2012 “The biosphere is being wrecked, we are on a trajectory to a ‘worst case climate change scenario’ and our leaders are failing us.....”

2013 “The biosphere is being wrecked, we are on a trajectory to a ‘worst case climate change scenario’ and our leaders – and our systems of governance - are failing us.....”

2014 “The biosphere is being wrecked, we are on a trajectory to a ‘worst case climate change scenario’ and our leaders – and our systems of governance - are failing us.....”

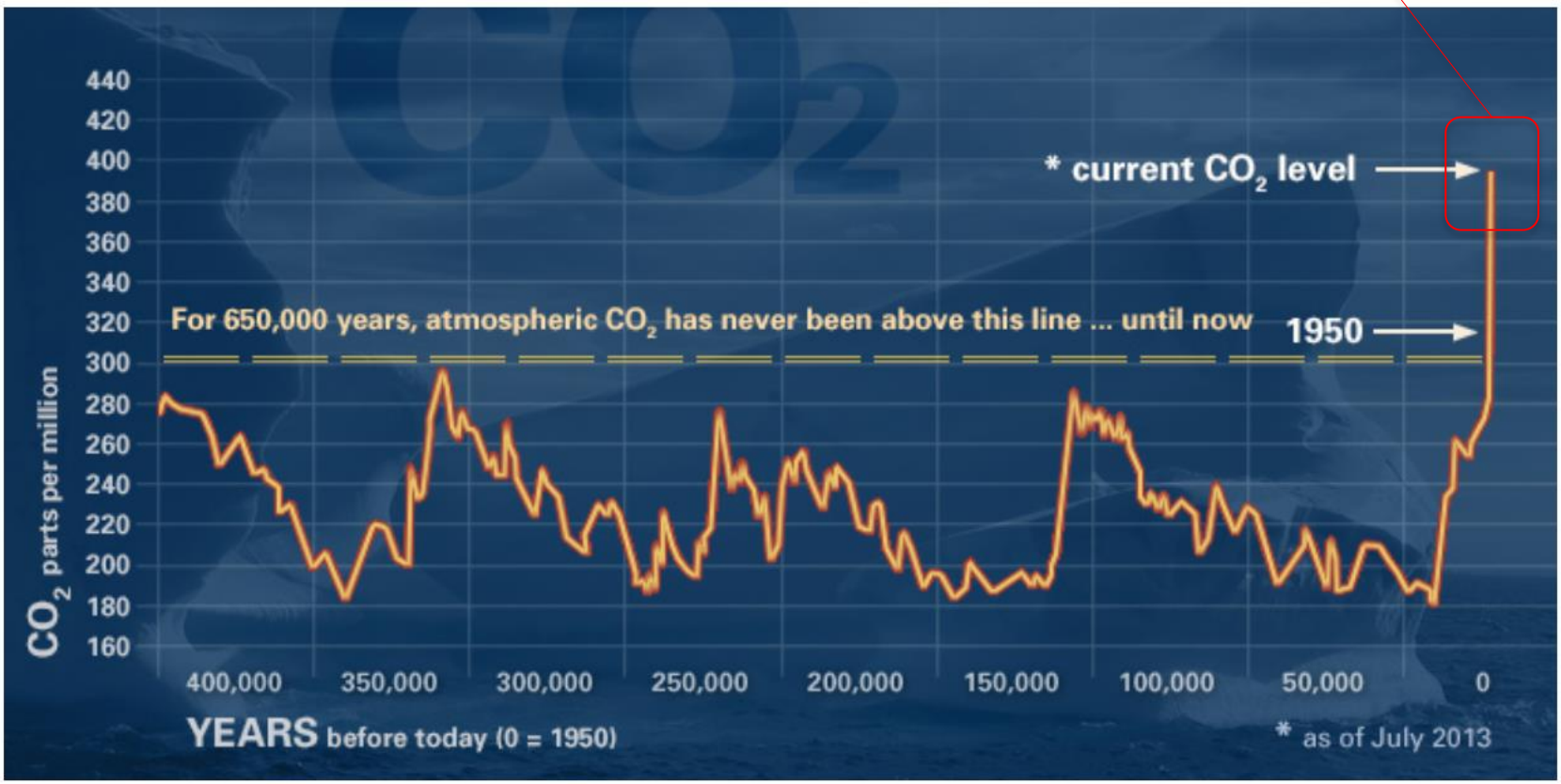
2015 “The biosphere is…

Our Generation’s Challenge

- **Preserving a climate fit for civilisation**
- **Adapting to already irreversible changes**
- **Tackling inequality…and other stuff**

CO_2 concentrations 650,000 years ago to today

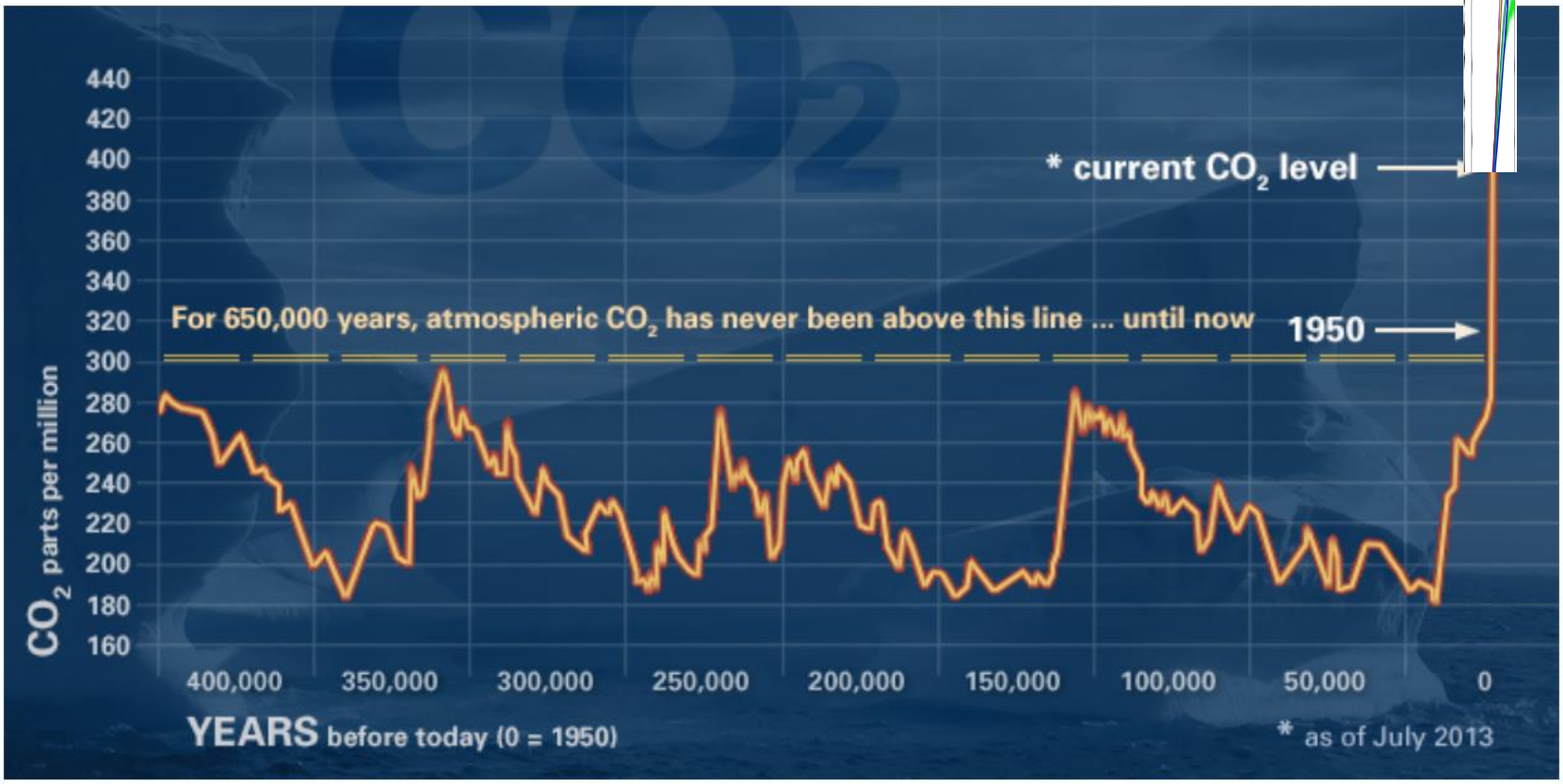
Where from here?



This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO_2 has increased since the Industrial Revolution. (Source: NOAA)

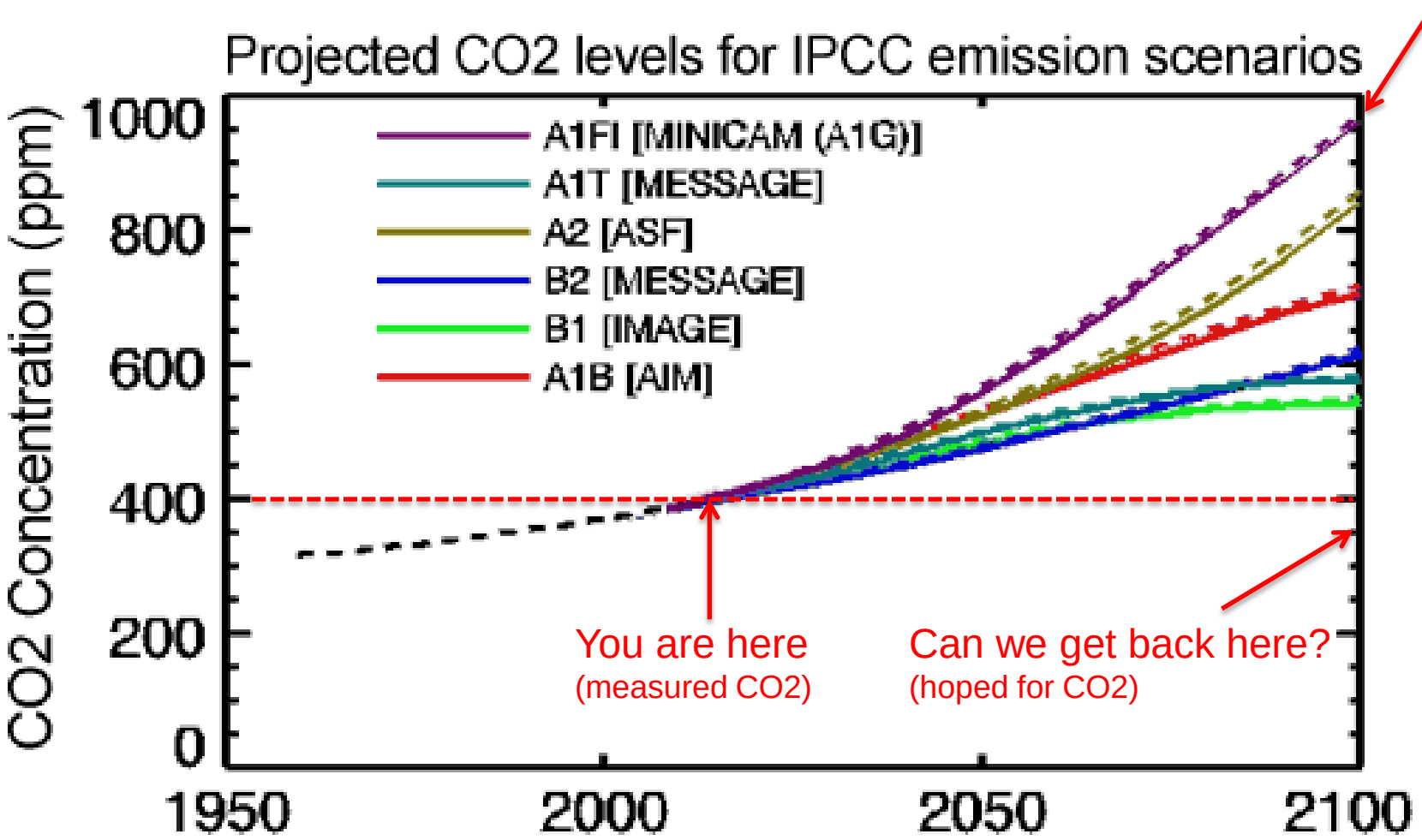
c. 1000 ppm ?

CO_2 concentrations 650,000 years ago to today

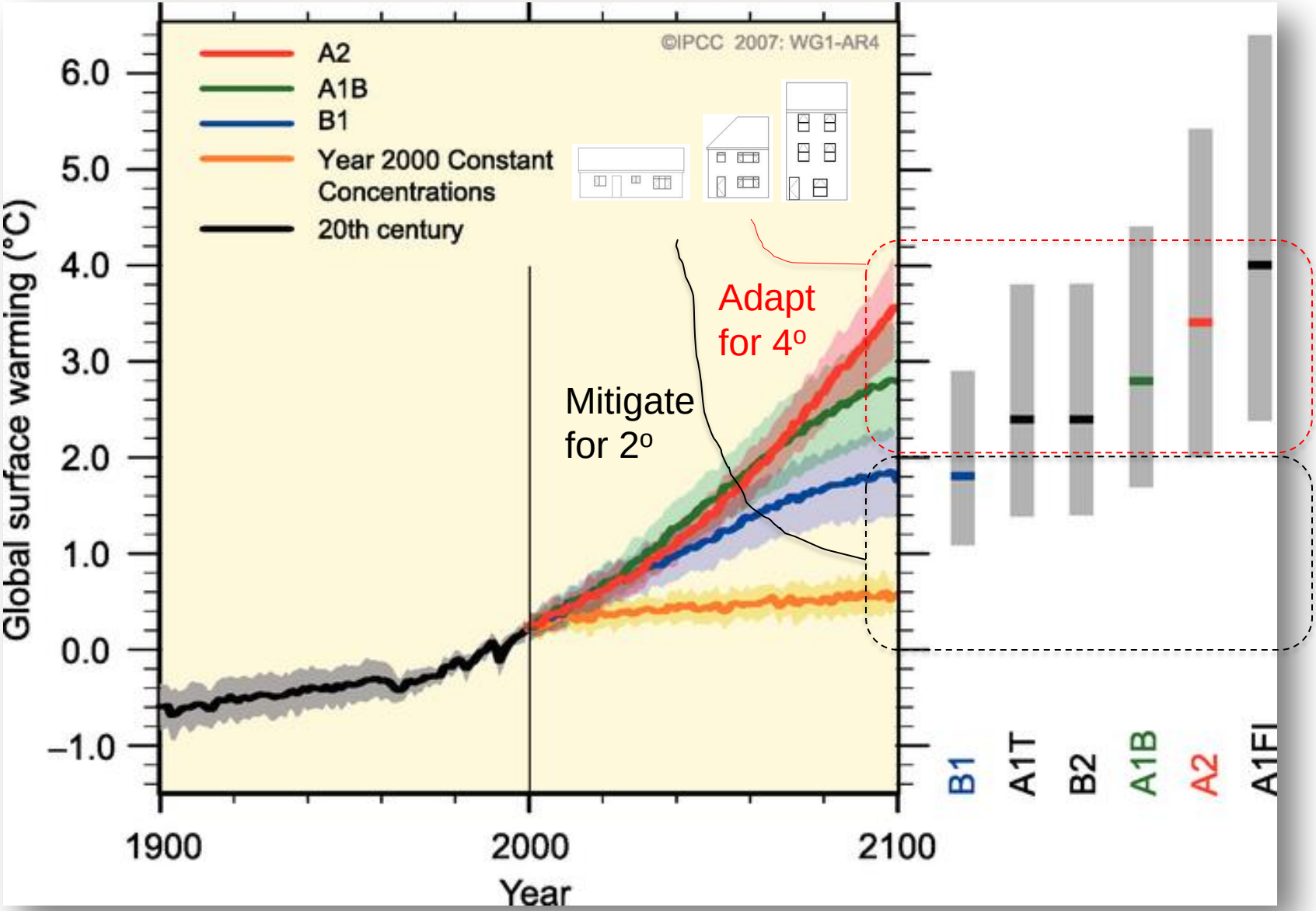


This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO_2 has increased since the Industrial Revolution. (Source: NOAA)

Could be heading here
(predicted CO2)



http://www.skepticalscience.com/print.php?r=332



http://www.skepticalscience.com/print.php?r=332

CO_2

Following the 'business as usual' approach (Scenarios A2 and A1F1) without major steps to move away from fossil fuels or limit greenhouse gas emissions, we will likely reach **850 to 950 ppmv** of atmospheric CO_2 by the year 2100 ... resulting in an **accelerating** rate of global warming.

Warming

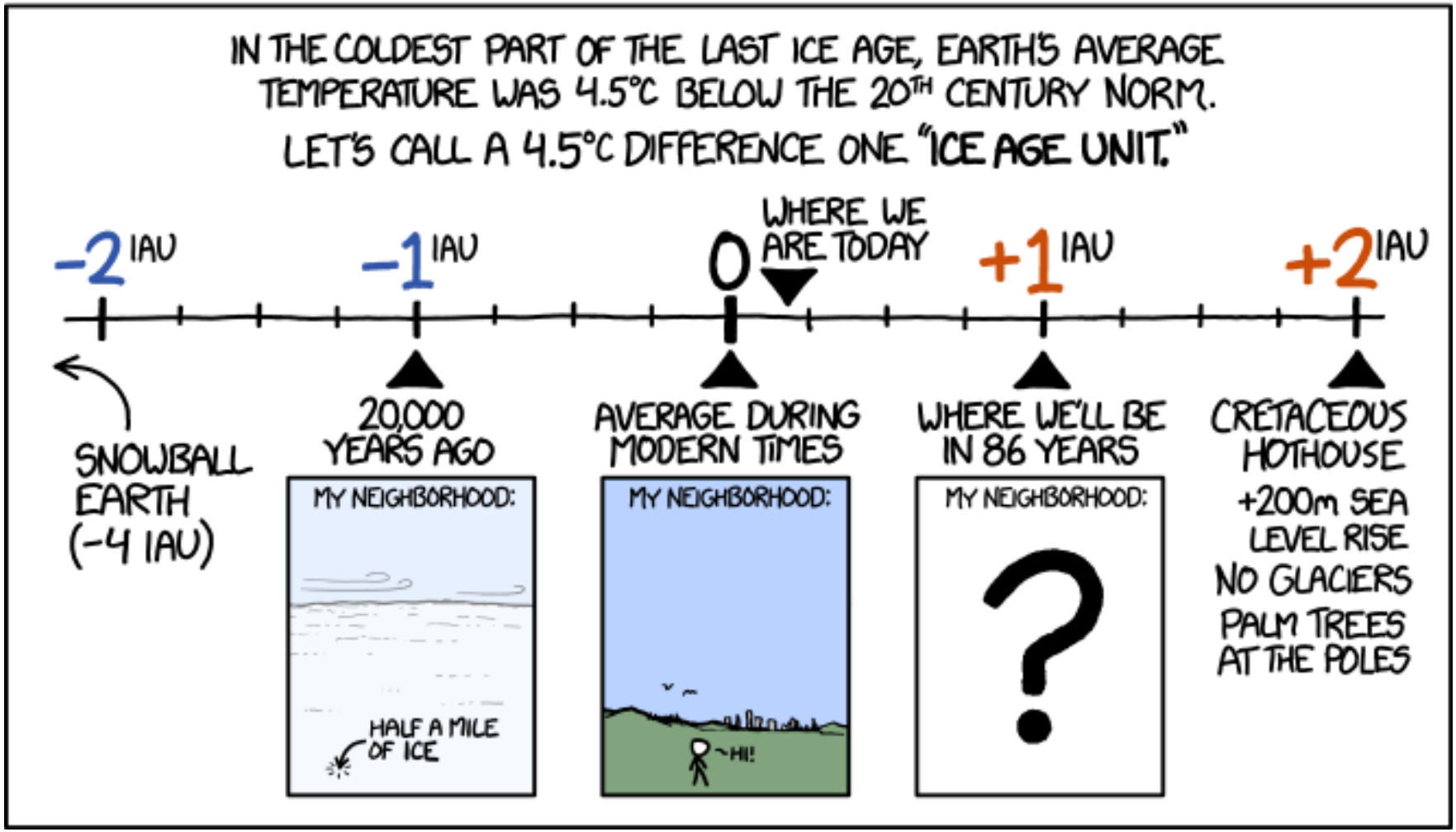
Under these 'business as usual' scenarios, the IPCC report projects that in 2095 the global average above pre-industrial surface temperatures will be:

- 2.6 to 7.0°C
- With a ‘best estimate’ of between 4.0 and 4.6°C

Lets call the best estimate value ‘one ice age unit’ or IAU >>>

WITHOUT PROMPT, AGGRESSIVE LIMITS ON CO_2 EMISSIONS, THE EARTH WILL LIKELY WARM BY AN AVERAGE OF 4°-5°C BY THE CENTURY'S END.

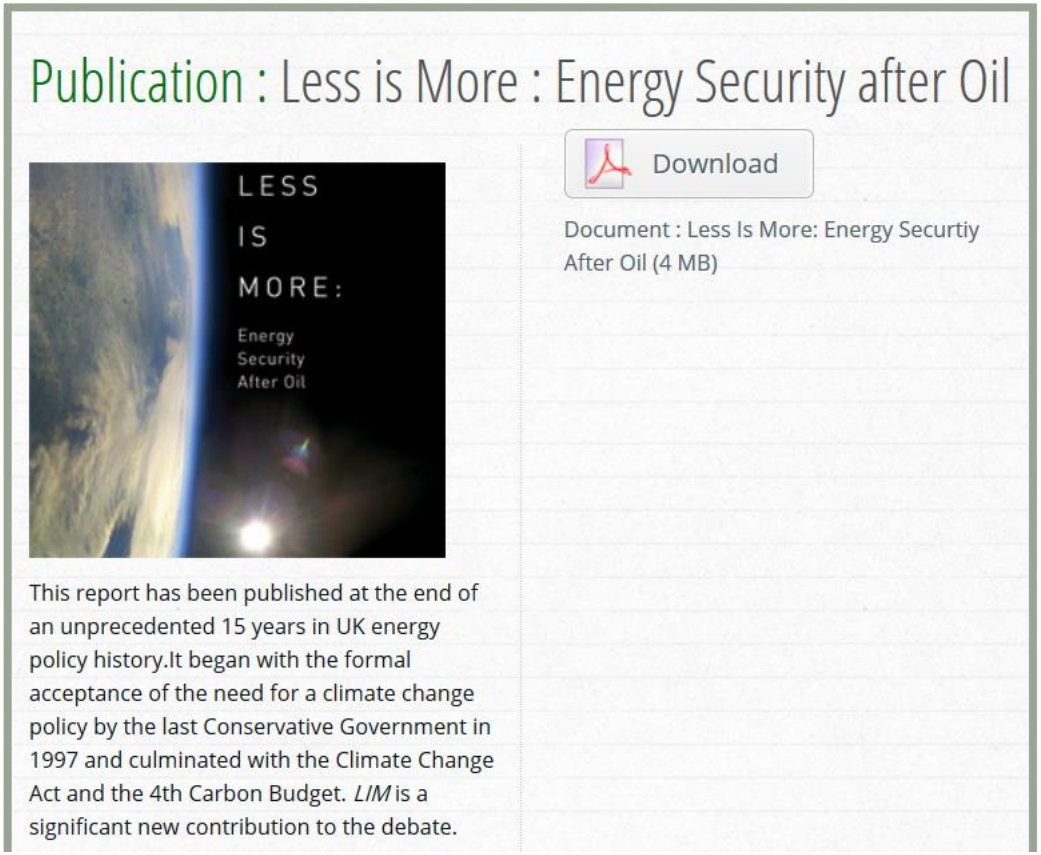
HOW BIG A CHANGE IS THAT?



Face the fear! Action is needed!

- There is no easy path to energy independence and decarbonisation
- All options pose acute difficulties
- Policy makers must not reject technologies because they appear difficult without making sober comparisons with the reality of the other technologies under consideration

What to do?



This AECB report sets out some possible courses of action

- Retrofit of existing buildings +
- Decarbonising heat supply +
- District heating networks +
- A small but stable low carbon electricity system for 'essential uses'
- Production of storable bio-fuels

Towards energy independence and decarbonisation

- **New buildings t**o Passivhaus / Silver levels of efficiency, don't build new problems. Doh!

- **Halve CO_2 emissions by deep retrofitting** existing building stock *
- **Halve them again with low-CO_2 heat** supply **
  *= increased Heath & Comfort *** (lots of happier, healthier citizens)*

- **Financially incentivise deep retrofit & get it into Climate, Energy and Health Policies.** Apart from being good for citizens, it saves carbon at a profit & is good for UK balance of payments, NHS, energy security (see UKGBC report etc)

- Base **Priorities** on value for money, solid engineering and technologies which save more energy than they consume

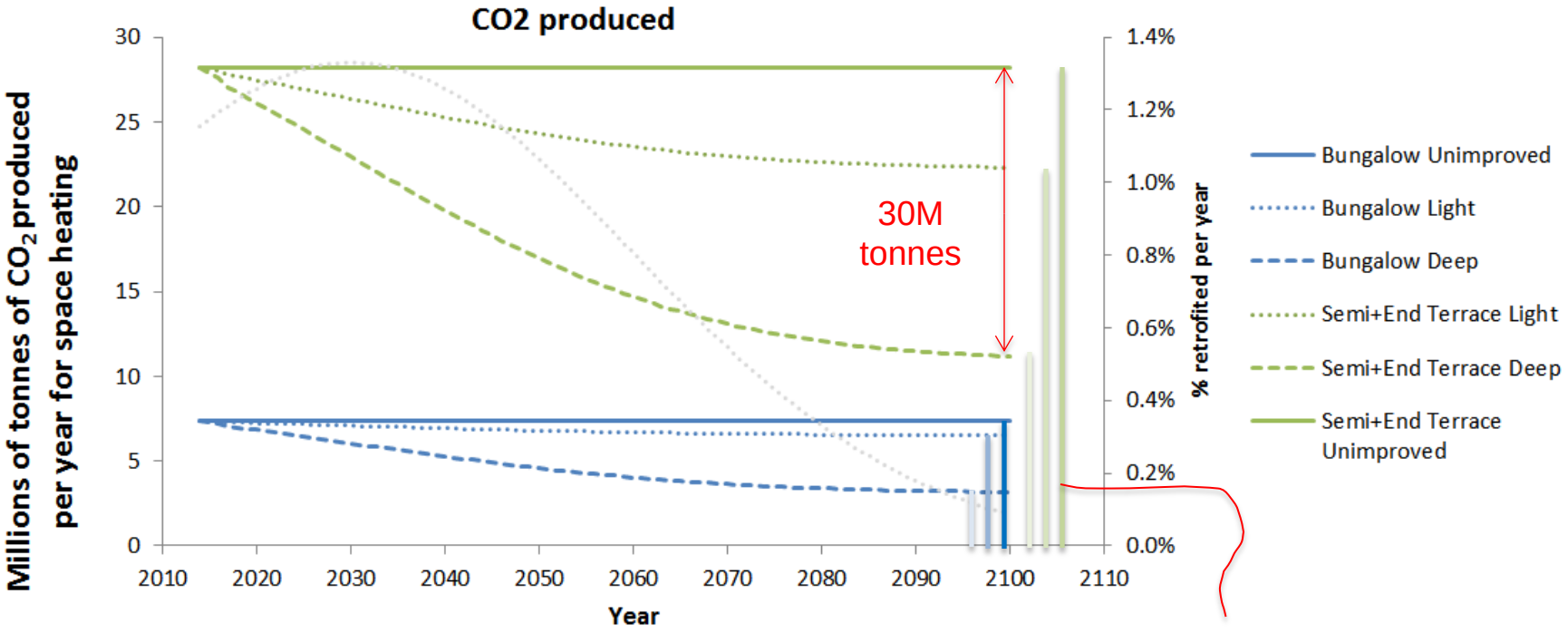
** Don't expect unrealistic results from retrofitting building stock – remember energy efficiency is very cost effective but there are sensible limits, where decarbonising heat supply at city, town or community scale becomes 'the best buy'. Also look at other areas for CO2 mitigation – see AECB's 'Less Is More' report*

** Commit to and start building a decarbonised heat supply

*** We should concentrate on **reducing heating consumption** first as building fabric is slow to change & there are huge climate, health, energy security, economic development policy wins here

Scaling up retrofit - heat demand reduction

Emission rate from heating UK bungalows, semi-detached houses



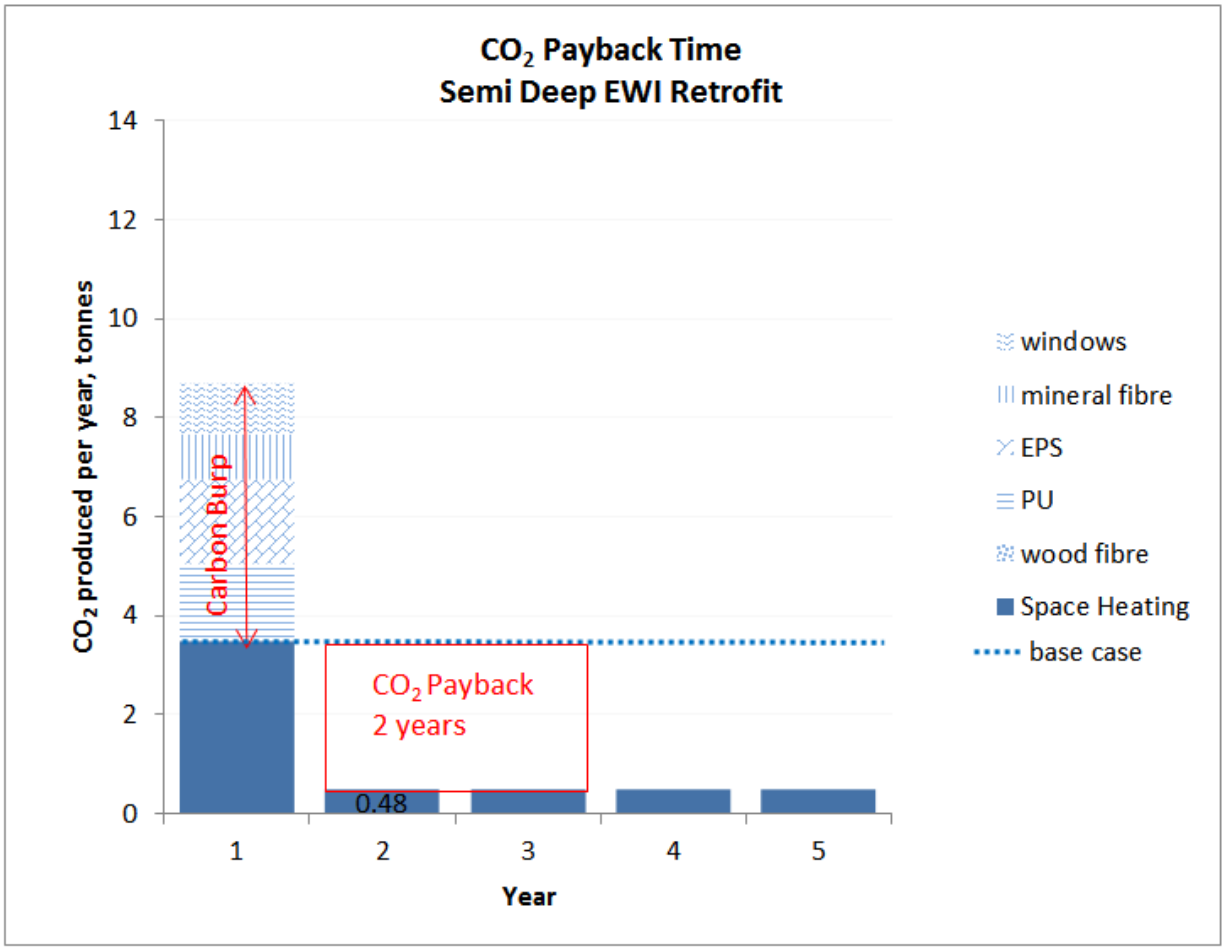
Space heating CO2 emissions post deep retrofit for 2 UK house types based on DUKES and English House Condition Survey data

Rate and depth of retrofit define remaining challenge for decarbonising UK heat supply

Remaining heat supply we need to decarbonise for these house types

Carbon Burp

After accounting fully for retrofit materials' manufacturing, delivery & installation emissions – when does the atmosphere start to see the savings?



Left: Emissions from insulation and windows

More work needed

- to identify all embodied emissions
- assess the national impact of the carbon burp to deliver timely CO2 savings

Decarbonising heat supply

(1) Braedstrup, Denmark: district heating

Aerial photograph of solar collectors and of the outskirts of the town.
Solar collectors were built in 2007.

‘Solar thermal farm’

From: Long-Term Experiences with Solar District Heating in Denmark
by Leo Holm, Marstal Fjernvarme, DK, 2012.

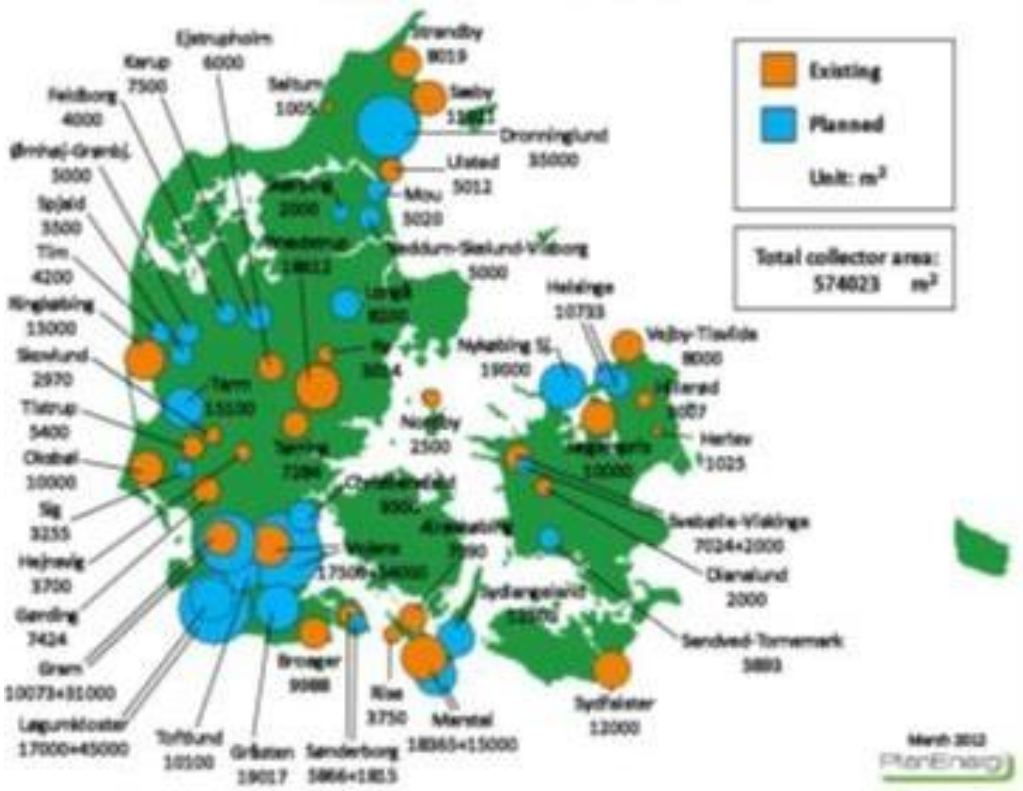
(2) Construction of a 75,000 m^3 seasonal heat store in the ground. Marstal, Denmark, 2011.

Left: Solar thermal store

Right: District heating pipes

(4) Heat main in Tubingen, Germany
Source: Wikipedia.
cf a UK gas main

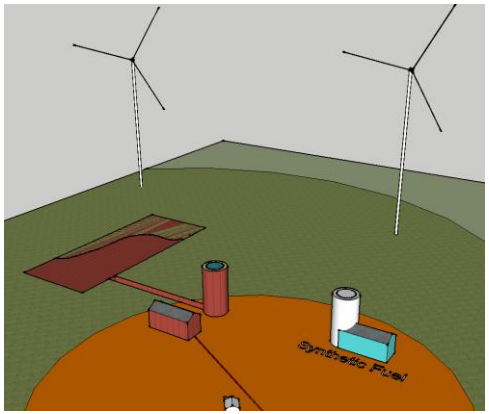
(3) Solar district heating in Denmark as at March 2012.



This is what action looks like.

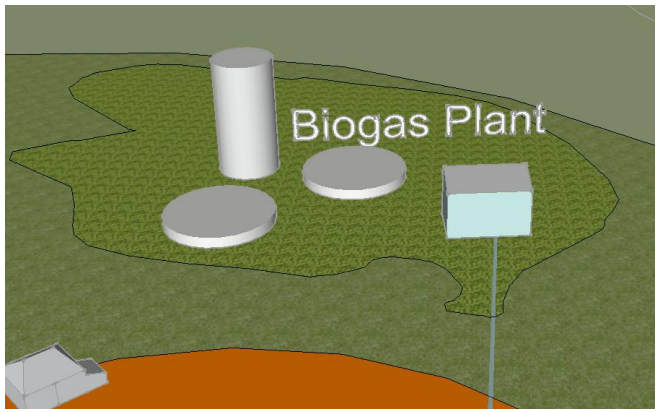
Surplus wind power

- Produces storable **synthetic liquid fuel**
- Runs large ground source heat pumps storing heat in hot water thermal stores (to DH network)



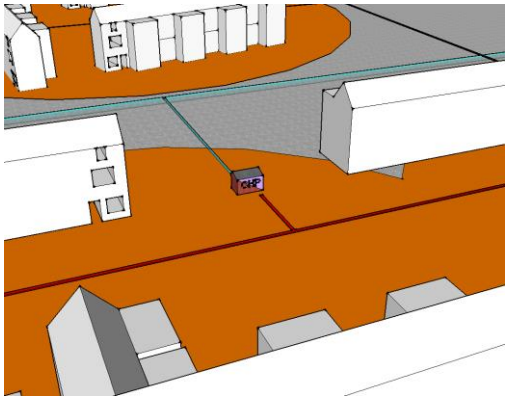
Food , agricultural and other wastes digested to produce **Biogas** which

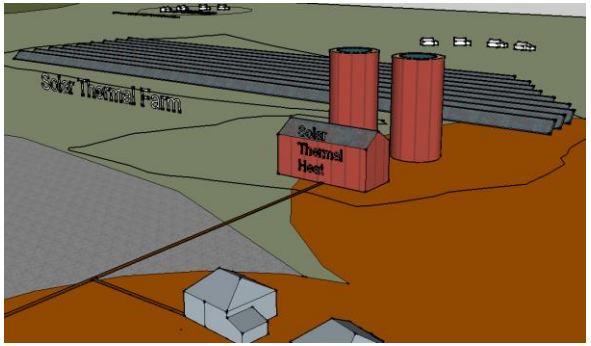
- Runs CHP to produce heat and electricity (to DH & electricity network)
- Feeds into the Gas Grid



Compact CHP units at substations

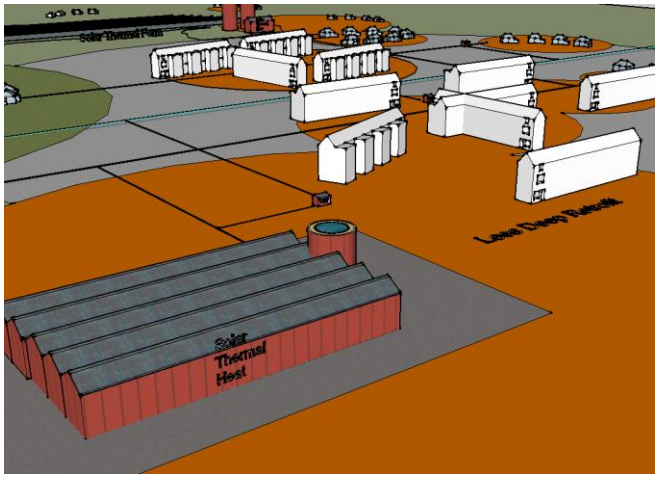
- linked to Electricity & Gas grids to increase **network stability** and respond to heat & power requirements locally

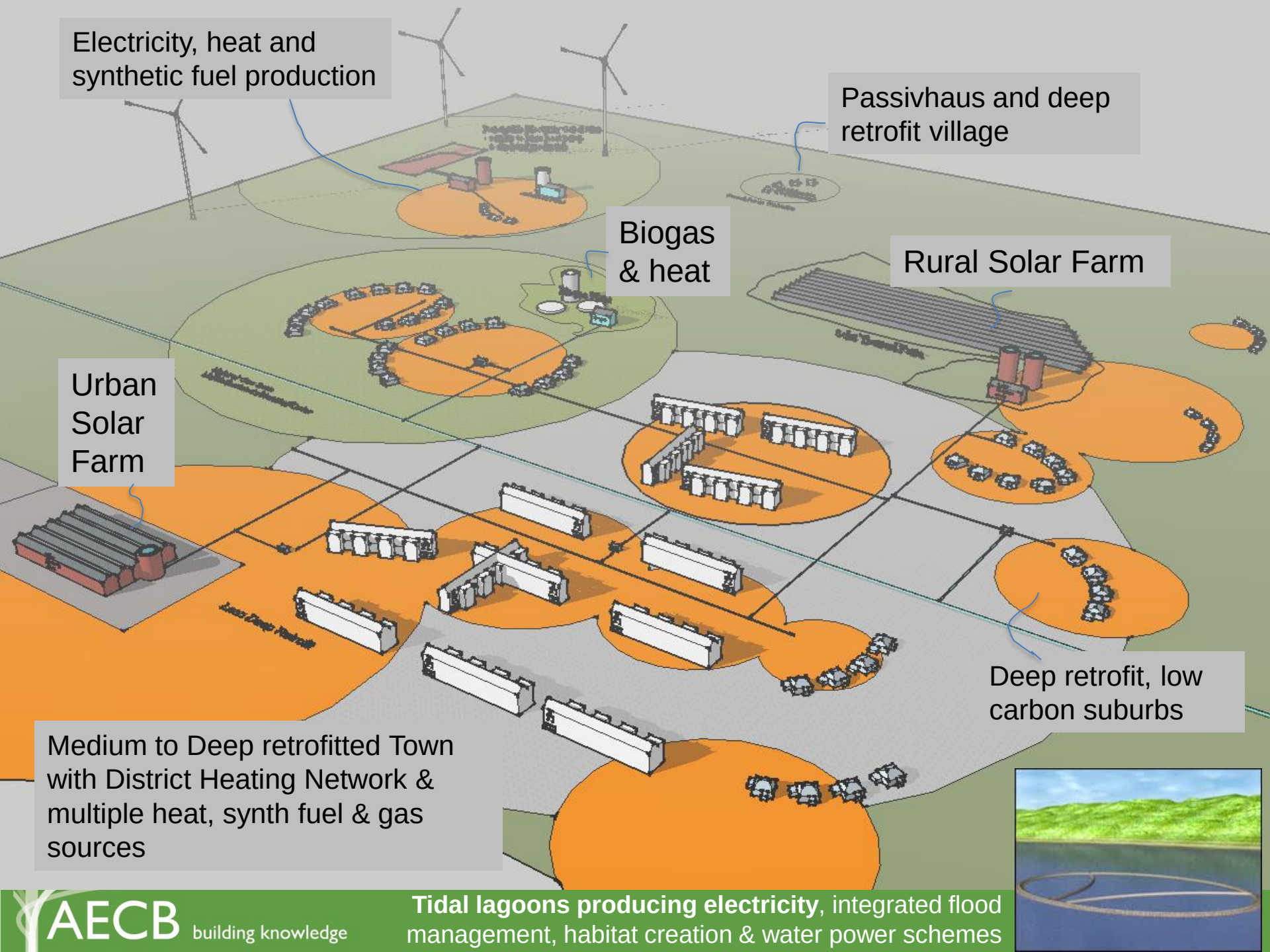




Semi-Rural & Urban Solar Thermal Farms

- storing heat in **large hot water thermal stores** (to DH network)





AECB building knowledge

AECB Charter

The objective and aims of the AECB is to facilitate environmentally responsible practices within building.

Specifically the AECB aims to:-

- promote the use of products and materials which are safe, healthy and sustainable
- encourage members projects that respect, protect and enhance the environment
- make available comprehensive information and guidance about products, methods and projects
- support the interests and endeavours of members in achieving these aims

1989

AECB staff – all part time

Sally Hall
Finance & Administration Officer (and joint Founder)

Andy Simmonds
Chief Executive

Gill Rivers
Business Operations Manager

Emma Furniss
Membership Administrator & Website Sub Editor, Facebook

Simon Kember
Website Administrator & re-developer, LEBd database manager

Tim Martel
CLR researcher. European-funded PiP exchange programme.

Debbie Mauger
Local Groups Co-ordinator

AECB – basic structure

AECB

Members

AECB Board of Trustees

CEO, Staff, Subcontractors

Local Groups

Our activities are funded principally from membership subscriptions
(+ occasional project funding)

= INDEPENDENT

Passivhaus Trust

is a subsidiary of AECB

PHT Board of Directors

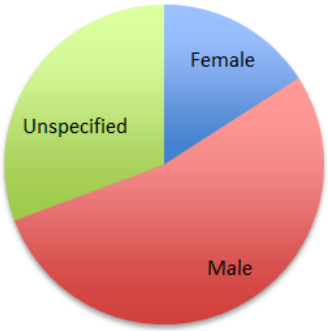
CEO, Staff, Subcontractors

Members

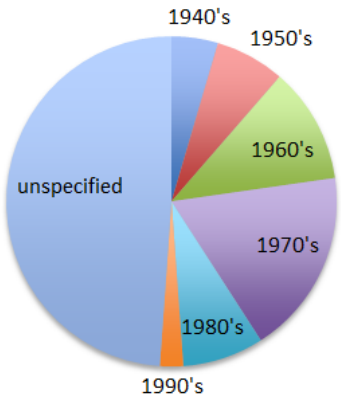
Check out AECB membership benefits: www.aecb.net/membership-benefits/

AECB stats

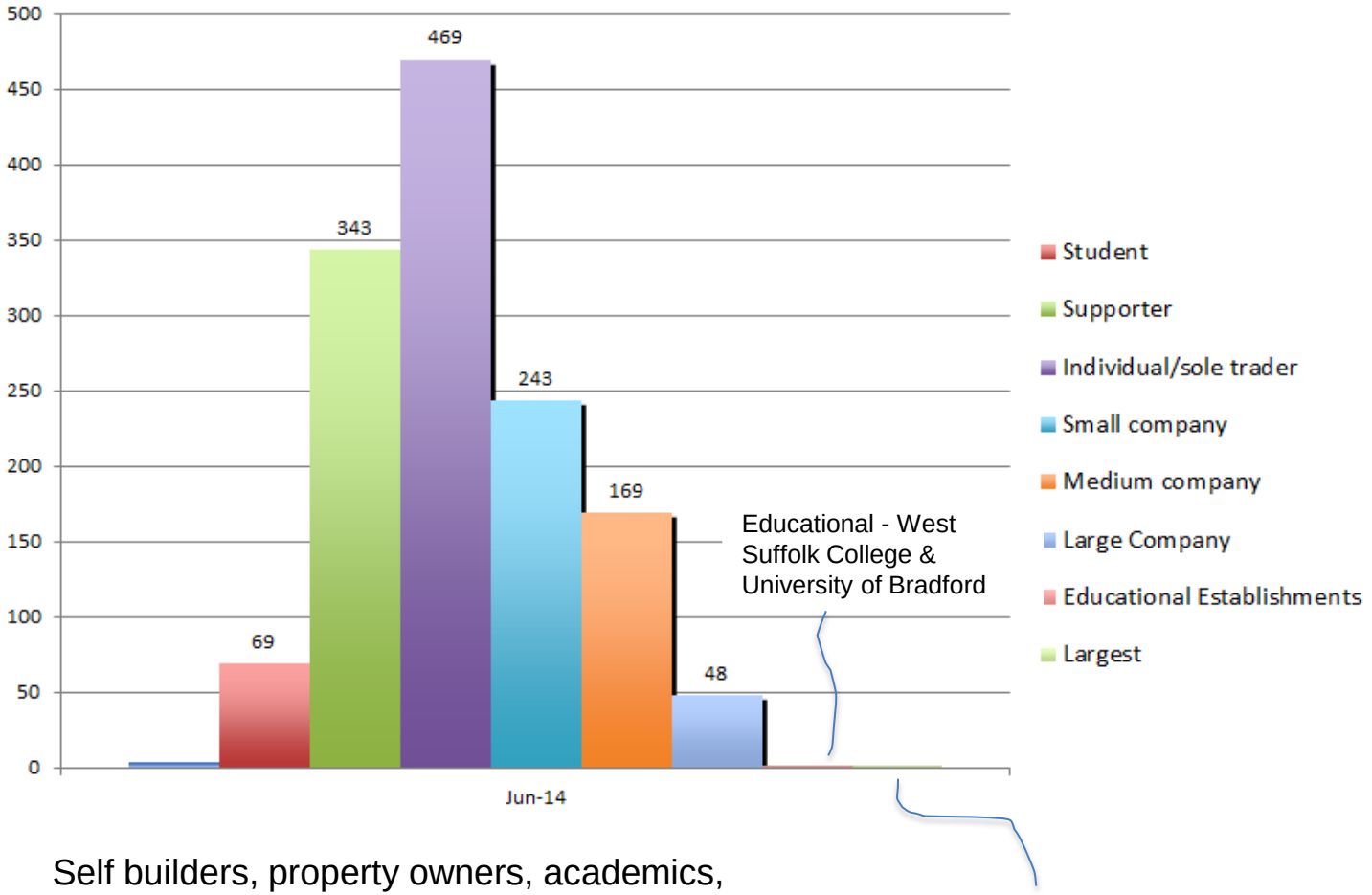
Gender



Year of birth

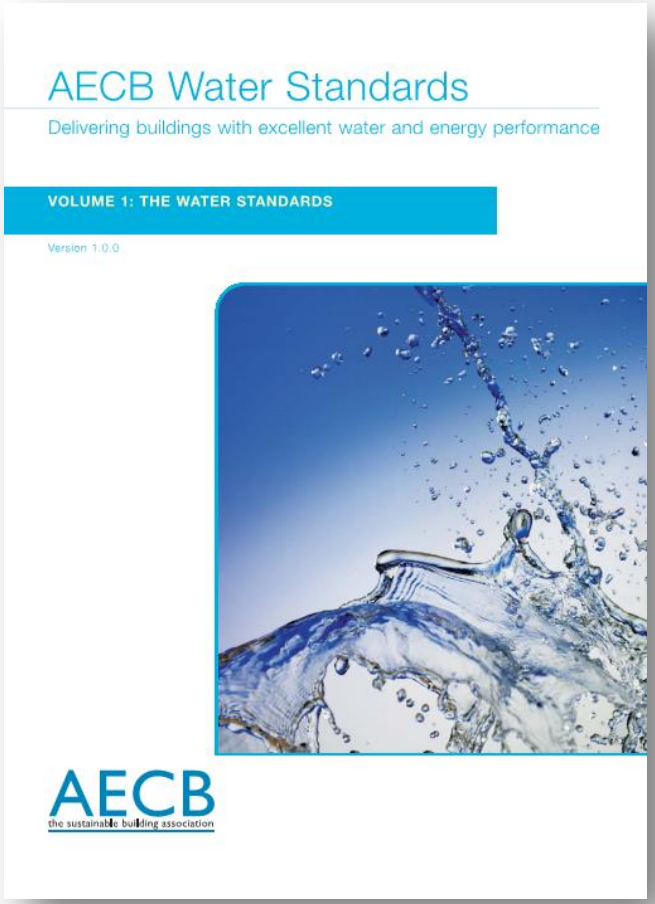


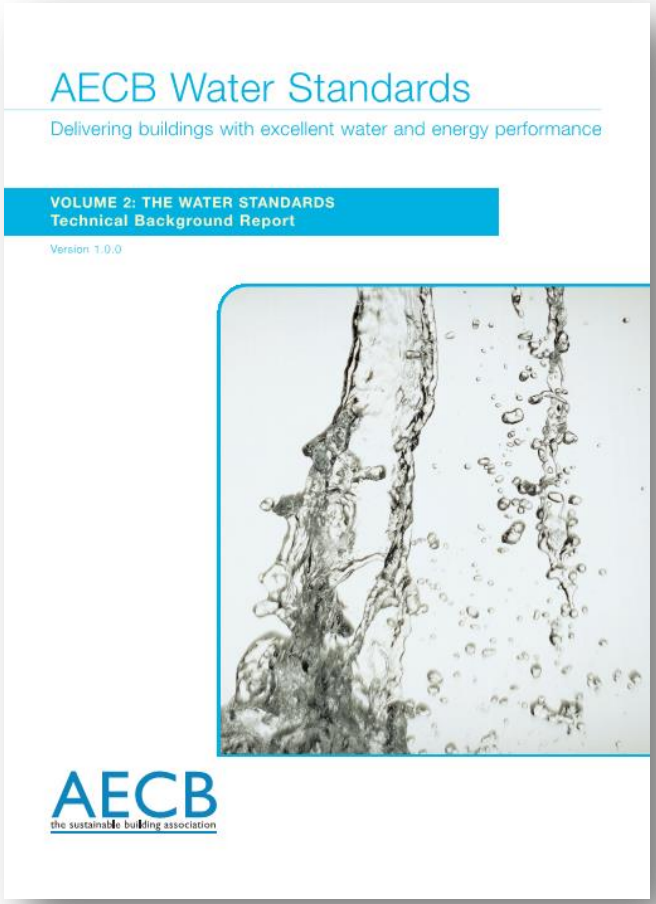
Members by category - June 2014



Self builders, property owners, academics, suppliers, builders, manufacturers, professionals from across the property, design & construction industries

Membership is stable, typically 1,350 – 1,400 members renew each year





http://www.aecb.net/wp-content/uploads/2013/02/1503_AECB_Water_Vol_1_V3.pdf

http://www.aecb.net/wp-content/uploads/2013/02/The_AECB_Water_Vol_2_V3.pdf

AECB Silver Standard
Aim for it – certify to it

- Space heat demand 40kWh/m2.a
- Air leakage 1.5-3.0
- Primary energy ,120 kwh/m2.a
- MEV or MVHR
- 2g or 3g
- PH methodology
- Useful for retrofit
- Self certification

AECB News : Welcome to the AECB Water Blog No. 2 – July 2014

The AECB water blog is posted every other month. Whether you enjoyed Blog Number 1 and have returned for more, or are a completely new reader, just dive right in (ha ha) and enjoy it.

By Cath Hassell of ech2o

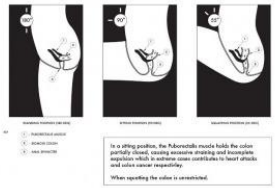
1. Efficient use of solar thermally heated water

There is still a lot of confusion amongst the general public as to how to use a solar thermal system. Therefore, whether you are specifying solar thermal for a private client, or making the decision to install it into a large number of Housing Association homes, I think it is incumbent upon you to provide clear and concise information about how to get the best out of the system. A few years ago that might have been difficult; there was little empirical data of actual monitored performance to draw on and quite a lot of conflicting advice available, much of it erroneous. But in late 2011 the Energy Saving Trust (EST) report, '*Here comes the sun: a field trial of solar water heating systems*' provided the evidence that is needed, and deserves to be more widely read. The EST monitored 90 homes with solar thermal across the UK for a full 12 months. On average, solar provide 39% of hot water use, whilst the range was from just 9% of hot water provided to 60%. Of course this wasn't all down to how the system was used, but it certainly played a major part. You can download the full report here. Or, if you'd just like to know a bit more about solar then this part of their website is a good beginner's guide.

Does it make a difference when you use the solar heated water? Well No!

In 2001 Cranfield University tested eight different solar thermal systems. The research showed that there is a relatively small difference in performance between different draw-off patterns of solar heated hot water. When the load consisted of a single 150 litre draw-off early in the evening the extrapolated annual hot water production from the tested systems ranged from 956 to 1339 kWh (3,440 to 4,820MJ). When the load was spread over the course of a day with hot water draw-offs in the morning, at lunch time, and in the evening the corresponding range was 1006 to 1350 kWh (3,620 to 4,860MJ). A draw-off pattern that requires water early in the morning requires that some hot water is stored overnight, with

Le Penseur



I love this toilet! (I also love the most recent WC siphon from McAlpine, just to give you an insight into my wide ranging tastes. And plain crisps.) I got to actually sit on one (though not to use it as not plumbed in) on World Toilet day back in November. Very comfortable. Tips you back subtly thus lowering your bottom beneath your legs.

get it installed by an MCS approved plumber, and instruct the householder as to wh to bring the back-up heating on at 6pm in the evening. Sorted!

2. Do you specify cold taps only in washbasins in a non-domestic site?

If you do please shout loudly! Because, although I have seen a few instances in schc the taps say hot were actually connected to the cold water supply) and heard anecd a hot and a cold tap. The result is we are wasting huge amounts of hot water in the health benefits to washing hands in hot water so why are we specifying hot taps in have pretty much always done it, and secondly we assume that the Building Regulat Regs (applicable in England and Wales) is complicated. I think it says cold taps only no-one yet has countered my claim that specifying hot taps in public toilets leads to the article here and decide which side you are on.

3. Girls can be engineers too you know!

Pink is now my favourite colour but when I was growing up I hated it, because every

difference when the back-up heating comes on? Absolutely Yes!

e are still using the boiler to heat up the hot water every day in the summer months instead of 're times that the sun cannot provide enough hot water. The chart below is monitored data fro d well-installed solar thermal system with the back-up heating (whether boiler or immersion h day if the solar system has not been able to reach the required design temperature.

s below (from the EST report) clearly show what happens in a cylinder when the back-up heati re 10) and in the morning (Figure 11).

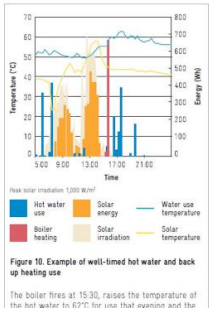


Figure 10. Example of well-timed hot water and back up heating use

The boiler fires at 15:30, raises the temperature of the hot water to 62°C for use that evening and the

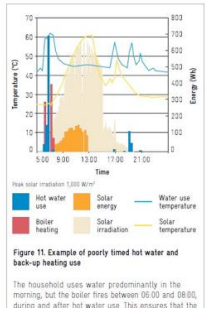


Figure 11. Example of poorly timed hot water and back-up heating use

The household uses water predominantly in the morning, but the boiler fires between 06:00 and 08:00, during and after hot water use. This ensures that the

Welcome to the Low Energy Building Database, a repository of low-energy building information created to help inform the planning and development of low energy new build and refurbishment

You can browse projects in our database, you can also create and edit projects if you have a log-in. New users can create an account.

Featured Projects

Clapham Retrofit

This 4-storey semi-detached Grade II listed Victorian townhouse has been eco-retrofitted to a high standard of airtightness and thermal performance. The 170-year old, solid brick building has been internally retrofitted with over 9 types of insulation material, each a bespoke solution to localised performance requirements respecting the historic significance of the existing fabric. The existing sash windows and doors have been upgraded through the installation of double-glazed secondary glazing. High performance insulation materials together with careful airtightness and thermal bridge detailing have resulted in a historic building that is both highly energy efficient and more comfortable to live in.

Semi-Detached, Solid Brick, Refurbishment
Project owner : Arboreal Architecture

AECB Silver Standard certified building

New Farmhouse

Passivhaus Trust Awards 2014 Finalist - Kirsty Maguire Architects worked in collaboration with Hope Homes and Morgan Associates to design and build this farmhouse to the Passivhaus standard. Construction started in August of 2012, and the building was completed and certifed as a Passivhaus 12 months later. The house has a timber frame with I-joists, glulam beams and zinc cladding for the roof, a small wood burning stove, with hot water provided by an air source heat pump.

Detached, Other, New build
Project owner : Kirsty Maguire Architect Ltd

Passivhaus certified building

About the LEB

During 2009-2010, the Technology Strategy Board implemented a £17m programme known as Retrofit for the Future (RfF), to kick-start the retrofitting of the UK's social housing stock. AECB – the sustainable building association was asked to develop appropriate energy performance targets for the competition and provide ongoing support and guidance. The AECB and the TSB have developed this database as an education and dissemination tool, incorporating both the RfF projects as well as new and refurbished domestic and non-domestic low energy buildings.
Find out more about the LEB

Home energy use check

The AECB Home Energy Check helps you to see how your existing home energy use compares against retrofitted energy efficient properties entered in the AECB Low Energy Buildings database.You will only need basic information about the size of your home and the amount of fuel(s) your home uses over a twelve-month period. See how your property compares

Charts

Charts of Energy use and CO2 emissions and Airtightness compiled from

Lots of resources….

Charts

Charts of Energy use and CO2 emissions and Airtightness compiled from aggregate data of all LEB projects. read more

- Post-development energy use and emissions
- Energy Use and Emissions – Refurbs and retrofits
- Airtightness chart
- Airtightness and energy targets
- Perceived Comfort Levels

LEB Technical reference

This section of the website aims to explain some of the issues surrounding Low energy building projects whether they are refurbishment or new-build projects . Energy performance ...read more

- AECB Silver Performance Standard
- Energy performance targets
- Fuel usage : coefficients
- Refurbishment & retrofit: Technical Glossary

LEB News

Low Carbon Domestic Retrofit Guides

Low Carbon Domestic Retrofit Guides : The Institute for Sustainability produced a set of guides based on the experiences of the Retrofit for the Future programme. They detail the business opportunities that retrofit offers, and provide practical and commercially focused … Continue reading →

Retrofit for the future

The Retrofit for the Future competition catalysed the retrofit of over 100 homes across the UK, with an ambition of achieving an 80% reduction in the in-use CO2 emissions of each property. Coordinated by the Technology Strategy Board , the … Continue reading →

….and clear explanations

New Build & retrofit: Technical Glossary

Air changes per hour (ac/h)

(volumetric), the number of times per hour that the air inside a building is changed. U

Air permeability

defined in BS EN 13829. Units m³/m²hr at 50 Pascals or m/h @ 50 Pa.

Air leakage index

per unit thermal envelope area (the CLP preferred definition). Units m³/m²hr at 50 Pa

CLP

The AECB's Carbon Literate Design and Construction Programme.

Delivered energy

the amount of energy which is supplied to final users, e.g., households, office buildin

Global Warming Potential (GWP)

a measure of how much a given mass of greenhouse gas is estimated to contribute t

compares the gas in question to that of the same mass of carbon dioxide (whose GW

nitrous oxide and sulfur hexafluoride have GWPs many times that of CO2, although

larger quantities.

Heat Loss Parameter (HLP)

a building's specific heat loss (in units of W/K) divided by the building's floor area (m

Units W/K.m²

Low-grade heat

normally used to mean heat at a temperature of ≤ 100°C

Mechanical Ventilation with Heat Recovery (MVHR)

a system of ventilating buildings, in which heat is recovered from the exhaust air stre

are two sets of ductwork, both connected to an air-to-air heat exchanger, with the air

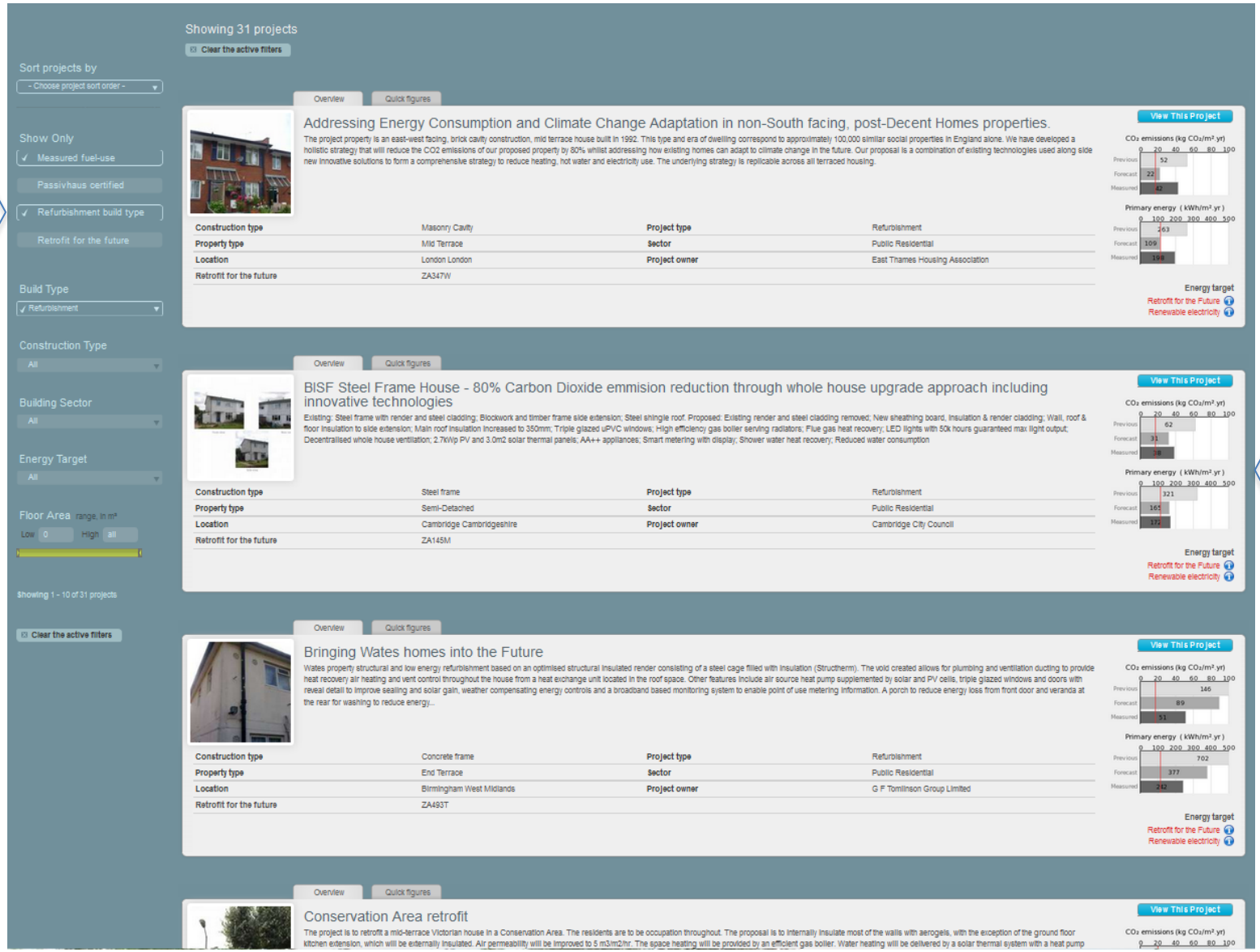
balanced.

Passivhaus

a low energy building standard. Passivhaus Institut (PHI) originator of the Passivhaus

Library of new build and retrofit, domestic & non-domestic buildings

Search filters



Quick summary

low energy building database

Search Go

View All Projects | Previous | Next

Clapham Retrofit

This 4-storey semi-detached Grade II listed Victorian townhouse has been eco-retrofitted to a high standard of airtightness and thermal performance. The 170-year old, solid brick building has been internally retrofitted with over 9 types of insulation material, each a bespoke solution to localised performance requirements respecting the historic significance of the existing fabric. The existing sash windows and doors have been upgraded through the installation of double-glazed secondary glazing. High performance insulation materials together with careful airtightness and thermal bridge detailing have resulted in a historic building that is both highly energy efficient and more comfortable to live in.

PDF
Download as PDF

Images | Graphs | Figures | Description | Strategies | Building

Detail

Gallery

Clapham Retrofit : Project images

Click on image to preview full size










Useful strategy

Clapham Retrofit

This 4-storey semi-detached Grade II listed Victorian townhous
170-year old, solid brick building has been internally retrofitted
requirements respecting the historic significance of the existin
double-glazed secondary glazing. High performance insulation
historic building that is both highly energy efficient and more c

Images | Graphs | Figures | Description | Strateg

Design strategies

Planned occupancy	Two people with occasional guests. Both oc
Space heating strategy	Low temperature hot water heating.Gas-fired
Water heating strategy	Unvented hot water cylinder with solar twin c
Fuel strategy	Mains gas. Mains electricity.
Renewable energy strategy	Solar hot water collectors. 3sqm facing due
Passive Solar strategy	n/a - retrofit of existing listed building.
Space cooling strategy	Natural cross-ventilation.
Daylighting strategy	n/a - retrofit of existing listed building.
Ventilation strategy	Whole house mechanical extract ventilation.
Airtightness strategy	Continuous air barrier formed by internal lime below. 2nd floor ceiling membrane sealed wi frames sealed with tapes. Grommets install
Strategy for minimising thermal bridges	Continuous layer of internal insulation. Caref blanket, perlite, technopor, perinsul.
Modelling strategy	Whole house modelling in PHPP.
Insulation strategy	Application of Internal wall insulation includir insulation.Existing concrete slab retained bu lytag screed.2nd floor roof filled with cellulos
Other relevant retrofit strategies	Pre-design investigations undertaken to deve allow a fine grain of design.
Contextual information	The existing building is Grade II listed.

Useful detail

Clapham Retrofit

This 4-storey semi-detached Grade II listed Victorian townhouse has been eco-retr
170-year old, solid brick building has been internally retrofitted with over 9 types of
requirements respecting the historic significance of the existing fabric. The existing
double-glazed secondary glazing. High performance insulation materials together w
historic building that is both highly energy efficient and more comfortable to live in.

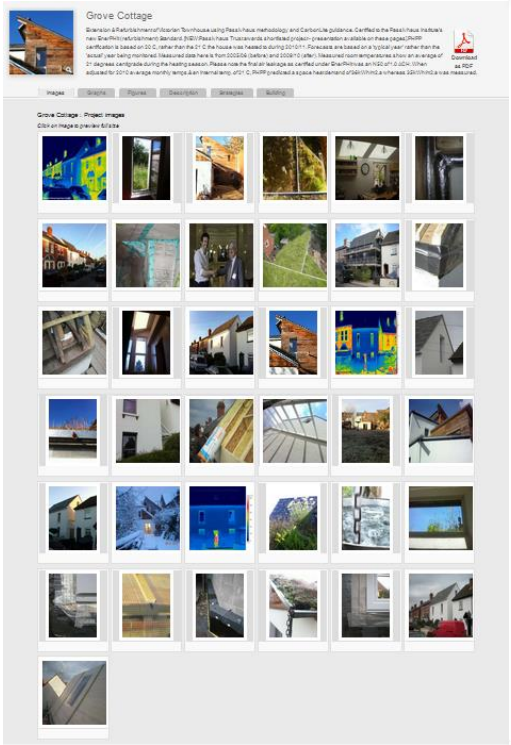
Images | Graphs | Figures | Description | Strategies | Buildin

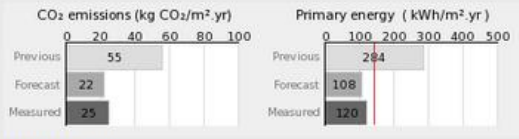
Building services

Occupancy	Two people with frequent guests.
Space heating	Low temperature hot water heating.Gas-fired 12kW condensing b
Hot water	Unvented hot water cylinder with solar twin coil.
Ventilation	Whole house mechanical extract ventilation.
Controls	Digital controller with room temperature compensation, hot water Integral isolating and thermostatic radiators valves to all radiators
Cooking	Gas hob with electric oven.
Lighting	LED lighting throughout.
Appliances	All appliances A+ to A+++ rated.
Renewable energy generation system	Solar hot water collectors. 3sqm facing due south.
Strategy for minimising thermal bridges	Continuous layer of internal insulation. Careful detailing of a rang blanket, perlite, technopor, perinsul.

Building construction

Storeys	4
Volume	613 m³
Thermal fabric area	376 m²
Roof description	Insulated 2nd floor ceiling with cold (but windtight) roof above. TG
Roof U-value	0.15 W/m² K
Walls description	Internal wall insulation including: woodfibre, aerogel, IQtherm, PI
Walls U-value	0.11 W/m² K
Party walls description	Solid brick. Party wall returns to external walls insulated (u-value
Party walls U-value	1.21 W/m² K

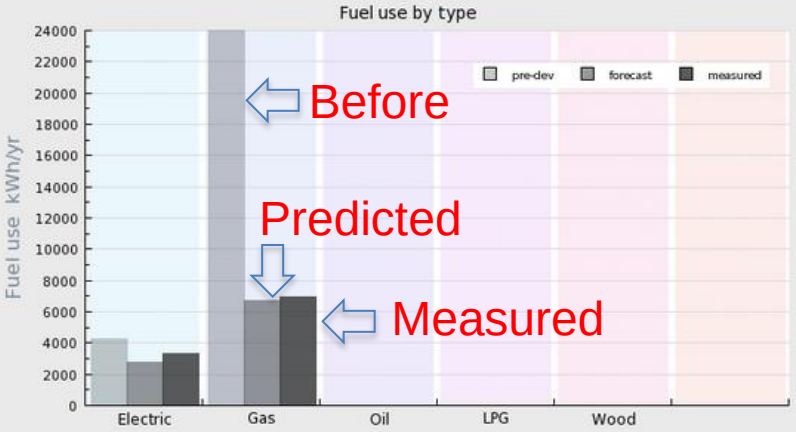


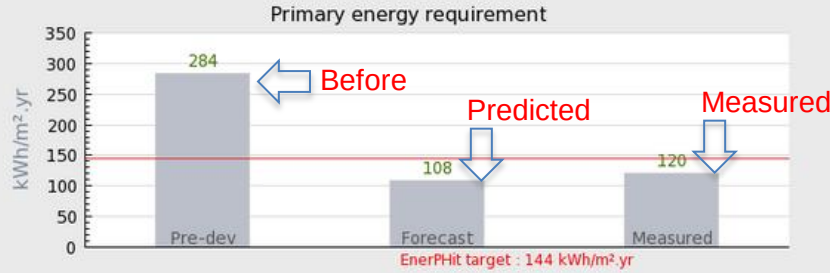


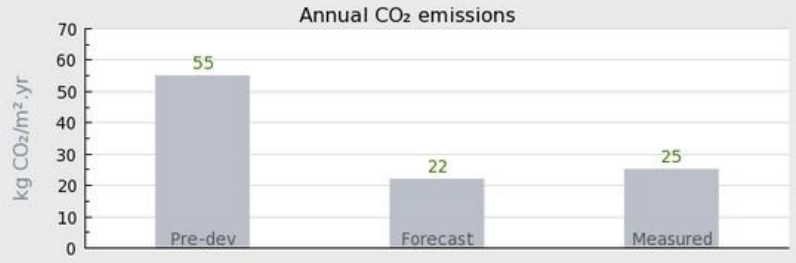
Energy target

EnerPHit

Energy and fuel use

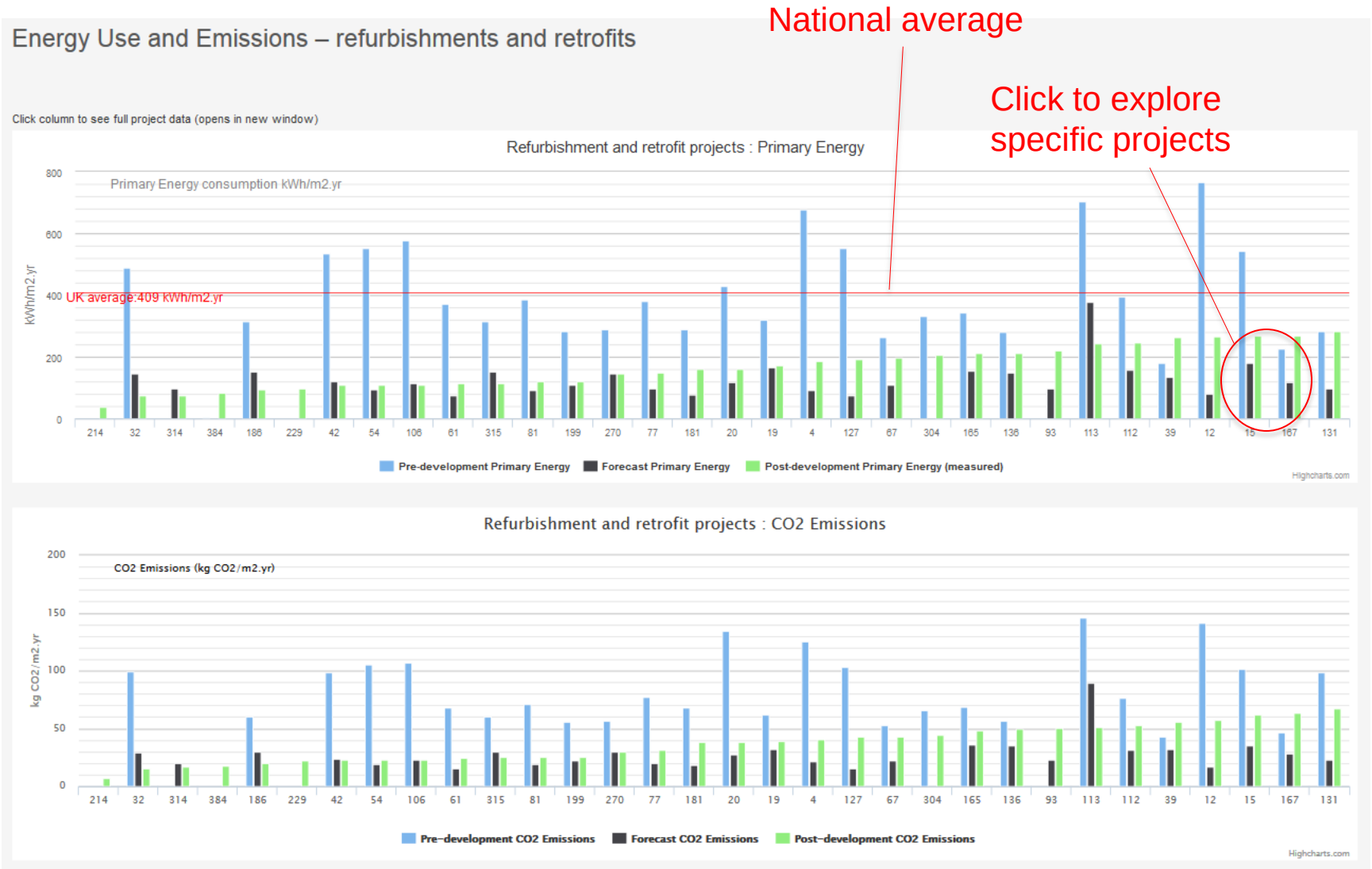




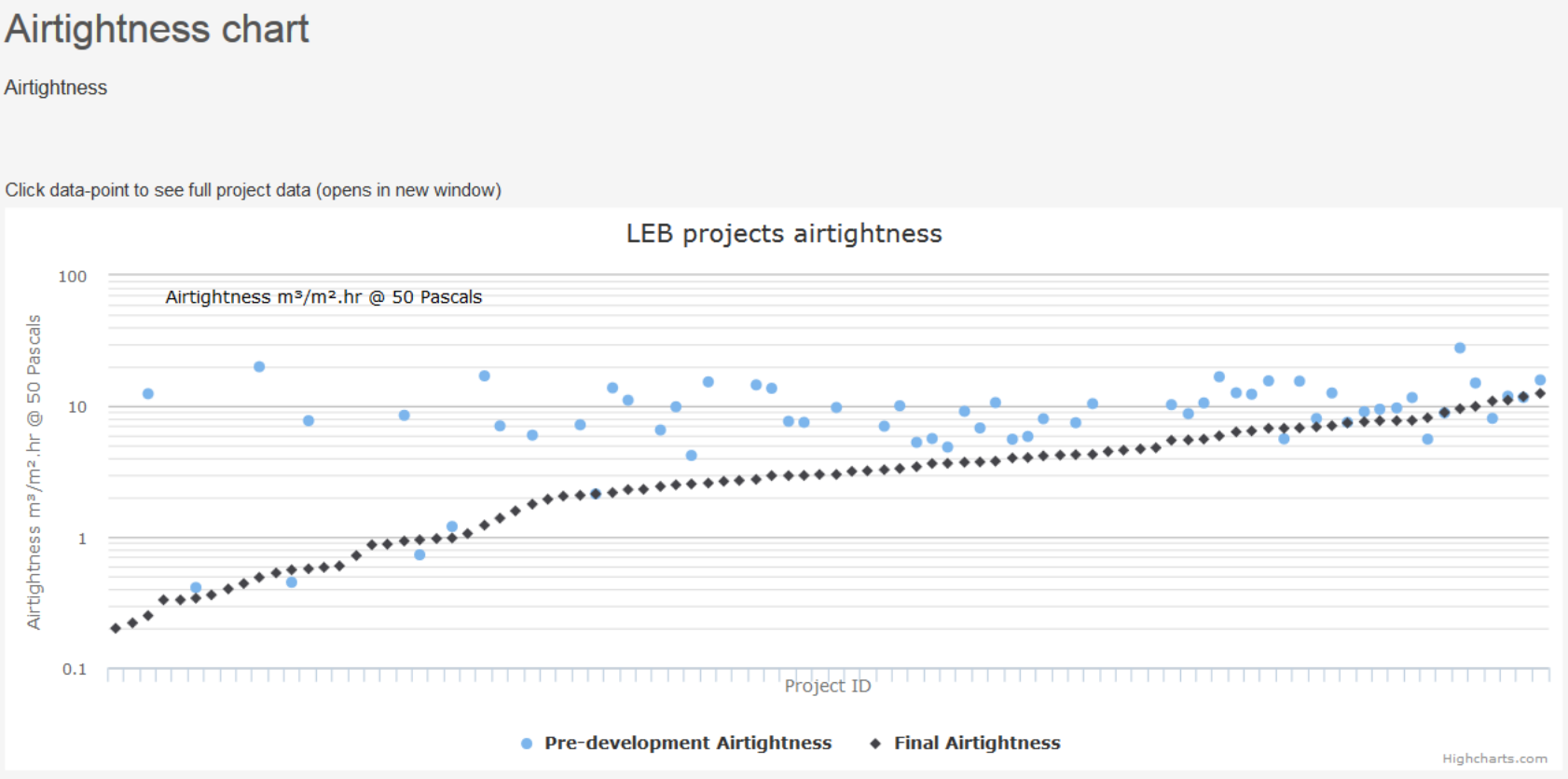


Predicted and measured performance

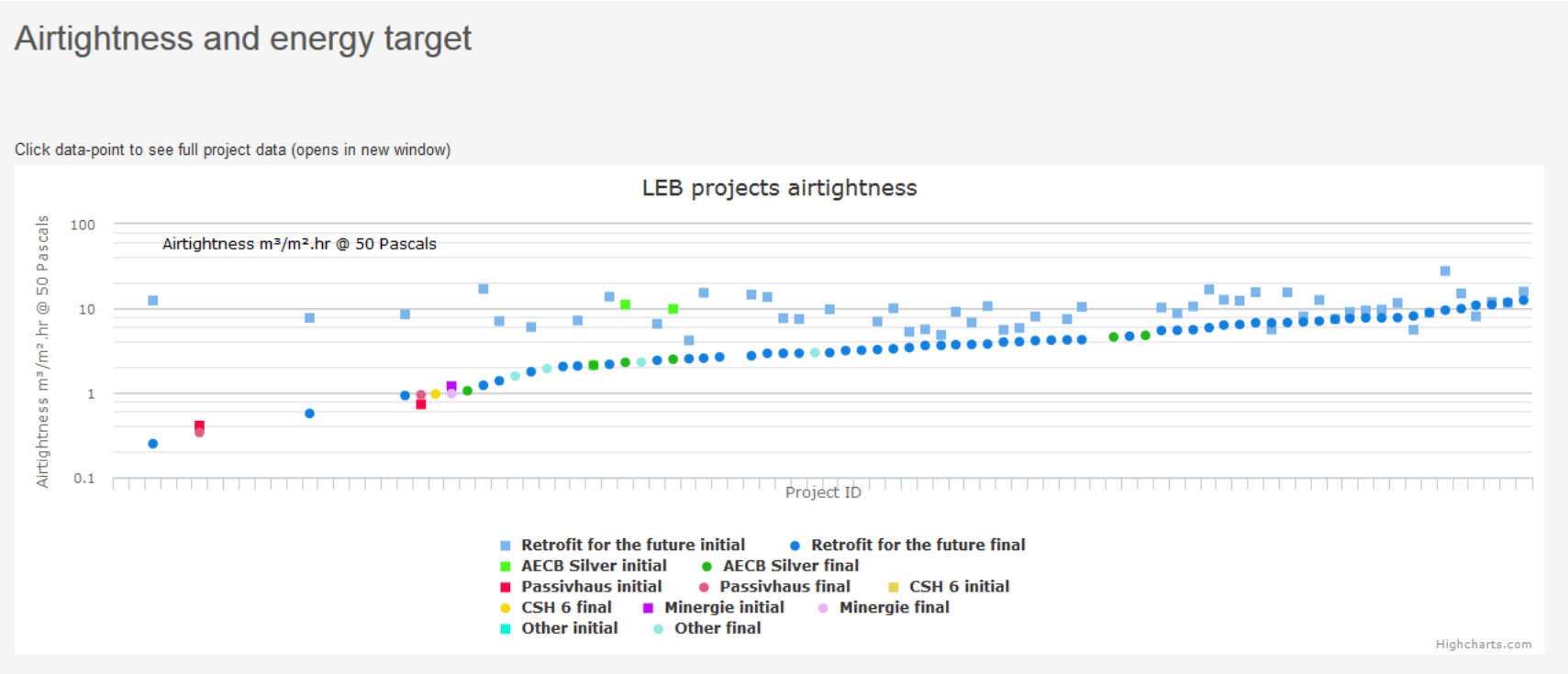
Look at <u>all</u> projects' energy & carbon performance:



Air leakage results – for increased comfort and good energy performance



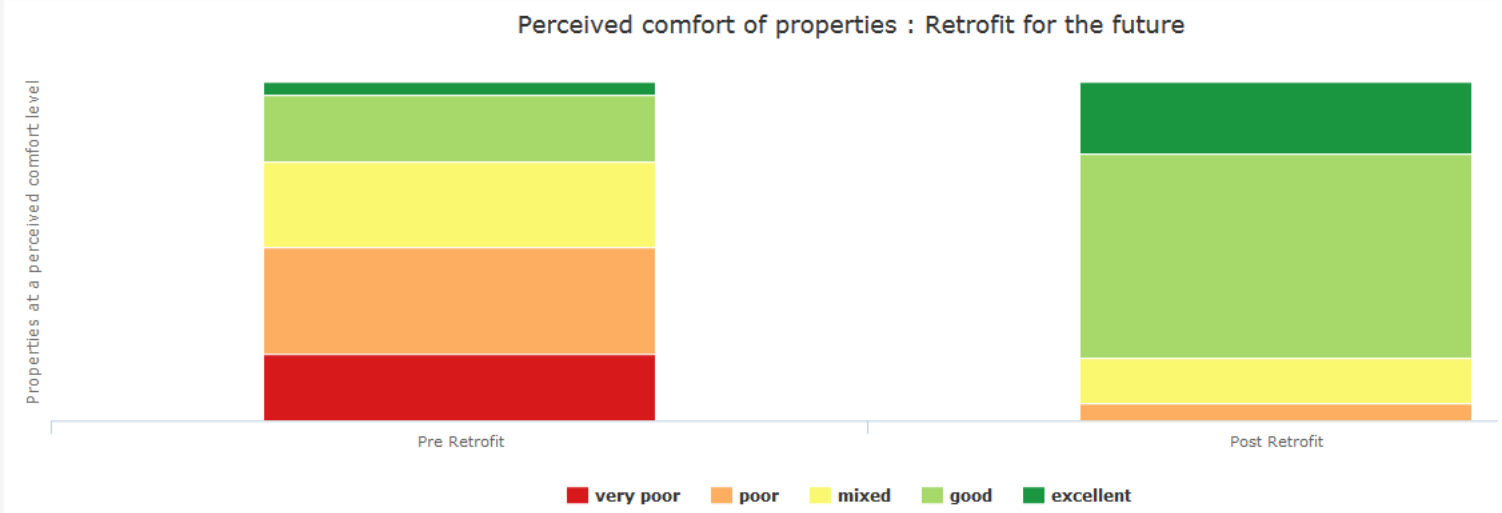
Compare intention with results – e.g. which energy standards deliver



Do occupants of retrofitted homes find them more comfortable? (yes)

Perceived Comfort Levels

Perceived comfort levels in 76 Retrofit for the Future properties before and after development.



Energy check – compare your building's performance

Your energy & CO_2 report

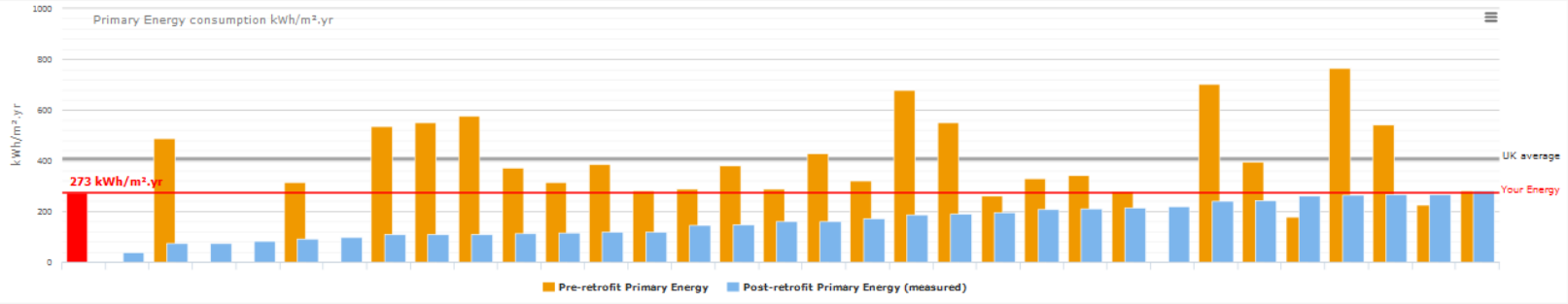
Overview

Here is a table which provides a quick look at how your property compares to the average outcome of a Low Energy Building project. To further see how your property compares to individual LEB projects and how it compares overall to the averages, take a look at the graphs below detailing Primary Energy usage and Carbon emissions.

	Your results	LEB post-retrofit Project Averages
Total Energy Use	19000 kWh.yr	10858 kWh.yr
Primary Energy Use	273 kWh/m².yr	166 kWh/m².yr
CO_2 emissions	55 kg CO_2/m².yr	37 kg CO_2/m².yr

Primary Energy - Your property compared to LEB Refurbishment and retrofit projects

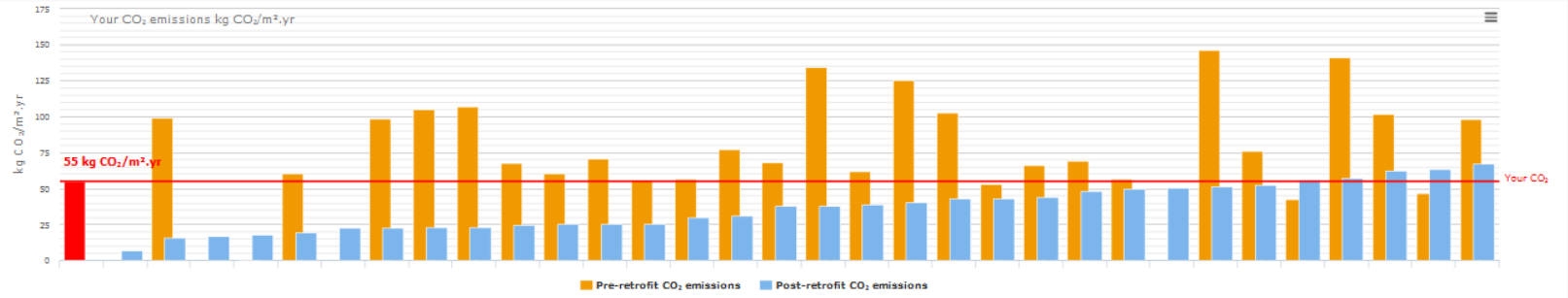
Primary energy is the amount of energy from coal, oil, natural gas,wood,coal, or other fuel that you use each year per square metre of your home. The UK average Primary energy figure for a household is 409 kWh/m².yr.



Actions : Print this graph | Save a PDF of this graph

CO2 emissions - Your property compared to LEB Refurbishment and retrofit projects

Annual CO_2 emissions represents the amount of carbon dioxide gas created each year per square metre of your home as a consequence of your household energy use



NEW – Retrofit Knowledgebase

Categories

Construction Features (37)

- Below-ground Masonry, Crawlspaces and Basements (19)
- Chimneys (1)
- Damp proof courses and Waterproof Tanking (2)
- Ground floors (11)
- Insulation (20)
- Masonry walls (11)
- Roof structures (9)
- Timber (7)
- Wall assemblies (21)

Environmental Systems (11)

- Energy targets (3)
- MEV, MVHR, Passive Stack (2)
- Monitoring & Metering (7)

Risk Points (46)

- Air infiltration (4)
- Climate (8)
- Existing Conditions (12)
- Flooding (2)
- Fuel Poverty (1)
- Heat loss (11)
- Historic Status (7)
- Indoor air quality (9)
- Moisture in Materials (32)
- Occupants (3)
- Penetrating and Rising Damp (11)
- Performance Gap (3)
- Rot, Mould and Bugs (18)

Type of Information (45)

- Analysis tools and techniques (4)
- Background and concept (18)

Carbonlite Knowledgebase

Carbonlite Knowledgebase

Mold: Cause, Effect and Response

1 January 2002

This paper offers a review of a variety of scientific, technical and medical resources to answer questions and to educate readers about the complex and often controversial issues surrounding mold growth in buildings. This paper is intended for the construction industry, including manufacturers, contractors and building owners and managers. It is not intended to provide design guidance or to serve as a training manual for mold assessment and remediation. The goal is to provide readers with an understanding of the state of the science so they can be better equipped to prevent mold problems, handle mold complaints when they do occur, and practice good risk management.

Originating URL : http://c.ymcdn.com/sites/www.wallcoverings.org/resource/resmgr/product_performance/wa-_mold_information.pdf

Year of publication: 1 January 2002

Relevant region :

Categories: Background and concept, Key reference, Moisture in Materials, Rot, Mould and Bugs, Wall assemblies

Status : Publicly available

Publishing Organisation(s): Wallcoverings Association

Download

Document : Mold: Cause, Effect and Response (206 kB)

Show/hide review

Reviewed 1 April 2014

1 April 2014

Reviewer: **Dr Jane Nicklin**
Reviewer's organisation & position: **Biological Sciences, Birkbeck, University of London**
Reviewer's professional qualifications: **BSc PhD**
Reviewer's area of expertise and interest: **Mycology, effect of mould on heritage materials**

Strengths and weaknesses of the document

Well written very informative, a very good source of information within the document but also in the appendices and references. Balanced.

Potential benefit of applying the knowledge

An excellent source of information for practitioners and students

Relevance of knowledge to the UK

Good, other than section 5 which pertains to the US regs on liability, assignment and insurance.

Buildings at Risk in Wales

1 April 2009

Cadw has commissioned this report to identify trends and to inform future actions. It is hoped that local planning authorities will use it as a tool when considering their priorities and future strategies for listed buildings in their area.

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Featured : CarbonLite Training

Training to achieve Certified Passivhaus Designer (CEPH)

Guiding you through becoming a certified Passivhaus designer and giving you the confidence to tackle UK Passivhaus projects

This course is aimed principally at building professionals in the UK: Architects, Builders, Building Engineers and others who want to learn how to deliver real low energy buildings. It introduces the principles behind the Passivhaus standard and methodologies and the use of the Passivhaus Planning Package (PHPP) for achieving low energy performance. To get the most out of taking the full course we recommend that you need to have a knowledge of UK construction systems, an ability to read building plans and an understanding of basic algebra.

PHI DESIGNER CERTIFIED PASSIVE HOUSE DESIGNER

What does the course involve?

The Passivhaus Designer qualification is an internationally accredited scheme linked back to the Passivhaus Institut in Germany. On successful completion of the exam delegates are listed on

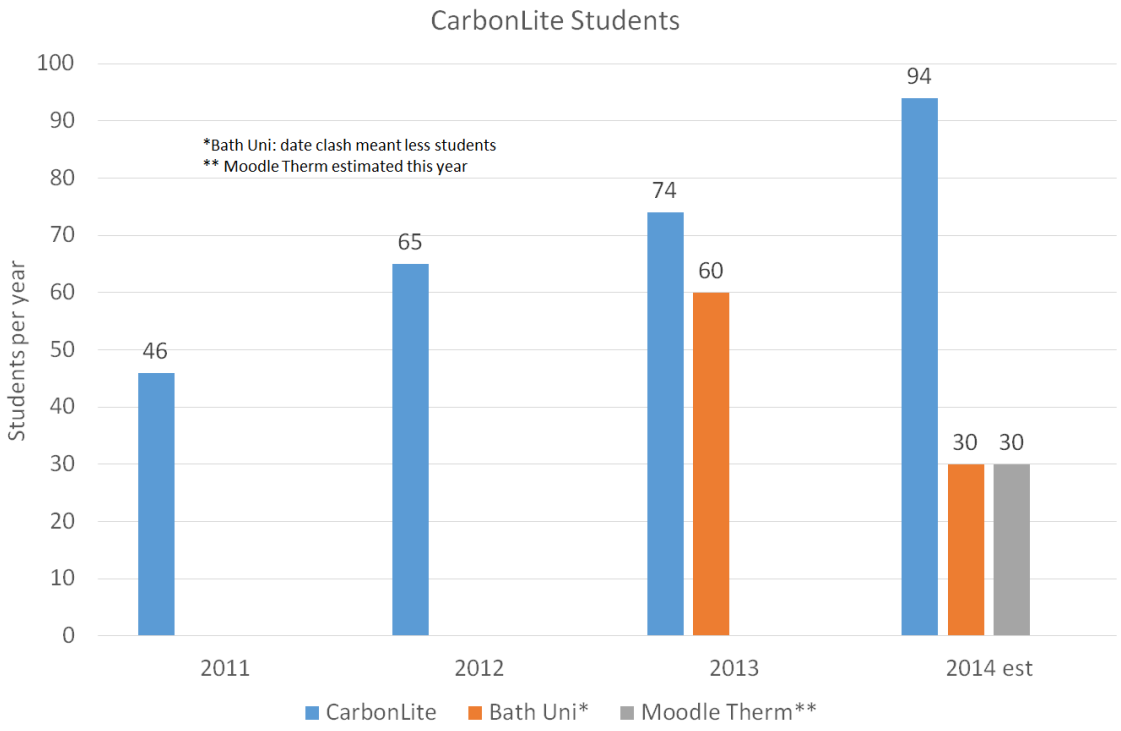
the Passivhaus Designer database where they will be awarded either Passivhaus Designer or Passivhaus Consultant status, depending on existing academic qualifications.

The CarbonLite Passivhaus Designer Programme is designed to prepare delegates not only for the exam but for future involvement in very low energy building projects.

Certfied Passivhaus Designer Training Courses

Guiding you through becoming a certified Passivhaus designer and giving you the confidence to tackle UK Passivhaus projects

Last 4 years: student numbers

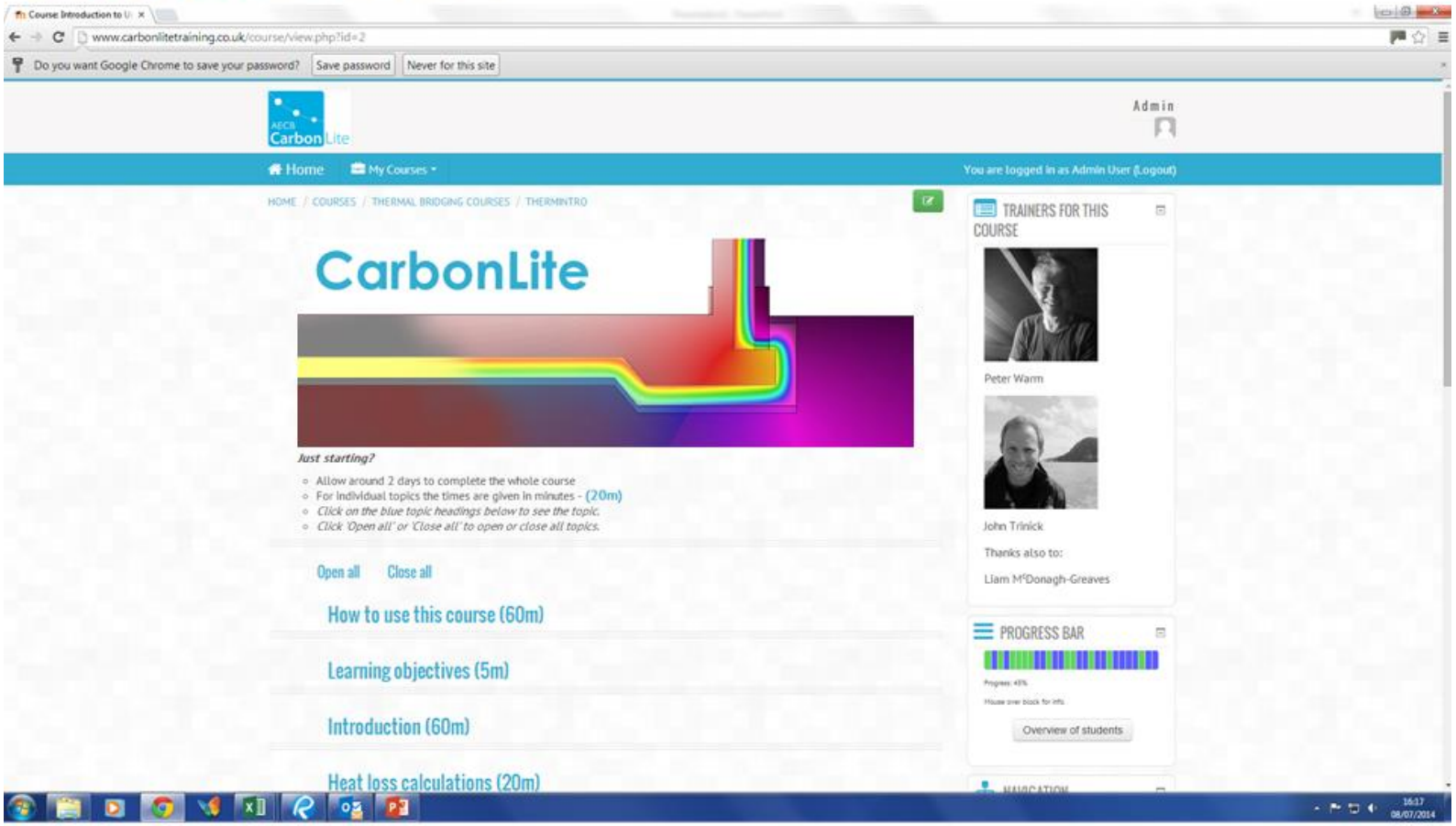


Moving to more online training…

AECB Carbon Lite Online Training

Thermal Bridging Course

NEW



Learn in your own time. Learn at your own pace. Learn to improve your buildings.

Developed to prepare online system for CarbonLite Retrofit Course, this separate course is ready to pilot

AECB Carbon Lite Online Training

Thermal Bridging Course

What does a thermal bridge look like?

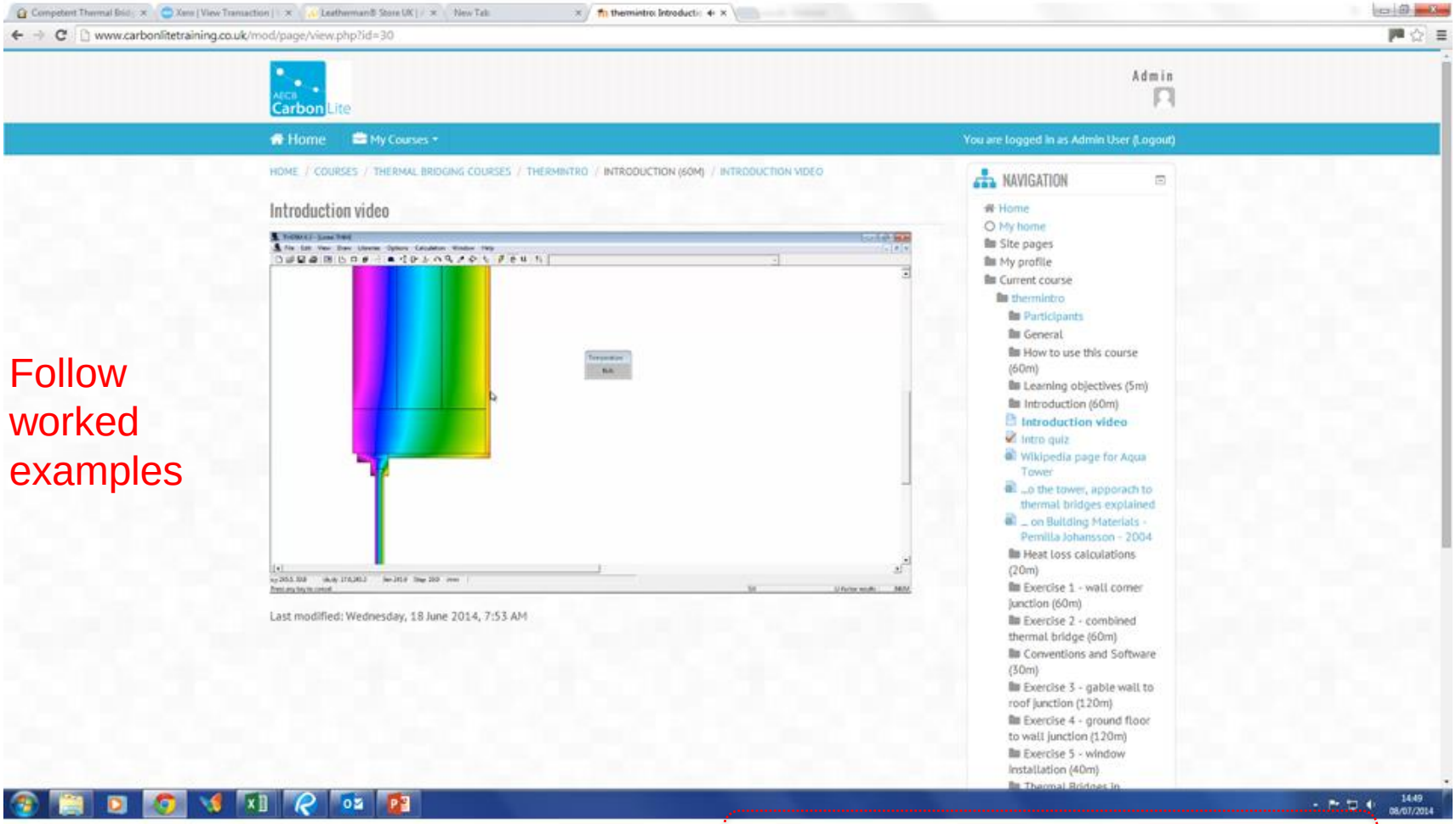
Aqua – skyscraper – Chicago – average winter temperature - 0.6°C

Video tutorials

Thermal Bridging Course

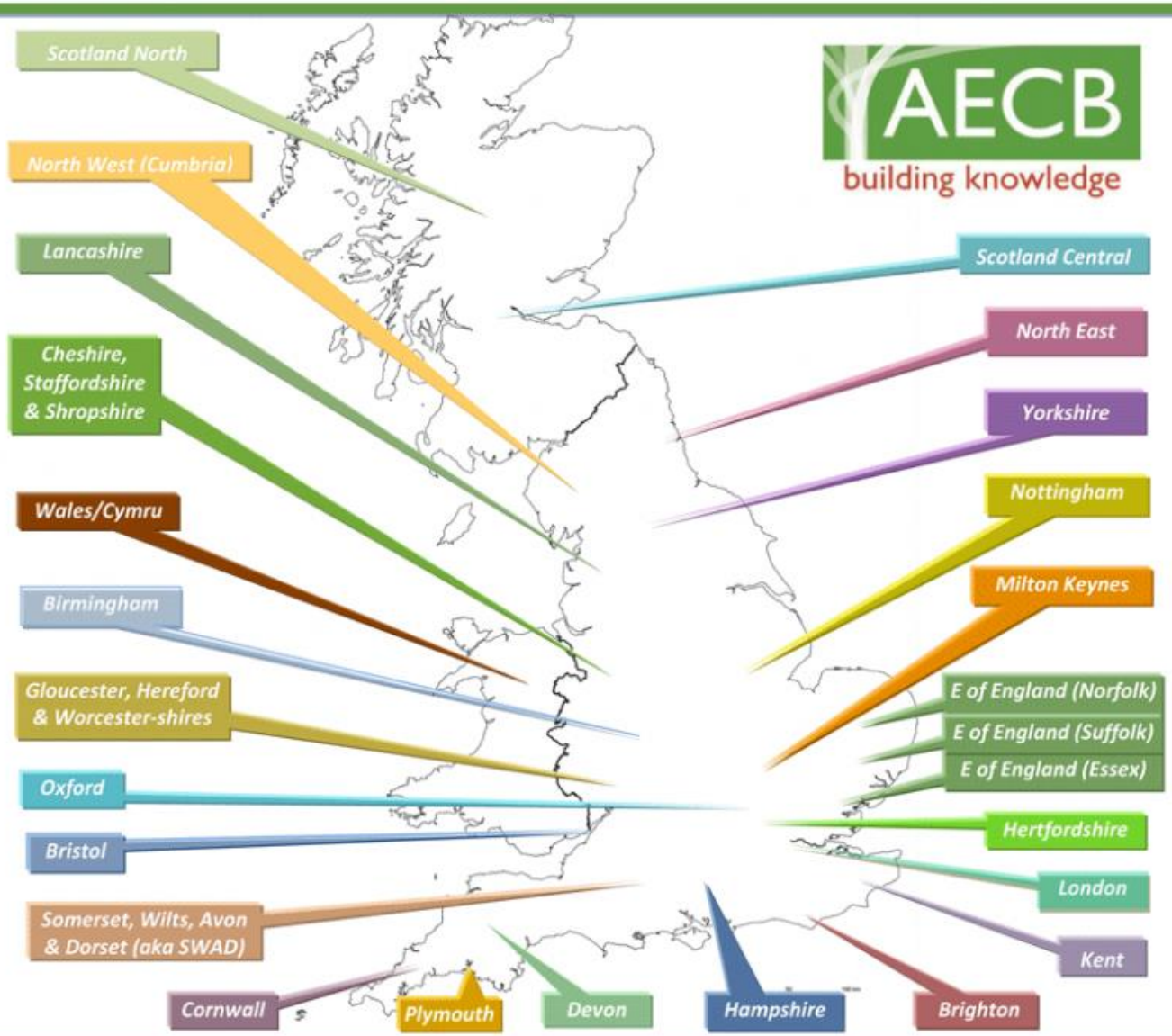
AECB Carbon Lite Online Training

Follow worked examples



Currently in pilot. Available August 2014. Taking bookings training@peterwarm.co.uk

LOCAL GROUPS



Interested? Speak to **Debbie Mauger**, Gill Rivers or an AECB Trustee

The AECB CarbonLite Retrofit (CLR) Course is for members only.

The following contains extracts from CLR course material and filters have been applied to certain images in this version of the presentation to allow post-conference public upload.

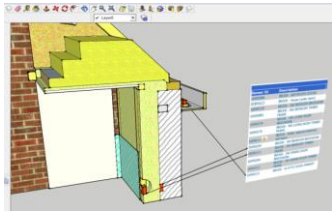
Carbonlite Retrofit Programme

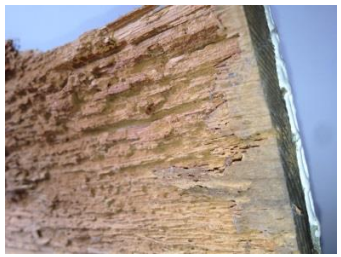
1. An online searchable **knowledge base**

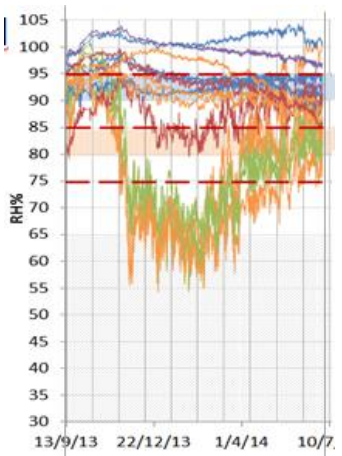
2. Online **training & exam** for decision makers, manufacturers, design & construction professionals, trades, building owners:

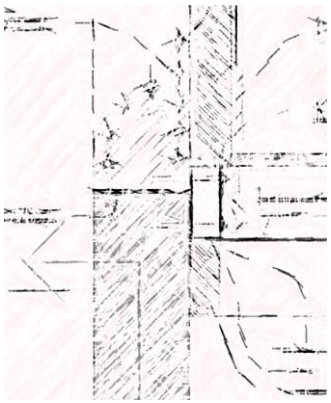
- Understanding the effective application of energy efficiency measures
- Reducing moisture related risks to property & occupants' health
- Energy efficiency targets
- Financial modelling
- Lessons from retrofitted building condition monitoring

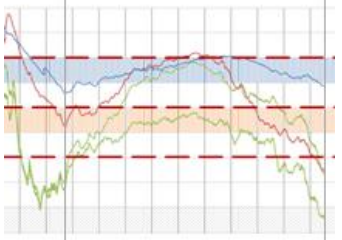
3. Project **Certification**
4. **Financing** Partners

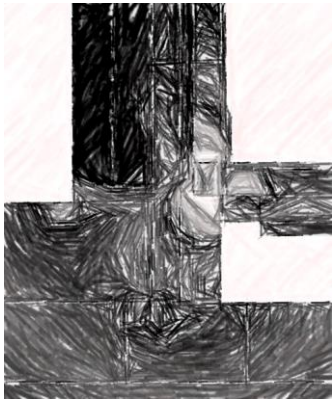


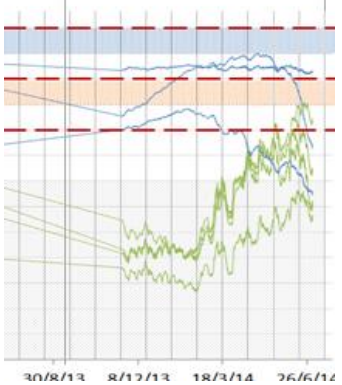




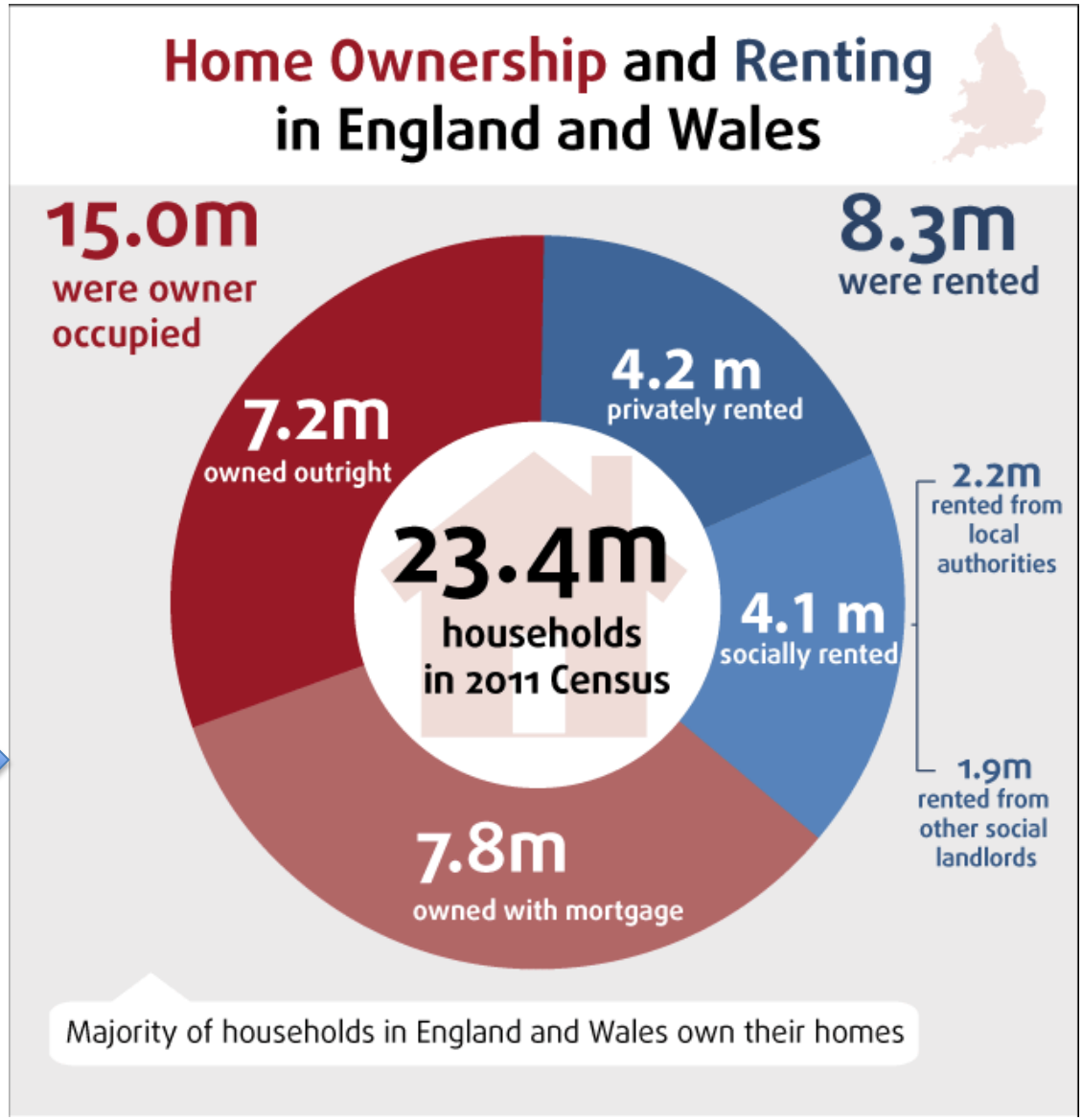








- Mainly domestic focus for now
- non-domestic section added in future
- For all those interested to help decarbonise this lot over the next 60 years



- Comprehensive (!) BUT accessible & useful
- Exam set at 'Pass' & 'Advanced' levels

Sections

1. The CarbonLite Retrofit Programme
2. Buildings in the UK climate
3. Understanding Buildings
4. How we achieve low energy & high comfort
5. Retrofit building physics
6. Case Studies
7. Strategies for Fuel, Heat, Power & Services
8. Factors: Financial, Climate Abatement, Comfort, House Types
9. Financing
10: Glossary

Sections

1. The CarbonLite Retrofit Programme

a. National & Community Scale, Standards, Methodologies, Tools

b. CLR programme elements, structure, process

c. Training course, exam, pass levels, CPD

d. Certification system, checklists, evidence

e. Embodied Energy and the 'Carbon Burp'

2. Buildings in the UK climate

a. Climate & Weather

b. Climate influence on building structures

c. Site scale micro-climate

d. Building scale micro-climate in non-habitable spaces -

e. Building scale micro-climate in habitable spaces

f. Building assembly scale micro climates: within constructions, behind layers (e.g., IWI), between joists, at floor edges

g. Bugs, moulds and rots; Identifying risks related to microclimates in unheated & heated spaces.

3. Understanding Buildings

a. National & Community Scale, Standards, Methodologies, Tools

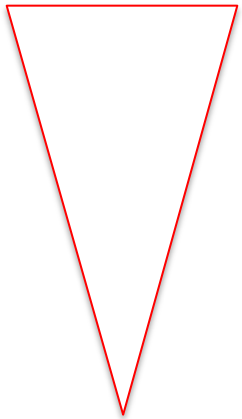
b. CLR programme elements, structure, process

c. Training course, exam, pass levels, CPD

d. Certification system, checklists, evidence

e. Embodied Energy and the 'Carbon Burp'

Increasing detail and focus within bigger context



4. How we achieve low energy & high comfort

a. Shape & Structure

b. Glazing

c. Thermal (including thermal comfort)

d. Air, vapour & wind layers

e. Ventilation - controlled

Great synergy between pioneering members' projects & theory –

- bringing building physics to life
- helping reduce unintended consequences

5. Retrofit building physics

a. Moisture mechanisms

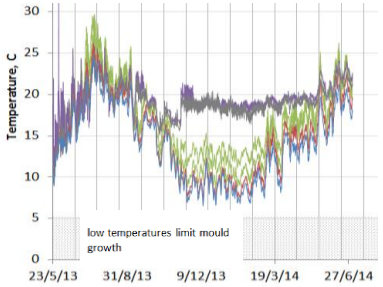
b. Thermal mechanism & consequences

c. Differences between indoors and outdoors (AH, RH, vapour pressure balance, effect of wind and stack effect etc).

d. climates in unheated spaces - crawlspaces etc. moisture load differences between deep and shallow subfloor voids and how these affect the buildings

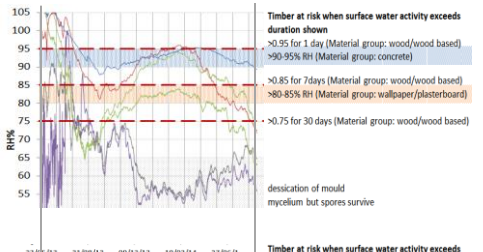
e. micro climates behind layers (e.g., IWI), between joists, at floor edges

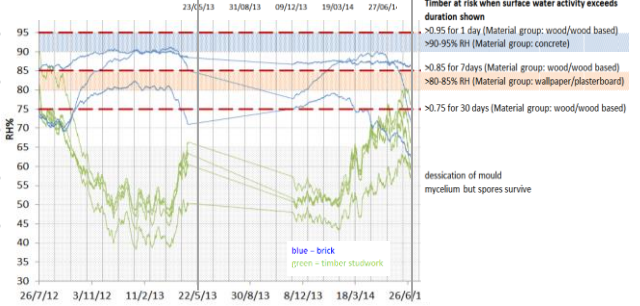
f. risks relating to microclimates in, under buildings and within constructions T, RH, WME: material decay, biological contaminants affecting health



6. Case Studies

See case study matrix





7. Strategies for Fuel, Heat, Power & Services

a. intro - which fuels? (LiM)

b. Appropriate scenarios for space and hot water heating systems

c. Overheating risks and space cooling strategy

d. Daylighting

7. Strategies for Fuel, Heat, Power & Services

a. intro - which fuels? (LiM)

b. Appropriate scenarios for space and hot water heating systems

c. Overheating risks and space cooling strategy

d. Daylighting

Mitigate for 2°C adapt for 4°C!

8. Factors: Financial, Climate Abatement, Comfort, House Types

a. Cost effective energy efficiency measures – the low hanging fruit

b. Whole house, lifetime costing evaluation methods

c. Scenarios & Sensitivity Analysis

Not forgetting the easy stuff!

9. Financing

a. Financing Partners

10: Glossary

In principle agreement with Ecology Building Society:

- Deep retrofits certified under CLR will attract mortgage rate discounts

Capital cost?

Marginal cost?

Predicted vs measured cost?

Table 3. From Residential Retrofit 20 case studies

House	Housetype	Age	Int floor area	kWh/m2.a Pre-retrofit	kWh/m2.a Post retrofit measured	Retrofit cost £	Cost £/m2	approx payback yrs	CLR modelled cost £/m2
TSB90	detached	Pre1919	177	316	115	117750	665	61	
						av.	**665**		1084
TSB28	town (3st)	Pre1919	115	250	128	69870	608	58	
TSB84	town (3st)	Pre1919	112	220	129	53025	473	45	
TSB108	town (3st)	Post1919	96	566	219	62742	654	94	
						av.	**578**		483
TSB51	town (2st)	Pre1919	61	535	129	78876	1293	124	
TSB58	town (2st)	Pre1919	106	470		63200	596	39	
TSB59	town (2st)	Pre1919	109	807	244	90090	827	138	
TSB57	town (2st)	Pre1919	70	638	154	56311	804	85	
Grove	town (2st)	Pre1919	100	285	120	45000	450	42	
TSB98	town (2st)	Pre1919	78	439	192	50050	642	80	
TSB65	town (2st)	Pre1919	116	634	89	134700	1161	97	
Coleford r	town (2st)	Pre1919	106	357	77	60000	566	46	
TSB31	town (2st)	Post1919	100	430	174	117077	1177	135	
TSB77/78	Semi	Post1919	80	531	107	87522	1094	97	
TSB72	Semi	Post1919	130	350	160	70252	540	58	
TSB64	Semi	Post1919	69	544	113	58567	855	77	
TSB25	Semi	Post1919	83	321	231	92795	1123	173	
TSB68/69	Semi	Post1919	71	663	188				
TSB60	Semi	Post1919	75	620	160	53541	712	77	
TSB10	Semi	Post1919	74	678	218	88967	1202	172	
						av.	**921**		801

Transparent, open book

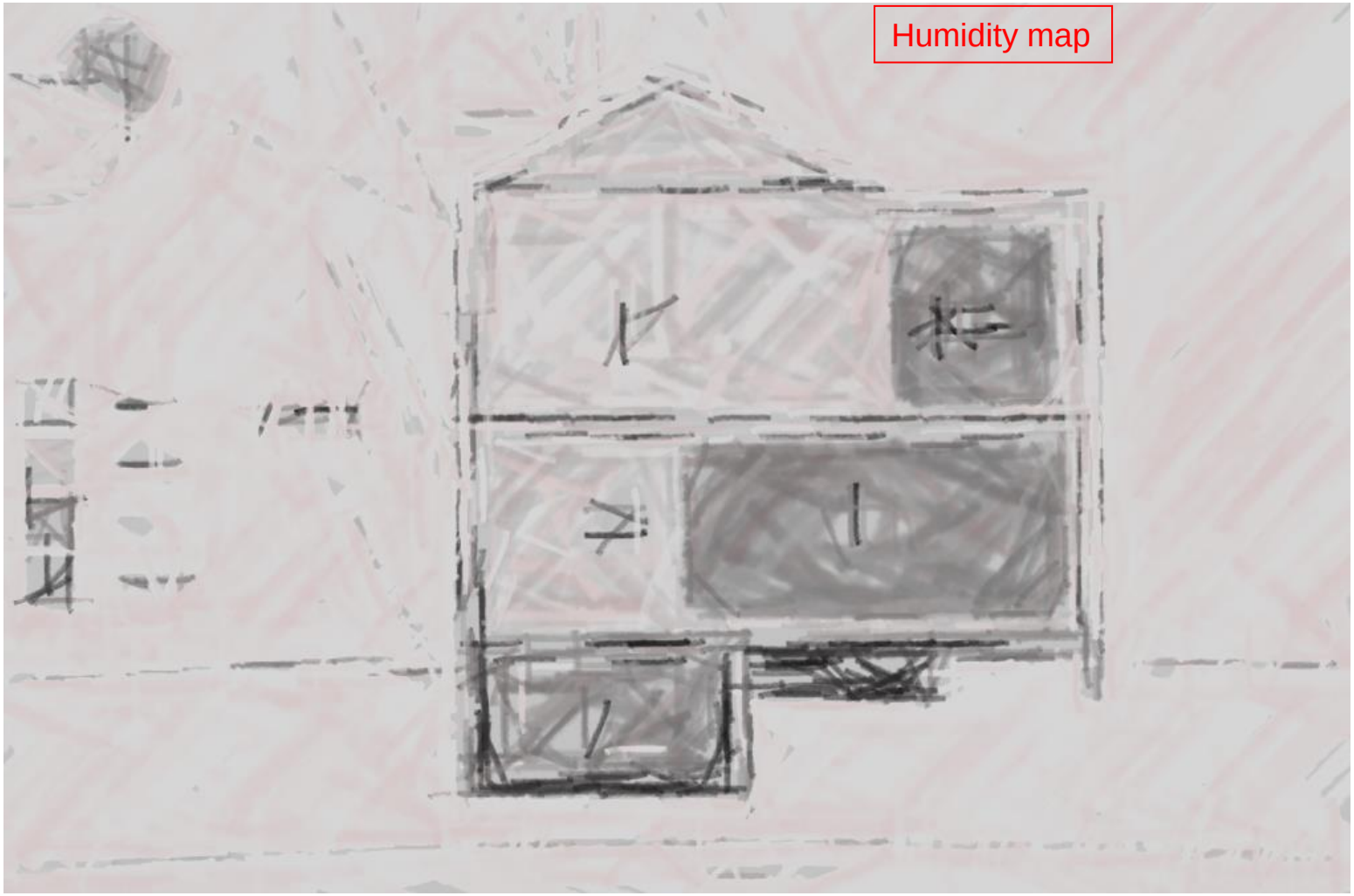
	Bungalow					Old 3 Storey Town House					Semi Detached				Housetypes
	A. Light	B. Medium IWI	C. Medium EWI	D. Deep IWI	E. Deep EWI	A. Light	B. Medium IWI	C. Medium EWI	D. Deep IWI	E. Deep EWI	A. Light	B. Medium IWI	C. Medium EWI	D. Deep IWI	E. Deep EWI
Specific Space Heat Demand kWh/m².a	152	148	133	69	40	69	49	40	43	16	86	69	51	56	24
Space Heat Demand, kWh/a	9512	8787	8337	4096	2538	10214	6813	5878	5962	2350	6576	4857	3896	3939	1797
Heating tCO_2/a	2.41	2.05	1.95	0.96	0.59	2.58	1.59	1.37	1.39	0.55	1.66	1.13	0.91	0.92	0.42
lifetime tCO_2 saved	64	74	92	140	173	106	148	177	160	225	90	109	136	122	165
lifetime cost, £ (-ve means savings)	-9204	5144	-2945	7380	9353	-18689	-7483	-13480	1563	-5619	-16688	-1066	-9075	6290	2474
tot capital cost of measures excl extra for loan	40,532	51,175	45,959	68,006	72,978	51,229	65,187	63,717	73,636	78,243	44,698	59,188	56,207	66,697	69,232
, £ (- means scenario was cheaper than base case)	-0.03	0.01	-0.01	0.01	0.01	-0.04	-0.01	-0.02	0.00	-0.01	-0.04	0.00	-0.01	0.01	0.00
Cost per m² floor area	**602**	**760**	**683**	**1010**	**1084**	**313**	**400**	**391**	**452**	**483**	**517**	**685**	**651**	**772**	**801**
Cost Per Tonne CO_2 saved, £/tCO_2	**-144**	**69**	**-32**	**53**	**54**	**-177**	**-50**	**-76**	**10**	**-25**	**-185**	**-10**	**-67**	**52**	**15**
Form Factor	4.1	4.5	4.3	4.7	4.8	1.8	2.0	1.9	2.0	1.9	2.8	3.1	3.0	3.2	3.2

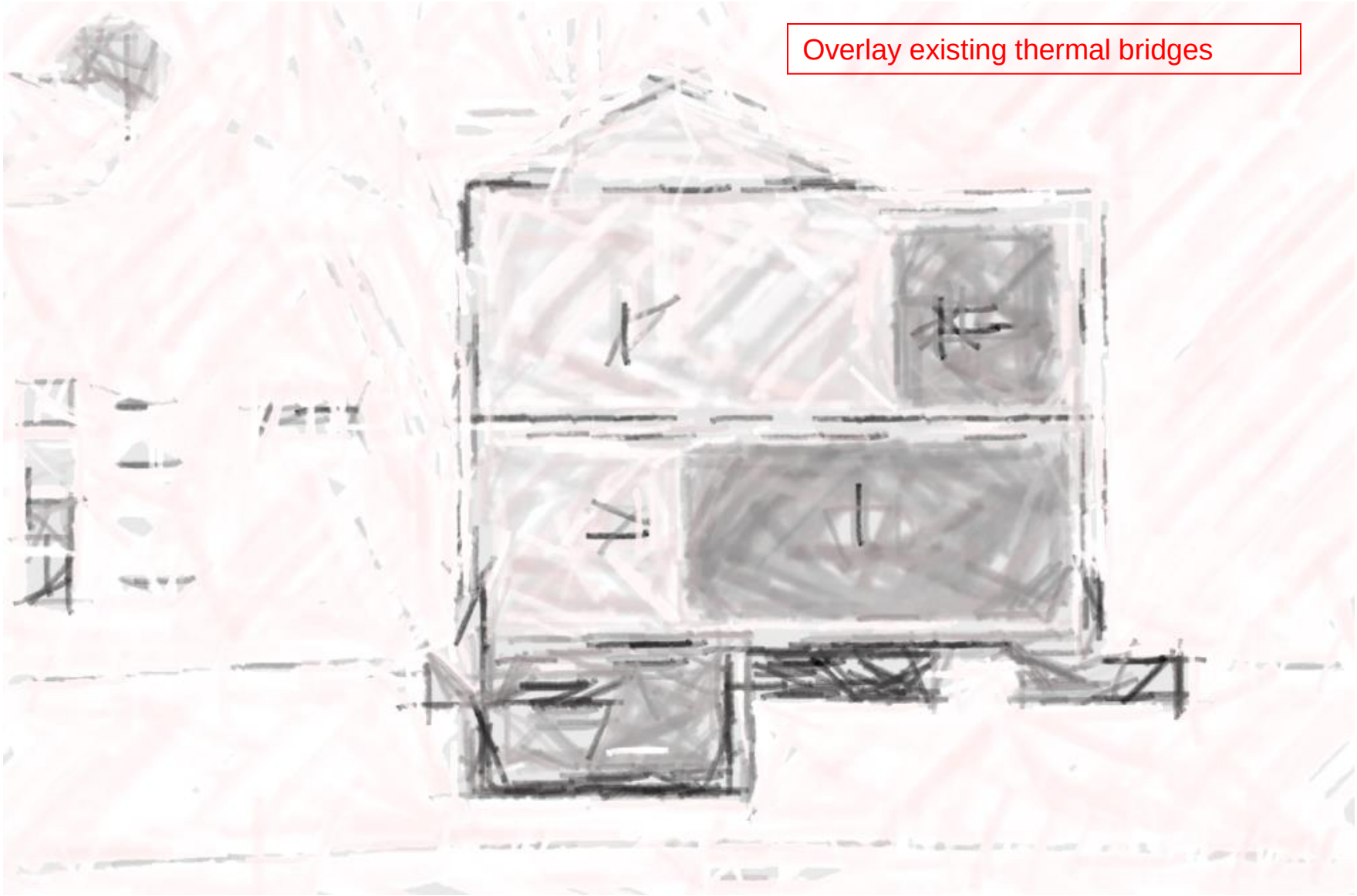
How much heat ‘should’ deep retrofits save – is it all about Passivhaus?

Retrofit Standards

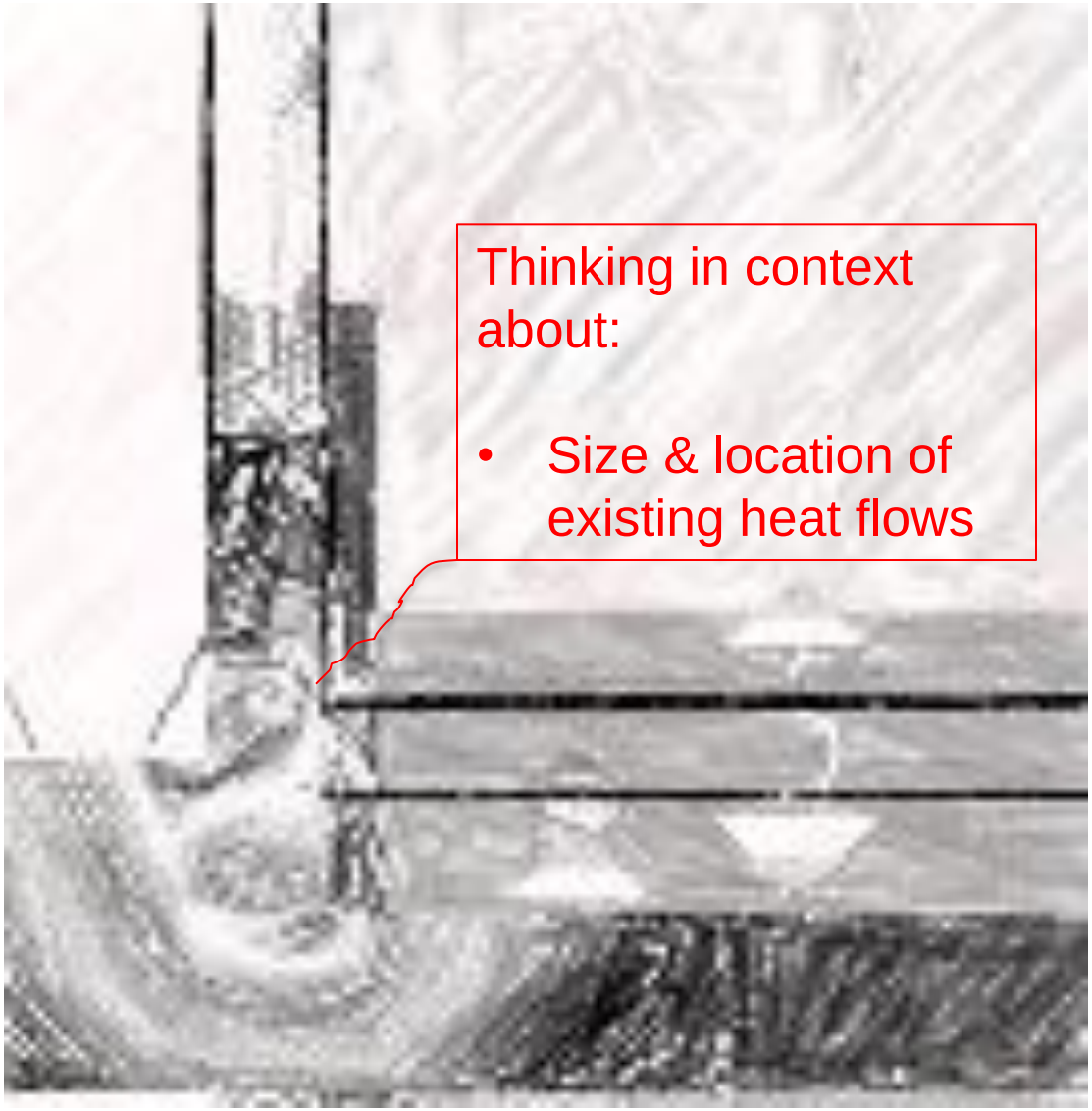
PH, AECB 'family' of Standards	Space heat demand (kWh/m2.a)	
Northern Europe average for poorly insulated homes	120-150 (this figure is still being researched)	
Passivhaus Classic	15	
EnerPHit	25	
New categories for rebranded PH family of standards:[1]		
Passivhaus Plus	+ renewable energy equipment & strives to meet the definition of a "nearly zero energy building."	
Passivhaus Premium	Incorporates a renewable energy system that is large enough to aim for the goal of an "energy positive" building. To be based on the building's footprint rather than the total floor area	
Energy Conservation Building	'nearly Passivhaus buildings' - not quite achieving the standard	
	30	
AECB Silver	40	
CLR modelled house types	'Deep IWI'	'Deep EWI'
Bungalow (form factor 4.0)	68	41 (Silver possible)
Semi-detached (form factor 2.8)	57	22 (EnerPHit possible)
3 Storey Town House (form factor 1.7)	37 (Silver possible)	13 (Passivhaus possible)

Understanding likely environmental conditions associated with micro-climates in buildings & assemblies



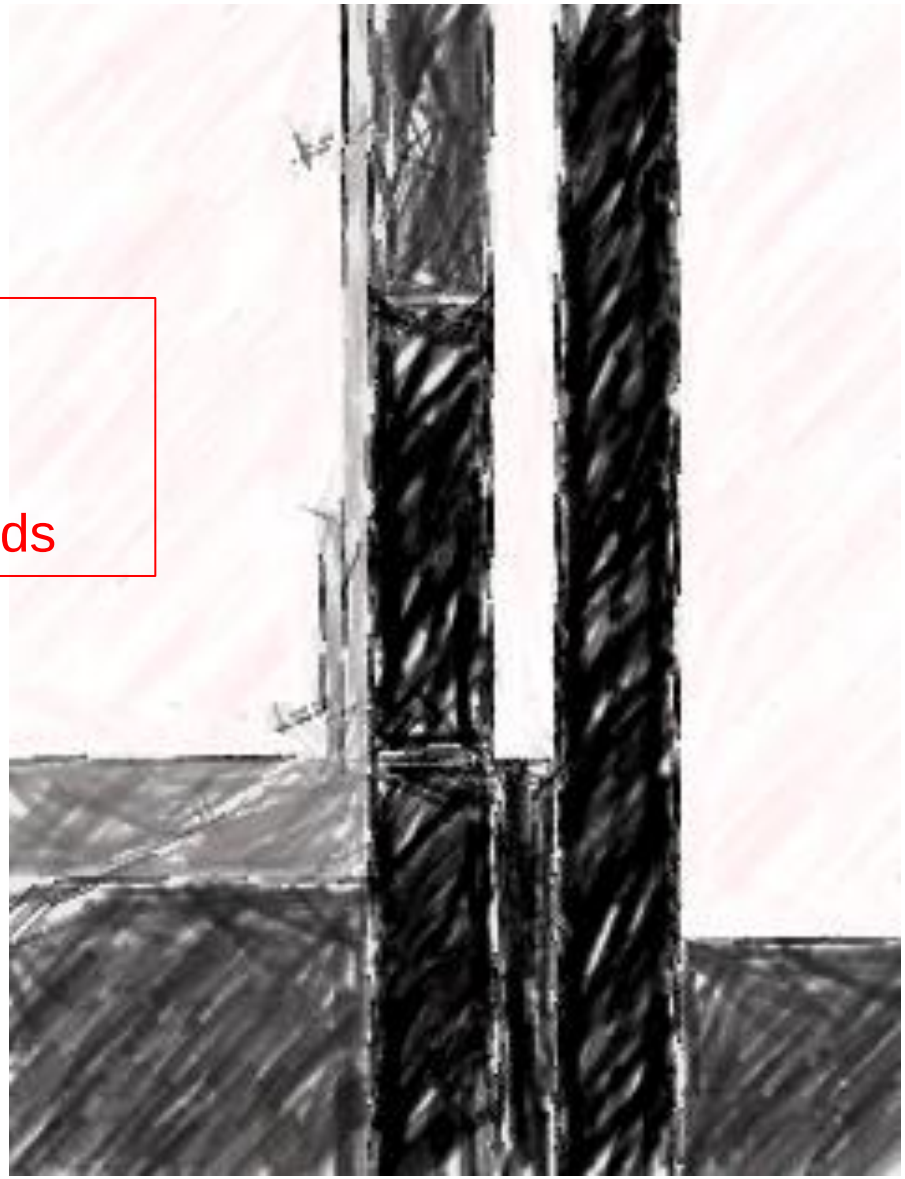

Overlay existing thermal bridges

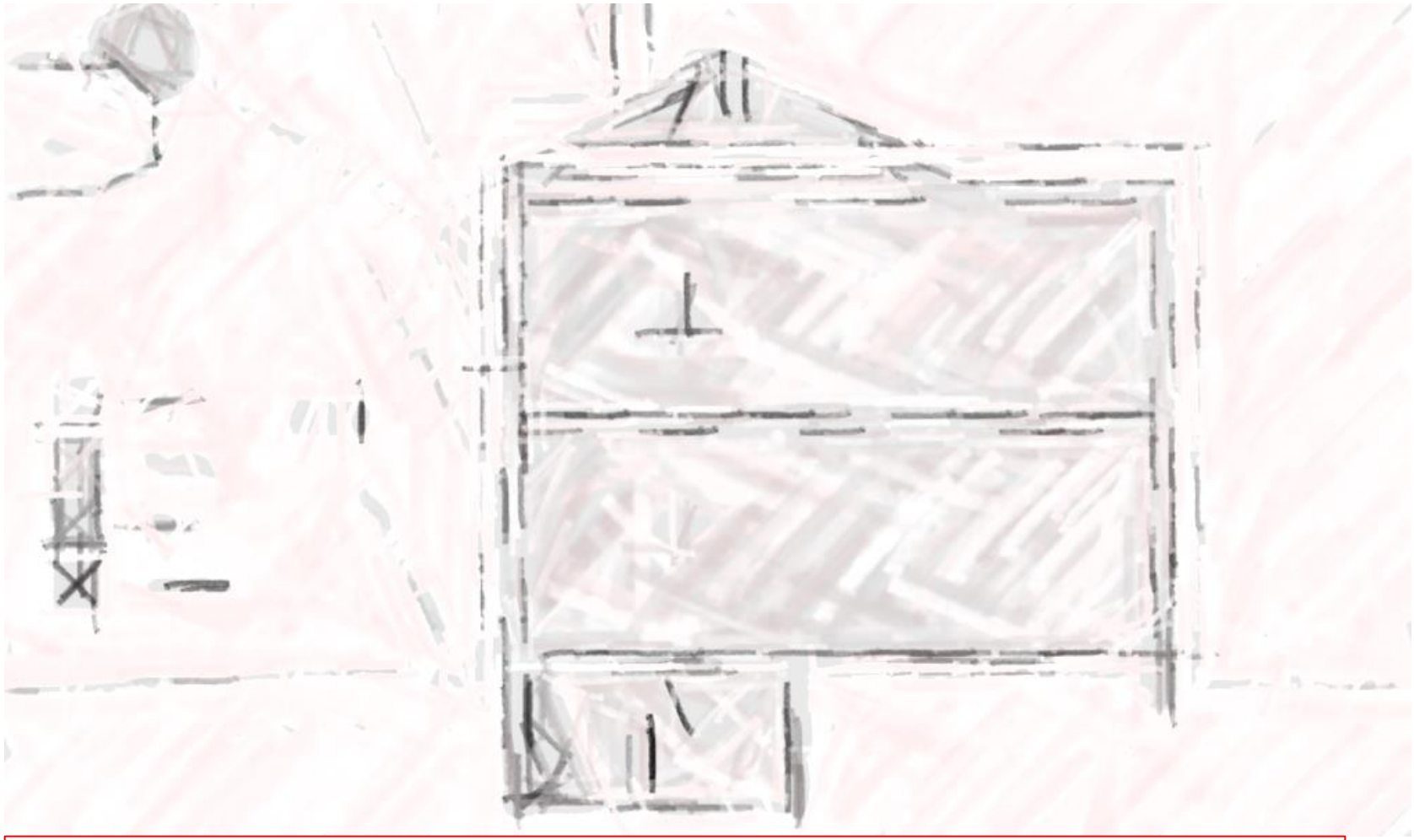
Overlay existing thermal bridges



Thinking in context about:

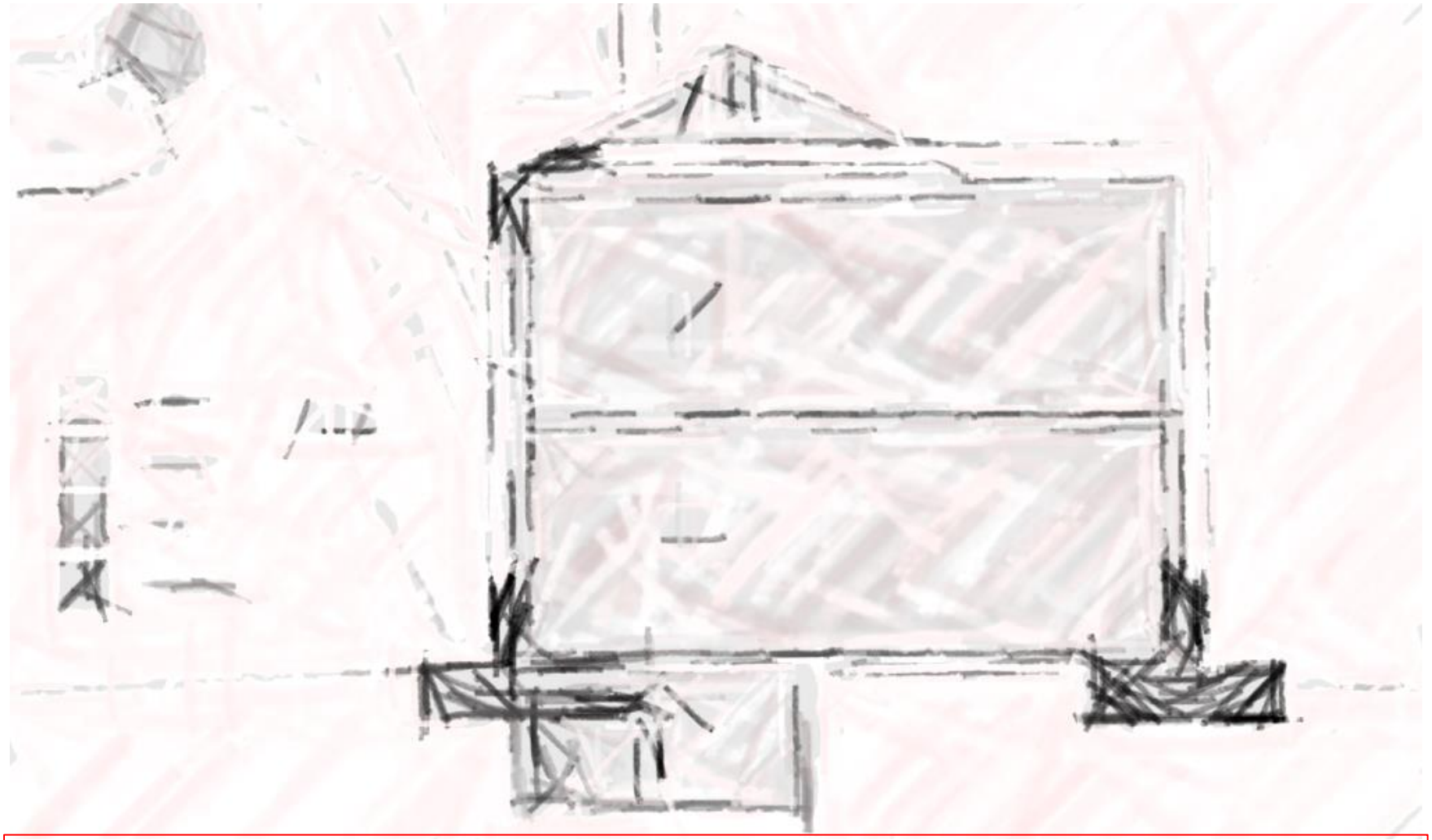
- critical comfort thresholds
- critical mould risk thresholds





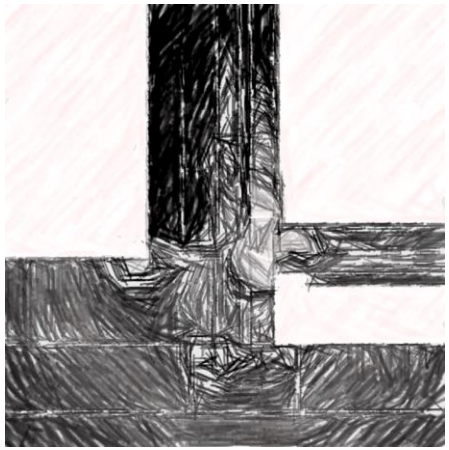
Thinking in context about:

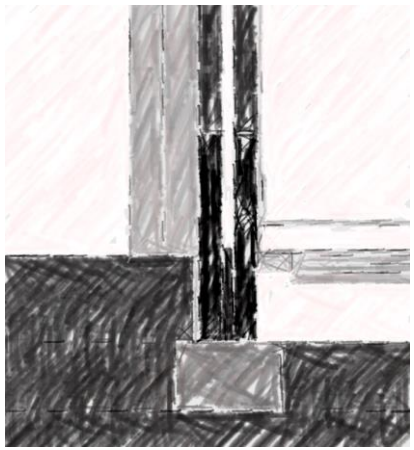
- Retrofit measures – can be ‘repair’ measures too
- Not just making it ‘no worse’ but making it ‘better’



Thinking in context about:

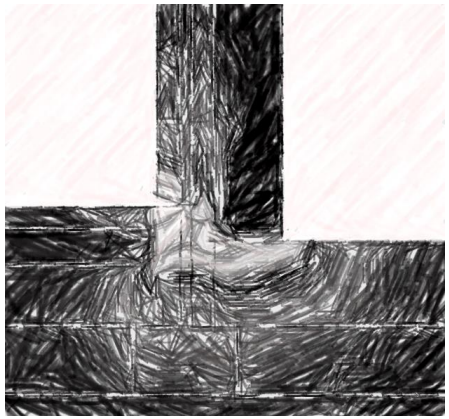
- Are retrofit solutions likely to deliver improved comfort, energy savings AND minimise risk of rot or mould?

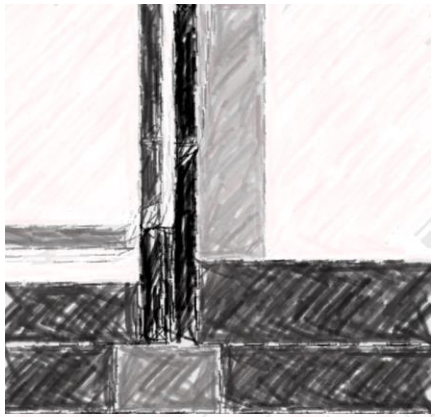


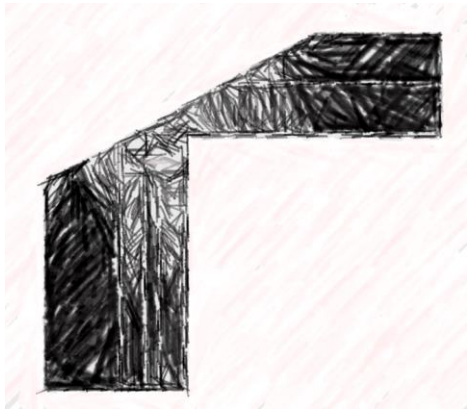


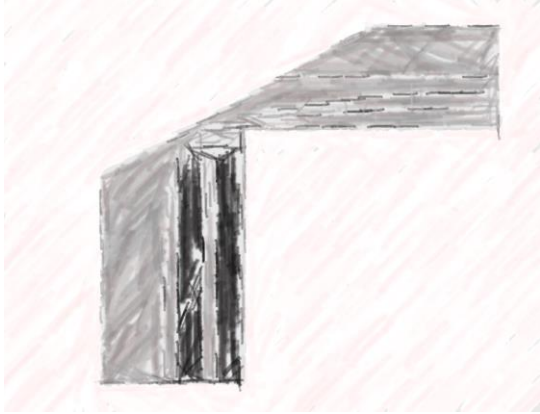
CLR aims to build up over time a larger library of materials for ongoing use by trainees.

Helping to gauge the detailing and specifying challenges for different building types, construction types …









The improved understanding & confidence resulting from CLR programme aims to improve both strategic and detail level decision related to:

- Climate, Health & Energy Security issues relating to retrofit policy
- Management, design & construction work
- Business activity relating to existing buildings

..and help avoid or better manage unintended consequences from the necessary radical refurbishment of our building stock

Publish projects to public database

Manage CLR projects

Manage Silver projects

Create New Project

Your Saved Projects

Project Name (click to edit)	Last Edit	Publish Status	Download PDF	Energy charts	CLR Certificate	Silver Cert.
King Canary Cottage	30 Jun 2014	published	PDF	View Charts	edit certification	view cert
test 1	10 Jul 2014	draft	PDF	View Charts	edit certification	edit
test 2	10 Jul 2014	draft	PDF	View Charts	edit certification	Begin

Projects marked 'Draft' are not viewable by the public. You can toggle the relevant Draft/Publish status by clicking it

LEBD entry
Interim certificate at Stage 2
Completion Certificate at Stage 3 (fee)

LEB / Your Projects / Carbonlite Retrofit Interim Certification / Edit Interim Certification Data

1 Enter Design Data

2 Interim Review & declaration

3 Begin Full certification

Pay Certification Fee

Cost per certification	
AECB Members	£60
Non-members	£250

Benefits of AECB Membership
Join the AECB

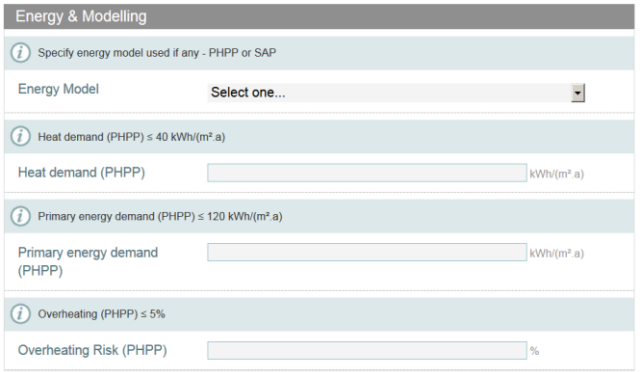
Comprehensive but easy to provide CLR evidence register, includes:

- Ventilation type
- Ventilation designed by
- Ventilation commissioned by
- Person responsible for Pressure test
- Design Certifier Name
- Tradesperson Certifier Name
- Designer CLR course pass date
- Designer CLR course pass certificate reference id
- trades CLR course PASS date
- trades CLR course PASS certificate reference id
- Heat demand
- Primary energy demand
- Overheating

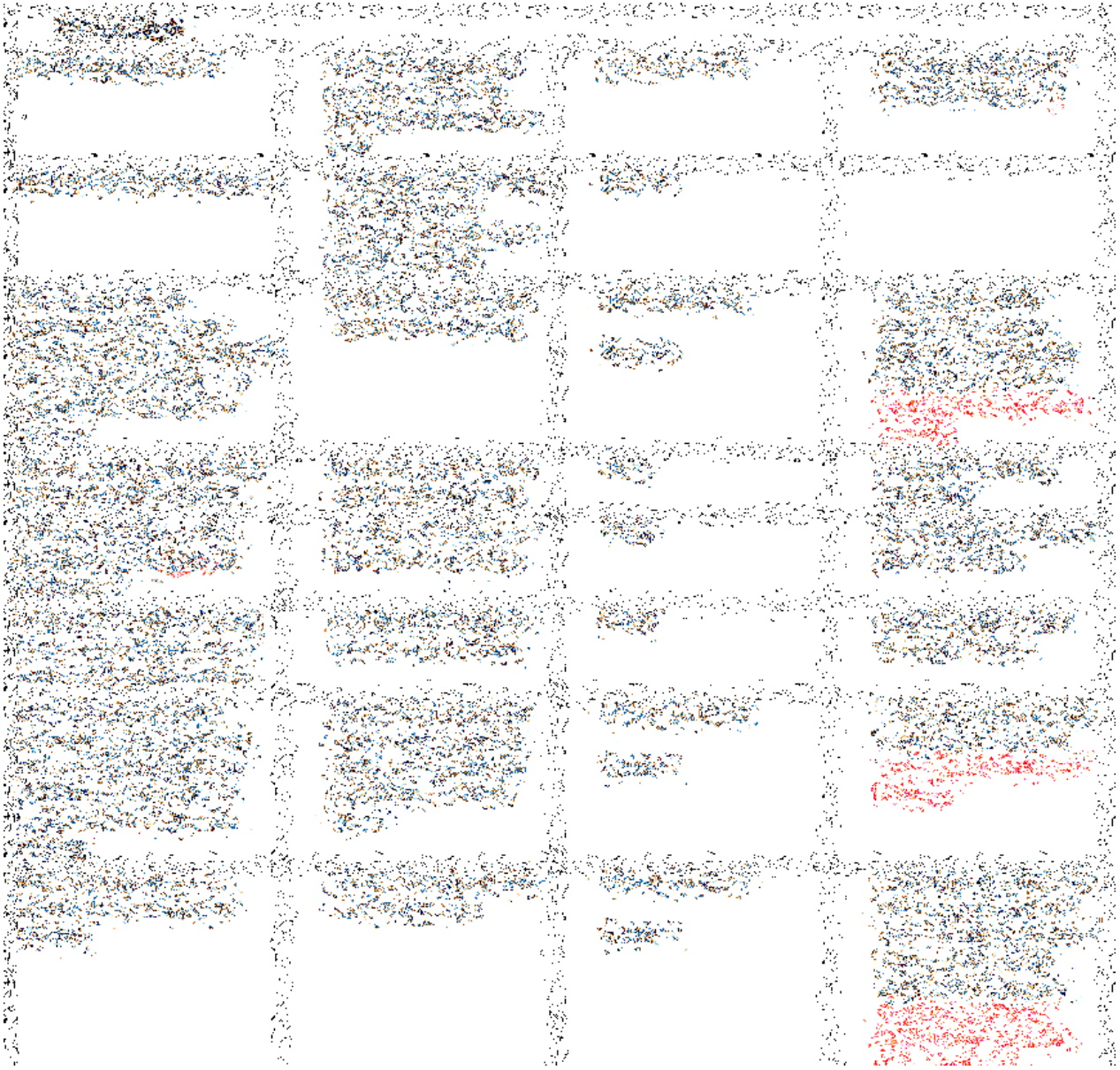
Emphasis on installation of heating & ventilation equipment - checklists

PHPP use not required but recommended

Checklists



Emphasis on moisture risk issues: comprehensive checklists for IWI, EWI, Floors…



Checklists to be used at design, specification stages and of course on site.

Act as basis for CLR **certification evidence**

Eddie Walker

Eddie Walker’s legacy has been used to partially fund the AECB's ambitious CarbonLite Retrofit Programme (CLR).

To recognise every year the generous spirit of Eddie Walker the AECB will sponsor one person annually to undertake the CLR course

Younger people or those in the earlier stages of their career are particularly encouraged to apply

Application details will be available soon.