Christopher Jofeh 14 May 2022

1. *To what extent is the absence of specific targets for all housing tenures is a block to progress?*
   The absence of specific targets is a block to progress, but it is only one of many.

   The use of EPCs for setting targets and measuring progress is not helpful, because EPCs were not designed for and are not well-suited for this.

   As Wales has committed to achieving net zero, that should be the over-arching target for homes, even though not it is not practicable for every home to achieve that. The date by which homes should achieve net zero will influence costs, as is explained in 2. below.

   When considering what should be done to decarbonise a particular home, the first question is the extent to which its consumption of heat should be reduced.

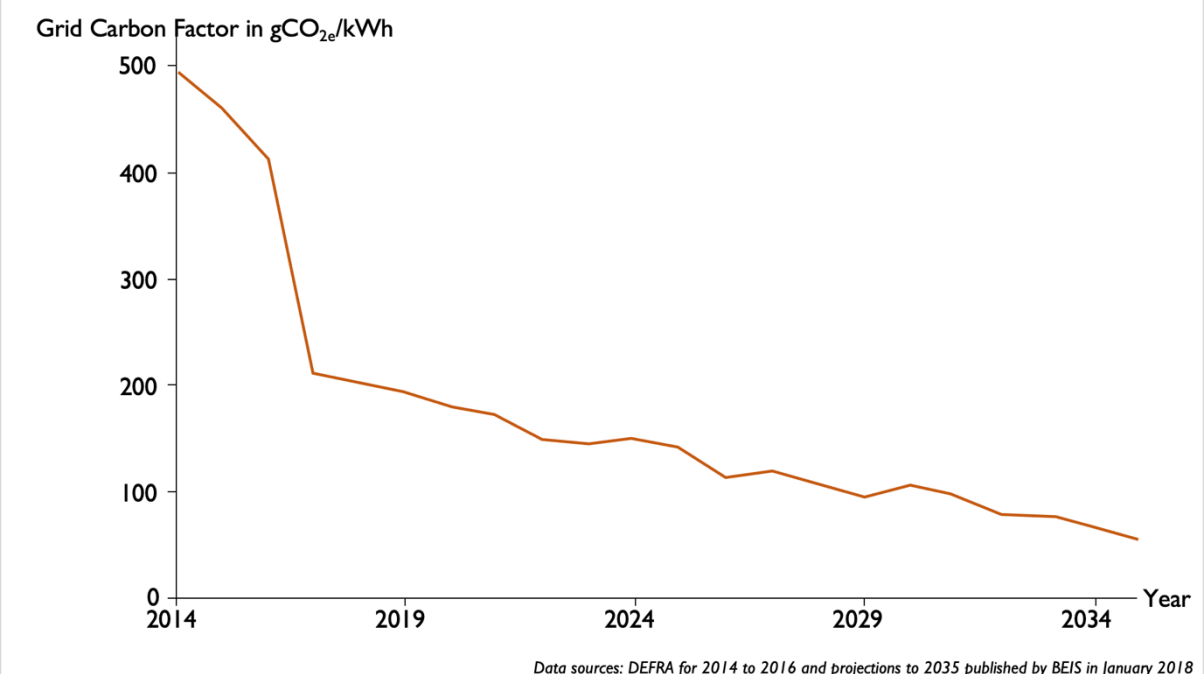
   We need a minimum standard for fabric energy efficiency that ensures that homes can be heated efficiently and affordably and that mitigates the home's increased demand on the electrical supply system. The standard could be expressed in kWh/m^2/year (the total amount of heat required to maintain a comfortable temperature throughout the year). An alternative approach, adopted by the Sustainable Energy Authority of Ireland[1], is to define a maximum rate of heat loss from the home in W/Km^2. The group I chair is investigating these and other metrics for Welsh Government.

   Targets require a means of measuring progress towards achieving them. To that end, Welsh Government and its agents need much better access to smart meter data held by the Data Communications Company than is currently permitted.

[1] SEAI (2020) *Technical Assessment Process for Heat Pump System Grants*, Government of Ireland

2. *To what extent is it feasible for all social housing achieving EPC A or equivalent by 2030?*
   Setting every socially owned home on its journey to net zero by 2030 is achievable but it depends on a) the availability of data about every home to inform decisions about how best to decarbonise the home and b) substantial new sources of funding for the sector. Boiler replacement in many homes may not make financial sense until the end of a boiler's life, which could be after 2030.

   'Setting every home on its journey' acknowledges the role that future decarbonisation of the electricity grid will make. The chart below shows the past and predicted average carbon intensity of the electricity grid. To make a home net zero in 2022, when the grid carbon intensity is about 150gCO_{2e}/kWh, is clearly harder and more expensive than making the home net zero ready in 2022, with a target date for achieving net zero in say 2035, when the grid carbon intensity will probably be only 50gCO_{2e}/kWh.



Past and predicted electricity grid average carbon intensity

3. *How should the next two phases of the Optimised Retrofit Programme differ to the approach of the earlier phases?*
   Social landlords should be required to upgrade some privately-owned homes (both private rented and owner occupied) as well as their own stock.

   A frequent criticism by social landlords is that letting ORP contracts in single year phases makes it for them hard to plan and integrate the work into their

normal RMI activities. Consideration should be given to making the next phase of ORP last for two years.

Not every social landlord has taken part in ORP. Some have bid unsuccessfully and some have not even bid. A new approach which shares the funding among all social landlords should be explored. This may involve assistance in bid preparation for those who have been reluctant to bid.

Having social landlords decarbonise some privately-owned homes will generate valuable lessons, but much more work is needed to create an environment in which increasing numbers of private homeowners choose to decarbonise their homes and find it easy to do so well. Accompanying this response are three documents that I prepared last year, describing an approach to private homeowners that is both systematic and based on an established behavioural science framework. The documents are:

1. Approach to owner occupiers.pdf
2. Homeowner mortgage example.pdf
3. Small builder example.pdf

4. *How can local authorities and housing associations be encouraged to explore alternative funding streams to support housing retrofit?*
A particular challenge for many HAs is that their ability to borrow more to pay for the retrofit is limited by existing covenants. But even if they could borrow more, their ability to repay the loans is limited because retrofitting homes does not generate increased income. In contrast, borrowing to build new homes does generate more rental income.

When the *Better Homes Better Wales Better World* report was published, I think the reaction of every HA and local authority was that Welsh Government would have to pay for most of the work needed to decarbonise the homes. I believe most HAs now recognise that Welsh Government cannot pay for this, and they are actively exploring alternative funding streams in which a share of the value of energy savings is used to repay long-term off-balance sheet lending. Welsh Government can support this by removing, with appropriate safeguards, any obstacles that exist to a housing association becoming its tenants' energy provider and receiving a proportion of the value of the energy savings.

I am not aware of similar efforts by local authorities but perhaps they too are exploring alternative funding streams. Given how under-resourced many LAs are, I would have liked to see DBW taking a lead here, but I am unaware of any such activity. DBW is in the early stages of exploring new funding streams for owner occupiers.

5. *To what extent does the Welsh Government have a clear picture of the skills currently available in Wales, and the skills needed to decarbonise at scale?*
It is very hard to tell if it has a clear picture. It is obvious that Wales will need people to insulate our homes and people subsequently to install low carbon heating in them. I have provided Welsh Government with estimates (by others) for what this would mean both for the whole of Britain and for the Vale of Glamorgan. Welsh Government also knows that Wales needs more surveyors to capture the necessary data about our homes and more people to use that data to assess what each home needs to set it on its journey to net zero. Lack of surveyors and a national survey programme are the immediate blockers to progress.

   Even if Welsh Government does have a clear picture, HE/FE colleges will not provide the necessary courses unless they believe there is a pipeline of work that will create the demand for sufficient training to justify the investment required to create the training. Such a pipeline of work requires a) social landlords to solve their funding challenge and b) an environment in which private homeowners are beginning to decarbonise their homes in large numbers.

   Accompanying this response is a list drawn up by London South Bank University of retrofit skills that it believes will be needed across the UK:
   LSBU RETROFIT SKILLS - DEFINITIVE LIST V2.pdf

6. *To outline any discussion with the Welsh Government about the creation and funding of an independent quality assurance regime for retrofit measures.*

   In 2015 UK Government commissioned the *Each Home Counts* (ECH) review. The ECH review called for the establishment of an industry-wide Code of Practice, which resulted in the publication of *PAS 2035 Retrofitting buildings for improved energy efficiency – Specification and guidance*. PAS 2035 is not a new BSI Standard; it is a framework for retrofit project delivery. It is intended to address the fundamental structural problems that have blighted many retrofit projects.

   I am unaware of any discussions that Welsh Government has had about the creation and funding of an independent quality assurance regime for retrofit measures. Having said that, ORP is trialling the use of PAS 2035 and in due course lessons will be learned that should inform the creation of a retrofit quality regime.

Owner-occupiers.

The Welsh approach to residential decarbonisation is to start with social sector plus fuel poverty. Why start with socially-owned homes and privately-owned homes in fuel poverty? Looking after the poorest and most vulnerable in society is not simply the right thing to do. It will benefit everyone, because upgrading 300,000+ homes by 2030 will give industry the confidence and the opportunity to invest, to train, to take on apprentices and new staff, to innovate, and to drive down costs. It will provide valuable data on how well different aspects work, which will aid continuous improvement.

The goal is that by the mid 2020s the retrofit 'offer' will be attractive to private homeowners, provided that action is taken to ensure that those people have the capability, opportunity and motivation to decarbonise their homes. We need decarbonising a home to be as easy, as desirable and as socially normal as having a new kitchen or bathroom.

There is no silver bullet - change at this scale requires a holistic approach that recognizes that the social and financial challenges are as important, if not more so, than the technical ones.

A focus solely on the actions of owner-occupiers, landlords and tenants neglects the important ways in which the behaviours of these groups are influenced by the actions of other actors in the energy system, such as banks, building societies, builders and builders' merchants, and others. To help design policies to bring about widespread retrofit it is necessary to adopt a systems approach that recognises the influences that the many different actors have on each other.

The UCL Centre for Behaviour Change has taught the advisory group powerful analytical techniques for identifying what needs to happen so that owner-occupiers and private landlords have the capability, the opportunity and the motivation to decarbonise their homes. These groups are important because between them they own over 80% of all homes in Wales and are responsible for well over 80% of all residential GHG emissions.

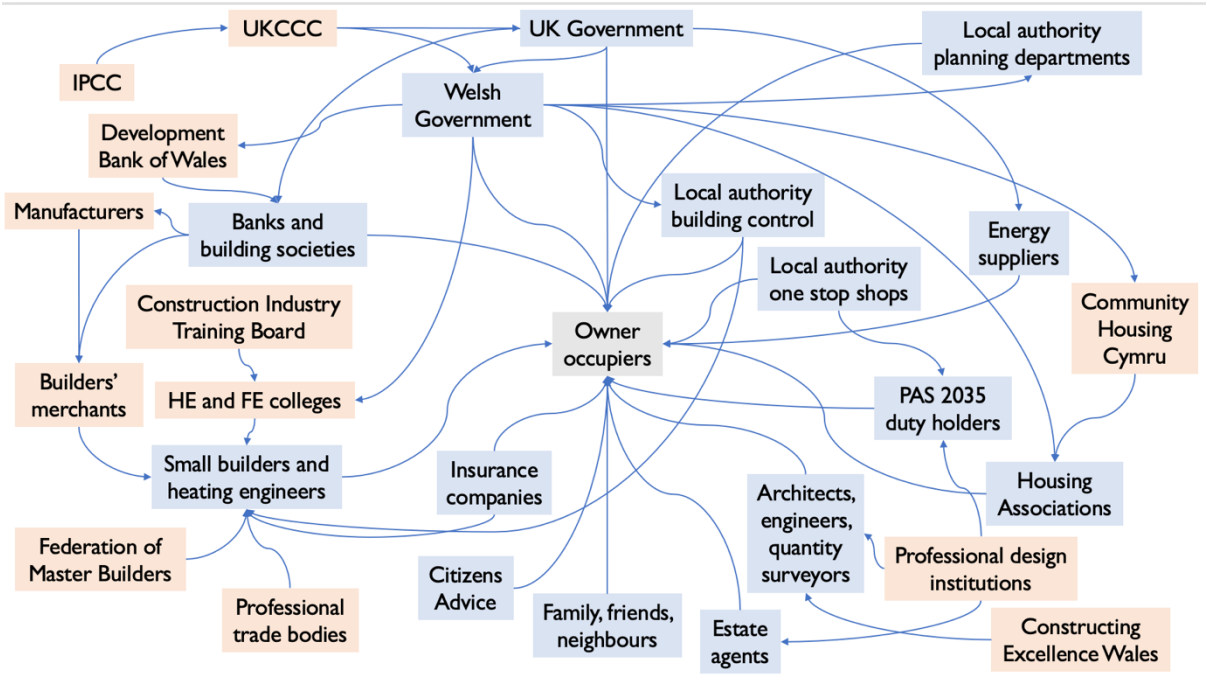


Figure 1. Example of retrofit systems map

The analytical work begins by acknowledging that people do not act in isolation. We are all influenced by the people and organizations with whom we interact. Figure 1 shows just some of the people and organizations that influence the behaviour of owner-occupiers. Those shaded in blue have a direct influence on owner occupiers, and those shaded in pale pink have an indirect influence. There was not room to include all the 'actors': for example, schools, churches, health boards, the Joint Contracts Tribunal and insurance companies, as well as the many voluntary, community and third sector organisations in Wales. The recent Blaenau Gwent Citizen's Climate Assembly has demonstrated how ordinary people can play an important role in determining local priorities.

Next, we need some way of deciding what we want these influencers to do. Fortunately, there is a tried and tested method, developed at UCL, that does just that, called the Behaviour Change Wheel. It informed the advisory group's policy recommendations for Welsh Government, and we now need to use it to identify who needs to do what.

Figure 2. Michie, S., Atkins, L. & West, R. (2014) The Behaviour Change Wheel – A Guide to Designing Interventions

The Behaviour Change Wheel uses a model of human behaviour called COM-B, which is an established behavioural science framework to understand the influences on behaviours and develop interventions to change them. Originally developed in the healthcare sector, it is

described in Michie et al (2014)[1]. Its application to retrofit is described in Wilson and Marselle (2016)[2], Murtagh et al (2020)[3] and Simpson et al (2021)[4].

The method begins by identifying a target group whose behaviour we wish to change, and what it is we want them to do differently. The retrofit system map in Figure 1 has owner-occupiers at its centre, but it could just as easily have small builders, or banks, or local authorities.

COM-B

COM-B identifies three factors that need to be present for any ***B***ehaviour to occur: ***C***apability, ***O***pportunity and ***M***otivation. (In this it's no different from crime fiction, in which the detective always looks for the person who had the means, motive and opportunity).

Capability refers to a person's physical (strength, dexterity) and psychological attributes (understanding, memory).

Opportunity refers to attributes of the physical environment (finances, policy content, material resources) and the social environment (social norms, culture).

Motivation refers to the reflective (beliefs, identity) and automatic psychological processes (habits, emotions) that drive a behaviour when the capability and opportunity are present.

These three factors form an interacting system with behaviour (Figure 3). If just one of these is not in place, then the desired change will not occur. Therefore it is important not only to remove barriers to the behaviours required, but also put in place targeted enablers to support capability, opportunity and motivation where needed.

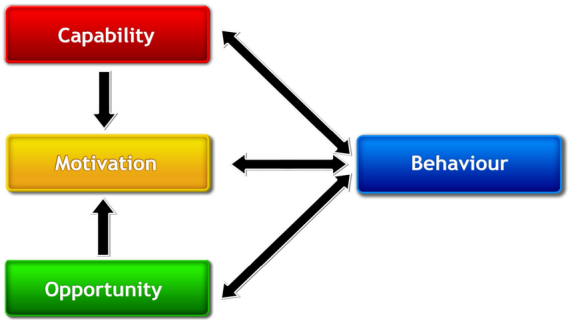


Figure 3. The COM-B model of behaviour.

[1] Michie, S., Atkins, L. & West, R. (2014) The Behaviour Change Wheel – A Guide to Designing Interventions

[2] Wilson, C. and Marselle, M. (2016) Insights from psychology about the design and implementation of energy interventions using the Behaviour Change Wheel. Energy Research & Social Science 19, 177–191

[3] Murtagh, N. Simpson, K and Owen, A. (2020) Beyond drivers and barriers: a theoretical framework addressing the engagement of UK construction practitioners in retrofit for energy-efficiency. SEEDS International Conference 2020.

[4] Simpson, K., Murtagh, N. and Owen, A. (2021) What motivates building repair-maintenance practitioners to include or avoid energy efficiency measures? Evidence from three studies in the United Kingdom. Energy Research & Social Science Volume 73. https://doi.org/10.1016/j.erss.2021.101943

The COM-B process
This has three stages, but for the sake of brevity only the first two are included in the examples provided.

Stage 1: Understand the behaviour
Step 1. Define the problem in behavioural terms. This means being specific about the target individual, group or population and about the behaviour itself.
Step 2. List candidate target behaviours and select one. Local knowledge and research literature may help choose which to begin with, based on
a) the likely impact of the behaviour change
b) the ease of changing the behaviour
c) the likelihood that the behaviour change will impact other behaviours in a beneficial way
d) how easy it is to measure the extent to which the behaviour has changed.
Step 3. Specify the target behaviour in appropriate detail: who, what, when where, how often and with whom?
Step 4. Identify what needs to change in the individual, group or population and/or the environment. The more precise this can be, the better the analysis is likely to be.

In the first example, the target group is owner-occupiers, what needs to change is their willingness to borrow to pay for retrofit and the target behaviour is that they apply for an extension to their mortgages.

In the second example, the target group is small builders, what needs to change is their reluctance to undertake retrofit and the target behaviour is that they actively seek retrofit work.

Stage 2: Identify intervention options
Step 5. Identify interventions, which could be to maximise capability, opportunity or motivation.
Nine types of intervention are used in COM-B, and these are defined in Table 1 below.

Intervention type	***Definition***
Coercion	Changing the attractiveness of a behaviour by creating the expectation of an undesired outcome or denial of a desired one
Education	Increasing knowledge and understanding by informing, explaining, showing and providing feedback
Enablement	Providing support to improve ability to change in a variety of ways not covered by other intervention types
Environmental restructuring	Constraining or promoting behaviour by shaping the physical or social environment
Incentivisation	Changing the attractiveness of a behaviour by creating the expectation of a desired outcome or avoidance of an undesired one
Modelling	Showing examples of the behaviour for people to imitate
Persuasion	Using words and images to change the way people feel about a behaviour to make it more or less attractive
Restriction	Constraining performance of a behaviour by setting rules
Training	Increasing the skills needed for a behaviour by repeated practice and feedback

Table 1. Definitions of intervention types

Guidance is provided in Wilson and Marselle (2016) about which interventions impact which aspects of capability, opportunity and motivation.

Step 6. Identify actions by the public sector and others that support the interventions.
Nine types of action are used in COM-B, and they are defined in Table 2 below.

Public sector actions	***Typically characterised by***
Communications and marketing	Mass media campaigns, digital marketing campaigns, and correspondence
Environmental and social planning	Architecture, urban and rural planning, object and location design, and planning for housing, social care, employment, equality, benefits, security and education
Fiscal measures	Use of taxation, tax relief and financial incentives
Guidelines	The development and dissemination of documents that make evidence-based recommendations for action in response to defined situations
Legislation	Use of laws, bylaws and similar legislative instruments to set the boundaries for acceptable behaviour with penalties for infringement
Regulation	Development and implementation of rules regarding behaviour that instruct the behaviour and possibly provide rewards and punishments for conforming
Service provision	Provision of services, materials and/or social resource and aids, whether they be structured or ad hoc, financed or unpaid

Table 2. Public sector actions to support interventions

Stage 3: Identify content and implementation options
This stage contains two more steps, the identification of what behaviour change techniques to employ and their modes of delivery. While these are important steps, for the sake of brevity they have been omitted in the worked examples.

Worked examples
The two worked examples are:
1. Welsh homeowner applies for extension to mortgage to pay for retrofit – see Homeowner mortgage example.pdf
2. Small builder actively seeks retrofit work – see Small builder example.pdf

They can be read both from left to right and from right to left.

To understand their creation, they should be read from right to left, beginning with the target behaviour. Adjacent to the target behaviour are the capabilities, opportunities and motivations that would support the target behaviour. To the left of those are some interventions to provide the necessary capabilities, opportunities and motivations, plus suggestions of the organisations that could intervene. And finally, on the left-hand side of the diagram, are some suggested actions by, mostly, the public sector, to support/facilitate/mandate the interventions.

To understand their operation, they should be read from left to right: work begins with actions by the public sector; these influence other actors, such as banks and building societies,

whose interventions, either directly or indirectly, influence owner-occupiers, small builders and other target groups.

A methodical approach requires that all target behaviours by all groups are identified, followed by their COM-B analyses. As the two examples show, there will be a great deal of commonality, particularly in the actions required by the public sector.

Chris Jofeh 13 October 2021

Supporting actions by public sector → Interventions → Factors required for behaviour to occur → Target behaviour

Service provision
Ensure adequate numbers of suitably-qualified consultants, builders and installers – *Training colleges*
Provide contact information for local suitably-qualified professionals. *LA one-stop-shops*

Communication
Media campaigns to communicate the importance and benefits of improving the energy efficiency of a home, and showing a homeowner what steps to follow:
National and international benefits - *WelshGov*
Local and personal benefits and what steps to follow – *LAs and RSLs*

Guidelines
Develop and disseminate recommendations for actions by LAs and others – *WelshGov*

Environmental and social planning
Develop 'pattern books' showing locally-appropriate external energy efficiency measures (including finishes) that do not require planning permission – *LA planners with local architects*
Commission and make available an all-Wales building stock model – *WelshGov*
Commission research and disseminate findings on critical technical issues including embodied carbon and ASHP refrigerant best practice – *WelshGov*

Legislation
Set mandatory residential minimum energy efficiency standards to be enforced by 2030 and 2040 – *WelshGov*

Regulation
Oblige estate agents and letting agents to provide energy cost information – *WelshGov*
Define retrofit quality regime – *WelshGov, FMB, professional institutions, RSLs*
Define conditions under which social landlords may benefit from metered energy savings - *WelshGov*

Fiscal measures
Allocate to Wales sufficient money from the Shared Prosperity Fund to enable decarbonization of l households in fuel poverty – *UKGov*
Provide clarity about long-term funding arrangements, including creation of a Wales Energy Service Company – *WelshGov*
Provide guarantees that reduce the interest rates charged on loans for energy efficiency improvements – *Development Bank of Wales*

Education
Provide information about the steps to be followed, likely costs and availability of grants – *Citizens Advice, banks, building societies, LA retrofit one-stop shops, builders' merchants, small builders & heating engineers*
Provide information on suitably qualified retrofit consultants, builders and installers – *LAs, builders' merchants*
Publish guidance for social landlords - *CEW*

Enablement
Undertake survey and assessment, prepare design – *PAS2035-qualified professional*
Cost the work– *Quantity surveyors, small builders, heating engineers*
Provide advice on planning and building control – *Citizens Advice, LAs, architects, small builders, builders' merchants*
Provide advice on grant availability – *WelshGov, LA retrofit one-stop-shops*
Create standard contract between homeowner and RSL for the RSL to deliver energy efficiency improvements – *FMB, JCT and CHC*
Create standard homeowner/small builder contact – *FMB and JCT*

Persuasion
Communicate the importance and benefits of retrofit –*WelshGov, LAs, mortgage providers, estate agents, health boards*

Modelling
Show examples & outcomes of an owner-occupier going through the retrofit process – *LA retrofit one-stop shops, Citizens Advice*
Show examples & outcomes of a private landlord going through the retrofit process – *National Landlords Association*
Show examples & outcomes of a small builder/heating engineer going through the retrofit process – *CEW, FMB*

Environmental restructuring
Contact each homeowner with data that shows how their home's energy efficiency compares with others in the neighbourhood, and what its potential is – *LAs*
Demonstrate value of metered energy savings for landlords – *GFI/CEEB/CHC*
Offer low interest loans for energy efficiency upgrades – *Financial institutions*

Incentivisation
Publish data showing the effect that improving energy efficiency has on the sales price of a home – *WelshGov, RICS*

Coercion
Campaign that describes harmful consequences for our children and grandchildren if we do not tackle climate change - *WelshGov*
Provide likely energy cost information when a property is offered for sale or rent – *Estate agents and letting agents*

Restriction
Write to homeowners describing the steps that must be followed if they are to be considered for an extension to their mortgage to pay for energy efficiency improvements – *Mortgage providers*

Capability
Homeowner knows why improving a home's energy efficiency is important
Knows the steps to be followed (survey, assessment, design, arrange finances, appoint contractor)
Knows how to carry out each step

Opportunity
Homeowner has time to improve the home's energy efficiency
Can afford to do it
Knows others who are doing it
Has triggers to prompt action
Has LA and WelshGov support

Motivation
Homeowner wants to improve the home's energy efficiency
Needs to do it (cares about negative consequences of not doing it)
Believes it would be a good thing to do
Draws up a plan for doing it
Anticipates greater comfort, bill savings and possibly enhanced property value

Homeowner applies for extension to mortgage to pay for retrofit

Key
Actions in regular text
Possible actors in italics
CEW – Constructing Excellence Wales
CHC – Community Housing Cymru
FMB – Federation of Master Builders
GFI/CEEB – Green Finance Institute/Coalition for the Energy Efficiency of Buildings
JCT – Joint Contracts Tribunal
LA – Local authority
RSL – Registered social landlord

Supporting actions by the public sector → Interventions → Factors required for behaviour to occur → Target behaviour

Service provision
Ensure adequate numbers of competent consultants, builders and installers – *AoC, CITB, DfE, GAAP/IfATE, GJT, HE/FE colleges*
Provide contact information for local competent consultants, builders and installers – *LAs, builders' merchants*

Guidelines
Develop and disseminate recommendations for retrofit actions by local authorities and others – *UKGov, devolved administrations*

Fiscal measures
Allocate to HAs and LAs sufficient money to enable decarbonization their homes and to resource Building Control for enhanced retrofit role – *UKGov*
Provide clarity about long-term funding arrangements – *UKGov*
Provide guarantees that reduce the interest rates charged on loans for energy efficiency improvements – *National Infrastructure Bank*
Extend Enhanced Capital Allowances to fabric and heating measures for privately-rented properties – *H M Treasury*

Regulation
Oblige, with penalties for non-compliance, estate agents and letting agents to provide standard energy cost information when a home is offered for rent or sale – *UKGov, devolved administrations*
Define retrofit quality regime suitable for small builders working on homes – *UKGov, devolved administrations, FMB, professional institutions*
Define conditions under which social landlords may benefit from metered energy savings – *UKGov, devolved administrations*
Require building renovation passports to be provided by, say, 2030 when a home is offered for sale – *UKGov, devolved administrations*

Communication
Conduct media campaigns to communicate the importance and benefits of retrofit, and showing a homeowner and a builder what steps to follow:
National and international benefits – *UKGov, devolved administrations*
Local and personal benefits and what steps to follow – *LAs, Royal Institution of Chartered Surveyors, building societies, banks*

Legislation
Set mandatory residential minimum energy efficiency/carbon emission standards to be enforced by, say, 2030, 2040 & 2050 – *UKGov, devolved administrations*

Environmental/social planning
Mandate and assist LAs to define the acceptable appearance of external energy efficiency measures – *Chief planners in each nation*
Commission and make available building stock models for every LA that requests one – *UKGov, devolved administrations*
Commission research and disseminate findings on critical technical issues including embodied carbon and ASHP refrigerant best practice – *UK research bodies*

Education – *AoC, CITB, DfE, GAAP/IfATE, GJT, HE/FE colleges and community energy organizations, national retrofit organizations, professional institutions, trade bodies, FMB*
Topics to include: the importance and many benefits of residential decarbonisation, why good data about a home is important, the meaning of net zero, setting appropriate targets for a home, what can be done to decarbonize a home, potential costs, avoiding waste, grid decarbonisation, PAS 2030 & PAS 2035, Energy Company Obligation and funding mechanisms in Scotland

Training – *AoC, CITB, DfE, GAAP/IfATE, GJT, Local HE/FE colleges and community energy organizations, national retrofit organizations, professional institutions, FMB*
Topics to include: working across trade boundaries, accessing knowledge, how to keep learning and developing, PAS 2030, domestic energy efficiency assessor and retrofit coordinator

Enablement
Lead work to define a national standard for building renovation passports – *Green Finance Institute*
Prepare building renovation passports – *Retrofit coordinators employed by local community energy organizations, national retrofit organizations, private consultants and small builders*
Arrange pilots/field trials of new funding models with early adopters – *Green Finance Institute, NIB, DBW, SNIB*
Provide retrofit financial advice - *Citizens Advice, banks, building societies, accountants*
Provide new retrofit funding models – *Banks, building societies, supported by NIB, DBW, SNIB*

Persuasion - *LAs, Local health trust/board, Local chamber of commerce, FMB*
Show how undertaking retrofit work will benefit the builder, its staff, its customers and the local community
Create annual local retrofit award schemes that celebrate best practice
Provide information from credible sources that builders would look up to
Show SMEs and homeowners examples of successful residential retrofits

Environmental restructuring
Develop 'pattern books' showing locally-appropriate external energy efficiency measures (including standard construction details and preferred finishes) that do not require planning permission – *LA planners with local architects and engineers, professional institutions, FMB, trade bodies*
Publish standard homeowner/builder contracts for retrofit – *Joint Contracts Tribunal*
Host stock models that enable builders and suppliers to gauge potential local demand for goods and services – *LA, builders' merchants*
Fund and staff Building Control to provide retrofit advice and quality control – *LAs*
Provide support for small builders completing accreditation paperwork – *FMB, builders' merchants*
Provide a steady and assured pipeline of work in the early years – *LAs, HAs*
Manage/facilitate work on behalf of private landlords and owner-occupiers - *HAs*

Incentivisation
Create annual regional and national award schemes for retrofit projects – *Constructing Excellence, BEIS*
Research, field trial and, if successful, roll out council tax/stamp duty changes to encourage decarbonisation – *UKGov, devolved administrations*

Coercion – *BEIS, devolved administrations, LAs*
Explain harmful consequences for the community and nation, if we fail to decarbonize

Restriction – *UKGov, devolved administrations, LAs*
Define enduring policies, set outcomes to be achieved and target dates
Mandate processes to be followed where public money is involved
Defines interim requirements, such as:
- Fabric first
- At no stage may a tenant's bills increase as a result of work done to their home.

Modelling - *LAs, Constructing Excellence, FMB, trade bodies*
Provide examples from credible sources that small builders would look up to

Capability
Small builder:
- knows why decarbonisation is important
- knows that residential retrofit is an important part of decarbonisation
- knows where to seek advice
- knows how to carry out the work well

Opportunity
Small builder:
- knows there is a good demand for residential retrofit
- has time and budget to train staff and seek retrofit work
- has the necessary tools to do the job
- knows others who are doing it successfully
- has triggers to prompt action
- has support from others

Motivation
Small builder:
- wants to undertake retrofit
- cares about negative consequences of not doing so
- believes that it would be a good thing to do
- believes that it can deliver a pipeline of profitable work
- develops a plan for winning more retrofit work
- develops a habit of carrying out retrofit work

Small builder actively seeks retrofit work

Key
Actions in regular text
Possible actors in blue italics

Acronyms:
AoC – Association of Colleges
BEIS – Department for Business, Energy and Industrial Strategy
CITB – Construction industry Training Board
DBW – Development Bank of Wales
DfE – Department for Education
FMB – Federation of Master Builders
GAAP – Green Apprenticeships Advisory Panel
GJT – Green Jobs Taskforce
HA – Housing association
IfATE - Institute for Apprenticeships and Technical Education
LA – Local authority
NIB – National Infrastructure Bank
SNIB – Scottish National Investment Bank

Retrofit Skills - a definitive list of retrofit roles

Data compiled from a variety of academic and non-academic sources; list published in Retrofit Skills: Building the local net zero workforce in the Borough of Lambeth; P Palmer & A Gillich, Revised April 2022

MANAGEMENT

Administrators
Funding / bid managers
Procurement managers
Project Managers
Sustainability Managers within HA/LA

PLANNING / REGS

Net zero planning
- New build
- Refurbishment
- Retrofit

Circular economy / materials

ADVISORY SERVICES

Citizen campaign developers
Energy efficiency advisors
Customer service / support agents
Financial advisors
Sales representatives
Quality Assurance advisors

TRAINING

Retrofit project management
Low carbon systems training
Heat pump installation training
Inter-trade training
Whole of house training
Retrofit supervisor training

DESIGN

Masterplanning (inc urban greening / climate proofing)
Architects
Building services
Retrofit programme designers

ASSESSORS

Energy assessors
Retrofit assessors
Retrofit co-ordinators
(PAS2035 compliant)

GREEN FINANCE

Green loan / mortgages
- Product development
- Underwriters
- Advisors
- Administrators

RETAIL / TRADE

Key account managers
Retrofit materials advisors
Material collect / recycle/ grade
Re-use & refurb / material suppliers

Retail / trade supply staff

MANUFACTURING

Innovation / funding specialists
Sustainable material developers
HP / PV / battery manufacturers
Insulation manufacturers
Glazing and timber manufacturers
Heat pump distribution

ENERGY

Energy services / tariff designers
Heating engineers
- Gas intall / convert
- Air-source HP installers
- Ground source HP installers
- Hydrogen boiler installers

Solar Thermal / PV installers
Building services engineers
Plumbers
Electrical engineers
Mechanical ventilation engineers
EV charging installers

FABRIC

Bricklayers
Wood & interior carpenters
Double glazing installers
Plasterers
Rooters
Floor layers
Insulation installers
- Cavity wall
- External wall
- Underfloor
- Loft

Drillers
Scaffolders
Sustainable draining

MAINTAIN & MONITOR

Maintenance / conversion
- legacy systems
- New / low carbon systems

Smart meter installers
Digital twinning
Data system design and analysis
Soft landings specialists
Facilities management
Technical monitors

Further information provided by Christopher Jofeh:

PACE loan repayments:
Repayments are collected by the Local Authority via an additional charge on existing property tax (e.g. Council Tax or Business Rates).

Attached is a document prepared by the Green Finance Institute that provides more information about PACE loans.

Publications provided by Christopher Jofeh

The health impacts of energy performance investments in low-income areas: a mixed-methods approach
Wouter Poortinga, Sarah E Rodgers, Ronan A Lyons, Pippa Anderson, Chris Tweed, Charlotte Grey, Shiyu Jiang, Rhodri Johnson, Alan Watkins and Thomas G Winfield

Health impact, and economic value, of meeting housing quality standards: a retrospective longitudinal data linkage study
Sarah E Rodgers, Rowena Bailey, Rhodri Johnson, Wouter Poortinga, Robert Smith, Damon Berridge, Pippa Anderson, Ceri Phillips, Simon Lannon, Nikki Jones, Frank D Dunstan, Jonathan Morgan, Sandra Y Evans, Pam Every and Ronan A Lyons