RICARDO-AEA

Developing an approach to Domestic Energy Efficiency Retrofit in Jersey

Final report to the States of Jersey

Version 1

ED60427 | Issue Number 1 | Date 29/10/2015

Customer:

States of Jersey

Customer reference:

Contact:

Nigel Griffiths
Ricardo-AEA Ltd
Gemini Building, Harwell, Didcot, OX11 0QR, United Kingdom

t: +44 (0) 1235 75 3713

e: nigel.griffithsnigel.griffiths@ricardo-aea.com

Ricardo-AEA is certificated to ISO9001 and ISO14001

Authors:

Nigel Griffiths, Jan Rosenow, Chiara Essig, Anna-Liisa Kaar and Fiona Porter

Approved By:

Fiona Porter

Date:

29 October 2015

Ricardo-AEA reference:

Ref: ED60427- Issue Number 1

Executive summary

Context

Ricardo-AEA has been commissioned by the States of Jersey to develop an approach to retrofitting energy efficiency in the able-to-pay domestic sector in Jersey. This sector was identified as a priority in the Pathway 2050 report which sets out an energy plan for Jersey to meet the commitments to reducing carbon emissions made as a signatory to the Kyoto protocol. The Pathway 2050 report also includes plans for reducing fuel poverty through building retrofits.

The Energy Efficiency Service (EES) of the States of Jersey has already carried out significant work in this area through the Home Energy Scheme and the Energy Advice Line. The aim was to build on the work of the EES, and it was anticipated that this would lead to a large scale subsidised retrofit programme. However, during the course of the project, there have been a number of developments which have suggested a change of approach:

- **A need for more data**

  In Jersey, as in the UK and EU, there is continuing uncertainty about the actual benefits of energy efficiency measures applied individually or in combination and a growing understanding of the effects of poorly applied energy efficiency retrofits to the integrity of building fabric, and hence it's energy performance. In particular a need has been identified for a better understanding of the actual costs and benefits occurring in practice and of the building stock in Jersey to ensure lessons are appropriately applied. The UK government now recognises a performance gap – the gap between expected savings and actual savings[1] – in its projections of savings from retrofit measures.

- **What householders need is information**

  The research carried out for this project (in particular using householder focus groups) suggests a key need is more and better information on the costs and benefits of retrofit measures. This is difficult to achieve in practice, due to problems with interactions of measures and absence of performance data.

- **An evolving policy climate in the UK**

  In July 2015 the UK Government announced that in light of low take-up and concerns about standards there would be no further funding to the Green Deal Finance Company, according to the UK Government to protect taxpayers. This decision came as part of Government's wider review of energy policies. At the same time, the UK Government has commissioned an independent review led by Peter Bonfield to look at standards, consumer protection and enforcement of energy efficiency schemes with a remit to ensure that the system properly supports and protects consumers. It is not clear whether this review will address the issue of lack of data on actual benefits arising from measures.

- **A changed funding climate**

  The funding situation in Jersey has changed markedly and substantial financial resources are no longer likely to be available for the kind and magnitude of programme originally envisaged.

As the policy landscape and understanding of the impacts of energy saving measures are evolving rapidly at present, this study proposes a staged approach based on a process of gaining more information, understanding the changing policy landscape and then taking action.

To inform the approach the following work has been carried out:

Review of programmes overseas

Incentive schemes aimed at encouraging retrofits in the domestic sector in other countries were examined in detail. With one exception the schemes selected were all financial incentives and took the form of tax rebates, grants, loans or other forms of facilitation such as on-bill finance.

The effectiveness of these schemes was mixed, with grant schemes, perhaps unsurprisingly, achieving the highest rates of penetration and take-up. Grants are often targeted at the fuel poor or other disadvantaged groups and can select the most cost effective measures in terms of £/kWh saved. On-bill financing has largely been ineffective – a good idea in theory but complex and costly to administer

1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/383547/5505-how-the-green-deal-will-reflect-the-insitu-perfor.pdf

in practice. It appears that lower cost measures are more suitable for this kind of financing but this begs the question of why financing should be needed at all if the measures are low cost, especially in the able-to-pay sector. For larger investments such as solid wall insulation or whole house retrofits, soft loans appear to be an effective enabling measure – and at the very least this would remove a potential barrier in Jersey – where property is expensive so new homeowners in particular may suffer from a shortage of capital.

It should also be noted that all programmes reviewed were essentially top-down policy driven rather than driven by an investigation of what is necessary or possible for any particular property.

Measures Analysis

An analysis was carried out in order to determine which energy efficiency measures are most likely to mitigate carbon emissions, reduce fuel poverty and contribute to energy security. Seven main measures were evaluated, including cavity wall insulation, solid wall insulation, loft insulation, window upgrades, replacement of hydrocarbon boilers with air source heat pumps or electrical resistance heating, replacement of electrical resistance heating with air source heat pumps and heating control upgrades.

By a large margin the biggest impact on reducing CO_2 emissions is the replacement of hydrocarbon fuelled space heating by electrical resistance heating or air source heat pumps. This is because Jersey benefits from a low carbon electricity supply from France.

Focus group findings

Energy efficiency does not appear to be an important priority for residents of Jersey. This may be because energy is not yet sufficiently expensive for it to matter to a relatively wealthy populace, especially given that the climate is mild so the demand for space heating is not as high as in other parts of Northern Europe. Where people were motivated to take action, this was based on achieving financial savings rather than a desire to contribute towards CO_2 emissions reductions or other sustainability goals.

The participants identified the main barrier to installing energy efficiency measures to be a lack of clear information in three areas:

- identifying the most appropriate measures for their specific dwelling;
- establishing the cost of installing any particular measure; and
- estimating the savings to be achieved from installing measures, singly and in combination.

In addition, participants definitely wanted an independent source of advice and expressed a lack of trust in industry. This was both in terms of being able to verify claimed savings and in terms of confidence in the quality of workmanship – especially in unfamiliar areas of retrofit work.

Stakeholder consultation findings

A list of the stakeholders consulted is provided in Appendix 2. Many stakeholders suggested that the way forward was for the States of Jersey to subsidise the installation of measures. Stakeholders also identified a lack of understanding and information as being key barriers to the wider take-up of retrofit measures. This can be addressed by the provision of a bespoke survey and of a centralised information service collating data on costs and savings, which can then be used to feed back into survey reports.

It was also suggested that the States of Jersey could take a lead in retrofitting its own stock, and in communicating the benefits of energy efficiency widely across the island.

Private Rented Sector

The Private Rented Sector (PRS) is included in the definition of the “able-to-pay” domestic sector in Jersey – on the basis that landlords (rather than tenants) should in theory be able to pay for energy efficiency improvements. The minimum standards to be introduced in the UK from 2018 are the one non-financial measure this study examined when reviewing existing programmes and it is important to recognise that these introduce a necessary element of compulsion. The need for legislation to tackle poor energy performance in the PRS was echoed by a number of stakeholders. Any proposed legislation needs to be carefully planned and introduced in Jersey where there is a limited labour supply and strong competition for rental property, so a voluntary accreditation scheme may be a useful first step.

Recommendations

Some of these recommendations can be carried out or at least commenced in parallel with each other but the priority should be kept under review as more and better data emerges, and as understanding increases:

1. **Maintain a watching brief on emerging research from the UK.** Following the demise of the Green Deal, the UK Government has commissioned a review of standards, consumer protection and enforcement of energy efficiency schemes and it is likely that this will change the approach to energy efficiency programmes in the future. It is not yet known when the Bonfield review will be completed but the results should be incorporated in the development of any pilot programme in 2016.
2. **Obtain clearer picture of the Jersey housing stock.** Data has been collected under the HES scheme and more data will become available through the use of the Home Energy Check tool. This data should be analysed to refine the assumptions used in the Measures Analysis included in this report and in particular to get a clearer idea of average space heating heat demand.
3. **Analyse data collected from work done in the homes of 2000 vulnerable residents.** Where energy consumption data is available both before and after a retrofit measure is introduced, this can be used to get a clearer idea of the impact of energy saving measures in Jersey and to confirm the relative importance of the measures recommended in the Measures Analysis, allowing for the fact that this group is likely to run dwellings at higher temperatures following retrofit.
4. **Private Rented Sector – voluntary and legislative approaches**. An initial approach could be to establish a voluntary accreditation scheme for landlords but to signal legislation to follow. Energy efficiency can be added to the scheme currently being prepared by Health & Social Services.
5. **Outreach and Education**. The States of Jersey already provides this service in part but we believe there would be benefits to expanding the service. There is a useful role to play in centralising information on actual submitted information costs and benefits, so that surveyors and householders can draw on a real source of data when making estimations. Launch and use of the Home Energy Check tool will strengthen the education and outreach activities.
6. **Energy Efficiency Survey**. An eventual approach to retrofit needs to be based on independent context-specific survey and an associated recommendations report for each property under consideration. This will enable a holistic approach to retrofit which looks at all aspects of a building and takes into account its location, exposure, condition and any heritage importance and then identifies the most appropriate measures for that property. Survey can be subsidised at relatively low cost and, if the process is correctly designed, can be used to improve the retrofit process. It will be necessary to work with the industry to identify training needs and with the local college to deliver increased capacity for delivering the survey through different delivery options.
7. **Consequential improvements**. When buildings are extended or converted there is an opportunity to oblige homeowners to improve the efficiency of the whole property by the use of the Building Bye-Laws. We understand that consultation has commenced on revisions to the current bye-laws.

Table of contents

Appendices

Figures

1 Introduction

1.1 Context

Ricardo-AEA has been commissioned by the States of Jersey to develop an approach to retrofitting energy efficiency in the able-to-pay domestic sector in Jersey.

The Pathway 2050 report[2] sets out ambitious proposals for transforming Jersey's energy system. The overall aim is to contribute to achieving a reduction in carbon emissions of nearly 80% lower than 1990 levels by 2050 driven by Jersey's requirement under the UK's ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

The third Action Statement in the Pathway 2050 report is 'Apply energy efficiency measures to the pre-1997 stock of properties'. Energy efficiency in the domestic sector is also part of 'Action Statement 6: Improved energy efficiency through a behaviour change programme'. Hence energy efficiency is the focus of 2 out of 27 Action Statements. For new buildings, 'Action Statement 2: Introducing a 'low-carbon' standard through Building Bye-Laws' makes provisions for reducing carbon emissions through higher energy performance standards. The Pathway 2050 report also includes plans for reducing fuel poverty through building retrofits.

As the Request for Quotation for this project states, a large proportion of Jersey's housing stock pre-dates the introduction of the Building Bye-Laws in 1997 which set out important provisions driving energy performance of new buildings. There will be new build activity in future years in addition to replacing buildings beyond repair, particularly given the shortfall of affordable housing. However most of the houses that will exist in 2050 have already been built. This highlights the crucial importance of tackling the existing housing stock and in particular those buildings built pre-1997.

Unlike most countries in Europe, Jersey has not yet embarked on a large scale programmes of subsidy or regulation to stimulate this market. This is a distinct advantage – as some schemes used have not been well designed and in some cases have led to negative unintended consequences. The recent failure of the Green Deal programme in the UK is merely one instance of a lack of clarity in thinking about this market.

The original aim of this project was to "to develop an approach to retrofitting energy efficiency" in Jersey and it was anticipated that this would lead to a large scale subsidised retrofit programme (such as those analysed in Section 2 of this report). However, during the course of the project, there have been a number of developments which have suggested a change of approach and sounded a note of caution:

- **A lack of data**

  There is continuing uncertainty about the actual benefits of energy efficiency measures applied individually or in combination[3]. This is not unique to the States of Jersey, but has been identified in a range of international studies. There is also a growing understanding of the risks of poorly applied energy efficiency retrofits to the integrity of building fabric, and hence it's energy performance. This can also affect human health as ventilation and damp can be major issues in retrofit, and building heritage. Recent insulation failures[4] in the UK illustrate these risks. In particular there is a need for better data to better understand the actual costs and benefits occurring in practice.

- **A need for information**

  The research carried out for this project (in particular using householder focus groups) suggested that the key need was not funding but for more and better information on the costs and benefits of retrofit measures. This was echoed by a number of stakeholders who noted that the able to pay sector should be able to afford measures which make economic sense. However, it should be borne in mind that international evidence suggests that programmes operating at scale require a significant amount of subsidy or regulation and that information measures alone do not deliver large-scale savings.

2 Pathway 2050: An Energy Plan for Jersey, http://www.gov.je/Government/Pages/StatesReports.aspx?ReportID=1039
3 For example http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2621817
4 http://www.southwalesargus.co.uk/news/12929570.Cost_to_sort_out_damp_problems_in_city_homes_hits___670k/
http://www.telegraph.co.uk/finance/property/11485758/Cavity-wall-insulation-crisis-may-hit-three-million-homes.html

- **An evolving policy climate in the UK**

  In July 2015 the UK Government announced that in light of low take-up and concerns about standards there would be no further funding to the Green Deal Finance Company, UK Government argued that this was done to protect taxpayers. This decision came as part of Government's wider review of energy policies. Earlier in July the UK Government had announced it was axing plans to make new homes carbon neutral from 2016, drawing widespread criticism from housebuilders and environmentalists.

  At the same time, the UK Government has commissioned an independent review led by Peter Bonfield to look at standards, consumer protection and enforcement of energy efficiency schemes with a remit to ensure that the system properly supports and protects consumers. It is not clear whether this review will address the issue of lack of data on actual benefits arising from measures.

- **A changed funding climate**

  The funding situation in Jersey has changed markedly and substantial financial resources are no longer likely to be available for the kind and magnitude of programme originally envisaged.

A change of approach

As the policy landscape and understanding of the impacts of energy saving measures are evolving rapidly at present, it may not be the optimal moment for the States of Jersey to embark on a wide scale retrofit programme. With this in mind, this study proposes a staged approach based on a process of gaining more information, understanding the changing policy landscape and then taking action.

Some of these recommendations can be carried out or at least commenced in parallel with each other but the priority should be kept under review as more and better data emerges, and as understanding increases. The States of Jersey has collected data from retrofits carried out to date on social housing and it is possible that an analysis of this data would yield more clarity at least for that sector.

The action proposed will depend on the understanding gained – but some initial suggestions are given here. This is an approach of cost-effectively working out a bespoke strategy for each building, removing barriers to delivery and learning from experience through the use of a pilot scheme.

The States of Jersey thus has a unique opportunity to plan and execute the retrofit of its building stock in a balanced, responsible and cost-effective manner.

1.2 This Report

This is the final report for the project which sets out the results of our research and makes recommendations on the options to address energy efficiency in the domestic sector in Jersey. This report:

- examines how other countries have addressed energy efficiency retrofit;
- analyses the measures which could be supported by a retrofit programme and the potential savings which could result;
- considers the current skills in Jersey to implement a programme of measures and the capacity of the market to deliver;
- summarises the results of a stakeholder consultation to inform the study;
- looks at triggers and barriers to householders taking action;
- considers the options available to Jersey, including issues to address before a programme is implemented; and
- presents a draft approach to gaining a better understanding of the housing stock and the effectiveness of measures, culminating in an action plan for the development of an energy efficiency retrofit programme

2 Review of domestic retrofit programmes in other countries

In order to understand what policies have been effective (or not) in other countries, a review of domestic retrofit programmes in other countries and jurisdictions was carried out.

2.1 Methodology

Policy initiatives take a variety of approaches to achieving an improvement in energy efficiency. This includes regulatory, educational and fiscal measures. The aims of such schemes differ and include carbon reduction, energy cost savings, fuel poverty alleviation, health benefits, economic stimulus, and regeneration.

Eleven case studies were selected and agreed with the States of Jersey. These were selected to cover a range of different approaches to supporting improvements in energy efficiency. In addition, programmes with the same overall mechanism can achieve significantly different results depending on the details of the programme, and how it is operated and publicised. The selection of programmes aimed to cover a range of key factors which could enable us to understand what made for an effective programme or not. In addition we were mindful of the need to select those programmes where the evidence base is sufficiently established in order to carry out a meaningful analysis.

The programmes analysed were:

1. UK – Green Deal
2. Germany – KfW Programme
3. US, Kansas - How$mart
4. UK – Supplier Obligation
5. France - éco-PTZ
6. UK - Landlord's Energy Saving Allowance
7. New Zealand – Warm Up
8. Oregon, US - Clean Energy Works Oregon
9. US - Palm Desert Energy Independence Program
10. France – CIDD
11. UK – Minimum standards for the Private Rented Sector

For each programme we examined the following elements which are particularly relevant to the context within the States of Jersey and the objective to inform a new home energy efficiency programme for the able-to-pay sector:

- programme type;
- programme architecture and how it operates (key actors, intervention logic etc.);
- programme impacts (number of energy efficiency measures installed, energy savings etc.);
- marketing and promotion activities;
- cost-effectiveness;
- success factors; and
- barriers to delivery.

This information is available for most energy efficiency programmes with varying degrees of detail and quality.

Table 1 provides a high-level overview of the programmes analysed and their key features in terms of:

- type of programme;
- type of measures targeted;
- PRS focus;
- cost-effectiveness (both technology cost and administrative cost);
- impact in terms of energy savings and number of properties retrofitted; and
- overall assessment.

Table 1: Overview of key features of programmes analysed

Case study	Type of programme	High-cost measures	Low-cost measures	PRS	Cost-effectiveness	Impact	Overall assessment
UK – Green Deal	On-bill finance		✓		Low	Low	Poor
Germany – KfW Programme	Soft loan and grant	✓		✓	Low	High	Good
US, Kansas - How$mart	On-bill finance		✓		High	Medium	Good
UK – Supplier Obligation	Energy Efficiency Obligation	(✓)	✓		High	High	Good
France - éco-PTZ	Soft loan	✓	✓		High	Low	Poor
UK - Landlord's Energy Saving Allowance	Grant		✓	✓	NA	Low	Poor
New Zealand – Warm Up	Soft loan and grant		✓	✓	High	High	Good
Oregon, US - Clean Energy Works Oregon	On-bill finance	✓	✓	✓	NA	High	Good
US - Palm Desert Energy Independence Program	PACE	✓	✓		Medium	Low	Poor
France – CIDD	Tax rebates	✓	✓		Medium	High	Good
UK – Minimum standards for PRS	Minimum standard	✓	✓	✓	(not yet introduced)	-	-

Detailed case studies on each of these schemes are provided in Appendix 1.

The following observations can be made on the features of the programmes analysed:

2.2 Finance Models

Most programmes analysed focus primarily on low-cost measures. This is a result of the finance models applied and the need for substantially larger incentives for high-cost measures.

2.2.1 On-bill finance models

On-bill financing mechanisms target low-cost measures. This is driven by the overall rule applied that the repayments must not exceed the cost savings. Particularly if interest is added to the repayments (which is the case for the Green Deal, How$mart) the admissible cost of the measures is restricted except for measures that save a significant amount of energy costs.

However, there is no reason why on-bill finance programmes could not be subsidised. For example, the subsidy could cover the part of the investment cost that is not covered by the programme, in cases where there are limited energy cost savings. If 40% of the cost (plus interest) would be offset by the energy cost savings the remaining capital cost of 60% could be subsidised.

Such an approach would break new ground, although the Green Deal in theory allows part-funding through other means such as contributions from the Supplier Obligation or own funding. Similarly, How$mart allows individual households to part-fund the measures with their own means.

In terms of communicating this to households it appears to be important that they are being offered a simple financial product rather than having to deal with the details around which measures can be funded and to what extent. To summarise, our review of international energy efficiency programmes indicates that if this route is followed the offering should provide households with a process following those steps:

1) Quick assessment of energy efficiency opportunities in property via short audit (free of charge or for small fee) or use of States of Jersey Home Energy Check (HEC) online tool.
2) If there is interest from the household and sufficient opportunities, a detailed assessment is required (free of charge or small fee)
3) Offer of package that can be financed
4) Contract is signed
5) Work is carried out
6) Repayments commence

The loan is usually attached to the property itself rather than to the owners. Successive owners (or in some cases tenants) would become liable to continue with the repayments if the property changes hands. At the point of sale, disclosure of the fact that the property is subject to an on-bill finance loan would of course be required.

On-bill financing can potentially be very complex as the Green Deal example has shown. However, if designed in a way that it appears simple to households such as the How$mart programme it can be marketed successfully.

On-bill financing mechanisms target low-cost measures with short pay-back periods such as energy efficiency appliances and simple insulation measures. This is driven by the overall rule applied that the repayments must not exceed the cost savings. Particularly if interest is added to the repayments (which is the case for the Green Deal and How$mart) the admissible cost of the measures is restricted (except for measures that save a significant amount of energy costs). Overall, this results in low-cost measures to be the only eligible technologies that can be funded. With subsidies in place, higher-cost measures could potentially also be included (see below).

Overall, on-bill financing seems most sensible in the context of significant potentials for low-cost measures. If most of the potential is within the high-cost segment on-bill financing is less suitable and soft loans might be more appropriate.

2.2.2 Soft loans

Soft loans are loans with reduced interest rates for investing in energy efficiency improvements. Under a Soft Loan, the householder is offered a loan with a reduced interest rate and does not have to deal with the process behind the financial product. The loan is attached to the householder, not the property as is often the case with on-bill finance programmes.

Soft loans are usually used to leverage private capital from the beneficiaries. The evidence from successful programmes shows that this leverage effect can be significant (in case of Germany more than a factor of 10). The main difference between soft loans and traditional loans is that the interest rate is much lower, in some cases (France) even 0%. This is achieved by ‘buying down’ the interest rate with the subsidy. The loan can be offered by private banks, a public bank or an organisation deliberately set up for this purpose.

The main focus of soft loans is technologies where the up-front costs are significant such as whole house retrofits involving solid wall insulation. Covering those costs by grants would require large subsidies and the soft loans enable the financing of high-cost measures by leveraging private capital. This includes deep retrofits costing in excess of £50,000.

High-cost measures are typically more complex to deliver and often architects are used to facilitate the process. They are also often part of a more general refurbishment programme whereas low-cost measures such as loft and cavity wall insulation are more likely to be installed outside of the refurbishment cycle.

2.2.3 Energy efficiency obligations

Energy efficiency obligations are a requirement on energy suppliers or distributors to achieve a specified amount of energy savings over a given period. The costs to suppliers of delivering energy efficiency policies are passed on to consumers' energy bills. While those consumers that have their homes improved can benefit from an overall reduction in bills, those who do not receive improvements experience increases in bills. If the suppliers' costs are passed through equally to all customers this is a form of regressive taxation because the bill increase constitutes a greater proportion of a poorer household's income. Because less affluent, more vulnerable groups are more likely to be over-represented in non-switching groups the potential for regressive outcomes is increased.

Because they are operating in a competitive market, suppliers aim to deliver their obligations at least cost. This creates an incentive not to focus on low-income households as they will generally require a supplier to provide a greater level of subsidy towards energy efficiency measures than those that are 'able to pay' (in the UK, typically, suppliers provided 100% subsidy for low-income households and 50% subsidy for able to pay). These cost differences are demonstrated in an evaluation of the second Energy Efficiency Commitment in the UK, which ran from 2005 to 2008, which estimated that suppliers spent more than 60% on delivering measures to the low-income group, even though this made up only 50% of the overall target.

Energy efficiency obligations usually target low-cost measures for a variety of reasons:

- low-cost measures usually can be standardised more easily (opposed to high-cost / more complex measures) in terms of the technical specifications;
- standardised measures enable a streamlined monitoring and verification regime – deemed savings (benchmarks) are used based on representative samples;
- the cost of delivering energy efficiency obligations are passed on to customers and delivering high-cost measures to a relatively small number of households paid for by all customers has social equity implications; and
- targeting low-cost measures allows policy makers to argue that the benefits in terms of cost savings outweigh the costs in form of increased energy bills so overall customers benefit.

However, the UK modified their energy efficiency obligations scheme in 2013 as part of the Energy Company Obligation (ECO). Despite the apparent success of the previous obligations in place (CERT and CESP, see case study), the UK government decided to radically overhaul the existing system at an unprecedented pace. Energy savings obligations were supposed to be directed primarily towards high-cost measures such as solid wall insulation and hard-to-treat cavity wall insulation. This was reversed in the second year of ECO on the back of a debate around the impact on energy prices of 'green levies' including ECO and in the light of technical concerns about solid wall insulation. In October 2014 it was confirmed that low-cost measures such as loft and cavity wall insulation would become eligible for a much larger share of ECO.

In summary, energy efficiency obligations have largely targeted low-cost measures in the past and recent attempts in the UK to include high-cost measures were reversed.

It is important to note that energy efficiency obligations do not currently apply in Jersey – and this could be an opportunity worth developing. There may be benefits in asking fuel providers including Jersey Electricity, Jersey Gas and heating oil distributors such as Petroleum Distributors Jersey to do more in this regard.

2.3 Private rented sector

Most energy efficiency programmes do not have an explicit PRS focus. However, we reviewed three programmes that target this segment deliberately. The case studies include the Warm up New Zealand scheme, the landlord's saving allowance in the UK, and the forthcoming minimum standards for the PRS in the UK.

The PRS is included in the definition of the "able-to-pay" domestic sector in Jersey – on the basis that landlords (rather than tenants) should in theory be able to pay for energy efficiency improvements. The minimum standards to be introduced in the UK from 2018 are the one non-financial measure examined and it is important to recognise that these introduce an element of compulsion. This is necessary in the PRS as there is little incentive for landlords to take the necessary steps – as the benefits in lower energy

bills will be experienced by tenants but the cost of the investment is borne by landlords. It is this disconnection which leads to the need to legislate.

To be effective, a robust approach will be required to have an effect on the energy performance of the PRS. Regulation will be required to achieve results. It is too early to say what the consequences of the UK legislation will be, although owners of large property portfolios (e.g. the CLA and the National Trust) have raised concerns around bottlenecks in skilled labour and a potential restriction in the supply of rented property around the effective dates in 2018 and 2020. This is a particular concern in Jersey where there is already strong competition for rental property. The UK legislation is framed around the EPC assessment system – but it is fair to say that EPCs were not designed as a legislative tool so their shortcomings are becoming apparent when being used in this way, especially as the underlying assessment programme does not correctly assess traditional buildings – which are 25% of the building stock and a prime target for retrofit.

Some soft loan programmes can have an impact on the PRS too – the German KfW programme is used by owners of multi-apartment blocks as a means to finance refurbishments.

Energy efficiency obligations in the UK have traditionally focused on social housing and owner occupiers rather than the PRS. Only 4% of all measures delivered under CERT (in properties where tenure information was available) were in the PRS[5], compared to 16% private rented properties across Great Britain as a whole. The Energy and Climate Change Select Committee[6] also found that CERT providers had been reluctant to engage with the PRS, due to the three-way nature of organising improvements, involving the tenant, landlord and installer. The Committee found that providers preferred easier delivery routes dealing only with owner occupiers or social housing providers, where there is a one-to-one relationship.

2.4 Cost-effectiveness

On-bill financing schemes are seen to be very cost-effective as the cost of the scheme can be entirely funded by private investors. While this was the case with the How $mart programme, the Green Deal programme suffered from severely low uptake, and DECC ended up spending more than £36 million on administering and setting up the programme.

The UK Supplier Obligation has been extremely cost-effective, with the per-kWh spend at roughly 1 pence, well below UK gas and electricity prices. The ecoPTZ loan, however, costs about €0.10/kWh of primary energy saved, which is a significant difference from the Supplier Obligations.

Finally, the CIDD tax rebate has also been seen to be cost-effective, but depends mainly on the type of measure. On average, the cost has been €93/tonne of CO_2 avoided, with wall and roof insulation being the most cost-effective at just €21/tonne of CO_2 avoided. The renewable energy measures are more expensive (e.g. €432/tonne of CO_2 avoided for solar thermal power installations). The data from the Jersey HES is not directly comparable due to the nature of the client group i.e. the socio-economically vulnerable sector; however the Jersey HES Phase 1 implementation (2009-2011) cost for implementation of measures was £791,896 which achieved savings of 7955 Tonnes CO_2 pa. This implies a cost to the States of Jersey of approximately £100/tonne (€124/tonne) of CO_2 saved,[7] which reflects the increased costs within the Jersey market.

2.5 Impact

Impacts vary greatly between the programmes.

In terms of numbers of measures installed, the UK Supplier Obligations have had the greatest reach, in part due to the sheer duration of the programme. Over the last 20 years, 6 million cavity wall insulations, 8.5 million loft insulations, 32 million energy efficient appliances, 500 billion energy efficiency lights and 10 million heating system upgrades have been installed through this programme. In terms of number of households reached, the French CIDD tax rebates have quite a wide reach as well, with 4.2 million households benefiting from it over four years.

The KfW soft loan scheme has had a lower reach, with 1.6 million dwellings receiving support since 2005. These three programmes benefit from particularly attractive finance models. On the other hand,

5 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/350722/CERT_CESP_Evaluation_FINAL_Report.pdf
6 http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1744i_ii/1744i_ii.pdf
7 Energy Efficiency Service Phase 1 Report Reb 11 Final

the Green Deal had very low uptake, with only 5% of the anticipated number of households actually completing retrofits. The ecoPTZ programme has also had low uptake, with only 4.6% of building energy performance upgrades being financed by this zero-interest loan in 2011. Similarly the LESA grant in the UK was only taken up by 0.2% of UK landlords between 2007 and 2008. Unlike KfW soft loans, CIDD rebates or UK Supplier Obligations, these three programmes suffer from unattractive finance models, indicating that the financing model is potentially the most crucial element to ensure high uptake and therefore significant programme impact.

In terms of energy and CO_2 savings, some programmes have had more impact than others. On one end of the spectrum, the Warm Up New Zealand grant has only saved about 1% of average annual total metered energy (although the increase in comfort has been associated with substantial health benefits). However, the CIDD programme alone is expected to reduce energy consumption in the residential sector in France by 26% by 2020. KfW also has high energy savings, amounting to roughly 7,000kWh per year per dwelling, or 30% of the average pre-retrofit consumption.

It is worth putting these in the context of what Jersey hopes to achieve. The Pathway 2050 report sets out ambitious proposals and the aim is to contribute to achieving a reduction in carbon emissions of nearly 80% lower than 1990 levels by 2050 and energy efficiency is the focus of 2 out of 27 Action Statements. In the domestic sector this means a reduction in emissions from 113,144 t CO_2eq in 1990 to 22,629 t CO_2eq in 2050[8]. As the request for quotation (RFQ) for this project states, the majority of Jersey's housing stock pre-dates the introduction of the Building Bye-Laws in 1997, energy efficiency measures applied to these pre-1997 stock of properties are anticipated to contribute to 22% of these carbon savings, compared to 4% from implementing micro-renewables in the domestic sector (solar thermal), 3% from introducing a low-carbon standard through Building Bye-Laws, or improved energy efficiency through behaviour change programme.

These are ambitious targets. The potential impact of fuel switching also needs to be considered, bearing in mind Jersey's low carbon electricity mix.

[8] Appendix 6 of http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Pathway%202050%20Energy%20Plan%20Appendices%20%28size%202mb%29%20DM%2020140325.pdf

2.6 Critical success factors and barriers to delivery

In addition to the key features we analysed the critical success factors and barriers to delivery. Those are presented for each programme in Table 2.

Table 2 Critical Success Factors and Barriers to delivery[9]

Case study	Success factors						Barriers to delivery						
	Clever marketing	Policy commitment	Attractive finance model	Flexibility of delivery	Streamlined programme	Quality assurance	Unattractive finance model	Administrative delays	Complexity	Uncertain funding base	Lack of promotion	Limited scope of technologies	Cost to consumers
UK – Green Deal		✓				(✓)	✓	✓	✓				
Germany – KfW Programme	✓		✓							✓		✓	
US, Kansas - How$mart				✓	✓	✓					✓	✓	
UK – Supplier Obligation		✓	✓		✓				✓			✓	✓
France - éco-PTZ		✓		✓			✓		✓		✓		
UK - Landlord's Energy Saving Allowance				✓			✓				✓	✓	✓
New Zealand – Warm Up	✓				✓							✓	
Oregon, US - Clean Energy Works Oregon	✓		✓		✓					✓			
US - Palm Desert Energy Independence Program							✓			✓			
France – CIDD		✓	✓	✓				✓	✓				

The critical success factors identified based on the 11 case studies include:

- **Clever marketing:** New programmes require effective communication to make them known to the public. New Zealand's Warm Up programme is promoted through the ENERGYWISE website which acts as a gateway to all its energy efficiency programmes. Awareness of the website in New Zealand is very high which is clearly a result of effective communication.
- **Policy commitment:** Policy commitment is needed to deliver the long term certainty which is required for long-term investments into the energy efficiency industry. Programmes that are at risk of being affected by funding cuts or even terminated do not provide this long-term certainty and confidence to stakeholders and investors.
- **Attractive finance model:** The financial proposition needs to be effective in order to achieve sufficient uptake. For loans this means a sufficiently low interest rate (a good example is the

9 It is not possible to add information for UK – Minimum standards for Private Rented Sector as at the time of writing this programme has not yet been introduced.

German KfW programme). Grants need to make a contribution to the overall cost of the retrofit measures that is significant.

- **Flexibility of delivery**: Most energy efficiency programmes are limited to specific technical interventions (e.g. insulation). As the programme develops and the potential for some measures declines or if the uptake has been limited increasing the scope of the measures supported can improve effectiveness. Examples of this can be found in Germany where loans also support single measures after initially only supporting packages of measures. The intention was to make the scheme available to a wider audience.
- **Streamlined programme:** If programmes are transparent and sufficiently simple from the households' perspective they are more likely to achieve their intended impacts.
- **Quality assurance**: Accreditation of installers increases their credibility and trust from consumers. In case of Kansas, US this played an important role.

Barriers to delivery include:

- **Unattractive finance models:** If the financial offering does not appear attractive the take-up of a programme is low. A good example is the Green Deal which involved high interest rates deemed as too expensive.
- **Administrative delays**: In addition to the application procedures from the perspective of the applicant there can be tedious and complex administrative procedures for the other actors involved.
- **Complexity**: If the application process is burdensome and not transparent demand for support from the programme is likely to be limited or at least remain beyond what it could be. A good example is the Clean Energy Works (CEWO) programme in Oregon which simplified the loan application process by using bill payment history as a proxy for credit instead of burdensome credit checks by the banks, allowing more homeowners to be eligible for the loans due to their timely bill payments, although this change only happened recently and we are not aware of any evidence available that would confirm how effective it has been.
- **Uncertain funding base**: Long-term investments into the energy efficiency industry require long-term certainty. Programmes that are at risk of being affected by funding cuts or even terminated do not provide this long-term certainty and confidence to investors. Similarly, programmes that depend on a set target of energy savings to be reached (such as EEOs) can suffer from frequent changes to the target which has repercussions for the industry as well.
- **Lack of promotion:** Particularly in the early stages of a new programme scepticism and lack of buy in from stakeholders can severely limit the uptake of the programme. Examples of this include the resistance from banks in Germany to promote the KfW programmes for energy efficient retrofits because they deemed their profit margins unattractive. Similarly, banks in France appeared to have been too stringent in terms of the eligibility criteria for loans.
- **Limited scope of technologies:** Energy efficiency programmes usually prescribe which kind of measures can be supported. For example, the British Supplier Obligation no longer provides support to low-energy lighting although LED lighting technology provides relatively cheap energy savings.
- **Cost to consumers**: Most energy efficiency programmes providing finance require a customer contribution which can be high (for the able to pay sector) or low (for those on low incomes). We identified the ability to pay as a potential barrier for programmes such as the German energy advice programme which requires a customer contribution that potentially detracts potential applicants.

2.7 Wider critique of energy efficiency programmes

2.7.1 Failure to understand context

Without exception, the schemes analysed above are driven by national targets aiming to reduce emissions; these targets are driven by European or global targets flowing from Kyoto protocol. This is essentially a top-down approach to policy but its implementation to date does not take into account the fact that buildings differ widely. In reality, to reduce energy consumption, every building requires a

specific evaluation which reflects its construction, location, exposure and the state of its existing fabric and services. The problems which have been caused by inappropriate cavity wall insulation have already been raised in the UK parliament and this risks discrediting the entire retrofit process.

2.7.2 Narrow definition of sustainability

Energy efficiency programmes also normally use as their only metric the energy consumed (or carbon emitted) by buildings in use. This fails to recognise that retrofit work leads to an immediate spike in emissions from the embodied energy of carrying out the work itself –so the materials used and the way in which the work is carried out (labour transport impact etc.) both need to be considered in order to minimise impact and to maximise the net benefits.

Furthermore, energy use is not the only aspect of sustainability which is important. The use of increasingly scarce resources needs to be considered and retrofit programmes can make a positive contribution by specifying and using recycled or renewable resources where possible rather than depleting stocks of metals and petrochemicals. The impact on waste streams can be significant and other environmental consequences may result from the retrofit process, which changes the overall assessment.

Overall, the net energy/emissions savings over the life span of an insulation measure significantly above the embodied carbon emissions and those linked to installation. A recent study shows that there are however significant differences between the different types of insulation materials that can be used.[10]

Lastly, other policy goals can also be factored into energy efficiency programmes. Whilst some of the programmes targeted fuel poverty, it is rare to see local employment included as a metric for retrofit schemes – the best way to tackle fuel poverty is to reduce poverty. Retrofit at scale can provide significant opportunities for the long term unemployed and administrative opportunities for people with physical disabilities. Conservation of older building stock is an important priority in Jersey so the retrofit process should be used to enhance and protect older buildings and not cause damage to heritage.

2.7.3 Limited focus of measures

In terms of delivery, many of the schemes analysed, and especially the grant schemes, are largely measure-specific. They thus promote a limited palette of retrofit measures and do not recognise the fact that buildings are integrated – so a change to building fabric may require alterations to building services, or changes to adjacent areas of building fabric.

For example, solid wall insulation reduces heat demand so adjustments are needed to the heating system in order for the full savings to be realised – this may be a simple TRV, or radiators may need to be resized or a boiler replaced. This measure also reduces ventilation, in some cases below legal limits set out in Building Regulations, so ventilation must be addressed or there will be negative consequences for the health of building fabric or the occupants. Lastly, improving the thermal performance of any element of building fabric will make other areas relatively cooler – so condensation may appear in places which previously did not suffer from this problem – an issue which is exacerbated by reduced ventilation.

2.7.4 The opportunity in Jersey

To date Jersey have retrofitted nearly 2,000 homes of vulnerable people. As Jersey considers a future programme to carry out larger scale upgrades, there is an opportunity to learn from the experiences of programmes elsewhere and to design an effective and appropriate retrofit solution for the island's building stock. In doing so, there is an opportunity to contribute towards a range of other policy goals and to ensure that negative unintended consequences are avoided altogether.

There is also an opportunity to design a programme in such a way that costs to the States of Jersey are minimal. This is explored further in Section 8.

[10] N Pargana, MD Pinheiro, JD Silvestre, J de Brito (2014): Comparative environmental life cycle assessment of thermal insulation materials of buildings. Energy & Buildings 82, pp. 466-481

3 Measures analysis

In order to determine in what areas of the economy capacity may need to increase, it is necessary to understand which measures are most likely to mitigate carbon emissions, reduce fuel poverty and contribute to energy security on the Island.

The majority of energy demand in most buildings is for space heating. Space heating in Jersey is delivered mainly by means of electrical resistance heating, oil and LPG. Gas is also used, as a manufactured Liquid Petroleum Gas/Air mixture (LPG/Air). All these systems are relatively expensive, and gas costs several times that of mainland UK[11]. Jersey has a low-carbon electricity supply (from predominantly nuclear generation in France) so a switch from gas or oil to electric heating will result in significant carbon savings. The savings achievable in relation to hot water use are relatively small by comparison. Savings can be achieved by - say - lower flow shower heads and smaller baths but these can be unpopular. Insulation of hot water cylinders can result in savings but it is rare these days to find a poorly insulated cylinder.

Appliance efficiency tends to improve naturally over time as appliances wear out and are replaced, with more efficient models produced to more stringent performance standards. Lighting efficiency is also improving rapidly now that LED replacements for conventional lamps are becoming more widely available.

Using our experience of retrofit and applying this to the Jersey context, we estimate that there are 7 key measures which could deliver substantial savings in space heating demand and these are ranked in order of energy saved

1. Cavity wall insulation where missing, where appropriate
2. Limited solid wall insulation, where appropriate
3. Loft insulation - installation or upgrade (if below 100mm) as needed to remaining properties
4. Window upgrade
5. Replacement of hydrocarbon boilers with air source heat pumps or electrical resistance heating
6. Replacement of electrical resistance heating with air source heat pumps[12]
7. Heating control upgrade

Each of these measures raises different issues which need to be managed in any large scale roll-out. The Responsible Retrofit report by the STBA provides guidance on specific measures and how potential unintended consequences can be avoided.[13] To decide whether a measure is appropriate requires an accurate survey – and this gives the States of Jersey an opportunity to shape the decision-making process in a way that ensures that all relevant factors are taken into account. (See Section 8).

Stock Data

At present we do not have a clear idea of the age and condition of the domestic building stock in Jersey.

The Kema Report (2007)[14] presents a total dwelling number of 38,376 in 2005. We may safely assume that dwellings constructed since this date were built to modern building regulations and so do not require retrofit of building fabric, though some may be appropriate for retrofit of heating services, and potentially lighting upgrades.

The Purcell Report (2013)[15] presents a total dwelling number of 44,698. We understand that new construction is currently running at a rate of 500 dwellings pa – so there is a discrepancy between these two reports which needs to be resolved. The Kema Report (2007) does not record the numbers of properties constructed before 1900 – and this is likely to be considerable.

---

11 http://www.jsygas.com/PDFs/jsygas_domestictariff.pdf (March 2015), http://www.energysavingtrust.org.uk/content/our-calculations (Feb 2015)
12 As Jersey has low-carbon electricity supply, a change from electrical resistance heating to an Air Source Heat Pump (ASHP) will reduce emissions by 2/3 (based on a Coefficient of Performance of 3 for ASHPs) but starting from a low initial level. Reductions will be much greater when switching from oil or LPG to an ASHP. The order could change if ranked instead by emissions, or by cost.
13 STBA (2012): Responsible Retrofit of Traditional Buildings. Online: https://www.spab.org.uk/downloads/STBA%20RESPONSIBLE-RETROFIT.pdf
14 States of Jersey, Energy Efficiency Study, G06-1643 Rev 1.2, KEMA Limited, 2007
15 Research Project Report, Energy Efficiency In Historic Buildings In Jersey, Historic Buildings Energy Study Jersey Purcell, July 2013

The breakdown of tenure presented in Table 2-4 of the Kema Report (2007) is as follows:

Table 3 Tenure of housing

Tenure	Households
Owner-occupier	18,026
Social-rented	5,017
Private Rental	7,854
Tied (Staff)	1,700
Private Lodging	1,539
Lodging House	1,268
Other	149

If we take the able-to-pay sector to include owner-occupied property and the PRS, and use data from the Kema report (2007) this gives the percentage in scope as 72.8%[16] out of a total stock of 38,376. Therefore the total number of dwellings in the able to pay sector would be estimated at 27,935[17]. Data on housing stock is here taken from the Kema Report (2007), as only older buildings will have unfilled cavities or solid walls or single glazed windows. For example no unfilled cavity walled buildings will have been constructed since 2007. The data from the more recent Purcell Report (2013) by contrast is later used for measures (such as ASHPs) which could be applied to any building. The Purcell Report has a higher figure for total dwelling stock (44,698), so using the percentage for tenure from the Kema report (2007) and multiplying it by the stock figure from the Purcell report we get a total for the able-to-pay sector of 72.8% x 44,698 which equals 32,540.

After 1 year of full operation, the survey process (see Section 8 - Recommendations) will yield much better sample data, which can then be applied across the dwelling stock, and the accuracy of this data can be improved year-on-year and used to calibrate the assumptions used below.

Carbon Factors

Different fuels give rise to different amounts of CO_2 emissions per unit of energy delivered. The carbon factors in the table below set out the kilograms of CO_2 emitted per kWh of energy delivered. As is clear from the table, coal, oil and gas have much higher emissions than electricity, due to the low carbon, nuclear, electricity supplied from France. (This is in direct contrast to the UK where the situation is reversed and electricity has three times the emissions of gas/oil/coal per kWh.) These factors can be used to assess the emissions from different fuels, and to calculate the impact on carbon emissions of switching from one fuel to another to provide space or water heating.

Table 4 Carbon Factors[18]

Fuel	$kgCO_2/kWh$
Coal	0.300
Fuel oil	0.260
LPG	0.210
Electricity	0.092

16 This figure is the number of stock in owner occupied plus private rented sectors divided by the total in Table 3.
17 This figure is obtained by multiplying the total number of households presented on P13 of the Kema Report (2007) of 38,376 by the tenure percentages given in this table – which is based on 2001 data
18 Source: Government of Jersey

Average domestic energy use

The Kema Report (2007)[19] sets out average total energy use (not just space heating) broken down into electricity, gas and heating oil:

Table 5 Fuel Consumption per Household

Fuel	Total Domestic Consumption	Average per Consuming Household per Year
Electricity – All Domestic Consumers	296,200 MWh	7,720 kWh
Electricity -- Standard Tariff		6,500 kWh
Electricity Comfort Heat		9,000 kWh
Gas – All Homes	71,800 MWh	8,000 kWh
Heating Oil (kerosene)	26,600 tonnes	

It is worth noting that annual space heating demand per property is higher in the UK (14,000kWhpa[20]) but Jersey has both a warmer climate and a high prevalence of smaller properties (flats and maisonettes) so average demand is likely to be significantly lower. Gas is stated as 8,000kWhpa in the table above but there may be supplementary electrical resistance heating in the form of room heaters so we have used the figure of 9,000kWhpa (average electricity comfort heating demand) as the basis of our calculations below.

Source of space heating

The RFQ provided the following breakdown of space heating sources:

Table 6 Breakdown of space heating sources

Fuel	%
Fuel oil	38%
LPG	13%
Electricity	49%

Data from Jersey Gas provided during the course of the project suggests that 4,300 dwellings in Jersey are heated by gas (LPG). This is approximately 10%. We have therefore reapportioned the remaining 3% between electricity and oil.

For electrical heating, a small proportion will have Air Source Heat Pumps (ASHPs). The performance of ASHPs is measured by the Coefficient of performance (CoP). A CoP of 3 means the heat pump produces 3 units of heat energy for every 1 unit of electricity it consumes. Within temperature ranges of -3°C to 10°C, the CoP for many machines is fairly stable at 3-3.5 so we have assumed a CoP of 3[21] for ASHPs in our calculations of the carbon savings arising. There is no data on the penetration of ASHPs in Jersey but we understand from the stakeholder consultation that the volume of installation is increasing – we have used a figure of 2% but this can be revised once better data becomes available. Overall, the breakdown we have used is therefore as follows:

19 Table 2-1.
20 Energy Consumption in the UK (2015) Chapter 3: Domestic energy consumption in the UK between 1970 and 2014 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/449134/ECUK_Chapter_3_-_Domestic_factsheet.pdf
21 i.e. for 1 unit of electricity input 3 units of heat output

Table 7 Breakdown of Heating sources in ASHP

Fuel	%
Fuel oil	39%
LPG	10%
Electricity (resistance heating)	49%
Electricity (ASHP)	2%

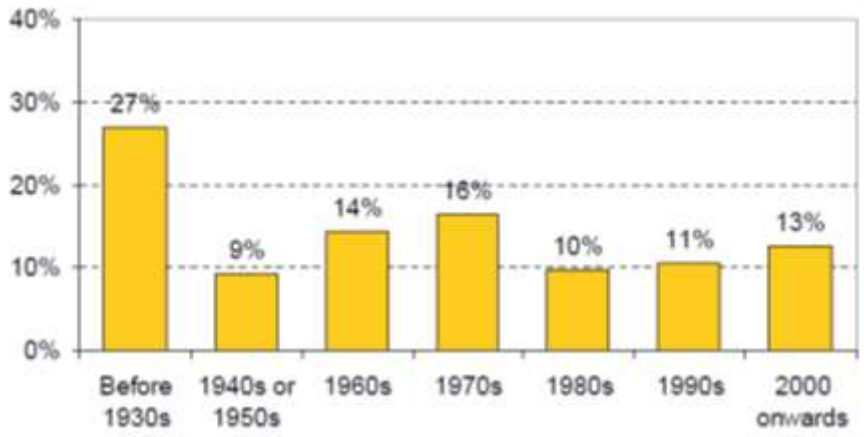
3.1 Cavity wall insulation

For properties constructed since the 1980s it has been customary to include insulation and double glazing, so these can be discounted from the target figure.

Cavity wall construction began in Jersey in the 1940s (later than elsewhere in the UK). We understand that solid wall construction continued into the 50s and even the 1960s in Jersey.

The 2008 Jersey Annual Social Survey (JASS)[22] included a question about property age, noting that the results are based on people's judgement and not on evidence, and that 1 in 6 did not know when the property they lived in was built.

Figure 1 Distribution of property ages (percentages) [23]



Discounting the properties built before the 1930s (27%) and after 1985 (29%) as after this point some insulation was mandatory, and splitting the properties built in the 40s and 50s into 50% solid and 50% cavity construction, we arrive at a net figure of 40% of dwellings constructed with unfilled cavity walls.

Using the total able-to-pay sector number of dwellings from the Kema Report (2007) of 27,935[24] and applying this 40% constructed during the relevant period, we arrive at a net figure of 11,174 dwellings constructed with unfilled cavity walls, which fall within the able-to-pay sector.

The Kema Report (2007) assumes that 35% have already been retrofitted. This will have risen in the meantime so let us assume 40%, leaving perhaps 6,704 dwellings to be retrofitted with CWI. However, 37% of Jersey's dwellings are purpose-built flats, maisonettes or conversions so the complications of tenure will reduce the number which could receive CWI still further. Assuming that some can be negotiated but that some independent dwellings cannot have CWI for other technical reasons, we apply a 25% discount figure to arrive at a net potential of 5,028 dwellings in the able-to-pay sector.

The Energy Saving Trust (EST) estimates that 1/3 of heat energy escapes through uninsulated cavity walls. (This of course depends on the thermal performance of the rest of the structure including

22 http://www.gov.je/Government/Pages/StatesReports.aspx?ReportID=855
23 Figure 3.1 of the 2008 Jersey Annual Social Survey (JASS)23
24 No unfilled cavity walled buildings will have been constructed since 2007 so we can use this figure as the baseline here and the next 3 sections

windows, roof and air tightness). If CWI reduces heat loss through walls by 50%[25] then we may assume that CWI could save 1/6 of energy costs and CO_2 emissions from space heating.

Table 8 Estimated savings available from CWI in the able-to-pay domestic sector

Type of heating	Number of properties	kWh saving pa per property	Total energy saving (MWhpa)	Carbon factor (kg/kWh)	Total carbon saving (kgpa)
Oil	1,961	1,500	2,941	0.260	764,759
LPG	503	1,500	754	0.210	158,382
Electrical resistance	2,464	1,500	3,696	0.092	339,993
ASHP	101	500	50	0.092	4,626
TOTAL	5,028		7,441		1,267,760

This table includes no allowance for the comfort factor (direct rebound effect) – where some of the savings may be taken by running the building at a higher temperature than before the intervention. A discount of at least 30%[26] should therefore be applied to the theoretical savings potential and a further discount at a macroeconomic level for any indirect rebound effects (spending the savings elsewhere with associated carbon emissions).

3.2 Solid wall insulation

According to the estimate in JASS (2008), 27% of Jersey's dwelling stock was constructed before the 1930s. As cavity wall construction began in the 1940s but solid wall construction continued into the 1960s, we estimate that 32% of the stock (38,376 from the Kema Report (2007) is therefore likely to be solid wall, making a total of 12,280.

72% are likely to fall within the able-to-pay sector, making a net total of 8,841. Of these, some will be conversions and many will be terraced properties, and some will be listed.

We understand that of 4,249 buildings recommended for historic listing, 80% are residences or commercial[27], so assuming that 60% are residential we arrive at a net figure of 2,039 residences which are unlikely to be suitable for any form of solid wall insulation as this would cover up historic fabric. Subtracting this from the total figure above for solid wall dwellings in the able-to-pay sector leaves a net figure of 6,802 dwellings in this sector which in theory could be suitable for SWI.

However, terraced buildings will not be suitable for external wall insulation, at least at the front, and many others will not be suitable for internal wall insulation due to exposure. There may also be other technical constraints and some will be conversions, so allowing a further discount of 25% we arrive at a net potential of 5,102 solid wall dwellings in the able-to-pay sector which could be suitable for SWI, be it internal or external.

Savings from SWI are not well documented due to the small number of SWI installations and we can only rely on estimates. A literature review by BRE illustrates that there are considerable uncertainties around the reliability of SWI energy savings estimates.[28] The most recent published analysis that models the potential energy savings from SWI is a study commissioned by the UK Committee on Climate Change.[29] This study has revised the savings estimates for SWI downwards following emerging evidence that the previous assumptions were overly optimistic. The Energy Saving Trust has undertaken a two phase field trial of SWI. Analysis of the first phase, with a sample of nearly 100 properties, found that un-insulated solid wall U values were on average 32% lower than otherwise assumed by SAP.[30] The revised modelling across the UK housing stock, taking into account improved

25 If the u-value reduces from 1.50 to 0.55 then heat loss in theory could reduce by 2/3 but allowing for thermal bridging and imperfections in installation it would be more prudent to assume 50%.
26 http://www.eea.europa.eu/publications/achieving-energy-efficiency-through-behaviour
27 As advised by Principal Historic Environment Officer 23/6/15
28 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/396363/solid_wall_insulation_literature_review.pdf
29 http://www.theccc.org.uk/wp-content/uploads/2013/12/Review-of-potential-for-carbon-savings-from-residential-energy-efficiency-Final-report-A-201213docx.pdf
30 Unpublished evidence quoted in http://www.theccc.org.uk/wp-content/uploads/2013/12/Review-of-potential-for-carbon-savings-from-residential-energy-efficiency-Final-report-A-201213docx.pdf

boiler efficiencies, the weighted average savings for external SWI are 6,700kWh/year i.e. around 4,300 kWh/year under Jersey conditions with the lower energy consumption taken into account.[31] The Bonfield Review is currently considering the efficacy of SWI and it is possible that the savings estimates will be reduced further.

An alternative and potentially more conservative approach is based on a simple engineering calculation which we use in this report given the uncertainties associated with SWI: If 1/3 of heat is lost through solid walls[32], and SWI reduces this loss by 75%[33] (there is unavoidable thermal bridging in most cases) then we may assume that SWI could save 25% of energy costs and CO_2 emissions from space heating.

Table 9 Estimated savings available from solid wall insulation in the able-to-pay domestic sector

Type of heating	Number of properties	kWh saving pa per property	Total energy saving (MWhpa)	Carbon factor (kg/kWh)	Total carbon saving (kgpa)
Oil	1,990	2,250	4,477	0.260	1,164,021
LPG	510	2,250	1,148	0.210	241,070
Electrical resistance	2,500	2,250	5,625	0.092	517,496
ASHP	102	750	77	0.092	7,041
TOTAL	5,102		11,326		1,929,627

This table includes no allowance for the comfort factor (direct rebound effect) – where some of the savings may be taken by running the building at a higher temperature than before the intervention. A discount of at least 30% should therefore be applied to the theoretical savings potential and a further discount at a macroeconomic level for any indirect rebound effects (spending the savings elsewhere with associated carbon emissions).

3.3 Loft insulation

Loft insulation is difficult to evaluate because many lofts have been partially insulated, some insulation has become degraded or moved over time and, while a little insulation goes a long way, it takes a lot more insulation to achieve a little more heat retention. Many dwellings have a “room in the roof” – or at least lack a flat ceiling on the top floor which lends itself to the easy installation of loft insulation.

In accordance with the Building Bye-Laws, properties constructed after 1985 will have at least some insulation fitted at the time of construction. 71% of properties were constructed before 1985[34]. Based on the 2005 figure in the Kema Report (2007) of 38,376, 71% gives a total of 27,247, of which 72% would fall within the able-to-pay sector, leaving a net total of 19,617. Flats (purpose build and conversions) account for 37%[35] of total dwellings and only top floor flats will have a loft above so based on an assumed average 3 storey flat we subtract 70% of these flats to yield a net figure of 14,536.

Let us assume that 10% of these properties do not have a flat ceiling suitable for loft insulation, leaving 13,082. However, the majority of these will already have had insulation retrofitted, either 100mm, 150mm or the modern recommended level of 275mm. The Kema Report (2007) states that 54% of homes in Jersey have a fully insulated loft but then assumes that the remainder can achieve a full saving, which is unlikely to be the case. Given that most homes in scope will have some insulation at least, and allowing for the fact that the savings from top-up insulation are limited, we estimate that this amounts to 15% of homes in scope having no insulation at all at present (survey will soon allow this figure to be better calibrated). 15% of 13,082= 1,963 (equivalent).

31 http://www.theccc.org.uk/wp-content/uploads/2013/12/Review-of-potential-for-carbon-savings-from-residential-energy-efficiency-Final-report-A-201213docx.pdf
32 http://www.buildingconservation.com/articles/solid-wall-construction/solid-wall-construction.htm
33 U-value reducing from 1.5 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/396363/solid_wall_insulation_literature_review.pdf) to 0.30 (modern building regulations requirement) is 80% but allow for thermal bridging at reveals so 75%.
34 JASS 2008 assuming constant build rate through the 1980s
35 Kema Report Table 2-3 (7,510 + 5,799) / 35,562

We can assume that 275mm of mineral wool will reduce the heat loss from a completely uninsulated roof by 80%. If 25% of heat is lost through an uninsulated roof[36], and this is reduced by 80%[37] then the net saving is 20%.

Table 10 Estimated savings available from loft Insulation in the able-to-pay domestic sector

Type of heating	Number of properties	kWh saving pa per property	Total energy saving (MWhpa)	Carbon factor (kg/kWh)	Total carbon saving (kgpa)
Oil	766	1,800	1,378	0.260	358,287
LPG	196	1,800	353	0.210	74,201
Electrical resistance	962	1,800	1,731	0.092	159,286
ASHP	39	600	24	0.092	2,167
TOTAL	1,963		3,486		593,941

Again, this table includes no allowance for the comfort factor (direct rebound effect) – where some of the savings may be taken by running the building at a higher temperature than before the intervention. A discount of at least 30% should therefore be applied to the theoretical savings potential and a further discount at a macroeconomic level for any indirect rebound effects (spending the savings elsewhere with associated carbon emissions).

3.4 Window upgrade

According to the estimate in JASS (2008), 66% of Jersey's dwelling stock was constructed before the 1980s, noting double glazing was customary after 1985. The Kema Report (2007) estimates that 16% of properties have no double glazing at all and that 16% have partial double glazing. This indicates (as is confirmed through conversations with Historic Environment and Building Control) that replacement double glazing has already been carried out on a wide scale, and this will have continued since 2007.

Based on the Kema Report (2007) stock of 38,376 and 72% in the able to pay sector, a residual 16% of properties this would amount to 4,420 dwellings in scope with single glazing.

Some of these will have historic glass and the Historic Environment policy is for this to be retained. However, the majority of savings can still be achieved through the use of secondary glazing[38], so we will still base our calculations on this full potential. Some listed buildings (say 30%) will not be suitable for any form of secondary glazing so we arrive at a net figure of 3,094 dwellings which may still be suitable for window upgrade (secondary glazing, glazing upgrade or window replacement).

If 20% of heat is lost through windows[39], and upgrade reduces this loss by 60%[40] then we may assume that window upgrade could save 12% of energy costs and CO_2 emissions from space heating.

36 http://www.nia-uk.org/consumer/
37 U-value reduces 2.50 to 0.16 eg http://www.home-extension.org/How-to-insulate-a-home-extension/roof-insulation.php in theory over 90% but need to allow for thermal bridging at junctions with walls, and at eaves 275mm is not normally possible as crossflow ventilation must be maintained..
38 Historic England: P 51 https://content.historicengland.org.uk/images-books/publications/energy-efficiency-historic-buildings-ptl/eehb-partl.pdf/
39 http://www.nia-uk.org/consumer/ quoting EST
40 U-value single glazed window 4.3 and with low-e secondary glazing 1.8 (see above HE report). 1.8/4.3 is approximately 40%.

Table 11 Estimated savings available from Window Upgrade in the able-to-pay domestic sector

Type of heating	Number of properties	Energy saving per property (kWh/pa)	Total energy saving (MWhpa)	Carbon factor (kg/kWh)	Total carbon saving (kgpa)
Oil	1,207	1,080	1,303	0.260	338,830
LPG	309	1,080	334	0.210	70,172
Electrical resistance	1,516	1,080	1,637	0.092	150,636
ASHP	62	360	22	0.092	2,049
TOTAL	3,094		3,297		561,687

This table includes no allowance for the comfort factor (direct rebound effect) – where some of the savings may be taken by running the building at a higher temperature than before the intervention. A discount of at least 30% should therefore be applied to the theoretical savings potential and a further discount at a macroeconomic level for any indirect rebound effects (spending the savings elsewhere with associated carbon emissions).

3.5 Replacement of Hydrocarbon heating by Air Source Heat Pumps or Electrical Resistance Heating

The breakdown of fuel sources assumed in these calculations is provided in Table 7 at the start of Section 3 and reproduced below.

Fuel	%
Fuel oil	39%
LPG	10%
Electricity (resistance heating)	49%
Electricity (ASHP)	2%

Data on housing stock is here taken from the Purcell report, as it deals with more recent housing than the Kema Report does. As noted earlier, any building may be modified to include an ASHP, but only older buildings (as included in the Kema Report (2007)) will have unfilled cavities or solid walls or single glazed windows. Based on a total 2013 stock of 44,698 (as modern buildings can have ASHPs) and 72% in the able to pay sector and 49% using Oil or LPG, we estimate that there are 15,769 dwellings in scope using heating oil or gas for space heating. As Jersey's electricity is so low carbon, substantial savings are available from switching to electrical forms of heating – either Air Source Heat Pumps or Electrical Resistance Heating.

According to manufacturers, ASHPs are claimed to be three times more efficient than electrical resistance heating, on average –some manufacturers claim higher savings. As Jersey also has a relatively warm climate, heat pumps will run more efficiently than in mainland UK as the heat source (air) is at a higher temperature so the pump has to do less work to raise this to a temperature high enough to be useful for space heating.

However, there will be constraints in terms of how many of these properties can be converted to ASHPs as there may be restrictions on siting air handling units and in some cases the visual impact may make it impossible. There are also constraints for flats (new build or conversions) and maisonettes which together comprise 37% of the dwelling stock. The cost of installing ASHPs is also much higher than installing electrical resistance heating. We therefore estimate that 50% of hydrocarbon properties could be converted to ASHPs and that the remaining 50% would be converted to electrical resistance heating.

Fuel switching from oil or gas to electrical resistance heating will not save a significant amount of energy delivered (measured in kWh) but it will save carbon emissions as electricity is low carbon in Jersey.

Table 12 Estimated savings available from hydrocarbon replacement in the able-to-pay domestic sector

Change of heating	Number of properties	Heating demand (kWh/pa)	Total energy saving (MWh/pa)	Carbon factor (kg/kWh)	Carbon factor of electricity (kg/kWh)	Total carbon saving (kg/pa)
Oil -> Resistance	5,875	9,000	0	0.26	0.092	8,882,585
LPG -> Resistance	2,010	9,000	0	0.21	0.092	2,134,381
Oil -> ASHP	5,875	9,000	35,248	0.26	0.092	12,125,433
LPG -> ASHP	2,010	9,000	12,059	0.21	0.092	3,243,776
Total	15,769		47,307			26,386,175

3.6 Replacement of Electrical Resistance Heating by Air Source Heat Pumps

The breakdown of fuel sources assumed in these calculations is provided at the start of Section 3 and reproduced below.

Fuel	%
Fuel oil	39%
LPG	10%
Electricity (resistance heating)	49%
Electricity (ASHP)	2%

Based on a total 2013 stock of 44,698 (as modern buildings can have ASHPs) and 72% in the able to pay sector, we estimate that there are 15,769 dwellings in scope using electrical resistance heating.

There will be constraints in terms of how many of these properties can be converted to ASHPs as there may be restrictions on siting air handling units and in some cases the visual impact may make it impossible. There are also constraints for flats (new build or conversions) and maisonettes which together comprise 37% of the dwelling stock. The cost of installing ASHPs is also much higher than installing electrical resistance heating. We therefore estimate that only 50% of electrically heated properties could be converted to ASHPs. This yields a net potential figure of 7,490 dwellings.

Table 13 Estimated savings available from replacement of electrical resistance heating with ASHPs in the able-to-pay domestic sector

Number of properties	Heating demand (kWh/pa)	New heat demand (kWh/pa)	Total energy saving (MWhpa)	Carbon factor of electricity (kg/pa)	Total carbon saving (kg/pa)
7,490	9,000	3,000	44,940	0.092	4,134,480

3.7 Improved heating controls

Improved heating controls include:

- system timers;
- system thermostats; and
- Thermostatic Radiator Valves.

Where complete systems are replaced (see 3.5 and 3.6 above) it is reasonable to assume that adequate controls will be fitted at the same time. To avoid double counting, the dwellings for which this heating replacement is estimated to occur should be subtracted from the potential total. However, it is important to recognise that this is a low cost measure with a rapid payback where good controls are lacking, so it may be a survey recommendation to install controls independently of any (later) system replacement. In estimating savings we have therefore made a gross rather than net estimate.

All heating systems installed during the last decade should have good controls so, using the Kema Report (2007) total number of dwellings of 38,376 and the 72% in the able to pay sector, the net figure in scope is 27,630 dwellings.

The Kema Report (2007) made an estimate based on a BRE report suggesting that around 10%[41] of UK houses did not have adequate heating controls so in absence of similar statistics in Jersey one must fall back on UK figures. 10% of 27,630 is 2,763 dwellings.

It is reasonable to assume that between 5% and 10% of space heating costs could be saved by the installation of adequate heating controls – so say 7.5%[42]. Note that ASHPs have not been included in the following table as it may be reasonably assumed that they will have been fitted with effective controls.

Table 14 Estimated savings available from improved heating controls in the able-to-pay domestic sector

Type of heating	Number of properties	Energy saving per property (kWh/pa)	Total energy saving (MWh/pa)	Carbon factor (kg/kWh)	Total carbon saving (kgpa)
Oil	1,050	675	709	0.260	184,264
LPG	359	675	242	0.210	50,915
Electrical resistance	1,354	675	914	0.092	84,075
TOTAL	2,763		1,865		319,255

41The Kema Report (2007) provides no reference but http://www.bre.co.uk/filelibrary/pdf/rpts/Space_and_WaterHeating.pdf from 2005 states "Room thermostats switch off a heating system if the room temperature rises above the demand temperature. Thermostatic radiator valves (TRVs) provide temperature control for each radiator in the system. The latter is less common than the former but around 90% or so of the most popular systems have access to at least one of these temperature controls"

42 http://www.energysavingtrust.org.uk/domestic/thermostats-and-controls

Table 15 Summary of CO_2 abatement potential

Measure	CO_2 saving Gross (kgpa)	CO_2 saving net of comfort factor (kgpa)	Longevity of measure (years)	Risks
Cavity Wall Insulation	1,267,760	887,432	~30-40 years[43]	Technical risks in exposed areas
Solid Wall Insulation	1,929,627	1,350,739	~30-40 years[43]	Technical risks Heritage risks
Loft Insulation	593,941	415,759	~30-40 years[43]	Ecology risks
Window upgrade	561,687	393,181	~20 years[43]	Heritage risks
Hydrocarbon replacement by resistance or ASHP	26,386,175	26,386,175	~20 years	Visual impact Waste streams
Change 50% existing electrical resistance heating to ASHP	4,134,480	4,134,480	~20 years	Visual impact Waste streams
Heating controls	319,255	319,255	~12 years[43]	Nil

It is clear from the above table that the most effective way to reduce carbon emissions through retrofit of domestic property is to eliminate the use of hydrocarbon fuels for space heating.

Note that these savings **cannot be summed** because they interact. The installation of one measure affects the savings which can be achieved from another – so the savings from wall insulation will be reduced if a more efficient heating system is also installed. There is no empirical basis on which to estimate the interactions between these measures but if the interaction were of the order of 10% on average, given the dominance of one measure (hydrocarbon replacement), then the total saving available would be in the order of 30,000 tonnes of CO_2 per annum once all measures are implemented.

The "comfort factor" shown in the table above is an example of the direct rebound effect - where dwellings were previously under-heated and are run at a higher temperature after retrofit because it is more affordable to do so. This is currently assumed to be around 30%[44] of all savings achieved from space heating measures. While this has positive health and social effects, the savings must be discounted by this sum to be realistic so the first four measures in this table have been discounted. In addition, the indirect rebound effect is where savings on fuel bills are spent in other ways which themselves give rise to increased emissions. Taken together, it is likely that these effects account for 50% of some savings measures[45]. There is no comfort factor applied to fuel switching or heating controls and no indirect rebound effect for fuel switching as this does not affect the cost of heating significantly in Jersey.

43 https://www.ofgem.gov.uk/ofgem-publications/83100/energycompaniesobligation-measures-pdf
44 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48407/5505-how-the-green-deal-will-reflect-the-insitu-perfor.pdf
45 http://www.eea.europa.eu/publications/achieving-energy-efficiency-through-behaviour, http://eng.janrosenow.com/uploads/4/7/1/2/4712328/rosenow_galvin_2013_evaluating_the_evaluations-_evidence_from_energy_efficiency_programmes_in_germany_and_the_uk.pdf

4 Assessment of current skills and capacity in the Jersey retrofit market

If retrofit is to be scaled up and delivered at greater volume and speed, it is essential that there is sufficient capacity at all levels in the local economy, from surveyors through to designers to materials suppliers and tradespeople. Bottlenecks will distort the market and can cause the retrofit process to become discredited if the process is not handled correctly.

It is important to understand that a policy drive to improve energy efficiency in the existing dwelling stock offers the prospect of quality job opportunities, for skilled and qualified employees or business owners. This is not just the case of low paid jobs: there are opportunities for entrepreneurs to capitalise on the demand that will be created. This can offer career paths for young people who are seeking an alternative to work in Jersey's finance sector and contribute to diversity in the economy.

In Jersey the economy of the island is constrained in various ways and resources are necessarily limited. In particular, housing is expensive and labour is limited so the cost of having construction work carried out is relatively high – and while capacity issues can be addressed in part by importing labour from the mainland this is not a long term sustainable solution.

We have examined the question of capacity in three ways:

- Assess the retrofit measures which are most appropriate for Jersey and therefore where capacity may need to be increased
- Carry out an analysis of the construction sector skills review
- Carry out a stakeholder consultation to determine where constraints may lie

The stakeholder consultation addressed broader questions than just skills shortages so these are addressed in Section 5 – only the responses relevant to skills and capacity have been analysed here.

4.1 Key measures for retrofit

In Section 3 the measures likely to be the most effective in reducing carbon emission were set out as follows:

1. Cavity wall insulation where missing, where appropriate
2. Limited solid wall insulation, where appropriate
3. Loft insulation - installation or upgrade (if below 100mm) to remaining properties
4. Window upgrade
5. Replacement of hydrocarbon boilers with air source heat pumps or electrical resistance heating
6. Replacement of electrical resistance heating with air source heat pumps
7. Heating control upgrade

The skills needed to deliver increased volumes of installation of each of these measures therefore include:

- CWI installers
- SWI Installers
- Window fitters
- Plumbers
- Electricians

The balance between supply and demand of these trades is explored further in the subsections below.

4.2 Construction sector skills review

4.2.1 Report Summary/Review

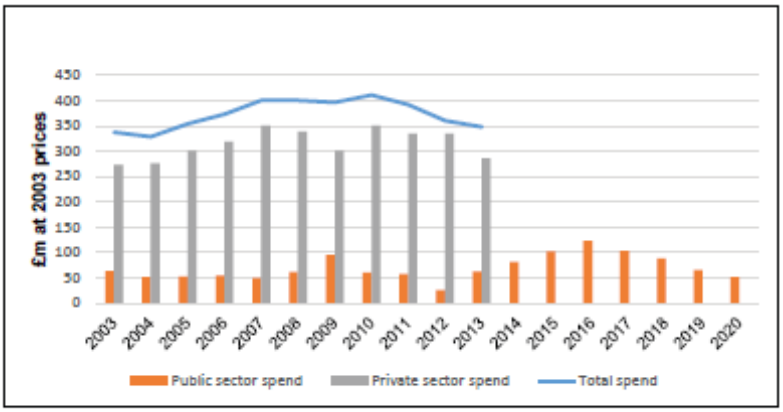
The Skills Review of Jersey's Construction Sector was prepared for Skills Jersey and the Jersey Construction Council in 2014. This analysed the state of the construction sector in Jersey, examining demand, employment, productivity, staff qualifications and earnings. It also analysed the skills needs as identified by a questionnaire sent to firms in Jersey. Furthermore, it evaluated the provision of construction education and training in Jersey and its uptake by young people and firms. It also identified skill shortages for particular types of jobs.

While the Skills Review did not contain specific information on energy efficiency and building retrofits, it does provide important background information on the types of skills available in Jersey and the likely need for further training.

4.2.2 The Sector

Jersey's Construction Sector employs over 4,700 staff (9% of the island's workforce) and contributes 6% of Jersey's GVA. In addition, there are approximately 500 consulting professionals (architects, quantity surveyors, engineers, etc.). There are over 1,200 businesses in the Sector, but only 30 companies employ more than 20 people and the vast majority employ less than five. 60% of staff are skilled tradespeople and 96% are locally qualified although only 38% were born in Jersey. Despite the recession, wages have kept pace with inflation and remain considerably higher than those in the UK.

Figure 2 Total construction spend



Source: States of Jersey Statistics Unit and Jersey's Fiscal Policy Panel Annual Report November 2013

In recent months, confidence in the Sector has been rising and many firms are becoming concerned that they may not be able to recruit the staff they will soon need. The research for this study showed that firms would be generally looking for experienced and/or qualified staff. Much of the current optimism in the Sector is due to the announcement by the public sector that it will rapidly increase its spending on construction projects to around £1.2bn over the next decade. This will create a number of recruitment problems for the Sector. Already some vacancies are hard to fill, for example:

- Plumbers
- Carpenters
- Professionals such as quantity surveyors and engineers
- Supervisors and project managers

As the new work comes on line, the following trades are also expected to become in short supply:

- Bricklayers
- Plasterers
- Painters & decorators
- CAD / Draughts-people

4.2.3 Technical skills

Technical Level (Tech Levels) qualifications at NVQ Level 3, are primarily designed for 16-year-old students who have a clear idea about the occupation they wish to pursue. They are vocational and equip students with the specialist knowledge they need for a specific recognised occupation. In the area of construction they include courses in:

- Construction and the Built Environment
- Bench Joinery
- Bricklaying
- Building Services Engineering for Technicians
- Electrical Installation
- Gas Utilisation
- Heating and Ventilating
- Painting and Decorating
- Plant Maintenance
- Plastering
- Plumbing and Heating
- Refrigeration, Air Conditioning and Heat Pump Systems
- Site Carpentry
- Stonemasonry
- Wall and Floor Tiling

The table below[46] from a recent Skills Review of Jersey Construction Sector shows the recruitment required within skilled trades to meet the identified shortfall

Table 16 Staff to be recruited into the sector during the next two years

	500 extra	Replacement of leavers / retirees	Total
1. Managers, Directors and Senior Officials	10	20	30
2. Professionals	10	20	30
3. Associate Professional & Technical	10	16	26
4. Administration & Secretarial	20	16	36
5. Skilled trades	400	160	560
6. Caring & Leisure	0	0	0
7. Sales & Customer Service	0	0	0
8. Process, Plant & Machine Operatives	20	26	46
9. Elementary	30	30	60
Total	500	288	788

The analysis in the Skills Review suggests that the following staff would need to be recruited over the next two years:

- 70 Plumbers
- 180 Carpenters
- 35 Plasterers
- 100 Painters & decorators
- 50 Bricklayers
- 30 managers and supervisors
- 55 professionals and associate professionals

46 Table 21 from Skills Review of Jersey Construction Sector, http://www.skills.je/userfiles/files/SKILLS%20REVIEW%20OF%20JERSEYS%20CONSTRUCTION%20SECTOR%202014%20V2.pdf

4.2.4 Report Recommendations

The need for rapid growth in the workforce comes at a time when there is a growing requirement for high quality well trained staff; largely driven by customer expectations, technology and regulation. It also coincides with a period when the number of people studying construction-related subjects at Highlands College has fallen from 520 in 2008 to 280 in 2013.

To meet the anticipated demand it will be important to:

1. Encourage more young people to pursue a career in the Construction Sector
2. Increase the training capacity for skilled trades staff
3. Help unemployed people join the Sector
4. Improve the productivity of the Sector
5. Be prepared to take action to prevent short term staff shortages

4.2.5 Report relevance to retrofitting – potential gaps

The Construction Skills Review report is focused on the new construction industry, so is not directly linked to the retrofitting of buildings. It may be that a more in-depth look at the skills is required. It may also be that there are more construction requirements in Jersey than have been identified when retrofitting and energy efficiency are considered.

The States of Jersey has observed that there is a lack of skills in traditional window renovation and upgrading of building fabric. Window fitting is not mentioned within the Construction Skills report but there will be a need for skilled window fitters if secondary glazing or glazing replacement is to be carried out in greater volume. It has been noted that plasterers are in very short supply in Jersey with 100% of respondents reporting difficulty in contracting a plasterer, filling this shortfall will be vital if there is going to be an increase in solid wall insulation.

There is a need for not just tradespeople to complete energy efficiency retrofitting work in Jersey but also for professionals in areas such as surveyors, engineers, project managers and supervisors. Currently there are the following relevant professionals listed in Jersey:

- 130 Engineering professionals
- 220 Architects, town planners & surveyors
- 70 Draughtspersons & architectural technicians
- 70 Construction supervisors

This totals approximately 490 professionals within the construction sector that will be key in designing and implementing any retrofitting/energy efficiency programme. The report acknowledges this in relation to the skills above but does not give any detail regarding researchers or manufacturers required for energy efficiency improvements. Neither does it consider any of the building management and monitoring skills that will be required when retrofitting or upgrading buildings. The primary focus is upon the shortfall of skilled and unskilled tradesmen within the construction industry of which there are approximately 3,800 currently in employment (there are also professionals and administrative staff making up the total of 4,700). It is also important to consider facilities managers, and to bear in mind that they have more formal qualifications (and CPD) and better experience. They are also in a position to share information and gain insights by meeting and discussing largely nondomestic energy use.

The Review does not address the question of survey skills. It is worth noting that during the Stakeholder Consultation this was identified as an area where skills were lacking, and from our experience the skills needed for high quality bespoke retrofit survey are lacking elsewhere in the UK.

4.2.6 Conclusion on Construction Sector Skills Review

Retrofit presents a substantial business opportunity and the market will react as demand rises. Certain skills may be already in short supply while there is spare capacity in others. Initially, increased demand can be met by imported labour but in the medium term, training in the skills needed for retrofit will be required. If properly planned, the existing facilities at Highlands College can be used to provide the necessary training, both for existing tradespeople and for new entrants into the industry.

However, effective retrofit requires also careful planning including high quality initial survey and experienced oversight of the installation process. These skills are currently lacking and there is no training programme available at present on the island to meet this anticipated demand. This issue is addressed further in Section 8 (Recommendations).

4.3 Stakeholder Feedback: capacity of the construction sector

A stakeholder consultation was carried out to inform this study. Full details of this are given in Section 4. This section summarises the feedback we received regarding the capacity of the construction sector.

4.3.1 General capacity in trades involved in retrofit

Property agencies[47] have already carried out programmes of refurbishment including:

- Loft Insulation
- Cavity wall insulation
- Solid wall insulation
- Double glazing
- Conversion to electric storage heating

This is particularly interesting as they have first-hand experience in procuring these services. Surprisingly, they did not identify problems in finding contractors – although this work may have been carried out prior to the increase in construction activity in the public sector, so the situation may have changed (as was pointed out by the Economic Development Department). The question of accreditation was also raised and this is explored further in Section 6.

One large contractor identified significant skills shortages and pointed out that Jersey is an expensive place to recruit and employ, given the high costs of living in Jersey. They suggested that industry should work closely with Highlands College and Building Control to scope out and deliver affordable locally based training in this area.

4.3.2 Specific trades shortages

Tradespeople identified a shortage of good plumbing and heating engineers – this is particularly relevant in relation to the installation of air source heat pumps – which we identified in Section 3.1 as a key potential measure. People with skills in both plumbing and electrics will become particularly in demand as they can understand a whole system correctly. Stakeholders also identified the need for locally based training in energy efficient technologies – as it is expensive to train on the mainland.

The Economic Development Department mentioned anecdotal evidence that that there was a shortage of skilled window fitters but this was not expected to be a significant issue as allied trades (e.g. carpenters) could easily retrain in this area if required. However, it should be pointed out that specialist skills in secondary glazing and the appropriate restoration and thermal upgrade of older windows would probably be in short supply if these were specified in greater volume by an informed public.

Insulation was also a market where two stakeholders identified concerns over capacity and the ability of the local market to meet expanded demand, especially with respect to solid wall insulation.

4.3.3 Survey skills

Highlands College identified that the biggest gap in the retrofit market was “a basic understanding of building pathology” and in particular how older buildings were constructed. This echoes the findings of the 2012 Responsible Retrofit report commissioned by DECC and produced by the STBA. The college also noted that surveyors in Jersey lacked an understanding of the techniques of gathering information on site to formulate a considered opinion of the current condition of a structure. An explanatory booklet was suggested to help practitioners and homeowners understand basic building characteristics.

A large contractor pointed out the need for a locally achievable qualification in Energy Efficiency which would allow the industry to provide advice to homeowners on a wide range of subjects.

Surveyors themselves stressed the need for a locally-based training course in energy efficiency survey of domestic buildings and again the cost of training off-island was mentioned as a significant barrier.

The need for high quality affordable survey comes up again in the Householder Focus Groups – see Section 6 – and in our key recommendations – see Section 8.

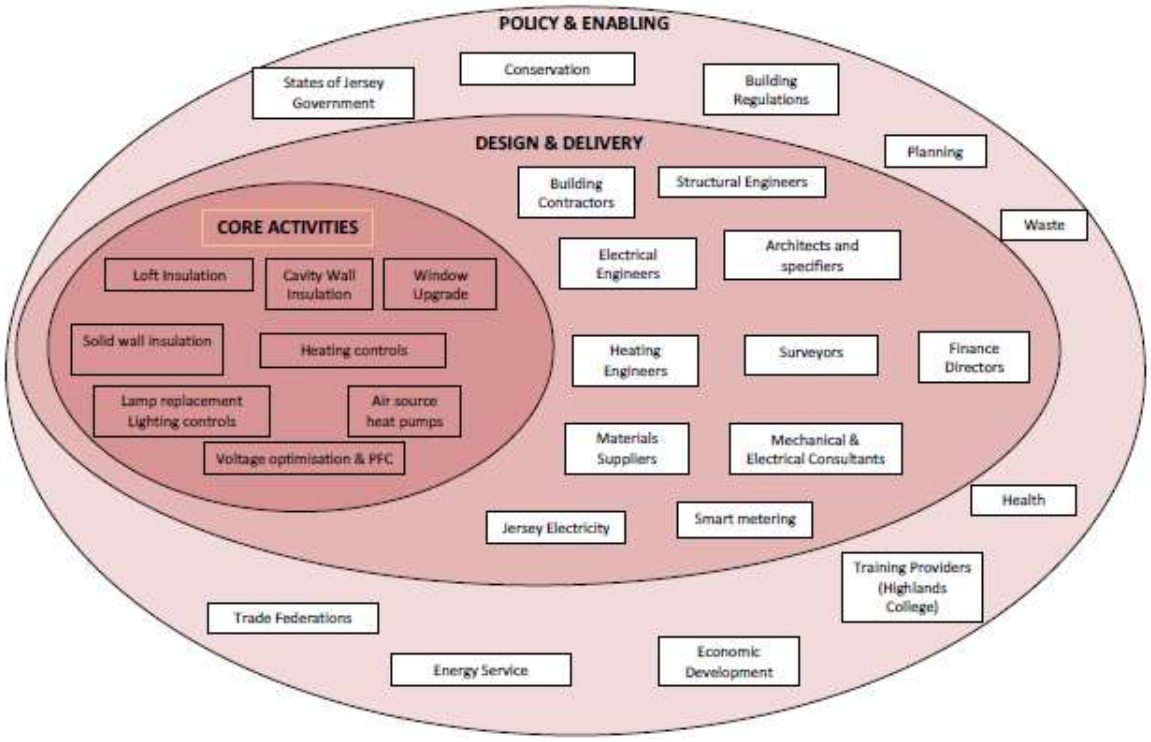
47 We consulted with Andium Homes, Voisin Hunter, Dandara and Brunel Management

5 Stakeholder consultation

A stakeholder consultation was carried out by Ricardo-AEA on behalf of the States of Jersey.

The aims of the consultation were to examine how different departments of the States of Jersey and various sectors of the economy with an interest in retrofit viewed this market, how it would develop in future and what were the key issues likely to arise. The stakeholder landscape is illustrated in the following diagram:

Table 17 Stakeholder Mapping



The following stakeholders were consulted:

- policymakers in energy area and related areas (health, waste, resources)
- property agencies
- architects
- surveyors and assessors
- skills and training
- main contractors
- trade bodies
- tradespeople
- materials suppliers

Questions were sent out by email in advance of the telephone interviews, and some respondents chose to reply by email.

Questions were tailored to the individual – so Stakeholders were not all asked the same questions. However, all stakeholders were asked what the States of Jersey should do to encourage the retrofit market. We have drawn out the key conclusions from these responses and summarised them below, including other relevant key information and priorities uncovered by the consultation process.

Issues identified by stakeholders in relation to **training, skills and capacity** in the retrofit market have been analysed in Section 4 which deals with this topic.

5.1 Survey

The need for high quality context-specific surveys and the provision of reports with recommendations arising was identified by numerous stakeholders. The need to raise knowledge and understanding was mentioned repeatedly, and a locally achievable qualification in energy efficiency was suggested as a means to facilitate this market – to provide sufficient numbers of surveyors to take on this task. One stakeholder stressed the need to connect with the general public in a way that relates to their own properties:

> *"Educate, educate, educate. This is a long term strategy that has to be put in front of every islander in terms and words that they relate to."*

Buildings all differ and even apparently homogenous buildings have wide variations in services, condition and alterations. Clearly, survey with bespoke measures identified (and costed) is the only way to deliver a strategy which is specific to each building.

The question of survey is explored further in Section 6 – Recommendations.

5.2 Provision of information

Closely allied to survey is the provision of more and better information to islanders. Numerous stakeholders mentioned this and there was a clear demand for the following types of information:

Provision of cost and performance data

Data on costs and performance of retrofit measures is in high demand. However this data is neither plentiful nor robust elsewhere, so the States of Jersey would be taking a lead by attempting to collate and analyse this data. There are many variables in retrofit so this is a complex undertaking, and data collection and analysis should be seen as a continual process rather than a single task.

As survey takes place, data needs to be gathered on the existing energy consumption of the buildings being surveyed. At least a year's worth of energy use data prior to the introduction of retrofit measures will be required. Data on energy use post retrofit is then necessary for at least a year after the measure or basket of measures is installed. At the same time, real cost data on installations can be gathered so that householders have a realistic basis to use for their decisions.

We recognise that there is a data protection issue here, so the survey process can be used to manage this issue and to encourage the sharing of data wherever possible. It may also be necessary to work with Jersey Electricity, Jersey Gas and heating oil distributors such as Petroleum Distributors Jersey and Central Jersey Heating Oil to gain data on past consumption in case householders' own records are incomplete.

Cost and performance data can then be fed back into the survey process to make it more robust.

Taking a lead

Firstly, demonstration projects can be used to show that retrofit technologies work. Householders can then see first-hand that, for example, well executed secondary glazing, or air source heat pumps both work and are not visually intrusive, in the correct circumstances, so the uncertainty and associated risk is reduced. As ever, this requires interpretation, so demonstration projects **need to ensure** that context is taken into account when a householder considers repeating the technology on their own property.

The States of Jersey is already taking a lead both with respect to its office portfolio and the Andium (States housing) domestic properties. Programmes are underway in both sectors in terms of bringing Andium homes up to decent homes standard and also in terms of upgrade of office accommodation and new build e.g. St Martin's school. The results of this retrofit would need to be carefully monitored and publicised in a way that is relevant to householders and helps in the decision making process.

Case Studies

Case studies were suggested by several people – and again this is something that can be achieved at reasonable cost by the existing energy service. One respondent commented that Jersey was well placed to develop a community understanding on these issues because of its well-integrated structure and the Energy Forum.

5.3 Financial support

Many stakeholders raised the question of incentivising or financial support to kick-start retrofit measures. However, there was a spread of opinion on which measures should be supported and the means by which this should be done. Without quality provisions any measure-specific subsidy runs the risk of measures being installed inappropriately – as has occurred under the Renewable Heat Incentive in the UK. Low interest loans were suggested by several stakeholders and this could be particularly useful in the PRS (see below).

We understand that funds available for subsidising installation are at present in any case very limited – unless some form of green tax on energy is introduced to fund a grant scheme. In terms of kWh/£ – the energy saved per £ invested – a greater impact can be achieved by the provision of better information to the general public on specific buildings, costs and benefits. If people have clear reliable guidance, they can make informed decisions without the need for subsidy.

The point is summed up succinctly by Economic Development:

> *"My recommendation would be that any retrofit should be encouraged by informing property owners of the benefits. Regulation and subsidy should be avoided. Further your email suggests the retrofit project is aimed at the 'able to pay' domestic sector. If this is the case then no subsidy should be required."*

However, international evidence suggests that while information is important it does not on its own deliver at scale. Successful retrofit programmes elsewhere are all based on significant public funds whether provided through general taxation or a surcharge on energy bills.

5.4 Specific measures

The measures below mentioned by stakeholders have been considered in approximate order of carbon reduction magnitude.

Air source Heat Pumps

Several respondents identified Air Source Heat Pumps (ASHPs) as a large and mainly simple win, and reported that installation numbers were rising. Incentivising heat pump installation was suggested but a lack of understanding on the part of the householders was cited as a barrier. There is a role for Jersey Electricity in providing accurate data on heat pump performance in Jersey and there may be a role for the States of Jersey to play in arranging for the development of good practice guidance on the use of heat pumps (without recommending any particular product) so that costs and benefits can be clearly understood and that householders can use them effectively. Support is also provided by Jersey Electricity who employ two people in customer support roles and can help customers to understand their systems, although this is general advice and not specific to ASHPs. There is a definite need for handholding, particularly for elderly residents[48]. Taken together, this implies that there is significant potential in this area but that an increase in the volume of installations would have to be planned carefully, both in terms of capacity in the trades but also in terms of public understanding.

Stakeholders also identified a number of constraints which need to be taken into consideration.

- Local grid capacity constraints[49]
- Cost of alterations to distribution systems
- ASHPs are all imported which increases cost
- Visual impact & space requirements
- Acoustic impact
- Limited number of engineers

48 For example see Aragon Housing Association "Heat Pump Trials in a range of Bedfordshire 'off gas' properties" http://www.nea.org.uk/Resources/NEA/Publications/2013/Aragon%20Final%20Report%20(V12)_06-03-2014.pdf

49 Note that this is a constraint when moving from oil or gas to ASHP but not from electrical resistance heating to ASHP, where loading is reduced.

Provision of better information is not complex or expensive to achieve and could reinforce a growing market for installation of ASHPs in appropriate buildings (i.e. where impact is minimal and there are no conservation or technical constraints).

Insulation

When asked about the greatest source of inefficiency in how space and water heating were used, several tradespeople and others identified a lack of insulation as being a major issue – indicating their view from experience that many properties leak heat badly – and this can be as much a matter of condition as with the thermal performance of the construction.

Heating controls

Heating controls were identified by tradespeople as an area where substantial savings could be made as most people do not understand how to use their controls properly. This is an area where the States of Jersey could take a lead in the provision of information; the lack of understanding (and in some cases the lack of effective controls) would be flagged up by the survey process and covered in the ensuing recommendations. Elderly people often struggle with complex or unfamiliar control systems, so there is also a need to ensure that any solutions are sufficiently user friendly. There is an opportunity to build on the role of a trusted messenger, similar to the successful call scheme that Jersey post is operating – in relation to heating controls, if a contractor is servicing a boiler they would have the opportunity to check and if necessary adjust the controls too, potentially giving instruction in how to best use them.

5.5 Private rented sector

The need for legislation to tackle poor energy performance in the PRS was raised by a number of stakeholders.

Again, grants were suggested but landlords in Jersey are considered to be within the “able-to-pay” sector so the need for financial support is questionable where rents are high and stable. One respondent suggested that grants should be paid to tenants but this is unlikely to lead to measures which deliver long term savings in energy use. Another suggestion was to provide a reduction in the level of rates charged to properties which are efficient (perhaps using the EPC system to determine which properties need to be targeted). This would need to be carefully costed – and accompanied by a the availability of low or zero interest loans so that access to finance does not become a barrier to landlords who do not have spare capital.

As discussed in Section 2.3, any intervention in the PRS would need to be carefully planned and introduced in Jersey where there is a limited labour supply and strong competition for rental property. In general there is a resistance to regulation so this would need to be light touch if used at all.

5.6 Interaction with other policy goals

The interaction with other policy goals does not yet seem to have been considered in depth – this is as expected since retrofit is a discipline which is still emerging and there remains much thinking to be done. Respondents recognised that retrofit has implications for conservation, health, economic development social security and fuel poverty, materials management and waste but thinking on how this should be integrated was not advanced. This should be addressed further at pilot project stage.

6 Identification of triggers and barriers to retrofit among householders

In the design of any programme to stimulate an activity among a diverse population, it is essential to understand the full range of triggers for that activity, and correspondingly to understand all the actual and potential barriers to achieving the policy goal. The States of Jersey commissioned a local market research company (4insight) to carry out a series of focus groups on the subject, to record the results and carry out a preliminary analysis. The focus groups were held in late March 2015 and comprised two groups – general members of the public and those who had been involved with and those who had been involved with previous Energy Efficiency Service pilots (triallists).

Measures identified

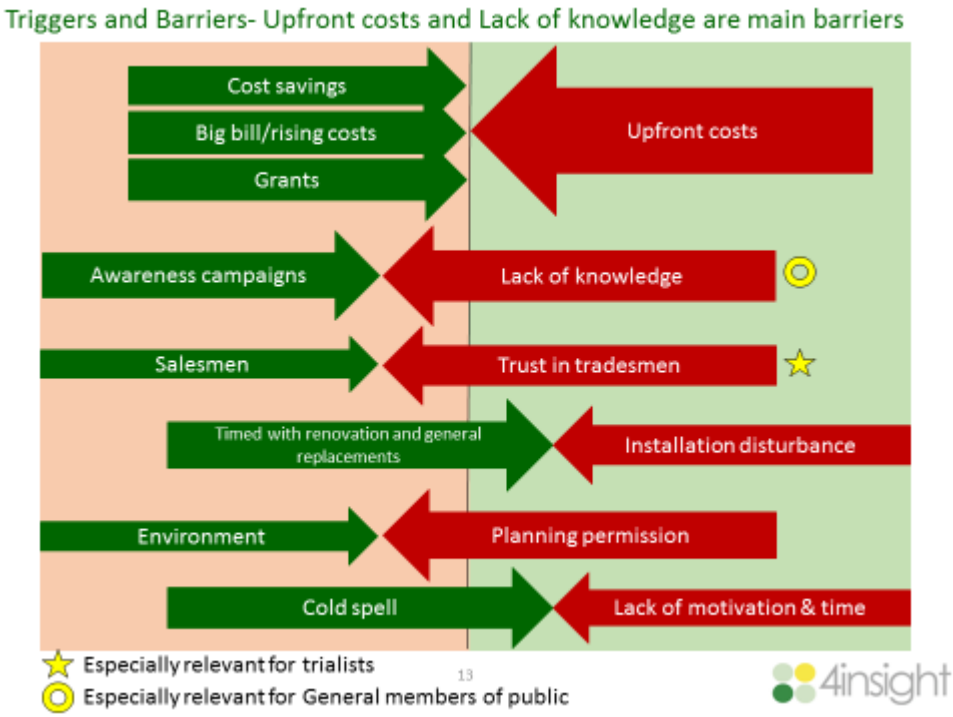
Participants identified building fabric measures including insulation and window upgrade as the most effective forms of energy efficiency improvements. Low energy lighting also featured prominently. Interestingly, a wide range of behavioural change measures was flagged up – indicating that most participants understand that they have a significant role to play in reducing their energy use. It is worth noting that renewable energy was (correctly) not seen as part of energy efficiency and that boiler efficiency was not strongly associated – perhaps as boilers tend to be replaced periodically for the most efficient versions or because the dominant fuel for space heating in Jersey is electricity.

Motivation

Most participants were primarily motivated to save energy by the opportunity to save money on running costs rather than by environmental considerations. Improved comfort – through warmer homes – was identified as a further major benefit of energy efficiency measures. Reduced maintenance and potentially increased property values were also cited as motivating factors. There is some evidence to suggest that improved energy performance has had a modest effect on house prices in the UK.[50]

Triggers and barriers are summarised in the graphic below. The arrows near the top show the issues most commonly identified by participants and the barriers have been paired with triggers to show that in some cases they are in tension with each other.

Figure 3 Summary of Triggers and Barriers



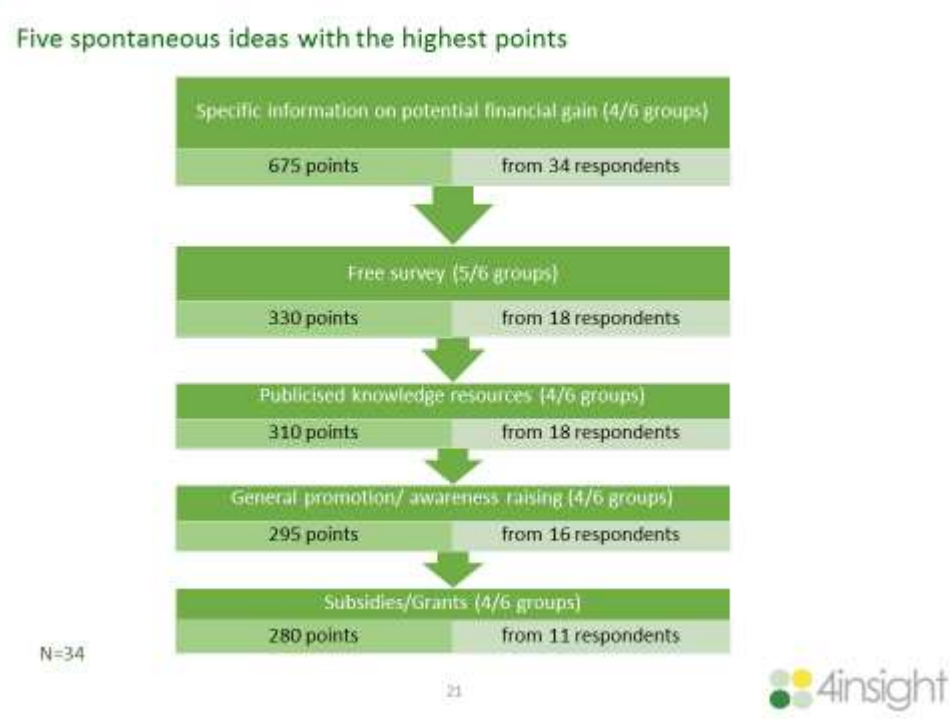
[50] https://www.gov.uk/government/publications/an-investigation-of-the-effect-of-epc-ratings-on-house-prices

As is clear from this chart, upfront costs and a lack of knowledge are the main barriers to the wider uptake of energy efficiency measures. This is reflected in the ideas suggested below.

6.1 Ideas suggested to encourage retrofit

The focus group participants were invited to suggest ideas to encourage the retrofit of energy efficiency measures to housing. The results are summarised in the graphic below.

Figure 4 Summary of most popular ideas



This clearly demonstrates that householders need to have a much clearer idea of both the costs and the benefits of measures before taking a decision on implementation. In general, respondents did not trust data from trades/industry and called for a single, central sponsored data collection service from the States of Jersey which they felt would be very valuable. Importantly, data which was ***specific to their own home type*** was identified by respondents as a key requirement.

The second most popular suggestion was the provision of free survey. This was explored further among the groups and the majority called for state subsidy of the survey although it was not necessarily required to be free of charge. The importance of complete independence to ensure maximum trust and confidence in findings was agreed by all. It was also pointed out that overcoming the knowledge barrier during the early stages was more important than funding directed at specific measures.

In addition to these key ideas, knowledge resources and general awareness raising was thought to be an essential element to encourage wider interest in and delivery of energy efficiency measures. This is an interesting point as the provision of high quality information and promotion also lie within the current remit of the energy efficiency service – so these resources should not be difficult to put in place.

Subsidies and grants were not the most popular suggestions. This is in line with expectations as the project is looking at the “able-to-pay” sector. Energy efficiency measures should be able to pay for themselves within an appropriate timescale (depending on the measure) so what is needed is better information about costs and benefits so that consumers can make an informed decision. However, upfront costs for more expensive retrofit measures such as solid wall insulation are a significant barrier also in the able-to-pay sector and it is unlikely that a substantial uptake of energy efficiency measures can be achieved by information provision and surveys alone.

6.2 Other barriers

Trust in tradesmen was identified as a significant barrier by a number of participants. Clearly there have been issues in the past with the quality of workmanship and this needs to be addressed by a combination of improved training and the use of properly accredited and widely recognised quality mark schemes. Improved knowledge about retrofit strategies was seen to be the most valuable tool to counter concerns of being taken advantage of and being able to identify lesser quality work.

It also needs to be recognised that some retrofit work is comparative new technology – solid wall insulation is a case in point. Many details for SWI have not yet been standardised so there are considerable heritage risks, technical risks in terms of moisture ingress or interstitial condensation, and risks that predicted savings will not be realised – due to thermal bridging or incorrect modelling. This barrier is thus endemic to the industry and not specific to Jersey. It is also worth noting from the conclusions provided by 4insight that "although trust in tradesmen and the efficacy of the industry in general was a major consideration for 2/6 groups, probing deeper it was clear that this distrust was a function of lack of awareness and knowledge". Again – this points us back to survey and to education and the provision of good knowledge resources on retrofit.

Access to finance did not feature strongly as a barrier.

6.3 Recommendations

A series of recommendations were derived from the householder focus groups.

- Increasing awareness and knowledge resources, as well as general energy efficiency knowledge of the general public, through awareness raising campaigns, would be considerably influential in encouraging consideration and uptake of retrofitting measures
- Marketing messaging should be focused towards cost savings
- Addressing planning permission issues or misconceptions, where possible, for energy efficiency measures, may be helpful for encouraging uptake by pro-active members of the public and encouraging consideration by re-active members of the public
- Accreditation of professionals would address trust issues in order to bridge the gap until the marketplace was better aware and educated
- Consider offering a free survey, or perhaps a 'charged but refund on proof of action' survey for encouraging the pro-active to begin the process, and specific guidance on expected costs and expected time to return would be highly valued
- A 'trade fair' (at Fort Regent as suggested by 2 groups), as opposed to a 'show home', may be useful for raising awareness
- Consider offering States grants or interest free loans, however the middle earners viewed this more as risk-assurance.

These recommendations were reinforced by a sentence completion exercise. Participants were invited to complete the following sentence:

"Energy efficiency home improvements would be greatly improved if …."

(The top 5 selected responses have been reproduced below.)

- *there is a more hands-on approach to help the householder with decision making and approval of work*
- *there was more available information on which to make our decisions regarding making improvements*
- *we knew what they were in the first place. What are the options? How much and benefits?*
- *there was more engagement by public with resources, discounts, support and education*
- *there was more knowledge, incentive, cost effectiveness and social responsibility.*

Again, a consistent pattern emerges – rather than a request for subsidies or grants, there is a demand for more and better information and a link to the decision-making process **based on bespoke understanding of each property and the options available**. This is explored further in the final section of this report where we present our recommendations to the States of Jersey.

7 Conclusions and options

As noted in the Introduction, a number of developments have occurred since the study began. As the policy landscape and understanding of the impacts of energy saving measures are evolving rapidly at present, it may not be the optimal moment for the States of Jersey to embark on a wide scale retrofit programme. With this in mind, this study proposes a staged approach based on a process of gaining more information, understanding the changing policy landscape and then taking action.

Some of these recommendations can be carried out or at least commenced in parallel with each other but the priority should be kept under review as more and better data emerges, and as understanding increases. This section summarises our conclusions and these are then developed into an action plan in Section 8.

7.1 Maintain watching brief on UK revisions to retrofit approach

Following the demise of the Green Deal, the UK Government has commissioned a review of standards, consumer protection and enforcement of energy efficiency schemes and it is likely that this will change their approach to energy efficiency programmes in the future. It is not yet known when the Bonfield review will be completed but the results should be incorporated in the development of any pilot programme in 2016.

7.2 Obtain clearer picture of the Jersey housing stock.

Data has been collected under the HES scheme and more data will become available through the use of the Home Energy Check tool. This data should be analysed to refine the assumptions used in the Measures Analysis included in this report and in particular to get a clearer idea of average space heating heat demand. A separate project may be required to collect improved data on age and condition, perhaps using data from the parishes if this is available.

7.3 Analyse existing data on savings from retrofit measures

2000 homes of vulnerable residents have already been retrofitted and energy consumption data has been collected by the States of Jersey. Where energy consumption data is available both before and after a retrofit measure is introduced, this can be analysed to get a clearer idea of the impact of energy saving measures in Jersey and to confirm the relative importance of the measures recommended in the Measures Analysis, allowing for the fact that this group is likely to run dwellings at higher temperatures following retrofit. In extrapolating to the wider economy it will be necessary to take into account the fact that these residents will be at home for a much longer time than average so their heating demand will be higher, and the types of property occupied may not be representative of Jersey's building stock.

7.4 Establish policy goals

The stated policy goals for the project relate to energy use, carbon emissions, fuel poverty and energy security. The process of retrofit can also be used to deliver other policy goals such as:

- **Conservation:** Protection and enhancement of Jersey's historic built environment (which includes all buildings of traditional construction, representing at least 25% of the domestic building stock) can be factored into the survey process. The process can be used as a route to deliver detailed information on what is and is not appropriate for specific buildings, based on a set of principles. For example, permitted development rights for wall insulation can be spelt out in detail, or what is permissible in terms of window replacement, glazing replacement or secondary glazing. We understand that a consultation on changes to permitted development rights is currently underway.
- **Economic Development:** Retrofit requires administrative and executive roles in addition to surveyors and trained installers. Green jobs represent a significant economic opportunity, which is repaid in reduced energy costs/imports and increased energy security.

- **Social policy:** Retrofit can be used as an agent of regeneration, and as a means of providing long term employment opportunities to the long term unemployed and also for the physically disabled. Reductions in fuel poverty also have positive social impacts.
- **Health:** By increasing internal temperatures, retrofit can have a positive effect on health.
- **Waste:** Avoid adding significantly to waste flows and encourage recycling

When designing measures and programmes to encourage retrofit, it is important to take all these other policy goals into account.

It is also essential to include these additional positive outcomes delivered by retrofit in any evaluation of proposed measures and stimulus programmes.

7.5 Facilitate high quality survey and recommendations for all properties

From both the Focus Groups and the Stakeholder consultation it is clear that there is a need for high quality independent context-specific survey and associated recommendations for each property under consideration. This will enable a holistic approach to retrofit which looks at all aspects of a building including interactions between fabric and services and occupants plus any heritage importance.

The selection of retrofit measures needs to be specific to the context of each building. Buildings are heated differently, their construction varies widely as does their condition, location, orientation and exposure (which is high in most areas in Jersey). Patterns of occupation also vary and these can have a large impact on energy use, so an additional challenge is to ensure that retrofit is appropriate for both current and future users of a building.

Take-up of retrofit measures is more likely if there is reliable, independent information on the likely costs and benefits of the measures under consideration. The reliability of this information will increase as the market grows, but there is also a role for the States of Jersey in managing this process and in communicating the survey-led process to the whole island. It may be desirable to make a condition of receiving a subsidised survey to require people to provide energy usage details to enable a more accurate picture of domestic energy consumption in order to estimate payback for measures more accurately and in due course to assess the impacts of the initiative.

Survey reports would therefore include:

- Context – location, setting and orientation of the building
- Age, construction, fabric and condition, heritage
- Actual energy use based on billed data, analysis and benchmarking
- Potential measures for energy efficiency improvement
- Analysis of interactions between measures and services including ventilation
- Estimations of costs and savings
- Risks and other costs and benefits
- Links to sources of further information

We recommend that the survey report specifies the standard to which any required work is carried out. This specification could then be used in any subsequent contract with an installer. This would enable the person commissioning the work to become a more intelligent client.

Jersey has a varied age of building stock and a high percentage of traditionally constructed buildings. Conservation of Jersey's historic environment is an important commitment of the States of Jersey so it is essential that programmes to encourage retrofit encourage appropriate measures which do not detract from the appearance or performance of the historic environment in any way.. For all types of buildings (not just listed buildings), there may be opportunities to develop standard drawings or specifications relevant to common situations so that the learning process can be captured and this learning applied cost-effectively in other cases, reducing the cost of specifying future retrofit projects.

7.5.1 Training of surveyors

At present the workforce to carry out the task does not exist in Jersey so a structured training programme needs to be developed which identifies and then trains surveyors in responsible retrofit. The States of Jersey can achieve a variety of other goals by driving the survey development process. It is essential that the survey process is properly designed and that training for surveyors is comprehensive and available locally. A good starting point for high quality surveys can be found in Germany where the programme Vor-Ort-Beratung (energy advice at the premises of the consumer programme) has been operating in different formats since 1998. The scheme provides households with independent information on retrofit options and finance programmes available. A prerequisite to apply for an energy efficiency loan or grant is the involvement of an approved energy consultant listed on the government website https://www.energie-effizienz-experten.de/energieeffizienz-experten-fuer-foerderprogramme-des-bundes/. The list of experts has been established by the German Energy Agency on behalf of the Federal Minister for Economic Affairs and Energy, the Federal Office for Economic Affairs and Export Control and KfW. Only persons with the qualifications laid out in the Energy Conservation Ordinance can apply to be listed on the website as experts. In the UK there are also some providers offering deeper and more comprehensive surveys than the standard Green Deal assessment (e.g. Parity Projects).

Controlling the design of the survey process and the surveyor training will also enable the States of Jersey to ensure that other policy goals such as conservation are delivered by means of detailed advice. Survey reports can also provide links to reliable sources of information, primarily those we are recommending below to be established by the States of Jersey to collate information on costs and benefits of retrofit strategies.

There will be a cost to the States of Jersey in setting up an appropriate training course which covers all aspects of survey. The survey skills that would be developed by a training programme could be adapted and expanded at relatively low cost to encompass non-domestic buildings as well. In this way the States of Jersey would be developing a multi-skilled workforce capable of covering all types of buildings in Jersey. There is an opportunity to explore the potential to develop a partnership approach to training development and delivery.

As was pointed out by Highlands College, there is a widespread lack of understanding of basic building physics, especially about the performance of older buildings, which needs to be remedied before retrofit measures can be considered properly. There may be a need to employ specialist advice to achieve this from appropriately qualified architects or consultants. Once established, the training programme should be self-financing. It would take a minimum 5 days of training to deliver and test the knowledge required to assess a diverse building stock, based on some pre-existing knowledge of buildings.

Access courses could also be designed for people who do not have this level of pre-existing knowledge. Fees for similar training programmes elsewhere range from £1,000 to £2,000[51] and given the likely volume of surveys required in Jersey a course priced in this range would constitute a reasonable investment to prospective surveyors.

Quality control is essential: some training programmes incorporate this QA checking within their course content. It would be appropriate to implement a process of review of the first reports from each surveyor and then random samples thenceforth.

7.5.2 Costs of survey

We do not recommend that survey should be free, as householders are more likely to act on a survey where they have paid something towards it but there is an argument for subsidising the process at least initially. The survey programmes in Germany are subsidised by government and cost households less than £45 which is significantly below the actual cost of the survey. Evidence from the UK suggests that households are willing to pay more than £45 as the Green Deal has illustrated where the cost were higher than £100.

It is suggested to first establish the cost of the survey per household if unsubsidised. Higher quality surveys currently cost around £250-£300 in the UK. We propose to test the response rate when using different levels of subsidies starting with little or no subsidy. If the response rate is lower than expected the cost should be reduced further in order to achieve the desired reaction from households.

[51] See Domestic Energy Assessor courses, Passivhaus designer courses, ISO50001 courses, CoRE diploma in Responsible Retrofit, for example for comparison

As the volume of properties surveyed increases, most major property types and issues will soon be covered, so the compilation of reports should become progressively easier and therefore less expensive. This does not mean that reports will become less context-specific, but merely that some individual components of reports can become standardised. The survey process will also become cheaper as competition increases so initial subsidy may be withdrawn. In time it should be possible for surveyors to deliver two reports in a day and for the cost to be reduced to a level that the householder might bear.

7.6 Continue education and outreach

There is a need for evidence based information on retrofit, and also for support to deliver the information. It is vital that the information is impartial, and goes across the board. The role of the States of Jersey is to co-ordinate the messages and the evidence.

The States of Jersey already provides this service in part. For example “lunch and learn” sessions are already being held with Jersey businesses – which develop links with different stakeholders in the construction and refurbishment industry. What is needed is simply an expansion of the service. There is a useful role to play in centralising information on costs and benefits, so that a more accurate assessment can be achieved of the cost effectiveness of actual measures in practice. This means that surveyors and householders can both draw on a more robust source of data when making estimations. It should be pointed out that this particular service does not exist anywhere else in the UK at present. Publicity needs should be very minor – if the survey process is high quality the word will soon spread. Launch and use of the Home Energy Check tool will strengthen the education and outreach activities.

There is also on opportunity for the States of Jersey to achieve energy savings by direct communication with the populace in order to achieve positive behaviour change – such as biennial reminders to re-set heating controls at the beginning and end of the heating season.

7.7 Ensure access to capital

In general, access to finance was not identified by the focus group participants as a major barrier. The able-to-pay sector, by definition, can afford to invest in at least some measures to improve the energy efficiency of their properties. Most investments in energy efficiency are self-financing through the savings which they achieve in the medium term and this will become increasingly obvious once survey and improved information demonstrate the savings to be achieved and the costs of improvements.

In a limited number of cases, access to capital may be a limiting factor. This may be solved relatively simply by the use of a loan fund. The failure of the Green Deal loan scheme in the UK is in part due to the complexity of the scheme and the involvement of the State within a private transaction, resulting in high administration costs and barriers to the use of the scheme. If a soft loan facility were to be arranged through one of the banks in Jersey, there should be no need for investment by the State, especially during an era of low interest rates. The question of security for loans would need to be addressed in case this becomes a barrier and there may be a role for the States of Jersey here. In any case, it is likely that most residents would already be able to borrow at relatively advantageous rates if they do not have cash available for energy efficiency improvements.

The States of Jersey could play a role in setting up a simple scheme and perhaps subsidising the interest cost – which in any case would be small in the current economic climate. This could be achieved in a number of ways, one of which may be the use of a Credit Union – or other organisations with which the States of Jersey has already established links.

7.8 Improve installation capacity and provide training

Due to the size of the island, there is a limited number of contractors who are sufficiently trained and skilled to carry out retrofit work. There are exceptions though, e.g. Andium Homes Ltd who have implemented a programme, mostly on 50s/60s housing. While this is a business opportunity, companies are unlikely to invest in training and recruitment unless they see strong signals of an expanding market in this area. Specific skills shortages need to be addressed as part of an initiative to drive up the volume of retrofit, if properly planned this should not constitute a barrier and the infrastructure exists in Jersey to provide the appropriate skills and training when required.

There is also sufficient flexibility in the available labour force and if the market becomes particularly active it is likely that companies based elsewhere would seek to expand in Jersey if local companies do not respond to the opportunity. Capacity may be a barrier at present but it seems clear that this can be addressed but it is essential that training is provided on the island and that companies do not have to send employees to the mainland for training as this is expensive.

It is difficult to predict what measures will require an increase in training capacity, until survey of a representative sample of properties has been carried out. The measures outlined in section 3.1 are those likely to be installed in greater numbers when the retrofit programme begins in earnest but there will be time prior to this point to make a more detailed assessment and to put in place the requisite training for installers of SWI, window upgrades or ASHPs. It may be cost effective to bring trainers across to Jersey, to provide this training.

In addition to training contractors (and surveyors), it is also important to recognise that other key players within the retrofit industry may also require training. In general, most training in the construction sector focusses on new construction and there is little if any formal training in the retrofit market – despite its being 50% of "construction" activity. Planners will require training especially in areas where there is likely to be a visual impact from retrofit measures, especially window upgrade and solid wall insulation. Already there are decision-making tool emerging elsewhere[52] in the UK to aid planners in this respect and it is likely that these could be adapted cost-effectively for use in Jersey. Similarly, Building Control officers would need to be up-skilled in retrofit and there is a clear need for designers to be better trained on various aspects of risk management including moisture and air quality in retrofit projects.

7.9 Impose quality control on delivery

As there is a lack of trust in companies offering to carry out retrofit work, a kitemark scheme could be used to address this issue. However, the market at present is not mature and there is a shortage of competition so there is a risk that a kitemark could add to costs as kitemark schemes are expensive to set up and to administer. This in turn would also increase costs for industry so runs the risk of introducing a barrier to market entry and restricting supply still further.

The question of a kitemark scheme requires further discussion with trades bodies and the general public. It may be that on a relatively small island the feedback on contractors could be shared more effectively by other means so that householders would rapidly be aware of the range of contractors available and their reputations. A limited degree of quality control is already provided by Building Control in Jersey.

7.10 Provide demonstration projects

Focus group participants and industry stakeholders both raised the question of demonstration projects – so that residents could visit and see first-hand what key measures look like and evaluate the potential impacts. This is particularly important for unfamiliar technology such as solid wall insulation or air source heat pumps – people need to see this installed to gain an adequate idea of what it would look like when applied to their own properties. Great damage has already been done by indiscriminate replacement of historic windows – and this risk can be reduced in future by demonstrating best practice examples of integral draught-proofing, secondary glazing or even glazing replacement where appropriate.

This should be a low cost or no cost measure but requires some planning and of course co-operation from the public. Similar schemes have been put in place in other areas of the UK – for example by COIN in Oxford, encouraging people to visit retrofitted demonstration homes on open days.

7.11 Private Rented Sector legislation and voluntary code

As noted previously, the PRS is included in the definition of the "able-to-pay" domestic sector in Jersey – on the basis that landlords (rather than tenants) should in theory be able to pay for energy efficiency improvements. However, there is little incentive for landlords to take the necessary steps – as the benefits in lower energy bills will be experienced by tenants but the cost of the investment is borne by landlords. It is this disconnection which leads to the need to legislate to oblige landlords to take action.

In the UK, from 2018 it will become illegal to rent out properties with an EPC rating worse than E. In theory this is a useful prompt but in practice there are serious issues with this approach as the EPC

[52] http://media.claspinfo.org/sites/default/files/SWI%20Decision%20Making%20Protocol.pdf

rating system is seriously flawed as it is based on RDSAP, which incorrectly assesses the thermal performance of older buildings (unimproved). This leads to a significant overestimation of the savings to be achieved from certain retrofit strategies, even before the comfort factor and other rebound effects are taken into account. There is also a danger that future governments will use the system to drive further improvements in due course, resulting in inappropriate measures being applied to existing buildings simply to meet targets based on incorrect assessment methods.

However, as we have pointed out, survey yields the most effective solutions for individual properties. It may be possible to legislate for private landlords to have survey carried out by a given date (unsubsidised) – and then to design a system whereby the benefits of energy efficiency improvements can be shared between landlords and tenants. Landlords of course can command higher rents for properties which are cheaper to run, and improved properties can command a higher sale price, so there are already benefits to landlords in having work carried out. The difficulty lies in selection of measures which are flagged up in the survey report and how the work would be enforced.

At present the Public Health and Safety (rented dwellings) (Jersey) law is being drafted.. It could be required that landlords carry out a survey whenever properties are re-let, with a further requirement to carry out – say – 3 of the top 4 recommendations in terms of energy saving, so long as these each save over 3% of energy use. To protect the integrity of the programme, there should also be a cut-off in terms of cost effectiveness – so landlords would not be obliged to implement measures which are estimated above a certain level in terms of £/kWh saved. As modern properties are well insulated, this requirement should also be limited to buildings constructed prior to a given date – we would suggest the year 1997.

In advance of – or instead of – this legislative approach, a voluntary agreement may be instituted. Landlords who join an accreditation scheme could demonstrate that their properties already comply with a certain level of energy efficiency or take steps to achieve this within a given timeframe. This accreditation could in turn be used to command higher rents and to demonstrate responsible behaviour along with other aspects covered under the forthcoming Public Health and Safety legislation.

7.12 Waste

There is also a need to provide support around construction waste disposal routes and construction waste management. There is currently no construction waste reclamation yard in Jersey – this would otherwise strengthen the opportunity for re-use of construction materials. This would also be a business opportunity. The re-use of vintage construction materials (floorboards, doors etc) has increased in demand. Social enterprises could also benefit – such as those relating to selling reclaimed wood (such as the Acorn Wood Shack project). The increased re-use of materials could also potentially reduce problems for Jersey's Energy from Waste plant – where inappropriate waste can cause operational issues. There is already a business (AA Langlois[53]) which provides recycled aggregate in Jersey. The planning process requires all development proposals to be accompanied by a waste management plan.

53 http://aal.je/the-3rd-quarry-aggregates/whats-available/

8 Action Plan

In order to deliver the recommendations in Section 7, an Action Plan is required which sets out the steps that need to be taken to achieve implementation.

The action plan proposed below aims to enable Jersey first to gather the necessary understanding to pursue an evidence based approach to reducing carbon emissions and improving energy efficiency.

Following analysis of improved information, a decision can be taken as to the best way forward and if appropriate, detailed steps can then be taken to make the necessary preparations to plan capacity, maximise benefits, minimise risks and to enable a smooth take-up of survey and ensuing installation of measures.

This section concludes with an implementation strategy and some sample costings.

The Action Plan is broken down into the following stages:

1. Maintain watching brief on UK revisions to retrofit approach
2. Obtain clearer picture of the Jersey housing stock.
3. Analyse existing data on savings from retrofit measures
4. Agree detailed objectives of retrofit project
5. Assess effects on the Jersey Economy and Environment
6. Plan to manage, mitigate and exploit the wider consequences of retrofit
7. Agree process for survey and recommendations
8. Commence process for legislation for PRS
9. Identify training needs for surveyors and design training
10. Identify skills needs for installers, plan capacity
11. Arrange finance facility
12. Pilot, feedback and amend
13. Plan launch & publicise

These stages are discussed in greater detail below.

8.1 Maintain watching brief on UK revisions to retrofit approach

As the UK government has recognised that its approach to retrofit has been sub-optimal and a review has been commissioned, useful information may emerge on potential improvements and a more holistic and context-specific approach to the retrofit process.

Action: Await publication of Bonfield Review and assess implications for Jersey.

8.2 Obtain clearer picture of the Jersey housing stock.

At present there is insufficient data on the construction or heating of Jersey's domestic building stock to make an accurate estimation of the potential impact of retrofit measures. Some data may be available but requires further analysis. Further research may be required to gain a clearer picture.

Actions:

- Analyse stock data gained from HEC tool as it becomes available
- Consider commissioning further research into available data elsewhere in Jersey.

8.3 Analyse existing data on savings from retrofit measures

Some detailed data is available on the impact of measures installed under one scheme in Jersey. While the comfort factor will be higher than normal and the property types may be limited this could prove a valuable data source which could be adapted to apply to other buildings.

Action: Analyse energy use before and after retrofit of 2000 homes of vulnerable residents and confirm the relative importance of the measures recommended in the Measures Analysis

8.4 Agree objectives of retrofit project

The brief for this project included reducing carbon emissions, addressing energy security and fuel poverty as the main drivers for a retrofit programme. Analysis of retrofit programmes elsewhere reveals that retrofit can lead to negative unintended consequences both in terms of energy use but also in terms of human health, building fabric, heritage and the wider environment. Based on discussions with stakeholders, a wider set of objectives may be required in order to maximise benefits and minimise risks, while delivering optimal reductions in carbon emissions.

A suggested list of objectives is provided below. This is of course subject to discussion with the States of Jersey.

i. Reduce greenhouse gas emissions from the occupation of Jersey's domestic building stock to meet commitments under Kyoto protocol
ii. Assess and take into account the embodied impact of retrofit work
iii. Protect and enhance the heritage of Jersey's historic buildings
iv. Protect and enhance the ecology of Jersey
v. Improve human health by reducing damp/mould and radon exposure
vi. Improve employment opportunities
vii. Reduce fuel poverty
viii. Increase fuel security
ix. Minimise waste and encourage recycling

Action: Agree objectives and obtain endorsement at high level.

8.5 Estimate Impacts of the Programme

Initial analysis from Ricardo-AEA indicates that the measures likely to deliver the most significant reductions in carbon emissions are as follows:

- Fuel switching for space heating: hydrocarbon to Air Source Heat Pumps (ASHPs)
- Replacement of electrical resistance heating by ASHPs
- Insulation of lofts
- Insulation of cavity walls
- Solid wall insulation
- Window upgrade
- Improved heating controls

If all properties currently lacking these measures and which are suitable for these measures receive them over the lifetime of the programme then we estimate that CO_2 emissions will be reduced by 30,500 tonnes per annum. This estimate does not include savings arising from behaviour change. . A recent review of behaviour change programmes in 11 EU countries[54] estimated that behaviour change can achieve as much as 20% savings. However, there are significant uncertainties associated with such estimates because often the programmes involve both behaviour change and equipment replacement/insulation.

The environmental impact of retrofit work includes the use of scarce resources and the embodied energy of both materials and labour used in the retrofit process. All retrofit work results in a spike in carbon emissions in the installation phase and unless this is taken into account the effect can be

54 L. Gynther, I. Mikkonen, A. Smits Evaluation of European energy behavioural change programmes Energy Efficiency (2011), pp. 1–16

counterproductive even using the narrow metric of CO_2 emissions alone. Once a palette of materials and products has been agreed, existing life cycle analysis methodologies can be used to predict the impact of rolling out these measures across the Jersey building stock. It is equally important to assess the impact on waste streams and to assess the likely effects on the labour market.

Action: Carry out an assessment of the economic and environmental impacts of the objectives proposed above -based on estimated volume and speed of installation.

- The embodied impact of retrofit work, in terms of carbon footprint, costs and opportunities arising.
- The heritage of Jersey's historic buildings – ensuring this is protected and where possible enhanced by sensitive upgrades.
- The ecology of Jersey
- Impacts on human health by reducing damp/mould and radon exposure
- Employment opportunities by providing careers opportunities
- Fuel poverty by making homes cheaper to keep warm
- Fuel security by reducing fuel demand
- Waste minimisation and recycling – by providing support for re-use of building materials

8.6 Plan to manage, mitigate and exploit the wider consequences of retrofit

i) Heritage: Poorly executed retrofit can have a negative impact on heritage but sensitive and well-planned retrofit will protect and enhance heritage assets. The main visual impacts of retrofit are:

- Window upgrade
- External solid wall insulation
- Internal solid wall insulation
- Siting of ASHPs

If properties are correctly selected for these measures and if details for installation are agreed with the Historic Environment service, the impact on heritage can be minimised or avoided altogether. The Supplementary Planning Guidance (2013) addresses this for Windows and Doors but other Planning Guidance is required for EWI and the siting of ASHPs.

Existing agreed details may be reused (noting the recommendation in the Purcell report p38). Where additional details are required then there may be a small cost to the States of Jersey – estimated costs would be in the region of £5,000 for an architect to draw up any details required (and amend as agreed).

Action: Investigate further overlap with historic environment considerations and implications for energy efficiency upgrade.

ii) Fuel poverty: reductions in energy demand can have a lasting impact on fuel poverty. This impact could be maximised if those properties with residents in the most severe fuel poverty are targeted for survey improvement first. However, as this programme is targeted at the "able-to-pay" sector then by definition these residents will not be in fuel poverty. However, the PRS is in scope as it is the landlords rather than the tenants who would be responsible for retrofit and are considered able to pay. The PRS is addressed under section 8.8 below.

Action: Publicise support to the PRS.

iii) Waste: It will be necessary to develop a plan for likely waste streams arising from two main sources:

- material removed from existing buildings, including redundant heating systems
- offcuts, packaging and other waste arising from new materials introduced

There is also an opportunity to expand the opportunities around Acorn (wood reclamation yard) and the plant nursery**.**

Action: Discuss with waste policy lead, predict waste flow from key measures and explore opportunities with Acorn.

iv) Employment: A major retrofit programme presents opportunities to boost career options for those in associated trades. The training of both surveyors and tradespeople will contribute to this (see Sections 9 and 10 below). Retrofit may also be used to help the long term unemployed back to work. In addition to trades skills, there will also be a need to increase administrative capacity in terms of marketing & sales, project management, accounting and communications. These opportunities can best be exploited by developing pathways back to work for specific groups, understanding their needs and skills/motivational gaps.

Action: Discuss with Economic Development, Highlands and the Social Security Department and develop strategy to maximise the back-to-work opportunities for long-term unemployed and disabled.

v) Ecology: Building upgrades can have a number of positive or negative impacts on ecology. For example, retrofit, if not properly controlled, can often damage gardens and mature trees and loft insulation can damage bat roosts. By contrast retrofit can be used to enhance ecology by improving the ecological diversity of land, cleaning up pollution and providing improved habitats for a wide range of species.

Action: Learn from best practice to ensure that the planned work reduces the risk of damage to existing ecology while taking advantage of opportunities for improvements.

8.7 Agree process for survey and recommendations

To be effective, survey needs to be bespoke, clearly understandable and based on accurate data. A requirement for clear, bespoke information was identified in the focus groups and survey was suggested and endorsed by key stakeholders. It is widely recognised that modelled data on energy use is of limited value, and that these estimates are frequently revised. The use of bespoke survey offers an opportunity to collect actual energy use data so that savings estimates can be based upon the house as occupied (patterns of occupation/ density vary widely which leads to large variations in energy use).

Actions:

- Consult with surveyors to establish costs of survey
- Establish level of subsidy available and agree a maximum annual funding pot.
- Test response to different levels of subsidy for surveys and refine until desired response takes place.
- Plan to use HEC during the initial phase of engagement with householders, before a visit, clearly setting out its role and limitations.
- Agree extent of survey, aspects to be covered and format of presentation, metrics etc.
- Discuss energy use data collection with fuel providers including Jersey Electricity, Jersey Gas and heating oil distributors such as Petroleum Distributors Jersey and Central Jersey Heating Oil (surveyors would ask householders for energy use data in any case)
- Establish Quality Assurance procedures
- Establish agreed details for relevant measures (see 3(i) above)
- Establish routes for data capture at States of Jersey and feedback to surveyors

8.8 Commence process for setting up voluntary accreditation scheme and later legislation for Private Rented Sector

Recognising that the PRS has a disconnection between the cost and benefit of retrofit work, and that there is strong competition for rental property in Jersey, legislation may be required to oblige landlords to act.

At present the Public Health and Safety (rented dwellings) (Jersey) law is being drafted and could include energy efficiency standards or targets.

The forthcoming PRS legislation in the UK is based on a somewhat flawed EPC system and has generated considerable objections from owners of large PRS estates. We therefore recommend that the requirement be limited to the necessity of carrying out survey **whenever properties are re-let**, with a subsequent imposition of a requirement to carry out – say – **3 of the top 4 recommendations** in terms of energy saving, so long as these each save over 3% of energy use. To protect the integrity of the programme, there should also be a cut-off in terms of cost effectiveness – so landlords would not

be obliged to implement measures which are estimated above a certain level in terms of £/kWh saved. Any requirement to have all properties surveyed by a certain date would lead to bottlenecks in the market and would skew the subsidised survey process unfairly towards private landlords, leaving insufficient scope for the owner-occupied sector. As modern properties are well insulated, this requirement should also be limited to buildings constructed prior to a given date – we recommend the year 1997, to coincide with the most recent changes to Building Bye-Laws**.** (Although many buildings constructed since then will have electrical resistance heating systems, the heat demand will be relatively low and may not justify the investment in an ASHP).

Actions:

- Work with Health & Social Services to include energy efficiency within the forthcoming accreditation scheme so that the energy performance of a property can be reflected in the information provided to prospective tenants.
- Consider a requirement of landlords of properties constructed before 2000 to have the retrofit survey carried out when they are re-let, and for landlords to be required to implement some / all measures which save more than 3% of energy use, within 2 years of survey.

8.9 Identify training needs for surveyors and design training

There are 2 likely sources of surveyors who could eventually carry out this work - existing energy efficiency surveyors and broader building surveyors (ideally Royal Institute of Chartered Surveyors (RICS) certified or similar - there are 17 RICS registered surveyors currently resident in Jersey). Others with a basic knowledge of buildings could also be trained to become surveyors, recognising that their training needs may be wider.

In order to carry out the retrofit surveys, surveyors will need to be skilled in several areas including:

- Building physics
- Retrofit strategies
- Conservation
- Ecological risks
- Data collection

This surveyor training should be planned at this stage but amended in the light of the pilot of the survey process (see below). Once training materials have been developed, the training delivery should be self-funding as surveyors will be required to pay to attend a course, since this presents a significant (and States of Jersey-subsidised) business opportunity.

Actions: To achieve this, the following actions need to be completed

- Speak to existing surveyors and identify available capacity for taking on more work
- Write specification for training programme and identify training providers (probably off island) who would be invited to tender to deliver this work.

8.10 Identify likely skills needs for installers and plan capacity

Increased capacity will be required in several trades active in retrofit but it will not be known precisely which trades and in what volume until the survey process is fully underway. Based on our analysis of measures likely to be recommended, the following skills are likely to be in increased demand:

i. Plumbers & Electricians – especially dual capacity for the installation of ASHPs
ii. Installers of CWI and loft insulation
iii. Plasterers – for installing solid wall insulation
iv. Window fitters and glaziers
v. Retrofit co-ordinators

Installer training would be delivered using the existing facilities at Highlands College and would be expected to be self-funding – as the college already has courses in all these disciplines with the exception of Retrofit Co-ordinators - a course is available through CoRE – the Centre for Refurbishment Excellence base at Stoke-on-Trent on the mainland (this course is delivered by multiple trainers so it may not be cost-effective to deliver the course locally).

If sufficient capacity in any subject is not available through Highlands College then additional trainers may be brought in from the mainland but in all cases local delivery of training is preferred to reduce environmental impact.

Action: Identify any constraints at Highlands and develop action plan for training for i-iv above.

8.11 Arrange finance facility

The “able-to-pay” sector in Jersey is comprised of both landlords and owner-occupiers. It is possible that some people in both categories may have a shortage of capital to implement what may be cost-effective retrofit measures to reduce energy use.

To remove this potential barrier to the installation of measures, a finance facility should be investigated. In a limited number of cases, access to capital may be a limiting factor. This may be addressed by the use of a simple loan fund. The failure of the Green Deal loan scheme in the UK is in part due to the complexity of the scheme and the involvement of the State within a private transaction, resulting in high administration costs and barriers to the use of the scheme. If a loan facility were to be arranged through one of the banks in Jersey, there should be no need for investment by the State, especially during an era of low interest rates. The question of security for loans would need to be addressed in case this becomes a barrier and there may be a role for the States of Jersey here. In any case, it is likely that most residents would already be able to borrow at relatively advantageous rates if they do not have funds available for energy efficiency improvements.

The States of Jersey could play a role in setting up a simple scheme and perhaps subsidising the interest cost. This could be achieved in a number of ways, one of which may be the use of a Credit Union – or other organisations with which the States of Jersey has already established link.

It is unlikely that there will be strong take-up but there is a good incentive for a financial institution to provide this facility as it offers good PR.

Key considerations needing to be resolved would be:

- Security – it may be helpful for the States of Jersey to underwrite the loans – this risk could be accepted or reinsured.
- We strongly recommend that repayment is not linked to bills or the property as this has been a barrier in the Green Deal in the UK.
- Maximum amount (if a maximum is in fact needed)
- Term of the loan – and whether this is linked to the types of measures selected (fabric measures can take over a decade to pay back).
- Able to pay criteria
- Publicity

Once these considerations have been resolved then key details of the loan facility can be included within the launch material. As Jersey’s proposed retrofit programme is a survey-led scheme rather than a loan-led scheme (unlike the failed Green Deal), we recommend that a loan is presented as an enabling facility only.

Action: Investigate whether a finance facility is required.

8.12 Pilot, feedback and amend

As the retrofit plan is to run over a long period, it is essential to build in a pilot phase and feedback so that lessons may be learned and the programme amended and fine-tuned before roll-out to the wider community.

Initial engagement activities are suggested to identify an initial cohort of properties – of the order of 25 is suggested. It is important not to raise greater demand than can be addressed, and at the same time to maintain a transparent process. A combination of measures such as local articles in the press, or following up with pre-existing contacts who have had contact with the States of Jersey may be suitable.

The pilot programme should be run with established surveyors conducting the surveys, as these will require a minimum of upskilling in order to be able to deliver all aspects of the survey and reporting process.

Once the pilot phase has been completed, a minimum period of 6 months should be allowed for feedback to be gathered and analysed, amendments to be made and capacity to be planned – recognising that the demand for increased capacity will not materialise until surveys have been completed, quotes obtained and orders placed, so there is a further grace period which is likely to occur before demand rises significantly. However, it is essential that this facility is prepared (see 7 above) so that capacity can be increased quickly if the pilot programme generates publicity and demand for the survey process.

Actions:

- Decide upon period and extent (suggest 25 properties) of pilot programme
- Select properties for survey – based on a representative sample of owner occupied and PRS, age and condition, type of occupier (in terms of energy use) and heating fuel type. As this is a pilot scheme and a learning process, the sample could come from sympathetic householders – perhaps those who have engaged with the States of Jersey energy efficiency initiatives in the past.
- Identify 3 surveyors who are most experienced in this area
- Assess training needs for these surveyors and deliver further training as required
- Test out data reporting and data sharing mechanisms
- Carry out detailed assessment of effectiveness of survey process, consulting occupiers, surveyors and installers.
- Analyse feedback on the operation of the scheme (gained via questionnaires to residents and to surveyors) and amend programme and survey process as needed
- Test out amended process and continue to monitor and feed back

8.13 Plan launch and publicise

Once the pilot programme is complete and any necessary amendments have been made, the States of Jersey should be confident to launch the wider programme.

The length of time that the subsidy will be available is not known but over time the knowledge and awareness among the general public will increase and not all properties will need to be surveyed. If the programme ran for 20 years at 500[55] properties per annum this would make a total of 10,000 properties, well over 20% of the total stock, which should be more than enough to learn what measures are appropriate to each situation and to embed all relevant quality assurance processes within the retrofit industry.

There is a risk that demand for survey will outstrip the availability of subsidised audits (500 pa) under the scheme. It is unlikely that demand for surveys will proceed at a steady rate of 500pa for the next 20 years. While there is nothing to stop owners commissioning surveys outside of the scheme and not using the £200 subsidy, they will not necessarily be using accredited trained surveyors so there is a risk to quality.

Mitigation: if demand exceeds supply, subsidy could be "borrowed" from future years – as there is a finite number of dwellings on the island, many of which are modern and will not require retrofit. Once most property types have been surveyed in numbers covering all other variables including occupation, location and condition, the recommendations can be made more generic and it may be possible to use existing surveys to produce a more robust version of the HEC tool for future use.

Actions:

- Provide link in HEC to survey process.
- Set up online resources for accredited details
- Design promotional materials
- Arrange open days in retrofitted dwellings (and prepare associated literature) as per suggestions in focus groups
- Arrange press and TV coverage
- Ensure key scheme officers at States of Jersey are aware of all aspects of the scheme and arrange backup in case demand exceeds ability to respond in a timely manner.

55 500 is based on the available budget indicated of £100,000 (£150k less administration) and an estimated survey subsidy of £200

- Continue process of quality assurance
- Continue data collection and sharing

8.14 Programme Management

The particular advantage of Jersey in terms of implementing a retrofit strategy is its size – so that it is more feasible to consider diverse objectives simultaneously and achieve genuinely joined-up government. This is exactly what is required to deliver whole-house context-based retrofit which takes into account a wide asset of environmental, social and economic factors while delivering sustained reductions in carbon emissions.

The following tasks would need to be coordinated in order to deliver the proposed programme as outlined in section 8:

- Co-ordination of the retrofit process
- Commission impact assessment
- Liaise with Historic Environment to generate agreed design details
- Liaise with Ecology Officer to include ecological impact of retrofit in process design, especially the impact of roof insulation on bat roosts
- Liaise with Planning Department to develop Supplementary Planning Guidance
- Liaise with Jersey Electricity, Jersey Gas and Fuel Oil providers (Petroleum Distributors Jersey and Central Jersey Heating Oil) for access to billed data
- Input into drafting of PRS regulations
- Develop a specification for the surveyor training
- Tender and manage delivery of surveyor training
- Work closely with Highlands College to develop enhanced capacity
- Work with Economic Development and Health and Social Security Departments to maximise employment opportunities
- Devise a construction waste minimisation strategy and encourage recycling
- Investigate setting up a loan facility with a locally based finance institution,
- Design and test the data collection and sharing service
- Set up and manage quality assurance processes (QA)
- Arrange a pilot phase, selecting properties and commissioning surveyors & implement any associated changes required post pilot
- Publicising the programme and awareness raising/ outreach

8.15 Costs

Set-up costs are expected to run over a period of 12 months and are estimated as follows:

Table 18 Set up Costs

Item	Estimated Cost
Programme management	£80,000
Design drawings for details	£5,000
Surveyor training design	£25,000
Full cost of 25 pilot phase surveys at £400 each	£10,000
Impact analysis	£10,000
Website costs	£10,000
Total	£140,000

Ongoing annual costs have been based on survey of 500 properties pa with subsidy of at £200 each:

Table 19 Annual Running Costs

Item	Estimated Cost
Subsidy of 500 surveys at £200 each	£100,000
Programme management (part time) inc QA	£40,000
Contingency for loan underwriting/insuring	£10,000
Total	£150,000

Appendices

Appendix 1: Case studies of retrofit incentive schemes in other countries

Appendix 2: Stakeholder consultation

Appendix 1 - Case studies of retrofit incentive schemes in other countries

France :CITE – Le crédit d'impôt pour la transition énergétique (Energy Transition Tax Credit) previously called CIDD: Le crédit d'impôt développement durable (Sustainable Development Tax Credit)	
Country	France
Programme type	Tax rebate scheme
Start year	2005
Overall assessment	The CIDD/CITE programme has had reasonable success, due to high uptake and its significant contribution to meeting France's building energy efficiency target.

Programme architecture	**Context**
	The CIDD scheme was first introduced in 2005 as a way to diffuse new high-efficiency technologies into the market and to support intermediate refurbishment of households. In August 2009, France adopted the first Grenelle law, which set targets for energy reduction in the building sector. Specifically, a target was set for a minimum of 38% reduction in energy consumption in buildings by 2020. In order to achieve the aims set out by Grenelle, France extended the availability of tax credits to 2015 in addition to introducing a green loan scheme (éco-PTZ).
	As of 1 September 2014, the scheme has been amended and renamed the Energy Transition Tax Credit (CITE).
	Technologies supported
	Eligible equipment and materials are:
	• Insulation materials
	  ○ Insulation materials for walls (including glass)
	  ○ Door insulation
	  ○ Insulation for heating or boiler equipment
	  ○ Protective glazing for roofs, walls, windows to prevent solar radiation
	• Appliances
	  ○ Smart meters
	  ○ Smart thermostats
	  ○ Thermostatic radiator valves
	  ○ Energy management systems
	• Installation of power generation equipment
	  ○ Efficient boilers
	  ○ Solar water heaters or combined solar systems
	  ○ Biomass heating/water heating
	  ○ Power from wind, hydro or biomass
	  ○ Geothermal heat pumps
	  ○ Thermodynamic heat pumps for water heating
	  ○ Efficient heat pumps for air/water
	  ○ Switching of equipment to a renewable energy or cogeneration heating network
	• Electric vehicle charging stations
	Finance mechanism
	At the start of the scheme, tax credit rates were very high (25-50% of eligible costs, depending on the equipment). The tax credit rates reduced over time due to rising costs to the public budget and increased market share of some of the eligible technologies. Previously, packages of two or more measures qualified for higher tax credits, to incentivise comprehensive retrofits.
	In 2014, the scheme was completely reformed and renamed CITE. All equipment retrofits will now receive a tax credit of 30%, regardless of the number of measures.

France :CITE – Le crédit d'impôt pour la transition énergétique (Energy Transition Tax Credit) previously called CIDD: Le crédit d'impôt développement durable (Sustainable Development Tax Credit)	
	There are minimum technical performance criteria and measures must also be applied to a significant part of the property (e.g. > 50% of all external walls isolated).
Programme impacts	**Uptake** Between 2005 and 2008, roughly 4.2 million households benefited from measures implemented through CIDD. This represents roughly 13% of the residential building stock. In general, the scheme has been used by wealthier households, with only 1.6% of the poorest 20% of the population and 9.1% of the richest 20% filing a CIDD tax credit in 2008. Uptake has, however, dropped over time relative to the number of retrofits undertaken throughout the country. For example, in 2008 62% of households that invested in energy efficiency measures took advantage of the CIDD scheme, whereas in 2010 this percentage reduced to 57%. **Energy/CO_2 savings** According to estimations by the Ministry of Ecology, Sustainable Development and Energy and ADEME (French environment and energy agency), the CIDD scheme alone will help to reduce energy consumption in the residential sector by 26% by 2020 based off its implementation from 2008 to 2012. Therefore, a large portion of the 38% energy reduction target set out by Grenelle would be achieved through this scheme.
Cost-effectiveness	The cost of the programme is estimated to be €230 million for 2015 and €700 million for 2016. The estimated cost of the scheme being implemented between 2005 and 2012 is €93/tonne of CO_2 avoided. The cost effectiveness of the scheme varies greatly depending on the type of equipment. For example, below are estimated costs per tonne of CO_2 avoided for various measures[56]: • Wall and roof insulation - €21/tCO_2 avoided • Window insulation (most common measure) - €70/tCO_2 avoided • Photovoltaic panels - €136tCO_2 avoided • Solar thermal power installations – €432/tCO_2 avoided
Marketing and communication	Marketing for this programme is primarily carried out by businesses which offer the installation of approved energy efficiency measures.
Success factors	• The program is very well-known among the public • EE measures financed under the scheme have generally had an IRR greater than the interest rate
Barriers to delivery	• Programme continuously being amended causing regulatory uncertainty • This also makes it difficult for participants to comply with the scheme as equipment sellers don't have the incentive to ensure that buyers are compliant • Complexity of programme means that administrators need to constantly keep track of technological developments. • Multiplicity of equipment and lack of reliability of the supporting documents are a source of varied application of the programme across the country, and sometimes even fraud. • The time lags between the purchase of equipment, receipt of the tax rebate, and administrative evaluation of compliance causes a lot of confusion for participants. In some cases, participants are required to reimburse the rebate amount three years after they are credited if they do not meet eligibility standards

[56] MEDDTL et al., 2011 pp. 14

Sources:

http://www.iea.org/publications/insights/insightpublications/Mobilising_investment_EE.pdf

http://www.economie.gouv.fr/cedef/economie-energie-credit-dimpot

http://www.economie.gouv.fr/files/files/PDF/20141001_PLF_pour_2015.pdf (pg. 116)

http://www.ademe.fr/particuliers-eco-citoyens/financer-projet/renovation/credit-dimpot-transition-energetique-01092014-31122015

http://www.insee.fr/fr/ffc/ipweb/ip1316/ip1316.pdf

http://www.economie.gouv.fr/files/import/rapport-depenses-fiscales/Annexe-D-rapport-CIDD.pdf

France : Eco Prêt à taux zéro (éco-PTZ)	
Country	France
Programme type	Loan scheme
Start year	2009
Overall assessment	The éco-PTZ programme has been viewed as rather unsuccessful due to extremely low uptake. This is in large part due to the fact that the loan is administered by participating banks who are required to confirm eligibility in the scheme while having little to no expertise in the area of building energy performance. Due to significant overlap with the CIDD/CITE tax credit scheme, there is some discussion over whether these two programmes should be consolidated to serve low-income households.
Programme architecture	**Context** In August 2009, France adopted the first Grenelle law, which set targets for energy reduction in the building sector. Specifically, a target was set for a minimum of 38% reduction in energy consumption in buildings by 2020. In order to achieve the aims set out by Grenelle, France extended the availability of tax credits to 2015 and introduced éco-PTZ, a green loan scheme. **Technologies supported** The éco-PTZ loan can be used to finance one of the following: 1. Zero-energy wastewater treatment for stand-alone sewage systems 2. Work that comprises of at least two of the following: • Thermal insulation of roofs • Thermal insulation of exterior walls • Thermals insulation of windows and exterior doors • Installation, regulation or replacement of heating systems, and where necessary, efficient performance of ventilation systems or boilers • Installation of renewable central heating systems • Installation of renewable water heating systems 3. Comprehensive work which allows the home to reach a minimum level of efficiency (150 kWh annual primary energy per m^2 for homes which previously consumed more than 180, and 80 kWh annual primary energy per m^2 for homes which previously consumed less than 180) **Finance mechanism** The éco-PTZ loan targets owners of properties that have been built before 1990, whether they inhabit or rent their property. Through the programme, loans of up to €30,000 can be obtained, depending on the type of retrofit performed. The measures must be performed by a company certified *by Reconnu Garant de l'Environnement* (RGE), which proves expertise in energy performance and/or renewable energy installations. 21 banks have signed a government convention to provide the éco-PTZ loan. The loan can therefore be obtained through any of these banks. Based on the type of retrofit package, the maximum financing are as follows: 1. €10,000 for wastewater treatment systems 2. €20,000 for 2 or more measures, €30,000 for 3 or more measures 3. €30,000 for comprehensive retrofits The duration of the loan is fixed at 10 years, or 15 years for comprehensive retrofits or retrofit packages of 3 or more measures. The duration can be reduced to 3 years by the property owner.

<table>
<tr><th colspan="2">France : Eco Prêt à taux zéro (éco-PTZ)</th></tr>
<tr><td>Programme impacts</td><td>There has been a constant decline in participation since the programme's inception. Between 2009 and 2011, roughly 0.6% of the housing stock had been retrofitted via éco-PTZ. In 2010, roughly 4.9% of building energy performance upgrades were financed by éco-PTZ. In 2011, this number dropped to 4.6%.

Below is a table which shows the targets for uptake and the actual uptake.
<table>
<tr><th></th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr>
<tr><td>Planned uptake (number of loans)</td><td>50,000</td><td>150,000</td><td>240,000</td><td>320,000</td></tr>
<tr><td>Actual uptake (number of loans)</td><td>71,000</td><td>78,500</td><td>40,800</td><td>~31,000</td></tr>
<tr><td>Average loan amount (€)</td><td>16,589</td><td>16,895</td><td>16,992</td><td>-</td></tr>
<tr><td>Average costs of measures implemented</td><td>18,896</td><td>19,473</td><td>19,619</td><td>-</td></tr>
<tr><td>Average term of loans (years)</td><td>8.9</td><td>9.1</td><td>9.2</td><td>-</td></tr>
</table>
Source: MINEFI, 2011 pp. 9 and presentation by Mélanie Barcet (MEDDTL) during the IEA expert workshop in March 2012110 and communication with MEDDTL

According to SGFGAS, 65.6% of loans given out between 2009 and 2011 were for two or more measures, and 29.1% were for 3 or more measures. The other two options (sewerage and comprehensive retrofits) only accounted for 1% or 3% of loans respectively. Roof/wall insulation, glazed area insulation and heating system measures each made up about a third of the measures implemented via éco-PTZ.

According to a 2011 survey, only 28% of households viewed state aid to be a decisive factor in energy efficiency investment, compared to 26% in 2008[57], before the inception of programmes like éco-PTZ.

On average, energy demand in buildings retrofitted through éco-PTZ has reduced by 50%.[58]</td></tr>
<tr><td>Cost-effectiveness</td><td>Due to low interest rates during this period, the cost of éco-PTZ to the public budget is viewed to be relatively low. Participating banks claim tax credits for éco-PTZ loans, resulting in a cost of roughly €398 million between 2010 and 2016.

The cost of energy and CO_2 savings is therefore €0.10/kWh of primary energy saved and €56/tonne of CO_2 saved.</td></tr>
<tr><td>Marketing and communication</td><td>The marketing for éco-PTZ primarily falls under the responsibility of the banks that offer the loan. However, as the banks have little incentive to encourage the use of this loan, marketing and communications are minimal.</td></tr>
<tr><td>Success factors</td><td>• The programme has achieved its goal of supporting deeper retrofits (50% reduction in energy demand)</td></tr>
<tr><td>Barriers to delivery</td><td>• A tense economic environment which leads people to postpone renovation works
• Decrease in housing sales resulting in fewer homeowners and therefore lower demand for retrofit loans
• Banks who provide the loans have an interest in directing clients towards traditional loans, which are more profitable for them and less complex
• Banks are responsible for ensuring that the works are done and that the forecasted energy savings are in line with the government's requirements. This furthers the banks' incentive to steer clients towards traditional loans, which are easier to administer</td></tr>
</table>

[57] ADEME, 2011 pp. 72
[58] https://www2.sgfgas.fr/web/guest/statistiques1

Sources:

http://www.inandfi-credits.fr/13947-eco-pret-taux-zero-2014/

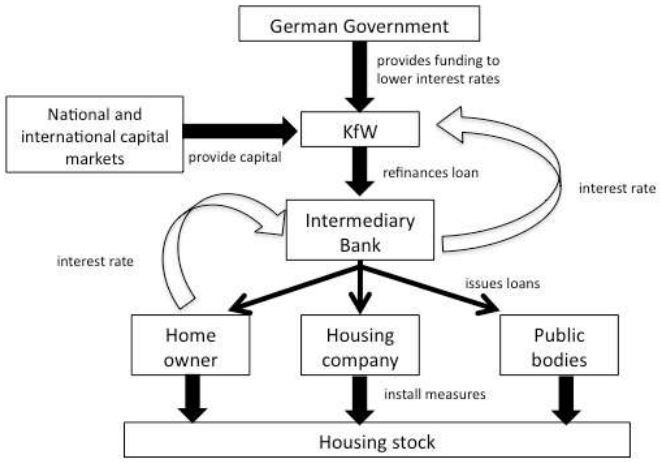
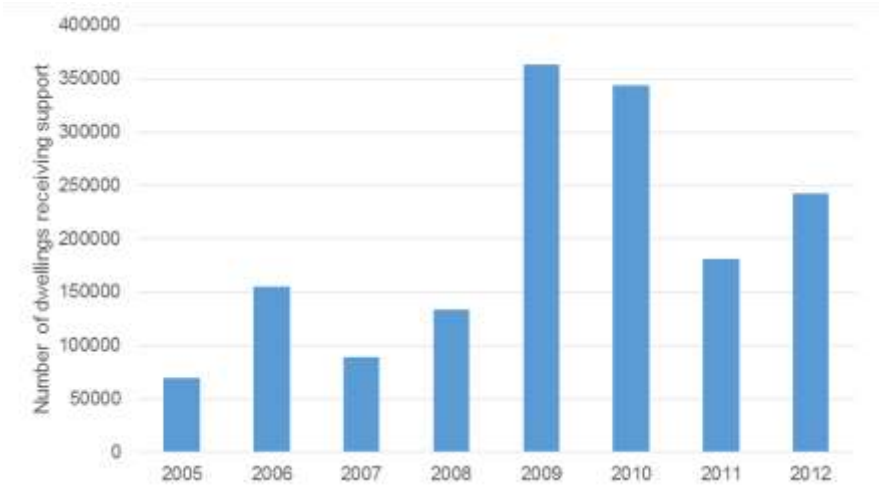
http://vosdroits.service-public.fr/particuliers/F19905.xhtml#N1007E

http://pret-immobilier.april.fr/tout-savoir-sur-l-immobilier/l-eco-ptz-bientot-relance

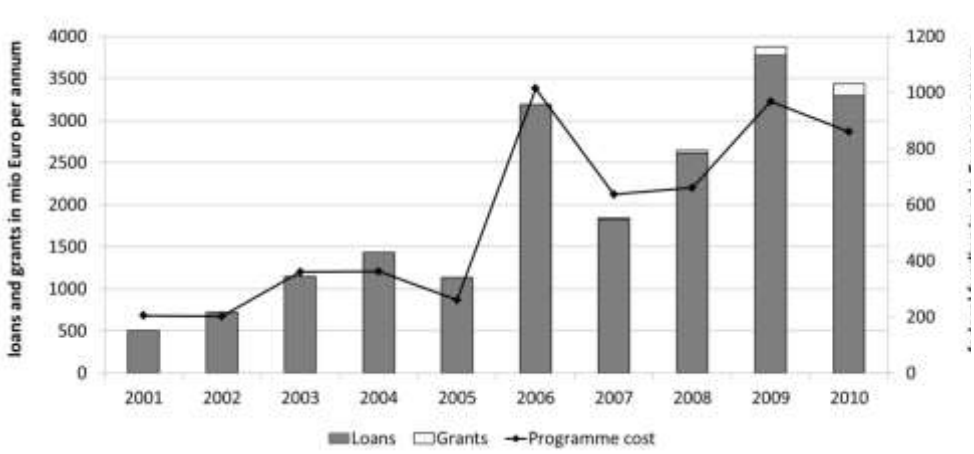
http://www.developpement-durable.gouv.fr/Tout-sur-l-eco-pret-a-taux-zero,28949.html

http://www.iea.org/publications/insights/insightpublications/Mobilising_investment_EE.pdf

Germany: CO_2-Building Rehabilitation Programme	
Country	Germany
Programme type	Soft loan
Start year	2001
Overall assessment	The programme has been very successful in terms of the scale of home renovations funded and is internationally known as a blueprint of a soft loan programme. There are uncertainties around additionality of the programme and the degree of free-ridership. The evidence suggests that at least some of the activity would have happened even in absence of the programme.
Programme architecture	**Context** The CO2-Building Rehabilitation Programme is administered by the Kreditanstalt für Wiederaufbau (KfW), usually known as German Development Bank. KfW was formed in 1948 after World War II as part of the Marshall Plan and since its creation KfW has run several loan and grant programmes related to housing refurbishment. The first programmes started in 1990, although their primary focus was not energy efficiency but modernising the housing stock in former East of Germany after reunification. Only with the CO2-Minderungsprogramm (CO2-Minimisation Programme), which started in 1996, did the KfW introduce a programme with the specific aim of reducing carbon emissions from the housing stock. By far the most significant loan and grant programme in terms of its budget was the CBRP which started in 2001 and is still running today. **Technologies supported** The programme funds whole house retrofits and single measures and combinations of those. Single measures are by far the most important component of the programme in terms of their share – in 2012 78% of all dwellings receiving support from the programme were refurbished using single measures. The programme supports the following single measures: wall insulation; loft insulation; insulation of ceiling between floors; energy efficient windows and doors; replacement or installation of ventilation system; replacement of heating system; and optimisation of heat distribution. In order to qualify for a loan for whole house retrofits an energy performance benchmark based on the *Energieeinsparverordnung* (Energy Savings Ordinance – EnEV) regulations on new buildings has to be reached. EnEV sets out detailed guidelines of how to calculate the annual primary energy demand per m^2 and rules concerning the heat transfer coefficient of different parts of the housing envelope. Note that the programe's requirements exceed the requirements in the EnEV for substantial building alterations. The technologies used to achieve the required energy performance are not prescribed. **Finance mechanism** The Federal Government funds the CO2-Building Rehabilitation Programme and enables the KfW to issue loans with an interest rate lower than the market rates – the subsidies provided essentially buy down the interest rates which are currently at 1%. The maximum loan size is currently €75,000 for a whole house retrofit and €50,000 for a combination of single measures. In addition to loans, some of the funding provided is used to issue grants (not covered here). Federal government sets the framework of the Programme and KfW carries out the delivery according to the Government's specifications. Historically the subsidies were funded through general taxation. However, since 2011 the programme is partially funded

Germany: CO_2-Building Rehabilitation Programme	
	by the Energy and Climate Fund, a Government owned fund to finance climate policy, energy storage technologies, electric vehicles, energy efficiency measures, and renewable energy. The Fund is financed by the returns from auctioning the EU Emissions Trading Scheme permits. Making use of both federal funding and national as well as international capital markets, KfW offers financial products to finance housing refurbishment and construction. Homeowners, housing companies, and public bodies can apply for loans at an intermediary bank which assesses the individual financial circumstances of the applicant. The intermediary bank then forwards the application to the KfW, which approves the loan. The figure below illustrates how the financial architecture is set up. 
Programme impacts	Since 2005 about 1.6 million dwellings received support from the programme (both grants and loans), see figure below. This is about 200,000 dwellings per year.[59]  Annual final energy consumption is lower by 12,760 GWh[60] as a result of the programme's impacts in 2005-2012. Assuming a lifetime of 30 years this adds up to lifetime savings of 382,800 GWh. Per dwelling this is equivalent to energy savings of 7,109 kWh per year which amounts to 30% of the average pre-retrofit consumption.

[59] https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Monitoring-EBS-2012.pdf
[60] Ibid.

Germany: CO_2-Building Rehabilitation Programme	
Cost-effectiveness	The figure below shows the development of the loan and grant volume and the subsidies provided.  The loans issued by the KfW more or less follow the federal funding and on average the ratio federal funding (minus funding for grants) to loans issued is around 1:4. The reason for this relatively low ratio is that the interest rate reduction is not only paid in the first year of the loan but over the whole credit period. Hence the funding paid to KfW covers the interest rate reduction over the whole credit period for all loans issued in a given year rather than just the interest rate reduction for all loans that have been issued since the start of the programme. For example, for a loan of €50,000 paid back over 20 years (KfW loans have credit periods of up to 30 years) with an interest rate reduction of just 1% the total cost of reducing the interest rate that accrues over time adds up to about €10,000. An analysis of the cost effectiveness shows subsidy costs of 2.6-3.4 Euro Cent/kWh which is well above the price for heating energy and electricity making the policy cost-effective.
Marketing and communication	Germany's banks, building societies and credit unions market the scheme to property owners, often when the latter are seeking finance for general property refurbishment. Supporting this are energy efficiency campaigns run by DENA (the German Energy Agency), and a range of KfW promotional activities including KfW awards, information campaigns and a KfW academy to train business partners. In addition to defining the framework for subsidies, the KfW-Effizienzhaus is used as a brand. It offers a consistent standard, defined by DENA, has energy auditor approval, and also translates complicated energy efficiency regulation into an easy to understand quality mark.
Success factors	attractive financial offering with very low interest rates, large loan sizes and complementary grants well-targeted advertising highlighting the comfort factor or better insulated homes
Barriers to delivery	free-ridership currently not sufficiently addressed focus on expensive measures lowers cost-effectiveness initially lack of promotion of the programme by local banks uncertain funding base evident through reductions of the budget in the past as based on general taxation and part of public budget

<table>
<tr><th colspan="2">New Zealand – Warm Up New Zealand</th></tr>
<tr><td>Country</td><td>New Zealand</td></tr>
<tr><td>Programme type</td><td>Soft loan scheme with grants</td></tr>
<tr><td>Start year</td><td>2009</td></tr>
<tr><td>Overall assessment</td><td>The programme stands out as achieving both a large number of recipients, breaking all expectations and reflecting the scale of the programme.
The aim of the scheme is to be broadly revenue neutral, or even to operate as a net consumer of financial resources, albeit with wider social benefits. The central estimate of gross benefits for the programme is $1.28 billion compared with resource costs of $0.33 billion, a net benefit of $0.95 billion, mainly due to health benefits (which represent approximately 99% of the total benefits).</td></tr>
<tr><td>Programme architecture</td><td>Context

Warm Up New Zealand: Heat Smart programme ran from 2009-2013; the Government has now invested into a new three-year programme Warm Up New Zealand: Healthy Homes.

Warm Up New Zealand: Heat Smart is a nationwide soft loan scheme with grants, promoting insulation and clean heating for homeowners and landlords of pre-2000 houses. Under the programme, low-income households (including landlords with low income tenants) are eligible for extra help. The follow up programme Warm Up New Zealand: Healthy Homes is however specifically targeting low-income households occupied by people with health needs related to cold, damp housing. Studies undertaken during the first programme period showed that the greatest benefits from insulation are for people on low-incomes and facing a higher risk of health issues.

The Government’s Energy Efficiency and Conservation Authority (EECA) administers the programmes and approved service providers fit the measures. Individual measures are partially state grant-funded but households need to cover the remaining costs themselves, and can do this through loans. Finance is offered by the major high street banks and by local councils. Loans from the local council are to be paid back through an additional charge on the council tax; this way the loan for the retrofit remains with the house as the repayments remain with the rates bill.

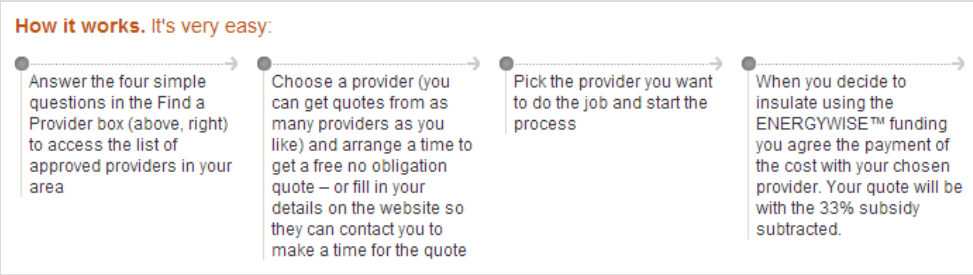
Eligible recipients and the amount of the grants under Warm Up New Zealand: Heat Smart is summarised below:

<table>
<tr><th>Recipients</th><th>Insulation</th><th>Clean heating</th></tr>
<tr><td>Homeowners who hold Community Services Cards</td><td>60% of the total cost</td><td>$1200 (incl GST)</td></tr>
<tr><td>Landlords with tenants who hold Community Services Cards</td><td>60% of the total cost</td><td>$500 (incl GST)</td></tr>
<tr><td>All other houses</td><td>33% of the total cost up to $1300 (incl GST)</td><td>$500 (incl GST)</td></tr>
</table>

The retrofits are audited by the service providers and EECA initially audited 10% of these (later 5%) to ensure quality and compliance.

Process

1. An individual chooses an approved service provider.
2. A representative of the chosen service provider will come to assess individual’s home and provide them with a quote and discuss their eligibility. Individuals can get quotes of as many service provides as they like.
3. The chosen service provider will complete the work, and bill the individual for their portion of the total cost.</td></tr>
</table>

New Zealand – Warm Up New Zealand	
	4. If the individual is eligible for funding the service provider will contact EECA to pay for the amount funded by the programme. 5. EECA audit 5-10% of the homes insulated through the programme. The individuals may be asked by EECA auditors for access for this purpose. The figure below summarises the process:  Source: http://www.wec-policies.enerdata.eu/Documents/cases-studies/Financing_energy_efficiency_buildings.pdf **Technologies supported** All products used in the retrofits must be on the EECA approved list. The funding can be used to install: • Ceiling and under-floor insulation • A hot water cylinder wrap • Pipe lagging • Draught-stopping • Ground moisture barrier • Efficient heating systems (ended in October 2012). It was assessed that most of the programmes' benefits were derived from insulation grants. **Finance mechanism** The EECA administers the programme, and the State provides funding for grants. Individual measures are partially grant-funded but households need to cover the remaining costs themselves, and can do this through loans. Private banks offer financing schemes and regional councils allow ratepayers to repay costs of measures over a period of time as part of their rates bill. The loan for the retrofit goes with the house as the repayments go with the rates bill. The banks and councils have liability for these loan risks – the state does not guarantee loans. The banks enable their customers to add to their mortgages to cover the cost of the retrofit with no charges. Councils provide access to funding which is fiscally neutral to them. The administration costs are covered by the interest rates which are around 7% and repayment is generally made over 9 years. Some councils have offered lower rates by subsidising the interest rate. The amount of funding available is capped by councils.
Programme impacts	*Warm Up New Zealand: Heat Smart* programme managed to insulate 235,000 homes (of which 26,000 were rental houses (11%)) for the budget of $347 million over the four years' implementation period. The energy savings were however observed to be relatively small (around 1% of average annual total metered energy or around 4% of average annual total metered energy used specifically for space heating). This is due to under-heating prior to energy improvements i.e. the energy savings were reduced by increased comfort. See further detail on energy savings in the next section.

84% of those who had insulation installed noticed an improvement in the warmth of their house and 42% noticed an improvement to their health or the health of others living in the house. 62% of those who had asthma/regular sickness (coughs, colds, respiratory problems) noticed an improvement in their health. Employment creation was estimated to be between 130-800 jobs per annum.

There will also be some additional benefits associated with consumer comfort but these have not been measured.

Now, within the scope of *Warm Up New Zealand: Healthy Homes* programme, the Government is investing $100 million over the new three year period and more than $50 million funding will need to come from project partners (targeting 46,000 homes).

Cost-effectiveness

To administer *Warm Up New Zealand: Heat Smart* programme, the EECA employs the equivalent of 22.5 full time people (FTEs) and 2.1 FTEs of contracted labour.

The costs of government overheads ($ million):

Item	2009-10	2010-11	2011-12	2012-13
Financial Costs				
Marketing	3.5	3.5	3.0	1.7
Audits	1.1	1.4	1.4	0.5
Staff	1.0 - 2.2	0.7 - 1.7	0.7 - 1.7	0.4 - 0.9
other (travel, legal etc)	1.2	1.0	0.9	0.6
Total	**6.8 – 8.0**	**6.6 - 7.6**	**6.0 – 7.0**	**3.2 - 3.7**

Value of Total Costs and Benefits ($ million):

Additionality:	**Central**			**Low**	**High**
Discount rate:	**4%**	**2.5%**	**8%**	**4%**	**4%**
Costs					
Admin costs	23	24	22	23	23
Deadweight costs of tax	51	52	49	58	44
Installations - insulation	173	176	165	83	263
Installations - clean heat	85	87	81	41	130
Sub-total	332	339	317	205	460
Benefits					
Energy	17	21	10	8	25
Health	1,266	1,541	816	608	1,926
Sub-total	1,283	1,562	827	616	1,951
Net Benefits	951	1,224	510	411	1,492

The final cost benefit analysis suggests that *Warm Up New Zealand: Heat Smart* programme would have a net benefit of $1.2 billion, and a benefit cost ratio of approximately 4.32:1 (based on the favoured model).

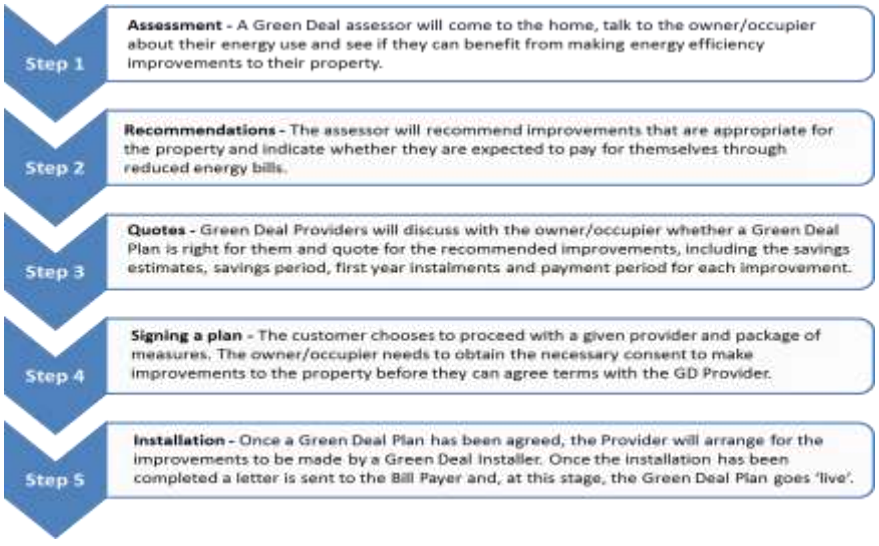
Marketing and Communication

The key objective of EECA's marketing and communications for *Warm Up New Zealand: Heat Smart* is to generate interest and demand from homeowners to insulate, through educating and informing people on the benefits of insulation.

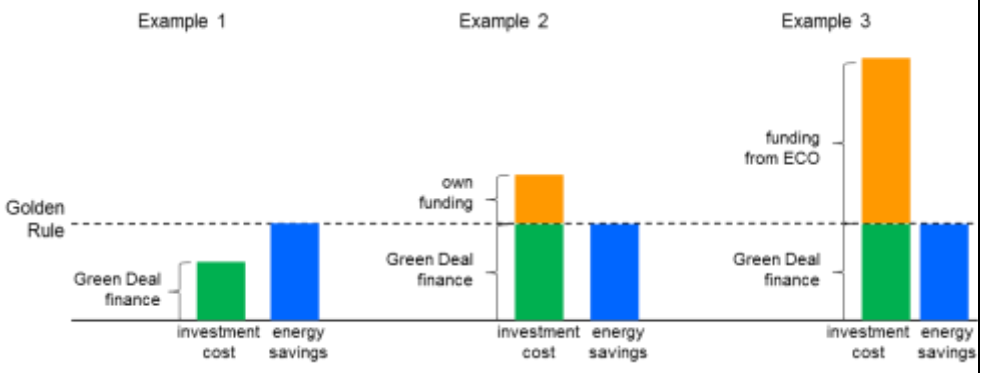
In years 1-3 the programme aims to extent the peak winter period by running two major campaigns either side of winter – a spring campaign and an autumn campaign. Another key part of the EECA's marketing strategy is using TV campaign "the Energy Spot".

The marketing has however changed focus over the years of the programme. The first year focused on building awareness of the programme and funding availability;

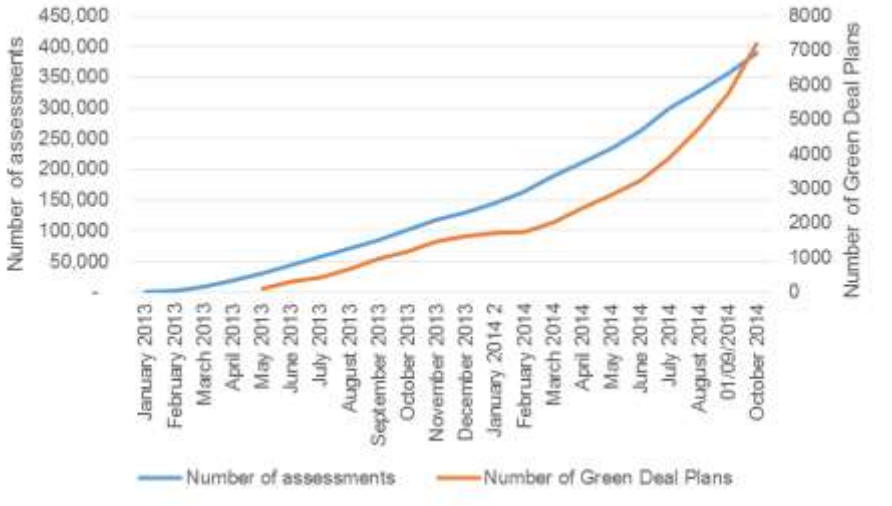
New Zealand – Warm Up New Zealand	
	the second year was about demonstrating benefits through testimonial experiences; year three focused on converting willingness into action through addressing affordability (with testimonials). In year four existing demand enabled EECA to reduce its programme marketing spend while still promoting generic insulation (non-funding) messages. Information is also distributed through parties to the programme - interested households can find information about the programme from their local council, high street bank or national energy agency website. Also materials are made available to Citizens Advice Bureaux, doctors' surgeries and retail outlets etc.
Success factors	• The commitment of the national Government. The engagement of low income households. The more generous subsidies for low-income households and their landlords have resulted in particularly high demand from low-income households. Free assessment of insulation required when preparing for quotes by the service providers contributed to removing barriers to engagement. A range of financial options are offered to accommodate customers' different financial circumstances and needs. Low starting point in terms of building efficiency; many New Zealand houses are poorly insulated, draughty and rely on inefficient or poorly performing heat sources. A well-designed website makes it easy for customers to see what help they will be eligible for, and to find registered providers in their area. Partnering with banks and councils also helps with trust and recognition.
Barriers to delivery	• Small number of measures; the scheme could be widened to include a broader range of technologies including wall insulation products.

UK: Green Deal	
Country	UK
Programme type	On-bill financing scheme
Start year	2013
Overall assessment	The Green Deal has failed so far to achieve its objectives in terms of scale. The number of properties refurbished using Green Deal finance has been significantly lower than expected by government and without substantial changes to the policy it is unlikely to improve.
Programme architecture	**Context** The Green Deal is based on the idea of attaching loans from an accredited 'Green Deal provider' for low carbon refurbishment of buildings not to the owner, but to the property itself, technically the electricity meter in the property. Repayment of the loan is then via a surcharge on the electricity bill, collected by the electricity supplier and paid on to the Green Deal provider. If the value of the energy savings triggered by the measures installed is greater than this surcharge, the occupant is better off financially.[61] In Europe this repayment method is a unique approach to energy efficiency (there have been similar policies in the US) and unknown territory. The Green Deal approach was tested in the UK from November 2009 to July 2011 in so-called Pay As You Save (PAYS) pilots, an initiative put forward by the previous government. However, the Green Deal differs from the PAYS pilots in a number of ways and particularly with regard to the finance mechanism: The Green Deal is subject to a 'Golden Rule' which prescribes that estimated savings must be greater than repayments. Households taking part in the PAYS pilot schemes were not subject to this Golden Rule and could install measures that would not pay back within the chosen repayment timeframe. PAYS provided up to £20,000 per property for energy saving measures at a 0% interest rate. The Green Deal also differs significantly from PAYS in that the interest rate is >7%. **Process** The Green Deal process for households is summarised below: 

[61] There may be instances where this is not the case, for example if the recipients use less energy than the average. If a lower than average energy user wishes to take out Green Deal finance, the Green Deal Provider must obtain a written acknowledgement that they are aware that, based on their energy use, the Green Deal charge may not be fully offset by their energy savings.

UK: Green Deal	
	Technologies supported At least 45 different measures are eligible for Green Deal funding, provided they are installed in packages that DECC's standardised assessment tools indicate will be compliant with the Golden Rule. The list of measures currently covers a wide range of technologies including: insulation: cavity wall insulation, loft insulation, roof insulation, under-floor insulation, external and internal wall insulation systems, hot water cylinder insulation; draught proofing heating and hot water controls; condensing boilers; heat recovery devices; and microgeneration: biomass, solar thermal, micro-wind, heat pumps, micro-CHP. Note that the above list is not comprehensive, please refer to the latest DECC publication for a complete list of measures[62]. Some measures are explicitly excluded from the Green Deal such as photovoltaics and lighting systems. **Finance mechanism** Whether a package of measures is suitable for Green Deal finance depends, however, on the individual property. The Green Deal provides only the amount of money that is likely to be saved over the lifetime of the package of measures implemented. It is important to understand that this applies to the *package of all measures installed* and not to each individual measure. For example, a household may decide to install cavity wall insulation (a relatively cheap measure) and combine this with solar thermal (a relatively expensive measure). Packaged up in this way the combination of cavity wall insulation and solar thermal is still compliant with the Golden Rule, even though solar thermal on its own would not fulfil the Golden Rule. Households can co-finance measures either by providing some of the required investment themselves or by using assistance from other instruments such as the Energy Company Obligation, an Energy Efficiency Obligation. This 'partial financing' means that where customers choose a package of measures that is unlikely to pay for itself in its lifetime; they can still get Green Deal finance towards the installation cost up to value of the estimated savings. This is illustrated in below:  The three examples, shown in **Error! Reference source not found.** are as follows: • **Example 1** is a case where the estimated savings are much greater than the investment cost which is why all of the investment cost is financeable through the Green Deal. No additional funding is required. • **Example 2** is a case where the investment cost are a little bit higher than the saved energy cost and only part of the investment can be financed through the

[62] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48406/5504-which-energy-efficiency-improvements-qualify-for-g.pdf

UK: Green Deal	
	Green Deal. In this case, the home occupier contributes own funding to make up for the difference. • **Example 3** is a case where the investment cost is much greater than the estimated energy bill savings, for example a property with solid walls requiring insulation. The Green Deal only covers about a third in the example case, the remainder is provided by ECO. This is driven by the rationale that in order to achieve the carbon reduction targets the more expensive measures need to be taken up as well. From a household perspective the funding from the Green Deal and ECO will be invisible and Green Deal Providers are expected to offer customers a package bundling funding from both funding streams.
Programme impacts	The UK government initially announced that 14 million homes would benefit from the Green Deal by 2020. In early 2013, the government expected that by the end of 2013 at least 10,000 Green Deal-funded retrofits would have been carried out. In reality, only 626 home retrofits through the Green Deal were completed, just over 5% of the anticipated figure. The latest statistics (October 2014) show that by the end of October 7,207 Green Deal Plans were confirmed. This is equivalent to a conversion rates of 1.8%.  Source: DECC, 2014. Green Deal and Energy Company Obligation (ECO): monthly statistics (November 2014). Online: https://www.gov.uk/government/statistics/green-deal-and-energy-company-obligation-eco-monthly-statistics-november-2014 In response to the slow take-up the government introduced the Green Deal Home Improvement Fund, a new cashback scheme, in June 2014 offering up to £7,600 in form of a non-repayable grant for households installing solid wall insulation and other measures. The cashback scheme has been very successful in that demand for the grants has exceeded expectations by far. This is also reflected in the figures provided above.
Cost-effectiveness	In theory, the an on-bill financing scheme operating with no direct subsidies such as the Green Deal can be expected to be highly cost-effective from a budgetary perspective as the cost of the scheme are almost entirely funded by private investors. However, as a result of the low take-up of the Green Deal the cost were significantly higher per property than expected. Analysis of the resources spent on the Green Deal published in April 2014 revealed that DECC had spent more than £36 million on administering and setting up the Green Deal, at the time about £17,000 per Green Deal Plan. Assuming a similar spend each month going forward (£3 million) this equates to almost £8,000 per Green Deal Plan in October 2014. While setting up a scheme is typically associated with some cost for

UK: Green Deal	
	establishing the administrative structures and advertising the programme the amount of resources spent so far and the results achieved indicate a low cost-effectiveness.
Marketing and communication	DECC developed a communications strategy for the Green Deal with an external communications planning agency CARAT. The strategy identified that industry was better placed to encourage consumers' interest in packages of energy saving home improvements and in converting this interest, accompanied by an understanding of and trust in the Green Deal, to action. Modelling that informed the strategy made the assumption that Government investment would account for no more than 40% of investment in advertising and other large-scale promotion. The strategy placed the Green Deal in the 'home improvement' space and recognised that different households would have different reasons for considering energy saving improvements, including comfort, energy bill and carbon savings. Over the period since the Green Deal launched in January 2013, Government-funded campaign activity has been dominant. There has been limited national promotion of the Green Deal from industry although several small and medium sized organisations have enthusiastically supported the initiative. The Green Deal Finance Company has been engaged in an active communication programme for its product. Government has funded an expansion in the number, and range of locations, of 'open homes' where people can visit properties like their own to understand the benefits that improvements can bring. DECC contracted with the Centre for Sustainable Energy to develop a national hub www.greenopenhomes.net,and is providing support for 27 local networks. DECC will provide further funding as long as the Department's funds are matched by third parties. The Government agrees that the involvement of local authorities and their local partners are important to the successful implementation of the Green Deal. DECC's Green Deal Communities projects - covering 96 individual Local Authorities across England - with £84 million of funding in the 2014-15 financial year. These projects tackle energy efficiency promotion at a local level, on a street by street basis, with a focus on harder to treat properties, such as those apt for solid wall insulation.
Success factors	The Green Deal as a concept was cleverly marketed by the Government and has received significant media attention prior to its launch. There was commitment by senior politicians including the Prime Minister to make the Green Deal a success. The Green Deal Home Improvement Fund received a lot of demand due to the high subsidies provided (up to £7,600 per property).
Barriers to delivery	The interest rate of around 7.5% has been criticised for being unattractive for households (this may be different for commercial sector organisations). Surveys showed that most households considered a 7.5% interest rate too high. Many households who had a Green Deal assessment decided to fund Green Deal measures independently of the Green Deal using their savings or different loans such as an extension on their mortgage or an energy efficiency loan. This applies particularly to the lower-cost measures such as cavity wall insulation and loft insulation. Prior to the Green Deal energy efficiency measures were primarily delivered by Energy Efficiency Obligations and provided at no cost or significantly reduced cost. The Green Deal requires homeowners to take out a loan and pay for the cost themselves which represents a substantial shift in the market. The IT systems required for administering the Green Deal (both within Government and the energy companies) were not fully functioning when the Green Deal was launched in January 2013. This led to delays logging Green Deal Plans and arranging repayment through electricity bills.

UK: Green Deal	
	Green Deal Finance was not available until 15 May. British Gas was the first utility that offered customers the facility to repay Green Deal loans through electricity bills. A large proportion of the early Green Deal assessments were provided free of charge to households making it more likely that free-riders benefited from them who would not otherwise have had a Green Deal assessment and who had no intention to install any measures. 56-60% of respondents stated that they had an assessment being done because it was free (GfK NOP, 2014a). The Green Deal cash-back scheme in place from January 2013 to June 2014 offered households rebates if they installed energy efficiency measures recommended by a Green Deal assessment. The majority of the cash-back scheme-funded measures were condensing boilers and there is anecdotal evidence that many households only had the Green Deal assessment to get access to the rebates with no intention to fund the measures using Green Deal finance. There appears to be a high proportion of free-riders amongst those who benefited from the early cash-back scheme. This is also confirmed by research carried out on behalf of DECC that shows how recipients had been offered a discount by installers being unaware of the links to the Green Deal (GfK NOP, 2014b).

UK – Landlord's Energy Savings Allowance (LESA)	
Country	UK
Programme type	Tax rebate scheme
Start year	2007 (expires 6 April 2015)
Overall assessment	The Landlord's Energy Savings Allowance (LESA) is seen to be rather unsuccessful due to extremely low uptake. The lack of participation can be attributed to a number of barriers, including split incentives between landlords and tenants, a lack of awareness surrounding the scheme, and a low maximum allowance amount.
Programme architecture	**Context** The Landlord's Energy Savings Allowance (LESA) allows landlords to claim up to £1500 of tax allowance for each property they rent out (on a long-term basis) for which they have bought and installed energy efficiency measures. It only applies to cases where Green Deal financing has not been used. LESA can also be claimed on properties rented out abroad, so long as the landlord pays UK taxes on the profits from these properties. **Technologies supported** The following measures are eligible for LESA: • loft insulation • cavity wall insulation • solid wall insulation • draught proofing • hot water system insulation • floor insulation **Finance mechanism** Once the work has been completed, landlords can claim the allowance under allowable business expenses on their corporation tax return (for corporations) form or their self-assessment income tax return (for individuals). Landlords are only permitted to claim allowance on the property that they let, so any installations that cover other parts of the property need to be apportioned. Landlords are able to use LESA and Green Deal financing on a package of improvements, so long as they are applied to separate measures.
Programme impacts	The program suffers from extremely low uptake; between 2007 and 2008, the allowance was only taken up by 0.2% of UK landlords[63].
Cost-effectiveness	(No information available)
Marketing and communication	There is a lack of information on the part of the landlords, as well as their accountants, as to the nature and availability of the allowance. This perhaps indicates that the marketing and communication for this scheme is relatively poor.
Success factors	Despite the programme's lack of success, there are some advantages: For those who would rather avoid the Green Deal financing process and can afford to pay for improvements upfront, LESA is beneficial It does not require the agreement or involvement of tenants LESA can be used for a portion of a package of improvements, with the remainder being financed by other schemes, such as the Green Deal
Barriers to delivery	Split incentives – landlords responsible for costs of energy efficiency measures but tenants reap the benefits

[63] http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/1744i_ii/1744we12.htm

UK – Landlord's Energy Savings Allowance (LESA)	
	Energy efficiency measures landlords require, or might be interested in, cost more than the £1500 allowance Some landlords who may qualify for the allowance do not claim it because they wrongly assume that measures like insulation are a maintenance cost that can be offset against tax anyway In general, there is a lack of awareness among landlords' accountants regarding LESA. This means that landlords would need to inform their accountants about their intention to claim LESA.

Sources:

http://www.energysavingtrust.org.uk/

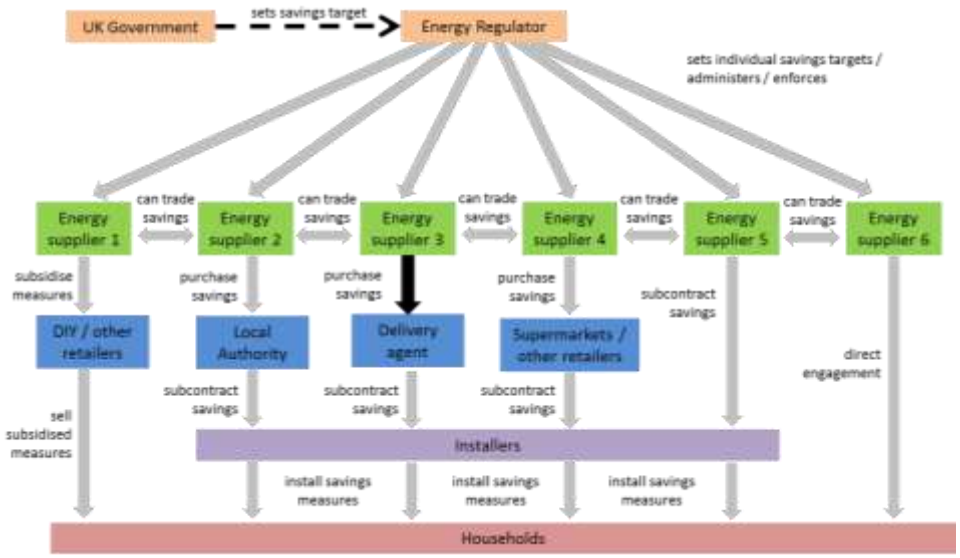
http://www.bpf.org.uk/sites/default/files/resources/Energy%20Efficiency%20and%20the%20Private%20Rented%20Sector.pdf

UK: Minimum energy performance standards (MEPS) for the private-rented sector *(proposal)*	
Country	UK (England and Wales)
Programme type	Minimum standard
Start year	2016-2018
Programme architecture *(proposed)*	The Energy Act of 2011 stipulated that minimum standards for the energy performance of let property come into force by 2018. In September 2014, the UK government closed its consultation for these minimum energy performance standards for the private-rented sector in England and Wales. The government has proposed to set a minimum standard for domestic properties with an EPC rating below 'E' (i.e. 'F' or 'G'), whereby these properties are required to install energy efficiency measures to reach at least an 'E' rating. In order to minimise costs on the part of the landlord, the landlord would only be expected to improve the property up to the Green Deal "Golden Rule", whereby the cost of the work does not exceed the expected savings. This takes into account funding such as the Green Deal, ECO, grants, or a combination of these. The government could introduce these standards under three different mechanisms: • Soft introduction – application of the regulation to *new* tenancies from 1 April 2018 • Hard introduction – application of the regulation to *all* tenancies from 1 April 2018 • Phased introduction – a soft start with a hard "backstop"; i.e. applies to *new* tenancies agreed from 1 April 2018 but with a hard "backstop" at a later date (1 April 2020 as a suggestion) which applies to *all* tenancies. Both the Government and the Domestic Stakeholder Working Group preferred the phased introduction.
Programme impacts *(expected)*	In general, the costs associated with this policy are those of installing energy efficiency measures, Green Deal credit re-payments, Green Deal assessment costs, cost of demonstrating compliance, etc. The benefits include reduced energy demand, carbon savings, comfort from warmer homes, increased property value, etc. The Government ran an impact assessment, the results of which are summarised below, based on the various introduction options mentioned above. **Soft introduction** • Estimated total cost of £1.7 billion • Estimated total benefit of £3.2 billion **Hard introduction** • Estimated total cost of £1.6 billion • Estimated total benefit of £3 billion **Phased introduction** • Estimated total cost of £2.1 billion • Estimated total benefit of £3.7 billion

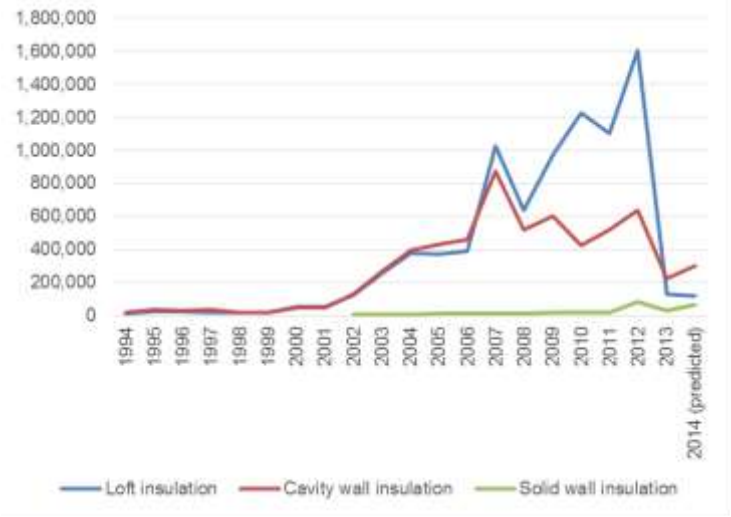
Sources:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/346767/Domestic_PRS_Regulations_Consultation_Draft__v1_6__No_tracks_final_version.pdf

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335075/Consultation_Stage_Impact_Assessment_for_the_PRS_Regulations.pdf

UK: Supplier Obligations (ECO, CERT, CESP, EEC 1-2, EESoP 1-3)	
Country	UK
Programme type	Energy Efficiency Obligations
Start year	1994
Overall assessment	The programme has been very successful in terms of the scale of home renovations funded and is internationally known as Europe's most robust Energy Efficiency Obligations scheme. It is the primary policy instrument in Great Britain to deliver domestic energy efficiency retrofits. However, recent policy changes had major repercussions for the industry – the target was lowered and is now much less ambitious compared to the time prior to 2013.
Programme architecture	**Context** The Supplier Obligation began in 1994 as the Energy Efficiency Standards of Performance (EESoP). It became the Efficiency Commitment (EEC1) in 2002; the EEC2 in 2005; and the Carbon Emissions Reduction Target (CERT) in 2008 which was complemented by the Community Energy Savings Programme (CESP). Since 2013, the Energy Company Obligation has succeeded CERT and CESP. The basic concept of the Supplier Obligation is that the government imposes an energy savings target on large energy suppliers (gas and electricity) that has to be achieved at the customer end, which may relate to energy consumption or carbon emissions. Businesses and industrial end-users are not covered by the scheme. The target is set by the Department of Energy and Climate Change (DECC) for a defined period of time. The energy regulator, the Office of Gas and Electricity Markets (OFGEM), administers and enforces the obligation. **Delivery model** All six major energy suppliers established partnerships with a wide range of organisations to deliver measures through multiple delivery routes - as shown in the figure below. This includes schemes involving local authorities, installers and managing agents; registered social landlords; and retail stores for direct sales of DIY loft insulation. Some of the energy suppliers only work with preferred installers and managing agents, while others work with a wide range of installers and managing agents. In addition, one energy supplier, British Gas, delivers insulation measures directly to households through its insulation and heating business. Since the introduction of the Green Deal / ECO brokerage platform a proportion of the savings is also delivered via purchasing from third parties through the platform. 

UK: Supplier Obligations (ECO, CERT, CESP, EEC 1-2, EESoP 1-3)	
	Technologies supported The technologies supported by Supplier Obligations changed over time. The early variations of Supplier Obligations supporte the following single measures: cavity wall insulation; loft insulation; upgrade of heating system (mainly condensing boilers); energy efficiency appliances (brown and white goods); and energy efficient lighting (mainly CFLs). During later stages microgeneration technologies and behavioural measures were introduced but their overall share of the delivered savings was negligible. The current obligation scheme (ECO) does not support appliances and focuses entirely on insulation measures. **Finance mechanism** Energy suppliers part-fund or fully fund measures (low-income customer usually received measures with costs covered 100%) and pass on the cost to their customers through energy bills. This is not regulated and at the discretion of the energy companies. In theory, Eco funding can be combined with the Green Deal (see Green Deal example) but in reality most measures are only promoted through ECO without using Green Deal funding.
Programme impacts	**Historical impacts** The Supplier Obligations have been very successful in terms of the number of measures being delivered. Over the last 20 years the number of measures supported include: cavity wall insulation: 6 million measures loft insulation: 8.5 million measures solid wall insulation: 300,000 measures Supplier Obligations have also helped promoting energy efficiency appliances, boilers and microgeneration technologies: energy efficient appliances: 32 million measures heating system upgrades: 10 million measures energy efficiency lighting: 500 billion measures air and ground source heat pumps: 7,500 measures solar water heating: 1,000 measures For insulation measures the following figure shows the historical development including the predicted figures for 2014 based on current activity levels.

UK: Supplier Obligations (ECO, CERT, CESP, EEC 1-2, EESoP 1-3)	
	 The figure shows a steep increase in the number of measures being delivered particularly after 2002. This is when the government started to set the target of the Supplier Obligations, it was previously set by Ofgem and they were reluctant to increase it beyond a very low level equivalent to costs of about £1 per customer per fuel per year. The figure also shows that after 2013 the installation rates collapse. The main reason behind this are recent policy changes outlined below. **Recent policy changes** The above is a result of a re-orientation of Energy Efficiency Obligations in the UK towards more costly measures such as solid wall insulation and hard-to-treat cavity wall insulation. In addition, further profound modifications of ECO are planned following a debate around rising energy prices and the impact of so-called 'green levies' on consumers which took place in the winter of 2013/14 after the Labour Party announced that it would 'freeze' energy prices until 2017 and significant price increases by energy companies. In December 2013, DECC announced that it would propose to significantly reduce the size of the target of the Energy Company Obligation and allow energy suppliers to use cheaper measures in order to fulfil their obligations.Together, the proposed changes would reduce the cost of ECO by about 2/3. Three months later DECC published the detailed proposals for consultation and recently confirmed to go ahead with the plans in a formal government response Our analysis of the carbon savings in 2013 compared to 2008-2012 previously indicated a reduction of 77% in terms of t CO2 lifetime emissions saved. When using the actual figures for 2013 the reduction is 86%. This is a result of very low uptake of the Green Deal (actual carbon savings are just 0.9% compared to the estimate in the impact assessment) and the revisions to ECO (the revised target will deliver 25% less carbon savings than the initial ECO target).
Cost-effectiveness	An analysis of the financial resources spent by energy companies of the period 2002-2008 shows that the spent per kWh is around less than 1 pence which is well below gas and electricity prices in the UK. Even if the contribution by households is taken into account the scheme is highly cost-effective. Historically, the actual cost of delivering the targets was always much lower than anticipated (around 20-30% lower). However, there are no figures yet for ECO and the initial policy changes made would have reduced the cost-effectiveness significantly as a result of the focus on solid wall insulation and hard-to-treat cavity wall insulation. Since the lower cost

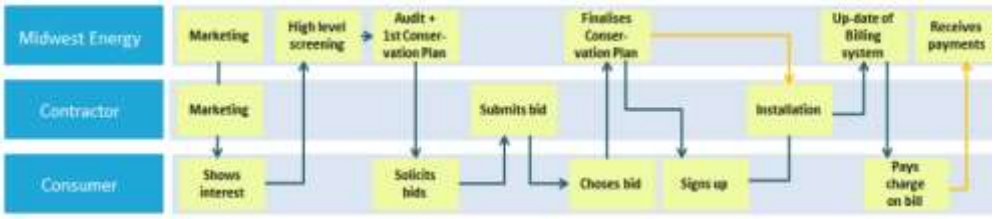
UK: Supplier Obligations (ECO, CERT, CESP, EEC 1-2, EESoP 1-3)	
	measures have been reintroduced for the main sub-target of ECO the actual cost of the scheme are lower than initially anticipated and may well be in cost-effective territory.
Marketing and communication	The main marketing routes utilised in the past include: Offers in conjunction with the **local authority** and other partners. In all cases these schemes were primarily promoted via local-authority endorsed mail-outs and/or door-knocking. Often those schemes involved managing agents as well. Offers from **installers and managing agents** without direct involvement of local authorities, promoted primarily via advice centres, but also through advertising (by larger installers), employee schemes and targeted door knocking in localised areas. Offers **directly from energy suppliers**; most of the major energy suppliers promoted national offers direct to households, at least one of which also offered preferential deals for their own customers. Other energy suppliers make a targeted offer to their own customers only. These offers were publicised via energy bills, websites, national advertising campaigns and advice centres. Offers through **supermarkets and DIY stores**, who often also promoted energy supply and/or DIY loft insulation materials.
Success factors	quantity—based instrument with mandatory targets ensured high levels of activity staged increase of targets allowing the supply chain to develop thorough monitoring and verification system involvement of local authorities in delivery focus on low-cost measures allowed to spread the benefits across all consumer groups focus on standardised measures minimised transaction cost
Barriers to delivery	costs passed on to consumers via energy bills has social equity implications increasingly politicised debate around energy prices and 'green levies' high-cost measures more difficult to deliver as more complex and benefit small number of households whereas costs are borne by all households targeting of low-income households complex and burdensome

US - Clean Energy Works Oregon (CEWO)	
Country	US
Programme type	On-bill repayment loan
Start year	2011
Overall assessment	Clean Energy Works Oregon has been successful over the past few years. CEWO grew demand for energy efficiency across the state and retrofitted over 3,000 Oregon homes. CEWO substantially elevated and helped to professionalize buildings trades industry, by creating hundreds of jobs in the hard-hit industry.
Programme architecture	**Context** Clean Energy Works began as a pilot program in 2009 run by the City of Portland. In 2010, the U.S. Department of Energy awarded $20 million to expand the program beyond Portland and serve homeowners in Oregon. To facilitate this expansion, the non-profit organization Clean Energy Works Oregon Inc (CEW) was created to deliver energy efficiency services to homeowners throughout Oregon. CEW subsequently received an $18 million sub-recipient award and Clean Energy Works Oregon programme (CEWO) was officially launched in March 2011. The state-wide energy efficiency retrofitting program features low-interest financing and incentives for residential homes (owner-occupied and rental) by providing on-bill loan repayment through heating utilities. Though the primary focus of the CEWO is to transform the residential market for whole home energy retrofits, large and small commercial energy efficiency retrofits are also delivered. There is no upfront costs and CEW's local lending partners offer attractive rates and terms specifically for this program. Credit requirements vary by lender and loan rates and length of terms vary on a project-by-project basis. CEWO initially required participant loan interest rates not exceed 5.99%; however with multiple lenders/loan options now available, interest rates and terms remain competitive. In general, loans are with around 6% interest rate with a 10- to 15-year term. Historic loan losses remain under 0.5%. Loans are either paid on utility bills or directly to lenders. The local utility is compensated for being a conduit for repayment but does not take on the risk of non-payment. Loan can be transferred across homeowners for a fee. The programme was initially heavily dependent on state funding. For example, loan origination fees and loan loss reserves were at first required by credit unions in the program. The market research undertaken however indicated that loans created by the program are desirable and that incentives to get lenders to work with the CEWO program were no longer required. CEWO is now implementing its new business model to become self-sufficient. **Process** 6. To begin, interested participants make sure they are eligible and apply to the program by completing online profile at CEW website. 7. Once approved, a Building Performance Institute (BPI) certified contractor performs a free Home Energy Assessment. This assessment will show the homeowners areas that can be improved to save energy and money on heating bills. 8. Once the work is complete, Clean Energy Works inspects the upgrades to ensure everything performs as promised. 9. CEWO's Energy Assistants are available to guide homeowners through the entire process. Source: https://www.portlandoregon.gov/bps/article/430528

US - Clean Energy Works Oregon (CEWO)	
	Technologies supported • High Efficiency Heating Systems • Air and Duct Sealing • High Performance Attic, Wall and Floor Insulation • High-Tech Water Heating Systems • Energy-Efficient Windows • Solar Energy CEW also offers services to help homes prepare for earthquakes and ensure clean and safe air by testing for radon gas. **Finance mechanism** During the program pilot, the City of Portland entered into an arrangement with Craft3 to provide low-interest, long-term financing with an option of utility on-bill repayment. During 2011 and 2012, as CEWO was expanded throughout the state, other lenders joined the program. CEWO allows homeowners to select their lender and loan option from a slate provided by each of the lenders. Loans are either paid on utility bills or directly to lenders. CEWO has funding from the State of Oregon, local governments, workforce investment boards and national foundations to support its efforts.
Programme impacts	Clean Energy Works Oregon has been very successful over the past few years. As of December 2013, 3,254 retrofits had been undertaken (includes 3,199 residential projects, 21 schools, and 34 small commercial buildings). Total estimated electricity savings were 7,090,000 kWh, total gas savings 767,000 therms, total savings from other fuels 24,000 MMKtu and total carbon avoided 8,500 MT CO2e. The average energy savings for the households participating in CEWO is 30%. CEWO has also created hundreds of jobs. More than a 1,000 workers have received pay checks from a CEWO project, including more than 342 new construction hires. Through Q3 2013, construction workers alone spent nearly 360,000 hours on CEWO retrofit projects. Together, they earned an average wage of $20/hour, as well as training and opportunities for promotions and health benefits. Nearly 13 percent of project dollars have gone to minority- and women-owned firms. 55% of hours are worked by women and people of colour. Forty-seven percent of new entry-level hires are women and people of colour. Individual contractors must meet certain minimum criteria to be considered for CEWO, for example pay family supporting wages and offer health benefits.
Cost-effectiveness	In 2009, $1.9 million ($1.1 million received from the US Department of Energy and the rest from local funds) was used to capitalize the initial loan fund for the pilot programme. The Portland Development Commission, the City's economic development agency, committed another $3.5 million in 2010, most of which went towards loan origination. The total funding from the State of Oregon is $10 million in 2013-2015. The use of ratepayer dollars to fund CEWO's gap has proven to be somewhat contentious. From the City's perspective, ratepayer dollars seem to make sense as a source of temporary, gap funding for CEW during this phase of its transition toward a revenue generating business, but not all of the stakeholders agree. The State expects this funding will be sufficient to transition CEWO to a fully independent program, supported by its own business model. It does not anticipate providing additional funding to CEW in the future. Historically CEWO has been dependent on state funding. For example, it provided significant incentives to move homeowners towards an energy efficiency upgrade, paid contractors for performing test-in audits and for selling the home energy retrofit, and provided loan origination fees and loan loss reserves to lenders. CEW

US - Clean Energy Works Oregon (CEWO)	
	however hopes to transform to self-sufficient business model, charging for its services and earning revenue from contractors, consumers, utilities and lenders for delivering value to each. For example, contractors began paying CEW for lead generation in November 2013. CEW's revenue model shows that with sufficient volume, the business can break even at the unit-level by the end of 2014. Breaking even at the organizational level, meaning that earned income covers full overhead, is planned for the end of 2016. Available capital: 2011: $12 million; 2012: $24 million; 2013: $36 million.
Marketing and Communication	From its inception, CEW understood the critical importance of marketing and driving demand to the overall success of the programme. CEW thoughtfully crafted its brand to encompass attributes of comfort, quality, confidence and cost. CEW conducted professional primary market research to inform the development of its value proposition and core messaging. CEW has diligently engaged with each of the many important stakeholders and partners, such as lenders, utilities, ratepayer advocates, realtors, contractors and consumers. Also, the use of public and purchased data to target direct mailings has proven to be one of the most successful lead generation tactics for CEW. Contractors are also encouraged to create demand for this program and attract customers through their own marketing and outreach.
Success factors	Repayment of loans through primary utility bill, which enhance accessibility to energy efficiency upgrades by making it easier and more convenient for homeowners to pay back the loan. Successfully engaging a number of lenders in the program, unlocking millions of dollars of private capital while eliminating costly credit enhancements. The use of public and purchased data to target direct mailings has proven to be one of the most successful lead generation tactics for CEW. Offering homeowners free home energy assessments expanded community awareness of energy efficiency and led to word-of-mouth referrals. Competitive lending situation/conditions.
Barriers to delivery	CEWO program has so far been dependent on state funding. CEWO is now taking steps to implement it new self-sufficient revenue model, there will however be period of time for the adoption, also state funding is essential to enable CEWO to make this transition.

US - How$mart®	
Country	Kansas, US
Programme type	On-bill financing scheme
Start year	2007
Overall assessment	How$mart® has been in place since 2007. While its overall scale is relatively small the longevity of the programme and the high conversion rates suggest that it has been successful. However, the rule that the repayments must not exceed the energy cost savings prevents the scheme from funding deeper retrofits going beyond the most cost-effective measures.
Programme architecture	**Context** How$mart® was introduced as a pilot programme in 2007 in four counties in Kansas. By 2008 the programme was fully implemented in all 41 counties. How$mart® is an on-bill financing programme for domestic retrofits run by Midwest Energy, a local electric and gas cooperative that serves 48,000 electric and 42,000 gas customers in central and western Kansas. The introduction of How$mart® is based on long-term experiences with energy efficiency services, which have been promoted by the utility since the early 1980s as an effective tool to manage high bill complaints and to improve customer satisfaction. The PAYS® system, as it was designed by the Energy Efficiency Institute, built the foundation for the development of How$mart®. Its aim is to provide a financing programme for efficiency improvements suitable for overcoming the identified barriers in rental and low-income markets. Worldwide, Midwest was the first utility to voluntarily adopt the PAYS® system. **Process** 1) Customers with energy bill concerns or complaints become familiar with the programme through contacting the utility. Others are actively approached by Midwest's contractors or informed about the programme by social service agencies. 2) When an initial contact has been established customers receive more detailed information about the functioning of How$mart® and a high-level screening of energy usage. This may then lead into a comprehensive on-site audit performed by one of Midwest's auditors. 3) The audit may include the following services: an air infiltration test, an infrared scan, a duct leakage test and a furnace combustion test. Midwest Energy charges a fee of $200 if the customer decides to stop the process at this stage. In case the auditor cannot find improvements that result in a lower energy bill, Midwest Energy covers the costs and the process stops as well. 4) If the audit reveals cost-effective energy efficiency potentials and the customer is still on-board, a preliminary Conservation Plan is developed which consists of recommended efficiency measures, the estimated costs of those measures and expected energy savings, translated into cost savings. 5) If the customer is interested in signing up for the programme, he or she solicits binding bids from a list of Midwest's approved contractors. When the most attractive bid has been chosen, the Conservation Plan is finalised. 6) The customer informs Midwest Energy when the instalment of the chosen measure or package of measures has been satisfactorily completed. Midwest Energy carries out a post-retrofit audit to check if all measures have been implemented as prescribed in the conservation plan. 7) As a last step, Midwest Energy pays the contractor and starts to issue the monthly tariff on the customer's utility bill. The tariff is either allocated on

US - How$mart®	
	the electricity or gas bill, depending on the customer's location in Midwest Energy's service area. The figure below summarises the process:  Source: http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=4699056&fileOId=4699057 **Technologies supported** Technologies that can be funded include (subject to the savings being higher than the repayments: Heat pumps Central Air conditioners Caulking/Weather-stripping Duct/Air sealing Insulation HVAC equipment and thermal shell improvements Windows Custom/Others pending approval **Finance mechanism** There is no charge for the audit when the customer participates in the program. If program is not used for financing the recommended improvements, Midwest Energy may charge customers $200 for the audit. Participating customers repay the funds through energy savings on their monthly Midwest Energy bills. No up-front capital is required for qualifying investments. Customers have the option of "buying-down" the cost of non-economic improvements when the projected savings will not cover the entire cost. Monthly surcharges covers the cost of qualifying improvements. The surcharge is always less than the projected savings. The surcharge is tied to the location. If a customer moves or sells the property, the next customer pays the surcharge. Full disclosure to subsequent customers is required. There is no penalty on paying off early. The current interest rate for residential customers is 3.0% over 15 years. Commercial is 4.5% over 10 years.
Programme impacts	Until the end of 2012, Midwest Energy invested US$ 4.8 million in energy efficiency measures in 858 locations. By August 2014, 1,184 projects have been completed. The average project size across all customer segments has been $7,489, based on data from 2012.[64] Since inception, the energy efficiency measures installed under the How$mart® programme saved 9,756 GJ of electricity and 33,072 GJ of gas. This resulted in 4,370 reduced tons of carbon emissions.[65] Midwest Energy closely monitored a small sample of households in the first year after the introduction of How$mart®. These households showed a 28% decrease in natural gas consumption in the winter months and a 15% decrease in summer electricity usage.[66]

[64] http://eeivt.com/wordpress/wp-content/uploads/2013/02/PAYSstatus2_21_13.pdf
[65] http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=4699056&fileOId=4699057
[66] http://www.aceee.org/files/proceedings/2008/data/papers/2_438.pdf

US - How$mart®	
	The conversion rates are very positive - under How$mart®, 55% of approached customers have agreed when offered efficiency improvements financed through the scheme.[67]
Cost-effectiveness	In theory, on-bill financing scheme operating with no direct subsidies such as How$mart® can be expected to be highly cost-effective from a budgetary perspective as the cost of the scheme are entirely funded by private investors. By the end of 2012, programme fees amounted for US$ 207,000. In relation to total investments made in energy efficiency technologies installed under the How$mart programme (US$4.8 million from Midwest Energy and US$ 1.4 million from programme participants), programme fees account for 3% of total capital costs. Spreading programme fees over the 858 sold energy efficiency service packages, programme fees amount to US$241 per project.
Marketing and communication	Customers with energy bill concerns or complaints become familiar with the programme through contacting the utility. Others are actively approached by Midwest's contractors or informed about the programme by social service agencies.
Success factors	• Being introduced as a voluntary initiative independent from government intervention gave the utility more freedom in designing the programme and may have reduced overall programme costs • Streamlined programme with low number of contractual sequences and actors involved make it low hassle for consumers • Midwest Energy had existing customer base • High level of quality assurance at little incremental cost is achieved under the PAYS® system by allowing utilities to pick the best contractors without a highly formalised accreditation system
Barriers to delivery	• Programme limited to cost-effective measures • Majority of customers are not actively approached by Midwest Energy, contractors or social service agencies (focus on above average energy use or unsatisfied customers)

[67] http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=4699056&fileOId=4699057

US - Palm Desert Energy Independence Program (EIP)	
Country	US
Programme type	Property Assessed Clean Energy (PACE) Financing
Start year	2008
Overall assessment	There is limited information available on the impacts and energy savings delivered by the programme. The programme had however no trouble recruiting participants – phase 1 funding was committed within 3 weeks, and phase 2 funding within 5 weeks. The initial funding derived from the city's general funds, which limited the funding available and the further success of the programme. Also as PACE lien on property is superior to the first mortgage on the property, it creates a significant risk to the mortgage lenders, which might limit the success of the programme.
Programme architecture	**Context** EIP allows property owners (tenants cannot access the fund directly) in Palm Desert to borrow money from the city for energy projects at their home or facility, and to repay those loans through increased property taxes. The program offers loans for residential, commercial, industrial and agricultural properties for energy efficiency or solar projects. Loans are primarily intended to fund solar installations and efficiency projects in existing buildings, but are also available for owners of new homes and businesses that wish to add energy improvements after they take title to the property. The loans are not available for properties that do not pay property taxes, so government entities and some non-profit organisations are excluded. There are no upfront costs and the loan is repaid through annual property taxes for a period of up to 20 years. The minimum loan amount is $5,000 and the maximum loan amount is $100,000, while funding over $30,000 requires a consent agreement from the mortgage holder. For the initial $2.5 million the city set interest rates at 7%; after the $2.5 million was utilised the city maintained the discretion to adjust the interest rate up to an amount not to exceeding 10% (to ensure financial viability of the loan fund). There is a $360 fee for procurement of a title report and title insurance, which can be included in the loan. The loans are affixed to the property being financed, they do not impact the borrower's credit and the financing stays with the building upon sale and is easy to share with tenants. The programme guidelines do not necessarily encourage a upgrade of whole building, but certain pieces of equipment that are prevalent in the region and use a significant amount of energy (like pool pumps etc.). The city's Office of Energy Management (OEM) administers the program and will provide energy checks at interested owners' properties. The PACE lien on property is superior to the first mortgage on the property. Mortgage lenders had concerns about this situation and in 2010 the Federal Housing Finance Agency (FHFA) determined that PACE loans were a significant risk to mortgage lenders and called for PACE programmes to be paused. As a result EIP was temporarily suspended, but was reinstated in August 2010 with a new requirement that property owners must sign a disclosure statement that participation in the program may violate their mortgage contracts. **Process** 1. Homeowners who want to apply for EIP financing begin by developing and pricing an energy improvement plan, either for self-installed work or as a bid from any appropriately licensed contractor.

US - Palm Desert Energy Independence Program (EIP)	
	2. Homeowners can also schedule a meeting with OEM staff to discuss proposed energy improvement and to get no-cost and objective assistance with planning. 3. Homeowners submit a program application to the city. 4. Applications are processed on a first-come, first-served basis, upon receipt, until funds are depleted. Incomplete and/or incorrect applications cannot be processed and will be returned. Resubmitted applications are processed on a first-come, first-served basis upon the new receipt date. 5. If there are insufficient funds available, an approved applicant will be places on a waiting list. 6. OEM runs a title check on the property and determines if the application meets programme criteria. The city staff member will identify and review all potential energy improvements, their estimated costs and their estimated energy savings. 7. Applicants are informed within 15 days of submitting the application if the application is incomplete, approved or denied. 8. All EIP loans $60,000 and higher must be approved by the city manager. 9. Once approved, customers have 10 business days to execute the loan. 10. Once executed, the city records an assessment lien against the property, including a 10% buffer in case project costs rise. 11. Property owners then enter into an agreement directly with a contractor, and they have six months to complete the job. 12. The property owner notifies the OEM that all work has been completed. 13. The OEM reserves the right to inspect completed work within five business days of receipt of notification. 14. Funding is provided directly to the property owner within 20 business days after the work has been completed. Source: http://www.hprcenter.org/sites/default/files/ec_pro/hprcenter/best_practices_case_study_palm_desert.pdf **Technologies supported** • HVAC system upgrades • Evaporative coolers • Water heaters • Solar photovoltaic systems • Solar thermal systems • Replacement windows and glass doors, skylights • Attic and wall insulation • Light fixtures • Pool heaters and pumps • Reflective roofs and coatings **Finance mechanism** Loan funds were initially derived from city's general funds, later agreement was negotiated with a bank to transition away from the unsustainable model of using general funds. Funding is provided to the property owner after the work has been completed and the loan is repaid through annual property taxes. Loans cover the costs of equipment and installation, where installation can include elements such as architects fees and permits. The property owner is free to select a qualified contractor to carry out the work, but OEM may require alternative quotes is it decides the costs quoted are not reasonable. The amount of loan may

US - Palm Desert Energy Independence Program (EIP)	
	be restricted to the costs that OEM considers reasonable, but the property owner will nonetheless be free to select their preferred contractor.
Programme impacts	The information available on the programme impacts and savings delivered is limited. In the first two phases, the funding was distributed to 220 projects (216 residential and 4 commercial). Phase 3 began in February 2010. An independent assessment of a similar programme in Colorado estimated in 2009 that it had created 126 short term jobs in Colorado and €7 million additional economic activity across the State.
Cost-effectiveness	The program was started using $2.5 million from the city's general fund, followed by a $5 million bond issued by the city's redevelopment agency to provide additional proceeds for the programme. Financing for phase 3 was negotiated with a bank, which agreed to purchase $6 million in lease revenue bonds. In the first two funding phases, solar PV accounted for about 70% of allocated funds even though it was only included in less than 50% of the projects. In phase 3, the program has set aside 50% of the $6 million in available financing specifically for energy efficiency improvements. The local government staff time required to administer the programme has been estimated to be $90,000 per annum (approximately 1.5 full time equivalents in terms of employment). The city's costs for administering the programme may however be recovered through differences between bond rates and loan interest rates. Also an assessment collection cost will be charged through the property tax bill. A marketing budget of $160,000 was included in the Directors Report in 2008.
Marketing and Communication	OEM is responsible for marketing the scheme. Primary marketing is the city's monthly free newsletter. Before the initial launch, the program also received some media attention from local news that helped to build interest. Advertising is also done through the city's another programme Set to Save. When free energy surveys are conducted for the Set to Save programme, programme staff mention EIP as a way to finance projects that will achieve deeper energy savings. Much of the marketing work is however directly done by contractors and installers as they see the programme as a big selling point for attracting customers.
Success factors	Financing caps in phase 3 has been effective in distributing limited funding across greater number of projects and targeting the most cost-effective measures. The fact that the loan is tied to the property overcomes the lack of commitment to spending on a home when the owner may sell before the investment has paid for.
Barriers to delivery	• Limited funds that ran out too quick in the first two phases. Since then, financing cap has been applied. • Phased block of funding rather than offering funding on an ongoing basis – property owners who did not wish to be on the waiting list delayed the improvements. • Equipment based, rather than whole-building energy performance based funding that can overlook some lower-cost projects that can yet deliver great energy savings. • There may be cost savings in administering the programme through running larger-scale programme (at county level). • Risk to mortgage lenders as the PACE lien on property is superior to the first mortgage on the property.

Appendix 2 - Stakeholder consultation responses

With thanks to:

Advanced Heating	Wayne Shales
JE Building Services	Steve Henesy
C.A.C Environmental Services Limited & Sarber Environmental Ltd	Mark Sartin
Ecoheat Jersey Ltd	Tony Pickton
Ecohomes	Greg Woods
United Electrical Contractors Limited	Daniel Matthews
1st Call Plumbing & Heating Solutions	Ben Williams
Association of Jersey Architects	Richard Le Sueur
Association of Jersey Architects	Derek Mason
Jersey Construction Council	
Jersey Electricity - Jersey Electricity Building Services	
Highlands College	Tony Bechelet
Dandara	Adrian Huckson
Andium homes	Carl Mavity
Voisin Hunter Ltd	Nikita Hall
Brunel Management	Steve Van Neste
Depth Health and Social Services	Stewart Petrie
Social security - Director of Policy	Sue Duhamel
Waste Policy	Emma Callandine-Richardson
Economic Development / Skills	Sean Pritchard
Jersey Energy (Energy consultancy)	Shaun Bisson
Normans	Nigel Queree

These cover:

Policy Leads on Health and Fuel Poverty

Policy Leads on Waste

Policy Leads on Economic Development

Property agencies (under the EES Scheme)

Architects

Surveyors & Assessors

Skills and Training

Main Contractors

Tradespeople (contractors for the grant scheme)

Materials suppliers

Replies have been anonymised but input from a single person is kept together with no paragraph breaks. The variety of responses reflect the different formats received.

1. Policy Leads (government)

Policy Leads 1 Health and Fuel Poverty

1. **Energy efficiency measures can contribute towards reducing fuel poverty. Is this a health or social priority for Jersey?**
   It should be - but not sure it is. There are a lot of problems with damp and mould. There is no way of subsidising improvements. It is certainly a health issue. It is mentioned in the latest strategic plan - but with no money associated with it. The PRS is important here.

   Fuel poverty does come into it – there is liaison with envt dept – sharing information on how to tackle issues with people with low income and develop lists of people to offer the existing scheme to. There are also a specific benefits to help people meet fuel costs. There are 2 schemes in England – winter payment AND temperature dependent payment - in Jersey they just have the temperature dependent scheme.
   The benefit is paid to 2 groups – general low income benefit – more like a universal credit (Jersey's is automatic payments) – households over 65, child under 3, people with disability – get the payment automatically. 2nd group – not poor enough to get income support but are not taxpayers.
   Cold weather payment is only paid to pensioners.
   Question – under discussion – in social housing sector, the States of Jersey is paying higher housing costs in rent – (housing benefit) – and housing authorities are doing energy improvement but tenants are getting lower costs. Could the state require a clawback in the form of higher rents.
   Same issue for PRS – if a landlord invests in EE work – and increases the rent – if a pensioner they could get a double win – so needs resolving. Social Services is not equipped to know how to work this out. Needs advice from Louise Magris.

2. **Improving the efficiency of building fabric and space heating systems results in homes being run at higher temperatures during heating season (the "comfort factor"). On Jersey is this likely to have positive health impacts?**
   Yes. Definitely in the States Council/Housing Association sector. It is a huge effect. They get referrals if kids have asthma - and it is clear that some houses are not heated at all.

   Quality is quite poor

3. **Do you think that the risks of reduced ventilation, poor indoor air quality and associated health implications are properly understood and managed in Jersey?**
   No - he is sure they aren't. There is a warm healthy homes programme in Liverpool - which gives a better understanding of issues around heating - but there are particular difficulties when the heating is by electricity.

4. **What do you think are the main barriers to retrofitting energy efficiency measures in owner-occupied and rented properties?**
   Not sure regarding the owner occupier sector - if government pokes its nose in, it can be accused of being interfering. There are many very old period properties with issues. Also a lucrative PRS. There are no housing standards. Thermal comfort is a big issue. There is no way to enforce action.

   Low level of owner occupation, high level of rented – so competition for property, creates a poor quality sector – so landlords not motivated.

5. **What do you think would that the Government of Jersey should do to encourage the retrofit market? (Subsidy, information, regulation etc)**

There is proposed rented dwelling legislation which could allow enforcement. There is lack of clarity around costs and financial benefits. Soft loans would be good. As would explaining why to take action and encouraging it.

We don't calculate fuel poverty stats accurately, based on proxies. High figures bandied around, inaccurate. Climate is mild, not a major problem. Issue is more around building quality – damp etc – need to talk more to health around this.
What about data protection ? Can we get better stats on fuel poverty –
Other barrier in Jersey is the cost of doing things – supplier of an ASHP has to import it – what can be done in the market to improve supply and keep costs down.
Fully aware of the short termism of paying people money on bills – and would like to withdraw from this but the minister would like to know that people are not being disadvantaged –
Total £200 pa in a mild winter – can go up to £400. Approx £400k overall pa

Policy Leads 2 Waste

I've reviewed your questions and the crux of the issue from a waste management perspective is understanding the waste that is generated from the retrofit/refurbishment process so we know what waste streams are produced and in what quantities. Perhaps there is an opportunity for a case study here?
Once we have this information, it will be easier to identify how our policy and facilities meet the customer need both by us simply receiving the wastes and by us promoting desired behaviour so these wastes are managed upwards through the Waste Hierarchy.
It would also be useful for the case study to identify aspects of the retrofit that generate waste that could be avoided if certain decisions had been made at the design stage i.e. surface mounted cabling, trunking with easy access/spare capacity, screwed in fixings rather than glue, etc. This would bring in a resource efficiency angle.
I think this would be a really useful exercise for TTS and Environment teams to work on together and, in addition to generating the information for customer targeted communications, it may also provide an opportunity for a presentation/industry engagement event.
Unfortunately, without knowing the waste streams that are generated, I find it difficult to answer your specific questions but I hope the above is useful in moving this forward. If you already know the waste streams, I'd be happy to review a list and identify the recycling/disposal points and provide some comments.
As a side but related point, the convenience of collection points for waste lamps for recycling is very poor, at our Household Recycling Centre (Gate 4, Bellozanne) for householders and Energy from Waste plant for commercial customers. We would like to improve this, ideally so customers can dispose of their old bulb/tube where they buy a new one. We have briefly looked at this and found difficulty in identifying the appropriate container as bulbs should be kept whole and dry and also we do not currently have the funding to operate a collection round. I don't know if there is an opportunity for the energy efficiency to help with this or look at sponsorship.

Policy Leads 3 Economic Development

1. **Which retrofit measures are most likely to maximise economic benefit to Jersey (fabric measures including insulation and window upgrade, heating equipment etc)? Which is likely to require most labour input?**

   Direct economic output (or benefit) in Jersey is measured in Gross Value Added (GVA) which is a sum of surplus operating profits and gross salary cost of the organisation. Businesses operating

in the services sectors to undertake the retrofit measures suggested, in general, operate in the same band of economic output per employee so determining a priority based on economic output would be difficult There will be wider (or secondary) economic benefit but again this would apply to all service sectors required for the retrofit measures. Recent labour market reviews suggest that the construction sector has some spare capacity. However, the impact of several large public sector capital project will have an impact on this and these projects are only just starting. Further without knowing the likely volume of retrofit contracts it is impossible to determine what, if any, level of labour demands there may be. In other Government led initiatives early consultation with contractors has provided the opportunity for businesses to increase capacity in advance of the project roll out.

2. **Do any of these measures require the import of materials which could in time be manufactured in Jersey?**
   All of the measures suggested will require the importation of materials. However, there is some manufacturing of window frames by some of the local contractors.

3. **What skills are currently lacking in this sector and which skills are likely to become more in demand as the market expands?**
   There is no skills gap analysis available but anecdotal evidence suggests that there is a shortage of skilled window fitters. However, the skills required are similar to other trades so there would be the opportunity for contractors to re-train and increase capacity if sufficient notice was given.

4. **What do you think would that the Govt of Jersey should do to encourage the retrofit market? (Subsidy, information, regulation etc)**

My recommendation would be that any retrofit should be encouraged by informing property owners of the benefits. Regulation and subsidy should be avoided. Further your email suggests the retrofit project is aimed at the 'able to pay' domestic sector. If this is the case then no subsidy should be required.

Property agencies (under the EES Scheme)

1. **Is a structured programme of energy efficiency retrofit planned for your portfolio?**
   Yes. Way are part way through a programme geared towards meeting the English Decent Homes Standard and are committed to meet the standard for all of our homes in 9 years. Generally, most of our portfolio has CWI, SWI, Loft Ins to 300mm and DG or SG. All but 19 of our circa 5000 homes have been converted to electric storage heating. We have then given direct control of heating systems to our tenants, as opposed to previous systems of retaining control and adding a fixed charge to rent. Have done some monitoring of this with some significant savings made. We still have some buildings not quite there yet but they are all in the programme with funding identified and planned.

   None planned.

   I look after both rental and owners. There is some planned in the rental, and there is a desire to do it in the privately-owned. I look after housing associations. The rental plans are insulation, double glazing, replacement double glazing and external thermal board

2. **Do you have sufficient information about your building stock and the potential of retrofit measures to plan such a programme? (What else do you need?)**

We have an industry standard stock condition survey, with full 30 year cost plans for all of our buildings. Good representative sample, augmented each year with re-inspections.

We have sufficient information on the condition of our housing stock but none identified that require retrofitting for the purposes of energy efficiency.

Yes, we know what we've got, what we should be doing, and the things that we can do to improve it. Generally speaking, on the rental stuff we look after, it's all been built in the last 20 years. From that point of view, it's fairly efficient, but of those that aren't we are going to have a programme of doing that up fairly soon. On the trust side of this, there's a greater incentive, but nonetheless I think it's something that the trust will take upon itself to do as part of good management.

3. **What are the main types of fabric and services issues that lead to energy inefficient buildings in your portfolio?**
   We have a very mixed portfolio, some pre war then 50s 60s 70s and 80s. Had some cold-bridging issues in highrises which we treated with over-cladding. In houses, the main issues was loft insulation. We have quite a number of solid walled properties which we addressed with external wall insulation. We've done CWI for a lot of the rest of the stock. With glazing, the only real issue was a handful of listed building which we had to treat with secondary glazing rather than double.

   Some inefficiencies have been identified in the past with gas services (the cost to run) and single glazed windows and escaping heat. To address this we arranged for a gas contractor to explain the usage of the system to the tenant, and have installed secondary glazing to the single glazed windows to try and retain the heat in the building.

   Of the total portfolio, the greatest inefficiency is probably within the commercial sector, which I suspect is the least energy efficient. It's everything from lighting to insulation, flat roof insulation, etc.

4. **As investment in the energy efficiency of rented property yields benefits to tenants at the expense of landlords, what kind of mechanism could be used to share out the costs and benefits more fairly?**
   We have considered this from time-to-time. Specifically in term of new, environmentally friendly technologies. Our rents are capped by the state so can't just add a premium on top. In Jersey there are no grants for Housing Associations for new technologies, and the buy-in-tariff is very low. If there was something available to make investments cost effective, this would help. We have looked at the potential use of PV, as the technology gets cheaper, for HA costs such as lighting in communal areas, so the benefit would be ours and therefor the investment more attractive. The other thing to look at is building regs, tightening these could help.

   Some sort of grant that Landlords could apply for any retrofit works. User friendly information/guidance leaflets distributed to tenants to advise on what actions they can take to save energy. A grant for tenants who are struggling with energy costs.

   In terms of the commercial side and ordinary landlords, I can't see how you are going to achieve it. If you are looking at a build and a return of 4%, loft insulation is fairly straightforward, but if you go anything greater than that like flat roofs and vapour barriers, it's getting very expensive. There's no payback to the landlord at all on it. The only time you are going to get landlords investing in insulation is if they are going to be doing a new roof and you can persuade them at

that point. If they're serious, probably the only way is grants. Or you could get the tenants to pay more. Rents in Jersey are incredibly low, so you could put it onto occupier rates. So you could have a carrot and stick. You could rate the properties; those that are rated high would get a reduction in their property rates, and those that failed would have an increase, so that's the stick. The carrot would be to say that if you do improve it, you can reduce your rates, oh and here's a grant to do it.

5. **Would tax breaks on retrofit work incentivise you to invest more in the efficiency of your buildings? If so, what kind of tax breaks? (Coporation tax, VAT?)**
   Not really, we don't pay VAT so wouldn't really affect us.

   Possibly although not quite sure how this work in Jersey. Possibly a claim back on GST for any works which improve energy efficiency in rental homes.

   For starters we don't have VAT. The only way tax would work is on rateable value. A large chunk of my portfolio is where I look after co-owners, like a block of 40. I have a classic example: building was built in the 1960s, no loft insulation, flat roofs. EPCs are failing, but the upfront cost of retrofit is too much. BUT if the government were to give a 5-year interest-free loan, you would probably get the owners do it. That would be very successful; the government would get paid back minus the interest, but interest rates aren't huge at the moment, and there would be no loss, so everyone seems to gain from it.

6. **What type of regulations would oblige landlords to improve their properties, without creating an undue burden?**
   We've already committed to Decent Homes Standard, and this is being applied across the social rented sector. (We have 5000 of the 6500 social homes on the Jersey). As far as I'm aware the Government are in the process of designing regulations around this. It's a question of whether the Government wants to regulate the PRS to the same standard.

   I think it would need to be made clear in any regulation both the expectations of the tenant and of the landlord as often there are things the tenant can do to promote energy efficiency and therefore regulation should not be weighted solely toward the landlord. It is a balance between Landlords keeping the properties to an agreed good standard of condition and tenants taking responsibility for their lifestyle and what changes they can make.

   You could have any regulation you like; that's in the hands of the legislators. But that would be a huge burden and chasing people out of the market, so you don't want to do that either. I think it comes back to a carrot and stick. Another way to do it is to have a green tax on energy and then recycle that back into providing grants to do retrofits.

7. **Is there any difficulty finding retrofit contractors? What would help you to choose them? Is accreditation needed?**
   We use approved lists. The manufacturers of the 'big ticket items' like SWI and DG have approved contractors. There would definitely be benefit in a similar scheme for renewable technologies.

   Is there any difficulty finding retrofit contractors? No, although as stated above we have had little involvement with retrofit works. What would help you to choose them? Best value, experience and reputation. Is accreditation needed? Depends on the nature and size of the works.

No. We've got it here. Accreditation is required but you've got the BBA certification. The government should have been doing this 6 years ago. All of this should've been happening over recession. There is a lot of low hanging fruit over here that you could've addressed, and it would've helped the building industry in Jersey. You could easily add, say, a 5% green tax and grant that money to individuals. You would have contractors busy and working during a recessionary period.

2. Architects

1. **Which measures (top 3) do you think would have the greatest effect in reducing energy consumption from existing buildings?**
   A hike in energy prices! With regard to measures, reducing ventilation and increasing insulation, followed by increased use of air source heat pumps to replace oil and gas. Also increased installation of solar thermal generation.

   Thermal insulation to building fabric - walls, roof and floors - by far and away the most useful thing to do.

2. **In each case: what stops people from implementing these measures?**
   ASHP - he cited an unreasonable approach taken by environmental health and planning in connection with their acoustic footprint which is very restrictive. This asks for complete acoustic measurements between 2 and 3 am, which costs the installer £1000 - recording night time sounds which are compared unfavourably with zero background. He thought this a very unreasonable approach. He also commented that there was not much acceptance in planning on the need for solar thermal and PV which are regarded as visually intrusive. Referred to the GDO which applies in Jersey both for listed buildings, and the coastal national park.

   Cost is by far the key factor.

3. **What do you think would that the Govt of Jersey should do to reduce enable people to realise these savings?**
   A more sympathetic approach from those in planning and environmental health and more joined up thinking within Jersey

   Improve knowledge and understanding. Jersey is very well placed to develop a community understanding, because of its well-integrated structure and the Energy Forum an excellent initiative to promote this.

4. **Should energy efficiency retrofit be used as an opportunity to deliver other environmental goals such as water efficiency and sustainable drainage?**
   Difficult. There are limits to the amount of money people spend at one time.
   Bad effects of building regulations: they can stop people making small changes as they would then have to do much more upgrading of building fabric, which can put them off making small improvements.
   It worth would be publicising the opportunities but not making them statutory requirements.

   Yes - but he was of the view that it was not.

5. **Materials used in energy efficiency retrofit have a substantial environmental impact. Should their embodied energy and other environmental impacts be taken into account in the selection for use in projects on Jersey?**
   This is not a major issue and it is likely the materials could be recycled in the main.

3. Surveyors & Assessors

1. **Domestic buildings differ widely in terms of construction, heritage value, condition and in terms of alterations. Is there currently a robust process for assessing the energy efficiency of buildings and remedial measures in Jersey**?

There are a number of tools/systems and processes available which can assist with elements of assessing energy efficiency in buildings including BRE Dom Energy Model / SAP / RdSAP / SBEM / CSH / EPC / NHER, (there are also a range of more specific modelling tools – these are more specialist) the tools listed would not be classed as a **robust** process for assessing the energy efficiency of buildings and remedial measures specific to Jersey, for the application being described.

The States of Jersey Energy Efficiency Service (SOJ-EES) probably has the most up to date information regarding the cost of measures and has the ability to reflect upon the cost of these measures and their real impacts upon the energy usage profile for domestic dwellings, across a wide range of measures / fuel mix and property types.

Use of this information would form a much more robust data set for developing a tool which can be used to help the assessment process. For example a recent survey by Purcell into the historic building housing stock (hard to treat category) could be incorporated.

A better understanding of renewable technology, its appropriateness and application in Jersey is required, as is the real life benefits from proper Jersey based operational studies and exemplars, which can dispel many of the myths surrounding renewable technologies.

Note – text above is copied from a secured pdf which is why it is a different format.

No! Energy efficiency comes bottom of the list as there is no legal requirement to incorporate it, or if there is, there's no enforcement. People just do the minimum required, trying to get tradesmen to work to very high standards is very difficult.
It is expensive to live here so some people are short of funds.
Investment horizons vary – if new owners they are mortgaged up to the hilt
Cost of survey £300-£350
Phone goes red hot after grand designs
First thing – start with the fabric

2. **What tools would prove useful to assessors in this respect?**
Again I believe the SOJ-EES are developing a tool to provide consumers with a guide on what the best and most effective measures might be to meet their specific needs, giving consumers information and power to make informed decisions about how best to improve their properties. Building control are also adapting their compliance tools (SAPjersey) to reflect improved energy targets for new and refurbished domestic projects that are governed under the byelaws.
There needs to be greater consideration on how a joined up approach might lead to an improved tool drawing on the knowledge base and objectives in both areas, plus private sector.

Proper training and the identification of proper test equipment etc. Also, a system of recognition from a governing body that those trained are the people who should be doing the work - some sort of accreditation scheme.

They have thermal imaging. EES started to build up a database – a number of approved contractors – approach 3 for a job and give them blank schedule – tick boxes – then they put their standard costs alongside.

3. **What skills are lacking in survey of domestic buildings and who should deliver these skills to new and existing surveyors? (A common question to the helplines is for independent advice on what do with my property)**

There are firms of energy & environmental consultants that will be able to offer energy advisory services, as well as the utility companies. Jersey Electricity already provides advice to their customers on a request basis regarding electrical energy use. No local training is presently provided to develop indigenous skills in this area which we would recommend; it is however important for government to set out its requirements and how this will be delivered and paid for i.e. will the consumer pay and what would they feel to be acceptable.
The market opportunity needs to be clear in order to encourage uptake from firms and for them to justify any invest of time and effort into a new market or activity area.
We would recommend that some surveys / facilitated workshops and perhaps focus groups would be advantageous to establish the appetite of the public for a range of services and what they would find useful. I believe some questions may have been contained in the annual social survey etc. carried out by SOJ.

Not enough training provided on the Islands. The Channel Islands are remote from any UK provision, and going off-island is very cost prohibitive. So provision of training and some state financial assistance towards it is needed.

Skills not lacking. Issue is quantity and timescales – want quick delivery. There is resistance to outsourcing. Investment in training needed – local college. They used to subsidise training for apprenticeship schemes then changed to system where people acquired a qualification then payment made. This system was not successful.

4. **What do you think would that the Govt of Jersey should do to encourage the retrofit market?**
If they're serious about energy conservation and encouraging householders they need to offer subsidies or grants for improvements. This can tie in needing to use an accredited installer so the public money is put to best use. This would encourage installers to train and register and would also increase consumer confidence.

Shared cost – a small help
Public awareness – EES did eventually hit the buttons – milk cartons

Acting as leader, using the opportunity to build and refurbish its own housing stock to act as a catalyst for other developers and those refurbishing properties in the private sector. This is already in progress at Andiam Homes and there is potential to use some of these properties as showcase examples of what can be achieved – if Andiam are willing to participate.

There should be a balance between '**come on**' States Leading & '**go on**' Private sector leading, not placing all burden to deliver on the private sector to deliver SOJ objectives. Awareness of the savings, health and environmental benefits resulting from warm and efficient low carbon homes needs to be promoted. Again joint working with other key stakeholders inc. public and private sector would help reinforce the message to the public.

Other Points of interest

In all of the above adequate funding is required in order to deliver objective targets. The skills exist to help develop this in the local market.
Andium homes have one of the largest portfolios of existing and plans for future delivery of

domestic properties – Large opportunity to lead.
Housing needs survey – provides a future pipeline of properties.
Public / Private partnership opportunities should be exploited.
States of Jersey Strategic plan – sustainability & the environment including a longer term vision needs clarification.
SOJ – EES Publicise achievements and impacts (short impact case studies to get key messages across)

The priority barriers deemed most important to address are therefore:

Consumer issues

Demand, incentives, resistance, awareness/information, trust, complexity, consumers, disruption

Education and skills

Skills, multi-skills, knowledge, training, quality and economic situation

Complexity in the supply chain

Coordination, sharing of best practice

Supply chain to install

Solution development and design integrity

Government/political issues

Box 1: RECAP – The barriers to Energy Efficiency take-up

The *Energy Efficiency Strategy* identified four key barriers to the deployment of cost-effective energy efficiency investment in the UK economy.

Embryonic markets: The UK already has an energy efficiency market but it is small relative to the size of the opportunity. There are significant economic benefits to be realised from growing this market and making energy efficiency a mainstream activity.

Information: Accessing trusted and appropriate energy efficiency information has often proven difficult. Where information is available it is usually generic and not tailored to specific circumstances; or it is focused on particular opportunities, meaning that individuals and businesses are unable to fully assess the benefits of investment in energy efficiency measures.

Misaligned financial incentives: Those investing in energy efficiency measures are not always the ones receiving the direct benefit. For example, the wider benefits of energy efficiency investment, such as improved security of supply and reduced carbon emissions, are not fully realised by those making the investment.

Undervaluing energy efficiency: The long term financial and wider benefits of improved energy efficiency are often regarded as less certain, partly because of the lack of trusted information in the market. Consequently, energy efficiency has traditionally been undervalued relative to other investment options, and not prioritised as it might have otherwise been.[1]

This respondent also supplied case studies which have been omitted from this summary.

5. **(For construction council) We understand that the interface between quantity surveyors and contractors didn't work that well on the EE service. Surveyors need to be well trained and to act as ambassadors for energy efficiency. Is this a business opportunity and what role could the construction council play?**
   Not sure I understand all of your question, so I will answer it as best I can.
   I would not expect Quantity Surveyors to have any expert knowledge of or to act as ambassadors for energy efficiency. In my experience they do not focus on this area so I would be interested to know how this relationship went with regard to the EES. Where they simply employed to survey properties and record what they have rather than what they could have?

   Regarding the business opportunity, I would see this as an opportunity for businesses with a services related background, for example M&E Consultants, Building Surveyors, Energy Suppliers etc.
   With regard to the JECC's role, we would be keen to develop this skill set for our members, although the need for local training and local certification is still unfulfilled and is therefore still an important requirement.

   Low level energy audits.

4. Skills and Training

The information below is pasted from a secured PDF which could not be copied as text:

What skills are lacking....

A basic understanding of building pathology and in particular how older buildings were constructed

An understanding of the format of and the techniques of gathering information on site to formulate a considered opinion of the current condition of a structure

Concise report writing and the analysis of building defects and identifying relevant remedies to these

Health & safety issues in relation to the collection of this data

Desk top information gathering skills

These skills are best delivered formally by an experienced practitioner both in a college/university setting and in practical real life surveys shadowing an experienced practitioner

Candidates should aspire to Chartered Surveyor status [MRICS]

Is there sufficient understanding....

In a word no!

The listing criteria of current properties in Jersey needs to be fully explained in layman's terms

Examples of exemplar styles of architecture [building stock] found in Jersey to be fully discussed and a booklet produced similar to a previous document published by the National trust for Jersey [although this only related to properties in St Helier]

Conservation policies to be fully explored and explained to both the practitioner and layman

In my view a short course provided by the local planning authority on the aforementioned areas would serve to enlighten interested members of the public and serve as CPD to existing surveying practitioners

5. Main Contractors

(Noting that Dandara and Camerons don't do much retrofit)

1. Which retrofit measures (top 3) are the largest in terms of work value? (e.g. Windows, Boilers, Loft Insulation, Cavity wall insulation)

Not applicable as we don't do retrofit

We do not have any specific data on the total value of available work in these categories; however the following links contain information on the indicative costs of associated projects:

Energy Efficiency Service Annual report 2011
http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Energy%20Efficiency%20Service%20-%20Phase%201%20Report%202011%20(size%20144kb)%2020141112%20DM.pdf

Energy Efficiency Service Annual report 2012
http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Energy%20Efficiency%20Service%20Annual%20Report%202012%20(size%2088kb)%20DM%2020131021.pdf

Historic buildings energy study Jersey July 2013
http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Historic%20Buildings%20Energy%20Study%20Jersey%20Report%20July%202013.pdf
The above report is UK focussed and would need to be corrected for application in Jersey

2. What skills are currently lacking in this sector and which skills are likely to become more in demand as the market expands?

Labour generally - skilled tradesmen.

Renewable Energy
As in the UK, renewable energy (ASHP, GSHP, Solar PV and Thermal) projects are becoming more popular.
As there is no grant funding scheme (RHI) and no accreditation scheme to police the quality of the design and installations, there is concern that poorly designed systems will lead to negative feedback and poor a customer experience, leading to low efficiencies/savings being realised.
Currently, there is no formal training available. Business who enter this market generally undertake manufacturers training, however this is not always the case.
An accredited installer scheme is recommended; i.e. MCS-Jersey.

Energy Advice
Training the industry on energy saving appliances, products and initiatives will ensure energy efficiency is being considered at every opportunity, across all fuels and systems.
A locally achievable qualification in Energy Efficiency would allow the industry to give advice to home owners on a wide range of subjects.

Insulation
The market is currently undefined and underserved. The uncertainty around the available size of the market, products available and skills required to serve that market are therefore leading to a shortfall in available contractors and/or contractors considering expanding into this area.

3. Is energy efficiency a high priority in large-scale domestic refurbishment projects? (If not, why not?)

No comment

In terms of small scale (individual homes) energy efficiency is a priority but would be driven by the home owner.
Developers tend to avoid larger upfront costs as they cannot realise the longer term benefits, especially when pressure is put on them to deliver affordable homes. For example, Heat Pumps would not normally be considered for First Time Buyer Homes.

4. What other challenges do you currently face in delivering high quality retrofit projects in Jersey?

No comment

The availability of skilled local labour
Jersey is an expensive place to recruit and employ, especially as the UK labour market is often more attractive when taking salaries, cost of living etc into consideration.
The availability of local training
We have a college that, for a number of reasons, does not deliver the vocational training the industry requires.

5. What do you think would that the Govt of Jersey should do to encourage the retrofit market? (Subsidy, information, regulation etc)

The government seem to add on what I consider to be taxes to projects, such as planning fees infrastructure works fees etc. There should be more support to encourage sustainability within schemes - an improved overall sustainability policy which rewards for improving the energy efficient credentials of projects, possibly by off-setting some of the costs referred to above.

We're not set up to feed electricity back into the grid if we're generating locally. I'd like to see a FiT type scheme to incentives these products. Tax incentives may also possible help.

Availability of finance
Being able to pay, and having the available funds are two different issues. Provide low or no cost finance for energy efficiency measures.
Tax benefits on home improvements
Consider incentives for energy efficiency work, for example in the IOM, A reduced rate of 5% VAT (normally 20%) is charged on domestic property repairs.
In Jersey, this could see the removal of GST on energy efficiency measures.
Training
Work with the industry, Highlands College and Building Control to deliver affordable, local training.
Educate the public
Educate, educate, educate. This is a long term strategy that has to be put in front of every islander, in terms and words they understand and relate to.
Case studies of local people, local properties and local installers showing islanders what can be achieved in Jersey.
Engage with the industry
Work with the industry and help them to educate and raise the profile of renewable energy.
Regulation
Any regulation must not be seen as a big stick, but rather a means to recognise those who are

delivering quality installations.
Double Glazing is often at odds with Planning when dealing with old buildings; having to fit wood rather than plastic.
Any regulation must also avoid unnecessary red tape.
Market Research
An energy efficiency questionnaire, focus group, energy workshop asking….

1. What would you be prepared to spend to save £250 per year on running costs
2. How much would you spend on a renewable energy product
3. What playback periods are attractive
4. Would you take advantage of an interest free loan
5. Do you know what products are available, what they cost and who can install them
6. A home energy, insulation, running cost, efficiency survey

Government lead
The Jersey Government must lead this process, develop and trial new initiatives and show what can be done. The recent Pathway 2050 Energy Plan set out targets for the private sector that were considerably more stretching than those allocated to the public sector; as expected, this was not well received.

6. Tradespeople (contractors for the grant scheme)

1. What are the greatest sources of inefficiency in terms of how existing space and water heating systems are used in Jersey?

A lot is down to insulation levels. Secondly, a lot is down to the end users and how they operate the controls

The lack of general loft and wall insulation, the lack of controls be it thermostats or time clocks, being on the wrong electric tariff.

Space heating in new builds tends to be price driven hence a majority of new builds use electric storage heaters which are pretty uncontrollable resulting in wasted heat as home owners open windows to reduce the temperature on a warm day. Hot water systems are generally stored or on demand i.e. combination boiler. Stored hot water is generally found to be set well above guideline temperatures. Home owners seem to have little regard for controls and using systems efficiently and generally have the property well above guideline temperatures. Owners will often hold out changing an appliance until it has totally packed up even if it's 25+years old.

Not too sure really, we have a legacy of old housing stock and old systems. There are issues with the high cost of improving buildings and a lack of government incentives.

Depends on the source of energy. We use oil generators for electricity and electric boilers which are not very efficient in that respect. I would like to see more PV. We have a lot of old boilers, especially oil.

Outwith the obvious issues of old boilers and poor insulation, most of the problems are a result of the end-user not knowing how best to use their controls. A lot of my clients are over 65 and they find modern controls very difficult to use. I try to make systems as simple as possible and this often results in 'dumbing down' complicated controls systems, such as for ASHPs.

The lack of general loft and wall insulation, the lack of controls be it thermostats or time clocks, being on the wrong electric tariff.

2. **Given the relatively mild climate, do you think that there is scope for widespread use of air source heat pumps in the domestic sector to replace oil, LPG or electrical resistance heating? If so, what are the potential barriers?**
   Yes, without a doubt. I've fitted around 115 - 120 with the vast majority being very happy customers. As for barriers, I just this the States of Jersey need to support the technology more, rather than looking to replace systems with lower cost options.

   We, as a company, have installed a lot of ASHP over the past 5-6 years and in the right property are very good alternative, the potential barriers for the install is the additional works that go along with lower temperature running, for example the need to upgrade pipe size or install a buffer tank, the potential increase in radiator size, and therefore the additional installation cost.

   The first barrier is supply and install cost. Most of these components require shipping in from the UK which could add £200+ to a project. The second barrier is electrical loading , we have been asked to quote on many projects only to find the electricity supply infrastructure isn't capable of supplying the load. However the occurrence of this happening is reducing due to the introduction of inverter heat pumps. Another problem for the retrofit market is that radiators may and usually do need to be changed to increase the output and hot water cylinders will also need replacing.

   Absolutely! Barriers are (a) space - they are bigger units and external space is needed and (b) cost, I've just installed a new oil boiler as it cost me £2k rather than £5-6k for ASHP. Also, we don't have enough engineers trained up on the technology and its benefits.

   Air source are great for new builds but retrofitting them has big issues, predominantly radiator sizes and lower flow temperatures. The other big barrier is electricity supply to homes, the size of the incoming mains cable is often not enough and upgrading this increase the up-front cost significantly and reduce the cost effectiveness.

3. **What skills are currently lacking in the retrofit sector in Jersey, or are likely to become in short supply?**
   It's very hard to find good heating and plumbing engineers. The standard of training on the island is very poor. Apprenticeships are very expensive for firms and there isn't much support available for them.

   Heating engineers, a mix of electrician and plumber, that can diagnose and fix problems, both mechanical and electrical controls.

   I wouldn't say there was a skills shortage at present as the take up of air source and renewables has been slow due to the high cost of the installation. However there seems to be an upward trend at present in enquiries. But I would add that some tradesmen cannot multi task i.e. making good, electrical etc. which increases installation cost further. There also seems to be a percentage of poorly trained installers charging a massive premium for heat pump installs which has a negative effect on those of us who have spent time and money training .

   Technical understanding and ability - how to specify systems to meet the existing stock in order to achieve the performance quoted.

   Electricians aren't fully up to date, for example the benefits of LED lighting are not properly understood. A lot of engineers are old-school and there's a lack of knowledge, and a lack of refresher type training available. What training there is, is expensive. If there were free courses people would jump at them. Going off-island for training is very expensive. The Govt should

look at bringing people over from manufacturers such at Mitsubishi and Daikin over to train our people, not just on their own units but the benefits and technical aspect of the new technologies in general.

I send all my guys to the UK for training, for instance for boiler installation training with manufacturers, which is very very expensive. Gas-safe and Oftec top-up training is purely to get the 'badge' and energy efficiency is usually just brushed over. There's no requirement for gas-safe etc. on the island so most guys here have not had any training for 20 years. The Island would definitely benefit from some on-Island energy efficiency training for the industry.

4. **What stops contractors moving into the insulation retrofit market? (low profit margin, difficult work, perception that it is already sewn up?)**
Not too sure on this one really, there isn't massive competition on the Island. Perhaps people don't really know the benefits of insulation work, and therefore don't see it as cost effective, so there isn't a huge market.

   A limited market that comes with its own unique problems, see above answer about heating engineers, changing your heating is not like changing your car, you only do it because you have to – it is normally a distress purchase not because there is a new or better model on the market.

   I would presume that the difficulty of the work in sometimes a hot uncomfortable environment puts many contractors off.

   This question isn't relevant to our sector of the industry however from past experience it is very expensive to get installed compared to the UK.

   Limited publicity and therefore uptake. This is as a result of not being massively supported by the State.

   There might be a lack of awareness that there's an actual market for it. Also a lack of technical knowledge of the products. There's a need for education within the industry.

   I work alongside another company who do insulation works, so have not really looked into in depth myself. The major barrier really is that insulation can be very hard to sell – solid wall insulation especially is a large outlay for a very low perceived benefit.

5. **(For CPM and Jersey Energy and Echomes only): In terms of building fabric, which measures would you like to see encouraged?**
For existing stock - uprating performance is a hard sell as can be expensive and potentially disruptive.

6. **What do you think would that the Govt of Jersey should do to encourage the retrofit market?**
Some sort of heat pump scheme, even to at least install one in a state property, monitor it and publicise widely to spread the word. That would lend credibility and make people begin to understand that it's a viable technology. Also, something to encourage youngsters to train, and therefore get better engineers available.

   Simply a financial incentive, especially when changing to a 'green' form of heating, ASHP, or when changing from a recognised expensive form of heating (Gas) to the cheaper more efficient electric heating boiler.

   I think the Government would have to incentivise potential clients.
   Some UK councils currently offer loans or grants such as 'the green deal' of where the some of

the cost of installation is paid back to the government from savings made on energy bills. More pressure should also be put on the local electricity supplier to buy back electricity, at a higher rate than at present from domestic suppliers (photo voltaic, wind turbines etc) This would increase client interest in the fitting of such equipment as there would be a faster return on investments made on such equipment.

We desperately need the States to take a lead in new technologies and to prove they work to the populace. Some form of grant system to enable the client to spread the cost or to act as an incentive is also much needed. The planning dept. also need embrace the fact that we are moving forward and stop insisting on inefficient windows and roofing systems purely for cosmetic reasons, we cannot live in museums.

Capital incentives. Zero rating for upgrades.

Education for the industry as already mentioned. Also, something to help with the costs. Something along the lines of the FiT to encourage PV etc, and advertising.

Some sort of discount scheme, as long as it was well designed and policed. It would need to encourage the use of known installers who have sufficient training and perhaps even accreditation. Although the accreditation would need to be tightly policed by people who really knew the ins-and-outs of the work - i.e. not just building control.

7. Materials suppliers

1. Which retrofit products (top 3) are the biggest seller in terms of sales value? (e.g. Windows, Boilers, Loft Insulation, Cavity wall insulation)

1. Insulated render
2. Loft insulation
3. Cavity wall insulation

Insulation materials – foam (some IWI) and fibreglass – lofts
Not doing anything for EWI.
They do have a supply & fit business for windows and doors (20 on island)
Boilers & heating. Don't split up.
Last 2 years less new build. More % renovation now

2. If the retrofit sector is expanded, do you foresee bottlenecks in the supply of any particular materials?

No

Do deal with ASHPs, haven't sold many. Part of Saint Gobain – includes Jewsons and Grahams – have done some roadshow. More likely to be supply & fit – so an engineering. Will have their own deals – but not thru standard builders' merchant. (NB Saint Gobain training centre). Issues about training and supply chains – so an opportunity – so the capability of local installers could well be a bottleneck. Similar for windows- a skills shortage. Running training courses at present.
Good quality independent survey by people who know what they are doing.
Finance may be a barrier but: Suppliers may be willing to help fund – using one of the finance houses. (They might prefer not to lend to individuals)
Example – LED suppliers have worked up a PAYS contract in Jersey to take on the risk.
Saint Gobain are offering retrofit schemes as part of the 350 year celebrations.

CWI – use of beads or mineral wool blown. But installer led – no capacity to get independent spec and quotes against it

3. Are retrofit materials price sensitive? (Is a reduction in price likely to lead to greater volume of sales or is it driven by other factors?)

Yes

Not best persons to ask. They are good value for money. Aimed at the trade – not many DIY – so no need for special – not marketing to the decision makers.

4. What do you think would that the Govt of Jersey should do to encourage the retrofit market? (Subsidy, information, regulation etc), Grants

Difficult to do regulation
They have had generic promotion, started with low income households – don't put in more building controls

PRS is a big challenge. Needs regulation.
Energy audits still needed
Create information for households, enabling measures
Demonstration projects – done in some housing associations for old bldgs. Identify main building types. Estates have done own buildings which can be used – for example St Clements

The Gemini Building

Fermi Avenue

Didcot

Oxfordshire

OX11 0QR