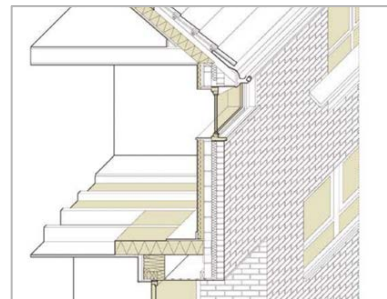
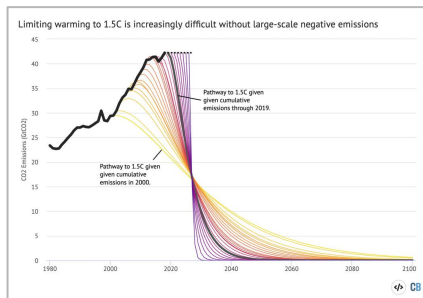


# Whole House Retrofit



Matthew Clubb  
Passivhaus Designer & Retrofit Coordinator

# Content

Matthew Clubb

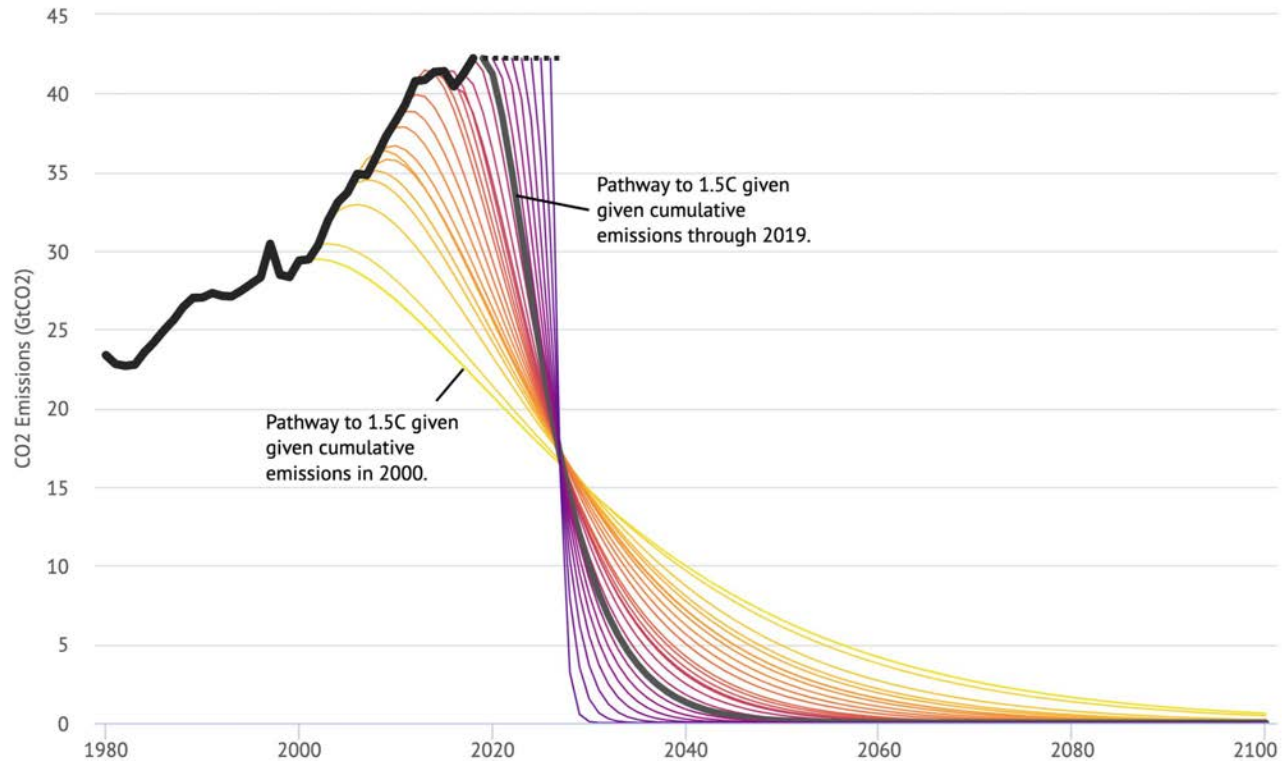
Architectural Designer  
Aberdeenshire



- Why whole house retrofit?
- How to do it?
- The new Retrofit Standard
- Medium Term Retrofit Plan
- Finance & Advice

# Why Retrofit?

Limiting warming to 1.5C is increasingly difficult without large-scale negative emissions



# Why we need to retrofit

## Global carbon emissions from buildings 1970-2010

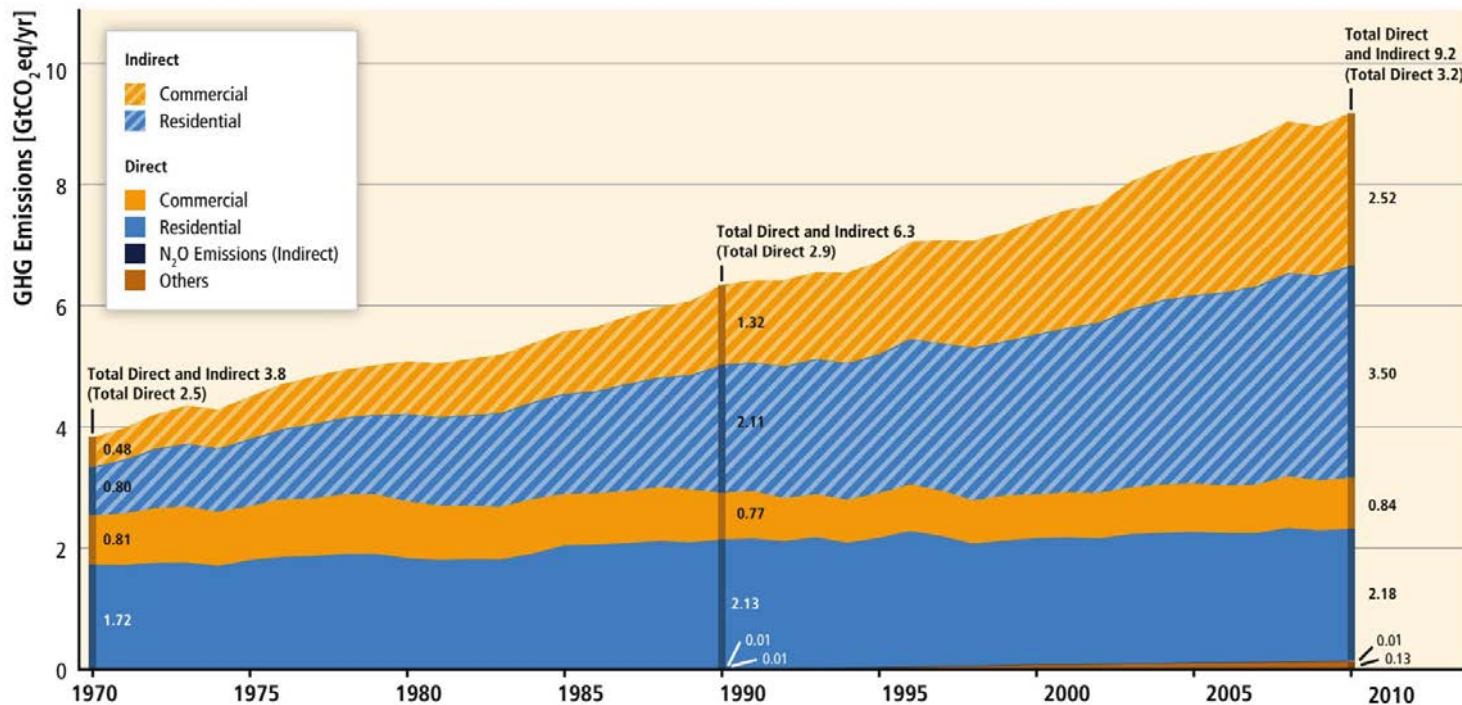
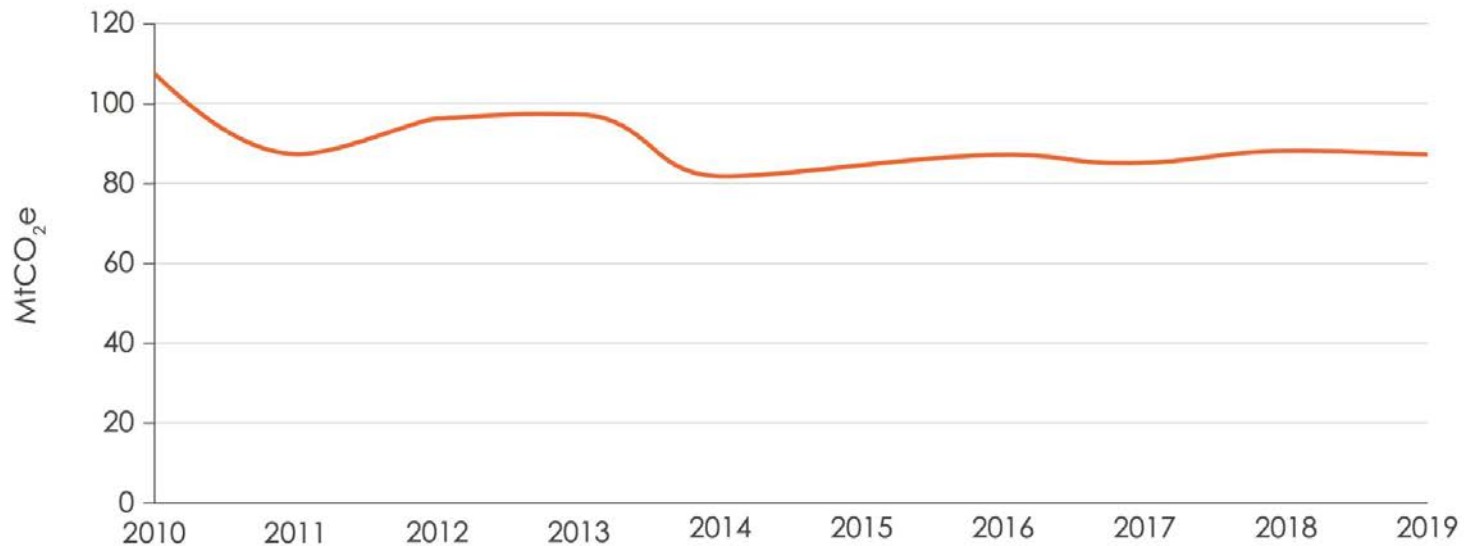


Figure 9.1 | Direct and indirect emissions (from electricity and heat production) in the building subsectors (IEA, 2012a; JRC/PBL, 2013; see Annex II.9).

# Why we need to retrofit

## UK Carbon emissions from buildings



**Figure 1.3** - Total annual emissions (direct and indirect) from UK buildings, 2010 to 2019, in MtCO<sub>2</sub>e. Source: UKCCC, Progress Report to Parliament, June 2020

# Why we need to retrofit

The big picture:

- 80% of the buildings that will exist in 2050 have already been built

The local picture:

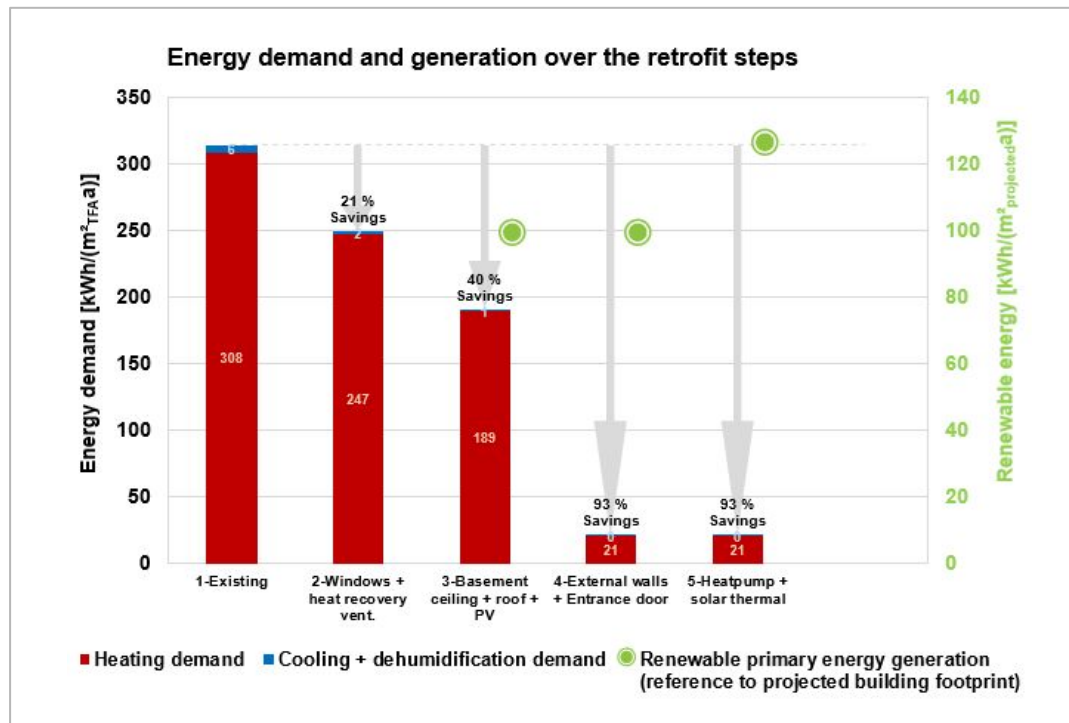
- In Aberdeen and Aberdeenshire 45% of homes have no wall insulation
- 25% of homes live in fuel poverty (energy more than 10% of income)

The physics:

- Renewable heating systems typically supply less heat than fossil fuel heating systems
- Switching to a heat pump, without assessing the energy consumption first, could push you into fuel poverty

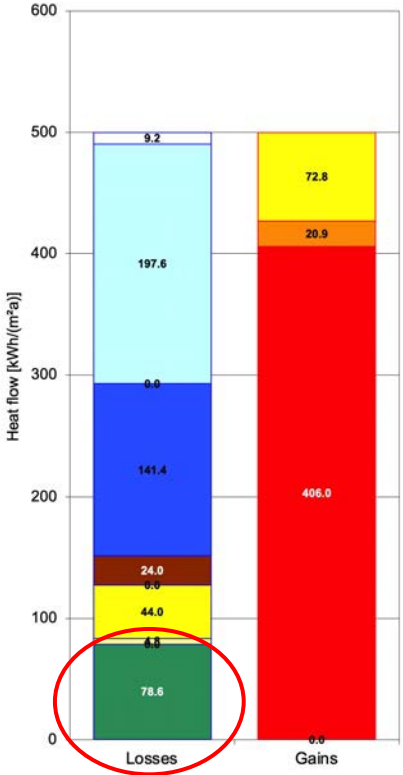
# What is possible

- Piecemeal measures will only get us so far
- To reduce our emissions a scientific approach is required
- Standards:
  - Scottish Building Standards Bronze, Silver, Gold
  - AECB CarbonLite
  - EnerPHit

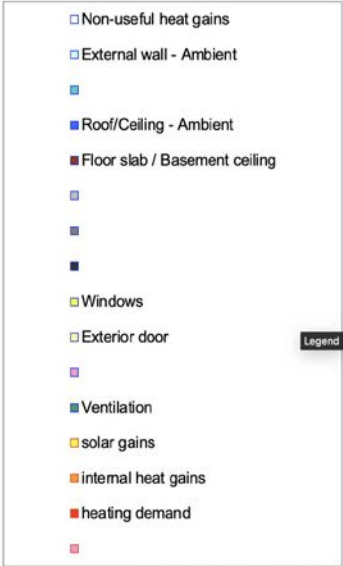
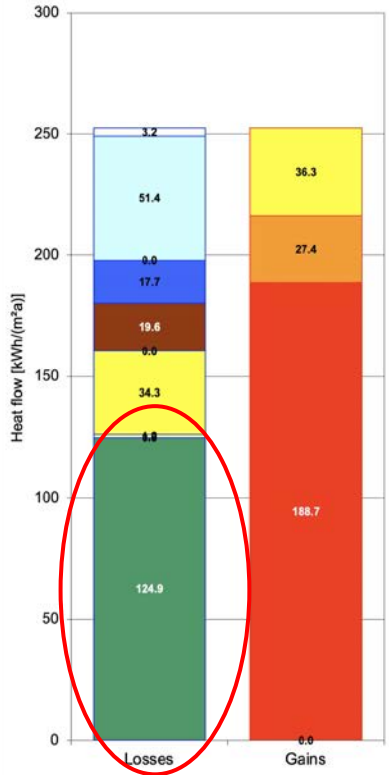


# Energy Loss Examples

End Terrace Granite Villa (Aberdeen)



1970s Bungalow (Aberdeenshire)



Ventilation losses can be significant



# Deep retrofit versus Shallow retrofit



## Deep retrofit

- Reduced carbon emissions
- Reduced renewable energy demand
- Reduced peak load
- Less grid storage required
- Significantly lower energy bills
- Improved health and comfort
- Effective heat pumps



## Shallow retrofit

- Reduced carbon emissions
- Large renewable demand
- Large peak demand
- More grid storage required
- Little change in energy bills
- Limited health benefits
- Sub-optimal heat pump performance

**Figure 1.12** - Comparison of percentage of energy demand reductions and associated co-benefits from shallow and deep retrofits.

# The benefits of good retrofit

## Homeowner

- Lower energy bills
- More comfortable home
- Better indoor air quality
- A more valuable home
- A more resilient home
- Lower carbon footprint

## Society

- Less fuel poverty
- More local low-carbon jobs
- Lower infrastructure costs
- Less demand on the grid
- Lower health care costs

Payback alone, is a difficult argument

# How to do it

- Retrofit has risks
- Attention to detail is important!
- Beware unintended consequences!

Damp - Mould - Condensation



Stale Air



Structural Problems



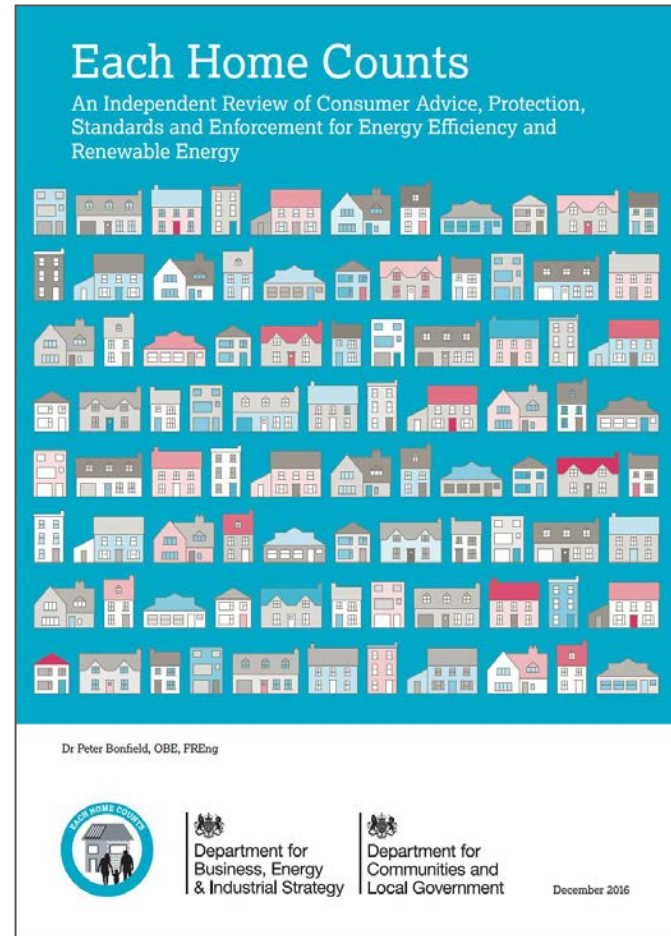
# Government Review

Commissioned to investigate industry failings

Key recommendation:

A quality mark to:

- A Consumer Charter which ensures that all consumers receive excellent levels of customer service, a clear redress process and guarantee protection
- A Code of Conduct which sets out how companies behave, operate and report, the requirements of which must be met or exceeded for the company to operate;
- Codes of Practice which are relevant to the installation of each measure under consideration so that the risk of poor quality installation is minimised



# A new standard

## PAS2035: Whole House Retrofit

- Quality Compliance Standard for Retrofit
  - Occupiers are at the centre of the process
  - Every project is assigned their own Retrofit Coordinator
- 
- Adopted for the Green Homes Grant Scheme
  - Adopted for the ECO grants
  - Scottish Government are adopting



# Whole House Retrofit Design

## Fabric First!

Insulation is the cheapest energy efficiency

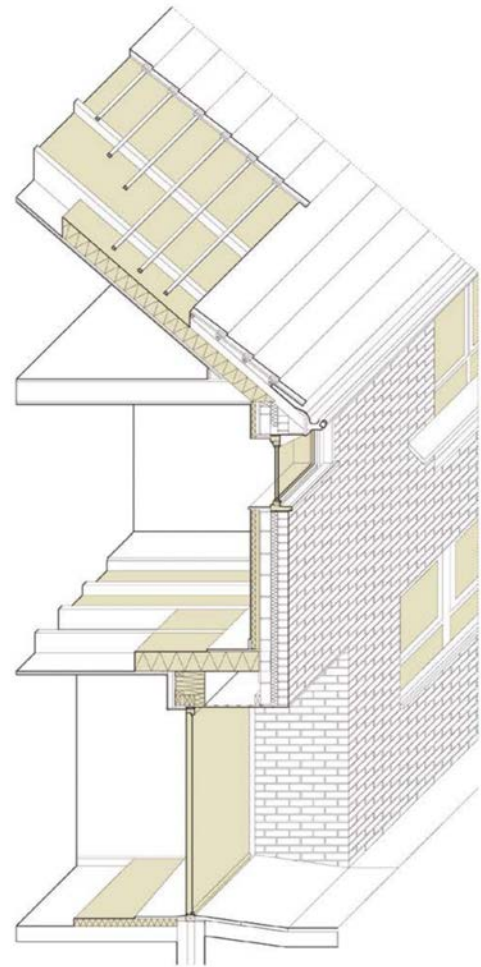
Focus on the junctions to reduce thermal bridges

## If you insulate, you must ventilate!

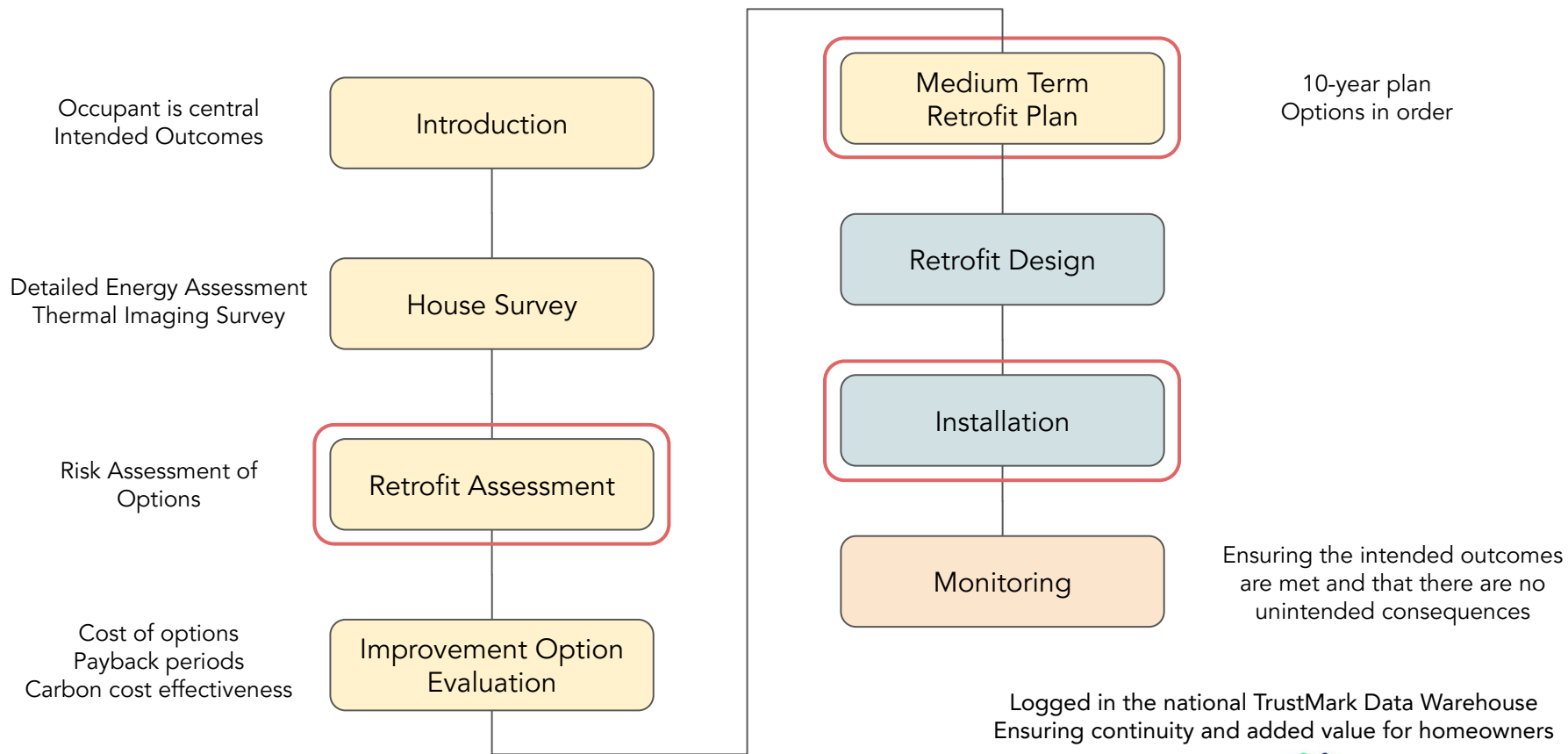
Mechanical ventilation systems can transform indoor air quality

## Renewable Energy Systems

The last step!

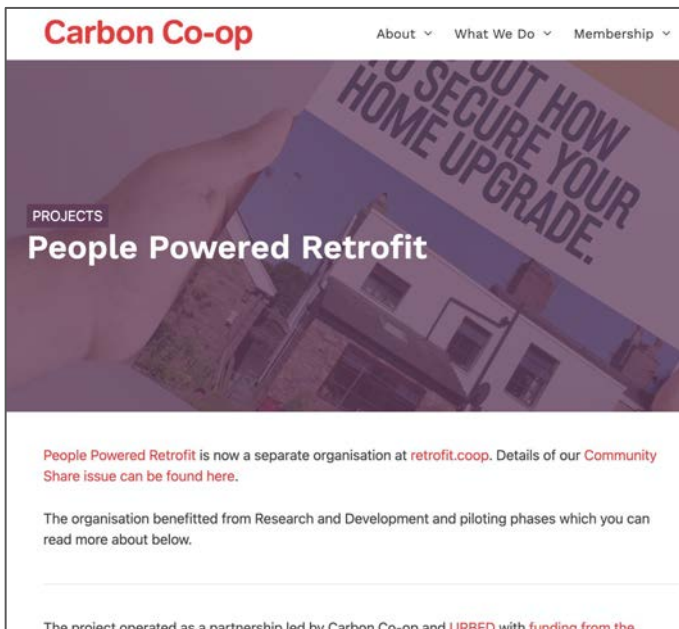


# The Whole House Retrofit Process





# Projects underway



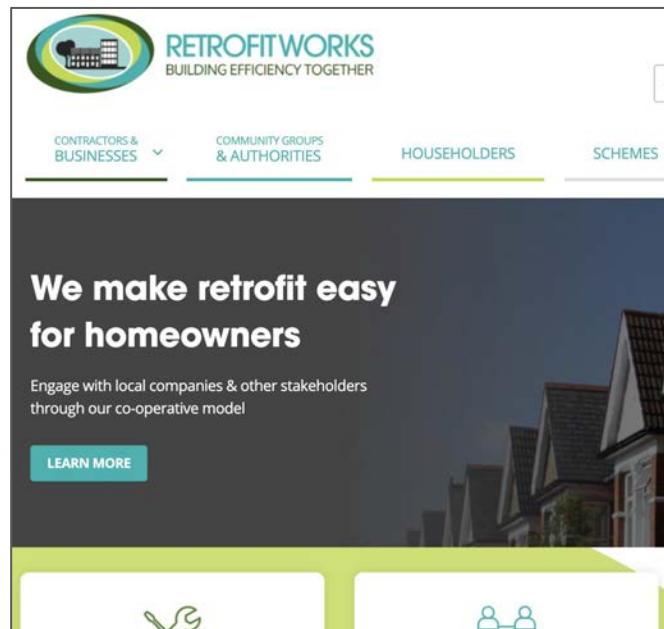
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**PROJECTS**  
**People Powered Retrofit**

People Powered Retrofit is now a separate organisation at [retrofit.coop](#). Details of our [Community Share](#) issue can be found [here](#).

The organisation benefitted from Research and Development and piloting phases which you can read more about below.

The project operated as a partnership led by Carbon Co-op and LIBBED with funding from the



**RETROFITWORKS**  
BUILDING EFFICIENCY TOGETHER

CONTRACTORS & BUSINESSES ▾ COMMUNITY GROUPS & AUTHORITIES HOUSEHOLDERS SCHEMES ▾

**We make retrofit easy for homeowners**

Engage with local companies & other stakeholders through our co-operative model

[LEARN MORE](#)

For homeowners not eligible for ECO funding



# Finance

Average deep retrofit cost: ~£70,000

Many options are available:

- Fuel Poor households will receive support
- Community Funding arrangements
- Green bank loans/mortgages (e.g. Ecology Building Society)
- Mass retrofit arrangements (e.g. EnergieSprong)
- Local authority funding (e.g. equity loans)

# Homeowner Advice

Things to think about

- What are your ambitions?
- Are you in fuel poverty? (>10% income on heating)
- Are you considering other alterations to your home already?
- What level of disruption can you tolerate?
- What is your budget?
- Are there cold rooms or problems with damp and mould?
- How much do you value your health?

Start with a Retrofit Assessment (~£500) and a Medium Term Retrofit Plan

# Questions?

Please get in touch with any additional questions you may have

Matthew Clubb

[matt@mwclubb.co.uk](mailto:matt@mwclubb.co.uk)

[www.mwclubb.co.uk](http://www.mwclubb.co.uk)

mwclubb

Architectural Design

