



**How Passivhaus can help deliver zero carbon in
the UK**

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Association**

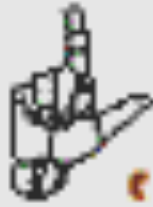
3 February 2010

“We know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns -- the ones we don't know we don't know.”



We have three known unknowns

Or are they still unknown unknowns?



Ελληνική

Español

עברית

Νεοελληνικά

اللغة العربية

زبان فارسی

Français

РУССКИЙ

日本語

Latin

Italiano

中国語

Deutsch

한국어

Türkçe

Português



Myths, Fables and Fairy Tales





Passivhaus is a discipline in counting and adding up

- An energy standard for buildings with an absolute energy target

15 kWh/ m².yr for space and cooling energy

120 kWh/ m².yr primary energy

- Measured performance

- A set of methodologies for delivering the target, or telling you what performance to expect if you can't go the whole way towards the target

airtightness

thermal bridge free

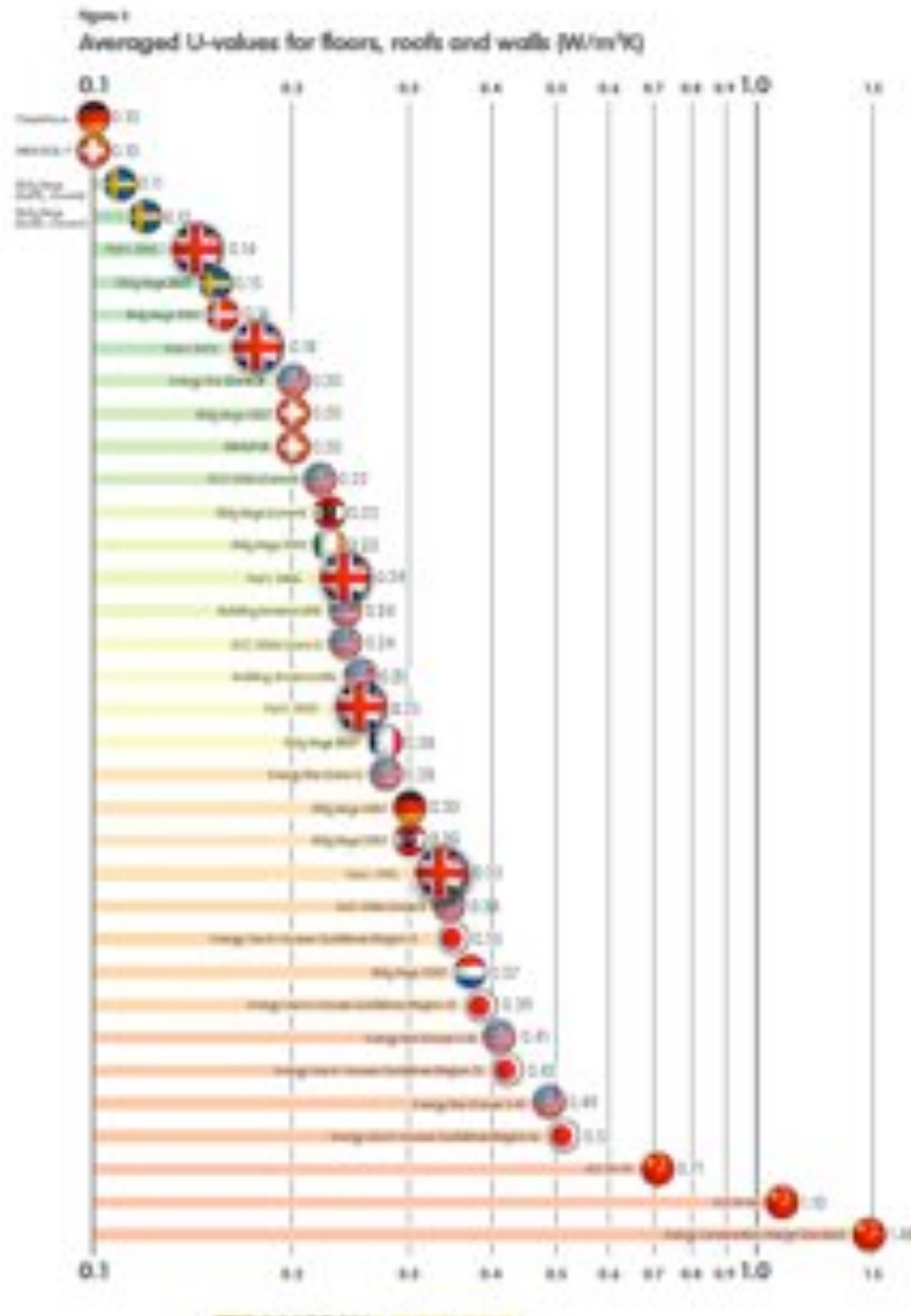
triple-glazing

heat recovery ventilation

energy-efficiency lights and appliances

optimising solar gain and avoiding overheating

passivhaus provides a real how-to guide, not an aspiration



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/m²K)

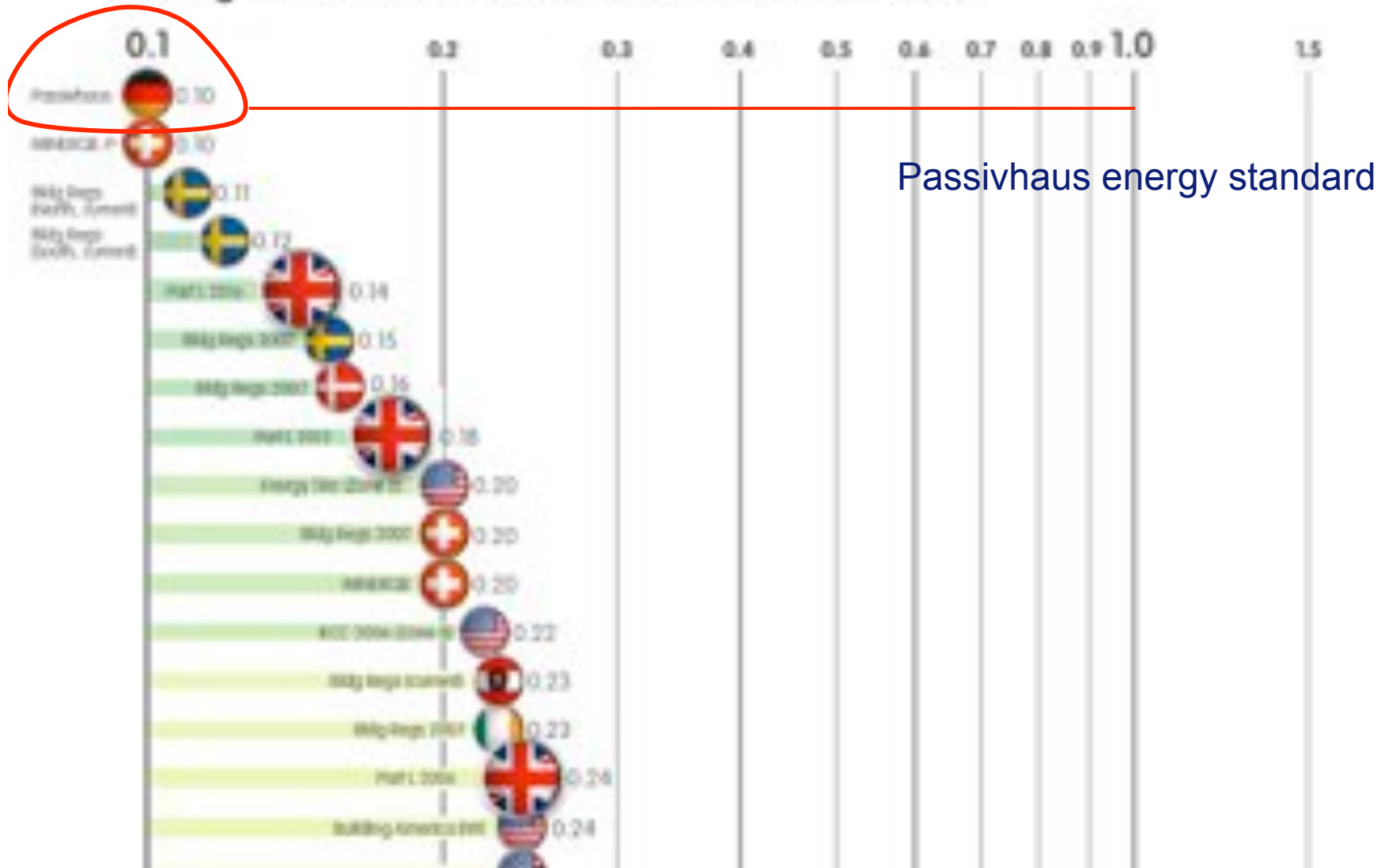


Figure 3

Averaged U-values for floors, roofs and walls (W/m²K)



low energy, low carbon

warm in winter

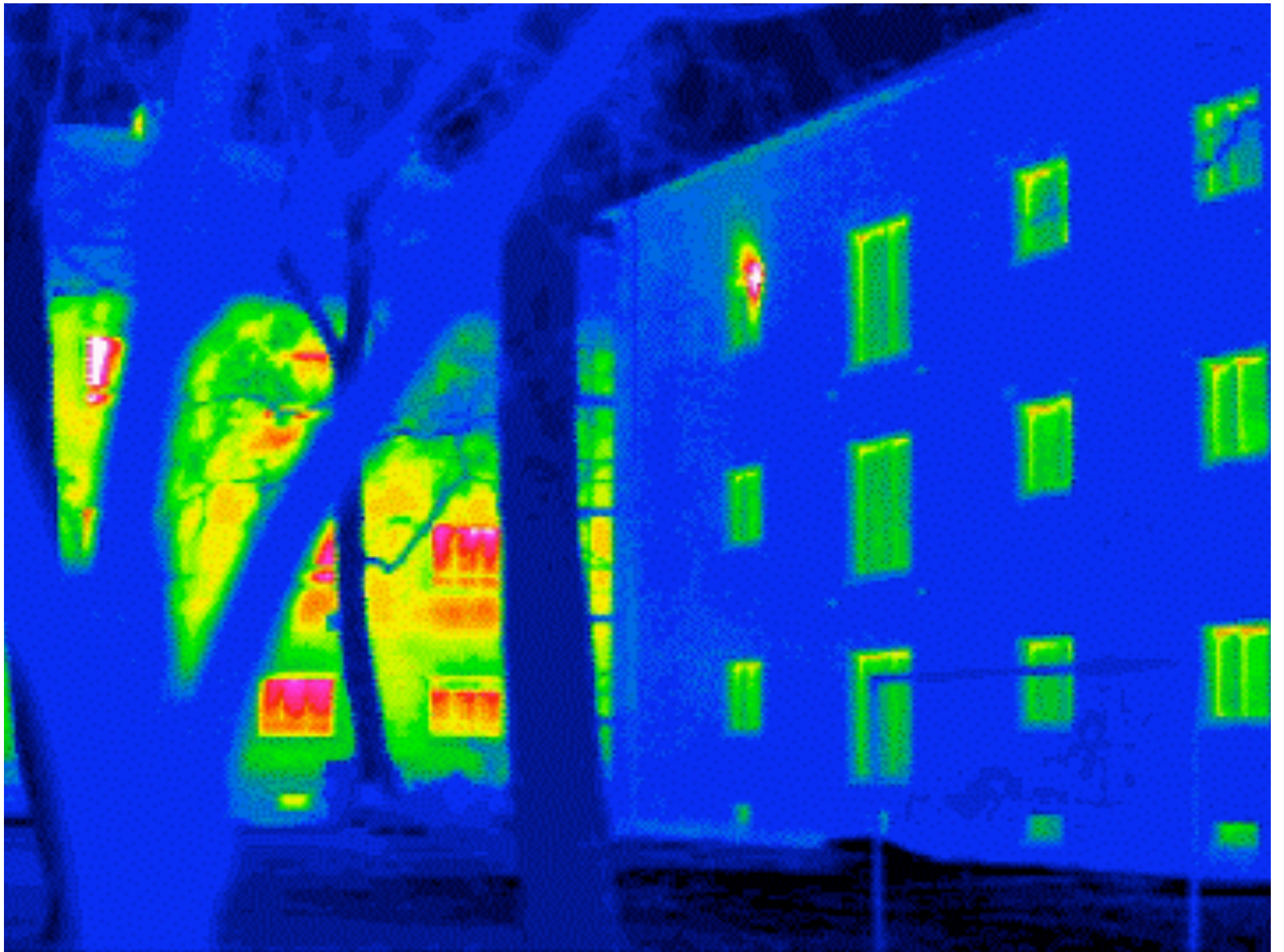
cool in summer

excellent indoor air quality

low running costs

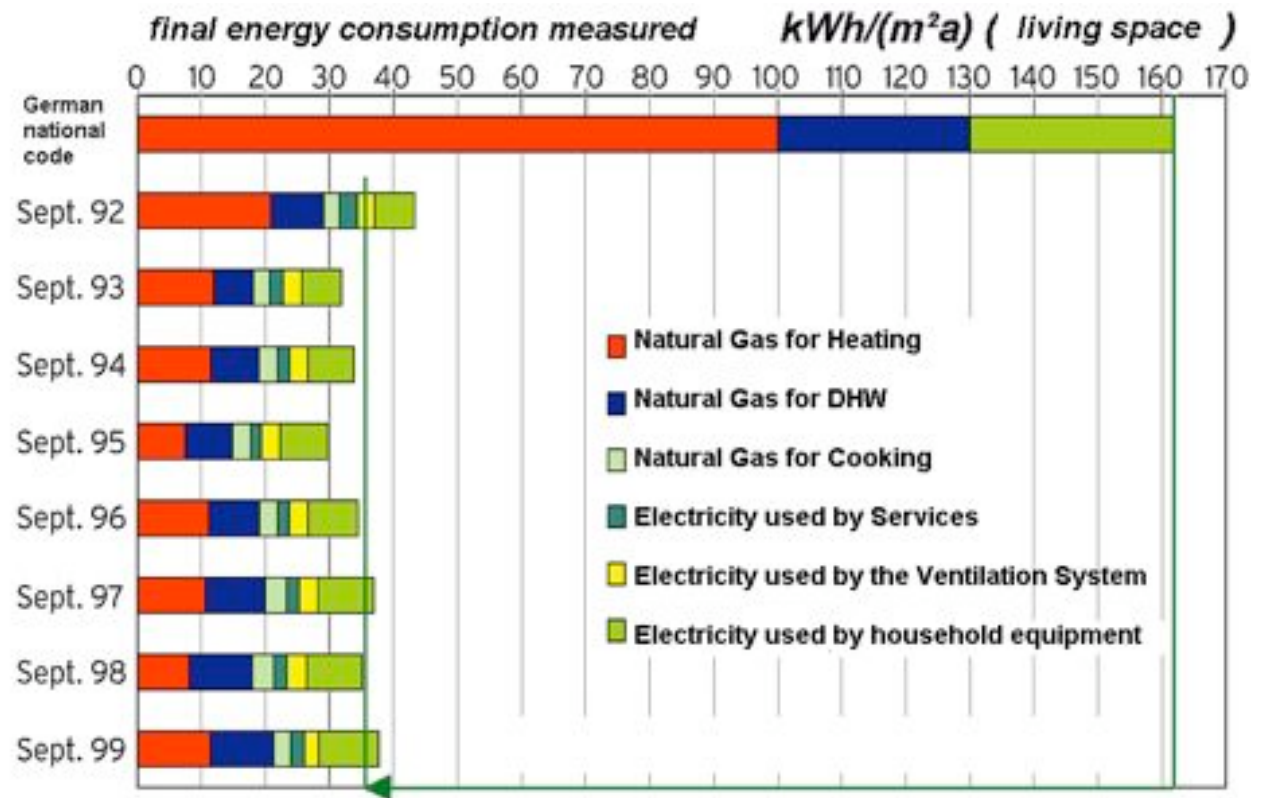
sustainable

Like going from a privy to a house with indoor plumbing!



Darmstadt Passivhaus





kWh/(m².yr)

actual

Heating

11

Total

32

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

Microsoft Excel - PHPP2007_English_Example

Bestand Beveiligen Beeld Invoegen Opmaak Extra Data Verster Help

Typ een vraag voor hulp

100%

Arsl 10

F20 6

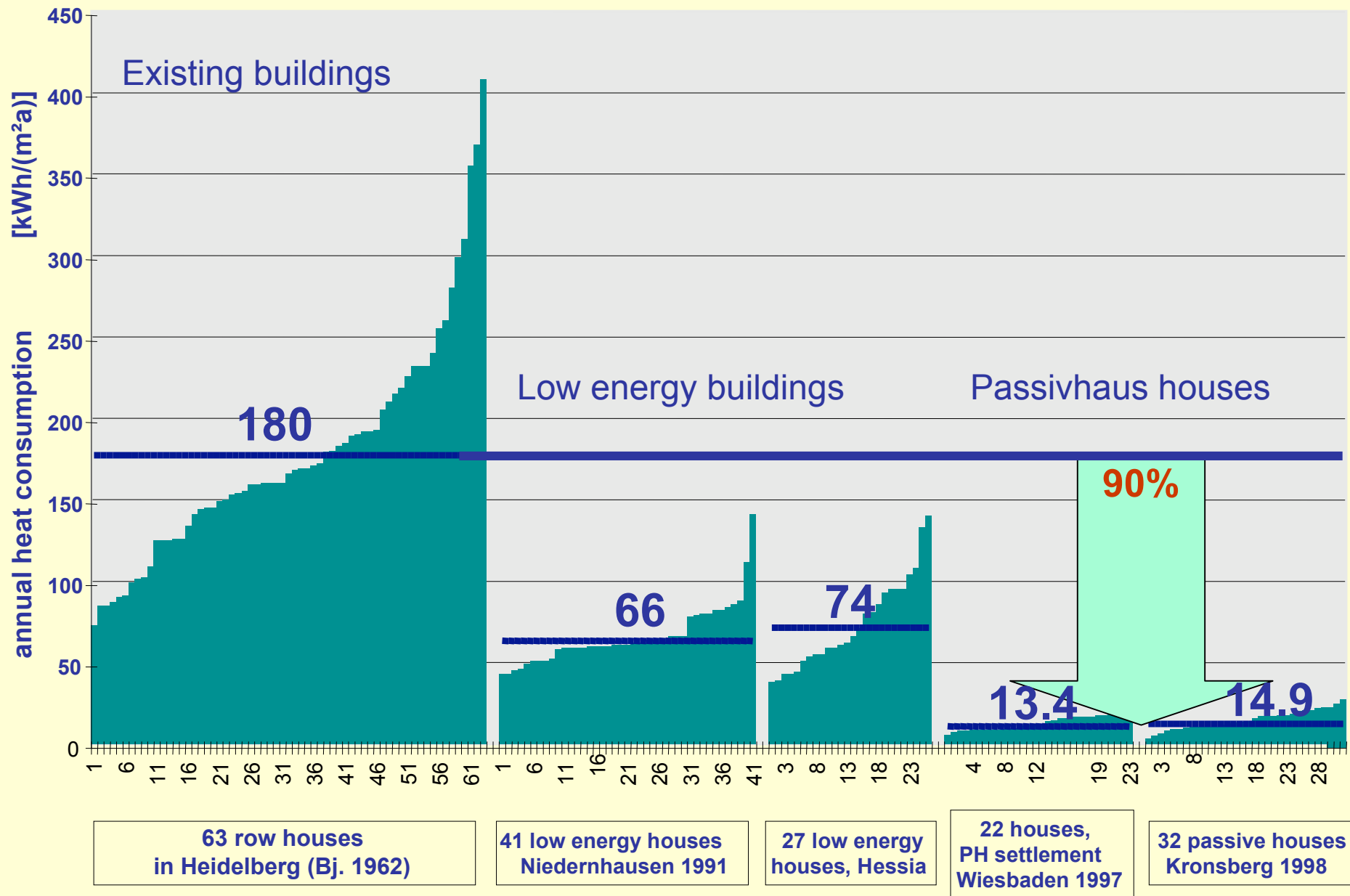
	B	C	D	E	F	G	H	I	J	K
29		Treated Floor Area:	156,0	m ²						
30		Applied:	Monthly Method				PH Certificate:			Fulfilled
31		Specific Space Heat Demand:	14	kWh/(m ² a)			15 kWh/(m ² a)			Yes
32		Pressurization Test Result:	0,2	h ⁻¹			0,6 h			Yes
33		Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):	61	kWh/(m ² a)			120 kWh/(m ² a)			Yes
34		Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):	36	kWh/(m ² a)						
35		Specific Primary Energy Demand Energy Conservation by Solar Electricity:		kWh/(m ² a)						
36		Heating Load:	10	W/m ²						
37		Frequency of Overheating:	3	%		over	25 °C			
38		Specific Useful Cooling Energy Demand:		kWh/(m ² a)			15 kWh/(m ² a)			
39		Cooling Load:	9	W/m ²						
40										
41										

Brief Instructions \ Verification \ Areas \ U-List \ U-Values \ Ground \ windows \ winType \ Shading \ Ventilation \ Annual Heat Demand \ Monthly Method \ H

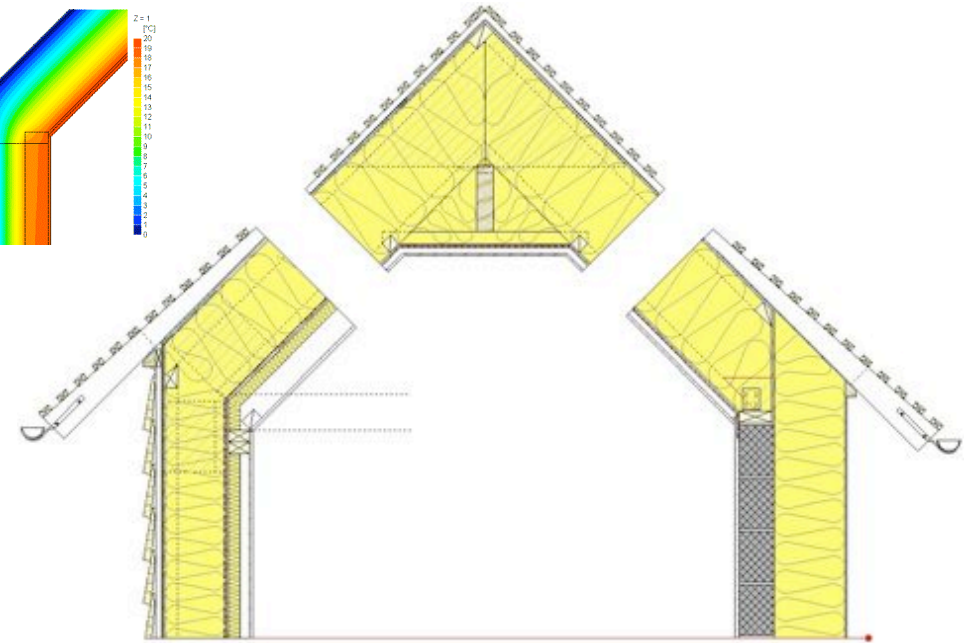
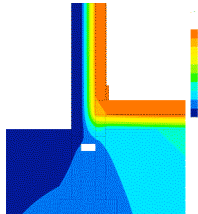
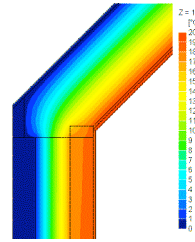
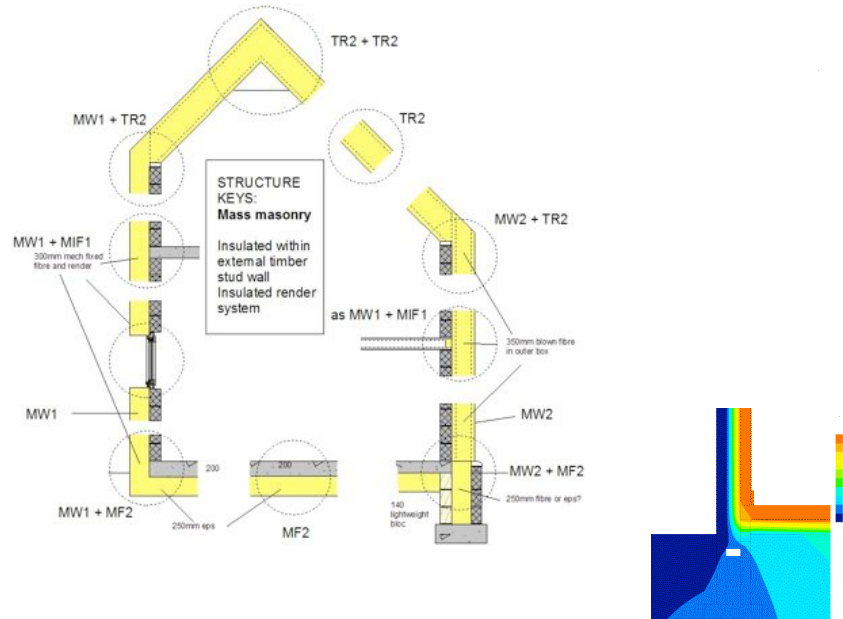
start

14:40

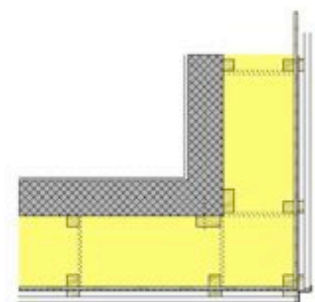
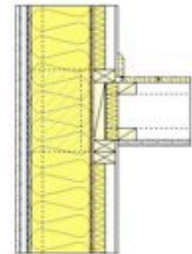
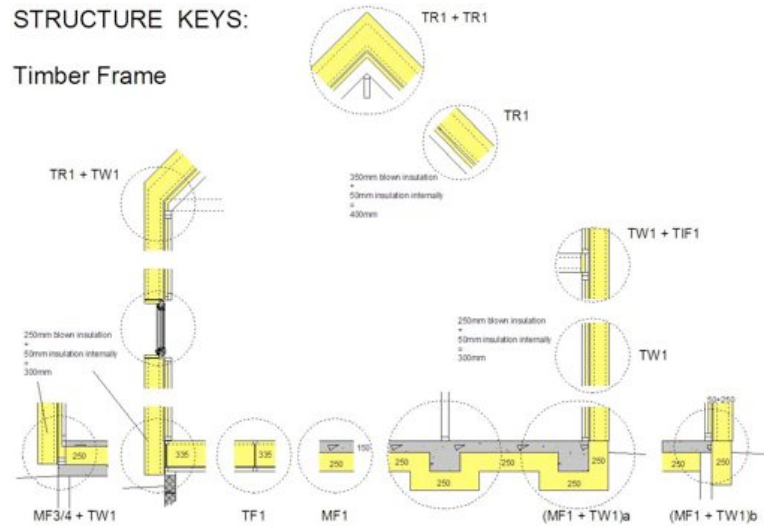
Occupant behaviour makes a difference: the average matters



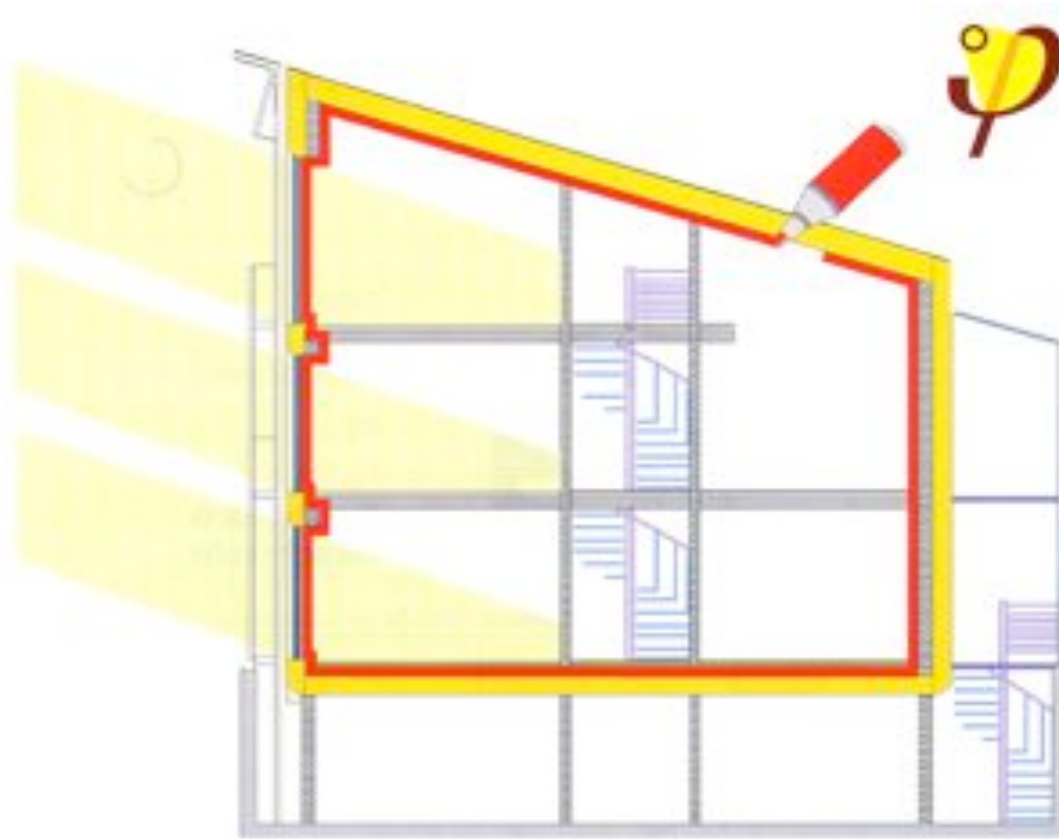
Careful design detailing is essential.....



STRUCTURE KEYS:
Timber Frame



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

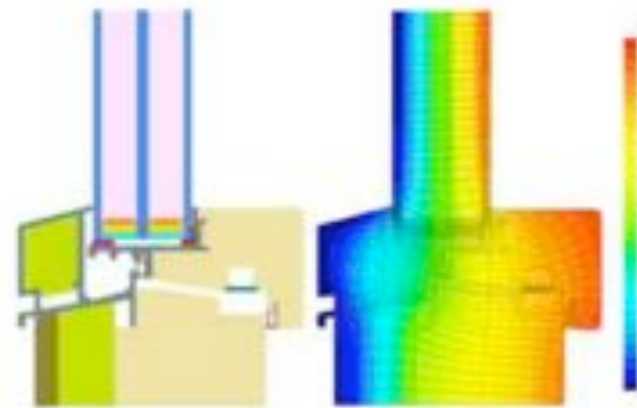
Keep breaks in the fabric to a minimum

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



green
building
store

And we need more passivhaus
products readily available in the UK



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



Denby Dale, West Yorkshire



Under construction

Disability Essex, Rochford



Just completed

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



25 homes under
construction



Before (1869 - 2008)



After its 100 year service (2008-2009)



So how Passivhaus can help deliver zero carbon in the UK?



Energy efficiency is the most cost-effective way of delivering zero carbon buildings

Step	Standard	Useful space heating energy kWh/m ² yr	Primary energy consumption ¹ kWh/m ² y r	CO2 Kg/m ² yr	Reduction in CO ₂ compared to average stock
One	Silver	≤40	≤120	≤22	70%
Two	Passivhaus Passivhaus in a UK context	≤15 ≤15	≤120 ≤78	No explicit limit ≤15	85%
Three	Gold	≤15	≤58	≤4	95%

1. These are domestic sector figures based on a 80m² semi-detached house

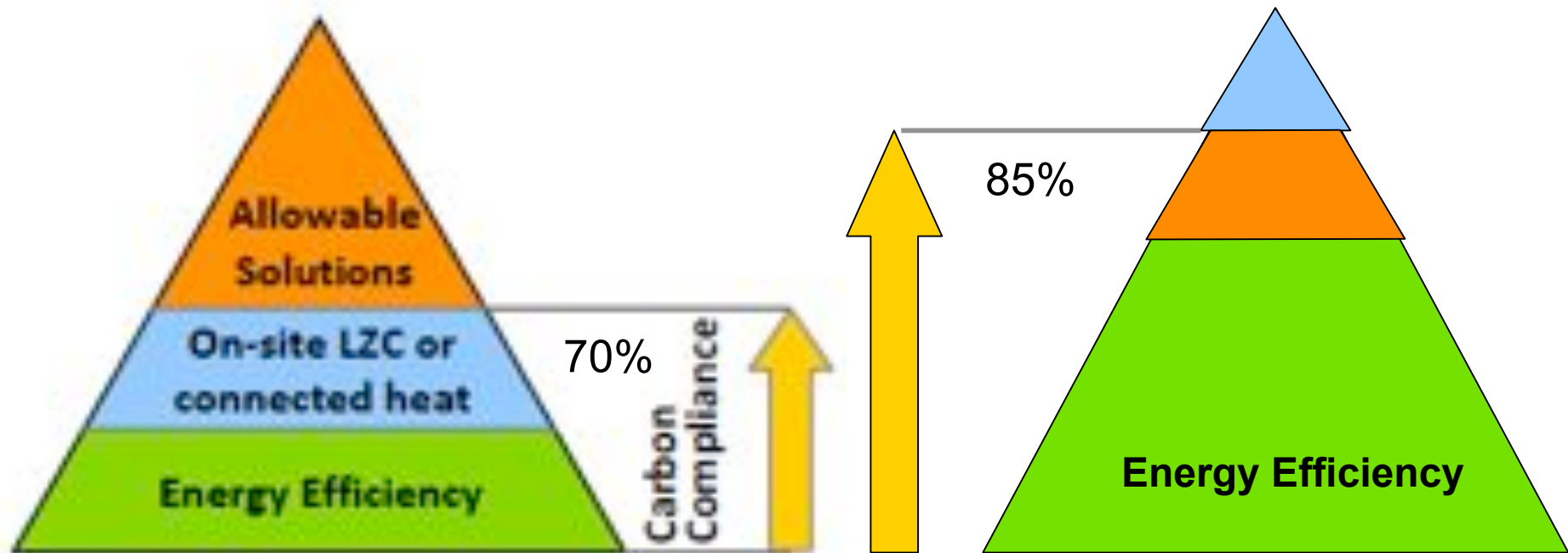
The standards apply to domestic and non-domestic buildings

The proposed minimum energy efficiency standard for new homes



based on the 2009 consultation version of the Standard Assessment Procedure (SAP), the energy standard applicable from 2016 should be 39 kWh/m²/year for apartments and mid-terrace houses and 46 kWh/m²/year for end-terrace, semi-detached and detached houses and

By providing an 85% reduction in energy demand and CO2
.... cost-effectively

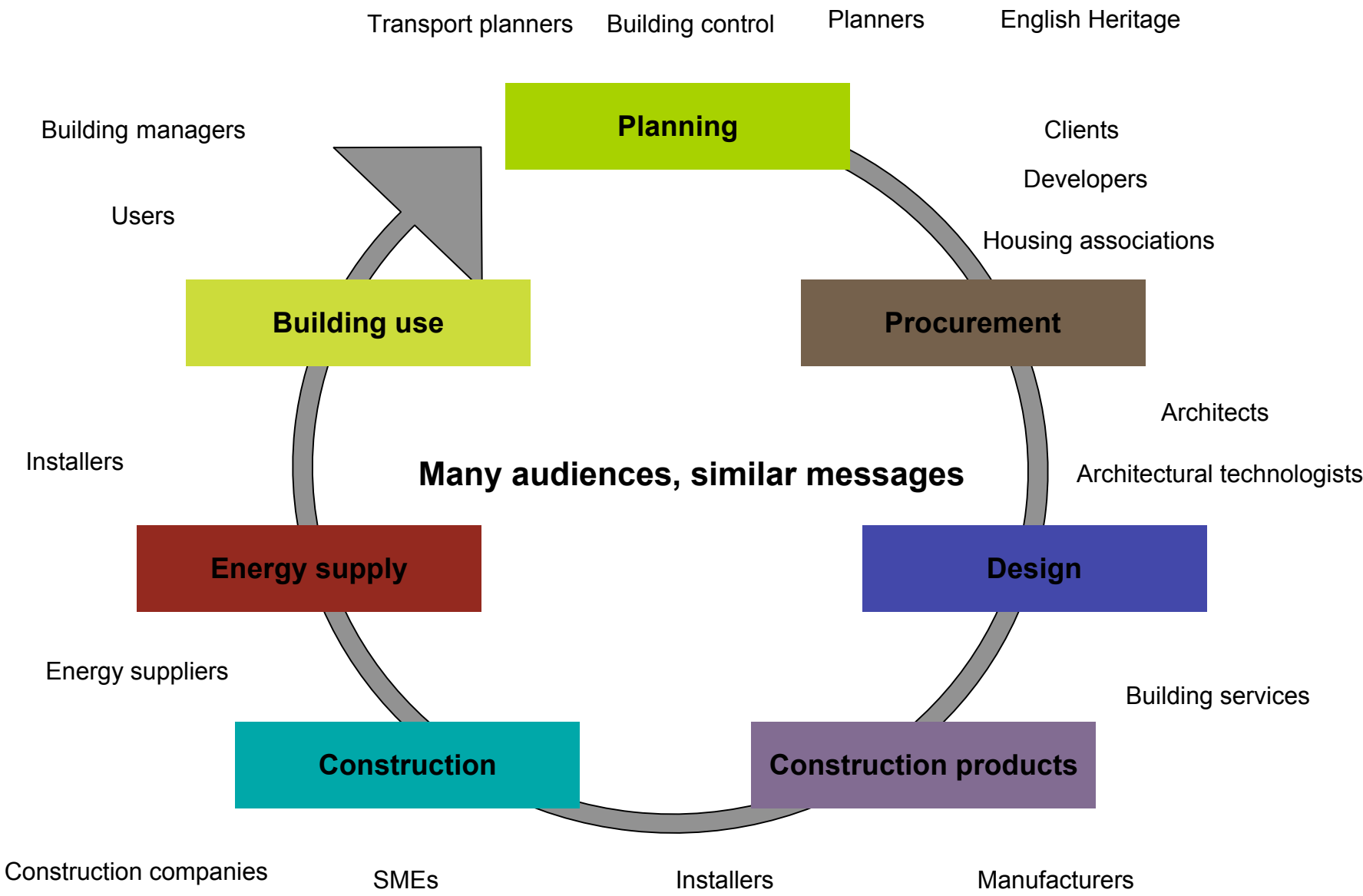


Working to the **passivhaus** standard will be an 'allowable' solution



These messages need to reach a lot of players in the buildings supply chain....

Lots of parties need an education....





www.passivhausbuildings.org