



Programme Area: Buildings

Project: Building Supply Chain for Mass Refurbishment of Houses

Title: Change management roadmap

Abstract:

Please note this report was produced in 2011/2012 and its contents may be out of date. This deliverable is number 6 of 8 in Work Package 4. This deliverable builds on the previous Detailed Supply Chain Workshop report (WP4.4) and presents detailed plans for delivery of mass scale whole house retrofit together with a time based and costed supply chain transformation road map. The road map presented here illustrates the key areas of change needed, what needs to be achieved in what time frame and what resources are required. The objective is to achieve a national capability for retrofit using poly-competent installation teams dedicated to retrofit and achieve a capacity of 400,000 retrofits per annum by 2020. This is seen as the required trajectory to build sufficient momentum to deliver to a large proportion of the UK's 26 million homes by 2020. It is recommended this report is read in conjunction with deliverable WP3.5 - Mass Implementation Plan.

Context:

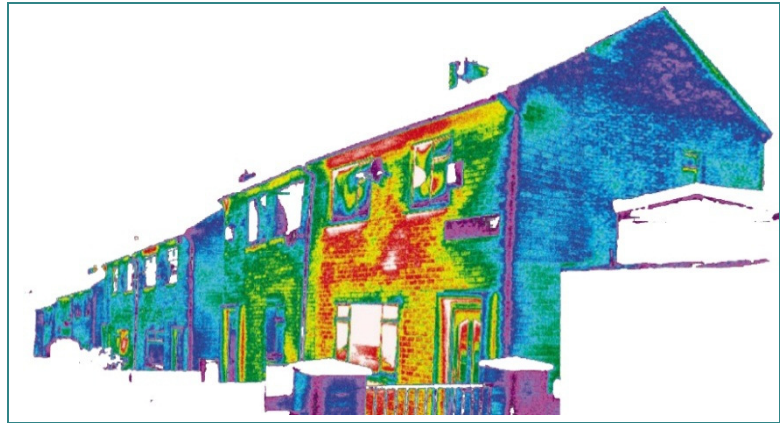
This project looked at designing a supply chain solution to improve the energy efficiency of the vast majority of the 26 million UK homes which will still be in use by 2050. It looked to identify ways in which the refurbishment and retrofitting of existing residential properties can be accelerated by industrialising the processes of design, supply and implementation, while stimulating demand from householders by exploiting additional opportunities that come with extensive building refurbishment. The project developed a top-to-bottom process, using a method of analysing the most cost-effective package of measures suitable for a particular property, through to how these will be installed with the minimum disruption to the householder. This includes identifying the skills required of the people on the ground as well as the optimum material distribution networks to supply them with exactly what is required and when.

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Change Management Road Map

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1 Executive Summary

This work package deliverable builds on the previous Detailed Supply Chain Workshop report (WP4.4) and presents detailed plans for delivery of mass scale whole house retrofit together with a time based and costed supply chain transformation road map.

Members of the existing supply chain and a wider group of stakeholders have been engaged to comment on the outputs from this work package and the results are contained within this report. We have continued to work with the existing supply chain to understand how the cost of product delivered to site is build up, results of this work are presented here with a hypothesis of how this may be reduced towards reducing the overall cost of whole house retrofit closer to the target cost of £6000 (this is the figure presented in section 13 of the WP 4.3 report developed using the DECC IAG valuation tool)

A road map for change is presented here which illustrates the key areas of change needed, what needs to be achieved in what time frame and what resources are required. The objective is to achieve a national capability for retrofit using poly-competent installation teams dedicated to retrofit and achieve a capacity of 400,000 retrofits per annum by 2020. This is seen as the required trajectory to build sufficient momentum to deliver to a large proportion of the UK's 26 million homes by 2020. (This is the capacity trajectory of capacity build presented in section 12 of the WP 4.3 report)

After the publication of the WP 4.4 report, further detailed information has been developed on the cost of materials supply for retrofit. This is presented as appendix 6 of this report and presents evidence behind the claims made that material costs can be reduced through streamlining of the supply chain.

Key messages are that to achieve the levels of efficiency and economy needed, we will need to:

- Stimulate consumer demand with a comprehensive public awareness programme about the benefits of retrofit and what is available
- Design a new, highly effective supply chain that protects commercial gain but is unencumbered by existing practices
- Move as close to the "least wasteful" supply chain model as possible and encourage collaborative working and a consortia approach to supply
- Decrease variety of product type and standardise as much as possible to drive up volume and decrease the overall stock holding burden
- Optimise delivery to site with customised solutions delivering all materials in one go with non HGV transport
- Simplify the accreditation of materials / systems for retrofit to allow greater competition and decrease time (and cost) to market for new developments
- Provide effective training packages for Sales, Surveyors, installers
- Provide a stable base on which to build a retrofit industry with transparent funding mechanisms and incentives.
- Consider any special geographic considerations such as areas of the UK which are off the gas grid or where weather conditions restrict outdoor working time available.

3 Approach

The objective of Deliverable 4.5 is to develop a Change Management Roadmap that details the actions needed to transform the supply chain to deliver retrofit effectively at scale. This report presents a top level transformation plan together with timescales and actions necessary to realise the future state supply chain that has been developed as part of this project. A stakeholder matrix was created to record where input has been received and highlight any gaps requiring further action

3.1 RIGHT TO LEFT THINKING - BUILDING THE TRANSFORMATION ROADMAP

The Roadmap for change presented here was developed using *right to left thinking*. We began by splitting the retrofit process into delivery steps and supporting activities, and added a description / specification at each step for the *future state*, this is the outcome we have designed in Work package 4.3 and 4.4.

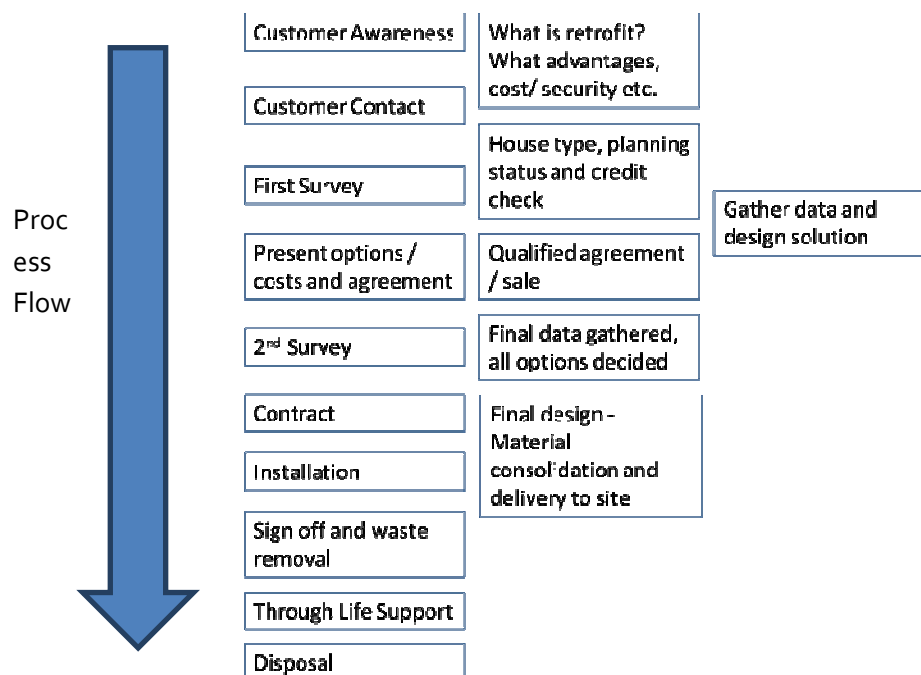


Figure 1. Simplified retrofit process chart

The next step was to add the current state for the existing supply chain.

The third step was to work out how to transform from what we have now to the desired future state, how long this is likely to take and who needs to take action to complete the transformation; this results in the transformation map and Gantt chart presented in this report.

4 Transformation Roadmap

The transformation roadmap illustrates the headline tasks that need to be completed to transform the current trade based siloed supply chain to one which is effective and easily scalable. The focus is on the scalable unit – the small poly-competent installation team as this could be deployed with a variety of head-line delivery organisations to serve any customer segment / property tenure in the most efficient manner. This is also the easiest model to scale quickly.

4.1 PROVING AND DEVELOPING THE RETROFIT PROCESS

Since retrofit of existing properties using poly-competent teams is a new concept the first step in transformation is to prove the concept and develop the techniques and capabilities required. A project comprising 100 homes over an 18 month period is suggested and a proposal for how this could be carried out is included as appendix 7 of this report. Key aspects of the proposal are:

- Multiple iterations of standardised RetroFix & RetroPlus transformations on similar properties, to demonstrate process improvement and potential.
- Detailed review of process steps to identify the need for innovation in product and process to meet consumer requirements for minimal cost and disruption.
- Pre-and post-Retrofit energy data collection to add to the knowledge base and refine the ETI energy models.

A total cost of £4million is estimated for this project.

- 25% funded by the home-owner at the target cost.
- 25% to bridge the gap between current and target costs of Retrofit.
- 50% for the process design, data collection, analysis and project management.

This could be funded in a variety of ways and the proposal contains some suggestions.

The project is designed to cover all the processes required for retrofit including customer engagement, the survey processes, design and installation of measures, waste management, through life systems and development of training systems in the required competences.

An option to start the programme with empty properties will reduce some of the risk associated with householder disruption.

4.2 TRANSFORMATION ROADMAP.

Process step	Future State	Current State	Transformation Requirements
1) Client Engagement (Gantt lines 1,	a) Attracting customers through advertising and information programme.	a) No established whole house retrofit market.	a) Establish WHR as a product and create brand awareness. Instigate Government run customer

	needed.		Way Leave access agreement is required.
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Process step	Future State	Current State	Transformation Requirements
6) Stage 2 survey (technical) (Gantt lines 6, 16, 17, 24, 26, 27, 29, 30)	a) Standard work in place including clarifying assumptions from stage 1 and identified equipment and tools. Process to calculate cost certainty; perform a HSE and Public liability assessment. b) Configure the standard install schedule to create a confirmed installation plan including labour, materials, logistics and finance plan.	No adequate comparison for this process step currently exists.	a) Develop standard work for stage 2 survey based on robust FMEA. Identify and purchase standard survey tool kit. Develop a data storage device and transfer the standard work to a software application that provides a robust cost evaluation. b) Standard install schedules created underpinned by labour, material, logistics and purchasing requirements.
7) Sale (Gantt lines 18, 26)	a) Contract of sale exchanged with preferred start date agreed. b) Confirmation of client change process communicated.	a) Only generic contracts exist, not tailored to retrofit.	a) Generate standard contract of sale. Create client schedule pack outlining timeline and any client requirements (eg. Clear rooms). b) Create Client management policy including Change, quality, and complaints processes.
8) Material Provision (Gantt lines 8,9,10,13,15)	a) Specify material requirements schedule and order. Ensure Labour, plant, specialist equipment, 3rd party requirements approvals and consents scheduled. b) On site material storage and waste removal in place. c) Equipment / tools procured and storage solution in place.	a) No planning tools are currently available that fit the need. b) High level material and tools storage concepts designed. c) Equipment and tools identified.	a) Develop scheduling planning and material resourcing tool. Material supply contracts in place to cover all products, tools and plant. Standard work and policies for procurement, insurance, logistics and access. b) & c) Design and procure material, equipment and waste storage solutions.

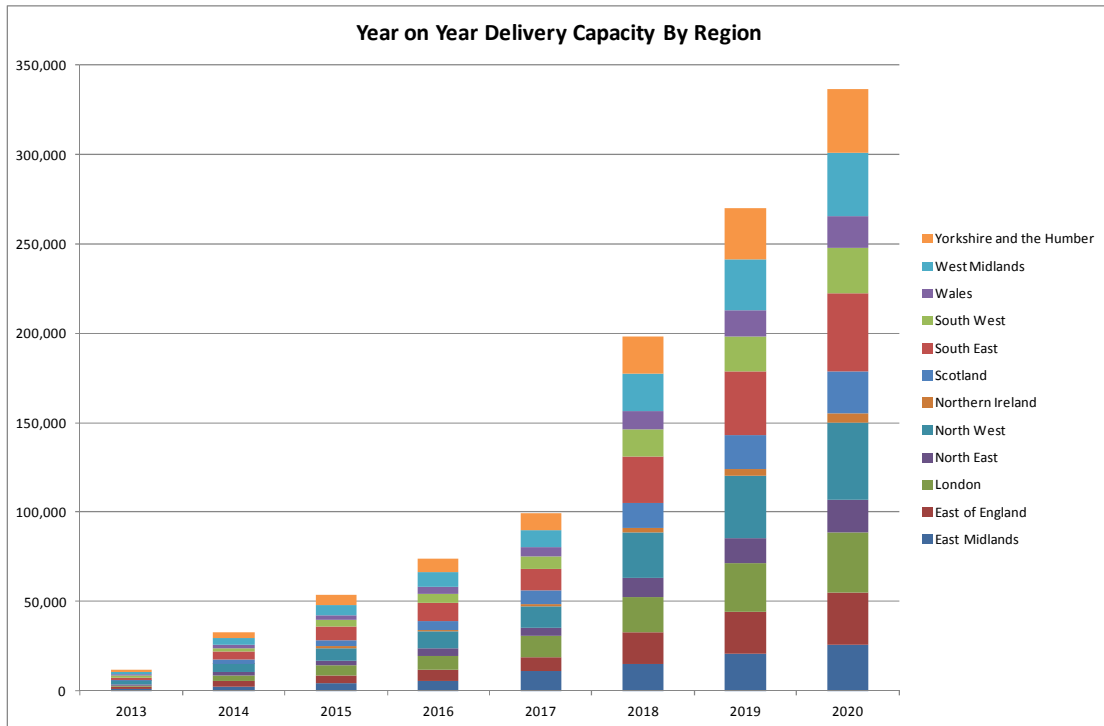


Chart 1 Year on year Retrofit Delivery Capacity.

4.4 TRANSFORMATION COSTS

After the transformation roadmap and gant were created, each transformation task was analysed, a resource and duration assigned and an approximation of the cost of carrying out the task was made. A table of the transformation activity, resource allocation and cost is provided in appendix 5. The total cost estimated is £54.04Million over a 3 year period.

NB. Management time =£800 per day. £4000 per week. £16000 per month

Transition Cost & Resource Summary.

Process Step	Resource Type	Estimated Cost
0. Development Project – 200 homes	Consortium	£4m
1. Client Engagement	Marketing, Technical, Management, IT.	£47.3m
2. Stage 1 survey	Management, IT, Marketing	£752k
3. Solution Design	Management & Legal	£405k
4. Proposal	Legal	£552k
5. Establish Agreement	Legal	£4k
6. Stage 2 Survey	Management & Technical	£55k
7. Sale	Legal	£154k
8. Material Provision	Management & Technical	£416k
9. Install	Management & Procurement	£176k
10. Through life	Management & Technical	£208k
11. Disposal	Management	£16k
	TOTAL	£54.04m

Client engagement is the predominant figure in the transformation costs above. This is split between a £20m budget for the cost of a 6 month advertising campaign and the £26m budget for setting up show homes in the 200 regions across the UK. Calculations and source of the figures for the media campaign above can be found in Appendix 8 and the cost breakdowns can be found in Appendix 5.

4.5 TRANSFORMATION ROADMAP SUMMARY.

It can be seen from the Gantt chart that to achieve the target capacity of 400,000 retrofits per year by 2020 the actions identified need to be complete by 2015. There will clearly be continuing action to refine and improve the delivery of retrofit and introduce new methods and materials, we consider that this will be an on-going process after the introduction of the poly-competent team.

5 Stakeholder Review

A key part of this project is engaging with the supply chain and key stakeholders and acquiring input and comment on the proposed solutions that are being generated. Key stakeholders have been identified for this project and engaged with; the objective is to get as many of them as possible to preview our findings and recommendations and assist with identifying obstacles and difficulties associated with the transformation roadmap and implementation of the ideas developed during the project.

5.1 INTRODUCTION

A document was compiled which summarises the outputs from Work Package 4 to date, this is attached here as appendix 2. Stakeholders were asked to comment on the hypotheses developed, what risks and hindrances could be foreseen and under what circumstances would their organisation consider taking part in the delivery of domestic whole house retrofit.

The complete list of Stakeholders identified is attached to this document as Appendix 1 and contains a list of their areas of interest, contact company name, and response received. The headline categories of stakeholder are listed below:

Customer	Marketing	Design	Specifier	Survey	Skills
CPD	Qualifications	Process	Equipment	Warranty	Insurance
Materials supply	Planning	Consolidation	Delivery	Through life support	Product manufacture
Finance	Legal	Industry bodies	Government	Franchisers	

5.2 STAKEHOLDER FEEDBACK

Full feedback can be found in appendix 3, a distilled summary follows.

- Customer demand

Almost all stakeholders saw customer awareness and generating demand as a key challenge to domestic retrofit. Payback is a central theme with the consensus being that a reasonable payback of retrofit measures must be achieved if demand is to materialise. "Margin Squeeze" was seen to be a danger to many when reducing the cost of retrofit was discussed rather than the opportunity to remove waste to reduce costs. One idea was that retrofit could be trigger point for replacing kitchens and bathrooms rather than the other way around.

- Existing supply chain capacity

Our figures for retrofit material capacity were considered to be out of date and very conservative by one respondent. The opinion was that insulation materials will not limit the ability to deliver and it will take less than one year to increase manufacturing capacity if required. In addition the material quantities for each house type were considered to be

One respondent stated that this has already been studied and thought to be highly attractive.

- Installation schedule

A variety of opinions were expressed from disagreeing that a bungalow can be retrofitted in 2 days, more like 7 days to agreeing that the stated timings should be possible with a mature process and Standard Work. Delays in material deliveries and availability of specific trades were stated as reasons why the schedules were not achievable. (*This is addressed with one delivery of materials and the poly-competent team*) In addition 2 coat render systems require curing times and are weather dependent

In summary, no stakeholder had considered the complete suite of changes that were presented in the stakeholder feedback document. Some supply side companies had considered a consortium approach but not re-designing supply from an end to end perspective, and delivery companies had considered some basic multi skilling but not challenging and reconfiguring the supply side. To be successful in realising a truly world class supply chain a systems approach is required, this inevitably will require a leading organisation or body and it is unclear who this will be.

6 Commercial Drivers

To achieve the levels of domestic housing retrofit required to achieve the UK's climate change objectives companies delivering retrofit must believe that there is sufficient commercial gain in the market in order to invest. It is arguable that since insulation has been heavily subsidised for a considerable time that the public do not see the value in it.

6.1 ESTABLISHING A MARKET

One of the biggest challenges we have had is defining what conditions are necessary for organisations to enter the retrofit market. The assumption has been that no government money will be available and that any subsidies available will be mainly targeted at those in social housing and / or in fuel poverty. For this reason we have attempted to design a delivery mechanism and supply chain that is best able to deliver at a cost low enough to pay back in a reasonable time, adds value to the property and attract consumers. There is no doubt that there is scepticism in the market and a belief that the only way a market will emerge is through subsidy and grants.

We believe that it is possible to create a retrofit delivery system where the cost to the consumer is close to paying back in a reasonable time and is attractive enough to win mass appeal. Organisations delivering subsidised retrofit programmes are mainly large companies delivering many house retrofits in clearly mapped out and defined programmes of work. In this way some economies of scale are realised but this does not benefit from the improvements that end to end supply chain design delivers.

transforming the industry through the elimination of waste and improving working practices cannot yet be visualised. High cost of finance is seen as an obstacle to the take up of retrofit and investment to enter the market as a retrofit provider. Green deal finance is predicted to be offered at 6.5%PA where secured finance is currently available for around 3 – 3.5% PA

A second obstacle is resistance to train people to work across trade boundaries, for the Poly-Competent team to viable a new set of competences needs to be developed along with training courses, qualifications etc. Availability of suitable courses and the benefits (both financially and socially) could overcome this over time.

The lack of an established market is probably the biggest obstacle to establishing a new highly effective supply chain; established businesses are loath to invest in an uncertain market. Certainty of payment from individual householders and long term liability of installed measures are seen as hindrances to companies entering the market

Most of the scepticism about transforming the current supply chain exists because the construction sector is extremely traditional and conservative. Education and illustration by example are the suggested solutions to the problem. A robust well executed pilot project deployed at sufficient scale would prove the installation mechanism and supply chain. A pilot of around 100 houses is thought to be sufficient, this should include several iterations where lessons learned can be embodied and standardised across delivery teams before proceeding.

7.2 RISKS

We have confidence that the poly-competent approach to retrofit will work, the risk is that other changes required to training and accreditation, insurance and warranties will not keep pace and that no one business entity will step forward and lead the transformation of the supply chain

In addition there is the risk that poor safety and quality as the industry is growing will cause customers to shy away from retrofit

These risks may also be mitigated through a robust pilot project. This would establish the specification for whole house retrofit and the quality guidelines and measures that are needed to maximise success. Any pilot would need to include pre and post energy performance monitoring to measure the effectiveness of measures installed, this would need to include a number of different house types and probably different regions in the UK.

7.3 GEOGRAPHICAL CONSIDERATIONS

There are some special considerations to be made in different regions across the UK which affect the retrofit solutions deemed to be appropriate for individual properties. Materials used in retrofit can be used in any location but in exposed areas greater levels of insulation of the building envelope could be required. In areas such as Northern Ireland material distribution systems are not well developed, these are currently served by relatively small independent merchants. In addition the gas distribution grid is undergoing expansion and

Insulation		warm / dry storage or extra room.
Primary Heat	Process	Ensure heating system is not over or incorrectly specified for maximum efficiency.
Primary Heat	Product	Design heating systems with inbuilt cut Carbon Monoxide detection and cut off.
Windows & Doors	Product	Continue to innovate windows and doors to resemble natural materials.
Windows & Doors	Product & Process.	Develop product and process to enable windows to be fitted without disruption or working at height.
Windows & Doors	Process.	Improve and standardise the town planning, building control and regulation processes associated with windows and doors.
Floors	Product	Innovate insulating products that can be overlaid on to existing floor coverings to reduce disruption and labour.
Floors	Product & Process	Evolve a foam based product installed using "key hole" methods to reduce disruption and labour.

8 Conclusions and Next Steps

In this document we have summarised the thinking and process leading to the development of the mass retrofit plans and the transformation roadmap; there is clearly scope to improve on current offerings from the construction sector and a whole house approach promises to deliver the best possible thermal performance balanced against disruption and cost. It has been challenging to obtain all of the information needed to accurately assess manufacturing capacity of retrofit products and the cost of manufacture and distribution; further collaborative work is needed to accurately project how costs will erode as the volume of standardised retrofit products increases.

The logical next step is to trial and prove the small poly-competent team model and develop standard processes for survey and installation. There are challenges to overcome in the development of training and qualification systems together with accreditation of systems and products. Development in all of these areas could be overcome through a robust retrofit pilot carried out at scale, on a number of different property archetypes. The size of pilot needed to prove the route is thought to be at least 100 homes using a number of delivery teams to fully standardise survey and installation methods. The pilot project should deliver retrofit to a number of different house archetypes and allow for different iterations of delivery to permit lessons learned to be embodied and new standardised methods to be established.

Development of the material and products supply chain is key to reducing waste, inefficiency and cost. A forward looking organisation or consortium of manufacturers is considered to be two alternative routes to achieving this. Product delivery to site is thought to require special purpose containers to deliver all materials required for retrofit in one drop and provide a simple method to segregate and remove waste from site.

The concept of products and computer applications to mechanise the collection of data and energy modelling of homes during the survey process has been developed throughout this project. The decision trees and standard solutions that have been developed as part of work package 3 are valuable input to the product development of such devices are the housing archetypes and energy modelling algorithms developed in work packages 1 and 2. Commercial exploitation of the above will require licensing of the intellectual property to permit their use. The identification of an organisation

Appendices.

Appendix 1 Stakeholder matrix



Appendix 1 -
Stakeholder List.xls

Appendix 2 Stakeholder review document



Appendix 2 -
Stakeholder Documer

Appendix 3 Stakeholder feedback summary



Appendix 3 -
Stakeholder Feedback

Appendix 4. SWOT and Pestle Analyses



Appendix 4a - PESTL
Analysis.doc



Appendix 4b - SWOT
Analysis.doc

Appendix 5 Transformation Roadmap Costs



Appendix 5 -
Transformation Road

Appendix 6 Supply chain cost reductions.



Appendix 6 - Cost
Reduction.doc

Appendix 7



Appendix 7 - 100
Homes Project.doc

Appendix 8



Appendix 8 - Media
Cost.xls