BREAKING BARRIERS

An industry review of the barriers to Whole House Energy Efficiency Retrofit and the creation of an industry action plan

Summary Report, March 2014

NATIONAL ENERGY FOUNDATION
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Energy Efficiency **Partnership** for Buildings

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Contents

Executive Summary

It is widely acknowledged by both industry experts and policy makers that low carbon refurbishment of existing housing offers by far the most cost effective means of abating CO_2 emissions. Implementation of low carbon refurbishment can also significantly reduce our reliance on fossil fuel based energy; sustainably reduce the running costs of our homes; improve our general health and wellbeing and also; create huge economic benefits through the creation of new skill bases, jobs and tax revenue.

What is perhaps less well understood is that in order for these benefits to be wholly realised an integrated, holistic and synergistic whole house approach is needed. This requires going beyond the conventional policy driven measure-by-measure piecemeal approach and the current trend of 'cream-skimming' whereby only the most cost effective energy efficiency measures are applied to the worst performing homes.

Instead, whole house energy efficiency retrofit involves combining improvements to optimise the performance of the building as a whole. Whilst this may still be implemented in stages, it differs from the current mainstream approach in that it promotes the interaction of multiple measures to be considered (e.g. fabric, ventilation, heating, lighting and microgeneration) at the earliest stages. This not only enables the most cost-effective approach to implementation to be identified, it helps minimise missed opportunities (e.g. when other work is being carried out), disruption and unearths much larger absolute savings and benefits from the stock.

Whilst countless desk based studies and large scale national pilot programmes have affirmed the benefits of a whole house approach to energy efficient refurbishment, some significant barriers remain. This is reflected within the EU Energy Performance of Buildings Directive (2010/31/EU) and EU Energy Efficiency Directive (2012/27/EU) which both discuss the need for "deep renovations" but which also highlight that member state strategies and accompanying policies to help overcome known barriers and encourage uptake are also needed.

In recognition that the notion of whole house refurbishment is largely misunderstood and that there are currently many challenges facing home owners, the Energy Efficiency Partnership for Buildings (EEPB) established the whole house energy efficiency retrofit project with industry and other key stakeholders.

This work set out to identify and assess the barriers and opportunities associated with whole house energy efficient retrofit and led to the creation of a two year action plan which can both address some of the key problems and also open up many new opportunities. The overall aim of which is to increase the market take-up of whole house energy efficiency retrofits.

Thus far the project has involved staging workshops with key industry stakeholders, undertaking desk based research, identifying and collating information and assessing gaps and opportunities. This has resulted in the production of an extensive literature review and the identification of 415 financial and non-financial barriers. These are grouped under the following eight main categories:

Economics	Coordination and supply chain
Education and skills	Practical installation issues
Political	Performance
Consumer	Pilots

This report aims to summarise the information collated and the barriers identified under these categories. Section 7 describes the action plan that is being taken forward by the establishment of a Whole House Energy Efficiency Retrofit Steering Group and three task groups. These task groups focus on;

- Developing a vision for energy efficiency retrofit;
- Realisation of whole house retrofit delivery plans and;
- Improving consumer information.

In working to remove the evident barriers and increasing demand for retrofit it is hoped that, with the backing of wider industry and Government, the work of the EEPB Whole House Energy Efficiency Retrofit Steering Group will make a meaningful contribution to both increasing the market size of whole house energy efficiency retrofit and help both industry during a period of limited growth and Government to achieve their energy efficiency targets.

1. Introduction

Whilst it is well known that whole house energy efficient retrofit of homes has been shown to improve the energy performance by an average factor of four or within a range of between 65-95% compared with pre-renovation levels, difficult barriers to large scale take-up and deployment remain.

This is perhaps best summarised by the wording of the EU Energy Efficiency Directive which both stipulates the need for “deep renovations” that “reduces both the delivered and the final energy consumption of a building by a significant percentage compared with the pre-renovation levels leading to a very high energy performance” under recital 16, yet which also requires an evaluation of the barriers (Article 19) and the creation of a long-term implementation strategy (Article 4) from each member state.

This will unquestionably require a paradigm shift from existing approaches which tend to support the most cost-effective measures available and only lead to superficial renovations.

As a first step along this road, the Energy Efficiency Partnership for Buildings (EEPB) and its members took the decision to work on this challenge from the bottom up. For example, the Green Deal goes some way to overcoming some financial barriers and begins to raise consumer awareness, but what implementation challenges remain for home owners? What more can be done to drive whole house solutions across the many relevant trade disciplines?

By identifying, reviewing and tackling the barriers head on, we wish to increase demand for retrofit and ultimately increase the market size significantly. This in turn would help both industry during a period of limited growth and Government to achieve their energy efficiency targets.

2. Objectives

The purpose of this project is to:

- Determine what the barriers to whole house energy efficiency retrofit market take-up, demand generation and supply capability are
- Understand what needs to be done by both Industry and Government
- Propose solutions to overcome the more significant barriers
- Form a vision for the future and how to get there
- Provide input for a two-year industry action plan
- Establish working groups to implement the programme

The overall aim is to increase the market take-up of whole house energy efficiency retrofits.

This interim report seeks to provide insight in to the work undertaken by the EEPB so far. It provides an overview of the barriers identified by industry and other key stakeholders. This has led to the formulation and implementation of an action plan, also shared, which we hope will begin to address some of the key problems and open up new opportunities.

3. Project Scope

The scope of the project is as follows:

- The project is mainly focussed on homes, but recognises the interrelationship between some of the findings and the non-domestic buildings sector;
- It covers all sectors; social housing, private rented, owner occupied and the equivalent non-domestic tenures;
- Looks at whole house energy efficiency measures only and not further sustainability solutions or water efficiency measures;
- Concentrated within the UK and concerns the current UK policy landscape only;
- Considers how whole house energy efficiency may be best implemented using both existing policy instruments but also potential new ones;
- Takes a longer term view, but aims to create a tangible short term plan that can be implemented now

4. Approach

The method used has been a combination of workshops involving key industry stakeholders and desk based research to determine what is already known.

An initial workshop was held on 21st September 2012 involving professionals and industry stakeholders including; Green Deal Providers, trade associations, architects, manufacturers and installers. During the workshop many barriers were identified that constrain the take-up and implementation of whole house energy efficiency retrofits. These barriers were then grouped together and ranked in order of level of importance. Potential solutions were then proposed and the preferred options were selected for inclusion within an Industry action plan. This is described within section 7 of this document.

In parallel, desk based research was also carried out to identify work that has already been completed in the area of whole house retrofit, specifically information on barriers to doing so and recommended solutions.

A summary of all the barriers identified can be found in section 5 of this report. All barriers were categorised and priority barriers were identified (see section 5.2) before a summary of all the potential solutions against the priority barriers was created.

Potential solutions to the priority barriers that emerged during the workshop and desk based research can be found within section 6 of this report and accompanying document, ‘Breaking Barriers: An industry review of the barriers to Whole House Energy Efficiency Retrofit and the creation of an industry action plan: Literature review and full list of barriers and solutions’,’ contains the full literature review and analysis.

Following the initial collation of barriers and potential solutions, a second workshop was held on the 29th January 2013 where results of the analysis were presented and the next steps to take in addressing the barriers faced when carrying out whole house energy efficiency retrofits were identified.

This all led to the creation of a two year industry supported action plan and working document, the ‘Whole House Energy Efficiency Retrofit Group Action Plan’,

An overview of the aims, scope and objectives of the three action plan delivery task groups can be found in section 7 of this document. The taskgroups focus on a need for a ‘whole house vision’, a ‘whole house delivery plan’ and the need for much improved ‘consumer information’. More detailed scoping workshops were held throughout March 2013, the minutes of which are hosted separately on the EEPB website.

5. Identification and Review of the Barriers

5.1 Summary of Barriers

A total of 415 financial and non-financial barriers to whole house energy efficiency retrofit were identified during the initial workshop and desk based research. These have been grouped under the following eight main categories:

Economics	Coordination and supply chain
Education and skills	Practical installation issues
Political	Performance
Consumer	Pilots

The full list of identified barriers can be found in the accompanying document, 'Breaking Barriers: An industry review of the barriers to Whole House Energy Efficiency Retrofit and the creation of an industry action plan: Literature review and full list of barriers and solutions', which contains the full literature review and analysis.

5.1.1 Economic Barriers

Economic Situation

The current economic situation in the UK with high unemployment, less disposable income and less consumer spending on renovation is a barrier, as is the trend towards renting versus buying homes.

Cost

Whole house refurbishments are very expensive and payback periods are long, with policies like the Green Deal not covering all the cost. Finding upfront capital is difficult. Do we even know how much whole house retrofits should cost?

Property Value

Energy performance is not currently reflected in property value (in both the rental and sales market) and Energy Performance Certificates (EPCs) are not displayed at point of sale.

Associated Costs

Other associated costs that add to the overall expense of whole house retrofit are VAT, the survey / assessment, redecoration and maintenance costs. Costs of failure rates are also high and there is additional expense in finding and treating hard to treat cavities and solid wall properties. Cost effectiveness also has to be built in.

Economies of Scale

Unless economies of scale can be achieved the cost of delivering programmes will be too high and additional government subsidy will be needed. There is a lack of community schemes and installation levels have been low. This also means that suppliers and installers have had little incentive to invest in the sector.

Energy Prices

For many, energy bills are still a small percentage of household expenditure and still seen as affordable. However, this perception is rapidly changing with successive price rises and an upward trend.

Funding

Lack of and difficult to access, low cost finance are barriers to consumers wishing to carry out whole house retrofits. Energy Company Obligation (ECO) funding is insufficient and interest rates for Green Deal are too high. The complexity and time taken in arranging grants and funding is also an issue.

Analysis

Energy savings are often calculated on current prices or wrong assumptions making savings appear to be much less than they potentially could be. Energy efficiency is a fairly intangible asset, physically hidden and hard to quantify.

Other

Issues with balance sheet constraints, liquidity and risk are acting as barriers to private firms investing.

5.1.2 Education and Skills Barriers

Skills

There is a lack of / shortage of skills with few tradesmen experienced in retrofit. Technical skills for surveyors and designers, and installer expertise were all seen as barriers.

Multi-skills

There are few experts that understand all the issues and whole house retrofit requires installers that are multi-skilled.

Knowledge

Lack of knowledge was also seen as a barrier, along with builders knowing how and when to offer information. Do we know enough about how whole house retrofit actually works / affects buildings?

Training

Installers need to understand what training is available and how to access it. Installers need to be up skilled and in certain sectors there is a need to introduce training and apprenticeship schemes to make sure installation skills are not lost to the industry. A move to a market with more Solid Wall Insulation means development of skills in this area is required. Also to overcome barriers in housing associations, etc. there is a need for education and training in the use of sustainable energy technologies and their economic, social and environmental benefits.

Quality

Poor installation can lead to poor quality, hence the skills issue is a significant barrier and relevant accreditation is required.

5.1.3 Political Barriers

Government

Lack of clarity, long term plans and a roadmap from Government are seen as barriers. Transparency, longevity and certainty in policy are required for market growth. Whole house retrofit is not on the Government agenda and there is a lack of legislation with further incentives being required. There is red tape around funding and has been a history of stop / start grants.

Planning/Conservation

Planning permission requirements are seen as a barrier. Listed buildings with Areas of Outstanding Natural Beauty (AONB) restrictions, conservation areas, aesthetics and neighbours' legal rights are all in conflict with whole house retrofit.

Green Deal

Green Deal not being suitable for and the 'Golden Rule' precluding whole house retrofit were seen as barriers, as well as the fact that DIY does not qualify, a lack of PR and few carrots and sticks to drive uptake. Green Deal may even be a distraction to whole house retrofit with too many eggs being placed in one basket and Government agenda needs to go over and above Green Deal to drive whole house retrofit.

Standards

No legislative or local requirements to go beyond building regulations and low standards were identified as barriers.

Policy

Legislation is an important barrier for crossing the gap to high volume of whole house retrofit. Consequential improvements don't apply to the vast majority of homes and a ban on renting poor homes in 2018 is viewed as too little too late.

5.1.4 Consumer Barriers

Consumer

Accessing consumers is a barrier. Who are the vulnerable customers who need it the most and the pioneering audience of early adopters? Who should be targeted first?

Awareness / Information

Lack of information, consumer awareness, interest, and understanding were all identified as barriers, as well as awareness of the measures, solutions and technologies available. Solid Wall Insulation in particular suffers from low public awareness and customers are unaware of microgeneration technologies and how to use advanced controls. Consumers are also unaware of the benefits and opportunities available to them. There is a lack of a coordinated marketing approach and independent and consistent advice. Do we know who should lead in stimulating interest/demand? Consumers are unaware of Green Deal and how to go about whole house retrofit.

Demand

There is a lack of consumer demand for energy efficient homes and whole house retrofit with many consumers not wanting to carry out measures even if offered free of charge.

Incentives

There is a lack of consumer interest. Retrofit is seen as unsexy and homeowners need to be inspired. Consumers need to prioritise against competing demands for time and money and other desires (lifestyle, car, holiday, etc.). There is no perceived added value or need for whole house retrofit, which has hidden advantages compared to a new kitchen, conservatory, etc, and savings, comfort and other benefits are undersold. Low energy bills/energy efficiency is not valued as much as other things, there is too much emphasis on carbon and consumers do not understand how little energy an energy efficient home could use. Trigger points present the best and most cost effective opportunities but are not being exploited.

Trust

Lack of trust is a barrier; trust in assessors, energy companies, Government, builders, installers, suppliers, etc and consumers are unable to find trusted sources of advice. The renovation sector is negatively associated with poor quality and there is a cowboy view of many trades. Bad press from failed projects and bad publicity has not helped. There is a fear of miss-selling, problems with the installations, vandalism/damage to the installations, damage to the structure, spoiling of the appearance and character of the property. An additional barrier is the high risk involved, with health problems associated with increased airtightness, mould and damp issues, uncertainty and scepticism in less familiar technologies.

Complexity

Complexity arises from differing messages received by consumers, the decision making process, the technology itself (particularly difficult for elderly consumers), the maintenance requirements, the process of selling electricity back to the grid, and measures are seen as specialist and are unavailable from local builders.

Resistance

Householders may be resistant to an imposed change in lifestyle, or a charge attached to their property/large debt on their home. They may be resistant to the disruption/nuisance factor and have negative perceptions of what whole house retrofit entails. They may be resistant to Government schemes such as the Green Deal, or have apathy, complacency, Laissez-faire attitudes. They may take pride in the appearance of their estate/property and find the appearance of energy efficiency measures ugly and unattractive.

Ownership

Ownership of the property can be a barrier, with consumers in the Private Rented Sector only having a short-term view and conflicts between investors and users. Average homeownership is only ten years in the UK and a full package of retrofit measures is likely to take much longer than that to pay back. The decision making process can be complex when multiple people have to consent.

5.1.5 Coordination and Supply Chain Barriers

Supply Chain

The supply chain is underdeveloped and fragmented, with piecemeal delivery and no one stop shops. Industry has a single product focus with components coming from overseas. There is a siloed approach, short-term thinking, lack of joint working, divide between trades, and lack of coordination, cooperation and control over the interface. There is a lack of trust in joint working, the standard of work (cowboy builders), that everyone will share in the benefits and split incentives. Renovation for energy efficiency is not coordinated with building system renovation resulting in poor use of resources and inefficient building performance. Suppliers only provide half the solution - not always noting the downsides and how to get around problems.

Capacity

Necessary building and industry capacity, the size of the supply chain and a lack of reliable suppliers available to assist with planning and carrying out work are all barriers to whole house retrofit.

Surveys

No two existing houses are the same and certain measures are not suitable for some houses or locations, therefore a refurbishment project should not be undertaken without a comprehensive survey of the house. The number of surveys required was also seen as a barrier.

Complexity

What is the definition of whole house retrofit, terminology is not agreed, and is whole house actually a desirable objective? The scope of works in whole house retrofit is extremely challenging for programming, involving a variety of suppliers and project management of multiple measures. There are few integrated solutions and the coordination is key to ensuring installations of different measures do not impact on each other, reduce cost effectiveness or cause damage. Customers have very different needs and each case is different. The approvals process is complex with multiple consents needed and more than one decision maker with programmes needing to meet the needs of all tenure and architectural types.

Design

Design is seen as a barrier, including the design of systems, having no integrated provision of design and delivery, the lack of holistic thinking and a whole house plan. There are few people who can create and deliver a plan and awareness of architects along with understanding of the full range of measures available were also seen as issues. Do designers understand how the measures work together and the detrimental impacts of some actions when combining measures?

Long Term View

Lack of a long term view, planning and future proofing of the supply chain were all identified as barriers.

Small and Medium-sized Enterprises (SMEs)

Research has shown that the energy efficiency sector sees a strong prevalence of region based small businesses who often struggle to bid for large scale projects. This can mean an unequal coverage of the wide variety of measures across areas. Implementation, verification, accreditation and commercialization of new technology are often too onerous and costly for small businesses. A lack of and a need for SMEs with the necessary skills within the Green Deal was identified as a further barrier.

5.1.6 Practical Installation Issues and Barriers

Technical Complexity

Barriers around technical complexity include hard to treat properties, complexities around measures (e.g. Internal Wall Insulation in kitchens, stairs, doorways, etc), an ignorance of building physics, and installers understanding from the outset that every home is unique and that there won't be a one size fits all energy retrofit solution.

Disruption

Barriers include actual and perceived disruption, hassle, inconvenience, mess, noise, dust, a need for decoration, loft clearance, with potential upheaval and need for decanting. Particular measures such as solid wall insulation, under floor insulation, renewables, etc have significant disruption and more so when installing multiple measures and with whole house retrofits. The time taken can be significant and there are additional constraints on building due to the occupants (e.g. noise and air pollution restrictions).

Installation

During the installation phase there are barriers such as a lack of information on the existing structure, unforeseen problems such as asbestos and other hazardous components, location of utilities, poor condition of the building, access problems and disturbance to and from the infrastructure. Also, space constraints, measures competing for the same space, measures reducing the living space such as internal wall insulation, etc all add difficulty.

Time

Time is itself a barrier, as are costs linked to the time taken and restraints on available time due to narrow windows of opportunity (e.g. holidays for tenants).

Quality Assurance

Quality control, assurance of performance and restriction/compliance with third party accreditation i.e. BBA certification on Hard To Treat Cavities were raised as barriers associated with quality assurance.

Responsibility

A split responsibility for the project and responsibility for maintenance and warranties were seen as barriers to whole house retrofit.

Appearance

Changes to the appearance of a property, especially with external wall insulation and where there is a need to keep the street scene intact, such as with Victorian Terraces, all cause issues.

5.1.7 Performance Barriers

Performance

There is a performance gap between estimated and actual performance resulting from measures not performing as they should, poor installation, occupants not understanding how to operate the technologies installed, etc. Incorrect advice can be given by the assessor, Energy Performance Certificate, installer, etc or the chosen technology may not be suitable for the household. Inefficient products are available on the market and products may be overlooked that are not listed within the assessment tools such as appendix Q of SAP.

Savings

Actual energy savings can be different to those calculated. Are the savings accurate and can savings be realised? Costs can be exaggerated, relative rather than accurate savings are used and we don't have accurate benchmarks or modelling.

Tools

The modelling tools used to calculate carbon savings and performance are inaccurate, and poor tools are available for ventilation, condensation, cold bridging, etc.

Commissioning

Poor commissioning of the systems is a barrier

Evaluation

Lack of evaluation and post occupancy assessment beyond the short term installation of measures limits the potential for scalability and development of best practice. Learning is not captured due to the lack of a positive feedback loop when things go well.

Behaviour

Advice on behaviours is poor and acts as a barrier to performance.

Standards

Insufficient quality assurance, low standards and specifications are additional barriers.

5.1.8 Pilot Barriers

Pilot Barriers

We need to move on from pilots and into the demonstration phase, with more focus on delivery. There are not enough good examples and too many pilots with too few final solutions. We need to manage the deployment of and carefully manage the publicity and expectations around new technologies. Bad exemplars and bad publicity has led to set-backs for the whole industry. An additional barrier is the lack of influential and trustworthy forerunners.

5.2 Barrier Ranking

The barrier categories were then ranked in order of priority by applying the scores given during the initial workshop (where the score is equal to the number of votes received when all attendees were given the opportunity to select their top three barriers to address).

Category	Sub-Category	Priority Score
Consumer	Demand	14
Consumer	Incentives	10
Consumer	Resistance	5
Practical Installation Issues	Disruption	5
Education and Skills	Skills	4
Education and Skills	Multi-skills	4
Education and Skills	Knowledge	4
Consumer	Awareness/information	4
Consumer	Trust	4
Economics	Economic Situation	3
Education and Skills	Training	3
Political	Government	3
Coordination/Supply Chain	Design	3
Consumer	Complexity	2
Coordination/Supply Chain	Complexity	2
Economics	Associated Costs	1
Education and Skills	Quality	1
Political	Planning/Conservation	1
Political	Green Deal	1
Consumer	Consumer	1

5.3 Priority Barriers

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

6. Identification and Review of the Solutions

6.1 Solutions to the Priority Barriers

This section seeks to provide an overview of the potential solutions for each of the priority barriers identified during the initial workshop and desk based research. The favoured solutions form part of a two year action plan which is discussed within section 7 of this report.

Note that many of the solutions address more than one of the barriers and therefore may appear on multiple occasions throughout the following sections.

The full list of all identified potential solutions can be found in accompanying document, 'Breaking Barriers: An industry review of the barriers to Whole House Energy Efficiency Retrofit and the creation of an industry action plan: Literature review and full list of barriers and solutions', which contains the full literature review and analysis.

6.1.1 Solutions to Consumer Related Demand Issues

Consumer related barriers are by far the most prevalent and it goes without saying that if barriers to consumer take-up can be overcome, a sizeable increase in demand may be realised. Our full analysis identified opportunities for numerous solutions to barriers such as lack of incentive; resistance; low levels of awareness and information; lack of trust; complexity and disruption and poor communication channels.

The following section provides an overview of all consumer related solution ideas arising from our workshop and desk based research activity;

Regulatory drivers:

- Stronger enforcement
- Carrots and sticks introduced by Government, including forms of subsidy, financial incentives (and disincentives)
- Consequential improvements
- Council tax reduction (permanent or one-off)
- Stamp duty linked benefits
- Income tax rebate scheme
- Capital gains tax / rebate
- Landlord regulations
- More visible legislation on the horizon
- Vary according to Energy Performance Certificate (EPC) rating/measures installed
- Link regulatory mechanisms to marketing
- Government to put in place both area-based and individual dwelling backstops that ensure that even the hardest to reach people and hardest to treat homes are included in the retrofit programme.
- Higher price energy/fuel tax

Increase influence and aspiration

- An aspirational standard should be introduced that will encourage householders to go above the minimum level
- Endorsed energy related TV programs
- MBEs for people with super energy efficient homes
- Competitions for area based approaches
- Visible realisation of energy efficiency
- Involve good partners from the industry as well as public actors
- Peer influence/ peer education – householders
- Employers incentivising uptake for employees
- Contractors spend most time in the home and have most opportunity to inform and influence residents
- Brand endorsement
- Financial incentives; Cash back; Time limited bargain; “cheque in the post”
- Research to find out what incentives work best
- Energy suppliers to reward landlords for leads to tenants

More active promotion

- Marketing
- TV programmes and reality shows
- Use community enablers to persuade wider populations
- Provide more information on technologies and direct benefits
- Work with local and regional media to ensure appropriate messages are communicated in all features about climate change and sustainability
- Via schools and education
- Robust and appropriately targeted marketing campaigns
- Best practice examples/case studies
- Produce and publicise more literature on funding
- Knowledge transfer from experts and exemplar organisations to homebuyers and tenants is fundamental.

More active promotion (continued)

- Communicating with the appropriate individuals and with appropriate information is of key importance.
- A segmented, as opposed to a population wide, marketing approach is needed to move beyond the energy efficiency 'early adopters'.
- Work with partners that the audience will listen to and trust
- Ensure we put out correct information, e.g. through myth busting publications.
- Market attractive and trustworthy examples of well proven solutions with a focus on rational arguments.
- Present trustworthy facts in an understandable way.
- It is important that consumers are told of the benefits of technologies and also that they obtain reliable and authoritative information and advice on the relative merits of the options for their own particular buildings.

Add value to energy efficient homes

- Train estate agents regarding the value of an energy efficient home and use them to train consumers
- Increase the associated value of an energy efficient house by label (e.g. in Australia)
- Attach value to the Energy Performance Certificate (EPC)
- Grand designs G → A rating
- Have "kite marks"/badges for home e.g. Display Energy Certificates for homes, Passivhaus, EPCs, etc

Overcome Disruption

- Center Parcs deals for homeowners while work carried out
- Holidays/retreats in exemplar homes
- Incentive to overcome disruption
- Exemplar homes with owners saying "yes it was a hassle, but it was worth it" – spend £30k on exemplars
- Clear communication is needed on the timescales and the level of disruption involved in the installation

Promote wider benefits

- What benefits are consumers looking for?
- Communicate how the solution fulfils the customers' needs
- Selling home energy retrofit on household bills reduction alone is misguided and must be augmented with other messages Benefits that can prompt action: Saving money; A warmer more comfortable home; The avoidance of waste; More comfortable, less damp, better health
- Have a comfort measurement / star rating (Cambridge University project)
- Payback / return on investment - a TV or car never has to "pay back" so why the house?
- "Shiny toys" / bits of kit like smart meters, LED lighting, heat pumps, solar PV, etc.
- Offer instant gratification
- Short term benefits are more powerful than long term ones
- Bring the issue of energy efficiency into the present
- Make it about the person/personal: their house, family & locality

Community/Getting people involved

- Consultation with homeowners/residents over their choice and how improvements should be focused
- Kick-start by investment in social housing with improvements rolled out across private tenures
- The community could play a key role in delivering programmes
- Community enablers
- Work with partners that the audience will listen to and trust
- The participation of key partners (such as the local authority) will give reassurances and generally make it more attractive.
- Positive word of mouth and a respected messenger are key drivers of trust and confidence.

Demonstration:

- Broaden the Superhomes/Green Open Homes concept
- Allowing people to ‘touch and feel’ energy efficient homes, can help to get initial interest
- Demonstrating the cost benefits of installing sustainable energy measures and the promotion of case studies.
- Almost all private homeowners opted into the scheme after seeing the properties completed
- Local examples/public buildings as showcases – boosting demand
- Feasibility studies (cost/benefits)

One-stop shop

- Whole house energy efficiency retrofit sales service
- Central information portal
- Central provision of credible information and qualified design
- Set up a “Ministry of information”/ central dissemination into an independent hub
- Set up a compare the market for whole house retrofit.

Information/share knowledge

- Create arenas for the exchange of knowledge
- Shared intelligence/raising awareness
- Comprehensive plans for dissemination of advanced renovation information, R&D, quality control and funding.
- Proactively disseminate information to stakeholders and focused, regular collection of information from stakeholders
- Learning from each other and sharing best practice
- Booklets with information on technologies and direct benefits
- Literature on funding
- Increase project reporting, transparency, and end-user education. Public reporting of such data not only promotes energy efficiency but also creates a competitive environment, especially for commercial building owners.
- Refurbishment guides to help builders promote energy-saving measures to householders when they carry out other refurbishment work.

Reduce risk

- Effective accreditation of those responsible for the work
- Ensure and police compliance
- Consider developing a certification scheme that accredits individuals and organisations according to their sustainability credentials.
- Maintenance, repairs and health and safety training on any installed technologies
- Insurance packages
- Sanctions for failure

Triggers:

- More needs to be done to integrate energy efficiency improvements with other household works. More investment needed in the up-skilling of small contractors to do this.
- Encouraging landlords and owner-occupiers to take advantage of the windows of opportunity for energy efficiency improvements at the time they're making other improvements e.g. re-roofing, planned maintenance.
- Householders are enthusiastic about tackling many energy-saving measures when they've already got builders in.
- Landlords continue to be focused on the financial bottom line, but see the logic in tackling energy efficiency when they are improving their properties.
- Make trigger-point guidance available through the consumer advice service, helping householders to build energy efficiency into room-by-room upgrades.
- Opportunities could arise from the requirements for adaptations to dwellings expected from an ageing residential population with higher standards of living comfort, increasing independence and an increase in peopling working from home.

Technology and logistics

- More innovative products (e.g. “WHISCERS” Internal Wall Insulation system, Aerogel, Pilkington Spacia glass, etc - http://www.nef.org.uk/service/exisiting-buildings/retrofit/whiscers)
- Prefabricated/off-site elements
- Use void times for rented properties and KPIs encouraging housing associations to carry out work in voids

Customer Journey

- Customer care throughout the process
- Customer instruction in the operation of the building and its systems on completion
- Communicating with the appropriate individuals and with appropriate information is of key importance.
- Main stream plans for whole house retrofit
- Manage projects using a single third party

6.1.2 Solutions to Education and Skills Issues

The following section provides an overview of all education and skills related solution ideas arising from our workshop and desk based research activity;

Education

- Improve links to schools / education
- Increase presence of skills on government agenda
- More education around fabric first
- More retrofit related CPD
- Educational programs at all levels, including professional training and development
- Improvements should be made to education and training throughout the industry in order to replicate the design and construction skills, knowledge and experience gained through experimental retrofit projects.
- Developing a comprehensive skills strategy to help provide the skilled workforce that will be required (e.g. HM Government UK Renewable Energy Strategy 2009).

Central Body

- An information portal or one stop shop
- Set up a “Ministry of information”/ central dissemination into an independent ‘hub’
- “Institute of building performance”
- Put weight behind the provision of centralised knowledge
- Research what information is missing and identify gaps - need evidence
- Collective of trade associations

Communication Mediums

- Leaflets, flyers, reports, guidance etc.
- Wider distribution of Institute for Sustainability (IFS) retrofit guides offer a quick win
- Ensure we put out correct information, e.g. through myth busting publications.
- Pilot new refurbishment guides, to help builders promote energy-saving measures to householders when they carry out other refurbishment work.

Right Education to the Right People

- Education to suppliers, installers and surveyors
- Multi-skilled operators and designers
- Educate project managers - how to run advanced renovation projects
- Professional education
- More needs to be done to integrate energy efficiency improvements with other household works. More investment in the up-skilling of small contractors is needed.
- Implement educational programs for in-house consultants, planners and on site workers and/or invest in technology clustering as a way to overcome technology dependant lack of skills and competences.

Certification

- Consider developing a certification scheme that accredits individuals and organisations according to their sustainability credentials.
- Accreditation of those responsible for the work
- Sanctions for failure
- Ensuring compliance
- Apprenticeships and apprentice networks
- More generic qualification that is fit for purpose

Learning from each other and sharing best practice

- Shared intelligence / raising awareness
- Creating arenas for all actors to meet
- Seminars to share knowledge, best practice, and experience
- Best practice examples/case studies
- Carry out research to identify case studies to be showcased at a "Best Practice Case Study" event and develop into a database.
- Use demonstration projects as showcases and learning opportunities.
- Determine the barriers and best practice for discussion at workshops and open days at the properties with the aim of sharing knowledge. Cover by the media.
- Establish a stakeholder community with the development of an extensive shared workspace and a knowledge repository to support networking.
- Increase project reporting, transparency, and end-user education. Public reporting of such data not only promotes energy efficiency but also creates a competitive environment, especially for commercial building owners.
- More participation in international research and projects.
- Making the tools and acquired experience available to all actors, for example, calculation tools and prescriptions for concepts, technologies, construction details, etc.
- A medium of proactively disseminating information to stakeholders and focused, regular collection of information from stakeholders

Research

- The involvement of experienced research teams to minimise the gap between predicted and actual performance.
- Research in order to learn about the state of the art
- Single technology pilots to increase the uptake of the most economically viable energy saving measure for the region could be developed. This could be supported by research into low or zero carbon technologies most advantageous for the region e.g. in areas off mains gas.

6.1.3 Solutions to Complexity in the Supply Chain

The following section provides an overview of all supply chain complexity related solution ideas arising from our workshop and desk based research activity;

Education

- Education around fabric first
- Education to suppliers, installers and surveyors
- Educate project managers/members how to run advanced renovation projects
- Multi-skilled operators and designers
- Engaging and training architects involved in the design of new homes
- Improvements should be made to education and training throughout the industry in order to replicate the design and construction skills, knowledge and experience gained through experimental retrofit projects

One-stop shop

- Central body
- Whole house sales
- Set up a “Ministry of information”/ central dissemination into an independent ‘hub’
- “Institute of building performance”
- Put weight behind the provision of centralised knowledge
- Central provision of credible information and qualified design
- Offer support

Whole House approach

- Whole-systems thinking can be applied to the delivery processes to optimize the building as a whole for resource and energy efficiency
- A matrix of solutions by market segmentation by tenure subdivided by type of property and age is required
- Whole house retrofit plans
- A whole house approach managed by a single third party
- Determine what order works should be carried out in
- Offer choices to consumer – not bundled into one estimate
- Plan from the customer’s perspective
- One size does not fit all
- Take a long-term approach
- It is essential that robust system design methods are developed for installers and consumer education is made a priority
- Utilise trigger points e.g. when people move home, fit a new kitchen, etc. Therefore addressing energy efficiency alongside other refurbishment projects - means fitting key measures like insulation or advanced glazing on a room-by-room basis over several years.

Coordination

- Careful planning from the design stage and consultation with all key partners
- Design intent needs to be communicated to all those in the supply chain who could potentially affect the performance of the measures installed.
- Coordinate activities
- Collective of trade associations
- Apprentice networks
- Program management
- Communicating with the appropriate individuals and with appropriate information is of key importance
- Effective coordination in order to pool different sources of funding and manage contractual arrangements.

Sharing of best practice

- Shared intelligence/raising awareness
- Carry out research to identify case studies to be showcased at a “Best Practice Case Study” event and develop into a database.
- Determine the barriers and best practice for discussion at workshops and open days at the properties with the aim of sharing knowledge. Cover by the media.
- Seminars to share knowledge, best practice, and experience
- Knowledge transfer from experts and exemplar organisations to colleagues involved in planning and development controls, homebuyers and tenants is fundamental
- A medium of proactively disseminating information to stakeholders and focused, regular collection of information from stakeholders
- Wider distribution of Institute for Sustainability (IFS) retrofit guides offer a quick win
- Involvement of experienced research teams in whole house retrofit projects to minimise the gap between predicted and actual performance.
- Making the tools and acquired experience available to all actors, for example, calculation tools and prescriptions for concepts, technologies, construction details, etc.

Product development

- Share insight with manufacturers and retailers of energy-saving products, showing what measures can be achieved and how to achieve them
- Diagnostics and measured surveys
- Rapid identification of necessary physical treatment
- Further development of integrated whole house propositions
- Off-site construction
- Identification of a replicable ‘kit of parts’ which can then be used to build the supply chain
- Development of products which will make the task more secure and less disruptive

6.1.4 Solutions to Supply Chain to Install Issues

The following section provides an overview of all supply chain to install related solution ideas arising from our workshop and desk based research activity;

Education

- Education around fabric first
- Education to suppliers, installers and surveyors
- Improvements should be made to education and training throughout the industry in order to replicate the design and construction skills, knowledge and experience gained through experimental retrofit projects
- Multi-skilled operators and designers
- Engaging and training architects involved in the design of new homes
- Wider distribution of Institute for Sustainability (IFS) retrofit guides offer a quick win

Approach

- Take a long-term approach
- A matrix of solutions by market segmentation by tenure subdivided by type of property and age is required
- Determine what order chunks of work should be carried out in
- A whole house approach managed by a single third party
- Whole house retrofit plans
- Program management to coordinate activities
- Utilise trigger points e.g. when people move home, fit a new kitchen, etc.
- The industry needs to produce an integrated proposition
- Customers to use the right technologies in the right contexts
- Undertake research to fill the evidence gaps
- More robust Identification of necessary physical treatment
- Development of products which will make the task more secure and less disruptive

One stop shop

- An information portal or one stop shop
- Set up a “Ministry of information”/ central dissemination into an independent ‘hub’
- “Institute of building performance”
- Put weight behind provision of centralised knowledge
- Central provision of credible information and qualified design
- Offer support
- Whole house sales

Working together

- Building bridges between the industry players (e.g. manufacturers, distributors and installers) and markets (e.g. social housing landlords and grant scheme managers)
- The involvement of experienced research teams in the whole house retrofit projects to minimise the gap between predicted and actual performance.
- Seminars to share knowledge, best practice, and experience
- Carry out research to identify case studies to be showcased at best practice events and develop into a database
- Determine the barriers and best practice for discussion at workshops and open days at the properties with the aim of sharing knowledge. Cover by the media.
- Knowledge transfer from experts and exemplar organisations to colleagues involved in planning and development controls, homebuyers and tenants is fundamental.

Coordination

- Careful planning from the design stage and consultation with all key partners
- Provide good advice, based on a thorough understanding of the home's construction 'status'.
- Select the project team early and accelerate iterative design process with a team-based rapid development of schematic design
- Design intent needs to be communicated to all those in the supply chain who could potentially affect the performance of the measures installed.
- Identify project constraints that design and construction have to meet early in the planning phase and accelerate the discovery of existing conditions. Carry out a thorough inspection of the existing building in design process.
- Practical planning checklists for those looking to design and deliver projects in order to increase the response and cost effectiveness of energy efficiency initiatives

Tools

- Expert assessment beyond Green Deal
- Diagnostics and measured surveys
- Through the E2rebuild project they have developed monitoring guidelines that define a common approach and unified methodology for metering and monitoring of the building's energy performance and indoor environment including thermal comfort for tenants. Guidelines explaining the surveying and planning process and give an overview of the features of a comprehensive digital survey, including the development of a fully featured 3D model for planning and production have also been developed.
- Making the tools and acquired experience available to all actors, for example, calculation tools and prescriptions for concepts, technologies, construction details, etc.
- It is essential that robust system design methods are developed for installers and consumer education is made a priority

6.1.5 Solutions to Government/Political Issues

The following section provides an overview of all Government and Policy related solution ideas arising from our workshop and desk based research activity;

Policy

- More Government intervention in the market needed
- Where necessary, change legislation not to hinder renovation (such as issues on investment and rent)
- Regulatory mechanisms with marketing
- Stronger enforcement
- Joined up Government Departments
- Consistent message across Government
- Industry representation within Government – understand industry needs
- Visible legislation on the horizon
- Set a national agenda to include perspectives for future policies
- Policy framework needs to be to be long-term and provide certainty for businesses looking to operate in this space
- Announce advanced renovation as standard renovation policy
- Government to introduce 'carrots', as well as 'sticks', including forms of subsidy, financial incentives (and disincentives).
- It is important that Government establishes tariffs and subsidies that provide a level playing field for energy efficiency and renewable energy or even to favour long-life energy efficiency measures that 'lock in' CO_2 reductions for the long term.

Standards

- Implement energy labelling and quality assurance systems.
- Strengthen legislation on required level and performance of renovation. Raise minimum standards for energy efficiency
- Online Display Energy Certificates for homes
- Energy related KPIs into housing regulations
- Energy standard for social housing - name and shame

Drivers

- Make whole house retrofit mandatory
- Use consequential improvements as a trigger point to drive whole house retrofit
- Allow access to other schemes only when all other measures have been completed (e.g. Renewable Heat Incentives/Feed in Tariffs) - offer higher rates with whole house retrofits
- Council tax reduction (Permanent or One-off)
- VAT reduction (0%)
- Linking energy performance to high profile measures such as taxation. Examples include Stamp Duty and Capital Gains Tax varied according to EPC rating and Council Tax rebates based on measures installed.

Local Authorities and Registered Providers

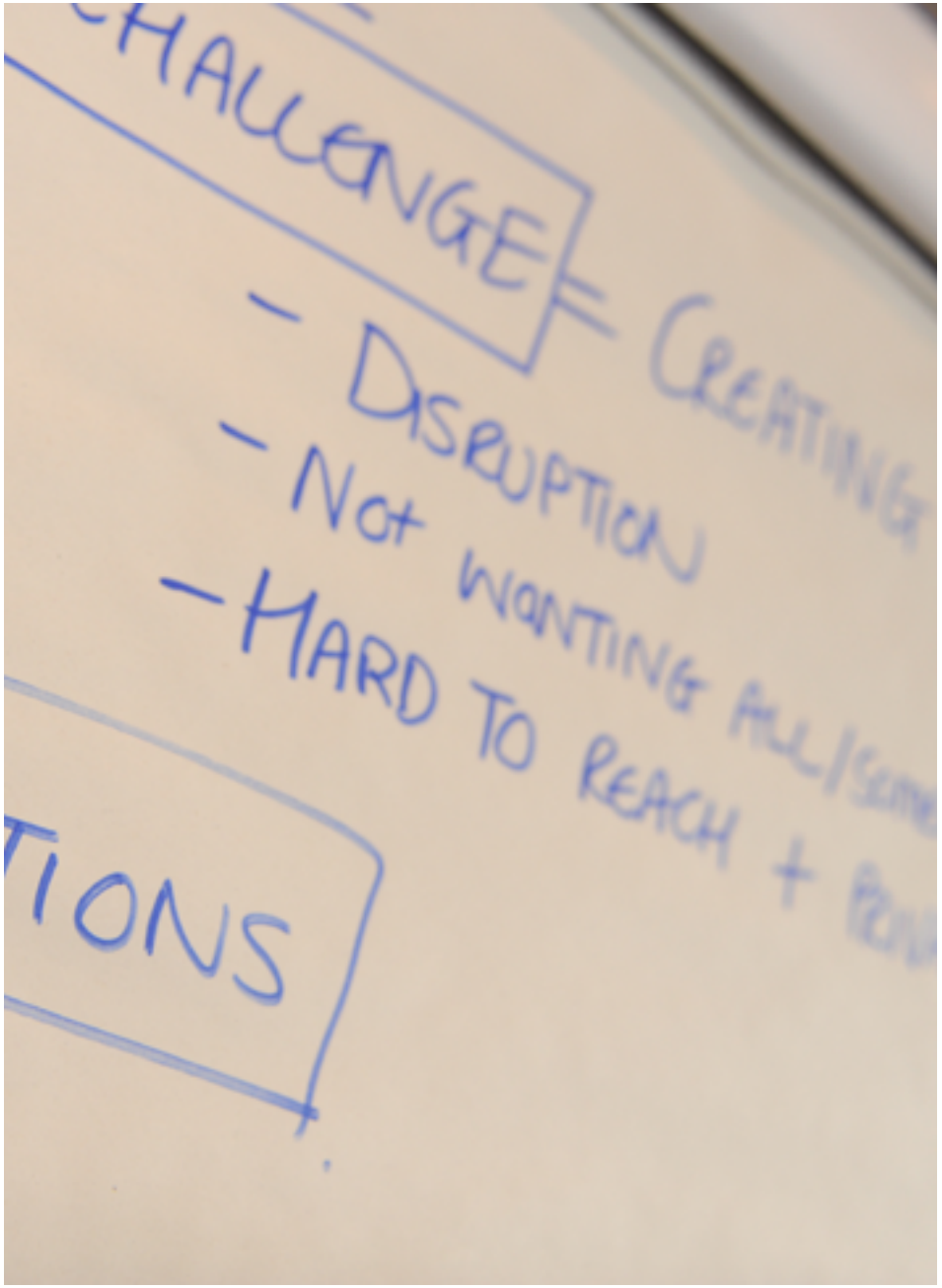
- There is a key role for Local Authorities and Registered Providers in either coordinating or delivering the step change in refurbishment activity needed. Steps must be taken to incentivise Local Authorities to prioritise refurbishment within existing spatial planning so that opportunities for investment and action add up to more than the sum of their parts.
- Local authorities can be encouraged to include tackling climate change within their local area agreements.
- Competition between local Government
- Add teeth to HECA perhaps via a league table and making the results public

Innovation

- Encourage innovation in green
- Government should keep the cost of capital for investment in low carbon technologies low

Education

- Skills on agenda
- Schools / education



Influencing

- Persuade citizens
- Government must put in place both area-based and individual dwelling backstops that ensure that even the hardest to reach people and hardest to treat homes are included in the retrofit programme

Landlords

- Use legislation to engage Landlords who have a nothing is in it for me attitude
- Lobbying for landlords to be treated as businesses (to receive tax benefits from investment in energy efficiency)
- Licensing of landlords

7. Creation of an Action Plan

In reviewing and consolidating the outlined potential solutions, a whole house energy efficiency retrofit project steering group was established. In recognition of the need for action, this group opted to create a two year action plan covering the following matters;

- The creation of a strategy to articulate a clear vision on whole-house retrofit. This is to be communicated widely; building industry support and helping traction to be gained within Government.
- Building consumer confidence and making retrofits desirable through the provision of more robust consumer information and education.
- Development of the concept of a whole-house plan and increasing knowledge and skills of the supply chain

To coordinate action, the steering group has set up three task groups focussing on the whole house vision, whole house delivery plan (pulling together knowledge and developing a methodology) and consumer information.

7.1 Scope of Work for the Task Groups

Whilst the steering group provides oversight, the intention is for the task groups to research, develop and realise robust solutions. The following sections list the aims, vision, scope and objectives for each of the three task groups.

7.1.1 Task Group 1: Whole House Retrofit Vision

Aims of the Whole House Retrofit Vision Task Group

The primary aim of the 'whole house retrofit vision task group' is to galvanise action toward defining a vision (where we want to get to) and a strategy (how we're going to get there) that can serve as both terms of reference for the wider group but also be disseminated more widely in order to ensure overall consistency and delivery of whole house retrofit, irrespective of Government Policy but taking into account current policies and existing programmes.

Vision for the Whole House Retrofit Project

The task group has proposed that the vision for the future be defined as: 'a vision for a sustainable housing stock'. Progressing this is a key next step to our work but a sustainable housing stock is one where;

"The UK housing stock is sustainably retrofitted to significantly reduce energy and water demand whilst promoting improved standards of health, comfort and basic amenities"

Scope of the Whole House Retrofit Vision Task Group Work

The whole house vision task group will specifically look at reducing overall domestic energy demand as a key priority; electricity, gas and water use. However, whole house retrofits should also be implemented in a manner that is not wasteful and they should capitalise on the opportunity to protect against future climate scenarios (flooding, overheating etc.) and also ensure occupants can lead a more sustainable lifestyle e.g. through the provision of recycling, water harvesting and vegetable growing facilities. Energy efficiency upgrades must also seek to maintain the character and communal benefits of the property and neighbourhood.

The vision and strategy are to be focussed on housing, but not to exclude non-domestic properties i.e. lessons learned can be shared where applicable.

Once defined and communicated, the overall vision is to be realised through the whole house plan and consumer information task groups.

Objectives and Actions for the Whole House Retrofit Vision Task Group The identified actions for the task group are as follows:

Action 1 - Agree and finalise a vision and scope with the steering group

Action 2 - Define the benefits to consumers, the supply chain and Government of achieving the vision

Action 3 - Determine who the vision needs to be communicated to and how it will be communicated to obtain maximum support (to consider Government, Industry, consumers, etc.)

Action 4 – Develop and implement a coherent strategy and communication plan based upon the outcomes of the above two actions

7.1.2 Task Group 2: Whole House Retrofit Delivery Plan

Aims of the Delivery Plan Task Group

Much of the existing policy and regulation concerning the increase of energy efficiency and the reduction of CO_2 emissions of homes in the UK encourages a measure-by-measure piecemeal approach. Vital consumer facing guidance such as that provided by an Energy Performance Certificate or a Green Deal Advice Report itemises possible improvements and provides little insight into how multiple measures interact or how they may be most cost-effectively implemented over time.

The primary aim of the 'whole house retrofit delivery plan task group' is to galvanise action toward defining and developing the concept of a whole house plan and to work with industry and Government to consider trials and wider implementation as appropriate.

Vision for the Delivery Plan Task Group

The vision for the future for the delivery plan task group is that:

- A whole house retrofit plan is used in all homes using a common language and format.
- The supply chain is sufficiently geared up to produce and recognise whole house plans and refers to them in delivering whole house retrofits cost effectively over the lifetime of the dwelling.
- A method is in place for storing and updating the plan to allow flexibility for future innovation and change in the industry and occupants' needs.
- The plan takes into account best practice, flags technical risks associated with retrofitting multiple measures and highlights actions that should be taken when carrying out specific installations.
- Monitoring of performance against the plan is in place to monitor and demonstrate progress.
- Demand exists with homeowners recognising and appreciating the value of having a whole house plan.

Scope of the Delivery Plan Task Group Work

The scope of work for this group is to develop the concept and methodology only. At present, the preparation of an online infrastructure or finer technical details required to feed the plans are not covered within the scope.

Objectives and Actions for the Delivery Plan Task Group

The objectives and actions for consideration within a two year action plan are as follows:

1 Determine a model for the creation, maintenance, storage and delivery of whole house retrofit plans

Action 1 – Gather examples of existing whole house plans

Action 2 – Design a template for the plan based on identified best practice

Action 3 – Develop the overall concept and model

2 Gain industry and Government support for a whole house delivery plan and a programmed approach

Action 1 – Prepare a business case and identify the benefits of the whole house plan concept for key stakeholders

Action 2 - Present the concept to industry and Government (DECC/CLG/BIS)

Action 3 - Engage DECC to include whole house plans in the next Energy Company Obligation (ECO) and wider policy

3 Set the criteria for a framework of accreditation for the creation and delivery of whole house retrofit plans (i.e. assessment, lodgement, oversight/coordination and implementation)

Action 1 – Carry out a gap analysis between the whole house retrofit plan concept and existing certification schemes

7.1.3 Task Group 3: Whole House Retrofit Consumer Information

Aims of the Consumer Information Task Group

The primary aim of the 'whole house retrofit consumer information task group' is to galvanise action towards an improved understanding of how best to communicate whole house retrofit and to work with industry and Government to implement demand creation initiatives as appropriate. The group also aims to:

- Provide information for and educate consumers;
- Overcome some of the key barriers raised previously; lack of incentives, complexity, trust, resistance, etc.;
- Increase confidence to carry out whole house retrofit and;
- Use trigger points to increase take-up of retrofit.

The starting point for the consumer information group is to consider what customers actually want, be it lower cost, to save energy, increased warmth, health, comfort, house value, etc.

Vision for the Consumer Information Task Group

The vision for the future for the consumer information task group is that:

- Consumers are aware of and understand their domestic energy use and have an appreciation of whole house retrofit as an option.
- There are robust benchmarks in place so people understand what energy levels they should be using based on their type of property and size of household.
- Consumers are also aware of what they can do and how they can go about making their homes more energy efficient.
- The definition of whole house retrofit is determined and communicated in a language which is understood and talked about by consumers. The concept is widely recognised and communicated consistently.
- The market has stopped talking about "pay-back" and started talking about what is of value to consumers. What is of value is determined, understood and marketed by the retrofit industry.
- Relations between the building and energy supply industries have been developed with the two industries working collaboratively.

Objectives and Actions for the Consumer Information Task Group

The objectives and actions for consideration within a two year action plan are as follows:

1 Determine what is of value to consumers

Action 1 – A literature review to determine the most effective tone and approach and the features that consumers will respond to (e.g. energy, health, comfort, aesthetics etc.)

Action 2 – Map the effective channels for communication to consumers (possibly include consumer education via schools)

Action 3 – Determine the 'whole-house retrofit' and 'future-proofing' key messages for consumers and how best to articulate them (metrics, benchmarks, language)

Action 4 – Validate outcomes through consumer testing

2 Determine how consumers can go about whole house retrofit and who to contact

Action - Encourage existing networks to engage with this framework

3 Incentivise take-up of whole house retrofit using existing channels

Action 1 – Support the UK-GBC retrofit incentives working group. The UKgbc work is aimed at providing Government and further actions are to be determined to incentivise consumers to take up whole house retrofits.

Action 2 - Feed the whole house retrofit proposition into future revisions of Green Deal, Energy Company Obligation, building regulations, etc.

Action 3 – Consider links with the roll out of smart meters.