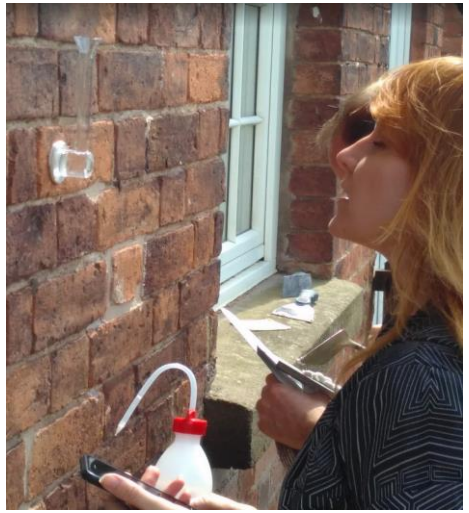










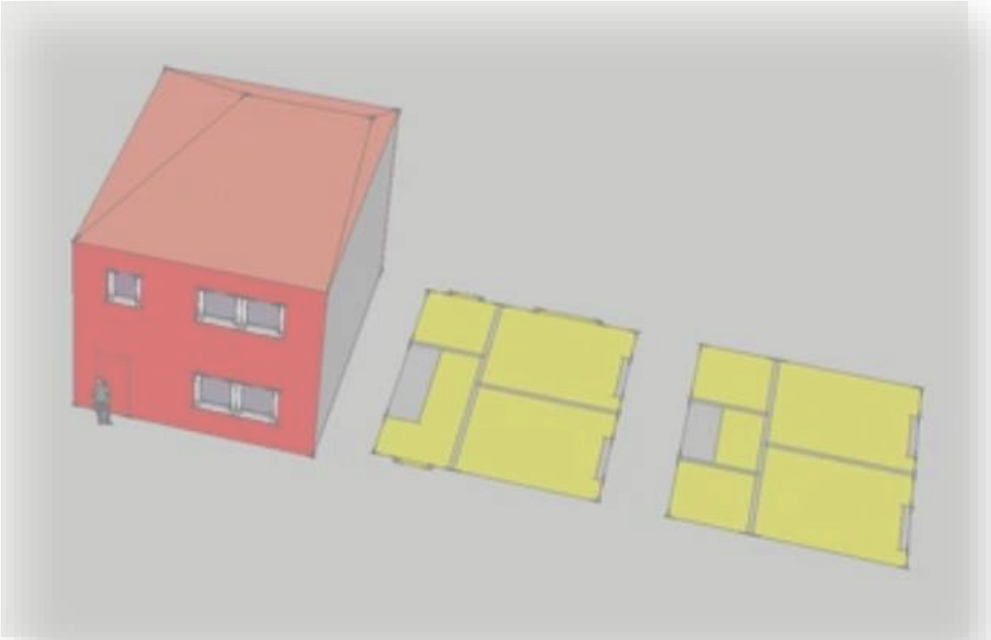



AECB building knowledge

The AECB Building Standards

Three standards:

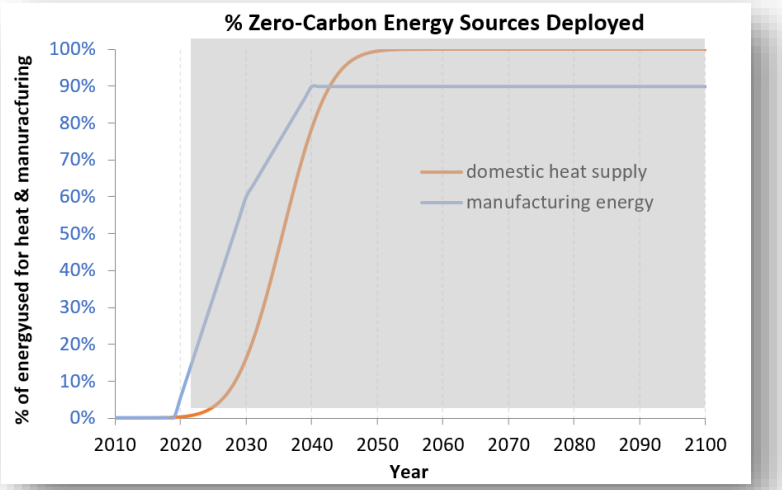
- Building Standard (self-certification)
- Retrofit Standards (self-certification)
  - Heat pump retrofit (Level 1)
  - Full fabric retrofit (Level 2)
- Water Efficiency (Standards & guidance)
- Lifetime Carbon (software, guidance & training)
- Daylighting (software, guidance & training)

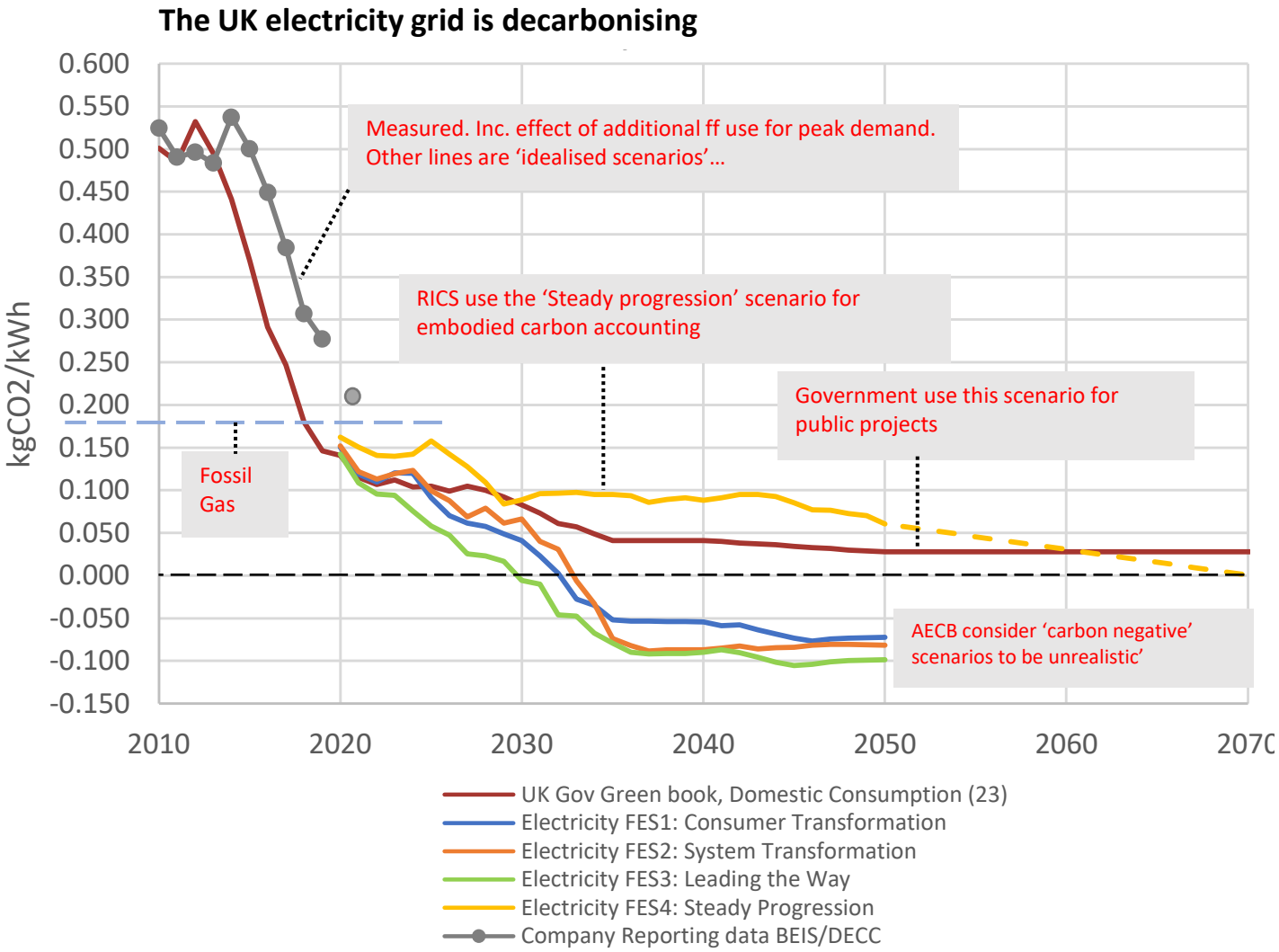


- PHPP
- DesignPH (SketchUp)
- PHribbon / EPDs
- AECB Stock Model

Modelling the deployment of Standards at scale

Decarbonising assumptions!



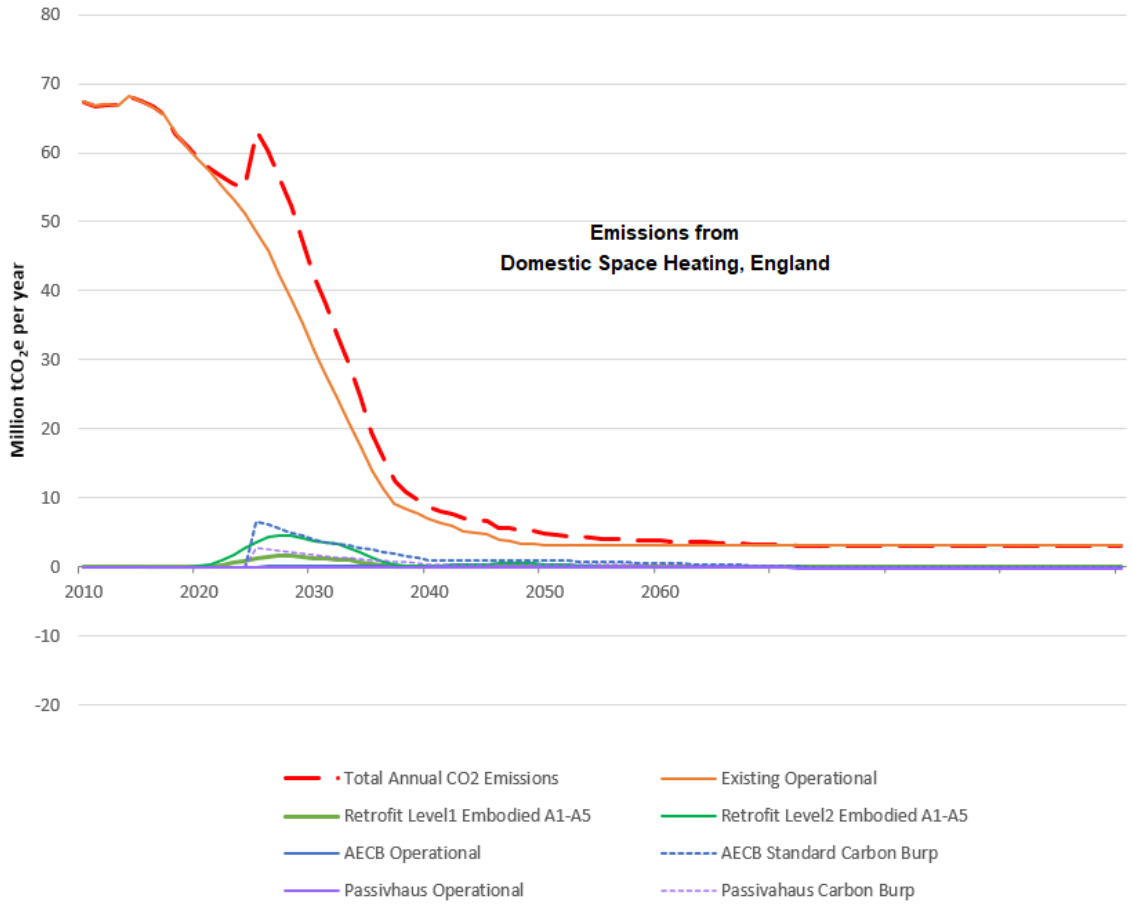


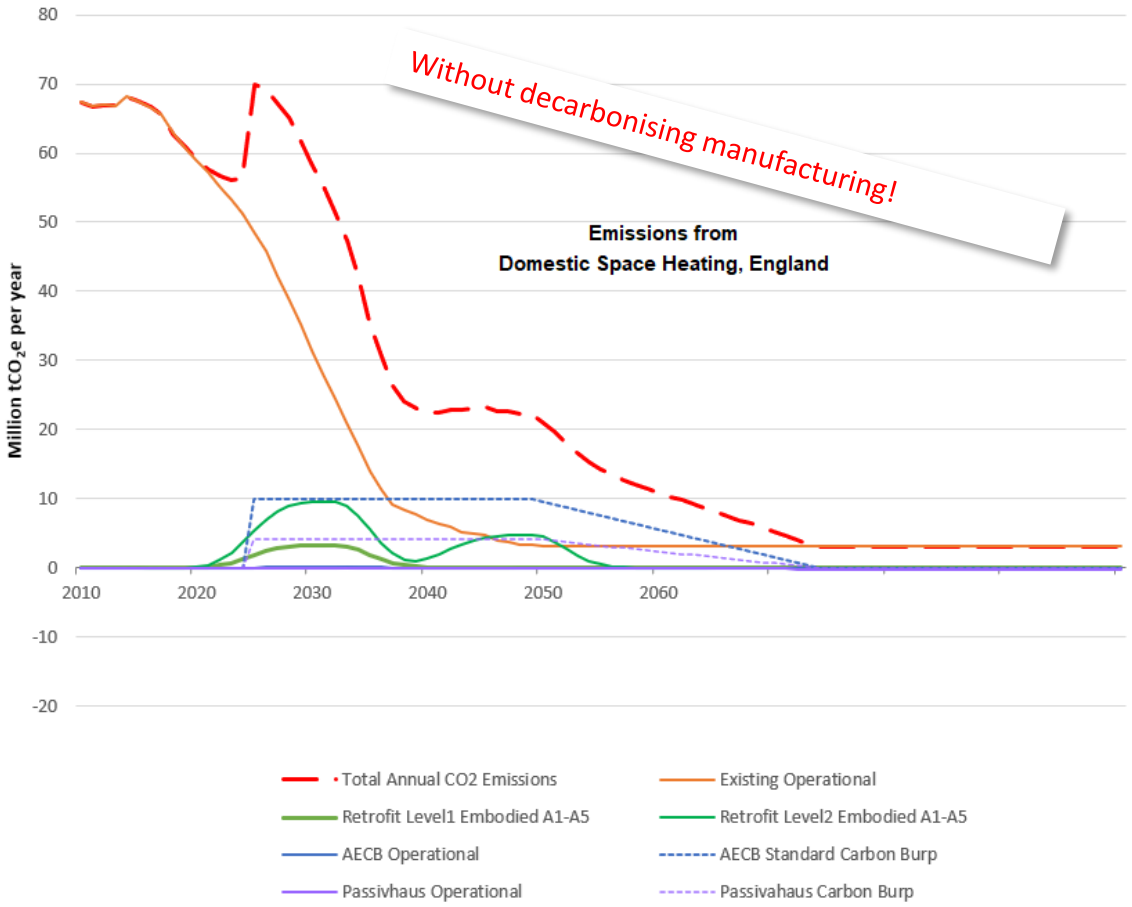
AECB building knowledge

Scenarios

CO2e emitted each year

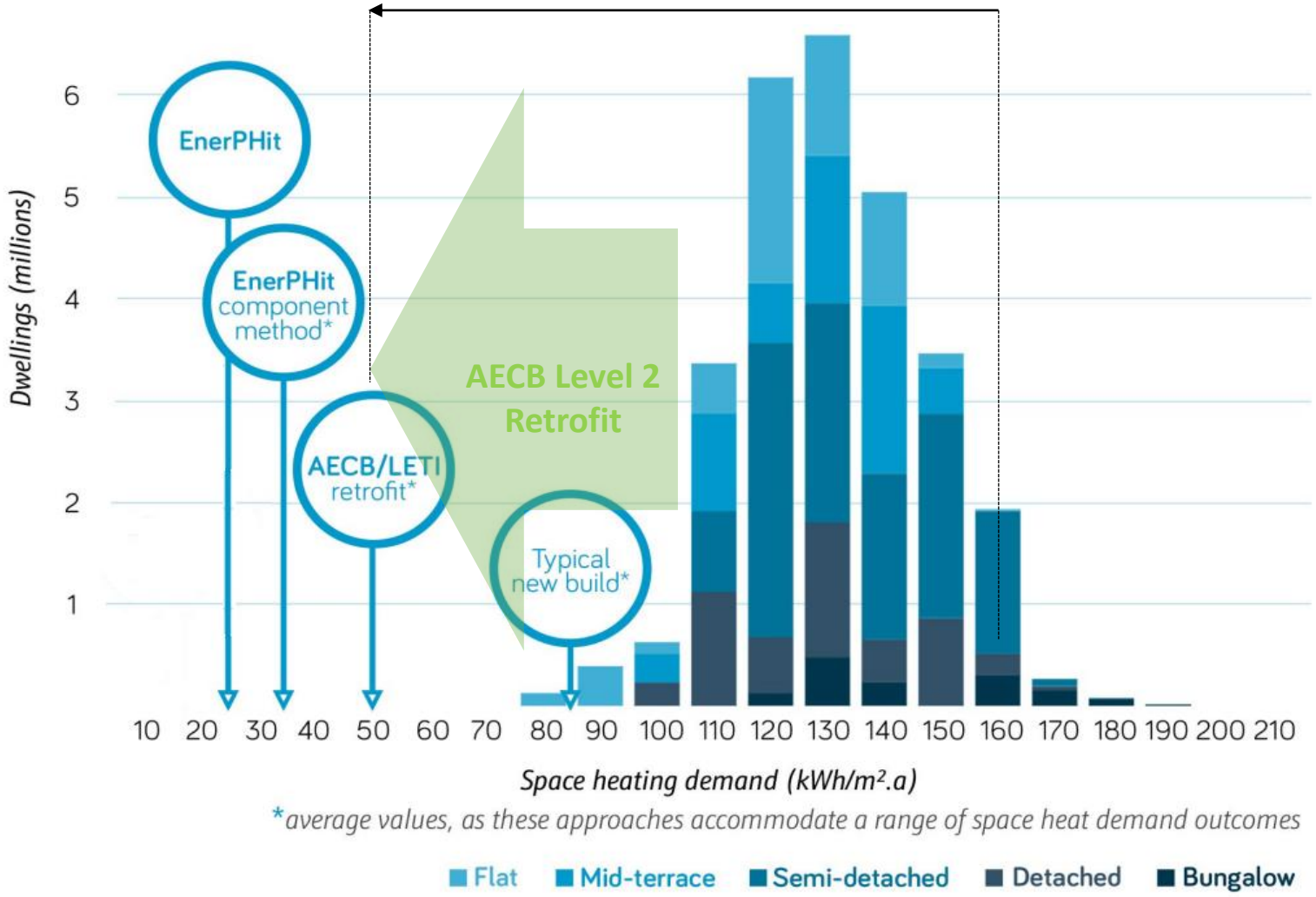
Consumption- based not territorial emissions





UK Housing Stock – by heating demand and dwelling type

AECB Level 1 Retrofit: 'typical' semi with cavity walls (delivered heating energy)



Note:
Space heat demand is not the same as 'delivered heating energy' (which factors in the efficiency of the system e.g. 350% for a good HP install)

AECB Level 1 Retrofit Standard does not have a space heat demand limit!

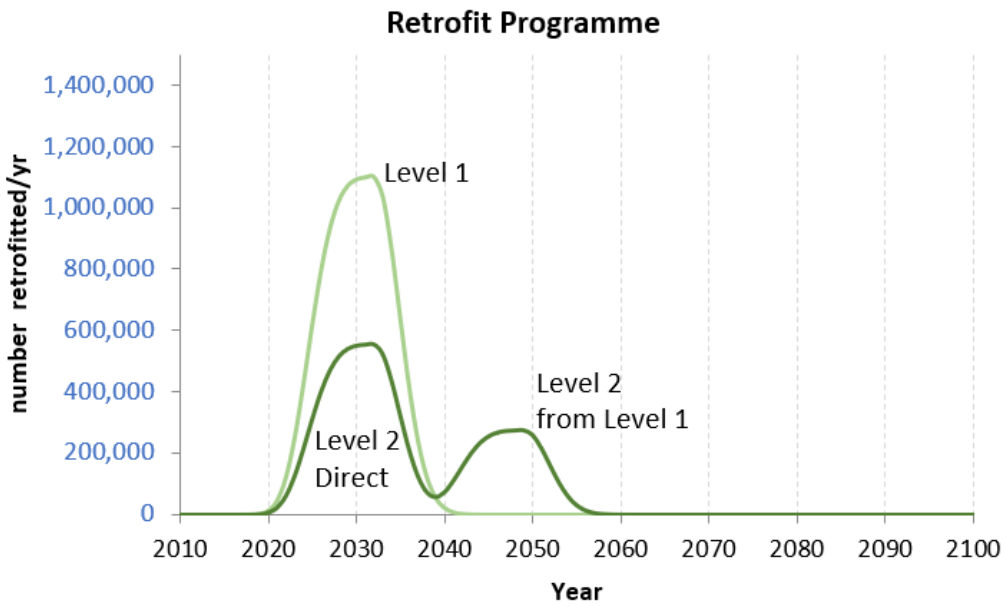
AECB Level 2 Retrofit Standard is set at 50kWh/m2.a but allows exemptions up to 100kWh/m2.a

The AECB Level 1 Retrofit Standard – '*heatpumpification*'

The AECB LEVEL ONE retrofit standard is designed to support a rapid transition to low carbon heating.

- ✓ It recognises that switching from fossil fuel heating to heating by heat pumps is the single easiest and cheapest measure to reduce both operational and embodied carbon whilst keeping homes warm
- ✓ As such it for many buildings it may not require the deeper fabric retrofit measures needed to achieve the LEVEL 2 AECB retrofit standard – but it *does* require good ventilation measures
- ✓ It is designed to ensure appropriately designed heat pump installations without worsening heating bills
- ✓ However, it is assumed that many properties will later be taken to Level 2 to further reduce operational carbon and energy bills and to again improve on building occupants' health and comfort
- ✓ For Level 1 the Standard includes for avoiding 'lock-in' which could compromise or prevent the successful implementation of a LEVEL 2 AECB retrofit
- ✓ For Level 1 & 2 retrofits there should be a clear focus on minimising upfront carbon emissions from materials used in the retrofit.

Rate of retrofit – two waves?



1st Wave

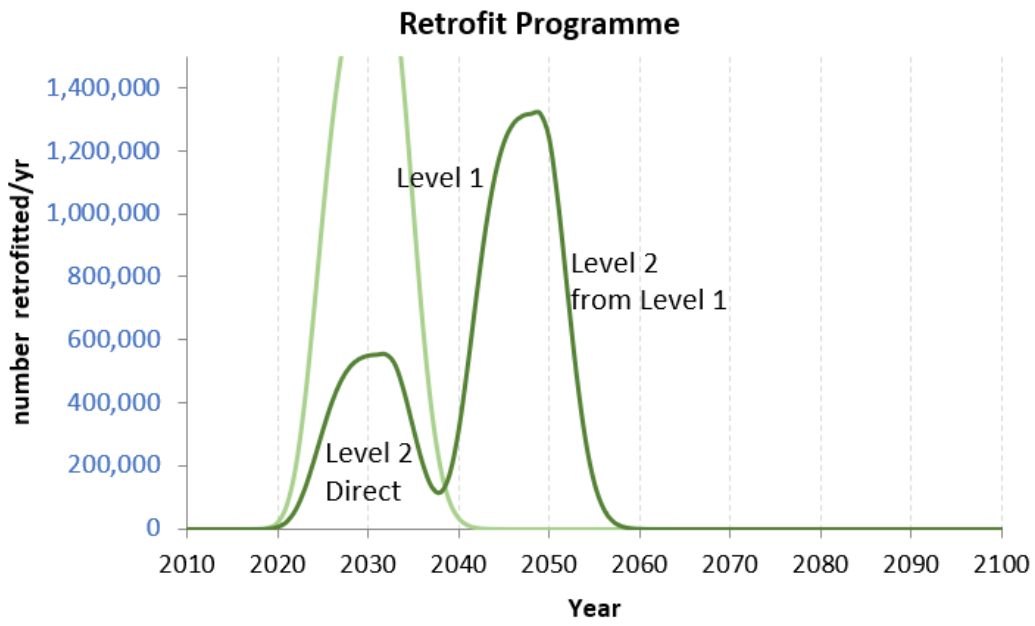
Level 1 % of stock	50%
Level 2 % Direct	25%

2nd Wave

Level 2 from 1 % Converted	25%

☑ Decarbonised manufacturing

☑ Show Embodied CO2



1st Wave

Level 1 % of stock	80%
Level 2 % Direct	25%

2nd Wave

Level 2 from 1 % Converted	75%

☑ Decarbonised manufacturing

☑ Show Embodied CO2

Headline certification criteria

Criteria	Building Standard	Level 1 Retrofit Standard	Level 2 Retrofit Standard	Level 2 Retrofit Standard with exemption
Delivered space heating and cooling (kWh/m2/a)	≤ 40 kWh/m2.a		≤ 50 kWh/m2.a	≤ 100 kWh/m2.a
Primary Energy (PE, varies)	(varies) kWh/m2.a			
Renewable (PER) (kWh/m2/anum)	≤ 75 kWh/m².a			
Ensure ventilation	Continuous MEV or MVHR must be installed : follow PAS 2035 Annexe C or as required by Part F of the Building Regulations. Note: the AECB Standards do not allow a 'natural ventilation' option.			
Airtightness (q50)	≤ 1.5 m3/m2.h	<5.0 m3/m2.h	<2.0 m3/m2.h	
Thermal Bridges	Assumed less than 0.01W/mk, else accounted for in PHPP or for L1 & L2 retrofit standards a default heat loss factor may be used.	NA, unless fabric measures below eaves junction are installed	Assumed less than 0.01W/mk, else accounted for in PHPP or for L1 & L2 retrofit standards a default heat loss factor may be used.	
Surface Condensation (fRsi) assessed	fRsi not to exceed criteria in PHPP, or 0.75 (as Building Regulations/ PAS2035), or local standards - whichever is more onerous.	NA, unless fabric measures below eaves junction are installed	fRsi not to exceed criteria in PHPP, or 0.75 (as Building Regulations/ PAS2035), or local standards - whichever is more onerous.	
Heating system	Install a non fossil fuel system or if appropriate a connection to low a carbon or future-proofed District Heating Network.	Change existing fossil fuel or direct electric heating system to a heat pump.	Existing heating systems may be retained, but future-proofing for low carbon heating must be evidenced.	

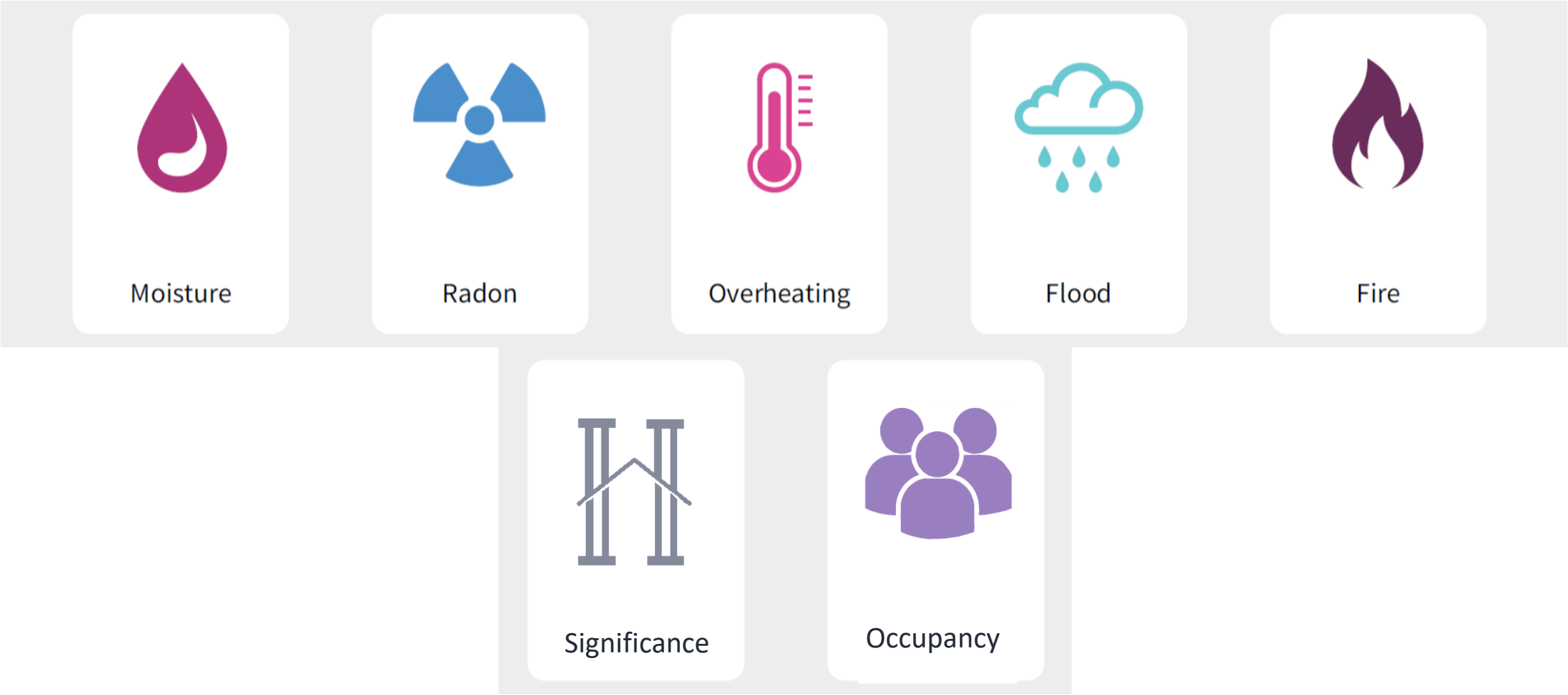
Energy Model using PHPP showing

Building Standard achieved	*- Pre-retrofit Baseline*	Level 2 achieved
	- Level 1 achieved	
	- a retrofit scenario showing how Level 2 could be achieved	
PHPP modelled overheating risk, <10% Acceptable (Guidance: <5% Good practice or <3% Best practice)		

Where a heat pump is installed

For certification the following applies: Acceptable - Heating system is designed and installed for flow temp <50ºC; Best Practice - Heating system is designed and installed for flow temp <45ºC

AECB Retrofit Level 2 Standard – The Retrofit Risk Report



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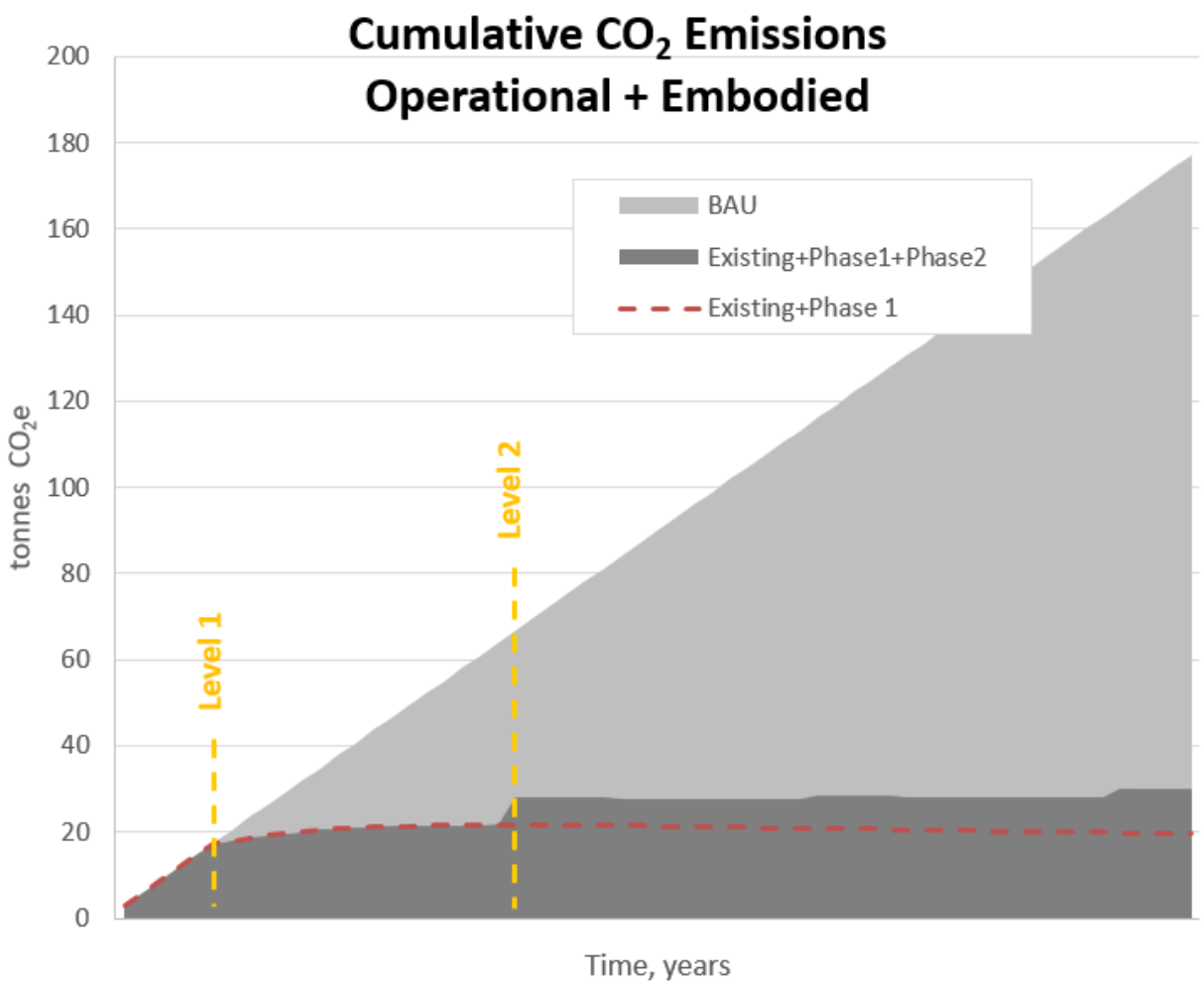
erational



Space heating and lifetime carbon of fabric and services measures:

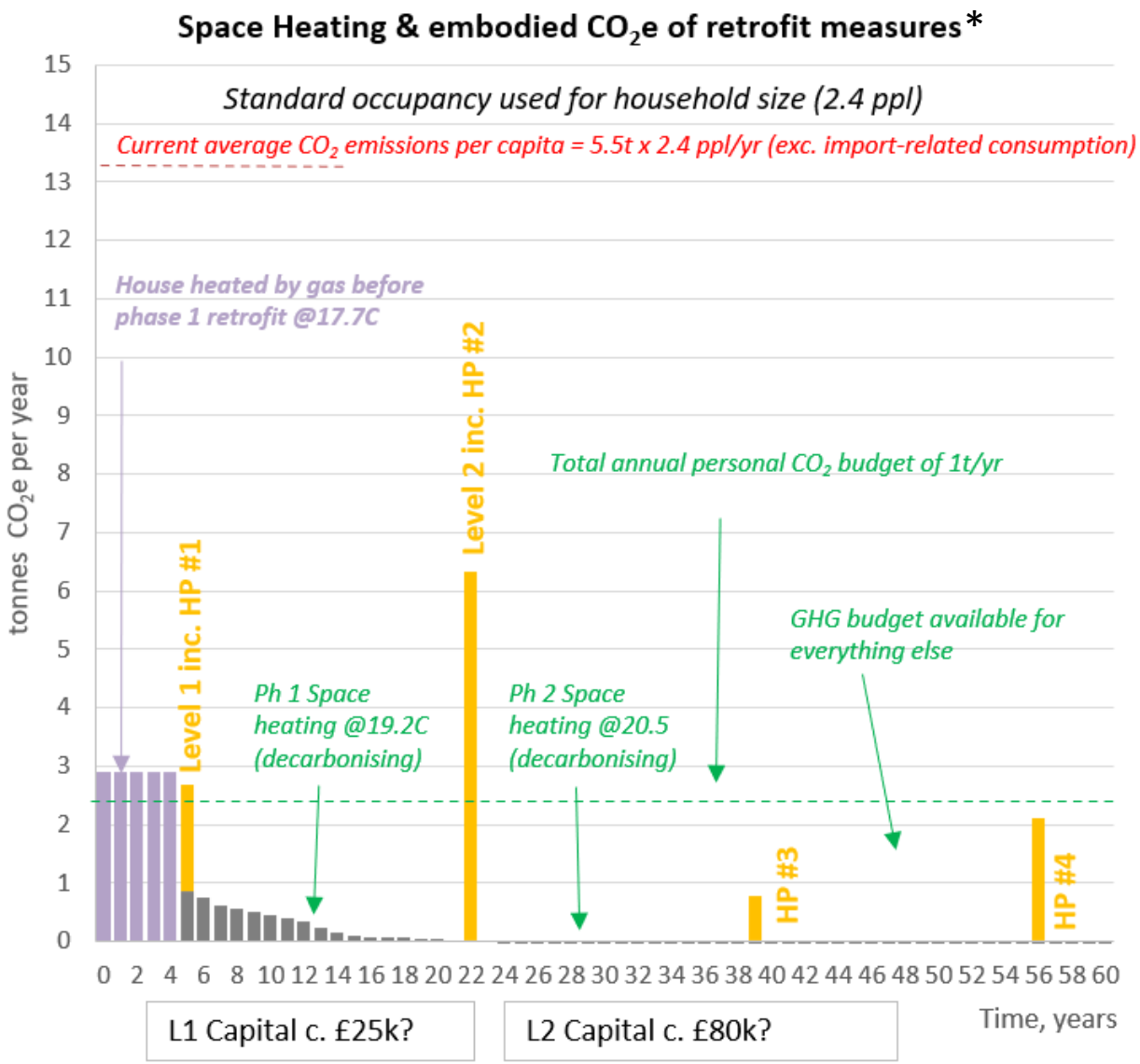
excluding end of life and no decarbonisation of manufacturing

AECB building knowledge

Embodied *

Operational

*excluding end of life and no decarbonisation of manufacturing

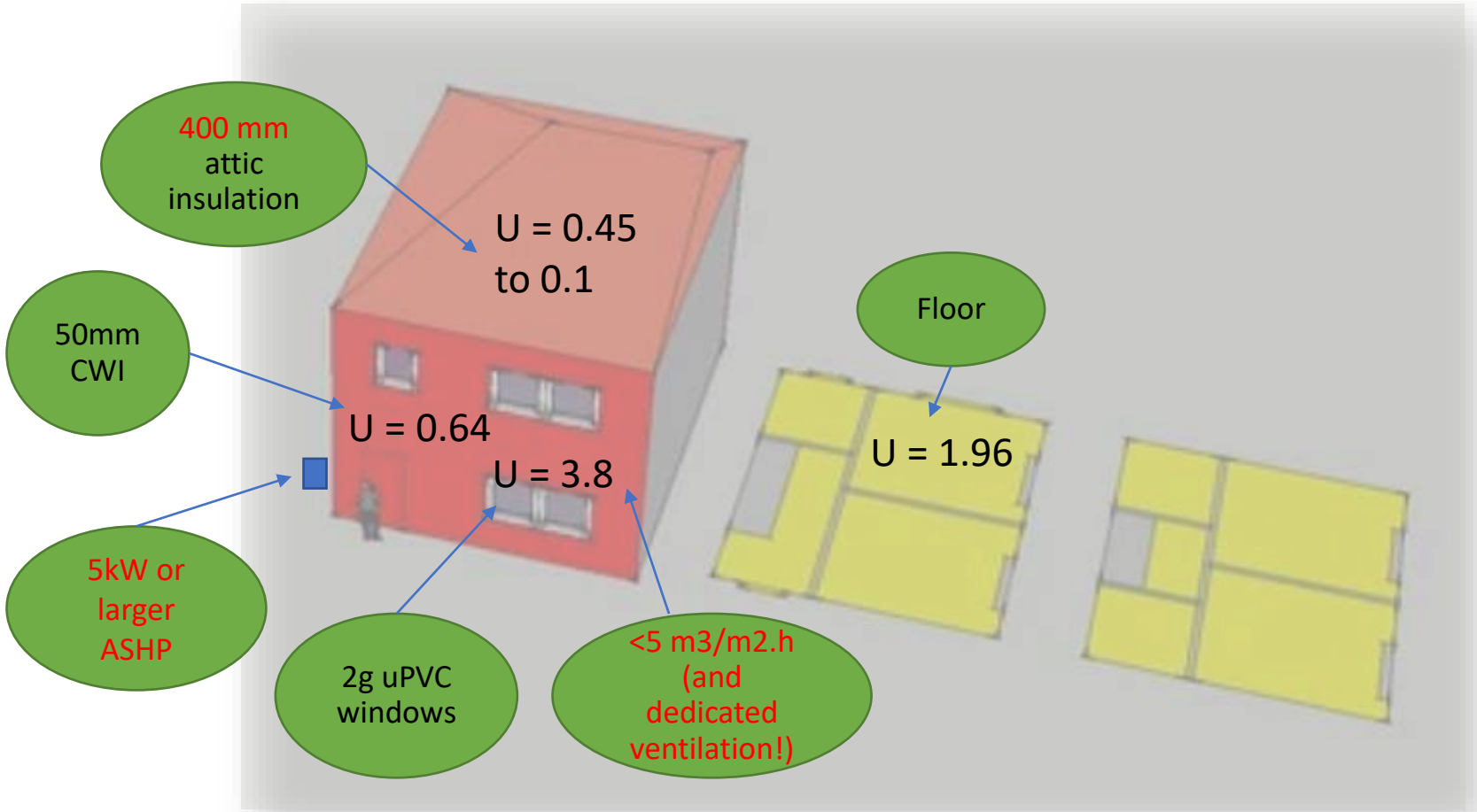


AECB building knowledge

Typical semi-detached house

Typical measures

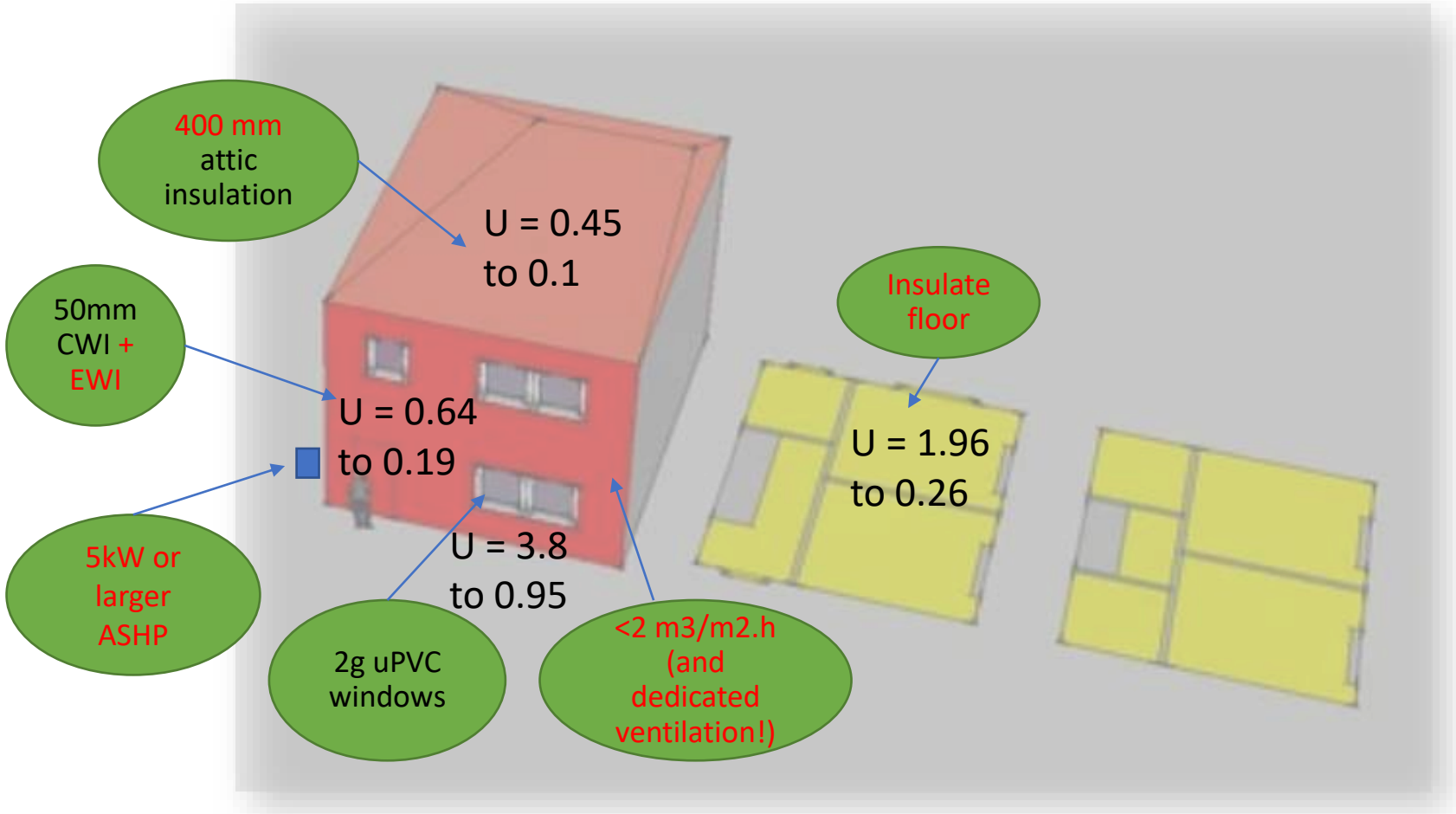
Existing house
to
Level 1 retrofit



Typical semi-detached house

Typical measures

Existing house
to
Level 2 retrofit



Q&A

For training enquiries contact: training@aecb.net