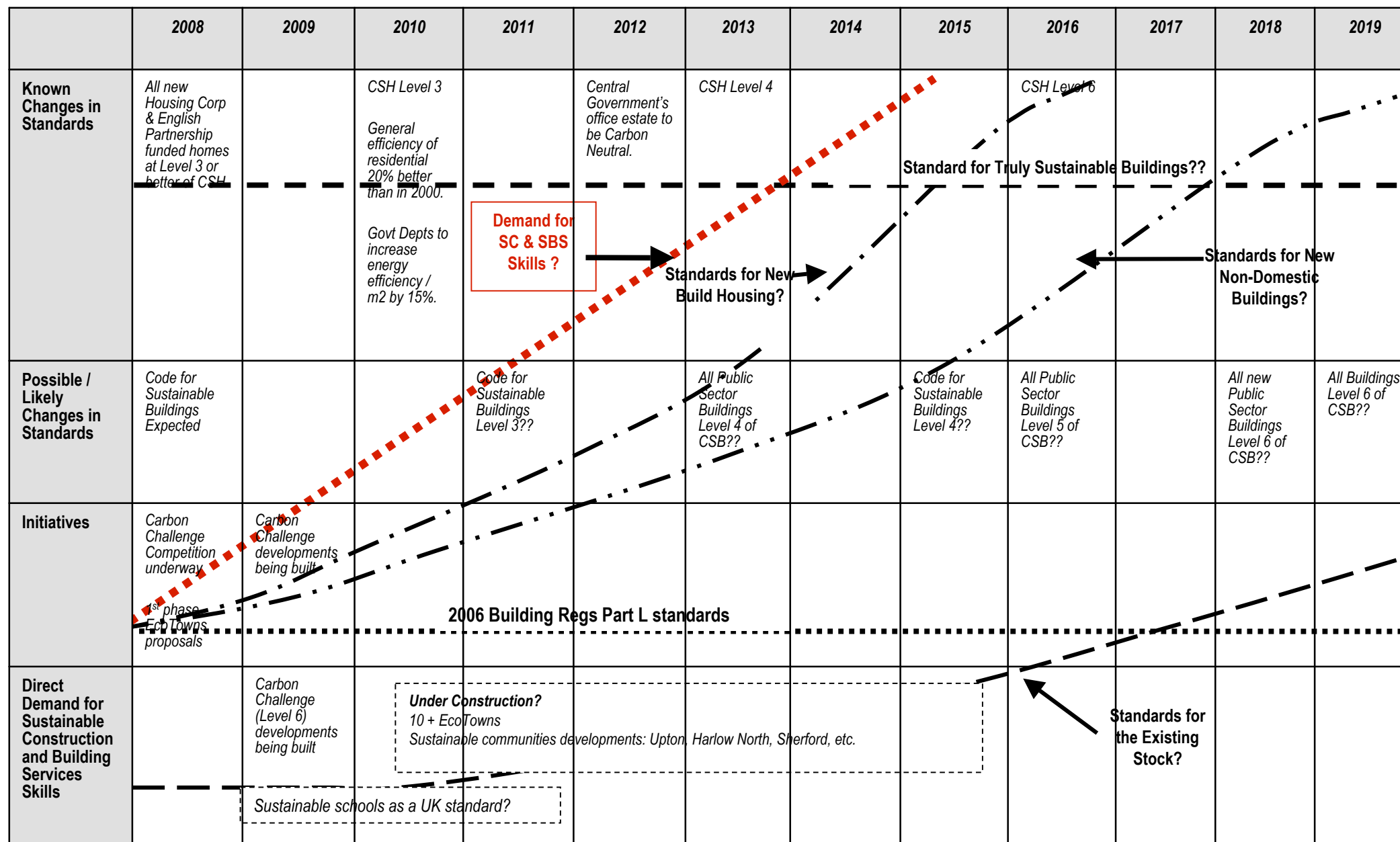


# **The Implications of Low Energy Sustainable Building Standards for Innovation, Products and Technology**

Steve Charter  
Director  
SC2 Sustainability Consultancy



# The 2010-2020 Challenge



# UK Reality Check

- **Stamford Brook (Leeds Met Uni):** actual build quality does not even reach current Building Regs energy performance;
- **BSF 'Green Schools' (Usable Buildings Trust):** not designed to be low energy buildings;
- **BREEAM & 'Zero Carbon' Definitions:** being reworked into more energy-intelligent forms – i.e. BREEAM 'Excellent' not = Low Energy Building;

# UK v's Global Perspective

UK focus on BREEAM, CSH and SAP ...

Global focus is now on kWh/m<sup>2</sup> ...

Passivhaus as a global benchmark:

- Based on building physics;
- 20 years of experience;
- Methodology based on accurate predictions – not notional buildings (SAP);
- Has created a market for Passivhaus Certified products;



# Sustainable Building Standards

Passivhaus

Minergie

Super-E

AECEB Gold & Silver  
Standards

GreenStar

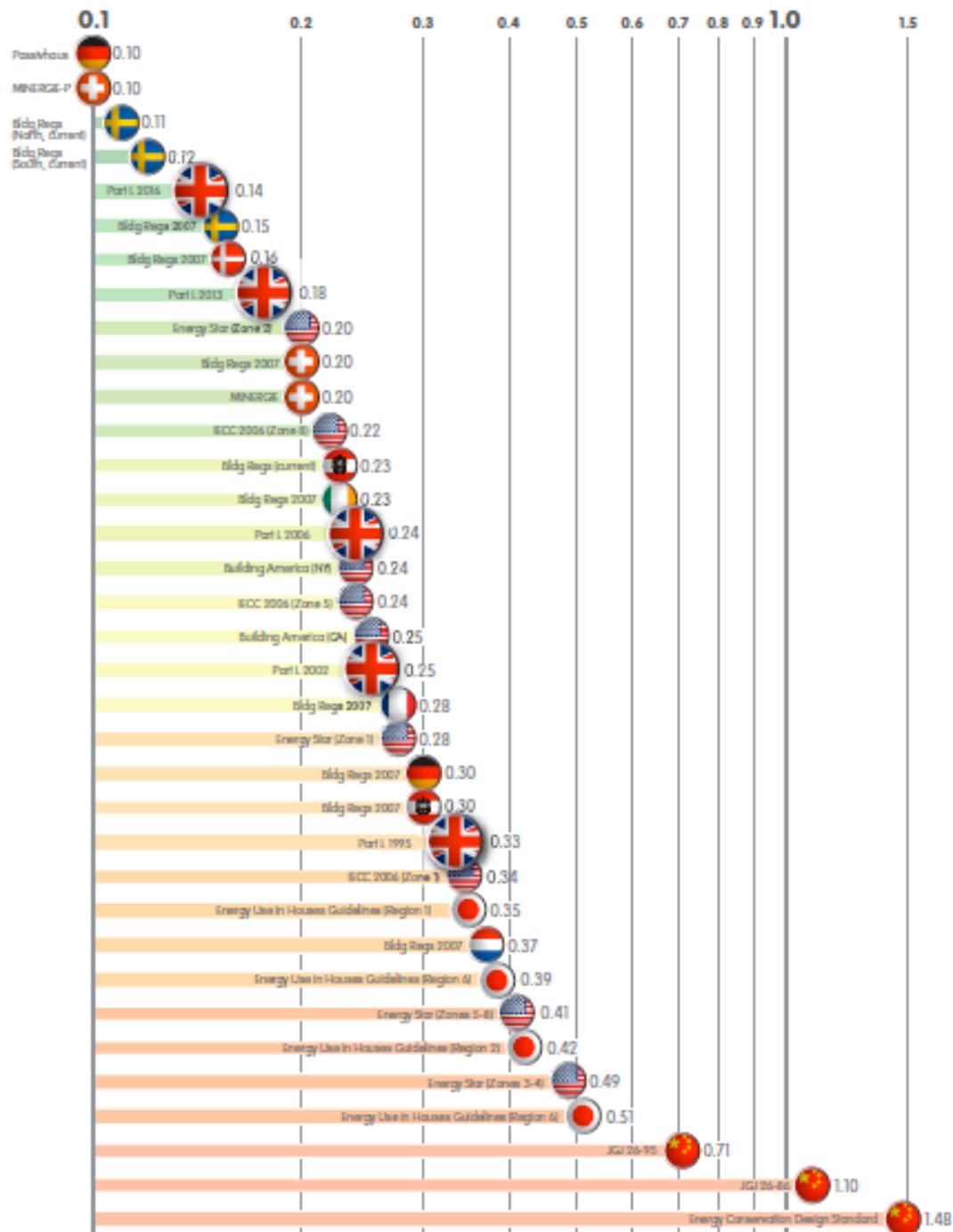
LEED

Code for Sustainable  
Homes

BREEAM

Figure 3

Averaged U-values for floors, roofs and walls (W/m<sup>2</sup>K)



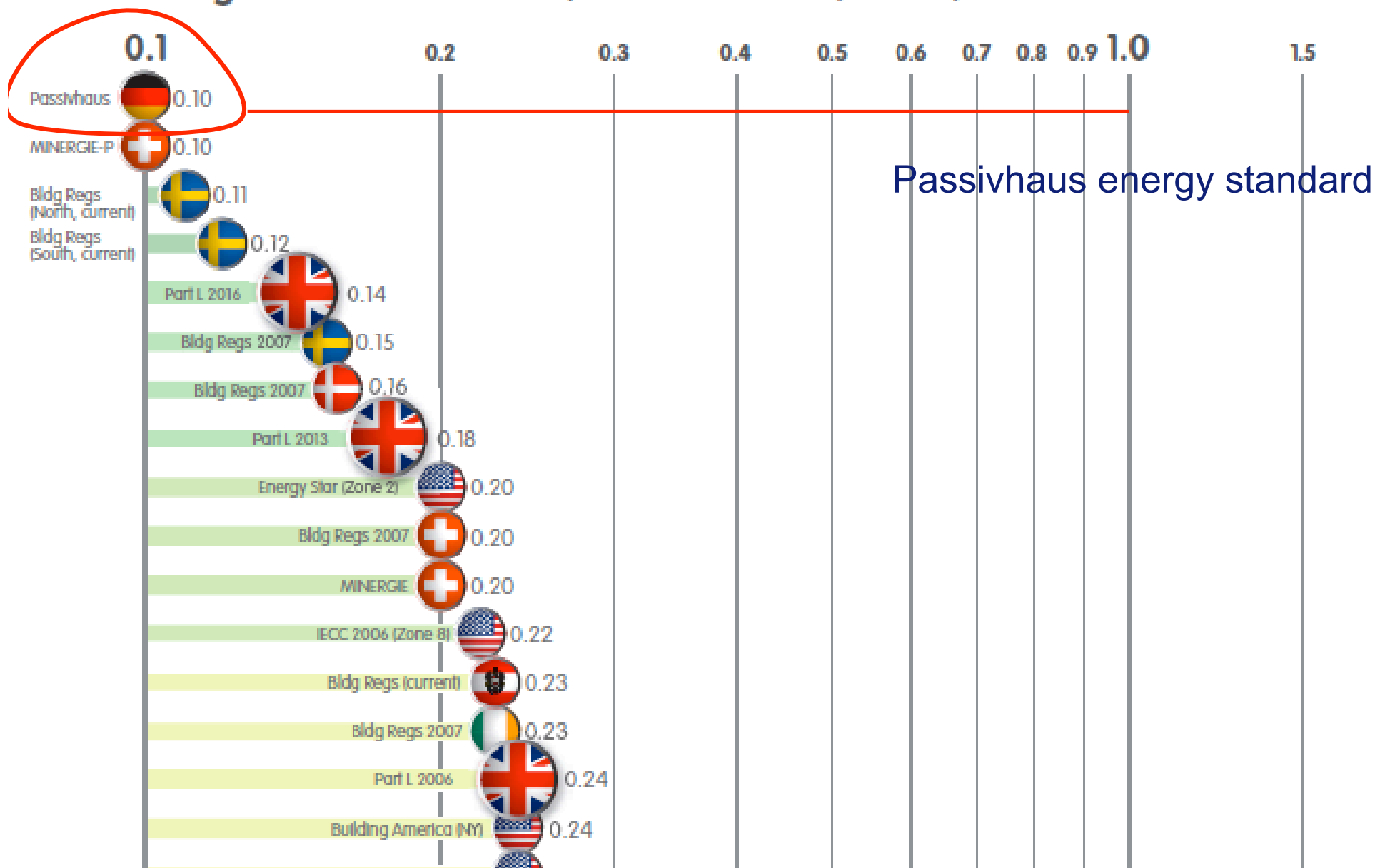
Zero Carbon Compendium  
NHBC Foundation

A comparison of energy  
efficiency standards  
around the globe

Published September 2009

Figure 3

## Averaged U-values for floors, roofs and walls ( $W/m^2K$ )



# Overview of PassivHaus buildings

- world-leading energy efficient construction standard
- designed and built using a step-by-step approach
- use efficient components and a whole house ventilation system to achieve ultra low running costs
- are comfortable, healthy and sustainable
- typically achieve an energy saving of 90% compared to existing housing.
- approx 17,000 PassivHaus buildings worldwide - total floor area over 200,000sqm.

Source: BRE website

# The LC Refurb Agenda

LC Refurb = driver for innovation & product development

- 500,000 homes/year up to 2050
- 7 million C80 homes by 2020

Which in C80 refurb completions equals:

- 2,500 per day / 333 per working hour
- Or 5.5 per minute

In the South East:

- 45 / hour
- £1million spend / hour

# The LC Refurb Agenda

- LC Refurbishment standards will soon be with us ...
- EST Hard to Treat Homes project:
  - U-values: 0.30 or better?
- External insulation systems (mainly for the 'big boys'?) v's internal insulation systems v's mixtures of both
- Windows & doors; MVHR; envelope products and air-tightness products; thermal bringing; etc

# Product Information & Certification

## Certification:

BRE Green Guide to Specification

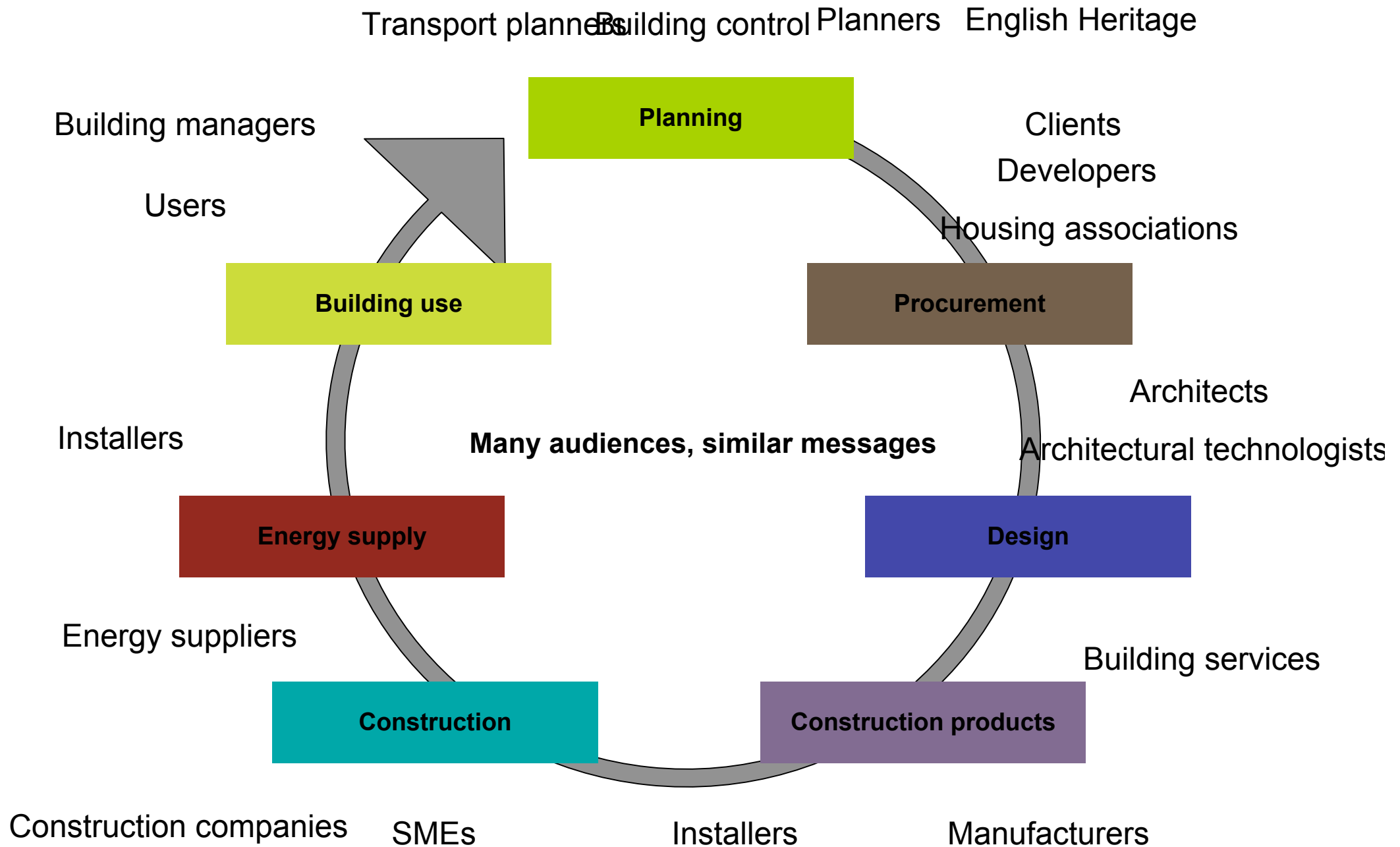
GreenSpec

## Information:

Bath University – Inventory of Carbon & Energy  
(ICE)

CAP'EM (simplified life cycle assessment for  
eco materials for SME manufacturers)

# Lots of parties need an education...

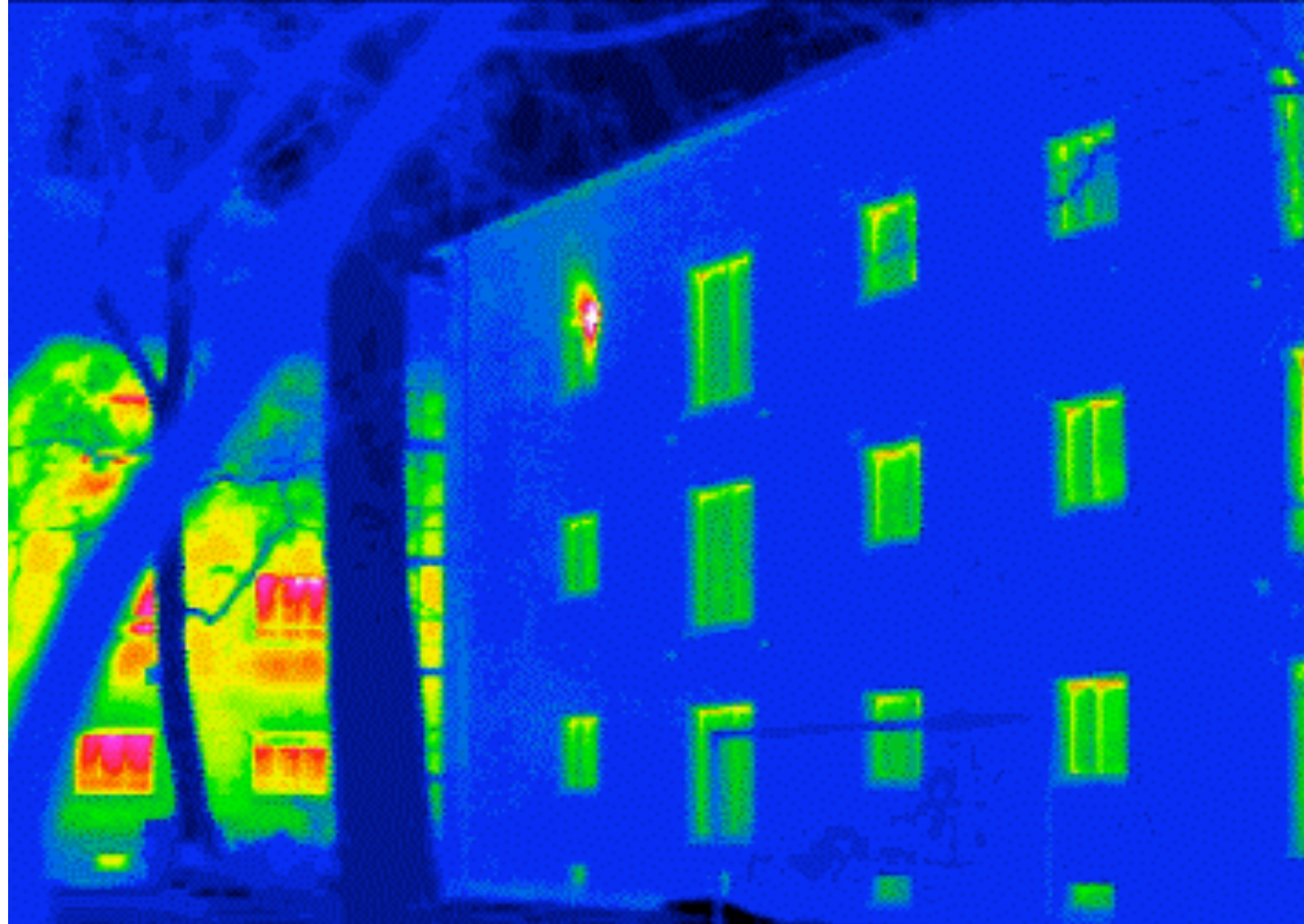




Darmstadt Passivhaus









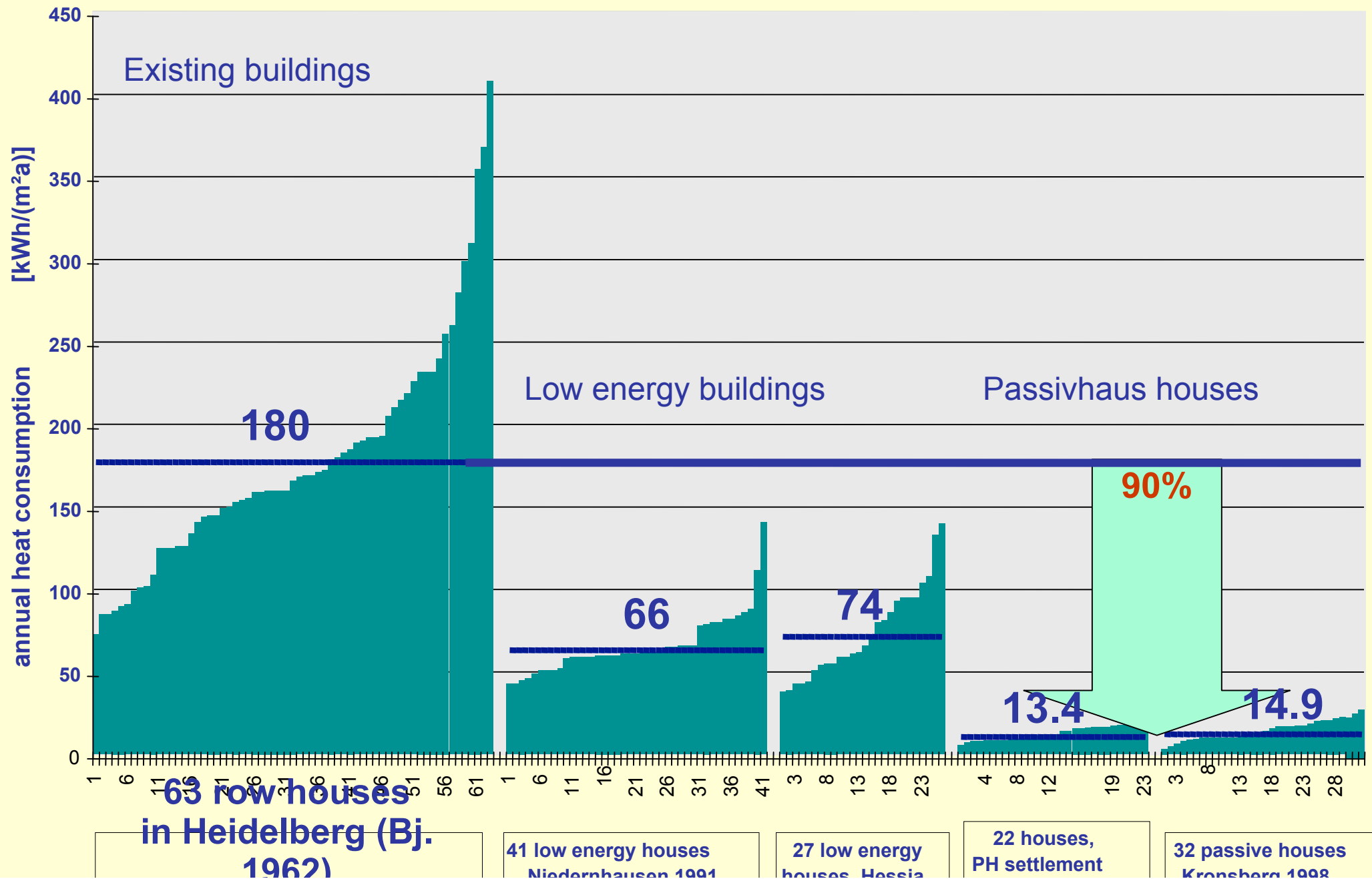
kWh/(m<sup>2</sup>.yr) actual

Heating 11

Total 32

....a 90% reduction on average consumption levels

# Occupant behaviour makes a difference: the average matters



# Disability Essex, Rochford



Just completed



# Gentoo Housing Association - Racecourse Estate Houghton-Le-Spring, Tyne and Wear



25 homes under  
construction



# The first officially PH certified UK building - training centre/ offices, Machynlleth





Before (1869 - 2008)

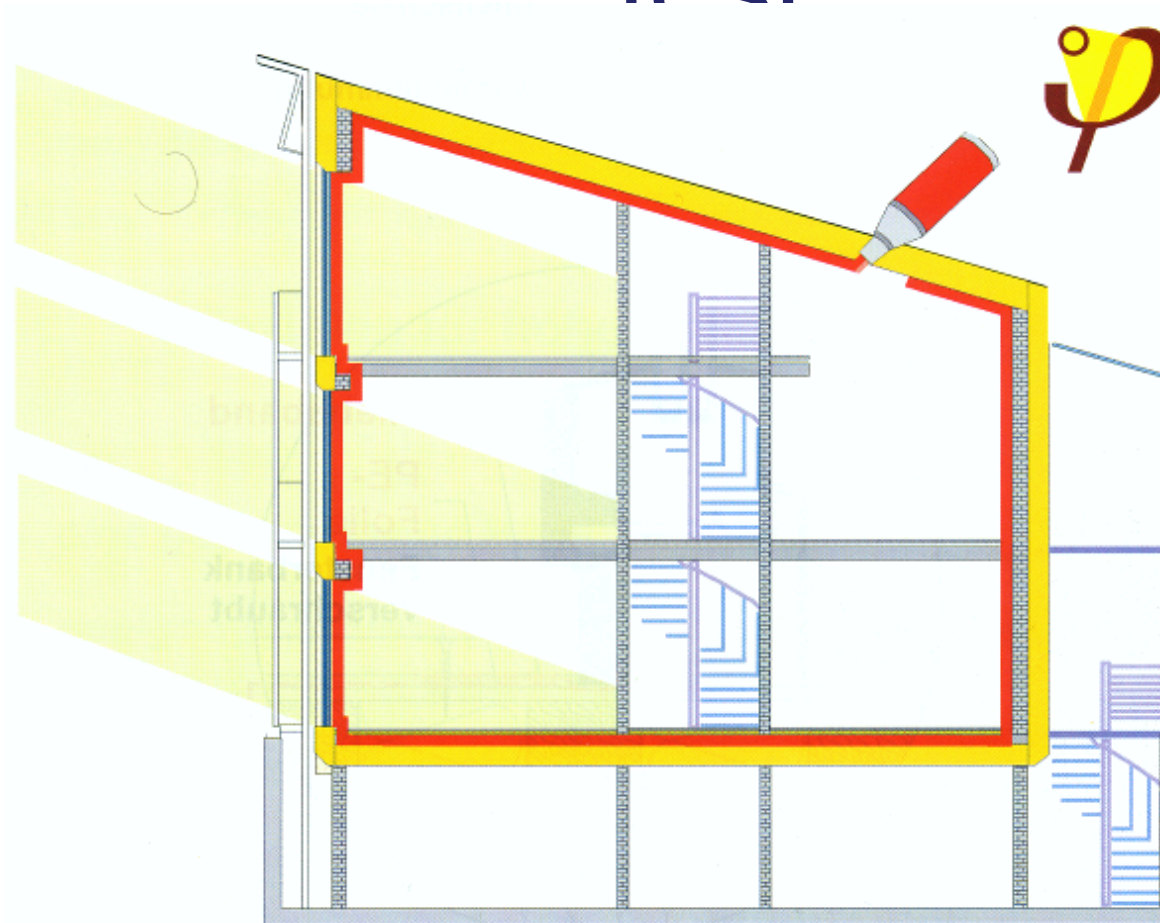


After its 100 year service (2008-2009)





# Airtightness – the red pencil line test



Source: PHI Darmstadt

Designing and installing a continuous airtightness layer is essential



# Careful sealing of window-to-wall junctions is essential

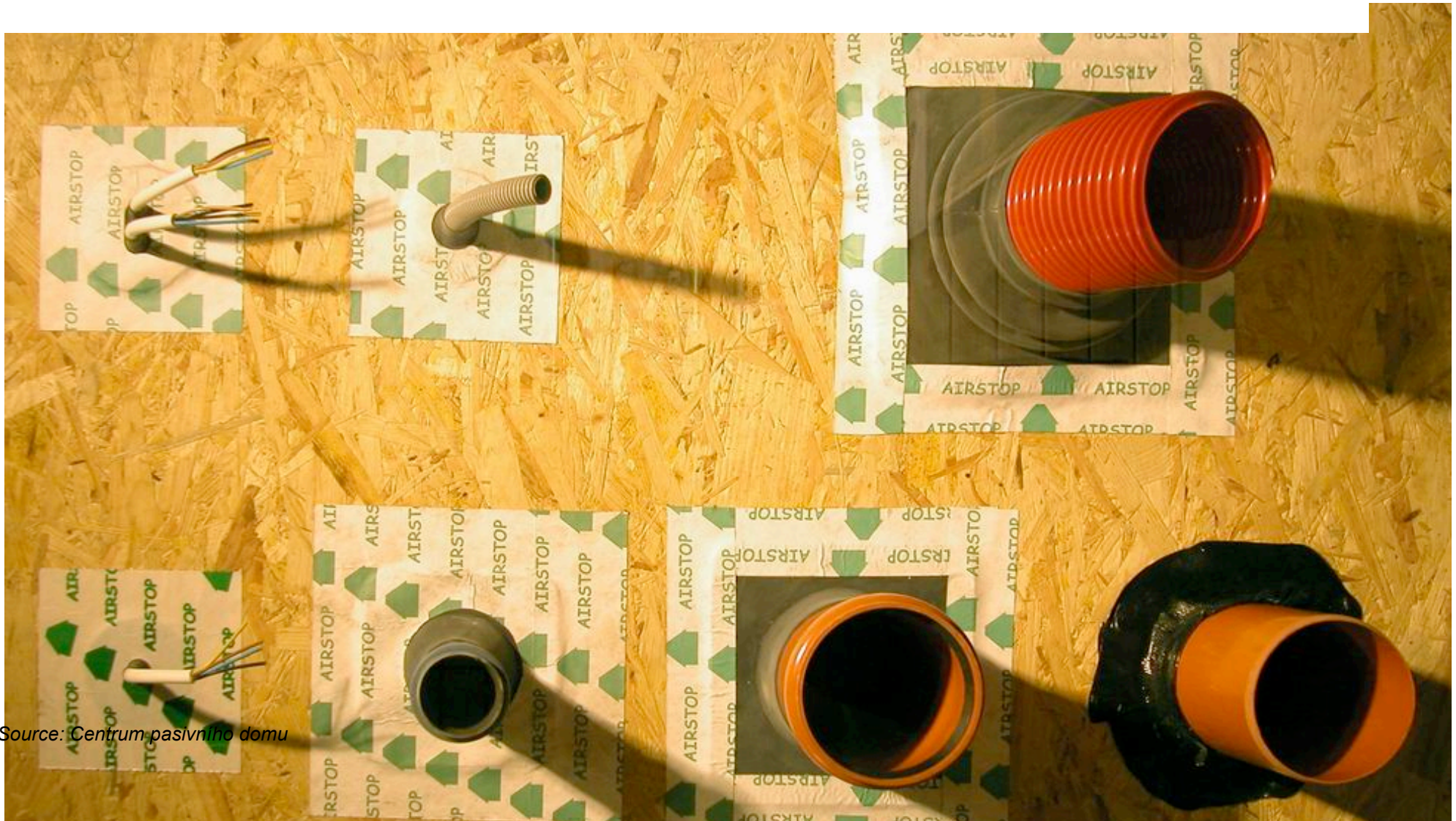


- use special tapes to seal the render to the airtightness membrane
- angles / corners needs to be sealed with special mastic



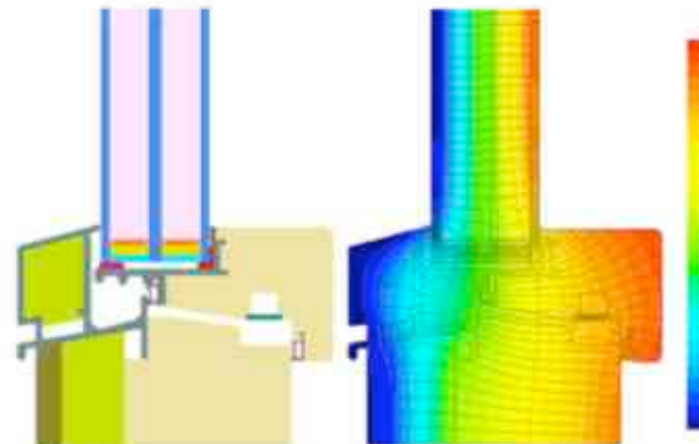
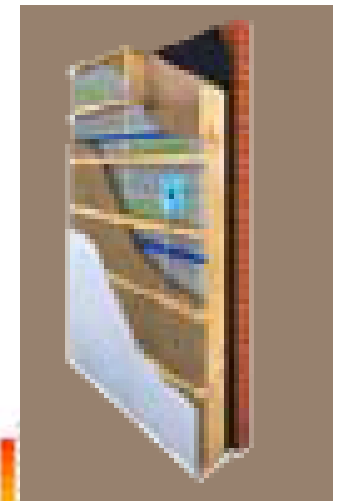
# Keep breaks in the fabric to a

Any services penetrations in the fabric should be sealed by cable or hose bushings, pipe sleeves or butyl rubber tapes

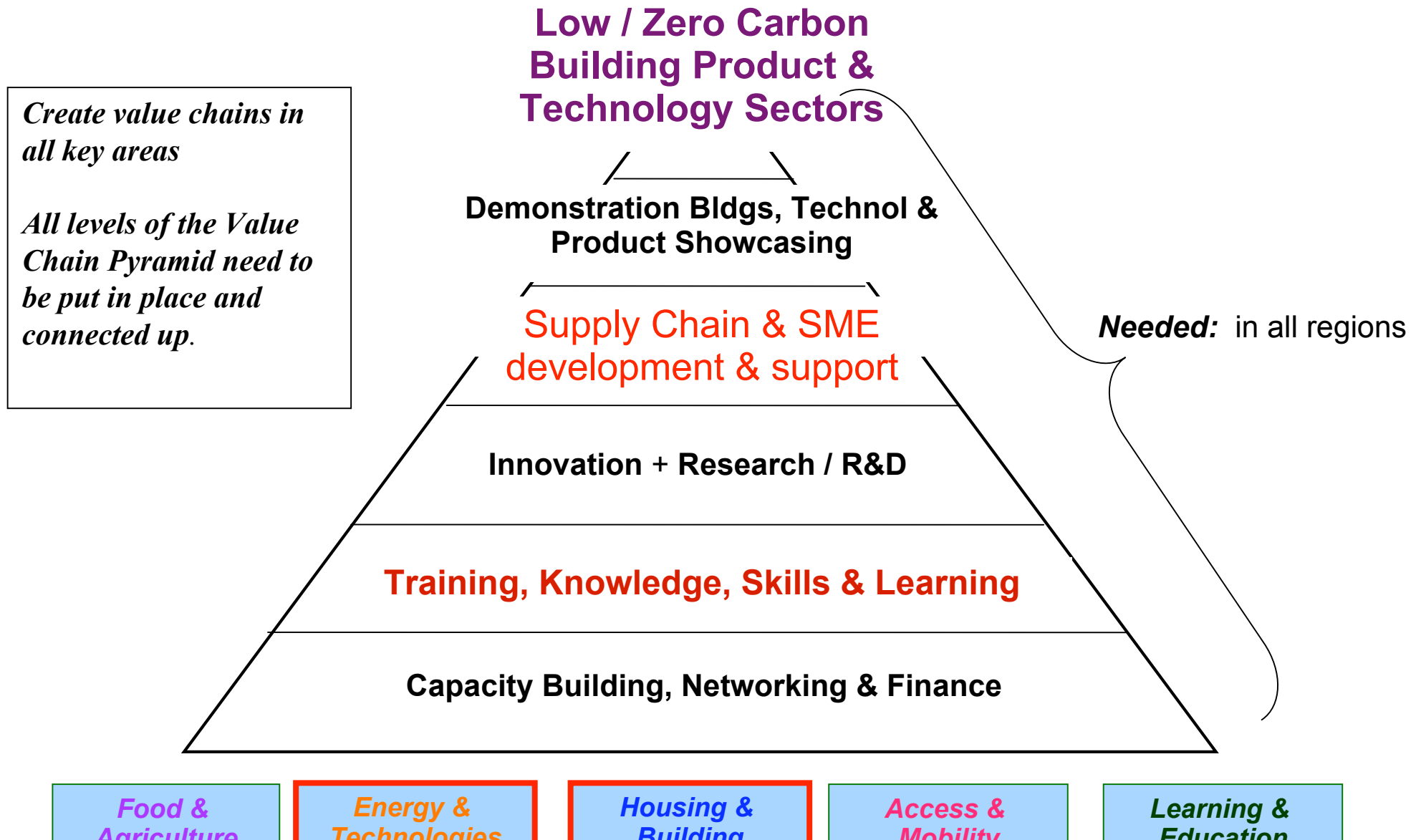


Source: Centrum pasivního domu

And we need more passivhaus  
products readily available in the UK



# Value Chains Pyramid for Low Carbon Building Product & Technology Sector



# Known Problems or Challenges?

- **Knowledge:**

- of energy and buildings in the UK is very poor;
- distorted knowledge: new build over existing stock; focused on Codes, etc not performance.

- **Skills:**

- (virtually) no body has a complete picture;
- trade based, not team or multi-skill based;

- **Scale of Issue:**

- very large sector, numerous players, complex, huge number of subbies & small builders;
- Existing homes: 27 million to low-to-zero carbon;

# Predictable Trends

*'sorting the wheat from the chaff'*

**Standards**

**Certification schemes**

**Building design and construction methodologies**

**Products**

**Technologies**

**Product+Technology combinations**

***General Trends:***

**Next 5 years – focus on reduction in  
operational (in-use) energy use, water use and carbon emissions**

**Within 5-10 years – shift towards  
impact = (operational + embodied) x energy, carbon and water impacts**



# Predictable Trends

*'sorting the wheat from the chaff'*

Energy and Carbon performance data increasingly critical for products + software for easy understanding

**Product/technology certification for high performance standards**

*Removal of barriers to entry for quality products and technologies*

**High investment in R&D and product development and improvement**

**Competent persons certification for high performance products**

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