

A community approach to retrofit and potential implications for the fuel poverty agenda

A report for the **Cheshire Lehmann Fund** by **Carbon Co-op** and **URBED**

March 2015 (final report)



CarbonCo-op





About Carbon Co-op

We believe the process of improving our homes to 2050 standards will be quicker, easier and cheaper if we work together, teaming up with friends and neighbours to share experience, knowledge and reduce costs through bulk purchase.

Established in 2008, we are a group of Greater Manchester residents who have started to carry out changes in our own houses and communities. We've teamed up with housing specialists to look at what more we can do where we live.

As a co-operative, a community benefit society, our organisation is owned and run by the householders who make up it's members. We have no external shareholders or owners making profits, all resources are kept within the co-operative.

We benefit from award winning technical expertise, partners URBED are among the leading retrofit specialists in the UK and authored the Greater Manchester Retrofit Strategy.



Acknowledgements

We are grateful for the funding and assistance provided by the Cheshire Lehmann Fund.

Thank you to the householders from Carbon Co-op's Community Green Deal programme for giving their time and providing valuable input.

Executive summary

This research, funded by the Cheshire Lehmann Fund, evaluates Carbon Co-op's Community Green Deal project, examining policy implications relating to fuel poor households and the future roll out of whole house retrofit at a national level.

Community Green Deal was a programme of whole house retrofits of owner occupied homes in Greater Manchester which started in 2012, with the first phase completed in 2014.

A whole house approach (or 'deep' retrofit) involves the design and application of multiple improvements as part of a holistic package. It has the potential to deliver substantial improvements in energy efficiency, resulting in lower fuel bills, lower carbon emissions and a more comfortable home.

This research collates qualitative insights from householders, examining their experiences at key stages, as well as some initial monitoring data from one home. It also explores the cooperative and community elements of the programme, and whether this has potential to catalyse street-based installations radiating out from whole house retrofit pioneers.

Based on learning from the Community Green Deal pilot project, we have devised 5 key recommendations for those developing programmes that tackle fuel poverty.

1. Undertake physical monitoring of homes.
2. Recognise the importance of ventilation.
3. Communicate retrofit in a concise and clear way.
4. Empower 'early adopters' to act as retrofit advocates in their own community.
5. Equip the supply chain to manage individual homes. Every household is different even if the physical framework is the same.

Contents

Introduction	5
Community Green Deal	6
Research questions & methodology	7
Whole house retrofit	8
Routes to retrofit	9
Planning a retrofit	11
Retrofit experience	12
Post-retrofit - initial findings	14
Dissemination	15
Collaboration	16
Recommendations	17
Challenges	19
References	20

Introduction

The Cheshire Lehmann Fund's primary objective is to support academics and community groups wishing to undertake active research or evaluation into the relationship between fuel poverty and energy efficiency.

Carbon Co-op is a community benefit society based in Greater Manchester which exists to enable its householder members to make large scale reductions in domestic energy usage through whole house retrofit. In 2014, with the assistance of DECC funding and partners URBED, Carbon Co-op has delivered 'Community Green Deal,' a programme of whole house retrofits in the Greater Manchester area.

Carbon Co-op applied to the Cheshire Lehmann Fund to enable further evaluation of the Community Green Deal whole house retrofit programme, examining policy implications relating to fuel poor households and the future roll out of whole house retrofit at a national level.

National policy context

Research conducted by Guertler and Preston in 2009 estimated that raising all properties in England to a SAP rating of 81 (equivalent to an EPC band B rating) would lift 83% of households out of fuel poverty. Given the efficiency and condition of the existing housing stock, this implies that a far more holistic and deeper approach to retrofit is required.

The recently launched Fuel Poverty Strategy for England outlines a target to:

'Ensure that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C, by 2030'

• Cutting the cost of keeping warm: A fuel poverty strategy for England. HM Government (March 2015)

The phrase 'reasonably practicable' gives little hope that this will be achieved, or that it will be enforceable. Furthermore, this tightly bound definition that targets the 'official' fuel poor raises concerns that many households on the edge of fuel poverty or more vulnerable because of changing circumstances, will continue to suffer from homes that are cold and expensive to heat.

Energy Company Obligation (ECO) progress

The Affordable Warmth (HHCRO) strand of ECO is designed to assist private households (owner occupied and privately rented) to improve the energy efficiency of their homes.

On the surface, official statistics from Ofgem show that suppliers exceeded their Affordable Warmth target during the first obligation period (1st Jan 2013 to 31st March 2015). However, dig a little deeper and the statistics show a familiar pattern of a reliance on the delivery of basic insulation measures (such as loft and cavity wall insulation) and straight forward boiler replacements (see also the Centre for Sustainable Energy's evaluation of the first year of ECO).

As of March 2015 (out of nearly 398,000 measures installed under HHCRO) the following numbers had been installed to Affordable Warmth households:

- > Solid wall insulation | 9
- > Hard-to-treat cavity wall insulation | 52
- > Other insulation (including hot water cylinder insulation, draught-proofing, window glazing, floor insulation) | 91

If the Government is serious about delivering the target outlined in the Fuel Poverty Strategy, then policies like ECO will need to deliver much more than basic insulation and heating improvements. A whole house approach has the potential to do this.

A whole house approach - opportunities and challenges

In the social housing sector, there is growing recognition of the need to push beyond the minimum performance standard established by Decent Homes (see Moving Beyond Decent Homes, 2009). Indeed many housing associations are looking towards very high specifications for their new-builds, recognising the fact that fuel poverty is a very real issue for their tenants. The owner occupied and private rented sector presents a more complex picture.

Through the lens of Carbon Co-op's Community Green Deal programme and householders' experience, we hope to contribute to the wider discussion about whole house approaches and how these might fit in with efforts to tackle fuel poverty.

Community Green Deal

Carbon Co-op's contention is that the process of improving homes to 2050 standards will be quicker, easier and cheaper by co-operative action, leveraging the peer support of friends and neighbours to share experience and knowledge and reducing costs through bulk purchase. Membership of Carbon Co-op acts as a gateway to technical advice, skills and resources as well as the opportunity to meet like-minded householders working to similar goals.

Project origins

The Department for Energy and Climate Change's (DECC) 'Go Early' programme¹ aimed to test some of the key mechanisms of the Green Deal, with Greater Manchester obtaining £3.5m of funding for a range of projects, mainly in the social housing sector. As part of this programme, Carbon Co-op, working with technical consultants URBED², delivered a £500,000 project.

Its title 'Community Green Deal' was a reference to URBED's 2012 report for the Sustainable Housing Action Partnership (SHAP) on the viability of a community-based intermediary for whole house retrofit³.

Project overview

The project consisted of 12 whole house retrofits in owner occupied properties, delivering CO₂ and energy savings of up to 80%. Grant funding covered assessments and technical ground work for the project whilst the majority of DECC assistance went in to the creation of a zero interest loan pot for householders. In addition to loans, some householders chose to contribute funds from savings with figures ranging from £500 to £13,000 per property. Carbon Co-op accessed ECO and Green Deal Cashback funding to cover some costs. Re-paid loan monies will be re-issued as fuel poverty grants.

Why local? Why a community energy organisation?

Much of the conceptual ground work for Carbon Co-op's role as a retrofit intermediary was developed in the Community Green Deal report (URBED, 2010). A key factor was leveraging high levels of trust in order to overcome barriers to retrofit.

Platt *et al.*, (2013) identify householders' need to access information on how energy efficiency measures might be suitable for their home and that this should come from a trusted organisation. However, to go from 'considering' to 'acting' requires extra impetus (Wilson *et al.*, 2013); something provided on this project by in-depth Carbon Co-op home energy assessments or from visiting eco-homes and talking to occupiers as part of open homes events.

Key facts

Location: Greater Manchester

Tenure: Owner occupiers

House types: mid and end-terrace, semi-detached

House ages: 1760 to 1990s extensions

In ECO Carbon Saving Communities area: 3

Measures include: external wall insulation, internal wall insulation, cavity wall insulation, loft insulation, rafter insulation, floor insulation, triple glazed windows, secondary glazing, insulated doors, draught proofing, chimney insulation/balloon, airtightness works, pipework insulation, condensing gas boilers, heating controls, passive stack ventilation, solar PV, loft storage

Once a decision has been made, information requirements become more specific and detailed. At this stage Wilson *et al.*, (2013) describe 'the most important features of an attractive value proposition [as] (in order):

- > Lower up-front cost
- > More reliable contractors
- > Less disruption to domestic life
- > Less 'hassle factor'

Arguably this is the stage at which most schemes fall short, with householders feeling poorly equipped to make the right decisions, hence the role for a Community Energy organisation in 'hand-holding' and householder advocacy.

¹ The Go Early programme (2012) was a series of initiatives across England funded by DECC to help kick start the Green Deal. Core Cities benefited from funding.

² URBED (Urbanism Environment Design), specialists in whole house retrofit | www.urbed.coop

³ Community Green Deal - developing a model to benefit whole communities, for SHAP (Sustainable Housing Action Partnership), by URBED, December 2010 (www.urbed.coop/projects/community-green-deal)

Research questions & methodology

A community approach to whole house retrofit and potential implications for the fuel poverty agenda.

Funding from Cheshire Lehmann has enabled Carbon Co-op to further evaluate the Community Green Deal whole house retrofit programme, extracting specific learning around fuel poverty.

We should be clear that this was not a programme designed to tackle fuel poverty. Indeed it is unlikely that any of the householders fall into the official classification of being fuel poor (under either the 10% or 'low income high costs' definition). However, there are elements of vulnerability, including:

- > A retired couple, increasingly spending a lot of time at home.
- > Health conditions exacerbated by the cold, including severe arthritis, susceptibility to chest infections and asthma.
- > Young children (under 5).
- > Anxiety (before the commencement of works).
- > Lower (and single) income households.

Initial assessments of some properties revealed a tendency to underheat. Three of the homes are located in qualifying Carbon Saving Communities areas (a sub-target within the ECO policy aimed at the bottom 15% of Lower Super Output Areas nationally for deprivation).

All of the householders are owner-occupiers, and have been able to invest some of their own money. However, this varies and the availability of a zero interest loan and ECO funding was key to securing engagement.

Research has focused on gaining qualitative insights into the experience of householders, collected via semi-structured interviews. One householder is methodically monitoring energy use and internal temperatures; we have included some of these initial findings as they help to demonstrate some of the benefits of a whole house approach to retrofit.

Reflecting on their own experiences, how do the 'pioneer' households think delivery could be applied to friends and neighbours?

Although this pilot project only includes a small number of households, the scale and complexity of works should not be understated.

We had hoped to speak to some neighbours and distribute a questionnaire to the rest of the street. Unfortunately this has proved unsuccessful; partly because of the limited scope of this research and the large time commitment needed to secure engagement, but also because some households are waiting on some smaller jobs to be finished.

In September 2014, Carbon Coop and URBED presented at the BEHAVE conference in Oxford. This led to discussions with Brenda Boardman, a Cheshire Lehmann trustee, who also presented on the issue of tackling fuel poverty through a community approach. Brenda's paper centres around the idea that many of the fuel poor are reluctant to get involved in programmes or policies, or are excluded because of eligibility criteria. These are the householders reluctant to switch energy supplier, to claim all the benefits to which they are entitled, or to self-refer to energy efficiency grants and schemes. To summarise, they are the 'hidden fuel poor' and potentially those in the most severe fuel poverty. Brenda calls for alternative approaches to ensure that these households are incorporated into energy efficiency schemes, recognising that it often takes multiple attempts and methods of engagement.

We were interested to explore the degree to which the cooperative and community element of the whole house retrofit programme is valued by participants, and whether this has potential to catalyse street-based installations radiating out from whole house retrofit pioneers.

Can the presence of a whole house retrofit pioneer household be used to increase the take up of energy efficiency measures in the surrounding street and immediate area, and how might this inform fuel poverty programmes?

Key findings are structured around the 'householder journey.'

- > Engagement (motivation for joining the programme and getting involved with Carbon Co-op)
- > Planning and design stage
- > Retrofit experience (during works)
- > Post-retrofit experience
- > Dissemination
- > Collaboration

Whole house retrofit

The Carbon Co-op whole house retrofits required a bespoke package of measures for each house, aiming for substantial carbon reductions (in line with the 2050 target of 80% carbon reductions).

Insulation improvements:

- Loft insulation
- Insulated and draught sealed loft hatches
- Eaves insulation
- External wall insulation
- Plinth insulation (at and below ground level)
- Internal wall insulation
- Cavity wall insulation
- Suspended timber floor insulation (accessed from above or below)
- Hot water and heating pipe work
- Chimney fill insulation
- Insulation of existing window reveals

Other fabric improvements:

- Triple glazed timber windows
- Refurbished/new draught sealed external doors
- Air-tightness works

Heating improvements:

- Condensing gas boiler
- Heating controls (including zoning)

Ventilation improvements:

- Passive stack ventilation system
- Additional air supply for solid fuel appliances

Other items need to be considered as part of a whole house approach. For example:

- Remove and refix fences, bird boxes
- Roof strengthening works to accommodate solar PV panels.
- Shortening of fitted furniture (such as book shelves, wardrobes) to accommodate internal wall insulation.
- Extend and refix rainwater goods



Routes to retrofit

The majority of householders learnt about the project via word of mouth. Some were active in their communities already, either through community activism or membership of other organisations (such as residents groups). Others were pro-actively looking for support. However, this was often more about wanting to 'do something' rather than pursuing particular improvements or a whole house approach.

In order to improve the attractiveness of whole house retrofit (to both householders and potential funders) there is a need to overcome the idea that it is only for 'middle aged, well-educated householders with comfortable incomes.'

Whilst such a description may be broadly fitting of 'pioneer' households (and similarly those investing in community renewable energy projects), it is worth noting that a number of householders were less able to contribute their own savings. In some cases this meant reducing the scope of work or selecting alternative finishes. The quotes to the right highlight that for many households, improving thermal comfort was very important.

What characterises these householders is that they actively sought support regardless of their motivation (whether green, comfort or cost driven). In a fuel poor context this engagement can be more of a challenge, particularly in the case of the 'hard to reach' - those that do not self-refer to grant schemes, rarely or never switch suppliers or payment methods, or claim the benefits to which they are entitled.

One way that a community intermediary can foster this engagement is through identifying 'community champions' and working with them to offer peer support to family, friends and neighbours. Carbon Co-op's initial efforts to run a street-based retrofit scheme in Moss Side in 2012 were difficult because residents were unfamiliar with, and wary of, outside agents. It was only after months of broader engagement work, building up a presence in the area that 'champions' and enthusiasts could be identified.



Above: some householders previously attended Carbon Co-op seminars or bus tours.

In priority order, householder motivations were:

- > To reduce household carbon emissions
- > To improve the comfort of their home
- > To save money on their fuel bills

Other motivations (but ranked less highly) were:

- > To be part of an innovative project
- > To improve the fabric of their home
- > To be part of a co-operative project

"Comfort was partly about air quality - was musty and damp."

"I was fed up of wearing a hat, scarf and gloves with heating in my own home."

"The house was too cold!"

"To improve energy bills and increase the comfort of our home. Getting older, we want a warm place to be, (we're) looking to the future, to manage our fuel bills. (We're) not so much green people but (we're) more into it now."



Left: Carbon Co-op's Community Champions project in Moss Side.

Routes to retrofit

Early adopters

Although many of the householders have personal reasons for participating, they also refer to being part of something bigger. This is characteristic of the 'participatory mentality' described by Radtke (2014) and which is particularly prevalent in co-operatives, with members often having a dominating ecological and social orientation.

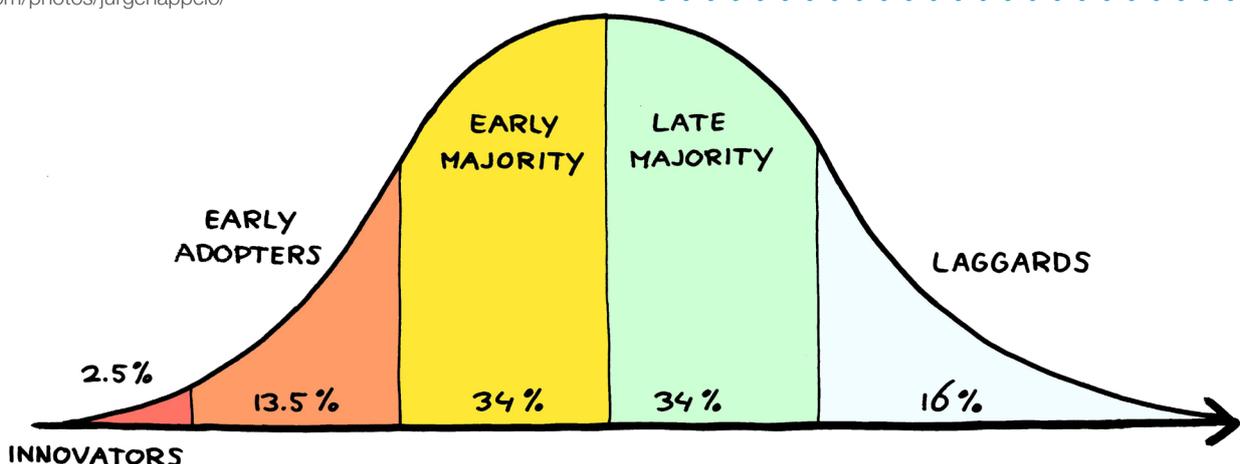
"To be part of a pilot in retrofits because it's something that really needs to happen nationally."

"Innovative was important to me - (a) pilot as an example for AGMA (Association of Greater Manchester Authorities) 100,000 house potential."

"To demonstrate how this is possible to others."

The innovation curve shown below represents the idea that retrofit could diffuse and become more mainstream after it has been taken up (and tested) first by a small number of innovators and early adopters. Although the viability of individual insulation measures, heating, ventilation and renewable technologies is relatively well established, the combination of improvements into a whole house package is perhaps less so. At present, the whole house retrofit market lacks clear routes to market, supply chain capacity, up-skilling and lower delivery costs which are all significant barriers.

Below: Jurgen Appelo | Figure 15.5 Innovation Adoption Curve. This illustration is part of the book Management 3.0. Reproduced under Creative Commons licence 2.0. Some rights reserved: <https://www.flickr.com/photos/jurgenappelo/>



The challenge in a fuel poverty context is to ensure that these households become the 'early majority' as opposed to the 'laggards.'

A trusted intermediary

For some householders, it was important that the project was led by a community intermediary because this fostered a greater feeling of trust.

"Working with people we trusted to retrofit the house."

"If it was a corporate (thing), probably wouldn't have had it done. I trusted them."

Neither Carbon Co-op or URBED had undertaken a project like this before, but had experience in aspects of the delivery. URBED had retrofit expertise and were involved with the Technology Strategy Board's Retrofit for the Future project which involved retrofitting a number of pilot projects to an 80% carbon reduction. Individually, members of Carbon Co-op had experience of retrofitting their own homes to varying degrees. What set the project apart was the whole house focus, something that few others were trying to tackle.

"It appeared to be the only place we could get a whole bunch of things done at the same time, holistically...a one-stop solution to a number of problems. (We) feared getting things done separately, (that we) would spend more than necessary. Also felt they had the expertise... We'll look at your whole house."

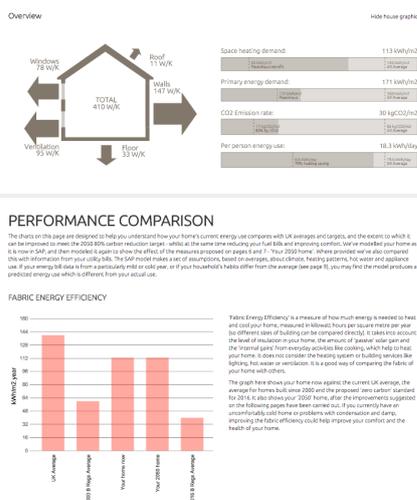
Planning a retrofit

Assessment

Participating households received a whole-house assessment. The Whole House Assessment Method offers a way to deliver an assessment of current energy performance (based on full SAP) as well as a costed set of measures to reduce this to 2050 targets. As well as the quantitative data needed to assess the building fabric, the assessment also collects qualitative data from occupants including:

- > Perceptions of comfort
- > Retrofit priorities and motivations
- > Concerns about damp, condensation and mould

This is an important note in the context of fuel poverty as many of the current funding schemes (particularly the Affordable Warmth strand of ECO) do not require that householders are provided with a Green Deal Advice Report (GDAR). Despite the limitations of GDARs, they do offer the householder an opportunity to discuss their energy usage (and how this might vary from the model) as well as the improvements recommended. Even the Community Green Deal householders found it difficult to understand which measures to prioritise. With no occupancy interaction at all, more vulnerable householders must find it even more difficult to understand what is being proposed, or feel empowered to question or challenge it.



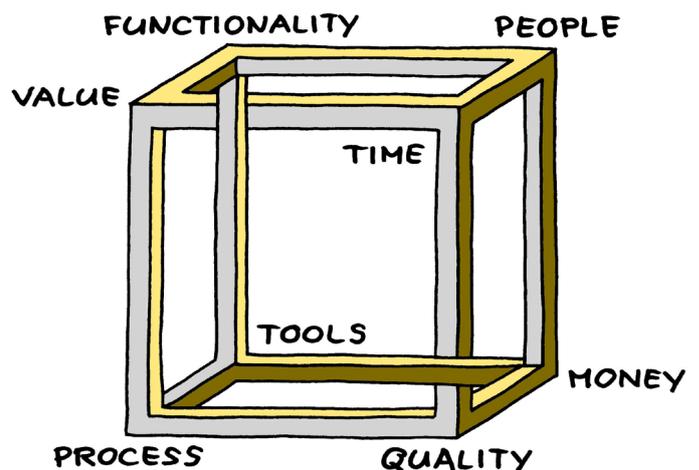
Above: A screenshot of the whole house assessment tool. Over 60 assessments have been delivered to date but the current process is very time intensive. With funding from Innovate UK, Carbon Co-op, URBED, Open Energy Monitors and the National Energy Foundation are working to develop this into an open-source web-based retrofit assessment and decision making tool called My Home Energy Planner. This will allow more assessments to be completed by more organisations.

Understanding the proposition

Householders were asked whether they agreed that the design process enabled them to understand what measures would be installed and (in outline), what would be involved in the installation and potential disruption.

The response to this was mixed; this highlights the clarity needed when presenting and explaining often complex information. This is critical in securing the buy-in and trust of participants. In this case, because of the pilot nature of the project, householders were perhaps more willing to take a step into the unknown. However, future programmes targeted at the 'majority' will need to invest time and resources into refining their messages and for future attempts to scale up whole house retrofit, this could be a significant barrier to participation.

- **"I didn't know what my priorities were, and you put your trust in them."** •••••
- **"Not particularly clear on the potential benefits due to the unproven nature of measures."** •••••



Above: Jurgen Appelo | FIGURE 11.1 Escher cube of constraints. This illustration is part of the book Management 3.0. Reproduced under Creative Commons licence 2.0. Some rights reserved: <https://www.flickr.com/photos/jurgenappelo/>

Retrofit experience

Householders reported different levels of disruption; some experienced little or none whilst others were affected by poor air quality (dust generation), noise, needing to move furniture and allow access to contractors on an ongoing and unpredictable basis.

Some householders had past experience of building works and a good understanding of the likely disruption, but an issue acceptable to one householder might be unacceptable to another given occupancy patterns (working from home or retired), levels of health, age and general willingness to accept disturbance.

These issues may be heightened in fuel poor households that may be more susceptible to:

- > Existing respiratory conditions caused by living in a cold and/or damp home and which could be exacerbated by dust.
- > Mental health problems (anxiety, depression).
- > Mobility issues caused by a disability, age or other medical conditions. These households are likely to need much more assistance in terms of moving belongings. There is already a recognised need to provide assistance with loft clearance to facilitate simple loft insulation top-ups. A whole house approach poses an even bigger challenge.

Furthermore, it may be more difficult for lower income households to take time off work or have a flexible working pattern. Although some of the Community Green Deal householders were happy to provide access to the contractors when they weren't there, others found this more difficult, either because of concerns about security and/or because it might invalidate their home insurance.

Tight deadlines caused by funding availability can cause significant stress for all involved, placing undue pressure on the household, contractor and management team. This is likely to be an issue where any project is reliant on grant funding (such as ECO) to subsidise or fully cover the cost of the work. Poor supply chain organisation (unexpected arrivals or delays to materials being on site) can throw work programmes off track and makes planning difficult.



“I had no idea of the amount of work that would go in, especially the windows.”

“The internal wall insulation was very messy, and the windows...airtightness work meant (the) amount of work needed was way more disruptive than (a) normal window swap.”

“The dust! Both of us got a (chest) infection in the first week, (the) whole place was filthy.”

“Doing the internal wall insulation room by room allowed us to decant progressively and was fine. Works taking place during spring and summer helped.”

–“Sometimes I wasn't told about (the work) so hadn't prepared/covered up.”

“I put down carpet protector which really helped.”

Retrofit experience

Householders suggested that precise information, provided in advance, on specific elements of work and the likely nature of disruption would assist in reducing levels of disruption. The nature of a whole house approach makes this particularly challenging because of the need to sequence works.

Programme leaders need to devise better strategies to communicate potential disruption to householders in advance of work commencing. Contractors need to develop strategies to be able to more effectively manage these issues and assist householders in adapting such as temporary decanting and dedicated and experienced householder support staff.

The longer works take, the greater disruption. Because of supply chain issues and the nature of the pilot project, many of the Community Green Deal householders experienced disruption over a long period of time. This was worse for the first few houses, but improved for the final homes which is a positive sign. It is particularly frustrating for householders when there are long spells where no trades are on site.

“Wasn’t always clear when they were coming.”

“We hadn’t realised rooms would be unusable for the time they were.”



Above: a video produced by the Centre for Sustainable Energy showing the experience of a Bristol householder.

- > **What furniture needs to be moved and by who? Is there any other support (such as loft clearance, handy person schemes from local support agencies)?**
- > **How long are works likely to take (individually and as a complete package)?**
- > **How long will individual rooms be out of action?**
- > **Will there be a quiet/unaffected space that the householder can retreat to?**
- > **Will the contractor will need to use outdoor spaces (such as a garden or driveway) to store or process materials? How might this impede access for those with a disability?**
- > **Work programme - what days will the contractor be there? Which trades will be on site and what time do they start and finish?**
- > **What access do trades need? Does the householder want or need to be on site?**
- > **What protective measures will be provided? What should the householder provide themselves?**
- > **Will there be any disruption to heating or electricity supplies that could affect those with medical needs?**

Post-retrofit - initial findings

The University of Salford is conducting in-depth technical evaluation of the programme, the findings of which are not yet available. However, we have gathered qualitative feedback from householders about their 'post-retrofit' experience to date. We also have data from one of the householders that is closely monitoring performance.

Householder perceptions

The Community Green Deal householders are coming towards the end of the first heating season 'post-retrofit' and the effect of the improvements has been stark for most. They observe that the house feels:

- > Warmer
- > Less damp and that the air feels fresher
- > Less draughty
- > Cooler in summer when it's hot
- > Warmer in the mornings suggesting an improvement in minimum internal temperatures (i.e. When the heating is switched off).
- > Slower to cool down and faster to warm up

In addition:

- > Gas usage is lower
- > Improved occupancy of rooms that weren't frequently used before
- > That it has made them more perceptive and questioning of their behaviour. For example, 'do I need hot water for this?'

Householders were asked whether they would recommend particular improvements to a friend or neighbour. External wall insulation was mentioned most, followed by triple glazing. Ventilation improvements also figure highly.

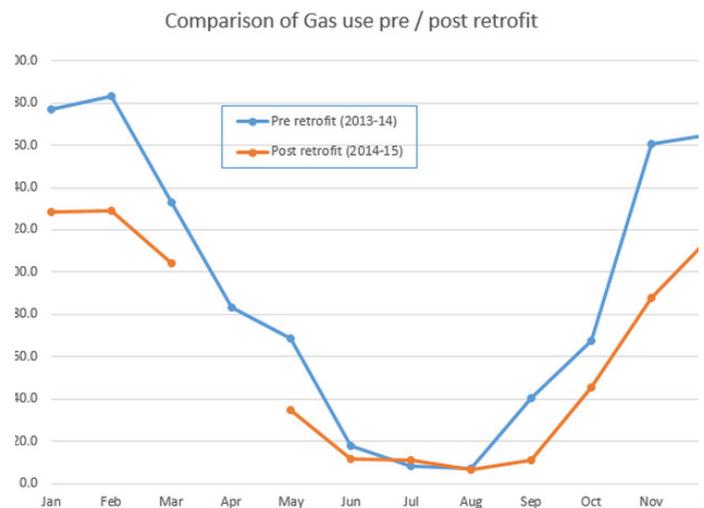
"External wall insulation as the least disruptive."

"If (you're) doing windows go for triple glazing because the difference it makes is amazing."

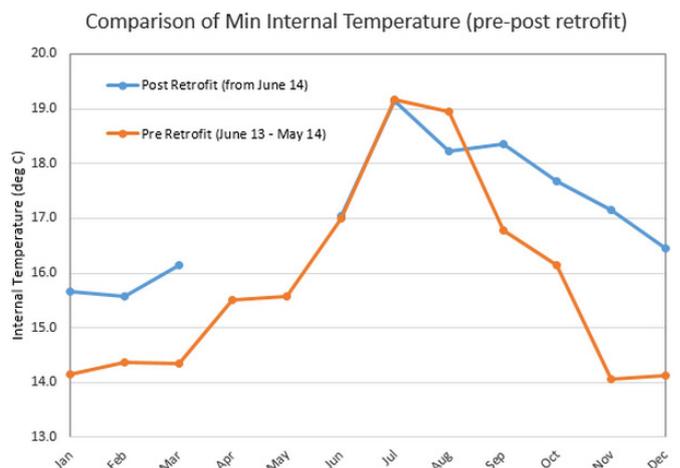
"If you're prepared for some disruption internal wall insulation isn't that expensive and will make a huge difference."

"The passive stack (ventilation system) is good because it doesn't rely on the user... (I) don't need to worry about condensation in those rooms any more."

The graph below profiles gas use before (blue line) and after (orange line) the retrofit of one of the homes. It shows a marked reduction on the previous year, particularly during the coldest months.



The graph below shows the minimum internal temperature before (orange line) and after (blue line) the retrofit. This shows that before the retrofit, temperatures were regularly dropping to 14°C when the heating was off. Post-retrofit, the minimum internal temperature is typically 1°C higher. Such a difference could make a huge improvement to the health of vulnerable householders.



Above graphs courtesy of Dominic McCann

Dissemination

In order to scale up whole house retrofit, moving it beyond the domain of a small number of 'early adopters,' their experiences need to be shared more widely.

Many of the households are keen to share their experience through:

- > Inviting interested neighbours to view the works whilst in-progress and when complete. They note that neighbours and passers by were certainly more interested once they could see activity (such as scaffolding being erected). Anecdotal feedback suggests that they have been particularly impressed with the way that improvements have been integrated into the house, preserving the look and character of the building and street.
- > Participating in open homes weekends, sharing their experience with interested residents from across Greater Manchester.
- > Participating in research and evaluation work.
- > Sharing their experience with other Carbon Co-op members via workshops and social events.



Above: one of the Community Green Deal homes as part of a Carbon Co-op Green Open Homes weekend.



Above: a Carbon Co-op social, with one of the Community Green Deal householders sharing monitoring data.

Some householders are understandably feeling 'retrofit fatigue' and express less certainty about wanting to open their homes to the public in future.

Householders were asked what advice they would give to someone considering a whole house retrofit in future:

“Get builders who have experience in the technologies involved. That’s where Carbon Co-op could be useful, promoting reputable and knowledgeable tradespeople, even if that’s having to deal with several contractors with experience in different areas.”

“For a whole house (retrofit) you DO need a good assessment of the Carbon Co-op type. The Green Deal one doesn’t do enough. For example, it doesn’t talk about passive ventilation...you want a healthy house, not just lots of insulation.”

“Get everything done at once to minimise the period of disruption and maximise the benefits. Go with a contractor used to dealing with single house jobs, rather than whole estates.”

“I wouldn’t recommend to people who haven’t got a supportive network.”

Despite the challenges of participating in such a complex pilot project, householders are generally very positive:

“We get cold calling and people interested and have great pride in saying we’ve had it done.”

“Saving energy is important to us. We definitely think it has been worth it.”

“I’d like to be involved in taking this forward for the whole of Manchester. It’s big and strategic work that could benefit tens of thousands of houses. I’ve stuck my neck out because I could see the bigger picture. It’s important.”

Collaboration

The role of a community energy organisation

Under the Community Green Deal model, Carbon Co-op played a direct role in aggregating and managing the programme of whole house retrofits, holding the contractual relationship with householders as well as the installer. This has been effective in terms of recruiting interested householders, but the risks and liabilities involved are significant and future models will require a more equitable distribution of risk between householders and intermediaries.

A shifting policy environment has created turmoil in the retrofit sector and ECO and similar funding mechanisms are prohibitive for community energy organisations to access and deliver. Delivering grant funded, fuel poverty-orientated programmes is therefore extremely difficult at present.

Whilst the current community energy sector focuses mainly on energy generation ('powering up'), a number of innovative organisations are testing out approaches in energy efficiency ('powering down'). Discussion within these organisations has highlighted key areas where locally-based entities can lead:

A bottom-up approach

A locally-based, bottom up approach can utilise the enthusiasm of 'early adopters', motivated by environmental and health benefits and prepared to tolerate more disruption. A peer approach, scaling up from these early adopters presents a more effective route to mass market than top down initiatives such as Green Deal.

Highlighting best practice

Increasingly, some mass market approaches have been shown to cut corners, risking the long term health of householders. Community Energy organisations have a role in setting and demonstrating best practice within retrofit, approaches that show all round high environmental performance and create healthy indoor environments.

Lobbying for policy change

With over 5,000 Community Energy groups in the UK the sector's membership represents a huge constituency actively pushing for more effective and consistent government policy to support energy efficiency.

Working with health and NHS partners to tackle fuel poverty

The NHS and social care partners increasingly recognise the contribution poor housing makes to a range of chronic health conditions. Community Energy could provide the perfect bridge between referral and effective action to tackle these health issues through improved homes.

A shared experience

Ultimately, co-operative action was found to have positive and negative aspects. Householders supported each other and shared experiences, the staged nature of works meant householders could highlight what to expect and project team members could source valuable information on the progress of work. However, sharing problems at times created unnecessary anxiety for other householders. Perceptions of disruption varied and householder communications had the potential to cause confusion and misunderstanding. Responding to these issues and offering reassurance required significant additional management resource.

What was most useful about taking part in conjunction with other householders?

"I think comparing notes and getting bits of info about things to watch out for."

"Nice and useful to be part of a community, and because of those other people we knew what to expect."

Conversely, what was least useful about taking part in conjunction with other householders?

"Being worried by some of their horror stories. Houses are not necessarily like each other!"

"In a sense that's one of the reasons why it was most stressful. Because of the funding changes (they) weren't able to do one house at a time."

"If it was less simultaneous and more phased you could visit houses with works done."

Recommendations

As the 2010 Community Green Deal guide outlines, whole house approaches to energy efficiency have the potential to deliver a 'triple bottom line' of benefits in strengthening local communities, re-balancing the local economy and tackling climate change. In particular:

- > Protecting and enhancing health and wellbeing: designing out construction defects, poor airtightness and cold bridging.
- > Making a difference to fuel poverty: reducing bills to <math>< \pounds 5/m^2/year</math> to ensure that properties are affordable for the most vulnerable households.
- > Restoring community pride: Investment in comprehensive home improvements as a means of lifting neighbourhoods and engaging communities in the creation of healthy, self-sustaining local housing markets.
- > Protecting and enhancing assets: Investing in the longevity and asset value of the existing stock, including private rental property.

Based on learning from the Community Green Deal pilot project, we have devised 5 key recommendations for those developing programmes that tackle fuel poverty.

1. Undertake physical monitoring of homes.
2. Recognise the importance of ventilation.
3. Communicate retrofit in a concise and clear way.
4. Empower 'early adopters' to act as retrofit advocates in their own community.
5. Equip the supply chain to manage individual homes. Every household is different even if the physical framework is the same.

1 Undertake physical monitoring of homes

Initial data suggests that the Community Green Deal whole house retrofits are performing well in terms of reducing carbon emissions, heating demand and improving thermal comfort. This can help to develop messages that are not necessarily focused on energy or carbon, but more about improved usability, comfort and health.

Physical monitoring of internal temperatures and relative humidity could be particularly valuable from a fuel poverty perspective, contributing to what is currently a sparse evidence base in terms of the link between energy efficiency and health (as outlined in the recent NICE guidance).

Physical monitoring need not be expensive or complicated. For example, Open Energy Monitors are open source energy monitoring kits with sensors that allow monitoring of electricity, gas, temperature and humidity.



Above: Open Energy Monitor kit



Above: an example of the Open Energy Monitor dashboard, displaying temperatures.

Recommendations

2 Recognise the importance of ventilation and detailing

Any retrofit project (whether individual improvements or a whole house approach) needs to recognise the importance of ventilation. This is not readily identified during simple energy performance assessments. Where a sensible ventilation strategy is lacking there is a real risk that unintended consequences will be encountered down the line, particularly where a home has extensive insulation works. This is reflected in the recently published NICE guidance on cold homes under recommendation 12 - ensure buildings meet ventilation and other building and trading standards.

The Community Green Deal retrofits included passive stack ventilation systems, but suitability will vary depending on the property type, occupants and retrofit ambitions. Contractors may not be familiar with whole house ventilation methods (whether passive or mechanical).

Don't underestimate the detailed design work required to achieve a quality finish and deliver on performance. This must be done with diligence, considering possible unintended consequences that could burden households with further costs down the line.

3 Communicate retrofit in an engaging but concise and realistic way

Investing time in the planning phase and ensuring that householders have confidence in the improvements proposed is critical to ensure ongoing trust and engagement.

Information that details the nature of the works, benefits, and likely disruption should be provided before work starts. Once completed handover information that is concise and engaging should allow householders to get the most out of their more efficient home as well as maintain it effectively.

This information should reflect different learning styles and be available in a variety of formats, including:

- > Visually stimulating information sheets
- > Short videos

Where possible Community Champions and 'early adopters' should be involved, either in designing resources or delivering advice face-to-face through a workshop, open-homes event or home visit. This builds on well-established principles of peer-to-peer learning.

4 Spread the word via community champions and retrofit advocates

The aspiration of whole streets and neighbourhoods full of retrofitted homes is readily conveyed by Government, local authorities and other organisations. Our experience leads us to believe that street by street retrofit is possible, but only in good time.

Asking whole streets to embrace the idea of retrofit at once, even just a single improvement, is challenging. As one householder described, "there is something inherently more 'do-able' about letting people determine when their own project will start because everyone has such different personal circumstances...the money issue aside, will you ever get that perfect moment when everyone's circumstances and priorities align to allow that to happen?"

'Early adopters' are key to planting the seeds of retrofit in a community. Through engagement (which community energy initiatives are well placed to guide) they can inspire others to act, whether that be DIY, taking up a grant offer or a whole house project.

5 Skill up the supply chain

The larger contractors that currently deliver area based programmes and social housing contracts (for example, under CESP and Decent Homes) may not be best placed to deliver whole house approaches on individual homes.

Even if a whole street was tackled, the nature of whole house retrofit means that every household is different, requiring the coordination of several different trades at once as well as just-in-time supply chains.

"It's very specialised, for the average person I'm not sure. (The) only way forward is with reliable builders and cheaper products."

Challenges

We do not pretend to have the answer to fuel poverty in the form of a programme of whole house retrofits! The issue is clearly more complicated than that. However, what we hope we have demonstrated is that whole house retrofits can play a role and that they offer great potential to radically improve the thermal comfort of homes, and in hand with that, the health of occupants.

Funding is a well established barrier to more in-depth retrofits of householders at risk of, or in, fuel poverty. This research is not intended to provide detailed analysis of how this type of work could be funded in future. But without going into detail, we suggest that it is crucial to document and highlight the health and wellbeing benefits of more substantial retrofits. In doing so, it may be possible to secure buy-in from other partners (such as health boards and agencies) that can:

- > Help to identify those most at risk
- > Play a role in engagement (helping to overcome barriers and uncertainties)
- > Provide funding to assist with the capital cost of works or a support programme (for example, peer support to help with home visits, be there when the contractor first visits and help to organise some of the practicalities such as storing belongings).

There are undoubtedly significant challenges in scaling up this approach:

- > Many householders are uncertain about being involved in initiatives if there is a risk of short term cost implications. Offering low cost or free comprehensive energy assessments may help to tackle this.
- > Many fuel poor or vulnerable households have developed well established coping mechanisms. A peer demonstrating that it is possible to have a home that is warm and affordable could help to start breaking these down.
- > Private rented housing. Although new regulations coming into force in 2018 will require that landlords raise their properties to a minimum EPC rating of E, this is well short of the C rating outlined in the Government's Fuel Poverty Strategy.
- > There is a need to break down the perception (held by some) that whole house retrofits are particularly hi-tech or fancy (and therefore potentially difficult to live with). They can be, but they can also be simple and very well integrated with the existing home if well designed. Open homes events and physical visits to retrofitted properties can help to challenge these preconceptions.
- > Reaching those that don't currently, and may be very unlikely to, engage with community groups, residents associations or respond well to a doorstep approach. Seeing work happening on their street could help with this, and the NICE guidance highlights a key role for health and other practitioners in this sphere.

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