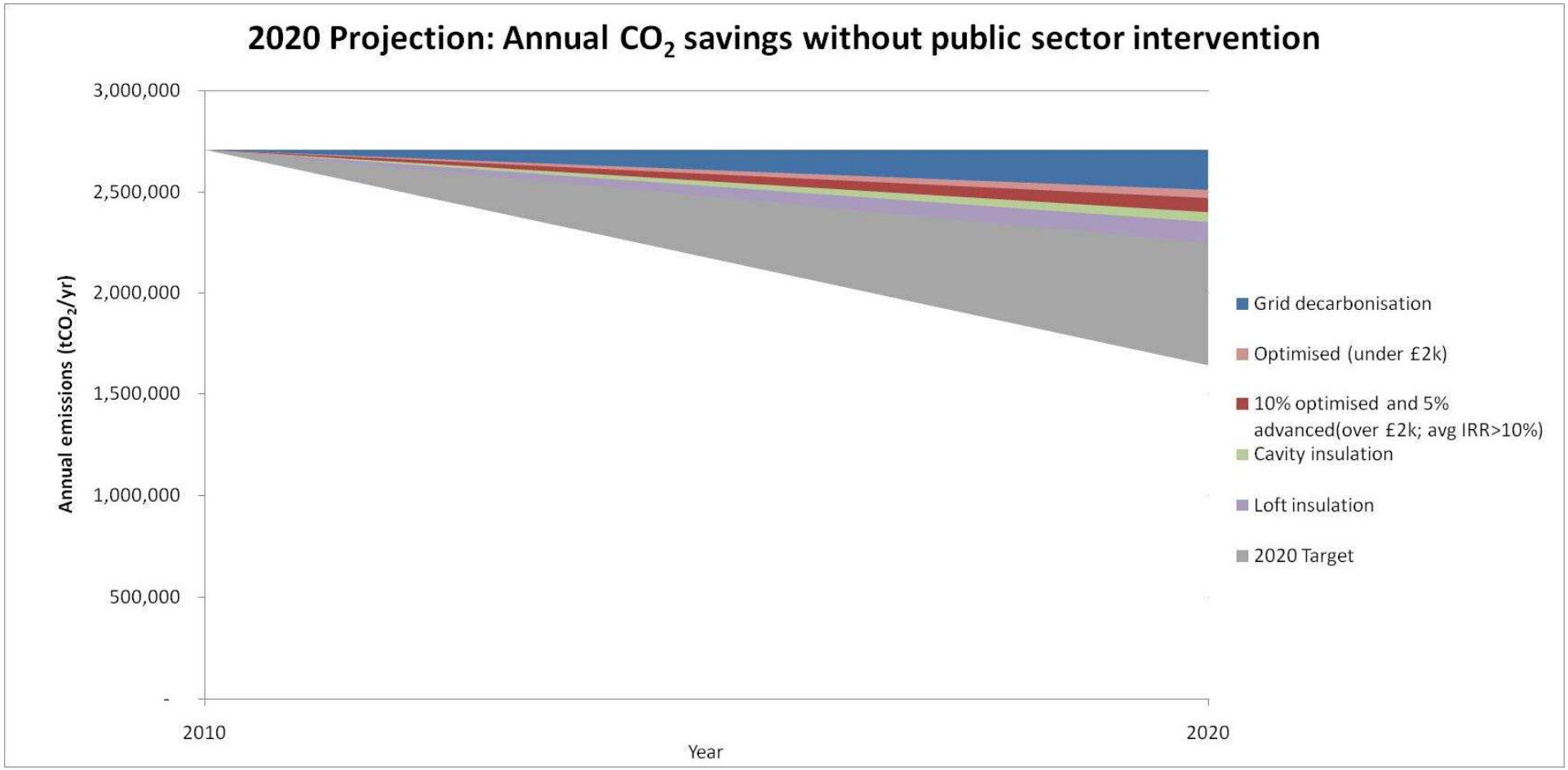


Figure 27 2020 Projection: Annual CO2 savings without public sector intervention

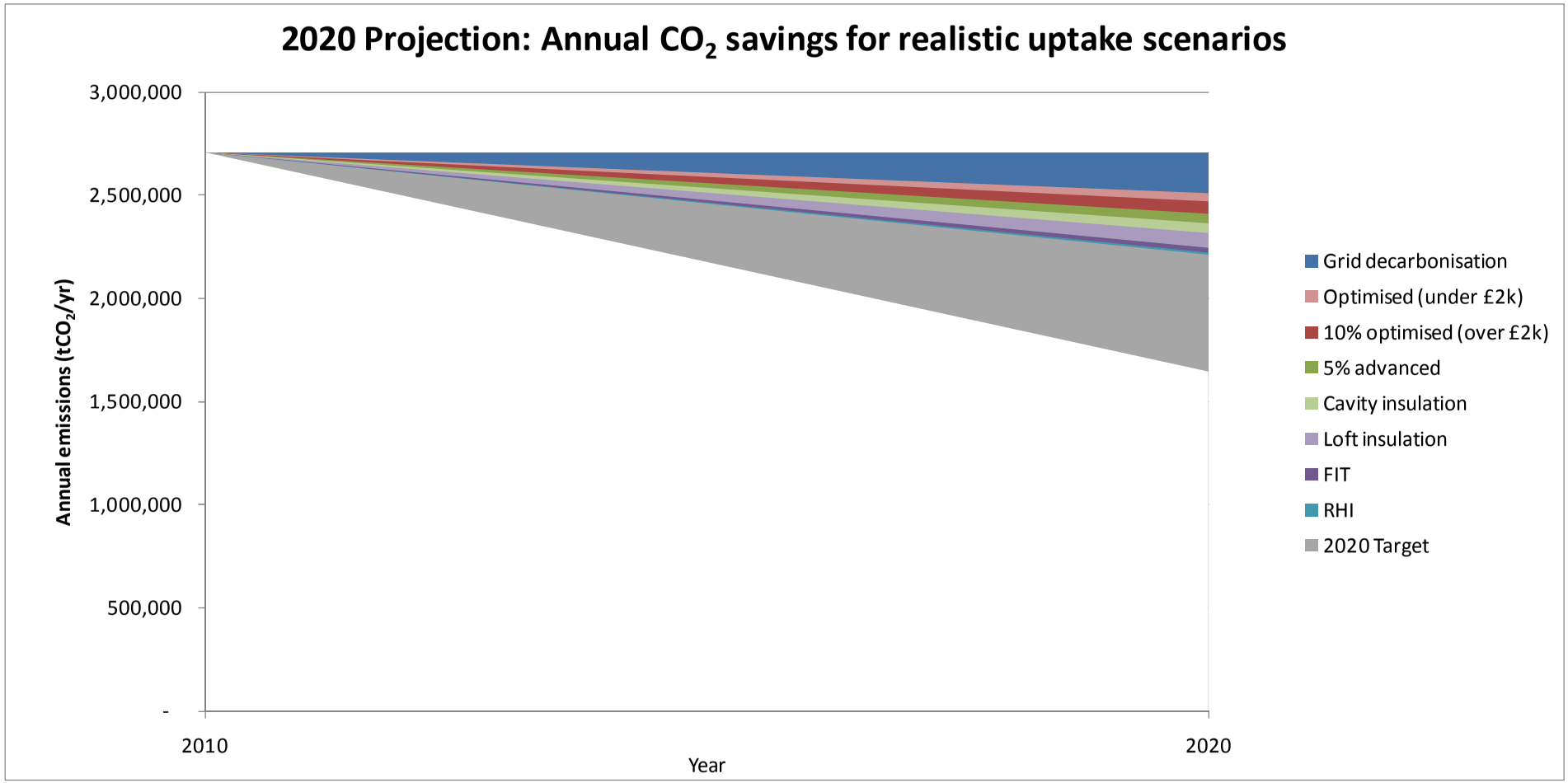


Figure 28 2020 projection of residential emissions with realistic uptake rates.

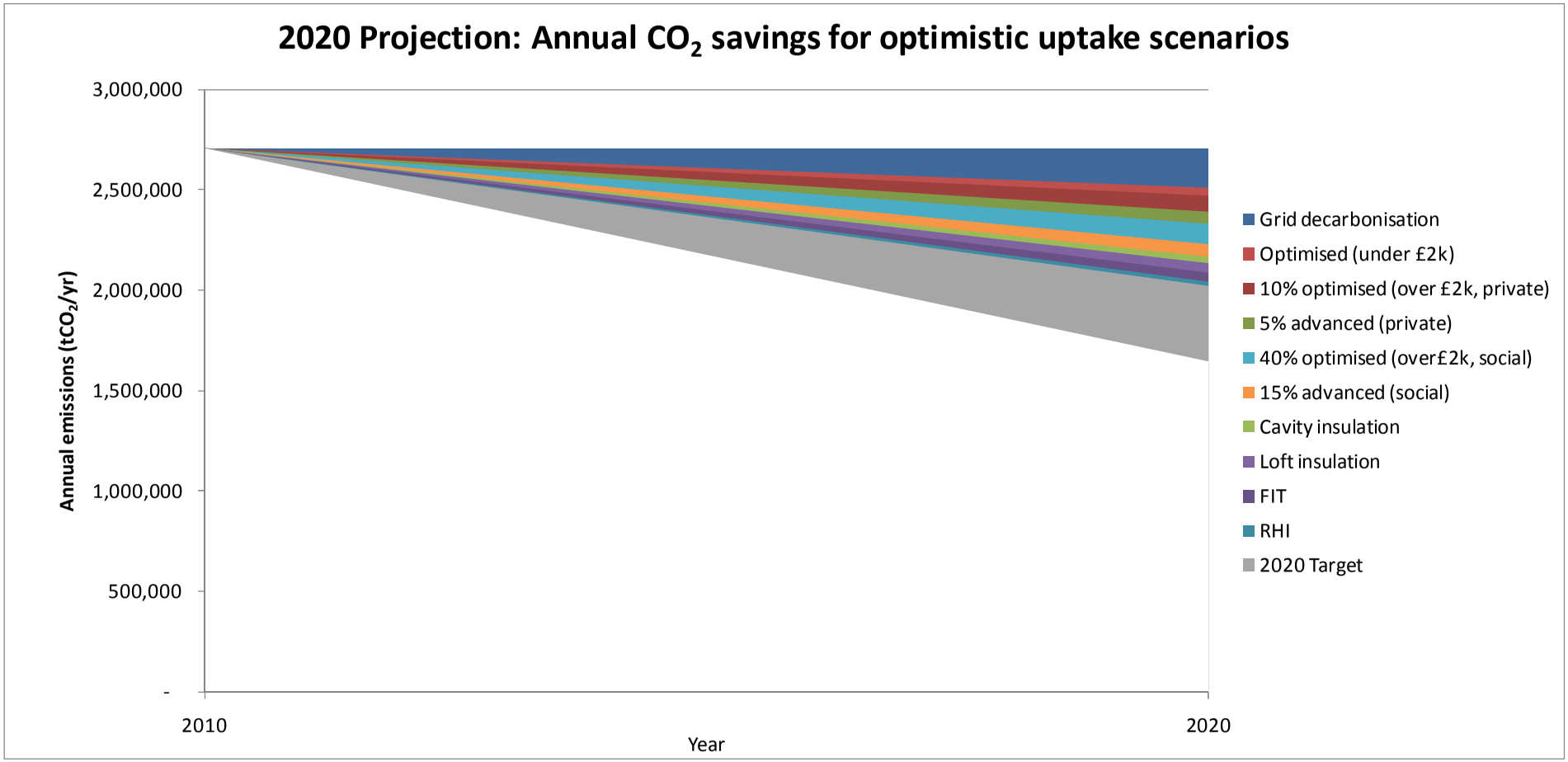


Figure 29 2020 projection of residential emissions with optimistic uptake rates.

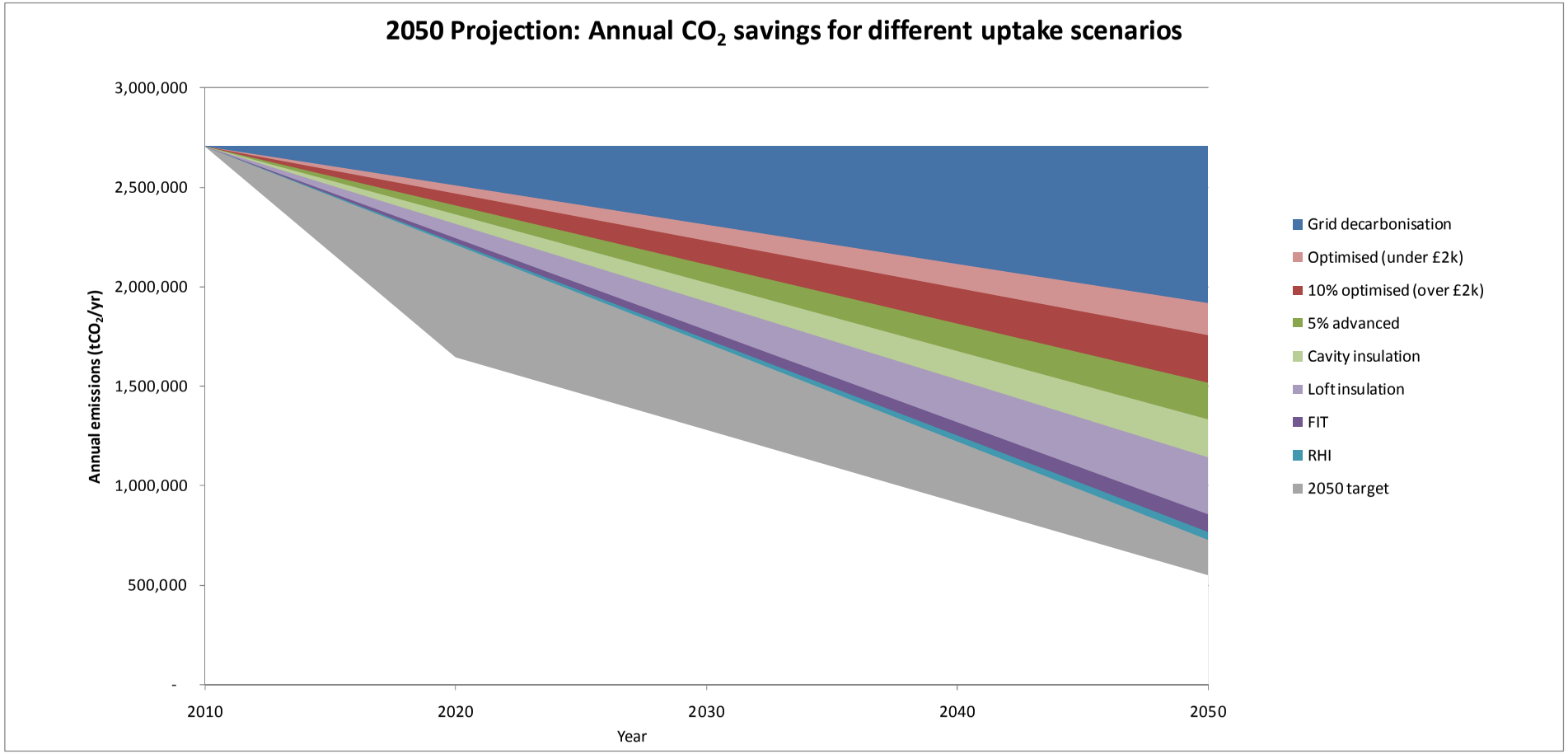


Figure 30 2050 projection of residential emissions

6.5.2 Springboard for growth - Regional balance sheet for eco-retrofit in the sub-region

If implemented in full at the expected customer take-up rate, the Green Deal programme realistic scenario to 2020 would:

- Establish a market worth £60 million a year to the household energy efficiency and repair, maintenance and improvement sector.
- Create over 537 direct full time equivalent jobs.
- Support the retention of a further 52 direct full time equivalent jobs.
- Liberate £2.8 million a year in energy savings to reinvest elsewhere in the local economy – increasing as energy costs rise.
- Enhance the asset value of homes in the sub-region by over £1 billion[29].

The retrofitting of existing housing stock will create significant business opportunities in the near future. An embedded awareness of this potential across all LA departments is the first step so that the green agenda can be integrated with other initiatives.

To enable development of local jobs and to support SME's in the sub-region to capitalise on these opportunities, it is critical that training initiatives and business assistance to SME's is a key focus area. The level and type of LA support can vary significantly depending on resources and delivery route for the retrofit programme (e.g. wholly public sector led or private sector led).

Training and business support initiatives could either build on existing London- wide initiatives (such as the FLASH programme) or alternatively enable new local partnerships for training and business support to be set up (such as with local educational institutions, construction academies, etc). Please refer to Section 4.2 for some examples of best practice for up-skilling schemes and business support initiatives. Funding may be available from the European Grants such as the European Social Fund and the European Regional Development Fund. There may also be potential to work with the London 'Local Enterprise Partnership' to promote green jobs at the regional level.

6.6 Priority programmes

The boundaries of priority areas for delivering the 10 year strategy outlined above should be determined based on the following parameters

- Areas of high fuel poverty
- Areas designated for RE:NEW programme
- Designated regeneration areas that have infrastructure or development works planned. Desktop research has suggested that uptake areas are likely to be higher where energy upgrade measures can be integrated with regeneration programmes
- Areas where other community initiatives are planned, and where community platforms being set up for these initiatives can be used to promote Green Deal initiatives. Again uptake rates have been found to increase in such instances.

6.7 Procurement strategy

The EU procurement regime is applicable to local authorities in the UK as they are bodies governed by public law. If they engage in procurement for works, supplies or services, then a designated procedure has to be followed.

The exact nature of the procurement requirements depends on the nature of the activities in question. There are various ways in which such matters might be structured, including:

[29] *This draws on research from Australia where a 3% increase in asset price for more energy efficient properties was found in a mature market for EPCs,* Australian Government, National Framework for Energy Efficiency, Energy Efficiency Rating and House Price in the Act, 2008*, as well as the average house price in December 2010 for Greater London of £409k,* http://news.bbc.co.uk/1/shared/spl/hi/in_depth/uk_house_prices/regions/html/region9.stm. .

- A services concession;
- A works concession;
- A land transaction;
- An asset improvement project;
- An in house company (the Teckal exemption);
- Or a compliant, new procurement exercise;

Specific legal advice will be necessary once the precise structure of the project is determined.

A variety of other legal issues will need to be addressed at the same time, for example the application of consumer credit law to the Green Deal offering. Again, this will depend on the exact framework of the Green Deal in the forthcoming legislation and the precise structure of this arrangement.

Key procurement stages for each of the delivery models are outlined below.

6.7.1 Public Sector Development Company

Step	Description	Timescales
1	Raise finance	
2a.	**Option A** – **Expand RE:NEW programme**. It is anticipated that a certain number of properties will be visited each year under the programme and the additional cost of collating data on green deal measures would be minimal. This is therefore the preferred option due to its low marginal cost. • The first step is to check that amendments can be made to the original framework agreements to include additional tasks required. • The next step would be to make the required amendments to both the framework agreements and the individual contracts. This would entail discussions with individual panel members and then making required changes to the legal and financial clauses. • A contract variation/ separate contract would then be issued for the additional services.	Depending on the flexibility in current framework agreement / contracts this option may require only a few weeks to become operational
2b.	**Option B – In-house.** • Decide on specification for development work to be carried out (surveys, energy assessments, etc.) • Recruit and train workforce. This could be six different teams in each of the LAs operating concurrently or a single shared team working across the six LAs. In case of the latter the lead LA could share the costs of recruiting the workforce via an admin arrangement. This option benefits from not having any procurement implications (for instance, compared to Option C below). However, a procurement process may still be required for the installation phase should the LA decide to use external companies to do so.	~ 6 months
2c.	**Option C – New procurement process.** This exercise could build on the framework agreements and contract templates used for the RE:NEW project to save time and costs. It could be a joint procurement across all six LAs to enable costs to be shared. • Define the overall strategy and specifications for procurement exercise. • Issue OJEU notice	~12 months

	• Create a select list and then award tender to preferred organisation/s. • Allow for required commissioning period to commence work.	
3.	Development phase starts	2011 - 2013
4.	Sign up customers	2013 onwards
5.	Pass on lead / bundle projects (e.g. by areas) and collect finder's fee. Each LA gets share of the revenue earned from their area of jurisdiction. Where a number of sub-regional boroughs get together to deliver this initiative, for instance, through an administrative arrangement, part of the revenue would flow back to the lead borough to cover the administrative costs.	
Issues to be addressed – *Which organisation has the right to Green Deal lead?* *Which organisation eventually signs the contract with home owners – Green Deal assessor or Green Deal provider?*		

6.7.2 First Loss Guarantee Fund

Step	Description	Timescales
1	Raise finance from Public Works Loan Board (PWLB), grants, and/or commercial lending	
2.	**Set up a guarantee fund** • Agree the aims, objectives and strategy for the guarantee fund in terms of what it needs to achieve. • Decide appropriate governance structure • Sign shareholder agreement	~ 12 months
3.	Appoint fund manager • Agree scope of fund manager • Procure as service through OJEU	£6-12months
4.	Liaise with banks • Establish term sheets with banks • Establish risk mitigation plan for investments	

6.7.3 Public Sector Ownership of Assets through Special Purpose Vehicle

Step	Description	Timescales
1	Raise finance from Public Works Loan Board (PWLB), grants, and/or commercial lending	
2.	**Set up Special purpose Vehicle** • Agree the aims, objectives and strategy for the SPV in terms of what it	~ 12 months

Step	Description	Timescales
	needs to achieve. • Based on the above, decide on the overall model (whether there will be a private investor with an equity stake in the company, what would the role of each LA be and the level of control or influence they would have) • Decide on type of company to be set up to deliver the aims and objectives (e.g. Community Interest Company, Share Company or a Guarantee Company). Where the SPV is wholly public sector owned, it would be governed by public law and provide functions for public good. • Outline memos and article for the company • Sign shareholder agreement	
3.	**Procure operating company (Opco.) to develop and implement projects** • Define the overall strategy and specifications for procurement exercise • Issue OJEU notice • Create a select list and then award tender to preferred organisation/s. • Allow for required commissioning period to commence work.	~6 -12 months (this step could partly overlap with step 2 above)
4.	Due diligence by banks to provide debt finance	
5.	Implementation phase starts. Opco. contracts installation companies to develop and deliver projects on ground.	2013 onwards
Issues to be addressed – *LAs will not be able to raise finance for the SPV from Public Works Loan Board.* *Credit rating of Opco. is critical to ensure debt funding from banks.* *A wholly public sector owned Opco. would be governed by public law.*		

6.7.4 Public Sector Ownership of Assets on balance sheet

Step	Description	Timescales
1	Raise finance from Public Works Loan Board (PWLB), grants, and/or commercial lending	
2	**Procure partner/ panel for 4 years to both develop and implement projects** • Define the overall strategy and specifications for procurement exercise • Issue OJEU notice • Create a select list and then award tender to preferred organisation/s. • Allow for required commissioning period to commence work.	~12 months
3.	Development phase starts. Allocate areas to different organisations involved in the implementation work, if required.	2011 - 2013
4.	Implementation phase starts. Allocate areas to different organisations involved in the implementation work, if required.	2013 onwards
Issues to be addressed –		

Where a single organisation is contracted for carrying out the works, there is a capacity issue for delivering the scale of programme required to deliver regional CO_2 targets? There is also a failure risk of the organisation going bust. Therefore a panel of 4-6 organisations may be preferable. The procurement cost for setting up the panel would not be any different.

Would require a schedule of rates and agreed methodology for selecting and implementing individual Green deal contracts.

6.7.5 Procurement Options when working jointly at sub-regional level

There are various ways that this can be done and formal legal advice will be necessary in due course. However, for the purposes of considering the options, the following are the main ways in which the project could proceed:

- Joint procurement by the six London Borough Councils together, with a single contract at the end, covering all of the sub region;
- Joint procurement by the six London Borough Councils together, with individual contracts at the end;
- Individual procurements by the six London Borough Councils, prepared on a pre agreed basis, so that each is a mirror image of the other; contracts, whilst individual, are nonetheless the same;
- Individual procurements by the six London Borough Councils, prepared on a completely individual basis;

Again, how the procurement is structured depends on what the local authorities want to achieve.

If the sub region is to work in close harmony, then a joint procurement and single contract would be evidence of that. At the other end is just a joining together under a single procurement exercise, but with the intention of each authority then doing its own thing at the end, whether that is taking no action or entering into a contract. That latter might be said to be less than joint working on a sub regional level.

6.7.6 Actions to reduce embodied energy

Embodied energy of a product includes the energy used for extraction of materials, the manufacturing process, transportation and deliveries, replacement of components during its service life, and disposal at the end of its life (e.g. emissions associated with landfill, incineration or recycling). This is referred to as a 'cradle to grave' approach and is the recommended approach for embodied energy appraisals.

While the embodied energy of some energy efficiency products (such as loft insulation) may be marginal compared to the total savings in operational energy that they are likely to deliver over the life of the dwelling, for other products (such as MVHR systems) it may be significant proportion of the total. As measures are implemented to reduce the operational energy demand in buildings, the embodied energy will increasingly become a significant proportion of their total life cycle impact. Typically it is estimated that for new build the embodied energy is around 20% of the total life cycle energy use, and this figure will to rise to around 35 40% for new dwellings built to current Building Regulations.

To ensure that embodied energy impact is taken into account when installing energy upgrade measures the two main steps are

Appraising the embodied energy impact

This means appraising the embodied energy impact (and wider environmental impact) of alternative products and materials that could be installed to achieve the same operational performance. For instance, different manufacturing processes (blowing agents used) for foam based insulation materials may mean that some products will have a much lower Global Warming Potential (GWP) than others. Durability and replacement intervals are also a key consideration. For example, LED lights typically have a service life of around 50,000 hours, which implies that over their life the embodied impact of the materials will work out to be less significant than a CFL with a life of around 6,000 to 15,000 hours. Products may also have varying degree of recyclability at the end of their life and certain products may

have special end of life disposal requirements (such as incineration). For example, mineral wool has a high degree of recyclability compared to most foam based insulation products.

Some of the existing accreditation systems such as the Green Guide Ratings produced by BRE can be used for appraisal of generic construction products and materials. However, these are not manufacturer specific and currently do not cover building services. Manufacturer specific 'cradle to grave' assessment of their products in line with an agreed methodology (such as WBCSD/ WRI Greenhouse Gas Reporting Protocol or PAS 2050) would provide the most comprehensive way to compare embodied energy of alternative products. This would highlight products that are exceptionally energy intensive to manufacture, are manufactured abroad and/ or use a high proportion of materials that are sourced from abroad. Over time, this will help drive wider improvements in supply chains and manufacturing processes.

Such an approach would however need to be introduced over time and as a first step compliance with Environmental Management Systems (EMS) such as ISO 14001 or BES6001 should be sought. An EMS does not define an absolute target but only ensures that processes are consistently followed. This will ensure that individual manufacturers of energy efficient products and materials are adopting an active approach to mitigating the climate change and embodied energy of their products.

Specifying appropriately

This means incorporating overall performance specifications for energy efficient products and materials in tender documentation. As discussed above, the performance criteria will set out the benchmark CO2eq per unit for the product or alternatively stipulate processes to be adopted such as compliance with an EMS. The performance specification then forms part of the procurement and tender process for installation companies. This could additionally stipulate the distance from which products are sourced (e.g. a 50 or 100km radius). Allowance should be made for tightening of the performance requirements over time as improvements are made to the supply chain and manufacturing processes.

6.8 Marketing and Communication strategy

The marketing strategy sets out a flexible framework for the central – borough driven - implementation of a communications strategy to support the roll-out of the five borough retrofit programme.

The final structure for implementation will be significantly influenced by central government, government body e.g. EST / Carbon Trust etc and private sector communications to support the Green Deal. This is likely to focus on the rationale for Green Deal, the functional detail and the delivery standard / kite mark.

The overall objective for the campaign remains to inform, educate and engage [ideally securing contact details] target audiences in the concept of the Green Deal and to begin to counteract the three key barriers to action – cost, inertia and time for return on investment

This will prepare the way for rapid engagement and take-up by commercial delivery partners.

6.8.1 Context

There have been numerous studies on consumer [ie. home owner or dweller] uptake of energy efficiency measures. We draw for our main source of information quadrangle / EST generated consumer research conducted in 2009 with a national based of 2920 adults. [Willingness to Pay –
Energy Saving Trust / DECC: Quadrangle, April 2009]

Noted above are the three key barriers i.e. Cost [cited by 57%], inertia 'Not got around to it' [21%] and roi – 'Not sure it will save me money / too slow to pay back / energy saving is too small' [21%].

The Green Deal packages are specifically designed to challenge issues of Cost and Payback with a loan structure and no – apparent – outgoing rather a claw back through the billing cycle. We consider this in the PR section as one issue will be independent [eg media] evaluation of actual costs for financing over time. Nonetheless, at top level, the structure is sound.

We must also consider the motivators to purchase. We have stripped out pro-active funding initiatives that will be precluded by the Green Deal packages [e.g. Grants etc] and are able to identify remaining emotive, and pragmatic, triggers to purchase:

- ✓ **Comfort:** 54% increase the comfort of my home
- ✓ **Cost:** 45% identify the high cost of energy bills
- ✓ **Environment:** 42% are motivated by reducing their impact on the environment

Significantly there is a raft of important substantiating information that should be carried through in the marketing campaign providing appropriate reassurance for take up of the offer:

- ✓ **Quality:** 28% identified positives of scheme certifying the energy saving measures
- ✓ **Cowboys:** 26% would want to know that the installer met a recognized standard
- ✓ **Information:** 23% would be motivated by information about the process

These factors highlight the importance of the Green Deal Kite Mark, providing accreditation of products and installers, and the communications behind it. As an early adopter region education on the specifics, as well as communication of the Kite Mark, should be integral to all activity.

Finally there is a noted correlation between home renovations ranging from extensions and redecorations to boiler replacement and consideration and uptake of energy savings measures. Whilst this will be the responsibility of the delivery partners, engaging parties in advance of these trigger points will be important, so that energy efficiency measures will become part of the planning process.

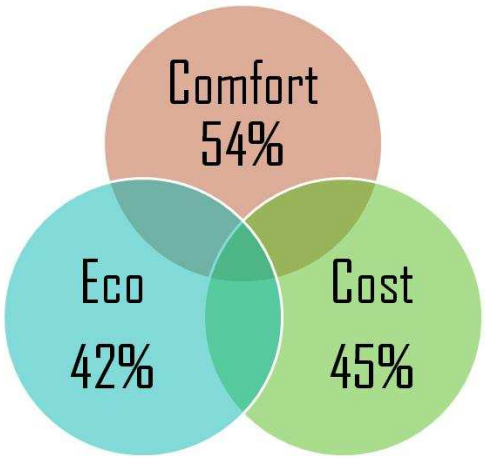
- ✓ **Timing:** 32% linked renovations to energy efficiency measures

6.8.2 Key Messages

We have looked in the previous section at the various barriers and motivators to change. A major question will be to define the extent to which the focus is on the pragmatic and tangible ie. No cost, reduced energy bills, increased home comfort and contextual information on environment.

Whilst 42% would be motivated by reducing their impact on the environment, studies also show that more than 70% of all adults associate climate change with energy use and are already doing 'things' to help reduce their energy use and emissions. Only 5% do not believe there are climate change problems caused by energy use.

We believe that all factors are valid – and should be part of the consumer dialogue - as there is no clear and single umbrella motivator between comfort, cost and environmental impacts. There are more clear triggers e.g. renovation and refurbishment and bill outlay and tailoring of communications should therefore be on timing, not on rationale.



We therefore recommend the use of an umbrella messaging structure and trigger driven sub-messaging. Two options are identified – the first looking at the value of the deal, the second assumes a degree of understanding of the green deal and therefore focuses on the simplicity of activation:

Proof points will be important and should be consistently carried across all communications. They should work to reinforce the quality, simplicity and impact of the programme drawing on the Kite Mark, the process and the materials and technologies in place.

Trigger messages would be introduced in the later part of the campaign when fulfillment is possible within eg. a three month window and would be driven by, or delivered in co-ordination with, delivery partners:

- cross region focusing on seasonality eg. Summer: Act now to enjoy this winter in **comfort,** Spring: Cut the **cost** of next Winter's fuel bill. The Green Deal is a Great Deal.
- direct to consumer groups via partners eg. B&Q brochure: **Renovations**? It's no big deal to benefit from the Green Deal. Now is the time to cut your heating bill by a guarantee 10%. Energy supplier: Bill mailing. **Cut your fuel bill** with the Green Deal – and do you bit for the planet. It's quick, it's easy and it requires NO capital outlay!

In three areas: centrally owned information resources eg website; public relations ie editorial work and direct 'selling' by partners will be a requirement to unpack the Great Deal / No capital outlay proposition as price is identified as the single most important element in the decision making process [37%] and Payment Method [16%].

Again the Quadrangle research identifies the best way to present what is effectively a new concept of a loan [we would argue a loan taken out by the house – not by the individual so a 'house' loan] repaid though energy bills. Whilst research does not address the payment mechanism we could summarise as follows:

1. cut costs, improve your home and help the planet with a Green Deal package for your home
2. the Green Deal is a Great Deal- it is delivered through a long-term, low-rate loan
3. the cost of payment is less than the money you save each month!

Secondary messaging includes:

1. the loan is taken out for the property, not for you meaning no loan applications
2. you are free to switch energy suppliers at any time

Finally we note that there may be concerns about the impact of a House Loan on the ability to resell the property. Should EST or other parties not conduct research we would recommend that a pilot survey is conducted, potentially with an estate agent to give a commercial / high street perspective, to assess the impact on reselling / purchasers. Research should explore:

- Purchase criteria of houses eg energy efficiency, running costs etc
- Perceived value of energy savings measures eg. reduced energy bill, comfort, greener house
- Likelihood to take up Green Deal offer if not already installed on property
- Influence of Green Deal House Loan on decision making process eg. ranked against other criteria from location, size, schools, amenities, décor etc

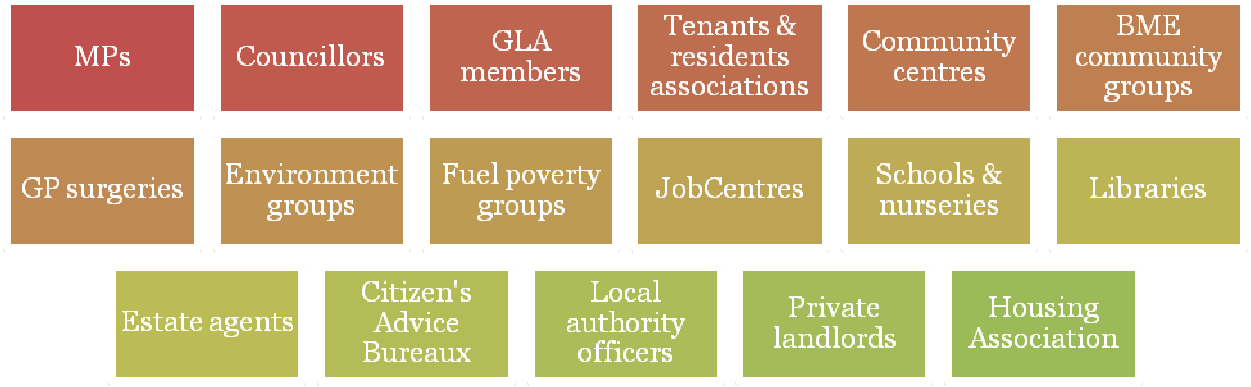
This should be used to develop messaging on desirability and transferability. These would inform communications materials in the period prior to campaign going live, in briefing materials for the estate agency / property and landlord sector and in public relations activity.

Finally there has been consideration of the concept of a Green Home makeover. The point of difference is in the package of measures. However we note that cost is the biggest driver on uptake and 'hassle' one of the biggest distracters and therefore whilst there is arguably an upside the downside of implicit cost and disruption is significant.

We therefore believe that Word of Mouth consumer messaging on the benefit of a makeover is more credible and valuable than the use of this messaging in the campaign activity.

6.8.3 Stakeholder audiences

We first look at those people who will help shape opinion about the Green Deal proposition and are able to engage on a one-to-one and one-to-many basis with our target audiences. The stakeholder map below sets out the key groups:



Mapping stakeholders, engaging target audiences

The objective of engaging the stakeholder communications channel is to trusted communications with our target audiences. These groups provide a channel to access consumers, particularly hard to reach groups, but also are potential channels for building advocacy and campaigns.

Given that these channels are largely geographically defined it should be possible to map them against the Census Output Area level data that forms the backbone of the CAMCO analysis. This would allow communications tailored to property and retrofit package type.

However, in practice, the messaging and communications with these groups need to be aligned with their interests rather than with the packages. The table below unpacks the groups above, their relevance to the campaign, the appropriate approach and the required messaging and anticipated outcomes.

Organisations	Relevance	Approach	Messages & outcomes
MPs, councillors, GLA members	Community leaders and opinion formers	One-to-one or group briefings Information pack 1 Posters / leaflets	Engaging and aligning political stakeholders will vary substantially by individual, with the approach ranging from 'right thing to do' messages to 'fuel poverty alleviation' to 'community benefit'. A very short factual information pack explaining the key benefits of the scheme should be married with face-to-face briefings where possible. For councillors it should be possible to offer political group briefings. Clearly this has to be done whilst maintaining strict political neutrality.
Tenants & residents associations (TRAs)	Decision makers	Local authority District Housing Offices (DHOs) & housing officers Local authority 'area forums' Information pack 2 Face-to-face briefings Posters / leaflets	This group covers a full mix of tenancies (private, housing association and socially rented). TRAs range from being opinion leaders to irrelevant so an approach needs to be based on local knowledge. This should be available through DHOs and community engagement teams within local authorities. As they have regular meetings with residents they provide a good channel of access, particularly if backed by local ward councillor advocacy. Local authorities typically have a database of these stakeholders (e.g. for planning consultations) and should be able to distribute collateral to chairs / secretaries of TRAs. TRAs that respond positively to initial contact / those in target geographical areas can be met and briefings provided, either to the executive members of the committee or a full meeting. Information packs can be provided to TRAs to promote advocacy and for distribution to individual households.
Private landlords / tenants		Certification scheme Information pack 3 for landlords Council tax mailing	A hard to reach group that are unlikely to see clear benefits from the Green Deal scheme as (a) property may be unavailable for let whilst works are undertaken, (b) there is no immediate value added to rental take. However, as they represent a large proportion of properties and have access to properties when they become vacant (and are therefore available for advanced packages of measures) they are an important audience. A certification scheme for private rented properties that have received the advanced package of Green Deal measures should be considered. This could add value for landlords, particularly if combined with an estate agent engagement programme. An information pack explaining the Green Deal and providing a clear enumeration of the value added to Green Deal properties could be distributed to significant private landlords known to local authorities. Otherwise we would recommend a Council Tax mailing (which will reach all households) with information for private tenants giving them information on how to secure Green

			Deal measures for their homes. This should ideally be combined with a support mechanism within the local authority (e.g. provided by officers dedicated to private tenancy issues, where they exist).
Housing associations		Conference Face-to-face briefings Information pack 3 Posters / leaflets	Housing Associations are likely to be aware of the Green Deal and should be incentivised to promote / deliver the programme. However, the local authority could look to organise a conference for associations within the sub-region to promote awareness of the initiative and mechanisms. This can be supported by face-to-face meetings and information packs. It is suggested that the sub-region might wish to create a coalition / charter to secure sign up and recognise engagement with the Green Deal programme
Community centres, libraries, GP surgeries, JobCentres, Citizens Advice Bureaux, schools and nurseries	Information channels and opinion formers	Posters / leaflets Information pack 4	These groups represent channels of advocacy (e.g. around health and fuel poverty calls to action) and information. A database of these organisations should be available to most local authorities, but access can also be purchased via the COI Publicity Register (see below).
Local authority officers	Internal audience and potential champions	Team briefings Information pack 4	Across local authorities there are customer facing staff whose interactions with clients / residents could be expanded to include advocacy of the green deal programme. This ranges from revenues and benefits staff dealing with people in financial difficulties (who are likely to be at risk of fuel poverty and would therefore benefit from Green Deal measures) through to planning service staff who are dealing with people who may be accessible for advanced package measures whilst undertaking home extensions / improvements. Existing internal communications channels can be exploited to raise awareness of the Green Deal programme and performance targets could potentially build in take-up.
BME community groups	Opinion formers	Peer engagement Face-to-face briefings Information pack 5	As above, but tailored / native language information should be made available to communicate with these groups. Typically these groups respond well to 'community leaders' where these can be identified and recruited to support the programme (peer engagement).
Environment groups, fuel poverty groups	Potential champions	Face-to-face and group briefings Campaign pack Posters / leaflets	These groups are likely to both understand the issues and the rationale for promoting the project. They should be relatively straightforward to recruit as advocates and the focus should therefore be on providing template materials / bulk buy promotional collateral for them to promote the initiative in their local communities. In engaging with these communities it is important to recognise that they will want to promote the campaign in their own language / on their own terms. This should be embraced as it is likely to result in greater

			acceptance by the local community.
Estate agents	Information channel for advanced packages	Information pack 6 Corporate briefings Leaflets	Estate agents are a channel to engage with consumers at a point where the advanced package of measures will be most accessible, i.e. it will be empty between occupants. Large chains of estate agents operating across the sub-region can be approached at a corporate level. The aim would be to secure support for, and promotion of, the programme on the basis of (i) the customer proposition, (ii) benefits to their corporate CSR. Information packs can be provided for individual's shops providing both a briefing note for sales staff and a handout for customers.

Platforms

The table above includes a number of platforms that could be deployed as part of a campaign to raise awareness and promote take-up of Green Deal measures. This would add value in a way uniquely available to the local authority, which can provide independent, trusted sources of recognition, endorsement and promotion. The table below unpacks these platforms in more detail.

Activity	Detail
Collateral	Basic poster and leaflet collateral based on campaign key messages with a clear call to action and 'destination' so that engagement can be converted into action (i.e. direction to web portal). This material could be pushed out to a wide range of organisations through the COI Publicity Register (see below). These tend to be trusted organisations and this activity would therefore add real value over what can be achieved by the private sector.
Information packages	The stakeholder list above sets out four different information packages; these would be characterised as follows: **Package 1.** Very short and simple summary of the Green Deal initiative and packages available with a clear call to action and rationale for would-be advocates. This would be targeted principally at political stakeholders and community leaders to give them the materials / reasons they need to promote the programme. **Package 2.** A very consumer friendly information pack both explaining the benefits of the Green Deal and the benefits (e.g. economies of scale) from promoting it across local communities. **Package 3.** A slightly more detailed briefing document to Package 1 setting out the economic arguments and added value for private landlords and housing associations that show them how implementation can help them to differentiate themselves from competitors and sell their product to consumers. This would work well combined with the 'Charter Group / Coalition' and 'Certification scheme' activities. **Package 4.** A more technical pack, potentially including scripts to structure interactions with consumers and other practical advocacy tools. The aim is to empower stakeholders to promote the Green Deal and publish / distribute / publicise leaflet and poster collateral. **Package 5.** Very similar to Package 2 but available in a range of languages and taking input from BME stakeholders / specialist consultancies. **Package 6.** A package explaining the rationale for home buyers / renters taking on the Green Deal. The aim would be to get estate agents to promote the accompanying literature.
Certification scheme	The local authorities across the sub-region could run a certification scheme, available to landlords who have taken up the Green Deal advanced package. This would provide a trusted marque of carbon /cost saving properties.
Conference	The aim of a sub-regional conference would be to bring together housing providers, NGOs and advocacy groups to raise awareness of the Green Deal. It would work well combined with a Charter Group / Coalition and poster / leaflet collateral.
Charter Group /	The aim would be to organise a group committed to promoting the Green Deal. It might

Coalition	have accompanying targets (e.g. take up across housing stock). The benefits to subscribers would be CSR / positive PR / differentiator for customers. This would work well with the 'Certification scheme' activity – which would provide a clear metric of success. The creation of a Charter Group / Coalition might also open up economies of scale through joint procurement.
Recognition event	A complement to the Charter Group / Coalition activity, this would aim to provide public recognition of individuals and communities that actively take up and promote the Green Deal. This could involve an awards element.
Local authority mailings	Local authorities have access to a number of regular mailings to some / all households in the participating boroughs. These should be used to provide information about the Green Deal. The statutory annual Council Tax mailing provides a particularly good vehicle as it is focused on financial matters.
Campaign pack	A briefing pack include campaign materials (e.g. leaflets, website, etc.) that would allow groups (e.g. Friends of the Earth through to local Transition Town movements) to campaign / promote the Green Deal. Ideally this would link into the main sub-regional web portal allowing data capture of individuals interested in the Green Deal and related marketing activity.

There are a number of ways that we can populate an initial stakeholder audit, using existing datasets:

Source	Details
Local authority	Local authorities should own a dataset of community and amenity groups across their area. This could be made accessible for the campaign. Where this does not exist in a single place research within the local authority should identify departments that have some of this data (e.g. planning).
GovEval	The company GovEval can provide a dataset of political stakeholders. This is available on GIS mapped basis. Similar data should be available through the COI Publicity Register. (See www.goveval.com for more details.)
Political stakeholder research	MPs, councillors, and Assembly Members will know who their active local community and amenity groups are. Securing their support for the programme opens up the scope for accessing their contacts (e.g. through a questionnaire).
Community research	Grassroots research would involve researches speaking to known local community stakeholders to identify other individuals / groups. For local authorities who do not already have this information the activity could clearly have other long-term benefits in terms of being able to identify and access stakeholders.
COI publicity register	See below.

COI Publicity Register

A useful tool that available to the local authorities to engage with stakeholder groups is the COI Publicity Register. This provides a channel for public bodies to contact 'hard to reach target audiences' through 'trusted intermediaries' on the high street. These organisations have opted-in to receive updates and literature, relevant to their work, from government. Most have daily contact with the public and want to be kept informed of policy changes and government services. Because they are members of the Publicity Register response rates are higher than other bought lists - from 5% to 40%. 70% of the file is unique and cannot be sourced elsewhere.

What you get

This is basically a channel for distributing publicity materials and very basic briefing information. Principally you get:

- Free display within high street outlets and other trusted environments (there is an equivalent media value to this)
- An indirect channel to hard to reach audiences
- A safety net/catch all particularly valuable for smaller activity where media monies are limited

How it works

The Register is accessed via the COI; the process for engaging the channel is fairly straightforward:

- A full list of the groups available, which can be accessed on a regional level, is set out in Appendix E
- Data is rented for one-off usage only.
- All creative is approved by COI
- For data protection reasons these mailings must be managed by COI DRM as the data owners
- Members are sent posters and examples of leaflets and invited to respond for more materials for display and pass on and familiarise themselves with the initiatives if people have queries
- COI will manage the mailing on your behalf and the normal mailing costs will apply in addition to data rental.

Pricing for use of this channel are set out below (note that the minimum spend is £500):

Volume	Cost per 1,000
1-2999	£200 per 000
3k - 7999	£120 per 000
8K - 19k	£80 per 000
20K - 39K	£75 per 000
40K - 59k	£70 per 000
60K +	£65 per 000

6.8.4 Segmenting Property Occupants

Evaluation of requirements for delivery of Green Deal packaging prioritises in excess of 360,000 / 60 per cent of all property stock in the boroughs with splits between flats, terrace, semi and detached properties as well as in fuel type, wall stock and age. Furthermore few properties are excluded on the basis of energy saving alone, rather than relative cost for savings.

Archetype (Good/Poor	Total in study area	Age and construction	Wall	Fuel	Size	Total cost (CAPEX)	Annual cost (Year 1, not including inflation)	Energy saving
103 Pr	80,948	Pre 1980	Solid	Gas	Flats	£2,630	£256	34%
109 Gd	78,208	Pre 1980	Cavity	Gas	Flats	£351	£34	4%
103 Gd	67,470	Pre 1980	Solid	Gas	Flats	£2,087	£151	27%
109 Pr	62,337	Pre 1980	Cavity	Gas	Flats	£3,527	£298	46%
101 Pr	48,388	Pre 1980	Solid	Gas	Terraced	£10,248	£731	61%
101 Gd	37,599	Pre 1980	Solid	Gas	Terraced	£1,197	£102	3%
107 Gd	21,970	Pre 1980	Cavity	Gas	Terraced	£697	£74	4%
107 Pr	17,548	Pre 1980	Cavity	Gas	Terraced	£9,092	£675	62%
102 Pr	17,452	Pre 1980	Solid	Gas	Semi / Detached	£17,593	£1,409	69%
115 Pr	13,821	1980 Onwards	Cavity	Gas	Flats	£3,248	£241	43%
113 Gd	12,395	1980 Onwards	Cavity	Gas	Terraced	£697	£66	5%
108 Pr	7,064	Pre 1980	Cavity	Gas	Semi / Detached	£14,137	£1,160	66%
112 Gd	5,907	Pre 1980	Cavity	Electric	Flats	£250	£23	3%
108 Gd	4,894	Pre 1980	Cavity	Gas	Semi / Detached	£735	£111	3%
106 Pr	4,237	Pre 1980	Solid	Electric	Flats	£7,343	£651	53%
106 Gd	3,436	Pre 1980	Solid	Electric	Flats	£4,358	£359	35%
112 Pr	1,544	Pre 1980	Cavity	Electric	Flats	£5,589	£493	45%

It is also recognized that the Green Deal is relevant to all audiences through one or more messages [ie price, comfort, planet] irrespective of dwelling and that the trigger of price / payment method and technology – which show 'slight' sensitivity by demographic subgroup is effectively negated by the Green Deal package and loan proposition. We do not want to focus on price, rather on saving.

We have also considered TGI Lifestyle statements that might indicate a greater propensity to engage with pro-active environment or sustainability lifestyle choices for example 'I am prepared to make lifestyle compromises to benefit the environment.' Run against ACORN this would allow for targeting through media consumption with prioritized green messaging and would form part of an ITV / London wide campaign. This is not however viable at the sub- regional level we are dealing with here.

Therefore with such a wide audience catchment, and without the ability to deliver meaningful and differentiated postcode messaging based on a clear need / motivation differentiation by property type or audience the most cost effective programme will take all residents within the region.

6.8.5 Understanding the role of Advertising

In a situation where scale and diversity of channel was available one would seek to deliver individual messaging for each segment. By its nature, the majority of advertising is 'broadcast' and therefore while individual messaging could be applied there would be large amounts of wastage and overlap. In a situation where all property owners are being targeted, and a majority, almost 2 / 3rds are prioritized, then a broad reaching, single message campaign phased over time becomes credible.

Changing Attitude

We recognise that there have historically been very low levels of take up of retro fit packages – typically sub 10 per cent versus theoretically high levels of interest in the principles. Previous campaign examples that have achieved significant swings in attitude have been built on coverage, frequency and time: broad high coverage, receiving the message sufficiently frequently to obtain cut through (versus apathy) over a period of time, to deliver 'credibility' (combined with relevant PR and social engagement) works – as was seen by the groundbreaking 1986 'Tell Sid' campaign for the privatisation of British Gas through broad based share take up.

Preferred approach

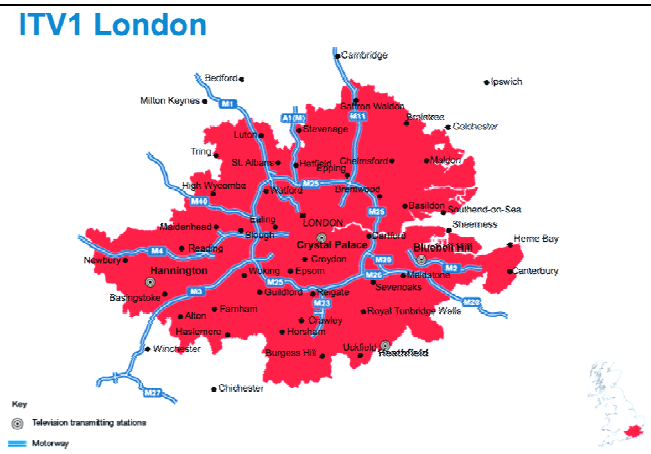
This would suggest as heavy a weight, multi-media campaign, over a relatively lengthy period of time as is viable within budget and geo-location. The role of national organisations will be significant in upweighting the campaign, for example in targeting national media and broadcast, and should be reviewed by media planners prior to the campaign launch. Advertising will be more challenging for the Boroughs as the media channels available are constrained by the need for the message to be specific if we are to avoid wastage and duplication.

Channel selection

We have examined the suitability of each channel for this campaign and provided a rationale for inclusion or exclusion in campaigns.

Exclusion: The immediate channels for exclusion in borough funded campaign activity are identified as:

Channel	Reason to exclude
Television	Proven the strongest medium for delivering brand and tactical messaging. TV can deliver extremely high rapid coverage of most target audiences with regular frequency. The major constraint however, is the broadcast nature of the medium. The smallest purchasable TV Region being London ITV Region making it untenable in terms of cost-efficiency and wastage. Subject to pick up of Green Deal programmes by other boroughs this should again be reviewed prior to final fund commitment.

	
Radio	Can be purchased 'locally' but once again is limited to 'London' Radio stations e.g. Capital Radio covering a much larger area than represented by the borough parties. Again this should be reviewed as above
Vertical B2B	Publications targeted at House Developers / Contractors / Housing Officers are without exception national in distribution. However relatively low costs to engage with important influencers suggest they may be included in the campaign – if they cannot be reached on a one to one basis.
Cinema	Advertising can be allocated to cinemas within the Borough e.g. Odeon – 14 Park Way. However, this medium delivers both low and slow coverage – a year long campaign would be required to obtain any reasonable level of coverage of the audience(s) and even then very low frequency would be obtained.
Regional Press	London as a region is served well by The London Evening Standard and The Metro but the wastage incurred is as high as that of TV. This segment may be covered by effective public relations activity.
Online	This will be a valuable tool and will play a large part in the communication process. It is possible to purchase advertising by geographical ip address. However, reducing display advertising activity to Borough level would deliver inaccuracies and few impressions that it is not the route to entertain. Again we must consider the impact of national activity with key search areas including Energy Savings Trust and the likes of MoneySupermarket.com

Inclusion: The channels viewed as viable in borough funded campaign activity are

Channel	Reason to include
Direct Mail (Postal and door to door)	**Postal** The primary advantage of this medium is its ability to be property type specific thus enabling specific messaging to various audiences. This would utilize the Arc types combined with Census data and Council knowledge of its estate and would allow 'tailoring' of sub-messages with more specific proof points and information on suppliers, timing and price. E.g. Flats: within Camden 23% are Council flats, 22% are Privately owned, under 10% are Housing association flats etc . However, we believe this route should be exploited by the major Energy providers in the Scheme who will have detailed knowledge of housing type, energy usage and demographic profile of the resident. Use of 'sub messaging' within Energy Bills will be a primary tool for the campaign. **Door to Door** Door to door leafleting would provide a cost-efficient the opportunity for additional 'umbrella' messaging. If Energy providers are able to delivery addresses related to the ARC types within the Borough door to door could also be used for sub messaging. Estimate cost based on single page leaflet: £60 per '000 households.
OOH (Out of Home)	This includes billboards, bus stops, transport above and underground. While OOH can be extremely geographically targeted, down to individual Postcode, it is the most 'broadcast' of all media. It is impossible to 'exclude' anyone from seeing the message although in this instance all viewers in a region become relevant audiences. Additionally, given the time spent 'reading' the majority of OOH messaging circa. 3 seconds the communication needs to be easily absorbed.

	As a result a major role in the campaign could be to provide endorsement of the Green Kite Mark / 'Umbrella' message. At the same time OOH can also deliver frequency of message as commuters / consumers tend to have daily set routes thus providing regular frequency. We are able to supply an exact interactive locator available for all Boroughs where each site can be located exactly by type and a sample spreadsheet for some of the 6 sheets in the Borough of Camden (see Appendix 1). However, OOH campaigns are purchased in periods of 2 weeks and the medium is relatively high in capital cost thus extended periods of messaging are unlikely to be afforded e.g.: Roadside 6 sheets : £275-£500 per site per 2 weeks dependent upon location Roadside 48 sheets: £400 per site per 2 weeks National Rail 4's, 6's, 48's : £300, £450, £800 per site per 2 weeks. A further option targets the London Underground, with comparative sample costings, is set out in Appendix B, showing Format, Planning Rates and Rate Card rates. However, we assume that the Council will have agreements with JC Decaux and other OOH contractors that would allow communication on panels at TfL bus stops within the boroughs. We would recommend that as a minimum OOH is used to coincide with 'face to face' engagement.
Local Press	This medium delivers relatively good penetration through the use of free papers which have greater coverage of the area than those of paid titles. The message once again however will need to be 'umbrella' in nature as coverage is not discrete to property types. Call to action messages can be easily incorporated driving to a website or phone number. Local press does provide a route for regular communication and can be used tactically to coincide with face to face engagement. Local papers can be selected for each Borough in the programme. For consistency we provide example costs based on Camden titles in Appendix C
Online	As indicated earlier this is a valuable tool and will play a large part in the communication process – and will be proactively used by consumers seeking detailed information. Clearly a borough website provides a channel for regular updated communication and we recommend creation of a dedicated central web resource for the programme. Effective Search Engine Optimisation will be an important feature within the programme to ensure that consumers seeking further information are easily directed to the website. As discussed it is possible to purchase display advertising by geographical ip address. However, reducing activity to Borough level would deliver inaccuracies and few impressions - it is not a route we would recommend. Text advertising, on the other hand, using Pay per Click via Google (for example) is available by postcode or discrete area. Thus text 'advertisement's' would pick on key words and phrases to lead information seekers to the website. The advantage of this route is that you only pay when a click to the website has been achieved therefore eliminating any wastage. Rates for pay per click vary depending on popularity of subject and competition – anywhere from 40pence to £10+ per click. Currently the phrase 'Save on Energy Bills' is trading at £2.80 per click while 'Save on Energy at Home' is £1.08. Given the small area covered we will need to test the likely response levels but we would envisage this route become as major pillar of communication and runs continuously throughout the communication process as we move from initial information to fulfillment.

6.8.6 Structuring the communications programme

Building on the context, messaging and stakeholder review we now set out the framework for a one year marketing programme designed to inform, educate and engage target audiences as identified about in the concept of Green Deal housing retrofits.

The programme assumes a budget of between £500,000 and £1,000,000 over the one year period and five boroughs.

Marketing mix:

There is a wide range of marketing tools available for delivery of the campaign including:

- **Public relations** offering a low cost, wide reach education would provide a backdrop with phased messaging as service launch nears.

- **Advertising** is undertaken to support door to door promotion and engagement in the run up to launch re-enforcing messaging and building the Green Deal brand and kite mark. This may include mobile and posters closely targeted to co-ordinate with e.g. face to face
- **Partnerships** developed with credible third parties e.g. local media
- **Direct mail** co-ordinated with known triggers to purchase in particular energy billing
- **Face to face** will deliver two options through peer group engagement e.g. via community groups or activated as part of meter reading schedule.
- **Stunts and experiential activity** designed to capture news pages and put Green Deal front of mind.
- **Sponsorships** for example of relevant local or regional events targeting / engaging people at purchase trigger points e.g. renovation or home improvement events or on an emotional level e.g. green living events

Clearly the significant activity and spend will be via the delivery partners.

6.8.7 Timing

We have prepared a critical path for the campaign working on a 12 month schedule and assuming a start point of late summer. We note as below a range of elements that would impact on the timing of phasing of the programme, or the gearing toward individual target groups driven by seasonal [winter], regular [fuel bills] or tactical [energy price rises] triggers.

As noted above campaign timing and tone will be driven by four factors and should be refined based on confirmation of final UK wide roll out plans and identification and delivery partners.

- **Green Deal Schedule.** Local activity should seek to be delivered in tandem with national communications programmes. This should seek to take national education and information messaging and support this with regional and local information and calls to action.
- **Local Market Development.** Consideration should be given to local delivery partners and the opportunity window before their conversion investment kick starts to educate and engage consumers. It is recommended that there is no log of more than three months between, for example, direct engagement by boroughs and fulfilment activity by delivery partners.
- **Seasonality.** Alongside this there are specific trigger points which should be used to increase the chance of engagement and / or proactive take-up. This will require consideration of the messaging. And includes:
    - Summer: e.g. Act now to enjoy this winter in comfort with the Green Deal.
    - Winter: Next winter don't get caught out. Live life in comfort with the Green Deal
    - Post Winter: Cut the cost of next Winter's energy bill. The Green Deal is a Great Deal.

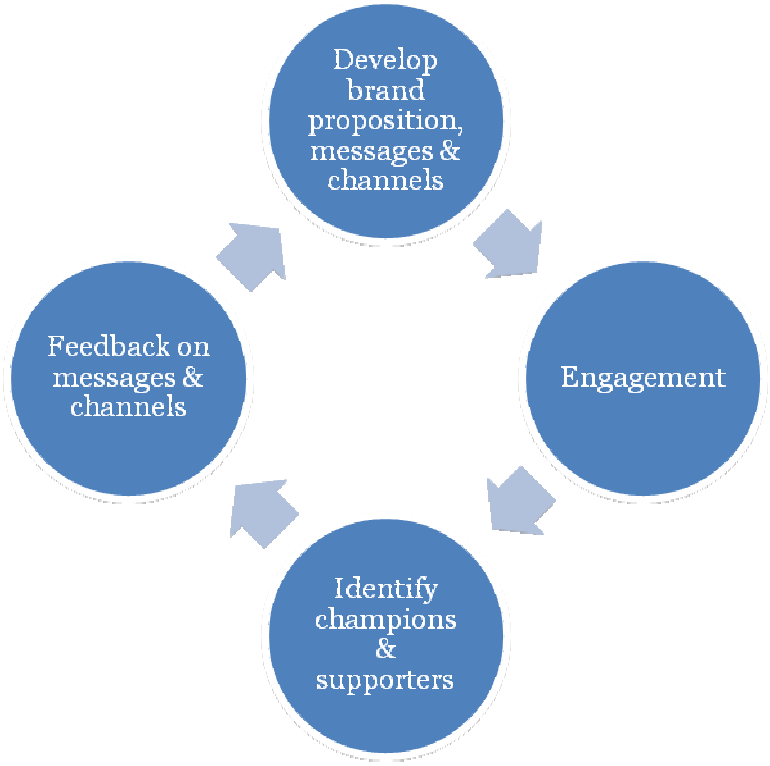
  With delivery of energy bills seen as a key trigger to action the role of the energy companies as channel or as delivery body should be carefully considered.
- **Customer Engagement.** We have identified earlier trigger points for change as being those points where physical disruption is planned for the home due to renovations, extensions, redecorations etc. Engaging in advance of these points will be critical to driving conversion levels.

  It is noted that this will only be achieved by engaging effectively with the search channels for renovations [online, local services publications] and with delivery partners [building and construction firms, bathroom / kitchen installers, plumbing and heating specialists, architects, estate agents and financial providers etc].

  The roll out of the programme identifies the need for a business to business campaign seeking integration into partner communications and onward linking from supplier websites as above and other portals.

Project phases

Phase	Detail
Preparation	Co-ordination of parties, review of recommendations against budget, engagement with EST and other parties influencing consumer mindset. Integration of activities into core timeline. Local appointment of implementation agencies, review of messaging against finalised packages and potential identification of showcase / trial case study opportunities. Development of stakeholder lists, media targets, media plans, information collaterals, case studies, spokespersons etc. Engagement with delivery partners to explore joint marketing, registration/fulfillment systems and other initiatives. Integration of elements into master timeline and review as appropriate.
Creating a Destination	With some 70% of all direct 'energy' related research being conducted on-line, and the primary local authority interface with the consumer being digital we would recommend that the start point for the campaign would be to create an accessible information and registration portal: This would have as the master brand the Green Deal with a sub brand structure, for credibility and engagement, of the five boroughs. The format would be scaleable to allow roll-out to other boroughs. It would introduce the Green Deal Kite Mark as the standard that should be looked out for. It would identify the certification process for suppliers and certified suppliers [and link on as appropriate to their service offer]. It would set out what the Green Deal will mean for the individual [comfort, cost and sense of well being in supporting the planet] with the messaging as outlined. It would set out how the Green Deal is structured and the immediate and ongoing benefits to be secured. It should bring this to life through case studies on individual's finances, on individual's homes, on the technologies supplies. And it should offer the option to run a carbon calculator for the bundle of measures linking to energy consumption [this should be considered against the final financial model but will at worst duplicated what will be found on money/loan and financial comparison sites reviewing the long term loan against bill structure]. It should offer an interactive Q&A and a simple way to register to be contacted by approved suppliers. Consideration should be given to the capture parameters required to align to suppliers eg. flat/house/gas/electric/wall type etc without discouraging consumers. A partner / supplier option should allow other partners / suppliers to secure information on the Green Deal, the partner options, the accreditation process and the support behind the programme [see asset centre]. The template as set out above offers the flexibility to scale up to integrate other London Boroughs and subscribers [avoiding resource duplication and consumer confusion]. We note from Re: New the lack of evidence of value of call centres and believe the information and registration opportunity offered by website – with door to door and delivery agent fulfillment is likely to be the optimum solution for cost/return.
Integrating Council Assets	It is critical that the local authorities activate the maximum number of engagement channels with their consumers to ensure frequency of message engagement. This will require a full audit of channels and standardization of materials and utilization strategies across all regions. The channel audit should include the local authorities': 'Corporate' websites Service websites (e.g. leisure centres, libraries, job centres etc Local Authority owned / operated venues e.g. leisure centres, libraries, schools etc Local Authority communications e.g. newsletters, council tax bills and other Local Authority spaces e.g. buildings and other out of home e.g. advertising wraps etc Local Authority transport e.g. recycling vans, cars, etc Each channel should be reviewed for timing on campaign integration, in channel opportunities [eg banner adverts, editorial, posters, leaflet packs etc] and sourcing of

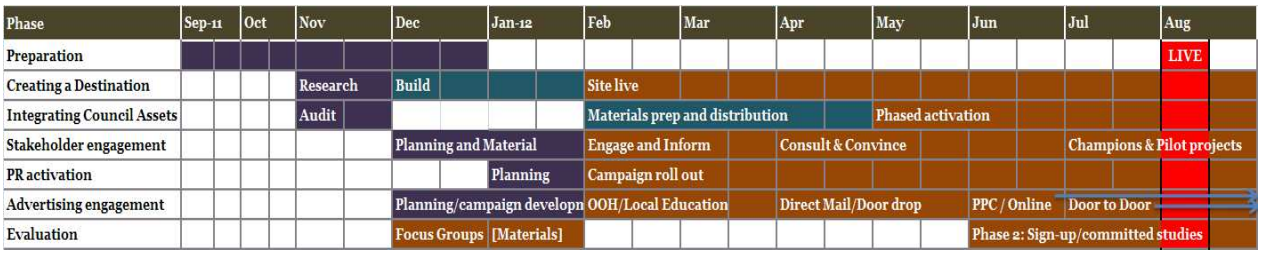
	materials [see asset centre].
Stakeholder engagement	As outlined above there are a series of direct engagements that can be made with stakeholder groups to secure their buy-in, advocacy and campaigning support. However the benefit of a stakeholder campaign arises from the multiplier effect that can be achieved from successful community engagement. Support from one organisation can be leveraged to reach out to other individuals / organisations, building momentum organically.  To achieve this multiplier effect our approach focuses on careful planning and learning as we go. We start with a strong brand proposition based on research, experience – and local authorities' local knowledge We identify and seed activism in the community, and then facilitate its development. The legacy of the programme will be champions, panels of engaged individuals and pilot projects across the boroughs. These can provide feedback on effective messages and channels, generate their own momentum and become self sustaining. They also provide case studies and models for future phases of the campaign. Our indicative programme is set out below, with three key stages: **Engage & inform**: data capture sweep to identify stakeholders who are likely to be positive about / willing to participate with the programme. This can be achieved through direct mailings and use of the COI Publicity Register. **Consult & convince**: in depth engagement with key stakeholder groups who have indicated an interest in getting involved with the project. The aim is to make these groups feel valued and move them from engagement to alignment. **Champions & pilot projects:** Not all stakeholders engaged in Stage 2 will make the shift from engagement to alignment, where they see the value for others of the campaign and are motivated to promote it. Those who do are worth working with in depth to progress projects, build local campaigns, and create case studies.
PR activation [then ongoing]	The PR programme will be critical in securing credible media endorsement and developing consumer dialogue. It will also offer the opportunity to deliver a top down/bottom up programme - setting out the context and breadth of the Green Deal reach for example in the nationals whilst showing its real-lives impact in the local press. The recommended programme would employ a number of different strands designed to engage around trigger points identified for consumers and to access different sections of consumer press and specialist titles and programming:

	Property / renovations: Options to improve your home – and ways to deliver **Personal Finance**: Cost of house hold maintenance. As noted earlier this will require a detailed Q&A and understanding of the actual cost, actual saving, payback time and profits for delivery partners. **Green / environment**: Doing your bit for the environment needn't cost the earth. The Green Deal unpacked **News**: Programme announcement, partners approval / accreditation, Kite mark unveil and awards, first signatures, research on consumer attitudes, job creation and then ongoing milestones in terms of scale: properties [100th house, 1000th house], cost savings [£10,000 saved borough wide, £100,000 etc], energy savings [Carbon but also tangible CO2e equivalents eg. taking XX cars of the road etc] **Poverty / fuel security**: Cost savings and comfort in the home for money / fuel poor. **Technology**: The latest technologies that are being employed in the fight against rising fuel bills and climate change Layered in on this will be the importance of putting a human face to the programme – in making the principles of the Green Deal tangible and real. Case studies should be targeted for pioneer Green Deal installations based on their relevance to audience groups including the family, newly married flat owner, renter / tenant, elderly pensioner, positive green and the sidelines supporter. Further activity should also focus in on the delivery partners recognizing the importance of credible, trustworthy and professional individuals. This might therefore include profiles on professionals trained up in the installation of solar panels, double glazing, wall insulation etc. Trigger points should be used to take consumers on a journey and to refresh the news agenda – giving a sense of dynamism and movement to the programme. This will chart the pre-launch education and engagement, the live day with the first customer profiles, interviews, reports etc and then track and promote take-up. Over time this should herald a transition from marginal activity to mainstream consideration. All public relations activity should include messaging on the Green Deal, the cost package, the home benefit and the environment benefit. It should also include a web URL linking to the central site.
Advertising engagement	Advertising activity should be carefully considered for the reasons outlined in earlier sections. It is effective in communicating, for example, the new brand and establishing a 'campaign' approach but it is also limited due to the geography of the area. It should also be noted that local authority funded advertising may be seen to be a costly approach to a communications issue and one that is actually doing the job for commercial delivery providers so should be carefully considered. This is noted in the timeline set out below and in its placement in the project phases. As we move from information towards engagement the advertising activity will be geared to re-inforcing messaging/endorsement on the Green Deal identity and Kite Mark and driving traffic to the online portal. This would see OOH, online and local press activity. This would be built on by information packs delivered on a door to door basis and targeted at quick 'energy win' property segments and areas based on density of property type and potential % carbon saving. At or near launch major Energy providers would be expected to undertake postal/DM activity utilizing their databases. Door to Door sales / engagement should see the re-introduction of OOH to support messaging and give credibility/legitimacy to street level activity. This would be backed by Pay Per Click on a postcode basis to marry with sales activity – although at this stage the cost may have transferred to the delivery partner.
Evaluation	Insight and accountability/value will be crucial to developing a longer term template for Green Deal delivery, and for refining the packages, messaging, marketing strategies and techniques employed. We would recommend that a consultancy is appointed to provide a combination of qualitative programme input [focus group based on materials etc] and quantitative uptake review. This would track reactions to messaging over time, branding, cost propositions etc. As well as identify where and why shifts have taken place [ie message meets channel meet demographic/lifestage] we believe that a major focus should be on reviewing and

	understanding the motivations and triggers for those that opt in [and out] of the Green Deal. This information should be shared more widely with authorities and can be used on a b2b level to establish the boroughs leadership in this area and to disseminate best practice.

Timeline

The diagram below sets out how the various phases and elements of the programme would fit together over a one year initial push commencing post end summer 2011 with Green Deal live from August 2012. Shifts to start point should bear in mind utilisation of seasonal triggers within campaign materials.



6.8.8 Budget

Working on the basis of an indicative budget of £500,000 the table below sets out suggested budget allocations to different programme elements and activities.

We would recommend where possible using local / regional suppliers and that consideration is given to agencies and resource that might be fresh to the Energy / Carbon debate. Economies of scale may be achieved through an integrated agency offering providing consistency in messaging, simplicity in management and cost effective fee negotiation.

Programme	Activity	Detail	Budget Allocation
Brief development	Appoint consultant to facilitate brief preparation	Prepare brief for agency tendering as below and facilitate agency search / tender process.	Allow £10,000
Brand development	Appoint branding consultancy.	Create template for materials. Provide guides for accredited suppliers within campaign. Development of hierarchy for Green Deal identity, Kite Mark and inclusion of supporters [boroughs] and delivery partners. Develop regional Green Deal brand guidelines	Allow £40,000
Online assets	Develop online resource portal for central assets [eg leaflets, imagery etc for use by partners.	Suite of assets from information guides on programme to detailed materials on technologies. Provide template Kite Mark applications for partners. Provide guides for leaflets etc for community groups and stakeholders	Allow £10,000
Website and digitized collateral	Appoint central digital agency. Develop information and capture website for programme.	Develop core web portal and microsite / links for partners and suppliers. Deliver mobile content and applications for download by homeowners Consider sales force requirements, apps etc Manage SEO programme	Allow £50,000

Materials and channel spend	Print, production, application and distribution [where non digitized]	For application eg vehicle and building wraps, posters and other information sites	Allow £70,000
Media Planning/buying	Appoint media planning agency	Develop media plan with focus on local press OOH, tactical regional and online channels.	Allow £200,000
Advertising / creative engagement	Appoint advertising / creative agency.	Develop advertising proposition and campaigns to timeline phasing. Provide content as appropriate for PR, web and other channels	Allow £30,000
Stakeholder relations	Appoint Public Affairs consultancy	Develop strategy, materials and outreach programme to identified groups on a monthly basis over 12 months.	Allow £45,000
PR	Appoint Public Relations agency	Develop media strategy and materials. Identify timeline and trigger points. Provide Q&As and media training. Develop case study portfolio. Engage with national / regional and local press – subject to national activity. Integrate online and social media strategy. 9 month programme commencing Jan 2012	Allow £45,000

Appendix A – Technical packages

Table 41 Top ten archetypes in the sub-region

	Archetype (Gd/Pr)	Description	Total number in North London sub-region
1	103 Pr	Pre 1980 Solid Gas Flats Poor	80,948
2	109 Gd	Pre 1980 Cavity Gas Flats Good	78,208
3	103 Gd	Pre 1980 Solid Gas Flats Good	67,470
4	109 Pr	Pre 1980 Cavity Gas Flats Poor	62,337
5	101 Pr	Pre 1980 Solid Gas Terraced Poor	48,388
6	101 Gd	Pre 1980 Solid Gas Terraced Good	37,599
7	107 Gd	Pre 1980 Cavity Gas Terraced Good	21,970
8	115 Gd	1980 Onwards Gas Flats Good	20,831
9	107 Pr	Pre 1980 Cavity Gas Terraced Poor	17,548
10	102 Pr	Pre 1980 Solid Gas Semi / Det Poor	17,452

Table 42: Optimised package for archetype 103Pr

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	N/A
Loft insulation (Poor - 60mm)	No	N/A
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	No	£0
External insulation	No	£0
Floor Insulation	No	N/A
Insulated doors	No	£0
Primary Pipework insulation	Yes	£101
Double glazing	Yes	£1,380
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	Yes	£101
Heat Recovery	No	£0
Low energy light bulbs	Yes	£10
Heating controls	Yes	£398
Foam insulated DHW cylinder	Yes	£400
Condensing boiler replacement (gas)	No	£0
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£2,630**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
11,134	£639	2,713	34%	31%	32%

Table 43: Optimised package for archetype 109Gd

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	N/A
Loft insulation (Poor - 60mm)	No	N/A
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	No	£0
External insulation	No	N/A
Floor Insulation	No	N/A
Insulated doors	No	£0
Primary Pipework insulation	Yes	£101
Double glazing	No	N/A
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	No	N/A
Heat Recovery	No	£0
Low energy light bulbs	Yes	£10
Heating controls	No	N/A
Foam insulated DHW cylinder	No	N/A
Condensing boiler replacement (gas)	No	N/A
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£351**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
8,709	£542	2,242	4%	6%	6%

Table 44: Optimised package for archetype 103Gd

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	N/A
Loft insulation (Poor - 60mm)	No	N/A
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	Yes	£1,736
External insulation	No	N/A
Floor Insulation	No	N/A
Insulated doors	No	£0
Primary Pipework insulation	Yes	£101
Double glazing	No	N/A
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	No	N/A
Heat Recovery	No	£0
Low energy light bulbs	Yes	£10
Heating controls	No	N/A
Foam insulated DHW cylinder	No	N/A
Condensing boiler replacement (gas)	No	N/A
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£2,087**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
8,439	£531	2,190	27%	24%	25%

Table 45: Optimised package for archetype 109Pr

Measure	Yes / No	Capital cost
Cavity Wall insulation	Yes	£118
Loft insulation (Poor - 60mm)	no	N/A
Loft insulation (Good - 165mm)	no	N/A
Internal Insulation	no	£0
External insulation	no	N/A
Floor Insulation	no	N/A
Insulated doors	no	£0
Primary Pipework insulation	Yes	£101
Double glazing	No	£0
Triple glazing	no	£0
Reduced infiltration A - to 5m³/m².h	no	£0
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	no	£0
Draught proofing - to 10m³/m².h	no	£0
Heat Recovery	no	£0
Low energy light bulbs	Yes	£10
Heating controls	Yes	£398
Foam insulated DHW cylinder	Yes	£400
Condensing boiler replacement (gas)	Yes	£2,500
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£3,527**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
8,327	£528	2,170	46%	39%	41%

Table 46: Optimised package for archetype 101Pr

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	£0
Loft insulation (Poor - 60mm)	Yes	£410
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	Yes	£3,038
External insulation	No	£0
Floor Insulation	No	£0
Insulated doors	Yes	£500
Primary Pipework insulation	Yes	£101
Double glazing	Yes	£2,540
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	Yes	£101
Heat Recovery	No	£0
Low energy light bulbs	Yes	£20
Heating controls	Yes	£398
Foam insulated DHW cylinder	Yes	£400
Condensing boiler replacement (gas)	Yes	£2,500
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£10,248**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
11,233	£692	2,872	61%	54%	56%

Table 47: Optimised package for archetype 101Gd

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	N/A
Loft insulation (Poor - 60mm)	No	N/A
Loft insulation (Good - 165mm)	Yes	£336
Internal Insulation	No	£0
External insulation	No	£0
Floor Insulation	No	£0
Insulated doors	Yes	£500
Primary Pipework insulation	Yes	£101
Double glazing	No	N/A
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	No	N/A
Heat Recovery	No	£0
Low energy light bulbs	Yes	£20
Heating controls	No	N/A
Foam insulated DHW cylinder	No	N/A
Condensing boiler replacement (gas)	No	N/A
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£1,197**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
18,606	£987	4,302	3%	10%	8%

Table 48: Optimised package for archetype 107Gd

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	N/A
Loft insulation (Poor - 60mm)	No	N/A
Loft insulation (Good - 165mm)	Yes	£336
Internal Insulation	No	£0
External insulation	No	£0
Floor Insulation	No	£0
Insulated doors	No	£0
Primary Pipework insulation	Yes	£101
Double glazing	No	N/A
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	No	N/A
Heat Recovery	No	£0
Low energy light bulbs	Yes	£20
Heating controls	No	N/A
Foam insulated DHW cylinder	No	N/A
Condensing boiler replacement (gas)	No	N/A
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£697**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
14,027	£804	3,414	4%	9%	8%

Table 49: Optimised package for archetype 115Gd

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	N/A
Loft insulation (Poor - 60mm)	No	N/A
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	No	£0
External insulation	No	N/A
Floor Insulation	No	N/A
Insulated doors	No	£0
Primary Pipework insulation	Yes	£101
Double glazing	No	N/A
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	No	N/A
Heat Recovery	No	£0
Low energy light bulbs	Yes	£10
Heating controls	No	N/A
Foam insulated DHW cylinder	No	N/A
Condensing boiler replacement (gas)	No	N/A
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	Yes	£0
Heat Pump	No	£0
Total		**£351**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
8,501	£534	2,202	4%	7%	6%

Table 50: Optimised package for archetype 107Pr

Measure	Yes / No	Capital cost
Cavity Wall insulation	Yes	£206
Loft insulation (Poor - 60mm)	Yes	£410
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	No	£0
External insulation	No	£0
Floor Insulation	Yes	£1,675
Insulated doors	Yes	£500
Primary Pipework insulation	Yes	£101
Double glazing	Yes	£2,540
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	Yes	£101
Heat Recovery	No	£0
Low energy light bulbs	Yes	£20
Heating controls	Yes	£398
Foam insulated DHW cylinder	Yes	£400
Condensing boiler replacement (gas)	Yes	£2,500
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£9,092**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
10,039	£645	2,640	62%	54%	57%

Table 51: Optimised package for archetype 102Pr

Measure	Yes / No	Capital cost
Cavity Wall insulation	No	£0
Loft insulation (Poor - 60mm)	Yes	£465
Loft insulation (Good - 165mm)	No	N/A
Internal Insulation	Yes	£8,981
External insulation	No	£0
Floor Insulation	No	£0
Insulated doors	Yes	£1,000
Primary Pipework insulation	Yes	£101
Double glazing	Yes	£3,380
Triple glazing	No	£0
Reduced infiltration A - to 5m³/m².h	Yes	£240
Reduced infiltration B - to 1.5 m³/m².h (incl. Heat Recovery)	No	£0
Draught proofing - to 10m³/m².h	Yes	£101
Heat Recovery	No	£0
Low energy light bulbs	Yes	£28
Heating controls	Yes	£398
Foam insulated DHW cylinder	Yes	£400
Condensing boiler replacement (gas)	Yes	£2,500
No secondary electric heating required post refurb	Yes	£0
Thermal bridging improvement	No	£0
Heat Pump	No	£0
Total		**£17,593**

Post measures			% reductions post measures		
Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)	Energy demand (kWh)	Energy bill (£)	Emissions (kg CO2)
15,271	£920	3,844	69%	63%	65%

Appendix B – Discounted Cash Flow Models

INPUTS	Model A - Dev Co.	Model B - Guarantee Fund	Model C - SPV Public	Model C - SPV commercial	Model D - on-balance sheet
Project costs					
Number of homes	8000	8000	8000	8000	8000
Acquisition cost per home	500	500	500	500	500
Total acquisition cost	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000
Capital cost per home		6,200	6,200	6,200	6,200
Finders fee per home	575				
Total capex cost	-	53,600,000	53,600,000	53,600,000	53,600,000
Interest rate to customer	7%	7%	7%	7%	7%
Default rate	2%	2%	2%	2%	2%
Indexation on GD payments		2.0%	2.0%	2.0%	2.0%
Length of Green Deal contract		25	25	25	25
Year 1 Green Deal Revenue per house per annum		500	500	500	500
Year 1 Green Deal Revenue per annum		4,000,000	4,000,000	4,000,000	4,000,000
Opex Costs per home per annum		£25	£25	£25	£25
Total opex per annum	-	200,000	200,000	200,000	200,000
Finance costs					
Cost of funds and margins					
Bank COF		3.80%	3.80%	3.80%	3.80%
Bank Margin		2.75%	1.00%	2.75%	2.75%
Bank COF to borrower		6.55%	4.80%	6.55%	6.55%
EIB COF		3.85%	3.85%	3.85%	3.85%
EIB Margin		0.50%	0.50%	0.50%	0.50%
EIB COF to borrower		4.35%	4.35%	4.35%	4.35%
DD costs					
Fin and legal DD Fees	£100,000	£300,000	£300,000	£300,000	£100,000
Management costs	£100,000	£100,000	£500,000	£500,000	£500,000
Tech fees	£100,000	£100,000	£500,000	£500,000	£500,000
Total funding Requirement	£4,300,000	£58,100,000	£58,900,000	£58,900,000	£58,700,000
Debt Funding Split					
Bank		100%	100%	100%	100%
EIB		0%	0%	0%	0%
Capital split					
Equity	100%	10%	30%	30%	100%
Bank Funding	0%	90%	70%	70%	0%
EIB Funding	0%	0%	0%	0%	0%
Arrangement Fees					
Bank Debt Facility		£52,290,000	£41,230,000	£41,230,000	£0
Bank Debt Term (Years)		25	25	15	25
Bank Arrangement Fee		2.00%	2.00%	2.00%	2.00%
EIB Debt Facility		£0	£0	£0	£0
EIB Term (Years)		25	25	15	25
EIB Arrangement Fee		2.00%	2.00%	2.00%	2.00%
Equity Requirement	£4,300,000	£5,810,000	£17,670,000	£17,670,000	£58,700,000

Model A – Development Company

Year			0	1	2	3	4	5	6	7	8	9	10	11
Indexation factor			1	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Finders Fees	4,600,000			4,600,000		-	-	-	-	-	-	-	-	-
Total revenues	4,600,000		-	4,600,000	-	-	-	-	-	-	-	-	-	-
Expenditure														
Start-up costs	(300,000)		(300,000)											
Acquisition costs	(4,000,000)		(4,000,000)											
Capital investment	-		-											
Operating costs	-		-	-	-	-	-	-	-	-	-	-	-	-
Total expenditure	(4,300,000)		(4,300,000)	-	-	-	-	-	-	-	-	-	-	-
	-													
Net pre-financing cash flows	300,000		(4,300,000)	4,600,000	-	-	-	-	-	-	-	-	-	-
Debt repayment														
Bank debt repayment	-			-	-	-	-	-	-	-	-	-	-	-
EIB debt repayment	-			£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	-			-	-	-	-	-	-	-	-	-	-	-
Net post-financing cash flow	300,000		(4,300,000)	4,600,000	-	-	-	-	-	-	-	-	-	-
cumulative cash flow			(4,300,000)	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Discount rate	6%													
NPV	£37,380													
IRR	7%													
Total LA investment	£4,300,000													
Total Bank funding	£0													

Year			12	13	14	15	16	17	18	19	20	21	22	23
Indexation factor			1.24	1.27	1.29	1.32	1.35	1.37	1.40	1.43	1.46	1.49	1.52	1.55
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Finders Fees	4,600,000		-	-	-	-	-	-	-	-	-	-	-	-
Total revenues	4,600,000		-	-	-	-	-	-	-	-	-	-	-	-
Expenditure														
Start-up costs	(300,000)													
Acquisition costs	(4,000,000)													
Capital investment	-													
Operating costs	-		-	-	-	-	-	-	-	-	-	-	-	-
Total expenditure	(4,300,000)		-	-	-	-	-	-	-	-	-	-	-	-
	-													
Net pre-financing cash flows	300,000		-	-	-	-	-	-	-	-	-	-	-	-
Debt repayment														
Bank debt repayment	-		-	-	-	-								
EIB debt repayment	-		£0.00	£0.00	£0.00	£0.00								
Total debt repayment	-		-	-	-	-	-	-	-	-	-	-	-	-
Net post-financing cash flow	300,000		-	-	-	-	-	-	-	-	-	-	-	-
cumulative cash flow			300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Discount rate	6%													
NPV	£37,380													
IRR	7%													
Total LA investment	£4,300,000													
Total Bank funding	£0													

Model B– Guarantee Fund

Year			0	1	2	3	4	5	6	7	8	9	10	11
Indexation factor			1	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775			3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Total revenues	125,558,775		-	3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Expenditure														
Start-up costs	(500,000)		(500,000)											
Capital investment	(53,600,000)		(53,600,000)											
Operating costs	(6,406,060)		-	(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
Total expenditure	(60,506,060)		(54,100,000)	(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
	-													
Net pre-financing cash flows	65,052,715		(54,100,000)	3,720,000	3,794,400	3,870,288	3,947,694	4,026,648	4,107,181	4,189,324	4,273,111	4,358,573	4,445,744	4,534,659
Debt repayment														
Bank debt repayment	(56,484,071)		53,335,800	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)
EIB debt repayment	-			£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	(56,484,071)		53,335,800	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)
Net post-financing cash flow	8,568,644		(764,200)	(672,795)	(598,395)	(522,507)	(445,101)	(366,147)	(285,614)	(203,471)	(119,684)	(34,222)	52,950	141,864
cumulative cash flow			(764,200)	(1,436,995)	(2,035,390)	(2,557,897)	(3,002,998)	(3,369,145)	(3,654,759)	(3,858,230)	(3,977,914)	(4,012,136)	(3,959,186)	(3,817,322)
Discount rate	6%													
NPV	£500,997													
IRR	7%													
Total LA investment	£5,810,000													
Total Bank funding	£53,335,800													

Year			12	13	14	15	16	17	18	19	20	21	22	23
Indexation factor			1.24	1.27	1.29	1.32	1.35	1.37	1.40	1.43	1.46	1.49	1.52	1.55
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Total revenues	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Expenditure														
Start-up costs	(500,000)													
Capital investment	(53,600,000)													
Operating costs	(6,406,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
Total expenditure	(60,506,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
	-													
Net pre-financing cash flows	65,052,715		4,625,352	4,717,859	4,812,217	4,908,461	5,006,630	5,106,763	5,208,898	5,313,076	5,419,338	5,527,724	5,638,279	5,751,044
Debt repayment														
Bank debt repayment	(56,484,071)		(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)
EIB debt repayment	-		£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	(56,484,071)		(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)	(4,392,795)
Net post-financing cash flow	8,568,644		232,558	325,065	419,422	515,666	613,835	713,968	816,103	920,281	1,026,543	1,134,929	1,245,484	1,358,250
cumulative cash flow			(3,584,764)	(3,259,700)	(2,840,278)	(2,324,612)	(1,710,776)	(996,809)	(180,705)	739,576	1,766,119	2,901,048	4,146,532	5,504,782
Discount rate	6%													
NPV	£500,997													
IRR	7%													
Total LA investment	£5,810,000													
Total Bank funding	£53,335,800													

Model C– SPV public

Year			0	1	2	3	4	5	6	7	8	9	10	11
Indexation factor			1	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775			3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Total revenues	125,558,775		-	3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Expenditure														
Start-up costs	(1,300,000)		(1,300,000)											
Capital investment	(53,600,000)		(53,600,000)											
Operating costs	(6,406,060)			(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
Total expenditure	(61,306,060)		(54,900,000)	(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
	-													
Net pre-financing cash flows	64,252,715		(54,900,000)	3,720,000	3,794,400	3,870,288	3,947,694	4,026,648	4,107,181	4,189,324	4,273,111	4,358,573	4,445,744	4,534,659
Debt repayment														
Bank debt repayment	(31,054,068)		42,054,600	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)
EIB debt repayment	-			£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	(31,054,068)		42,054,600	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)
Net post-financing cash flow	33,198,647		(12,845,400)	795,653	870,053	945,941	1,023,347	1,102,301	1,182,834	1,264,977	1,348,764	1,434,226	1,521,398	1,610,313
cumulative cash flow			(12,845,400)	(12,049,747)	(11,179,693)	(10,233,752)	(9,210,405)	(8,108,104)	(6,925,270)	(5,660,293)	(4,311,529)	(2,877,303)	(1,355,905)	254,407
Discount rate	6%													
NPV	£6,812,785													
IRR	10%													
Total LA investment	£17,670,000													
Total Bank funding	£42,054,600													

Year			12	13	14	15	16	17	18	19	20	21	22	23
Indexation factor			1.24	1.27	1.29	1.32	1.35	1.37	1.40	1.43	1.46	1.49	1.52	1.55
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Total revenues	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Expenditure														
Start-up costs	(1,300,000)													
Capital investment	(53,600,000)													
Operating costs	(6,406,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
Total expenditure	(61,306,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
	-													
Net pre-financing cash flows	64,252,715		4,625,352	4,717,859	4,812,217	4,908,461	5,006,630	5,106,763	5,208,898	5,313,076	5,419,338	5,527,724	5,638,279	5,751,044
Debt repayment														
Bank debt repayment	(31,054,068)		(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)
EIB debt repayment	-		£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	(31,054,068)		(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)	(2,924,347)
Net post-financing cash flow	33,198,647		1,701,006	1,793,513	1,887,870	1,984,114	2,082,283	2,182,416	2,284,551	2,388,729	2,494,991	2,603,378	2,713,932	2,826,698
cumulative cash flow			1,955,413	3,748,926	5,636,796	7,620,910	9,703,194	11,885,610	14,170,161	16,558,890	19,053,881	21,657,259	24,371,191	27,197,889
Discount rate	6%													
NPV	£6,812,785													
IRR	10%													
Total LA investment	£17,670,000													
Total Bank funding	£42,054,600													

Model C– SPV commercial

Year			0	1	2	3	4	5	6	7	8	9	10	11
Indexation factor			1	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775			3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Total revenues	125,558,775		-	3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Expenditure														
Start-up costs	(1,300,000)		(1,300,000)											
Capital investment	(53,600,000)		(53,600,000)											
Operating costs	(6,406,060)			(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
Total expenditure	(61,306,060)		(54,900,000)	(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
	-													
Net pre-financing cash flows	64,252,715		(54,900,000)	3,720,000	3,794,400	3,870,288	3,947,694	4,026,648	4,107,181	4,189,324	4,273,111	4,358,573	4,445,744	4,534,659
Debt repayment														
Bank debt repayment	(25,250,414)		42,054,600	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)
EIB debt repayment	-			£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	(25,250,414)		42,054,600	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)
Net post-financing cash flow	39,002,301		(12,845,400)	(767,001)	(692,601)	(616,713)	(539,307)	(460,353)	(379,820)	(297,677)	(213,890)	(128,428)	(41,257)	47,658
cumulative cash flow			(12,845,400)	(13,612,401)	(14,305,002)	(14,921,715)	(15,461,022)	(15,921,375)	(16,301,196)	(16,598,872)	(16,812,763)	(16,941,191)	(16,982,447)	(16,934,789)
Discount rate	6%													
NPV	£967,592													
IRR	6%													
Total LA investment	£17,670,000													
Total Bank funding	£42,054,600													

Year			12	13	14	15	16	17	18	19	20	21	22	23
Indexation factor			1.24	1.27	1.29	1.32	1.35	1.37	1.40	1.43	1.46	1.49	1.52	1.55
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Total revenues	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Expenditure														
Start-up costs	(1,300,000)													
Capital investment	(53,600,000)													
Operating costs	(6,406,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
Total expenditure	(61,306,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
	-													
Net pre-financing cash flows	64,252,715		4,625,352	4,717,859	4,812,217	4,908,461	5,006,630	5,106,763	5,208,898	5,313,076	5,419,338	5,527,724	5,638,279	5,751,044
Debt repayment														
Bank debt repayment	(25,250,414)		(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	-	-	-	-	-	-	-	-
EIB debt repayment	-		£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	(25,250,414)		(4,487,001)	(4,487,001)	(4,487,001)	(4,487,001)	-	-	-	-	-	-	-	-
Net post-financing cash flow	39,002,301		138,352	230,859	325,216	421,460	5,006,630	5,106,763	5,208,898	5,313,076	5,419,338	5,527,724	5,638,279	5,751,044
cumulative cash flow			(16,796,437)	(16,565,579)	(16,240,363)	(15,818,903)	(10,812,273)	(5,705,510)	(496,612)	4,816,464	10,235,802	15,763,526	21,401,805	27,152,849
Discount rate	6%													
NPV	£967,592													
IRR	6%													
Total LA investment	£17,670,000													
Total Bank funding	£42,054,600													

Model D– Project cashflows

Year			0	1	2	3	4	5	6	7	8	9	10	11
Indexation factor			1	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775			3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Total revenues	125,558,775		-	3,920,000	3,998,400	4,078,368	4,159,935	4,243,134	4,327,997	4,414,557	4,502,848	4,592,905	4,684,763	4,778,458
Expenditure														
Start-up costs	(1,100,000)		(1,100,000)											
Capital investment	(53,600,000)		(53,600,000)											
Operating costs	(6,406,060)			(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
Total expenditure	(61,106,060)		(54,700,000)	(200,000)	(204,000)	(208,080)	(212,242)	(216,486)	(220,816)	(225,232)	(229,737)	(234,332)	(239,019)	(243,799)
	-													
Net pre-financing cash flows	64,452,715		(54,700,000)	3,720,000	3,794,400	3,870,288	3,947,694	4,026,648	4,107,181	4,189,324	4,273,111	4,358,573	4,445,744	4,534,659
Debt repayment														
Bank debt repayment	-		-	-	-	-	-	-	-	-	-	-	-	-
EIB debt repayment	-			£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	-		-	-	-	-	-	-	-	-	-	-	-	-
Net post-financing cash flow	64,452,715		(54,700,000)	3,720,000	3,794,400	3,870,288	3,947,694	4,026,648	4,107,181	4,189,324	4,273,111	4,358,573	4,445,744	4,534,659
cumulative cash flow			(54,700,000)	(50,980,000)	(47,185,600)	(43,315,312)	(39,367,618)	(35,340,971)	(31,233,790)	(27,044,466)	(22,771,355)	(18,412,782)	(13,967,038)	(9,432,379)
Discount rate	6%													
NPV	£2,594,262													
IRR	6%													
Total LA investment	£58,700,000													
Total Bank funding	£0													

Year			12	13	14	15	16	17	18	19	20	21	22	23
Indexation factor			1.24	1.27	1.29	1.32	1.35	1.37	1.40	1.43	1.46	1.49	1.52	1.55
	PROJECT TOTAL													
Revenue														
Start up grants	-													
ECO subsidy	-													
Green Deal payments	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Total revenues	125,558,775		4,874,027	4,971,508	5,070,938	5,172,357	5,275,804	5,381,320	5,488,946	5,598,725	5,710,700	5,824,914	5,941,412	6,060,240
Expenditure														
Start-up costs	(1,100,000)													
Capital investment	(53,600,000)													
Operating costs	(6,406,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
Total expenditure	(61,106,060)		(248,675)	(253,648)	(258,721)	(263,896)	(269,174)	(274,557)	(280,048)	(285,649)	(291,362)	(297,189)	(303,133)	(309,196)
	-													
Net pre-financing cash flows	64,452,715		4,625,352	4,717,859	4,812,217	4,908,461	5,006,630	5,106,763	5,208,898	5,313,076	5,419,338	5,527,724	5,638,279	5,751,044
Debt repayment														
Bank debt repayment	-		-	-	-	-	-	-	-	-	-	-	-	-
EIB debt repayment	-		£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total debt repayment	-		-	-	-	-	-	-	-	-	-	-	-	-
Net post-financing cash flow	64,452,715		4,625,352	4,717,859	4,812,217	4,908,461	5,006,630	5,106,763	5,208,898	5,313,076	5,419,338	5,527,724	5,638,279	5,751,044
cumulative cash flow			(4,807,026)	(89,167)	4,723,050	9,631,511	14,638,141	19,744,904	24,953,802	30,266,878	35,686,216	41,213,940	46,852,219	52,603,263
Discount rate	6%													
NPV	£2,594,262													
IRR	6%													
Total LA investment	£58,700,000													
Total Bank funding	£0													

Appendix C – Examples of alternative delivery models

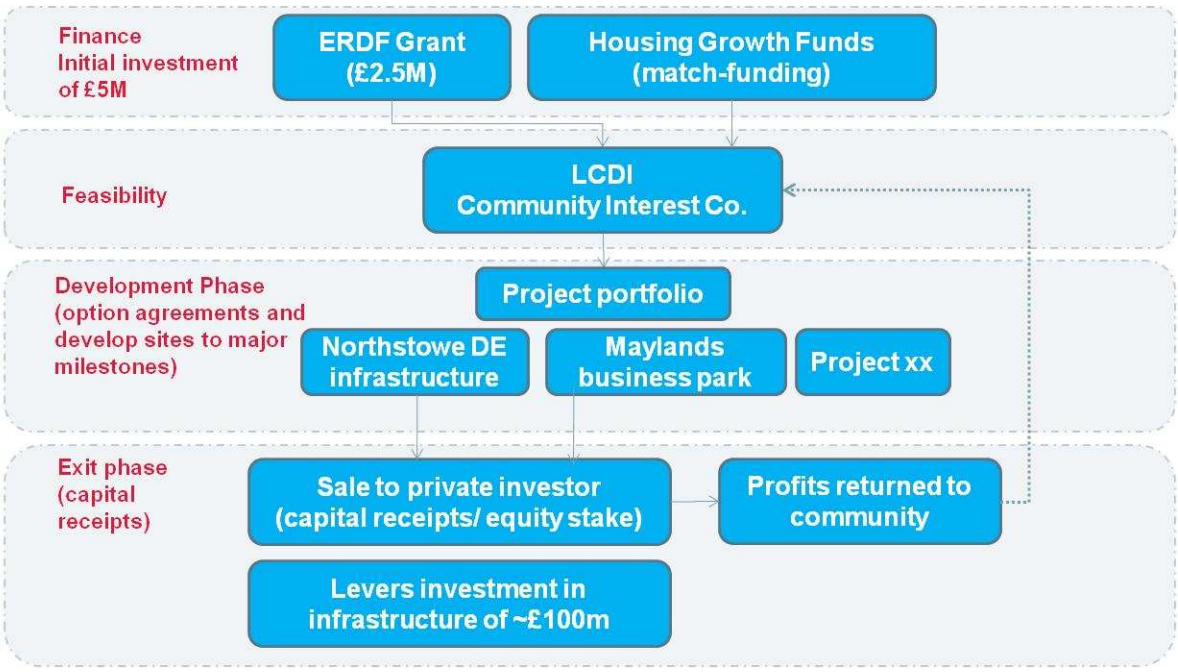


Figure 31: Example of Model 'A'– Low Carbon Development Initiative

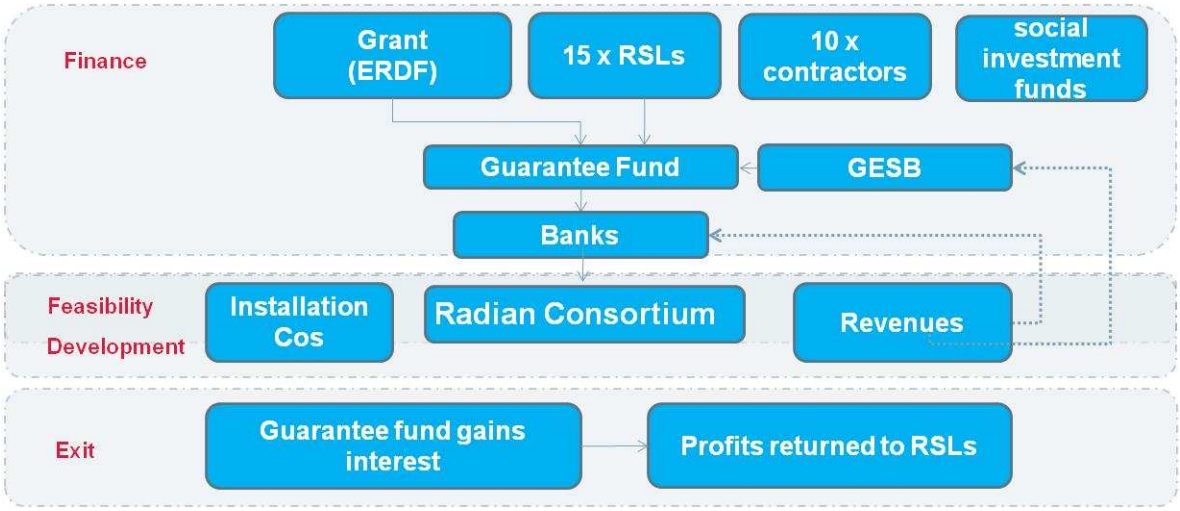


Figure 32: Example of Model 'B' – Retrofit South East

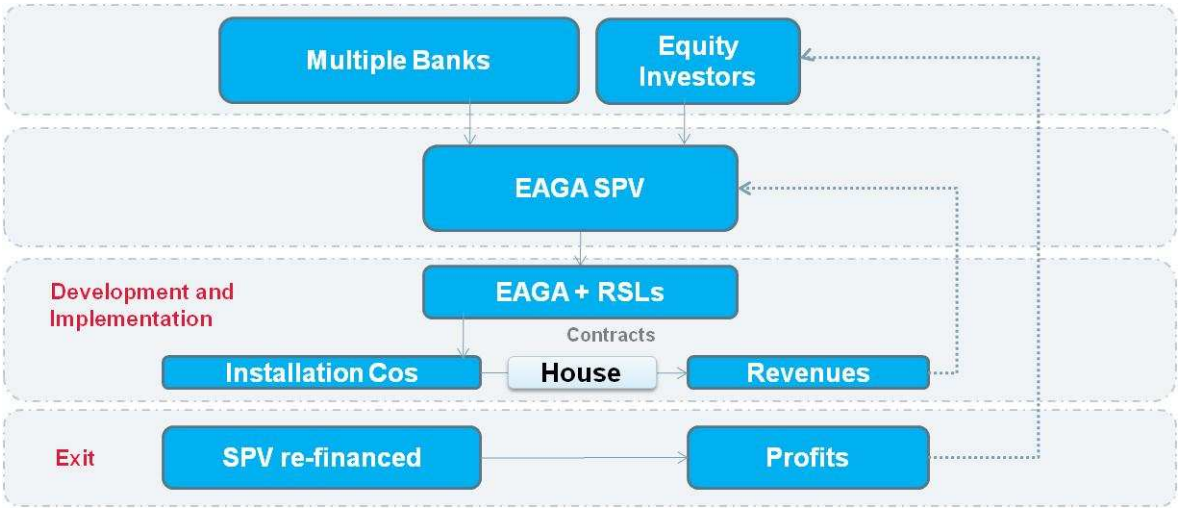


Figure 33: Example of Model 'C' – EAGA Solar PV model

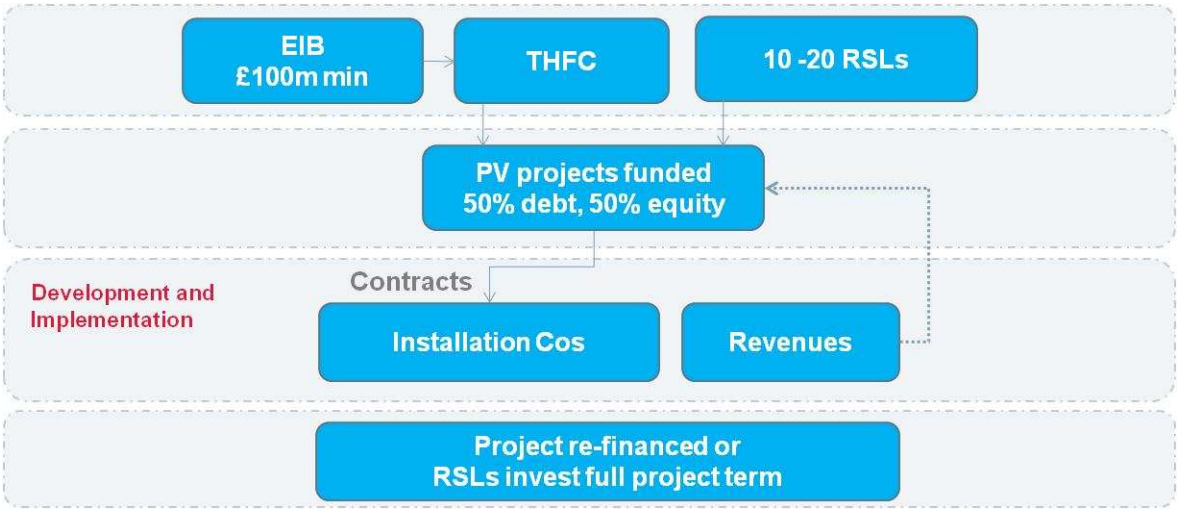


Figure 34: Example of Model 'D' – THFC finance for RSLs

Appendix D – Research on customer take-up rates

Objective: to investigate likely customer take-up rate of the proposed Sub-Regional Green Deal offering, in order to determine:

(a) likely overall deployment levels by 2020

(b) what level of carbon reduction might be delivered

(c) an appropriate budget for marketing & communications.

B1. Background

This paper summarises key relevant findings from the 'Willingness to Pay' (WTP) research undertaken for the EST & DECC by Quadrangle in 2009. From a literature review this report was identified as the one most closely representing consumer behaviour characteristics specifically in relation to Green Deal type package offerings for energy efficiency & microgeneration measures. While there are a number of reports focusing on potential take-up rates of different individual measures, it was felt that for the purposes of this North London Sub Region (NLSR) Stock Analysis & Business Plan it was the likely take-up rate of the *whole package* which was of most relevance. The Green Deal is a new way of offering energy efficiency measures to consumers and historical rates of take-up under e.g. CERT are likely to unrepresentative.

NB At a later stage it is proposed to also include the findings of the Element Energy report for the Committee on Climate Change, 'Uptake of Energy Efficiency in Buildings', which provides a measure-by-measure analysis. The purpose will be to cross reference overall assumptions on take-up rates against any 'critical' (ie supply chain) constraints on any individual measure, to ensure our assumptions do not exceed these measure-based upper limits. Given the low expected uptake suggested by the WTP research however, this is unlikely.

B2. Overview of approach adopted in 'Willingness to Pay' research

The 'Willingness to Pay' research used market testing approaches to determine the effect of a number of key attributes of a Green Deal type offering on customer take-up by homeowners. The study uses an approach called 'conjoint analysis', in which participants were offered a range of different technology & financial packages, asking which they would prefer and allowing them to 'trade off' certain choices. Through repeating this process a number of times, it is possible to understand which factors are influencing their decisions and quantify the extent of their influence.

B3. 'Willingness to Pay' Packages

Three basic packages were constructed as the starting point for offerings to participants. These packages are illustrated below (A, B, and C).

On their own they highlight three very different scenarios in terms of uptake. Package A was one of the least preferred packages. Package C on the other hand was made to appear so attractive that the incentive actually exceeded the cost of the measure by £500. **Despite the fact that homeowners chosing Package C would actually be being paid to do so, the research suggested that nearly 50% of people would still not take it up.** This is perhaps one of the starkest findings of the whole research exercise and effectively provides an absolute 'upper limit' for the likely take-up of the offering in the NLSR.

Example package A	
Technology	External wall insulation, Energy saving - £20 per month
Price	£8,000
Incentive	Council tax rebate - £500
Payment method	Personal loan from bank (7% APR)
Monthly repayment	£50
Payback	13.3 years
Uptake	**3%**

Example package B	
Technology	Internal insulation, Energy saving - £40 per month
Price	£3,000
Incentive	Government environmental reward - £125 - 10 yrs
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Payback	6.3 years
Uptake	**19%**

Example package C	
Technology	Solar water, Energy saving - £40 per month
Price	£2,000
Incentive	Government environmental reward - £250 - 10 yrs
Payment method	Loan from government (0% APR)
Monthly repayment	£30
Payback	5.6 years
Uptake	**53%**

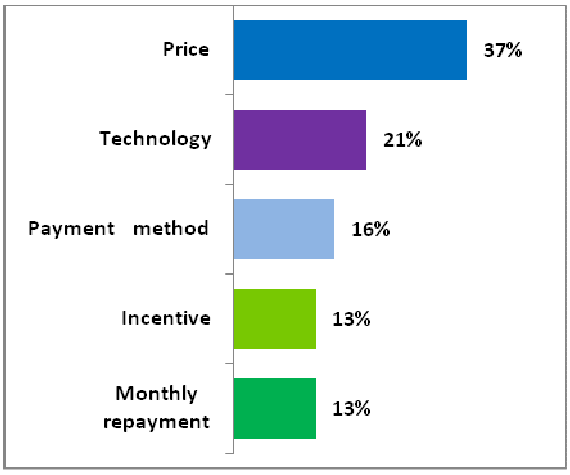
Of the three packages, A and B most closely resemble the proposed offering to the NLSR. It is important to note that both these packages have more attractive attributes than ours for the following reasons:

- The payback period is much shorter (13.3 and 6.3 years respectively compared to our 25 years) - see discussion below which shows that many homeowners automatically discount packages with long payback periods.
- The 2% interest rate for Package B is much lower than our 7%. While package A more closely resembles our offering with a 7% APR, it is based on a 'personal loan from a bank', which is acknowledged by the research as less attractive than a 'loan repaid through the energy bill' – see discussion below on the effect of different repayment options. In practice the attractiveness of our NLSR offering is likely to fall somewhere between the two.

This paper now delves into the relative effects of each of the key package attributes in more detail.

B4. Effect of different attributes on customer take-up

The following attributes of the energy improvement package were investigated, and their relative importance in terms of customer take-up is shown in the figure below.



Of all the attributes considered, price was found to have the most important effect on take-up. Homeowners living in flats place more emphasis on price, meaning this effect will be particularly accentuated in Camden, and potentially across the rest of the North London Sub-Region.

B5. Effect of price

To illustrate the effect of overall price of the package on consumer take-up, the tables & graph below show take-up rates at different £1,000 price bands for Package B.

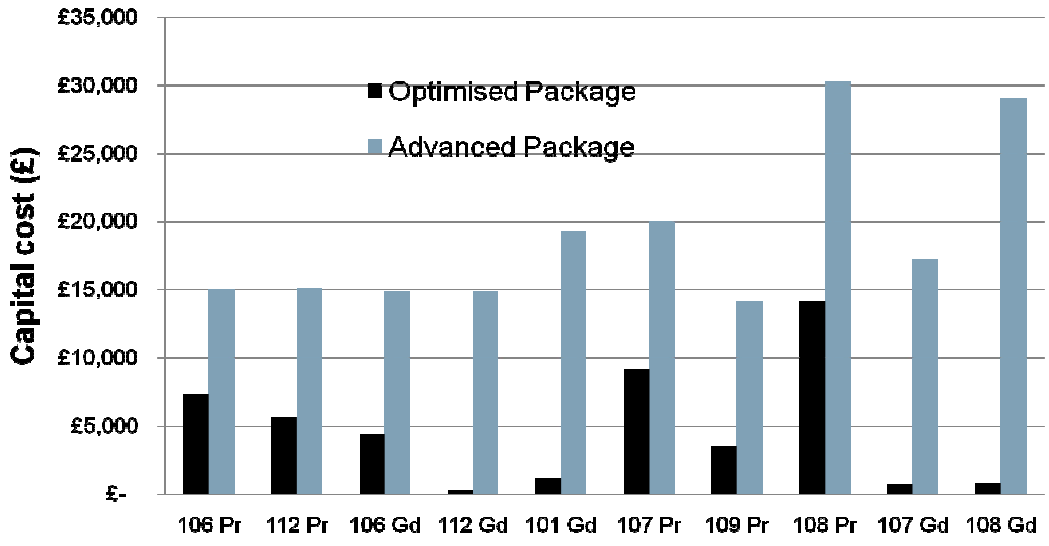
Example package B	
Incentive	Government environmental reward - £125 - 10 yrs
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Payback	6.3 years

Price	Internal WI (£40)	External WI (£40)	Triple glazing (£40)	Solar Water (£40)
£1,000	40%	42%	55%	58%
£2,000	26%	28%	40%	44%
£3,000	19%	19%	28%	34%
£4,000	14%	14%	19%	22%
£5,000	11%	10%	14%	17%
£6,000	10%	9%	12%	14%
£8,000	8%	7%	9%	10%
£10,000	7%	6%	7%	9%

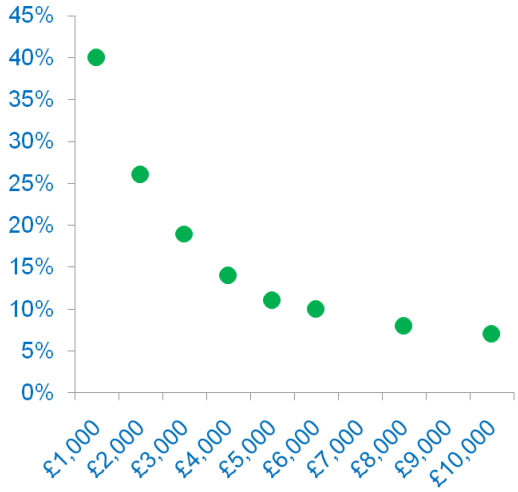
Based on Package B, customer uptake at a package price of £1,000 is 40-58%, depending on technology. This falls to 7-9% for packages costing £10,000. There is a sharp drop off in interest at prices over £4,000, suggesting the optimal package cost is in the range £0-4,000. A number of the 'Optimised' packages in the NLSR work are above this cost level. All of the 'Advanced' Package cost in excess of £10,000 (see graph for Camden analysis below).

The weighted average price of the Optimised Packages across the NLSR is £3,640, which is similar to Package B. Take up for Package B ranged between 16-26% depending on technology and price. The weighted average price for the Advanced Package is £16,335. Customer take-up was not considered for such an expensive package but take up might be assumed to be below the lowest take up rate suggested of 6%.

Since Package B is much more attractive than the package we would be offering householders in the NLSR we would expect customer take up in practice to be lower than the levels indicated above.



Capital costs for retrofit packages



B6. Effect of payback period

The payback period of the loan is also a vital decision making attribute for a large number of homeowners. However, since this attribute is conditional upon price and monthly loan repayment it could not be ascribed its own ranking. The WTP research found that some homeowners automatically discard options with long payback periods, even when the saving is greater than the amount being paid back. In some cases, people may not even stop to consider the package if they see extremely long payback periods. They payback period assumed in the NLSR work of 25 years would be considered 'long' in this context.

B7. Effect of different measures

The WTP research found that certain measures (such as solar water heating, triple glazing) were more attractive to homeowners than others (such as internal and external wall insulation). Again for Package B as illustrated above, the effect on take-up of technology type is shown below. Due to a limited number of measures being market tested in this way it is difficult to draw conclusions in the context of the NLSR study.

Technology	Uptake
Solar water heating, Energy saving - £40/month	32%
Triple A rated windows, Energy saving - £40/month	29%
Solar water heating, Energy saving - £20/month	26%
Triple A rated windows, Energy saving - £20/month	24%
External wall insulation, Energy saving - £40/month	19%
Internal wall insulation, Energy saving - £40/month	19%
External wall insulation, Energy saving - £20/month	16%
Internal wall insulation, Energy saving - £20 / month	15%

B8. Effect of payment method

The WTP research found that when it comes to method of payment, homeowners are attracted by options that are interest free. Paying from savings (when this is a possibility for them), or 0% APR loans appear to hold greater appeal. Take-up rates for different payment methods are illustrated below.

Unfortunately the APR was not specified for the option of 'loan repaid through energy bill'. The description provided for this option talked about 'low-rate loan' therefore we can assume that participants assumed it to be in the range 0-2%. Customer take-up at a higher interest rate of 7% was markedly lower. In practice we might expect customer take-up for our NLSR offering to fall in the range 21% (for 'loan repaid through energy bill) to 14% (for 'personal loan from bank at 7%'). Again this is based on the Package B illustration which in practice features other attributes much more attractive than our proposed offering to the NLSR.

Payment method	Uptake
Loan from government (0% APR)	24%
Personal savings	24%
Interest free loan from energy supplier (0% APR)	23%
Loan repaid through energy bill	21%
Loan from government (2% APR)	19%
Loan from energy supplier (2% APR)	18%
Loan from bank (2% APR)	17%
Mortgage	16%
Personal loan from bank (7% APR)	14%

B9. Effect of incentive offered

The WTP research found that uptake with no incentive (again for Package B) was likely to be around 12%. The WTP found that the financial element of the incentive is more important than its source (eg government vs council), and one-off upfront incentives are generally preferred to incentives provided over a period of time (by giving the incentive upfront, it is possible to give up to 30% less and get the same uptake results).

Incentive	Uptake
Council rebate- £250 - 8 years	22.6%
Government environmental reward - £250 - 10 yrs	21%
Government environmental reward - £125 - 10 yrs	19%
Council rebate- £250 - 3 years	15.4%
Council tax rebate - £500	15%
Government grant - £500	15%
Council tax rebate - £300	13%
No incentive	12%
Stamp duty discount - £500 off stamp duty	12%

For the purposes of examining likely customer take-up levels we have assumed that some level of government incentive will be available to households to subsidise packages under the ECO. In the absence of a clear indication on likely ECO subsidy rates we have assumed they fall roughly in line with levels being paid by energy suppliers under CESP. We have modelled the effects of incentives for CESP-eligible measures based on energy supplier payments of £20/tCO_2 (lifetime savings), which is our best estimate based on intelligence from energy suppliers, with no uplift applied. We have assumed all households in the NLSR would be eligible for these incentive payments.

Applying incentives at this level gives a weighted average incentive payment across all packages of £523 for the Optimised Package. The WTP research suggests uptake with this level of upfront incentive for Package B would be around 15%. The weighted average incentive level for the Advanced Package is £1,090, which suggested a more attractive consumer response of perhaps up to 20%, although the other characteristics of the Advanced Packages (such as high price) are likely to counter this reaction.

B10. Effect of monthly repayment

The effects of different monthly repayment levels, for different payback periods and package prices, are shown below.

Monthly loan repayment	£3,000	£5,000
£10 (**saving**: +£30, **years** 25 / 47.1)	14.4%	9.1%
£20 (**saving**: +£20, **years** 12.5 / 20.8)	16.9%	**10.6%**
£30 (**saving**: +£10, **years** 8.3 / 13.9)	**18.9%**	10.1%
£40 (**saving**: £0, **years** 6.3 / 10.4)	18.9%	9.8%
£50 (**saving**: -£10, **years** 5 / 8.3)	**20.1%**	9.9%
£60 (**saving**: -£20, **years** 4.2 / 6.9)	19.5%	**10.1%**
£70 (**saving**: -£30, **years** 3.6 / 6)	19.4%	9.6%

Monthly loan repayments for the NLSR Optimised packages range between £0-120. The weighted average across all packages is £24. The payback period in all cases is 25 years. Interpolating from the table above suggests an average take-up rate might be around 15-16%.

Monthly loan repayments for the NLSR Advanced packages have a similar range, and a weighted average of £34. However the average weighted price is much higher than the range considered by the WTP research at £16,335. The findings in the table above suggest take-up for a package with these characteristics might be somewhere below 10%, perhaps significantly below due to the effects of price.

B11. Considering packages of measures together

The boxes below illustrate take-up rates for individual measures. Note that a generous incentive is offered in each case, and interest rate is low at 2%. The value share is zero in all cases except for solar water heating. By offering all four measures at the same time, the uptake is boosted to around 21%.

Internal wall insulation	
Energy saving	£40 per month
Price	£3,990
Incentive	33% discount Final price of £3000
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	11.8%*

Solar water heating	
Energy saving	£20 per month
Price	£3,990
Incentive	33% discount Final price of £3000
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	18.8%*

External wall insulation	
Energy saving	£40 per month
Price	£6,650
Incentive	33% discount Final price of £5000
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	8.9%*

Triple glazing	
Energy saving	£40 per month
Price	£7,980
Incentive	33% discount Final price of £6000
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	10.2%*

In a different illustration given, it is possible to see the effect on take-up rates of a lower incentive, and a higher interest rate. Note that the effect on take-up of offering all 4 measures together was not provided in this case.

Internal wall insulation	
Energy saving	£40 per month
Price	£4,000
Incentive	Government environmental reward - £125 for 3 years (19% of price)
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	**13%** (w 7% bank loan - 9.7%)

Solar water heating	
Energy saving	£20 per month
Price	£4,000
Incentive	Government environmental reward - £125 for 3 years (19% of price)
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	**15.7%** (w 7% bank loan - 12.1%)

External wall insulation	
Energy saving	£40 per month
Price	£6,000
Incentive	Government environmental reward - £125 for 10 years (21% of price)
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	**10.8%** (w 7% bank loan - 8.5%)

Triple glazing	
Energy saving	£40 per month
Price	£8,000
Incentive	Government environmental reward - £250 for 8 years (25% of price)
Payment method	Loan from government (2% APR)
Monthly repayment	£40
Uptake	**13.1%** (w 7% bank loan - 9.6%)

Take-up rates in these last 4 packages range between 8.5% - 12.1%, for a 7% interest rate.

B12. Conclusions

Considering the above research and comparisons with the NLSR offering suggests that a reasonable customer take-up rate target for the NLSR 'Optimised' packages across the whole sub-region would be around 15%. Some of the findings from the WTP research suggest a higher uptake could be realised based on some of the discrete characteristics of the NLSR package offerings. However the findings of the market research suggest that in general the high interest rate (of 7%) and long payback period (of 25 years) are likely to depress customer take-up.

Customer reaction to the 'Advanced Packages' is likely to be dominated by the relatively high price (weighted average of £16,335; outside the range considered by the WTP research which only considered packages up to £10,000 in price). Although offset by a relatively higher incentive level, and reasonable monthly repayment figures (due to significant energy bill savings), the findings of the WTP research suggest that an overall customer take-up level across the whole sub-region of around 5% might be expected for the Advanced Packages.

A more accurate estimate of customer take-up might be calculated from the Willingness to Pay calculator tool developed by Quadrangle as part of the research project for EST & DECC.

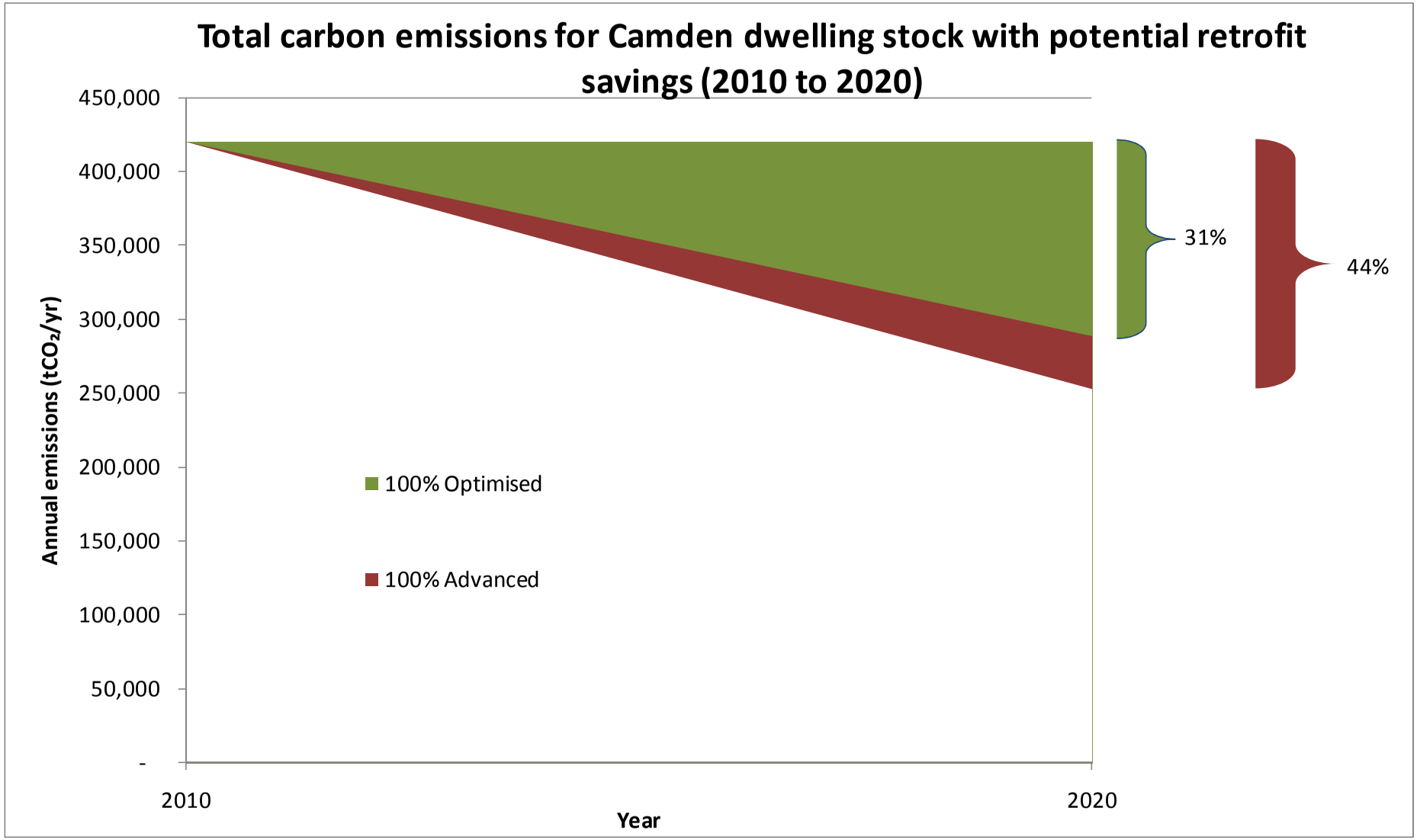
The Element Energy Research is unlikely to suggest upper limit constraints on the take-up of any measures given the low attractiveness suggested above for the Green Deal type offering.

Appendix E – Camden Data

The table below illustrates the results of the dwelling analysis for Camden, which covers 95% of the total stock.

Archetype		Camden	Existing emissions and savings tCO_2			Total Cost	
Identifier	Description	Number of dwellings	Existing emissions (aggregated)	Savings from optimised Package	Savings from advanced Package	Optimised Package	Advanced Package
103 Pr	Pre 1980 Solid Gas Flats Poor	31,037	123,852	39,658	66,395	£81,634,608	£437,075,078
109 Pr	Pre 1980 Cavity Gas Flats Poor	20,449	75,481	31,112	37,337	£72,124,307	£290,378,556
103 Gd	Pre 1980 Solid Gas Flats Good	15,075	44,055	11,043	16,148	£31,458,434	£204,760,213
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	2,581	28,377	18,457	20,451	£45,401,438	£76,573,944
101 Pr	Pre 1980 Solid Gas Terraced Poor	3,806	25,066	14,135	16,502	£39,006,702	£75,538,968
109 Gd	Pre 1980 Cavity Gas Flats Good	9,467	22,510	1,284	4,954	£3,320,860	£128,582,047
106 Pr	Pre 1980 Solid Electricity Flats Poor	2,184	10,414	5,556	5,715	£16,038,622	£24,553,529
107 Pr	Pre 1980 Cavity Gas Terraced Poor	972	5,909	3,341	3,721	£8,840,939	£19,499,449
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	556	5,323	3,272	3,614	£7,865,276	£16,848,126
115 Pr	1980 Onwards Gas Flats Poor	1,356	4,498	1,672	1,969	£4,403,911	£19,253,551
107 Gd	Pre 1980 Cavity Gas Terraced Good	1,169	4,320	330	1,674	£814,152	£22,527,011
113 Gd	1980 Onwards Gas Terraced Good	1,193	4,003	312	1,334	£831,256	£23,000,268
101 Gd	Pre 1980 Solid Gas Terraced Good	580	2,710	217	1,412	£693,412	£11,168,854
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	296	1,579	119	675	£217,416	£8,604,538
115 Gd	1980 Onwards Gas Flats Good	658	1,539	90	318	£230,904	£8,940,470
106 Gd	Pre 1980 Solid Electricity Flats Good	377	1,532	530	685	£1,643,760	£5,612,623
112 Gd	Pre 1980 Cavity Electricity Flats Good	486	1,488	43	449	£121,413	£7,226,710
112 Pr	Pre 1980 Cavity Electricity Flats Poor	232	984	447	487	£1,295,109	£3,498,981
TOTAL		**92,474**	**363,640**	**131,619**	**183,840**	**£315,942,518**	**£1,383,642,917**

The graph below illustrates the impact of applying the optimised and advanced retrofit packages across all relevant dwelling types.

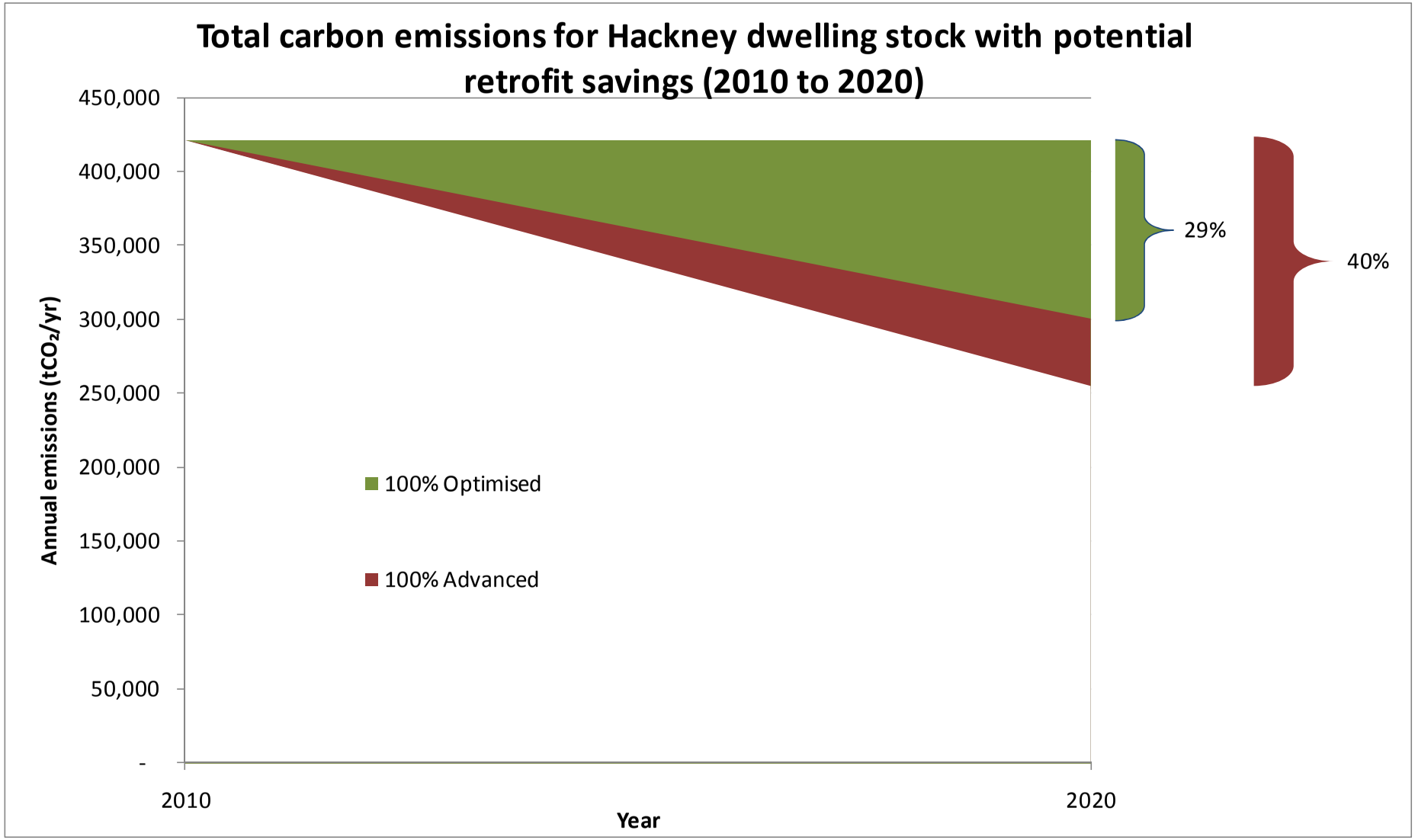

Total carbon emissions for Camden dwelling stock with potential retrofit savings (2010 to 2020)
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
Annual emissions (tCO2/yr)
100% Optimised
100% Advanced
31%
44%
2010
2020
Year

Appendix F – Hackney Data

The table below illustrates the results of the dwelling analysis for Hackney, which covers 88% of the total stock.

Archetype		Hackney	Existing emissions and savings tCO_2			Total Cost	
Identifier	Description	Number of dwellings	Existing emissions (aggregated)	Savings from optimised Package	Savings from advanced Package	Optimised Package	Advanced Package
103 Gd	Pre 1980 Solid Gas Flats Good	29,031	84,841	21,267	31,098	£60,582,650	£394,327,212
103 Pr	Pre 1980 Solid Gas Flats Poor	14,537	58,008	18,574	31,097	£38,234,983	£204,711,687
109 Pr	Pre 1980 Cavity Gas Flats Poor	15,118	55,804	23,002	27,603	£53,322,092	£214,679,246
101 Pr	Pre 1980 Solid Gas Terraced Poor	7,128	46,945	26,473	30,907	£73,054,704	£141,475,095
101 Gd	Pre 1980 Solid Gas Terraced Good	4,506	21,071	1,687	10,978	£5,391,240	£86,837,278
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	1,738	16,625	10,221	11,287	£24,566,986	£52,624,688
109 Gd	Pre 1980 Cavity Gas Flats Good	5,170	12,294	701	2,706	£1,813,656	£70,223,869
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	1,084	11,925	7,756	8,594	£19,078,976	£32,178,550
115 Pr	1980 Onwards Gas Flats Poor	2,201	7,302	2,714	3,196	£7,149,743	£31,258,114
107 Pr	Pre 1980 Cavity Gas Terraced Poor	1,076	6,538	3,697	4,117	£9,782,683	£21,576,545
106 Gd	Pre 1980 Solid Electricity Flats Good	1,437	5,836	2,018	2,611	£6,262,597	£21,383,649
106 Pr	Pre 1980 Solid Electricity Flats Poor	604	2,881	1,537	1,581	£4,436,697	£6,792,141
112 Gd	Pre 1980 Cavity Electricity Flats Good	679	2,081	61	628	£169,831	£10,108,634
107 Gd	Pre 1980 Cavity Gas Terraced Good	403	1,491	114	578	£281,051	£7,776,473
113 Gd	1980 Onwards Gas Terraced Good	336	1,128	88	376	£234,209	£6,480,394
112 Pr	Pre 1980 Cavity Electricity Flats Poor	261	1,110	504	550	£1,460,236	£3,945,104
115 Gd	1980 Onwards Gas Flats Good	418	977	57	202	£146,651	£5,678,241
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	11	60	5	26	£8,247	£326,402
TOTAL		**85,741**	**336,918**	**120,476**	**168,134**	**£305,977,232**	**£1,312,383,323**

The graph below illustrates the impact of applying the optimised and advanced retrofit packages across all relevant dwelling types.

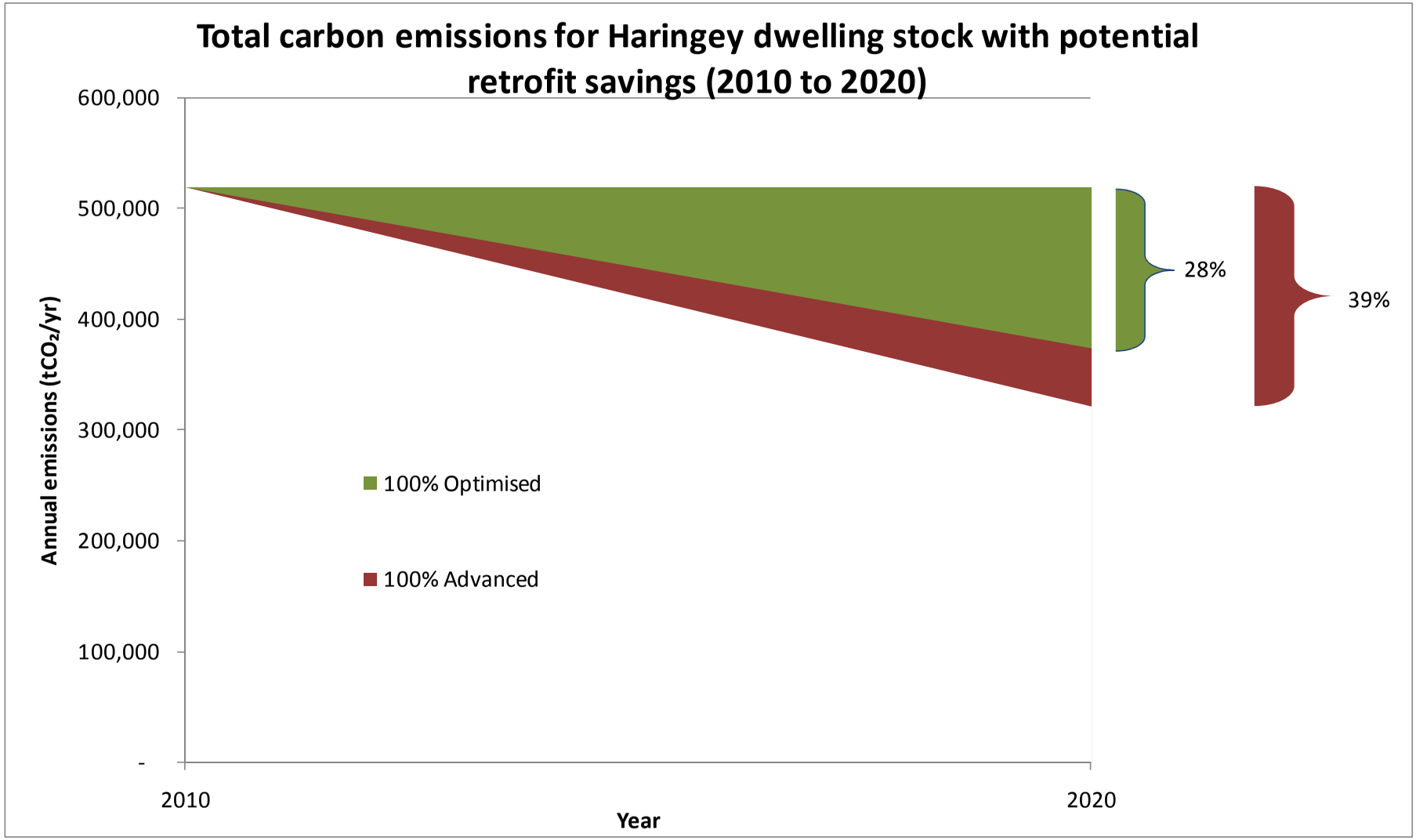

Total carbon emissions for Hackney dwelling stock with potential retrofit savings (2010 to 2020)
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
Annual emissions (tCO2/yr)
100% Optimised
100% Advanced
29%
40%
2010
2020
Year

Appendix G – Haringey Data

The table below illustrates the results of the dwelling analysis for Haringey, which covers 82% of the total stock.

Archetype		Haringey	Existing emissions and savings tCO_2			Total Cost	
Identifier	Description	Number of dwellings	Existing emissions (aggregated)	Savings from optimised Package	Savings from advanced Package	Optimised Package	Advanced Package
101 Pr	Pre 1980 Solid Gas Terraced Poor	15,336	100,996	56,954	66,492	£157,168,014	£304,365,887
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	5,041	55,428	36,051	39,946	£88,681,387	£149,569,789
103 Pr	Pre 1980 Solid Gas Flats Poor	10,575	42,198	13,512	22,621	£27,813,745	£148,915,946
101 Gd	Pre 1980 Solid Gas Terraced Good	7,686	35,942	2,877	18,726	£9,196,143	£148,123,253
115 Pr	1980 Onwards Gas Flats Poor	8,746	29,012	10,783	12,699	£28,405,551	£124,186,828
115 Gd	1980 Onwards Gas Flats Good	12,395	28,980	1,687	5,992	£4,348,170	£168,358,950
109 Pr	Pre 1980 Cavity Gas Flats Poor	4,095	15,115	6,230	7,476	£14,442,384	£58,146,259
109 Gd	Pre 1980 Cavity Gas Flats Good	5,858	13,930	795	3,066	£2,055,079	£79,571,628
103 Gd	Pre 1980 Solid Gas Flats Good	4,208	12,299	3,083	4,508	£8,782,059	£57,161,660
107 Pr	Pre 1980 Cavity Gas Terraced Poor	1,902	11,557	6,536	7,278	£17,292,292	£38,139,633
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	796	7,611	4,679	5,167	£11,247,082	£24,092,259
107 Gd	Pre 1980 Cavity Gas Terraced Good	1,584	5,854	447	2,268	£1,103,173	£30,524,019
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	864	4,610	349	1,971	£634,586	£25,114,634
113 Gd	1980 Onwards Gas Terraced Good	566	1,897	148	632	£393,990	£10,901,435
106 Pr	Pre 1980 Solid Electricity Flats Poor	386	1,838	981	1,009	£2,831,236	£4,334,340
106 Gd	Pre 1980 Solid Electricity Flats Good	117	473	164	212	£508,001	£1,734,571
112 Pr	Pre 1980 Cavity Electricity Flats Poor	81	343	156	170	£451,019	£1,218,514
112 Gd	Pre 1980 Cavity Electricity Flats Good	66	201	6	61	£16,439	£978,476
TOTAL		**80,298**	**368,284**	**145,436**	**200,295**	**£375,370,350**	**£1,375,438,082**

The graph below illustrates the impact of applying the optimised and advanced retrofit packages across all relevant dwelling types.

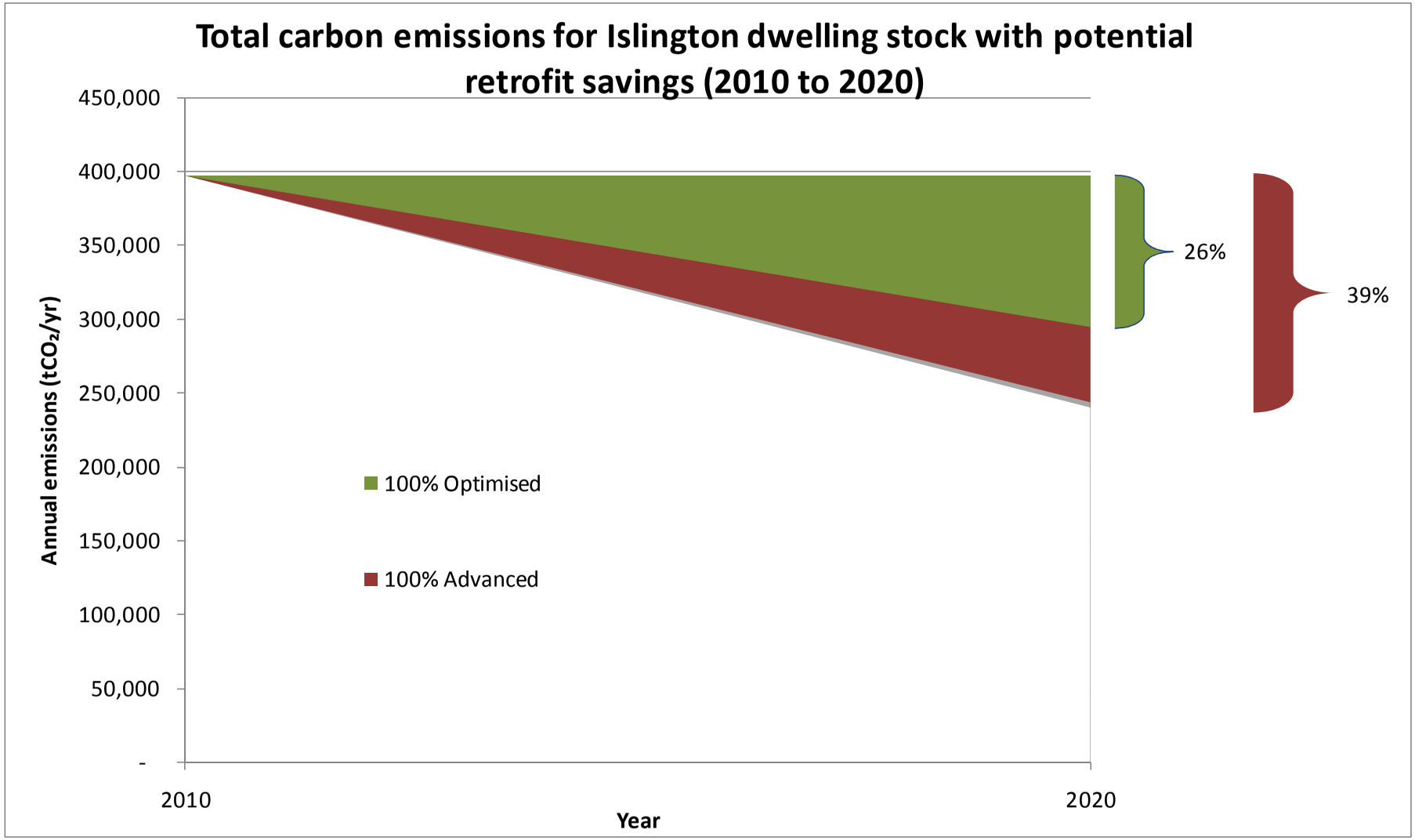

Total carbon emissions for Haringey dwelling stock with potential retrofit savings (2010 to 2020)
600,000
500,000
400,000
300,000
200,000
100,000
-
Annual emissions (tCO2/yr)
100% Optimised
100% Advanced
28%
39%
2010
2020
Year

Appendix H – Islington Data

The table below illustrates the results of the dwelling analysis for Islington, which covers 95% of the total stock.

Archetype		Islington	Existing emissions and savings tCO_2			Total Cost	
Identifier	Description	Number of dwellings	Existing emissions (aggregated)	Savings from optimised Package	Savings from advanced Package	Optimised Package	Advanced Package
103 Pr	Pre 1980 Solid Gas Flats Poor	19,276	76,917	24,629	41,234	£50,698,431	£271,441,502
109 Pr	Pre 1980 Cavity Gas Flats Poor	15,136	55,871	23,029	27,636	£53,386,345	£214,937,936
103 Gd	Pre 1980 Solid Gas Flats Good	17,654	51,593	12,933	18,911	£36,841,252	£239,796,511
109 Gd	Pre 1980 Cavity Gas Flats Good	19,499	46,365	2,645	10,204	£6,840,082	£264,844,530
101 Pr	Pre 1980 Solid Gas Terraced Poor	3,731	24,572	13,857	16,177	£38,238,470	£74,051,237
107 Gd	Pre 1980 Cavity Gas Terraced Good	5,399	19,953	1,523	7,732	£3,760,329	£104,045,677
107 Pr	Pre 1980 Cavity Gas Terraced Poor	2,683	16,305	9,221	10,268	£24,396,502	£53,808,578
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	1,363	14,986	9,747	10,800	£23,976,894	£40,439,365
101 Gd	Pre 1980 Solid Gas Terraced Good	1,754	8,202	657	4,273	£2,098,693	£33,803,870
115 Pr	1980 Onwards Gas Flats Poor	1,012	3,357	1,248	1,469	£3,286,898	£14,370,058
106 Gd	Pre 1980 Solid Electricity Flats Good	556	2,260	781	1,011	£2,424,560	£8,278,665
113 Gd	1980 Onwards Gas Terraced Good	670	2,246	175	749	£466,471	£12,906,932
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	219	2,095	1,288	1,423	£3,096,352	£6,632,665
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	268	1,429	108	611	£196,669	£7,783,447
106 Pr	Pre 1980 Solid Electricity Flats Poor	146	697	372	383	£1,074,141	£1,644,402
115 Gd	1980 Onwards Gas Flats Good	132	308	18	64	£46,268	£1,791,471
112 Pr	Pre 1980 Cavity Electricity Flats Poor	29	122	55	61	£160,826	£434,503
112 Gd	Pre 1980 Cavity Electricity Flats Good	38	118	3	35	£9,592	£570,942
TOTAL		**89,565**	**327,398**	**102,290**	**153,041**	**£250,998,775**	**£1,351,582,292**

The graph below illustrates the impact of applying the optimised and advanced retrofit packages across all relevant dwelling types. An additional 1% of savings are required to meet the 2020 target (40% reduction based on 2005 baseline emissions).

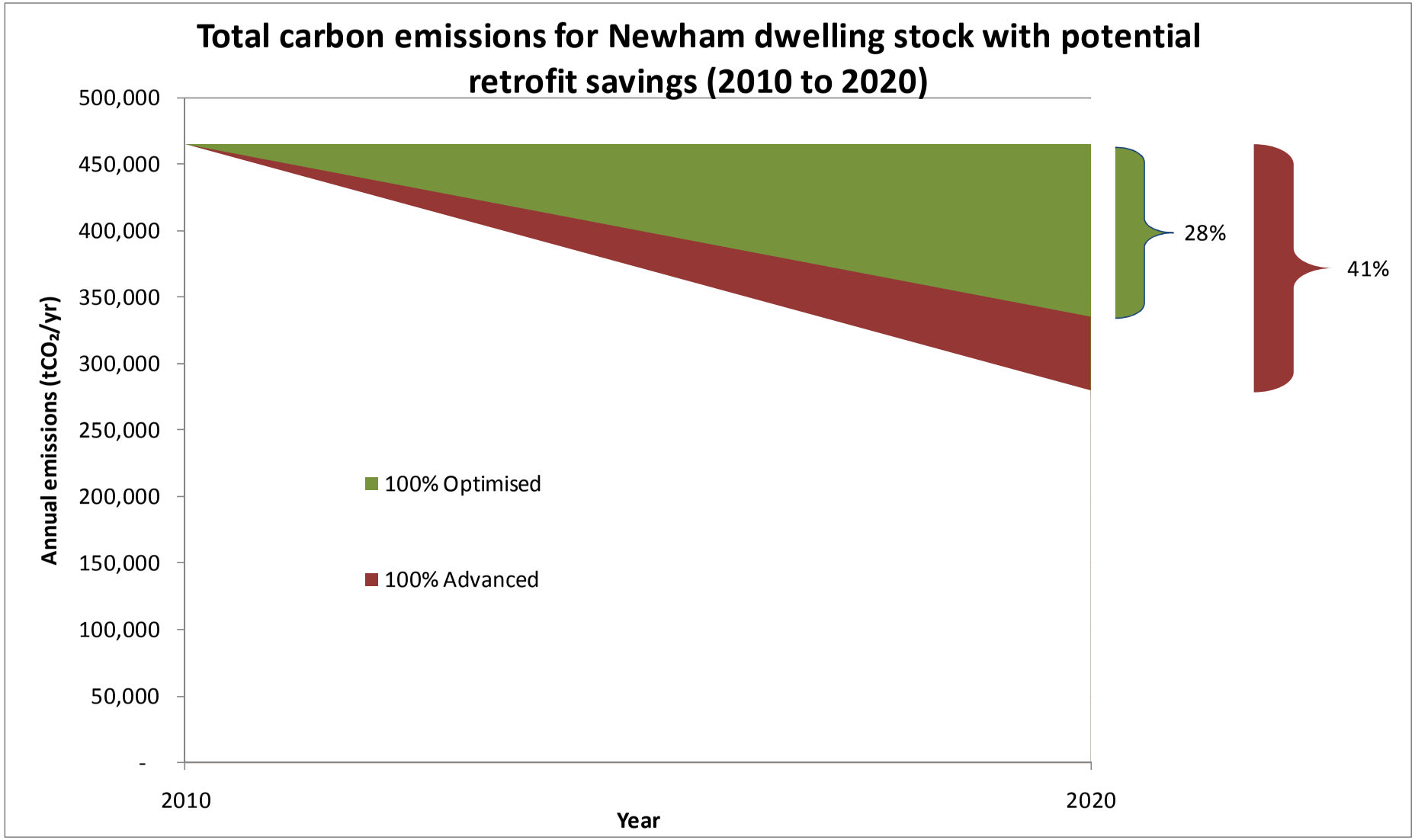

Total carbon emissions for Islington dwelling stock with potential retrofit savings (2010 to 2020)
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
Annual emissions (tCO2/yr)
100% Optimised
100% Advanced
26%
39%
2010
2020
Year

Appendix J – Newham Data

The table below illustrates the results of the dwelling analysis for Newham, which covers 79% of the total stock.

Archetype		Newham	Existing emissions and savings tCO_2			Total Cost	
Identifier	Description	Number of dwellings	Existing emissions (aggregated)	Savings from optimised Package	Savings from advanced Package	Optimised Package	Advanced Package
101 Pr	Pre 1980 Solid Gas Terraced Poor	14,036	92,436	52,126	60,857	£143,847,448	£278,569,762
101 Gd	Pre 1980 Solid Gas Terraced Good	9,397	43,944	3,517	22,895	£11,243,647	£181,102,630
109 Gd	Pre 1980 Cavity Gas Flats Good	16,702	39,715	2,266	8,740	£5,858,964	£226,856,147
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	3,300	36,285	23,601	26,150	£58,054,140	£97,913,957
107 Pr	Pre 1980 Cavity Gas Terraced Poor	5,906	35,886	20,293	22,599	£53,693,769	£118,426,212
109 Pr	Pre 1980 Cavity Gas Flats Poor	4,940	18,233	7,515	9,019	£17,421,746	£70,141,420
107 Gd	Pre 1980 Cavity Gas Terraced Good	4,574	16,905	1,290	6,551	£3,185,887	£88,151,258
113 Gd	1980 Onwards Gas Terraced Good	4,152	13,927	1,085	4,642	£2,891,850	£80,015,470
103 Pr	Pre 1980 Solid Gas Flats Poor	3,274	13,063	4,183	7,003	£8,610,364	£46,100,246
115 Gd	1980 Onwards Gas Flats Good	4,233	9,896	576	2,046	£1,484,763	£57,489,268
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	1,032	9,873	6,070	6,703	£14,590,154	£31,253,420
103 Gd	Pre 1980 Solid Gas Flats Good	3,127	9,138	2,291	3,350	£6,525,402	£42,473,274
112 Gd	Pre 1980 Cavity Electricity Flats Good	1,951	5,977	175	1,803	£487,727	£29,030,313
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	739	3,942	298	1,685	£542,579	£21,473,332
115 Pr	1980 Onwards Gas Flats Poor	966	3,204	1,191	1,402	£3,136,819	£13,713,925
106 Gd	Pre 1980 Solid Electricity Flats Good	630	2,557	884	1,144	£2,743,574	£9,367,938
106 Pr	Pre 1980 Solid Electricity Flats Poor	483	2,302	1,228	1,263	£3,545,822	£5,428,300
112 Pr	Pre 1980 Cavity Electricity Flats Poor	466	1,980	899	981	£2,605,952	£7,040,473
TOTAL		**79,904**	**359,263**	**129,488**	**188,833**	**£340,470,608**	**£1,404,547,343**

The graph below illustrates the impact of applying the optimised and advanced retrofit packages across all relevant dwelling types.

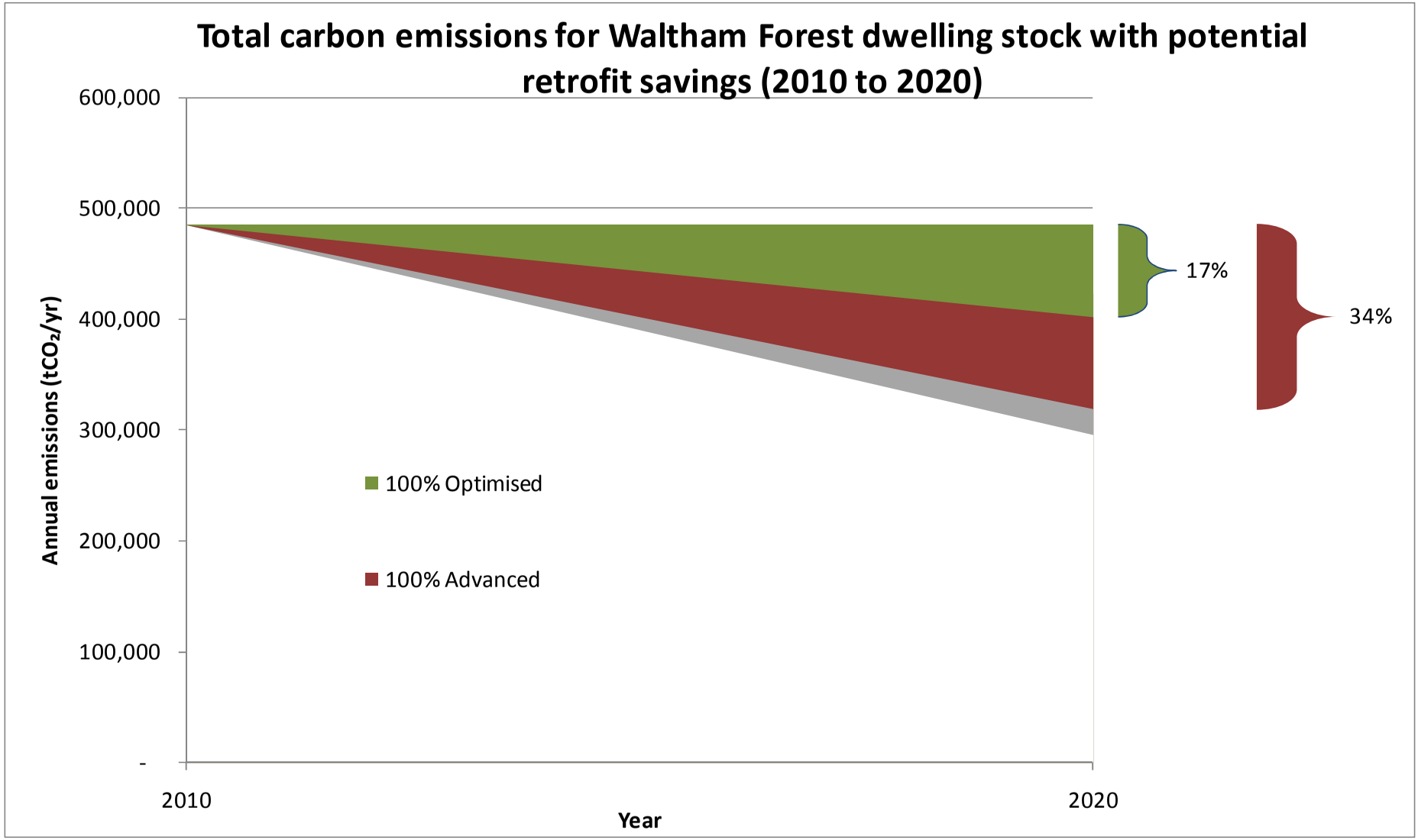

Total carbon emissions for Newham dwelling stock with potential retrofit savings (2010 to 2020)
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
Annual emissions (tCO2/yr)
100% Optimised
100% Advanced
28%
41%
2010
2020
Year

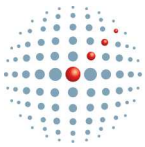
Appendix K – Waltham Forest Data

The table below illustrates the results of the dwelling analysis for Waltham Forest, which covers 84% of the total stock.

Archetype		Waltham Forest	Existing emissions and savings tCO_2			Total Cost	
Identifier	Description	Number of dwellings	Existing emissions (aggregated)	Savings from optimised Package	Savings from advanced Package	Optimised Package	Advanced Package
101 Gd	Pre 1980 Solid Gas Terraced Good	18,362	85,873	6,873	44,739	£21,971,378	£353,895,344
109 Gd	Pre 1980 Cavity Gas Flats Good	15,854	37,698	2,151	8,296	£5,561,462	£215,337,024
101 Pr	Pre 1980 Solid Gas Terraced Poor	5,208	34,296	19,340	22,580	£53,371,293	£103,356,914
107 Gd	Pre 1980 Cavity Gas Terraced Good	8,994	33,242	2,537	12,881	£6,264,677	£173,339,222
102 Pr	Pre 1980 Solid Gas Semi / Det Poor	3,014	33,138	21,554	23,882	£53,018,746	£89,421,275
108 Gd	Pre 1980 Cavity Gas Semi / Det Good	4,975	26,551	2,007	11,354	£3,654,892	£144,647,461
103 Pr	Pre 1980 Solid Gas Flats Poor	5,282	21,075	6,748	11,298	£13,891,403	£74,375,146
113 Gd	1980 Onwards Gas Terraced Good	3,086	10,351	806	3,450	£2,149,407	£59,472,594
103 Gd	Pre 1980 Solid Gas Flats Good	3,442	10,058	2,521	3,687	£7,182,079	£46,747,529
109 Pr	Pre 1980 Cavity Gas Flats Poor	2,618	9,663	3,983	4,780	£9,233,216	£37,173,709
108 Pr	Pre 1980 Cavity Gas Semi / Det Poor	1,001	9,577	5,888	6,502	£14,152,608	£30,316,157
107 Pr	Pre 1980 Cavity Gas Terraced Poor	1,505	9,144	5,171	5,758	£13,681,168	£30,174,990
112 Gd	Pre 1980 Cavity Electricity Flats Good	2,252	6,899	201	2,081	£562,933	£33,506,667
115 Gd	1980 Onwards Gas Flats Good	2,810	6,570	383	1,358	£985,779	£38,168,860
115 Pr	1980 Onwards Gas Flats Poor	993	3,295	1,225	1,442	£3,225,724	£14,102,613
106 Pr	Pre 1980 Solid Electricity Flats Poor	330	1,571	838	862	£2,419,678	£3,704,285
112 Pr	Pre 1980 Cavity Electricity Flats Poor	288	1,224	556	607	£1,611,427	£4,353,575
106 Gd	Pre 1980 Solid Electricity Flats Good	206	836	289	374	£897,535	£3,064,634
TOTAL		**80,218**	**341,061**	**83,072**	**165,931**	**£213,835,405**	**£1,455,157,999**

The graph below illustrates the impact of applying the optimised and advanced retrofit packages across all relevant dwelling types. An additional 5% of savings are required to meet the 2020 target (40% reduction based on 2005 baseline emissions).


Total carbon emissions for Waltham Forest dwelling stock with potential retrofit savings (2010 to 2020)
600,000
500,000
400,000
300,000
200,000
100,000
-
Annual emissions (tCO2/yr)
100% Optimised
100% Advanced
17%
34%
2010
2020
Year



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