D 4.1 Implementation of models of coordination

Black Country Housing Group (UK)

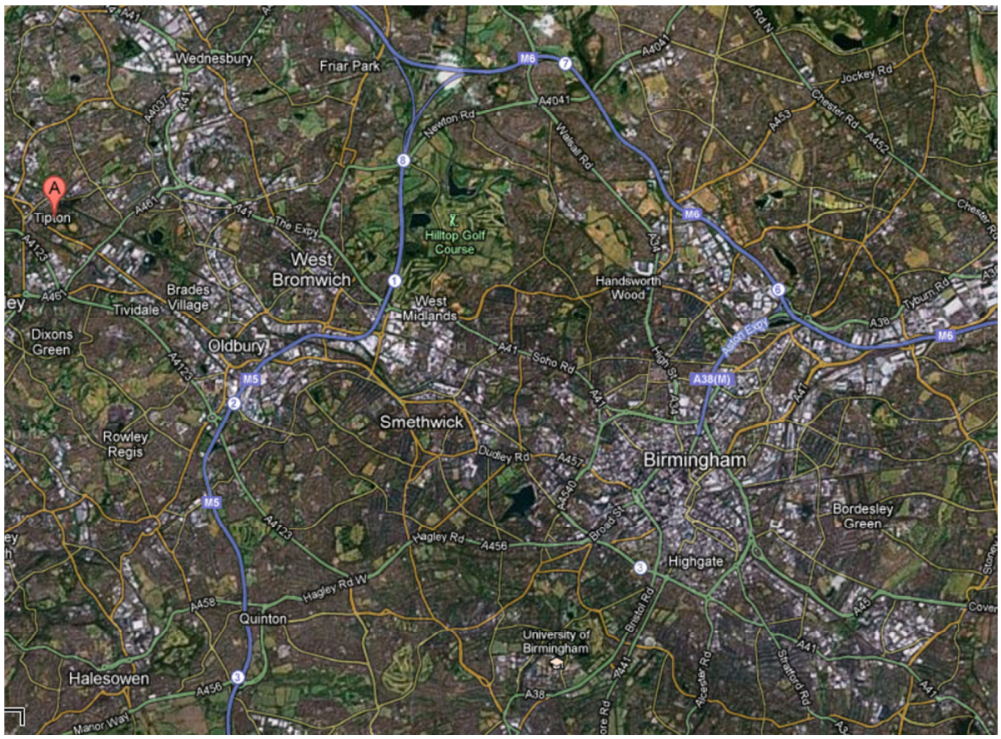
Draft, May 2012

PART I PILOT PROJECT DESCRIPTION

1. Description of the pilot development

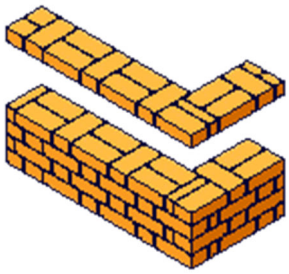
The Moat Farm Estate in Princes End, (Post code DY4 0XH, North Road, East Road, West Road and South Road) is in the township of Tipton in the West Midlands region of England. It is about 15km/10 miles to the west of the city of Birmingham. The project will extend to various other addresses across the region.

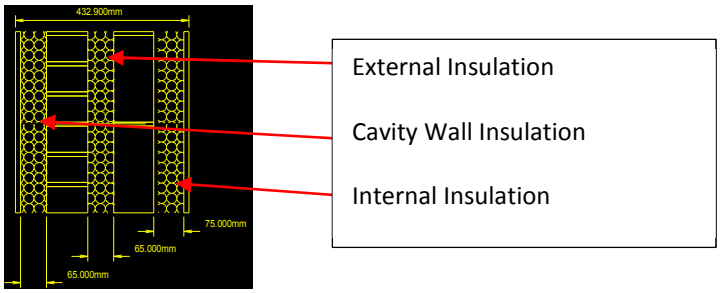
Moat Farm Energy Renovation	
Address	Tipton, West Midlands
Year of construction	1919 - 1945
Type of building	Terraced houses
Number of dwellings	38
Tenure	Social Rented



Construction characteristics	Short terraced blocks of between 3 and 5 houses with solid-walled construction; all with three bedrooms on two floor-levels and with approximately 72m^2 total floor area. Roofs are sloping and of timber structure with a ceramic tile or slate finish. There are solid concrete floors. Window frames are uPVC and most are double glazed with a 16mm air gap and aluminium spacer bar.
HVAC system	The back-boilers and gas fires are replaced by a wall-hung high efficiency condensing and modulating combination boiler. That will provide mains-pressure hot water directly to taps. Time and temperature control.
Energy performance before renovation	Energy consumption before renovation 461kWh/m^{2}year (1990 levels)
Expected performance after renovation	Expected energy consumption after renovation 150kWh/m^{2}year

Almost all of BCHG's dwellings with cavity-walls have already been insulated by filling the cavity. Where houses have not been insulated there will either be a technical problem that prevents treatment or a property might have been missed in a past insulation programme. It is much more expensive and technically more difficult to treat solid walls, which is why we have not treated them before.





Solid Wall Cavity Wall

This programme is focussed on treating dwellings with solid walls that would not otherwise have been treatable; because of the relatively high cost of this measure. In the UK, a typical solid wall looses heat at a rate (U-value) of 2.1W/m^{2}K.

2. Description of the refurbishment project

Building envelope specifications

110mm of thermal insulation and render will reduce the rate of heat-loss to just 0.35W/m^{2}K; comparable to the walls of new dwellings built in the UK as recently as 2005.

The minimum thickness of loft insulation is now 300mm because we have repeatedly topped-up loft insulation. We now apply either 100mm or 200mm insulation across whatever thickness is already in place, to always surpass the minimum requirement of 270mm. The reduced rate of heat loss should be approximately 0.16W/m^{2}K.

It is anticipated that air leakage will still be significant. That rate of air change will remove a significant amount of moisture vapour that might otherwise cause problems of damp and mould growth. The application of solid wall insulation, externally, allied to the installation for double-glazed windows which incorporate high standards of draught-proofing will halve the rate of heat-loss through uncontrolled ventilation.

Heating specifications

The back-boilers and gas fires are replaced by a wall-hung high efficiency condensing and modulating combination boiler so the domestic hot water cylinders can be removed, releasing blocked storage space.

. A programmer provides the option to have the heating come on and switch off at three adjustable times during each day. There is a wall thermostat that governs the boiler, preventing firing if the temperature is acceptable – this is usually located in the circulation space, e.g. hall. In other spaces each radiator is fitted with a thermostatic radiator valve.

Renewable Energy Sources specifications

There are no plans to include solar water heating or solar photovoltaic panels as part of this project. These technologies are not practical because most of the dwellings face east-west. We have a separate project investigating how to fund solar installations in the small number of dwellings where the roofs face approximately south.

Where we install solar water heating systems and combination boilers, the solar system usually includes a small hot water storage vessel in the loft that transfers stored heat to mains cold water that is then supplied, at a higher temperature, to the boiler; reducing the fuel burned by the boiler to heat the water for the taps.

Energy demand objectives

In comparison with an un-insulated dwelling, i.e. the 1990 standard, the dwellings in this programme should save approximately 70% of the fuel used to combat fabric and ventilation heat-loss.

Non-technical objectives (energy advice and support for residents, others)

BCHG operates an energy services company called Energyextra. This organisation provides the highest quality of energy advice to every member. All new tenants are offered in-home face-to-face energy advice that is specific to the dwelling and their circumstances. Existing tenants have access to the same advice at any time. Our advisers also provide an advocacy role for tenants that are having difficulty understanding their supply contract or how to pay for the services they get from their fuel supplier.

The organisation provides a range of other information and/or signposting services to help tenants with other problems, including general money advice, housing related advice, training and employment advice, etc.

Energy demand measurement method (simulation, monitoring)

In the UK, we use a Government-derived Standard Assessment Procedure (SAP) to calculate the energy rating of a dwelling. The SAP calculation excludes the emissions that come from electrical appliances. The SAP calculation only considers fuel used for space and water heating, the electricity used to operate the heating system, electrically powered mechanical ventilation and artificial internal lighting. The SAP results are used to produce an Energy Performance Certificate (EPC). All new-build properties must be issued with an EPC on completion. All existing dwellings must have a valid EPC at the time of a new letting or re-sale. EPCs are valid for 10 years at present in the UK.

Social landlords are allowed to use the data from one dwelling to calculate the SAP rating and issue an EPC for another dwelling where the two dwellings are sufficiently similar to enable an accurate rating to be raised for a house that has not been measured or surveyed. This is possible because many houses were built at the same time and to the same design and have been maintained identically. Small variations in specification, that are significant for the SAP rating and therefore relevant to the EPC, such as replacement boilers that might be more efficient, are recorded by social landlords and this specific information can be used to up-date an existing data-set used for a SAP rating; ensuring the greatest possible accuracy for least effort and therefore leastcost. This process is known as “cloning”; the verified and accurate data from one dwelling is “cloned” to provide all or most of the data for another address. Address-specific data is included where known.

BCHG has SAP ratings for all of its dwellings and EPCs for approximately 25% of its existing dwellings have been issued since they became required in 2008.

BCHG has used advanced computer thermal simulation systems extensively in developing a detailed understanding of heat loss, heat gain and air movement in domestic and other buildings. We are therefore able to interpret the results of simpler SAP calculation data to derive the likely impacts of different fuel saving and alternative energy technologies.

We have undertaken extensive detailed monitoring of fuel use and thermal comfort in many new and existing buildings over several decades and we therefore know how to interpret data from much less sophisticated monitoring of internal and external temperatures and internal relative humidity, along with gross fuel consumption data; to analyse the impact of specific packages of fuel saving measures and alternative energy technologies.

Project budget and part of the budget dedicated to energy efficiency measures

Renovation investment per dwelling was between £9,200 and £16,300 depending on the type of construction, the size of the dwelling being treated and the specific measures required – not all dwellings need all measures.
The percentage of the renovation investment per dwelling applied to energy saving elements was between 61% and 78%. The higher value relates to the solid wall dwellings receiving EWI, where that measure is disproportionately expensive.
Average renovation investment of previous projects per dwelling was £9200, indicating that the new programme is an improvement programme rather than merely a maintenance programme.

Whole renovation investment in €		Energy renovation investment in €		% of renovation investment dedicated to energy saving measures
Total	Per dwelling	Total	Per dwelling	%
660000	11040 - 19560	480000	660 - 10080	61 -78

Name of the energy saving measure	Saving		Necessary investment	Repayment period	Reduced CO_2 emissions
	kWh/year	€/year	€	years	t/year
Insulation external walls	7004	290	6600	22.7	1.404
Roof insulation	835	34	600	13.8	0.167
Boiler	7840	325	2880	8.8	1572
Total:	15679	649	10080	15.5	3.143

Financing scheme

BCHG is funding boiler replacement, heating control upgrade and loft insulation top-ups from its planned maintenance budgets which are funded from rent receipts. We have a rolling programme of installations and, for this project; we have focussed work in grant-eligible locations. This funding is used as match funding for externally applied wall insulation and render that is funded by Community Energy Saving Programme (CESP) grants.

Where un-filled cavities are found in neighbouring properties, these are treated; with all of the cost funded by Carbon Emission Reduction Target (CERT). Where other fuel-saving measures are identified in neighbouring properties, these are treated; with the cost funded by either CERT or CESP, as appropriate.

There is a subsidy available from gas and electricity suppliers that are regulated by the UK Government. Regulated fuel suppliers are obliged to collect a carbon tax from every metered domestic fuel supply. One tax payment is collected from the 8 million UK households that only have an electricity supply whilst two tax payments are collected from the 18 million UK households that have both mains-gas and mains-electricity supplies. The tax does not apply to any other fuel supply arrangements. This tax is an energy company obligation and has to be redistributed to tax payers for fuel saving measures. The redistribution of this tax, in the form of grants from fuel suppliers, is governed by a set of rules developed by the UK Government's appointed regulator of gas and electricity supplies, "Ofgem". These rules are very complex and make it particularly difficult for social landlords to make plans on a stock-wide basis. There are two grants: The Carbon Emission Reduction Target (CERT) and the Community Energy Saving Programme (CESP). Both grants are being replaced by a new energy company obligation (ECO) on the 1st January 2013.

The regulation of these grants is based on a target for the amount of carbon saved and not the amount of money spent. The target has a deadline. Failure to meet the target brings a huge penalty to the regulated fuel supplier – a fine in the sum of 10% of Global turnover! A fine of this magnitude would bankrupt the UK regulated fuel supply companies; they therefore need to meet their targets. It has been up to the regulated fuel supply companies to find the cheapest way to meet the carbon-saving target. Lack of controls allowed abuse of this light-touch regulation and some changes have been made to the regulations to improve the scheme. As the target deadline approaches and regulated fuel supply companies find themselves falling short of their carbon targets the companies are offering more money to secure carbon savings, i.e. they will pay more grant to buy the carbon savings.

CERT

The CERT grant applies to single dwellings and can apply to single measures. It is limited to measures that are especially cost effective, e.g. loft insulation, cavity wall insulation, draught proofing, heating controls, etc. These measures achieve carbon savings at a low cost per kg. More expensive measures can be off-set by lower cost measures per house and within a package but an overall average cost per kg CO_2 saved must be achieved and this cost is so low that it limits what can be done. In addition; in most cases, the fuel suppliers have expected that the dwelling owner, including social landlords, would make a contribution towards the cost, often amounting to 50%. Social landlords do not all have sufficient access to funds to make this contribution. In the last few months of 2011 some regulated fuel companies were offering 100% grants in order to meet their carbon-saving targets.

CESP

The CESP grant incentivises landlords to install multiple measures (i.e. a whole-house approach) and to concentrate their activity geographically in order to address problems of deprivation in certain parts of the UK and to maximise delivery efficiency. Unfortunately the geographies chosen ignored the distribution of dwellings amongst the landlords that could manage area-wide projects. Our SHELTER programme is operating on an estate of dwellings that were all built to the same designs; between 1925 and 1939. We own 117 out of the 350 dwellings on the estate. The local authority owns another third and the final third is in private ownership. We and the private home owners bought our dwellings from the local authority between 1990 and 2005. Whilst all these dwellings are within geographical boundaries that are targeted by the CESP funds, half of the dwellings are within in one geographical boundary and the remainder are in another geographical boundary.

SHELTER pilot

On the pilot estate we had a programme to replace obsolete kitchen-units (floor-standing cupboards and drawer units and wall-hung cupboard and shelving units) and to update the electrical and water services in the kitchen. The heating systems were obsolete; being low (65%) efficiency “back-boilers” (i.e. boilers that form part of and are co-located but behind a decorative gas-fire) in living rooms. It makes sense, when we are refitting the kitchen to take the opportunity to remove the inefficient back-boilers and replace them with modern, high efficiency boilers in-line with the new kitchen units; as part of a refurbishment programme.

We took the opportunity to upgrade the heating system controls and replace old radiators if they were no longer in good condition and to increase the quantity of insulation in the loft. We ensured that draughts were sealed between the house and the loft and that the loft was well ventilated (protecting the roof timbers from condensation).

Our replacement of the boilers and controls and the additional loft insulation measures provide us with enough match funding (carbon savings) to lever full-funding for externally applied insulation of solid walls. Normally in the UK insulating solid walls is not cost effective, even though it transforms the comfort and running cost of the treated dwelling. This is because the UK housing stock comprises a large number of individual dwellings that are quite small but that have a complex plan form and wall detailing, making the cost of applying solid wall insulation very high in comparison with the fuel bill savings that it achieves.

PART II IMPLEMENTATION OF THE ALTERNATIVES TO THE CURRENT COORDINATION MODEL

3. Reminder of main conclusions from TU Delft study and targeted problems that the pilot project will try to overcome.

Asset managers don't have access to professionals that are able to lead the delivery of energy renovation in reasonable time and with reasonable cost. The main cause is the lack of models of cooperation between professionals, perhaps because there is a lack of common culture shared by specifiers, builders and their clients (social landlords).

In most European countries (except in Austria and Germany), there is no established supply-chain for energy renovation. Applying "supply-chain" logic to energy renovation would facilitate economies of scale.

This project intends to establish a dialogue between delivery agents and professional organisations. This dialogue is intended to address the needs of deliver agents' operational issues and support the development of a new market for cost effective and deep energy-saving retrofit.

One step in the process concerns the cooperation between professionals, at the micro level, by application of innovative models of collaboration.

A second step concerns the up- and down-stream impacts, from the operations on the ground to the coordination of the work of professional organisations. This coordination is intended to support the structuring of an economical sector for energy renovation; through dissemination by European federations and is organised to deliver a real economical "niche" for future energy renovation.

The key actions identified by the SHELTER project review of past experience of energy renovation projects were:

- Introduce energy efficiency as one of the main parameters in the energy renovation strategy of SHOs.
- Define standard design by dwelling typology for SHOS that use planned maintenance as renovation strategy.
- Involve construction and maintenance companies during the design phase in energy renovation projects.
- Define lists of legal and recommended award criteria for energy renovation projects.
- Make use of performance-based specifications.
- Define separate contracts for specific works in energy renovation projects.
- Implement professional certificates at European level.
- Implement actions that make a direct link for the tenants between their behaviour and the energy bill.

The following recommendations were made to BCHG following academic assessment of our past approaches to energy renovation (Work-package 3 of the SHELTER Project):

- Make energy renovation a strategic priority
- Include a design element
- Framework partnering

The lessons learned from the pilot phase of the project (Work-package 4) must include the answer to the question: Management - In the opinion of the project manager, have the innovations applied, caused or saved troubles during the renovation process? If so, which ones?

4. Analysis of the chosen alternatives

Description of the alternative: objective (gains expected), phases affected, actors involved. Tackled obstacle

In order to achieve the objectives of: economies of scale and elimination of higher costs due to lack of understanding between the actors involved in energy renovation projects, BCHG identified the need to employ framework agreements with a range of relevant experts.
The experts brought together in this project are:

- BCHG maintenance team
- BCHG in-house environmental consultants "e^2S"
- BCHG in-house energy services club – "Energyextra"
- nPower, one of the 6 big suppliers of gas and electricity to UK's households.
- Effective Energy limited – a specialist energy efficiency programme brokerage
- Mark Group plc – a major UK insulation installation company
- Wates Livingspace – a major UK construction contractor
- Halesowen Gas Ltd – certified gas system installers
- Axis Design Architects LLP
- Paul Mantle Partnership – Employers' Agents

This project aimed to deliver 70% fuel and carbon-emissions saving (in comparison with 1990 levels) and attract £500,000 of additional funding to the organisation enabling the treatment of 106 dwellings that would otherwise not be treatable.

The critical work on the project affected the procurement phase, including data collection, specification development, team assembly (identification/tendering/appointment), writing of new contracts and project planning. It also included, unusually, a design assessment and local authority approvals element, because the appearance of the treated buildings would be altered quite significantly.

This group of experts has addressed several significant problems.

1. The first problem to be addressed was collation of property data. It has not been common practice to collect the data needed for designing energy renovation projects, in the UK. Some of the data is available but only a very small part.
   The way renovation has been approached in UK social housing has caused single-measure programmes to be undertaken. There are three reasons why this has happened:
   - the standards that are imposed by regulators demand this; in particular the Decent Homes Standard and "component accounting" practices
   - each component in a property has a different service life
   - some renovation is not practical when a property is occupied
2. It is difficult to develop specifications that satisfy complex third-party funding rules. Solving these problems demands new knowledge and therefore research and development.

3. Using existing budgets to match newly available funding demands the co-ordination of building trades delivering a range of measures where a degree of interdependency exists, i.e. the electrician and plumber have to finish their first-fix work before the plaster can be repaired.
4. In a multi-disciplinary project; where no one company possess all the qualification needed to undertake all of the work, the nature of contracts is complicated. The contracts have to protect everyone from the risk of not being able to identify who is responsibility for a given problem.
5. This project is about insulating solid-walled buildings. Our preferred solution is to add the insulation externally, which changes the appearance and that means that we have to obtain permission from the local authority. In the UK this can be very difficult and costly.

Description of its implementation: description of actions taken, means of implementation

This project was focussed on insulating solid-walled dwellings; utilising grant-funding. Identification of a target site was relatively straight-forward. As we had undertaken a lot of fuel saving work on our houses already, installing those measures that were affordable and funded by grants, we knew which houses were still in need of major fuel saving measures. These were houses with solid walls. We only have one estate where we have any concentration of solid walled buildings and that is called Moat Farm.

We wanted to work at the highest concentration level because that will generate some economies of scale and because we wanted to offer a reasonable sized job to contractors to make it attractive to work with us on a pilot project. Initially we could only get funding for 6 dwellings to be treated – but to a very ambitious performance standard of 80% CO2 savings c.f. 1990 levels and for all heat and power services. The European Regional Development Funding, originally sought, became unworkable and we had to reinvestigate funding. We were fortunate that a change to funding rules for the CESP grant (see above) arrived at that time. The change meant that we could treat many more houses, but only to a lower fuel saving standard. Even so we aim to achieve 70% fuel savings c.f. 1990 levels for space heating, water heating, internal lighting, ventilation and the power needed

to run the heating system. The total carbon savings will be considerably greater (3,287.81 toe lifetime savings c.f. 186.10toe lifetime savings) as a result.

The failure of the ERDF grant caused us to research alternatives. There are a limited number of sources of funding for fuel saving measures. Almost all capital-funding grants, which are specific to fuel saving, are from fuel suppliers or their regulator. Other funding sources are manufacturing- and service-sector oriented and are intended to stimulate product and or market development, often with job and/or enterprise creating outputs attached. Whilst these can be harnessed, their special rules demand time-consuming applications; usually over extended periods. We did not have time to apply for non-energy-related grants and therefore had to ensure that we could satisfy the requirements of the fuel suppliers in order to access their funding.

Implication of alternative CESP funding on specification and procurement

The change to CESP funding for the project brought with it specification rules that had to be met. Most of these rules are good practice that we already employ but we had to review contracts.

The CESP funding rules had a profound effect on procurement. Normally, an improvement programme would be developed with a specification that could be tendered with prospective contractors. In this case we could not tender the energy saving work. Instead we researched the offers available from the fuel suppliers. There were three routes to grant funds available to us. We could apply directly to the fuel suppliers, we could apply to a broker or we could apply to a contractor appointed by the fuel supplier. Our research considered the same factors that we would have included in a formal tender to purchase. In particular we investigated the reliability of the contractor and the value of grant that we could obtain.

We spoke directly to the three fuel suppliers that responded to our enquiry (the enquiry went to all six suppliers). We interviewed two brokers and three contractors. We chose to work with a broker because they were able to offer the most reliable contractor and the most funding.

Whilst not a conventional procurement process, the result was what we would have wanted to achieve if we had been able to tender works. One justification for researching the best offer available rather than tendering works (which was not an option) is that, in this case, we were not purchasing anything because we are receiving a grant for 100% of the cost of the solid wall insulation works.

The remaining works (boiler replacement and loft insulation, kitchen and bathroom upgrades and re-wiring) were already in progress and had been procured by competitive tender in the normal manner, prior to their introduction to this project.

Bringing together single-measure programmes

One of the most complicated elements of this project has therefore been to bring together several single-measure programmes. Each measure demands its own set of skills and was procured separately. Designing a programme of works (that was affordable, maximised budget value, addressed needs and met the competing rules of multiple funders and providers) was much more difficult. If we had owned large numbers of houses on one estate we could have approached our planned maintenance in a different way, but we don't, so normally it would be most efficient to procure single-measure programmes. The complexity here is rooted in two issues:

- the interface between different trades, e.g. heating engineer and kitchen-unit installer
- the sequence of different elements of work, e.g. electrical first fix preceding plastering and second fix following plastering

As with any programme of works to our dwellings we consult with tenants who have the right to refuse works, unless the work is for safety reasons. The main cause of refusal is disruption, especially where our work means that the tenant will have to redecorate. We do offer vouchers for

redecorating which most tenants accept, normally decorating to their taste. If they do not decorate we will have to redecorate when the tenant moves out and before a new tenant moves in; at some time in the future. In this project some refusals were received where tenants had installed their own kitchen units and they didn't want them altering to accommodate the new boiler. In those cases we have been able to install the boiler in an under-stairs cupboard; by agreement with the tenant.

Survey data

Having established the location for the project by default, we initially assumed that we knew the form of external wall construction. We believed that, due to the age of the dwellings, they all had solid walls. Several surveys had been undertaken at different times in the past and on investigation there was some discrepancy. Some houses had records indicating that an insulation contractor had filled cavities whilst neighbouring properties had not been treated. Eventually a 100% repeat survey was undertaken and we discovered that the builder had mixed the form of wall construction across the estate; on an apparently random basis. Initially we thought we would be treating 120 dwellings. In fact we only own 38 solid walled dwellings at Moat Farm. There are another 38 solid walled dwellings that we do not own. The solid walled dwellings are grouped in blocks of three four or five dwellings but those blocks are surrounded by blocks of cavity-walled dwellings. Whilst surveying the wall constructions we took the opportunity to review loft insulation and boiler condition. The thickness of loft insulation present varied considerably. None had less than 100mm. The condition of and details for all the boilers agreed with our stock database. In addition to our survey the contractor installing the external wall insulation undertook a 100% survey to identify what enabling works would be required. The contractor also undertook sample pull-out tests to make sure that the external wall insulation we intended to apply could be fixed safely to the buildings.

Installation of insulation on solid walls requires a planning permission

The key fuel saving feature of this project was the installation of insulation on solid walls. The most cost effective approach for these dwellings is to apply the insulation externally. That approach changes the appearance of the buildings, which only have partial render on the street façade. Consequently we have been obliged to obtain planning permission for a change of appearance. The vast majority of mass-housing built in the UK has little or no architectural value. The UK's "right-to-buy" policy, that has offered social housing for sale to its occupants since 1979, combined with lax application of planning controls means that the existing appearance has almost no consistency and almost any change could not make it any worse. Never the less, this project provides an opportunity to improve the appearance and we took that opportunity by employing an architect to develop pallets of colours and textures and detail treatments that effect an improvement. The "pallet" is offered to tenants, along with a set of governing rules such that there is a degree of choice but that the choices made compliment each other rather than conflicting with each other. This pallet and the choices made are presented to the local authority Planning Department in discharging conditions set by the planning authority when it gives permission to alter the appearance of the buildings. In theory one planning application would have been required for each dwelling; at a cost of £200 including the VAT. In practice we were able to make block applications on a street-by-street basis. Drawings were prepared of the street elevations; illustrating the colours and textures to be implemented. This reduced the total cost. This is a time consuming and costly job that could be avoided if Planning Authorities would, in the published area plans, set out locations where, subject to complying with their published guidance on colours and textures, automatic approval would apply at little or no cost. We have published this suggestion in several UK mediums and are pressing the UK Government and Planning Authorities for a response and action to implement this alongside the launch of the Green Deal.

Project steps

The programme commenced with removal of obsolete heating systems and installation of the new system including upgraded controls for time and temperature. The heating contractor also

undertook the top-up of loft insulation and draught proofing of the loft hatch. Where necessary, a specialist supplier replaced doors and windows. The house was rewired, new kitchens and bathrooms were installed and internal plaster was then repaired. In a small number of cases we fill any empty cavities.

Our own inspectors oversee work and sign-off quality or require corrections where mistakes have been made. The heating system and loft insulation measures were logged and reported to the broker and the fuel supplier who inspected a sample and approved them as being compliant with the grant conditions. Once approved the broker was able to establish the level of funding generated by these measures, in combination with solid wall insulation measures yet to be installed. This ensured that the total carbon value of the works would cover the cost of the wall insulation and triggered the wall insulation works.

The work was inspected and signed off by our in-house surveyors and the tenant and the scaffold was struck. The work was logged and reported to the broker and fuel supplier. A sample of jobs was audited by the fuel supplier, approved and grant was paid to the broker who paid the EWI contractor on our behalf.

The scheme was conceived such that a surplus was generated. That surplus is to be redistributed to purchase additional fuel saving measures elsewhere in our stock.

Quantitative and qualitative achievements, impact of the alternative on the refurbishment project: impact on project costs, impact on project duration, impact on the communication flow between actors, impact on building design and technical decisions, impact on final energy performance of the buildings, etc.

Using existing planned maintenance programmes and budgets to lever grant funding for additional carbon-saving measures is much more complicated than just planning and spending the organisations normal budgets. The additional effort has a cost; however, the additional funding received far outweighs the administrative cost.

In this case we have doubled the effort to organise a particular planned maintenance programme. Budgets for single-measure programmes, such as a stock-wide boiler or kitchen replacement programme are normally allocated globally. It is therefore difficult to distribute internal costs to specific sites. This SHELTER pilot project, to increase the carbon-saving by attracting additional funding for solid-wall insulation, was attached to an existing planned maintenance programme. Not all dwellings in the planned maintenance programme were included in the SHELTER pilot because not all dwellings in the planned maintenance programme had solid walls or were located in grant-eligible geographies.

The administrative effort required, incorporating the SHELTER pilot work within the pre-existing planned maintenance budget and programme, doubled the normal cost, however, that additional work has levered £500,000 of capital grant funding that was not otherwise available to the group. It is fair to say that, at some time in the future we would have had to plan and implement a solid wall insulation programme and that would have had to be administered at a standard administration cost. What we have therefore done is bring forward that administration cost, in order to secure two things: 1) much earlier implementation and therefore earlier carbon savings and 2) funding that might not otherwise have been available. Other costs that were incurred, unusually, were the development and administration of the contracts (which would not usually be required on a single-measure programme) and the special design work needed to secure planning permission that is only

required because of the change of external appearance that results from installing insulation on the outside of the walls.

Previous attempts to secure CESP funding had only realised very small grant offers, worth less than the administrative cost of securing them in the first place and at a very low intervention rate (20% c.f. 100% for the SHELTER pilot). Consequently we had not pursued those earlier offers. The difference is the scale of the pilot and the employment of the broker to redouble the effect of economies of scale.

The co-ordination of complex contracts created an environment in which collaboration was the natural method of operation – for the mutual benefit of all parties. The result of that co-ordination was timely delivery and lower levels of consequential damage. Both of these improvements were the result of interdisciplinary dialogue and a much greater focus, on the dwelling as a whole rather than one a single measure. Individual specialist tradespeople were aware of the preceding and following trades' activities, which would not normally be present. It would appear that this awareness encouraged a more co-operative approach. For example, rather than leave a job in such a condition that additional work was required by a follow-on trade, the operative undertaking the first job identified how best to hand-over their work to the following trade.

Another benefit of this amount of co-ordination was the reduction in what, in the UK, is called "out-of-sequence-working", i.e. finishes being applied before services were installed beneath them, causing the services installer to damage a new finish and demanding refinishing at extra financial and time costs.

Analysis of barriers encountered

The nature of funding rules and social housing regulation in the UK is such that smaller social landlords with widely geographically dispersed dwellings find single-measure planned maintenance programmes more efficient than multi-measure programmes. This is because there will be no geographical economies of scale and because many measures have service lives that are very different. For example, the planned service life of modern boilers is between 10 and 15 years. That is to say that we expect to replace a boiler, on average, once every 10-15 years. At the same time the planned service life of a double-glazing unit is 20-30years. It does not, therefore, make sense to replace/up-grade double-glazing units every time a boiler needs to be replaced. In practice some boilers will fail early, whilst others will last much longer than expected. This is because of a combination of build quality and use. As a result, a whole-house planned maintenance programme that include boiler replacement could easily replace a boiler that was only a two years old. To avoid such illogical waste, planned maintenance programmes must have a degree of flexibility. Only where a dwelling has remained un-improved beyond the service life of the majority of its components and where, probably, the condition is so bad that the property cannot be let and is therefore empty, is it practical to have a whole-house planned maintenance programme.

In some circumstances it is possible to undertake a range of measures in a planned maintenance programme. When that happens, it is likely that several specialist contractors will be required to work together. Unless their work is carefully planned and contractual terms demand collaboration,

there could be conflicts between trades, causing costly rework. The most likely problems will be trades finishing their work out-of-sequence, for example, an electrician or plumber damages new plasterwork to install a component, which should have been programmed for installation prior to the plastering.

Where social landlords have widely geographically dispersed dwellings it is not possible to achieve economies of scale on a geographical basis. In the majority of cases, UK social housing was built in estates, where a significant number of dwellings of the same design were built at the same time. The break-up of these monolithic estates began in 1979, when the Thatcher government introduced the right to buy. Some individual dwellings were purchased by their occupants. More recently, strategic sale or transfer of larger numbers of dwellings, within a monolithic estate, has taken place. The result of these changes of ownership is reduction in the potential to achieve economies of scale in refurbishment programmes. In order to overcome that obstacle to cost efficiency actors will have to work to engage a multitude of owners in a programme. This has caused a problem. As property has been transferred, new owners have made different repair, maintenance and improvement decisions at different times. This makes it more difficult to prepare cost effective specifications and means that a social landlord that wants to construct an estate-wide programme that includes property owned by other people will have to do much more data collection that they would if they owned all of the property. Smaller social landlords are in a position to assist larger organisations by providing the data needed to develop cost effective specifications.

There will be circumstances where no estate-wide programme can be developed. A social landlord might own six houses in a rural location. Under these circumstances the only economies of scale that might be achieved are in the purchase of a larger number of the same component to be used in as many dwellings as possible, even though they are dispersed geographically. A framework contract should generate some economies of scale, through continuity of business for the contractors and greater flexibility to plan work, even though there will be a higher cost to travel to dispersed dwellings than there would be for a large estate.

In the UK there are laws governing the appearance of dwellings. There are some changes to appearance that are permitted and that do not therefore require permission but insulating the external surface of a building is not normally one of them. Even where a dwelling was already finished with render and there is no intention to change the colour or texture, after thermal insulation has been applied to the external surface, UK planning officers very often demand a planning application. This is so that they can consider the impact that the change in depth of reveals might have around windows or the reduction in the roof overhang might have on the overall appearance of the building after the insulation has been applied and the finish re-instated. Clearly, where the original finish is plain brick and the proposed finish is white render, the change will be very significant.

The planning process is time consuming and costly. It is a matter of opinion whether changes to the appearance of the vast majority of mass housing would ever be a bad thing. In most cases a fresh, clean finish improves the majority of buildings. Given a little thought about details, appearance can be very significantly enhanced.

If there were no control and every house was radically different in appearance, architectural value could be diminished. There is, therefore, a need to design the appearance and co-ordinate appearances, especially colours and textures, to produce harmonious results. It would be much more cost effective if that design were done on a geographical basis, once, and published in the form of pallets of materials, textures and colours with rules for their choice and juxtaposition.

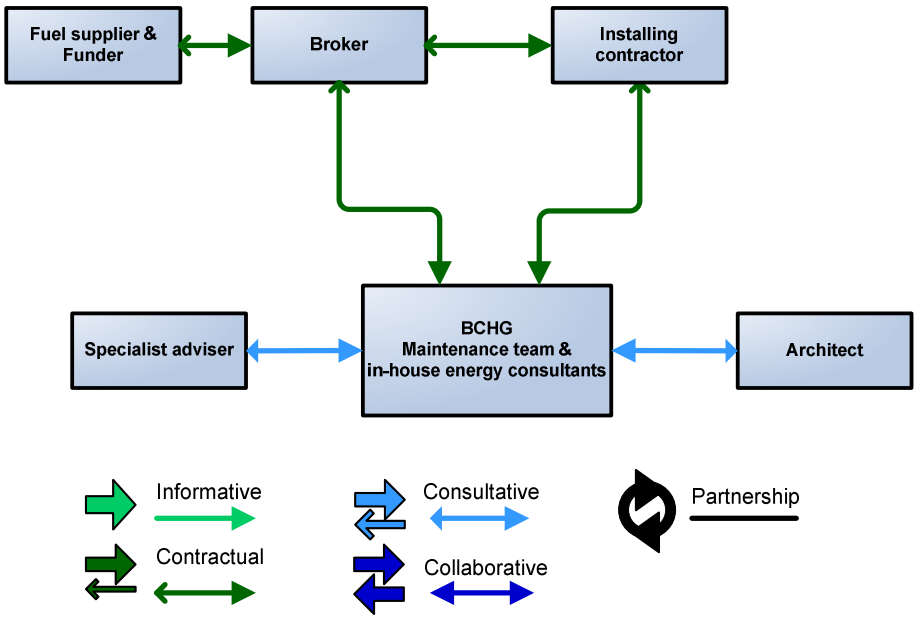
The UK planning law has recently been changed and simplified. Local authority planning departments are obliged to produce an area plan, for allocation of space and some other guidance on acceptable development. Planning bodies should include guidance on what changes to external appearance, specifically associated with application of external insulation, will be acceptable without the need for a planning application. The UK's National Building Regulations has such a process for gas installations and the energy efficiency of replacement windows. Self-certification is allowed through an independent certification body. Qualified and accredited operatives are allowed to self-certify where they lodge a record of their work for audit. This deemed-to-satisfy approach is much more cost-effective and achieves the same result at much lower cost.

5. Legal/technical expertise

Description of the contracted expertise

The arrangements for this SHELTER pilot were very complex because we were using existing activity to match and draw-down new grant funding that had not been available when the existing activity was arranged and procured. As a result the contractual and programming activities were also complex.

The nature of the new grant funding was also very complex. The most cost effective approach was to access the grant through a broker, who procured the grant-funded works on our behalf and as part of a bigger procurement for a number of clients, like us, but in different parts of the UK. As a result the partnership ended up with a complex contractual arrangement:



The four contracts were altered so that they worked back-to-back, i.e. a requirement in any one contract was either also included in other contracts or, at least, did not contradict a requirement in any other contract. Bringing these four contracts together in this way was not easy and took the majority of the contract preparation effort provided by the specialist adviser.

The specialist adviser also provided a range of services that are more normal in new construction projects than maintenance and repair contracts. They were the Employers' Agent, they were the Construction Design and Management co-ordinator and they chaired the project team meetings.

The design of the external appearance was undertaken by architects. It is very unusual to employ an architect for maintenance works, in the UK. Sometimes a structural engineer might be required but design changes are rare. In this pilot we employed the architect to prepare the pallets of materials, textures and colours and the rules by which they could be juxtaposed. They prepared documents for and made the planning application on our behalf and the documentation they provided was also used during the consultation process.

PART III CONCLUSIONS

6. Future possible improvements and replication

Possible further improvements of the model at SHO level

We believe that there is potential for the cost to reduce over time. Some of the processes that we have employed for the first time demanded one-off investment that should not be needed a second time. If others replicate what we have done some of the new ways of working will become accepted as standard or common practice and some of the time and therefore cost of engaging people and organisations and teaching them how the process works will not be needed.

The key areas we believe that improvements will be found are:

- Assembling area-based programmes with multiple owners – this will be a key feature for accessing the UK Government's proposed energy company obligation grants (ECO) associated with their proposed Green Deal financing mechanism.
- Data collection is already improving. The introduction of Energy Performance Certificates (EPCs) as a mandatory requirement for new dwellings and any sale or re-letting of a rented dwelling has caused some data to be collected for some dwellings. About 25% of BCHG's dwellings now have an EPC. This data will increase in quantity and quality, especially if the UK Government's proposed Green Deal is successful.
- Specification development will become easier and less costly as the quantity and quality of data improves. The UK Government's proposed Green Deal financing mechanism will increase the numbers of new technologies being installed and that will reduce cost. Lower cost will accelerate the rate of installation; bringing further cost reductions and wider application. This will apply to low carbon and alternative energy technologies and the rates of carbon saving achievable for a given budget should accelerate.
- The work to develop back-to back framework contracts should be re-usable in future and therefore not be as expensive.
- There is an opportunity to have pre-approved designs for the change of external appearance, in the form of formal guidance from local authorities. Planning approval should therefore no longer be needed for the vast majority of the 7-million solid walled dwellings in the UK that could be insulated externally.

7. Conclusions

- The SHELTER project and this pilot created a focus for BCHG that had not previously existed.
- This pilot enabled a range of new approaches to be explored and implemented that delivered a near doubling of the available capital budget (to £1M) and very substantial (3000+lifetime toe) carbon savings that would not otherwise have been achieved until much nearer to 2050.
- The cost of deep whole-house carbon saving measures in the UK is still beyond the financial reach of social landlords and demands substantial subsidy for early deployment.
- Funding rules attached to grants, especially in the UK and for carbon saving measures, are complex and demand dedicated and specialist attention to develop specifications that are practical yet meet the funders' requirements.
- In the meantime, it may be more efficient for social landlords to apply for planning permission on behalf of attached dwellings belonging to others.
- Single-measure programmes are the most cost-effective way for smaller social landlords to maintain their dwellings at a given standard when the dwellings are widely geographically dispersed and components have very different service lives.
- The biggest problem we encountered on this project was aligning the work and contracts from several single-measure programmes.
- In future and where possible, smaller social landlords with dispersed dwellings should attempt to identify programmes of work to dwellings outside their stock and which they can join to obtain economies of scale.
- Where they cannot join such programmes, employing the co-ordination model that brings work programmes and contracts together to collaborate will be the most cost effective approach.
- The absence of local authority guidance and a simplified notification and approval process for change of appearance of dwellings with little or no architectural value has added considerable time, cost and complication to this SHELTER pilot. It is a recommendation of this report that the UK planning regimen adopts the "deemed-to-satisfy" approach that has been adopted for the self-certification of energy saving building components such as safe boiler installation and replacement windows. It is accepted that in locations where the architectural value of existing facades is high, the normal and comparatively expensive planning process will remain in place but the vast majority of UK mass housing has little or no architectural value and could be enhanced by a planned change to appearance that the local authority should determine on behalf of the community as art of their area plans. The UK planning system urgently needs to address the issue of guidance on how best to treat solid walled dwellings where the insulation has to go on the outside of the building; changing the appearance. This can be a one-off exercise that has the potential to save the UK economy up to £1.4Bn of unnecessary expenditure. Even where applications can be grouped together, the potential saving is still between £30M and £50M.

It could be interesting to add here a table answering to our project officer request: analysis of gains in terms of time, costs, energy savings, final quality of the works.

8. Annexes:

PowerHouse template (Shelter customized)