Sponsor's Update and Passivhaus Awareness

CAN National Conference
York 27**.03.12**

Peter Chisnall
Climate Energy
Certified Passive House Consultant

Summary

Climate Energy update

Passivhaus Principles
Passivhaus design
PHPP
Elements
Airtightness
MVHR
Comfort

Climate Energy Update

- CESP/CERT – Still available
- Green Deal – Main game in town
- CES, CC & CEH

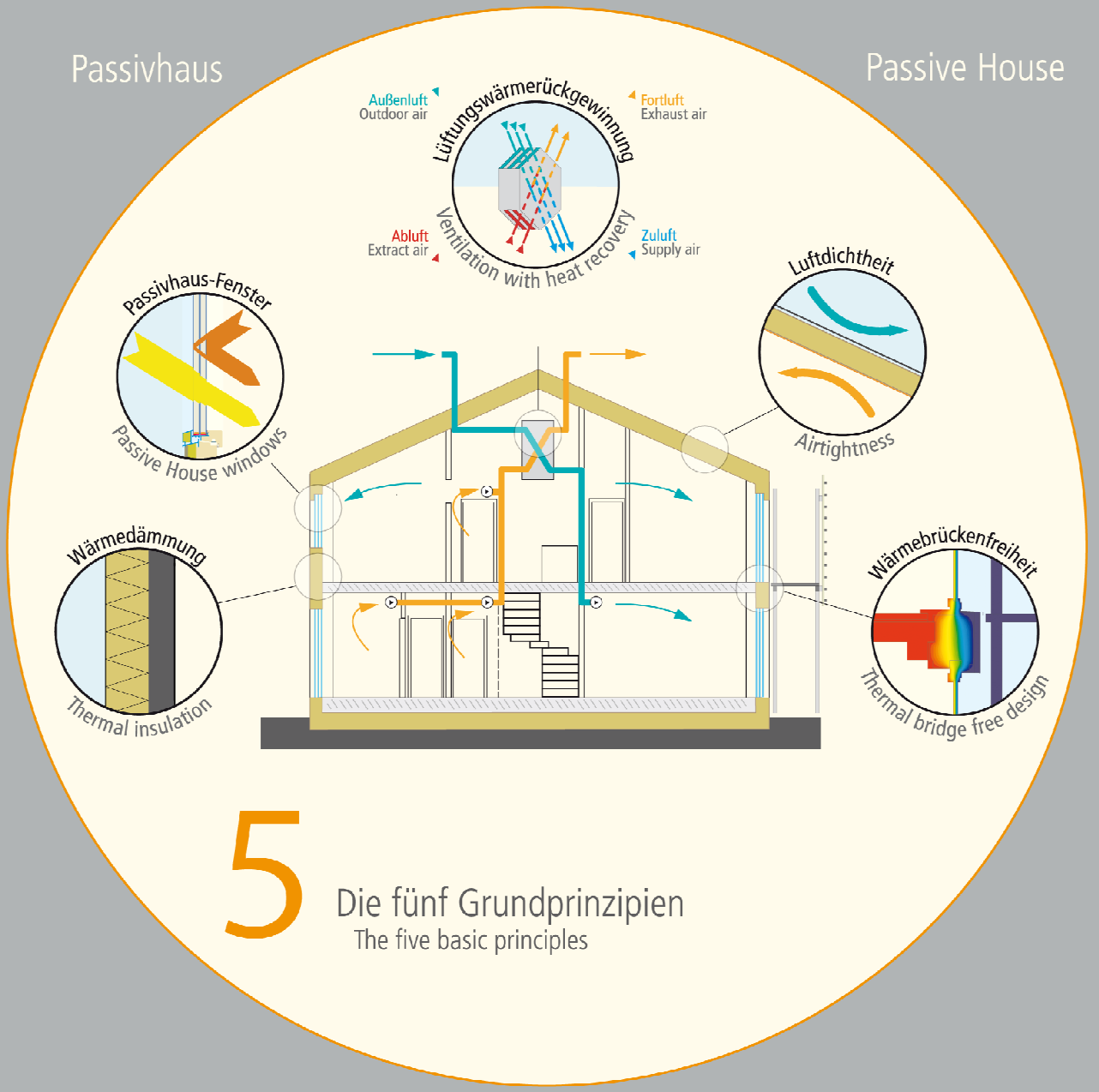
"I was working as a physicist. I read that the construction industry had experimented with adding insulation to new buildings and that energy consumption had failed to reduce. This offended me – it was counter to the basic laws of physics. I knew that they must be doing something wrong. So I made it my mission to find out what, and to establish what was needed to do it right."

Professor Wolfgang Feist
Founder Passivhaus Institut, Germany

PASSIV HAUS INSTITUT
Dr Wolfgang Feist

Passivhaus

Passive House

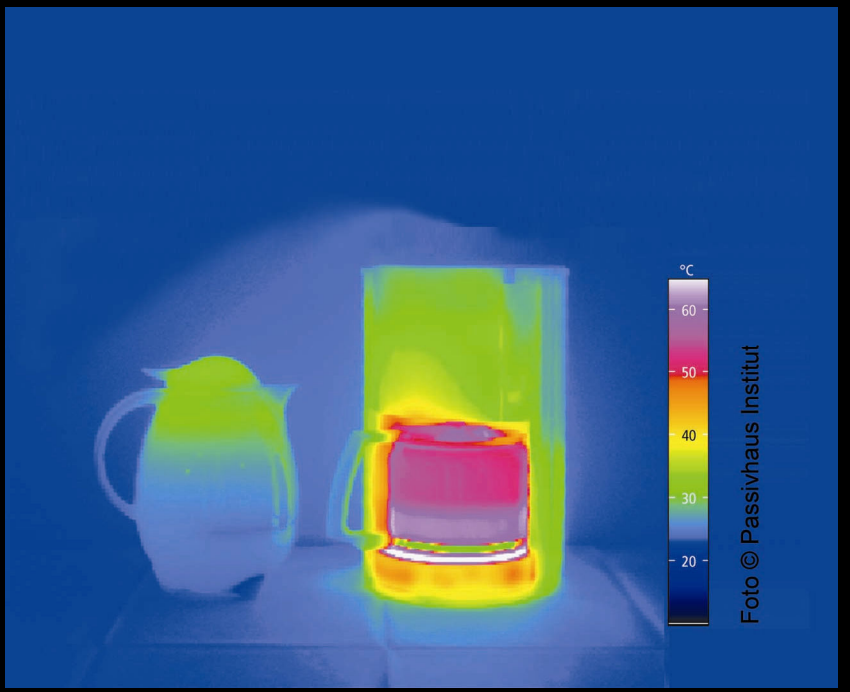


5 Die fünf Grundprinzipien

The five basic principles

Passive – maintaining the heat using an insulated flask

Active – maintaining the heat by energy input



Key design criteria

- Annual heating requirement is no more than 15KWh/m^2/a

or

- Heating load is no more than 10W/m^2

- Total combined primary energy consumption does not exceed 120KWh/m^2/a

- Airtight envelope: no more than 0.6ac/h @ 50Pa (generally means air permeability <1m^3/h/m^2@50Pa).


Would you like to have less?

How to achieve a Passivhaus

- Wall and roof U values c. 0.1 – 0.15W/m^{2}K
- Window and door U values < 0.85W/m^{2}K installed
- Mechanical ventilation with heat recovery with efficiency above c.80% (tested to PH standard)
- Compact form (surface to volume ratio)
- Excellent design and onsite practice to ensure very high levels of airtightness
- Very low thermal bridging 0.01W/mK
- Care with orientation of window openings.

How to achieve a Passivhaus

Compact form

How to achieve a Passivhaus

Care with orientation and size of windows

How to achieve a Passivhaus

Superinsulation – wall, floor and roof U values c. 0.1W/m2K

How to achieve a Passivhaus

How to achieve a Passivhaus

How to achieve a Passivhaus

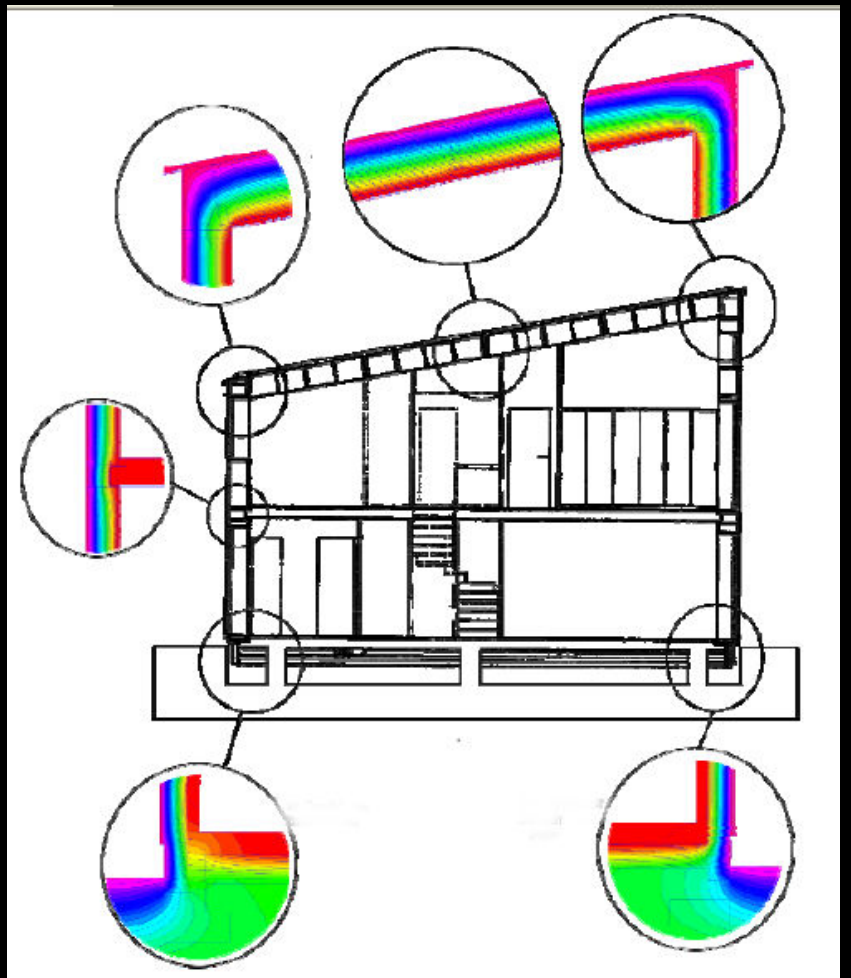
How to achieve a Passivhaus

How to achieve a Passivhaus

How to achieve a Passivhaus

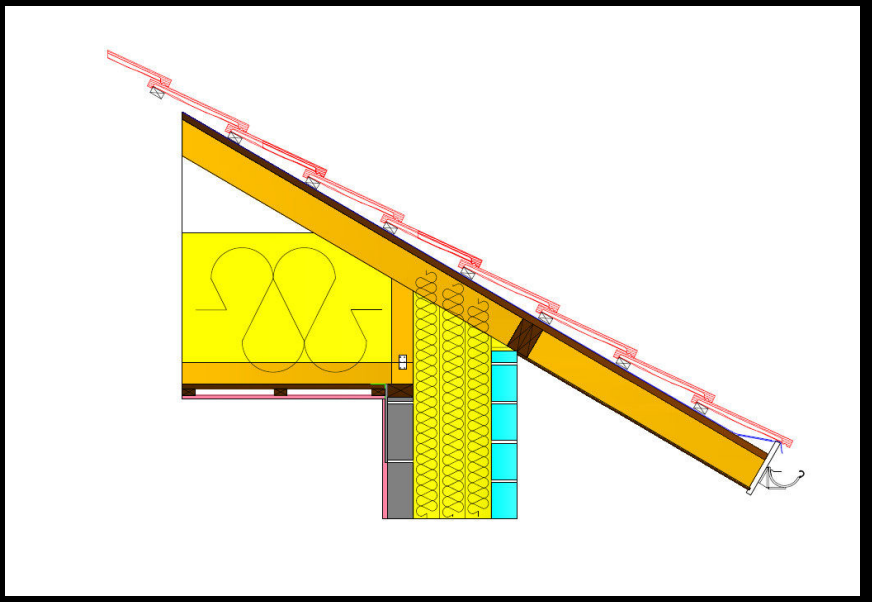
How to achieve a Passivhaus

Very low thermal bridging ψ < 0.01W/mK



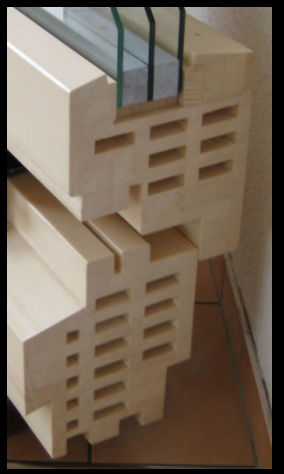
How to achieve a Passivhaus

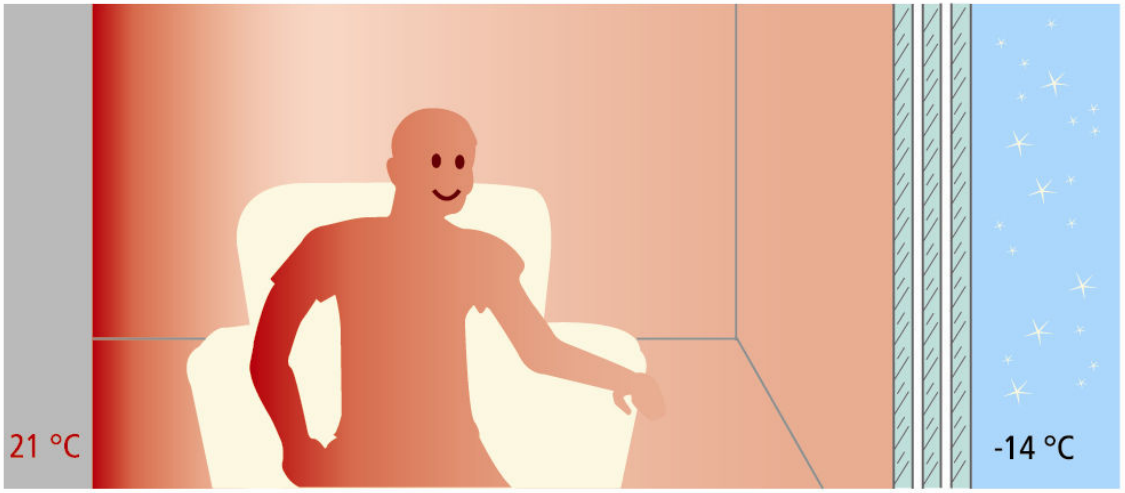
How to achieve a Passivhaus



How to achieve a Passivhaus

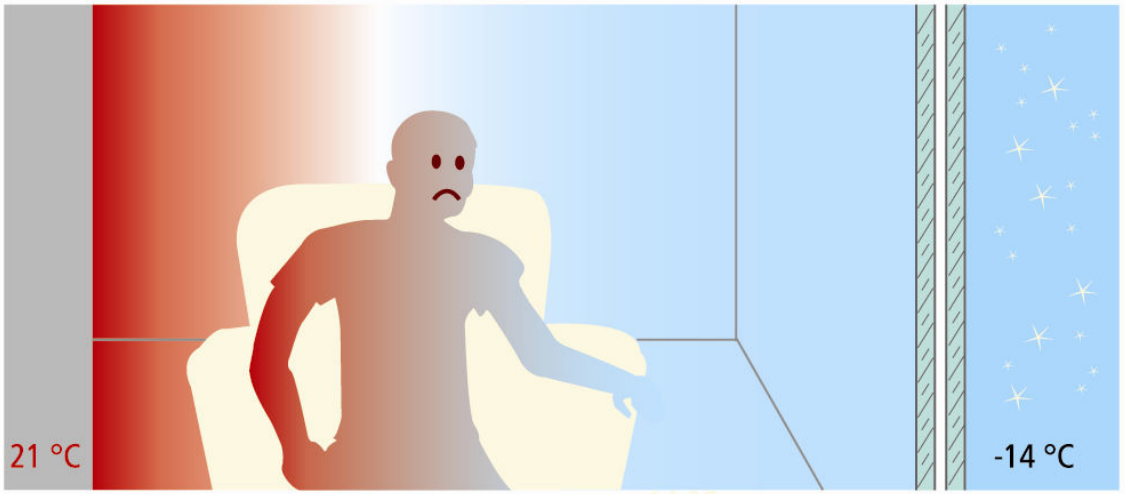
Super windows - window and door U values ≤ 0.8W/m2K





triple-glazing
radiation
temperature:
20,5 °C
left half
of the room

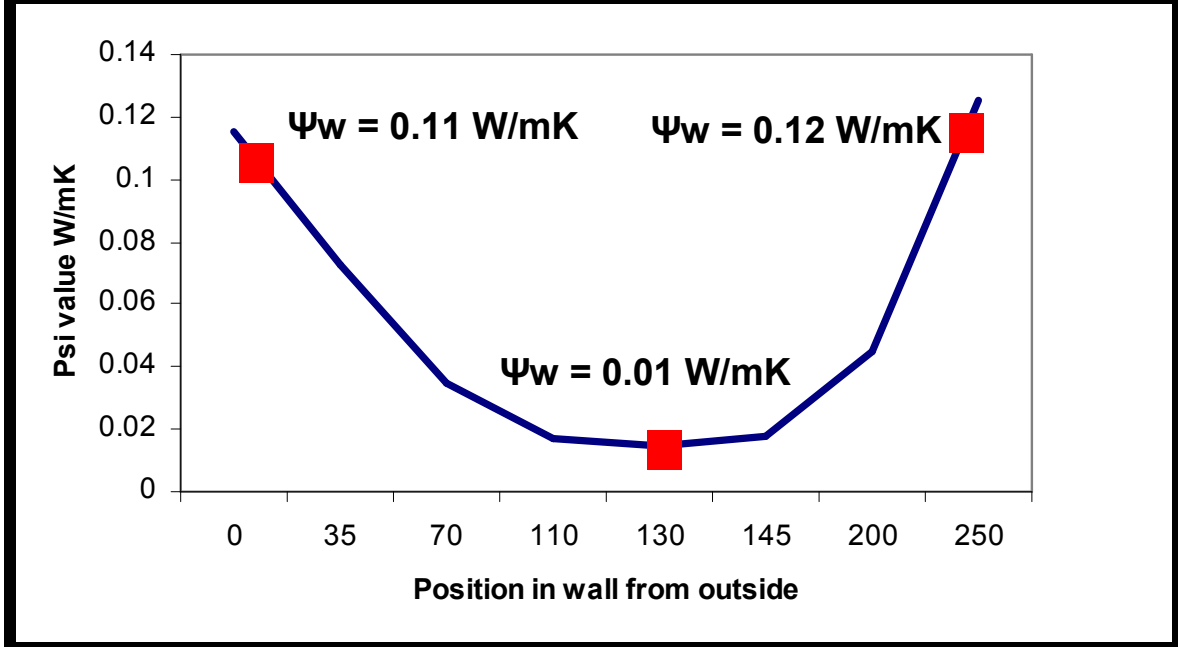
radiation
temperature:
18 °C right half
of the room

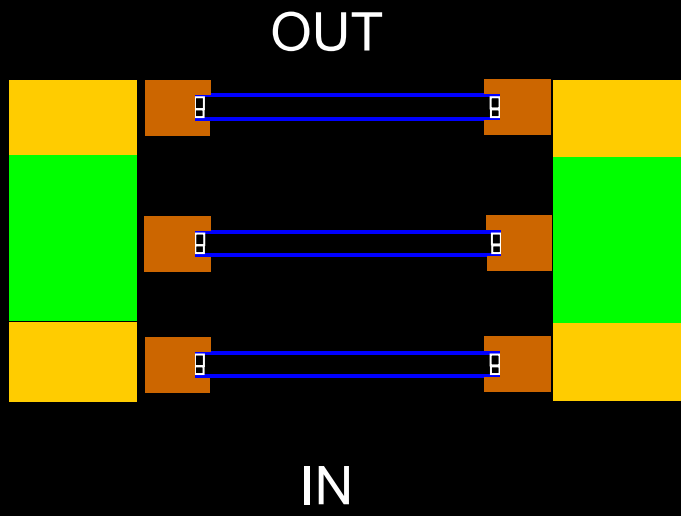


double-glazing
radiation
temperature:
20,5 °C
left half
of the room

radiation
temperature:
15 °C right half
of the room

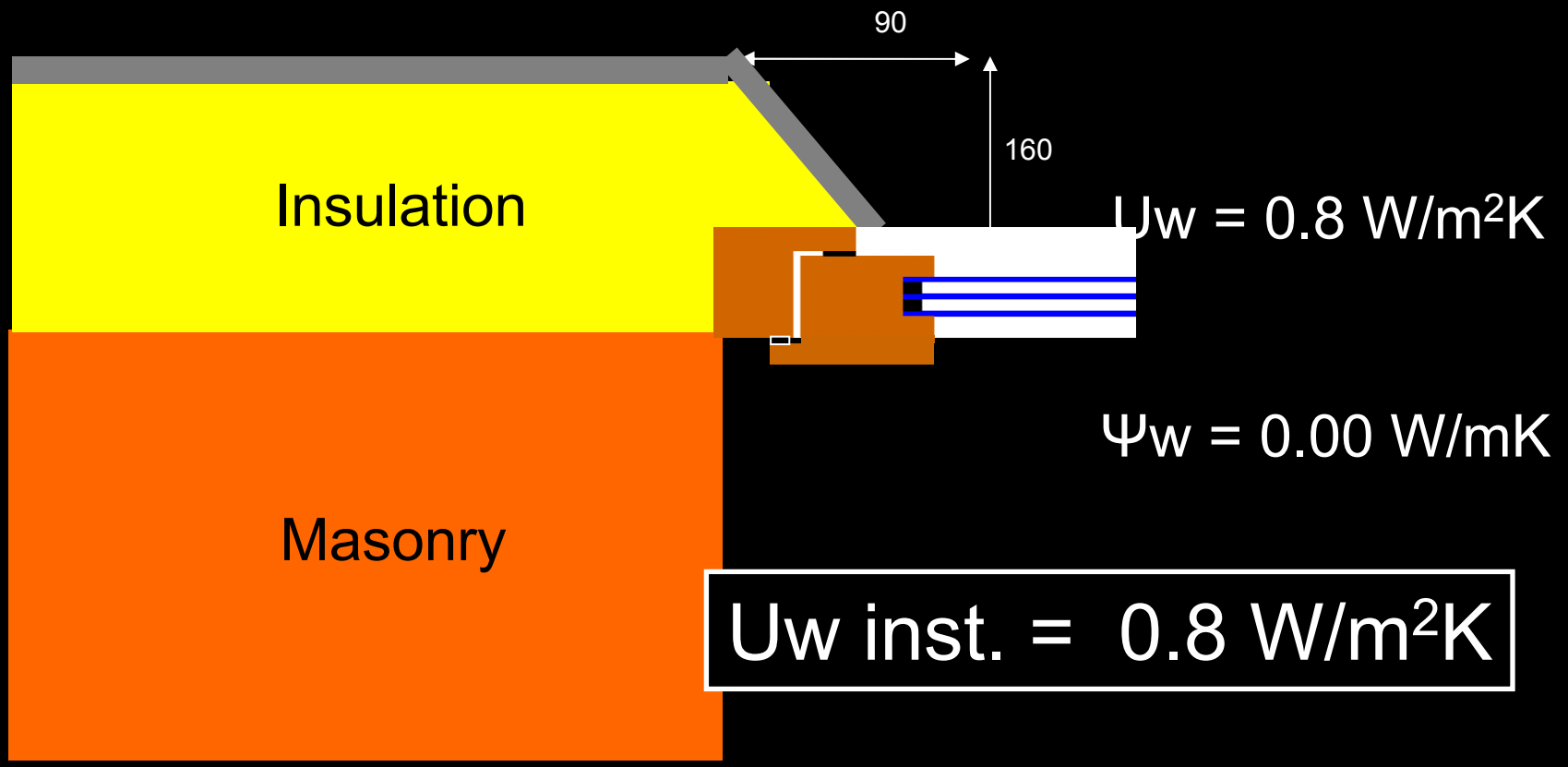
The effect of installing window in different positions in the wall





Schematic for illustration purposes based on installation positions for a high performance double glazed window into advanced specification cavity wall construction
From “Stamford Brook – making sustainability work” Lowe et al

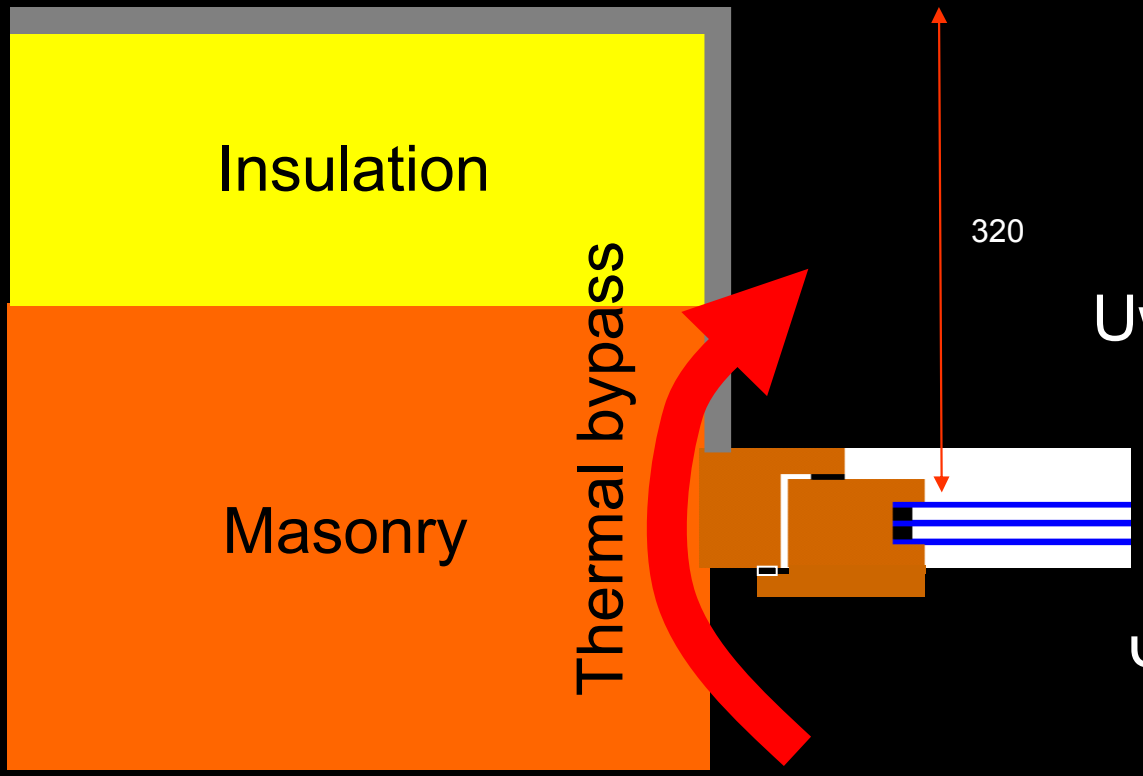
The effect of window position and insulation wrapping



Schematic drawing based on an example from proceedings of the Passive House Conference 2006 for renovation of typical German construction using PH standard window. Freundorfer, Kaufmann and Krause

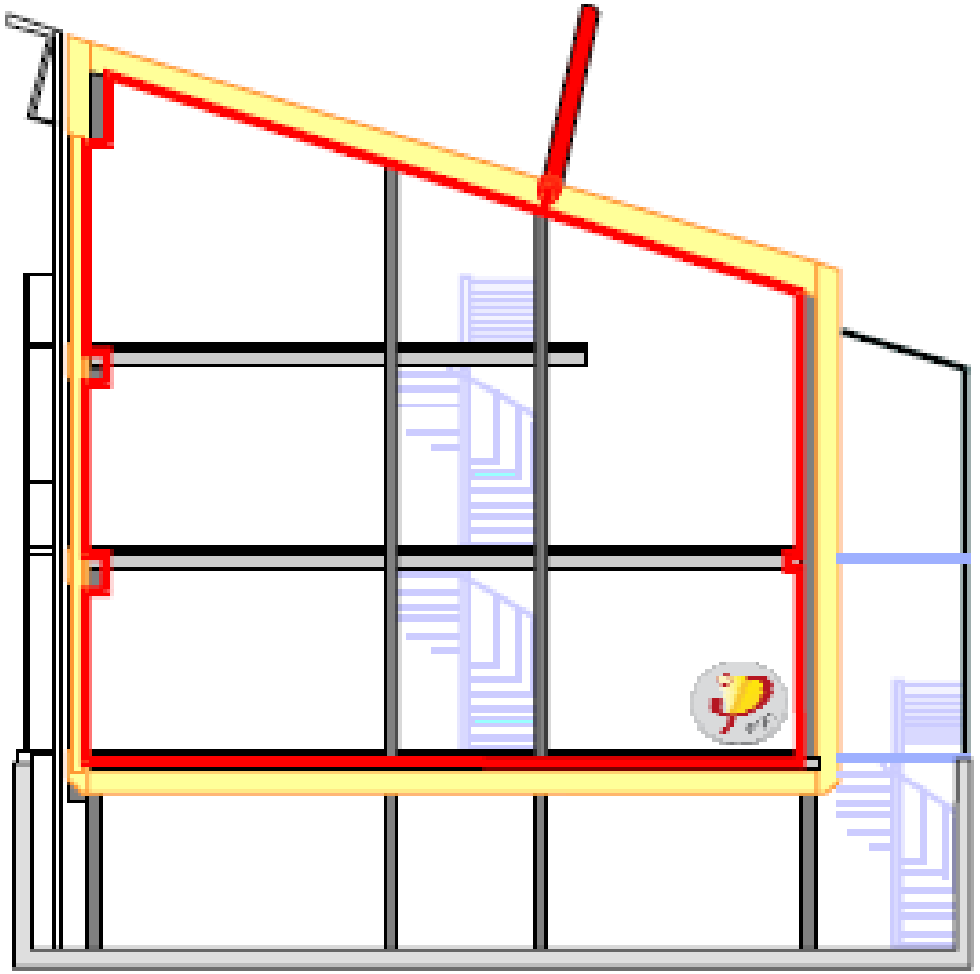
The effect of window position and insulation wrapping

Uw inst.* = 1.84 W/m²K



Schematic drawing based on an example from proceedings of the Passive House Conference 2006 for renovation of typical German construction using PH standard window. Freundorfer, Kaufmann and Krause

*1m x 1m window



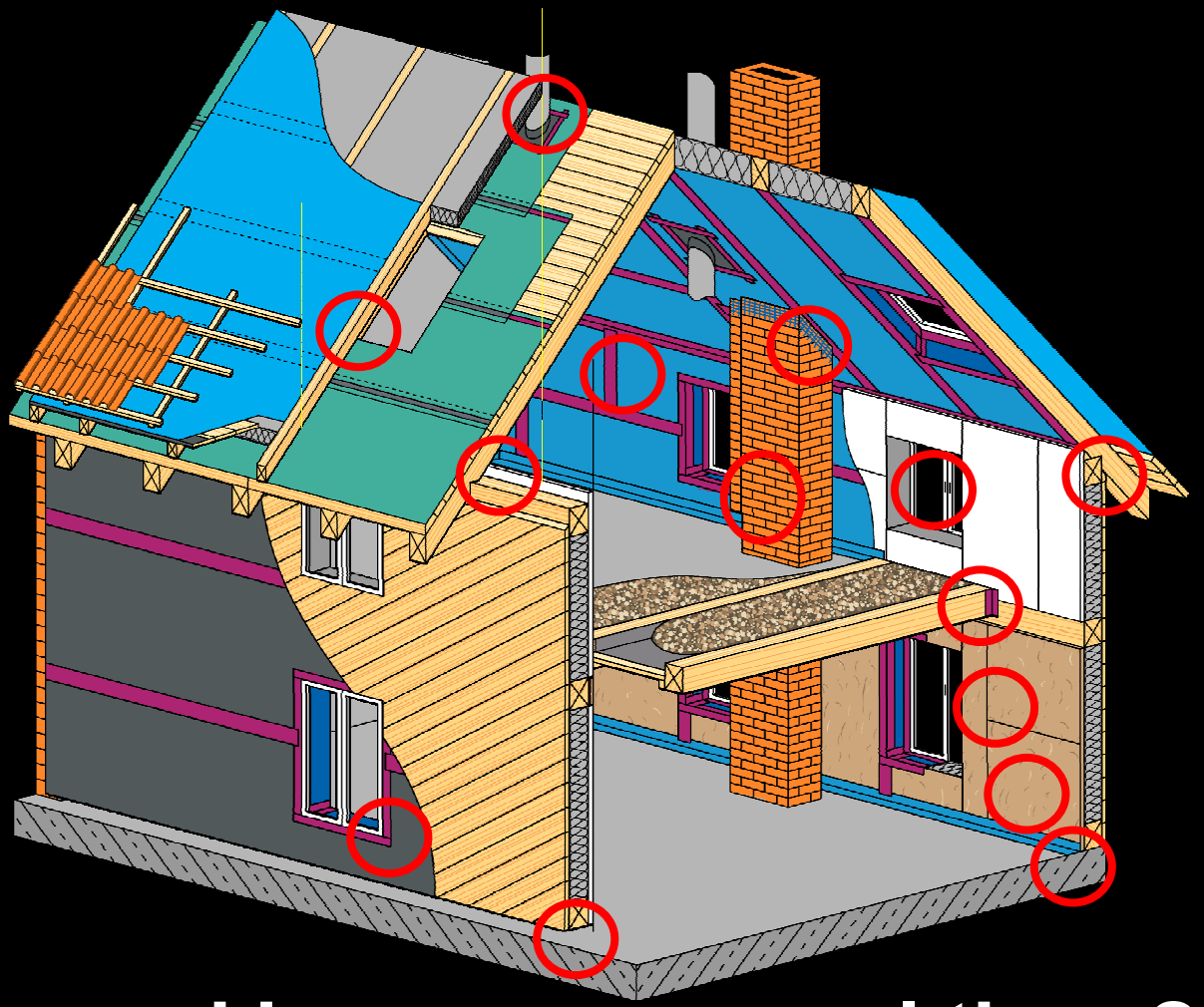
n_{50} max. 0.60 h^{-1}

design **ONE** airtight layer
all around the building

How to achieve a Passivhaus

Highly airtight ≤ 0.6 ac/h @ 50 Pa

So where are all of the gaps?



…and how can we seal them?

Tapes ▪ Membranes ▪ Grommets

How to achieve a Passivhaus

Tapes

Window box and wall

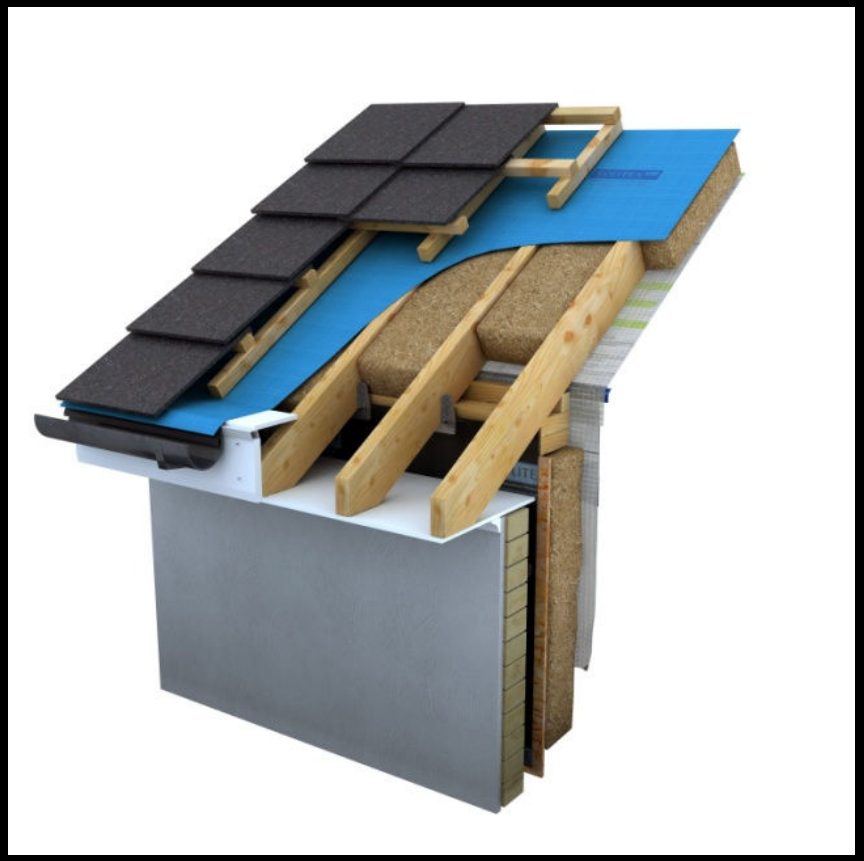
Sealing of overlaps

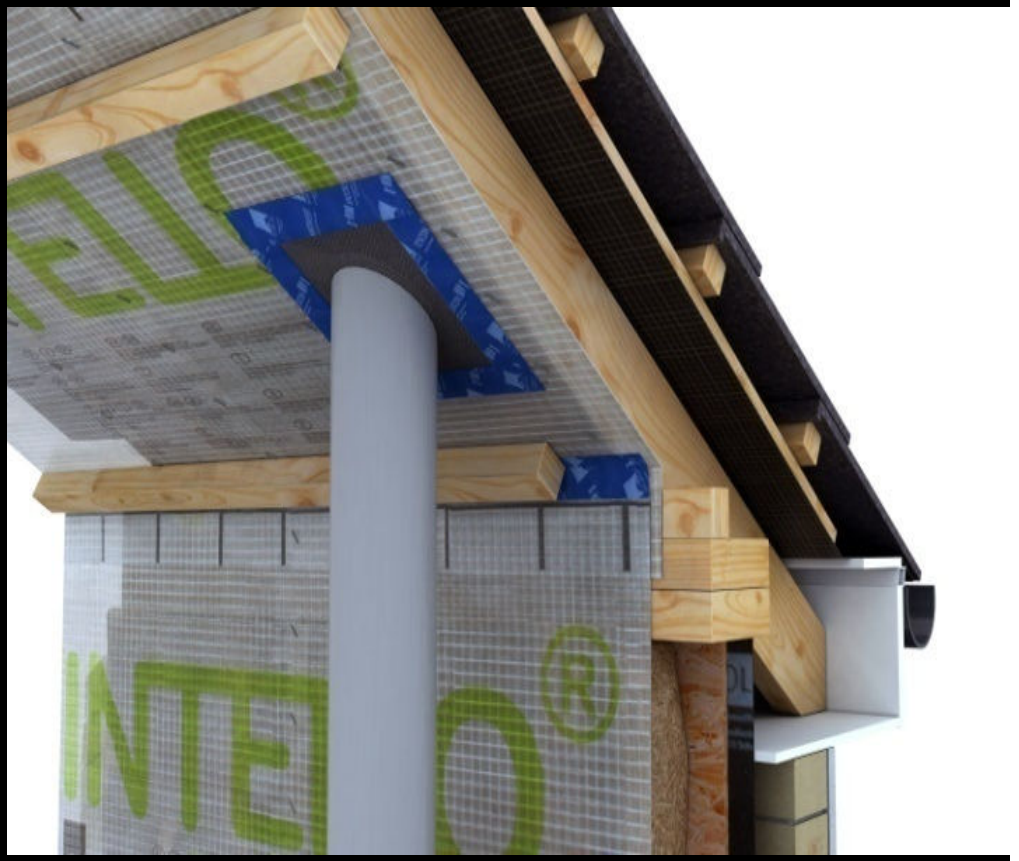
How to achieve a Passivhaus

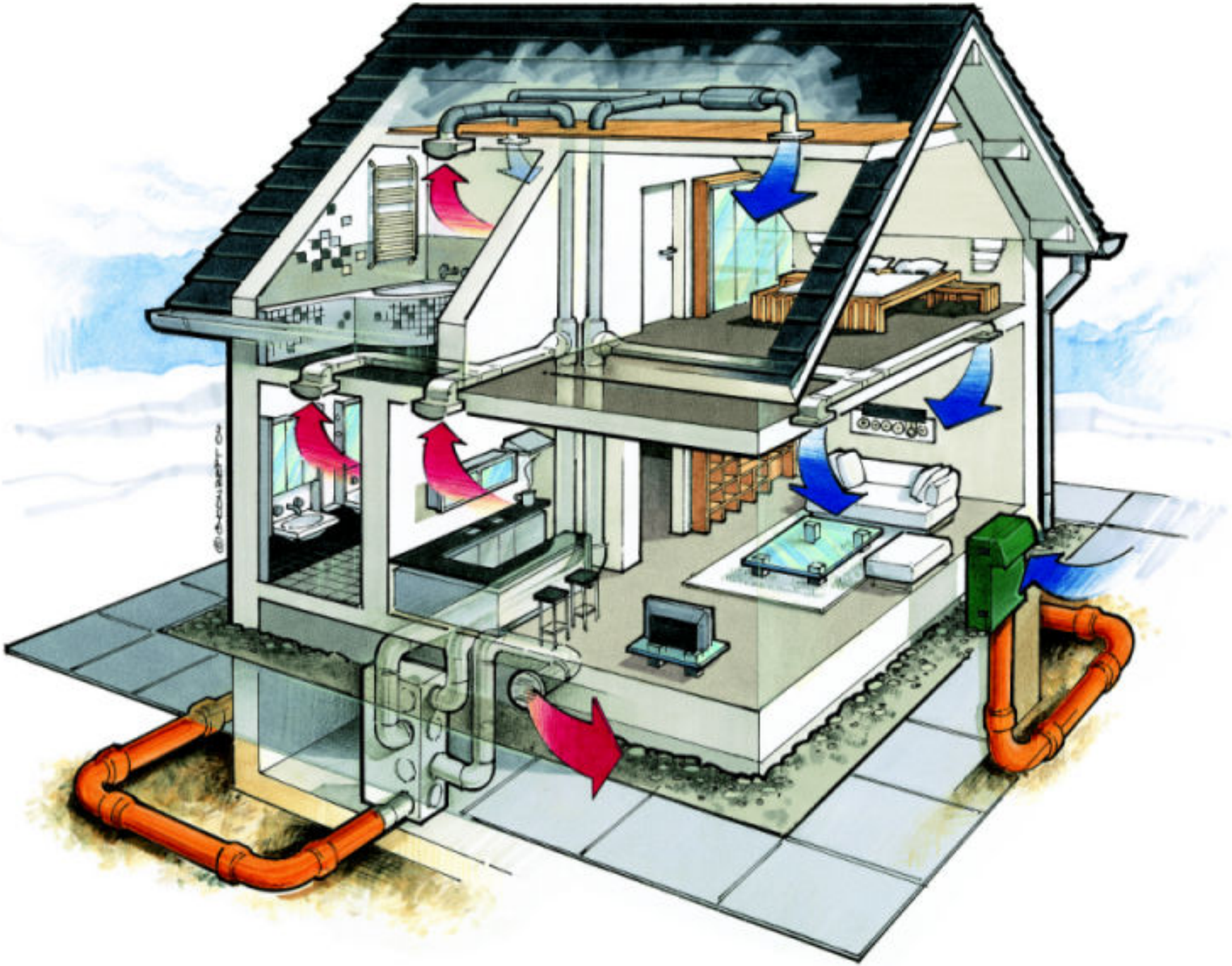
Connections of corners and edges in timber construction

Connections to plastered walls

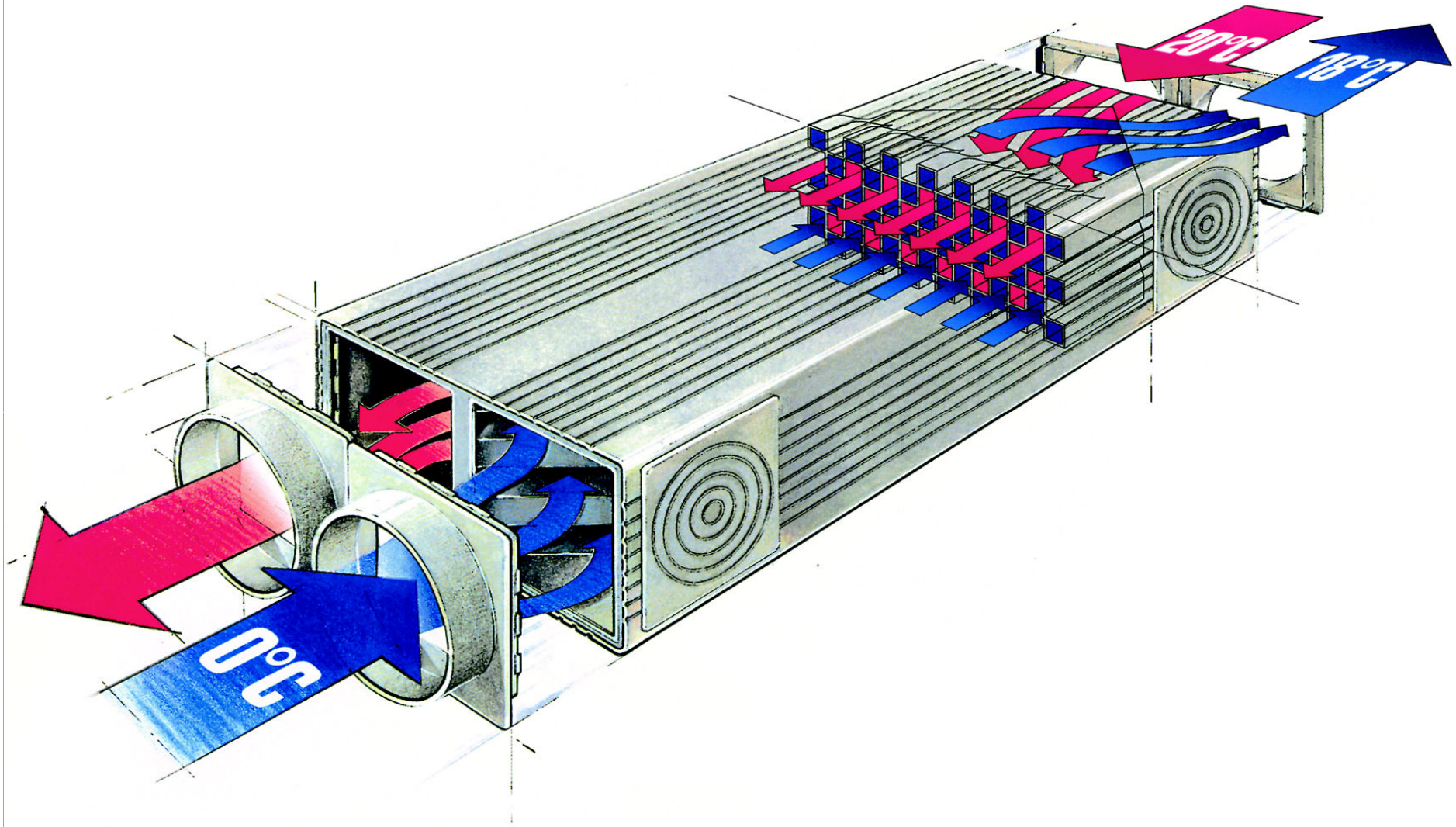
Membranes



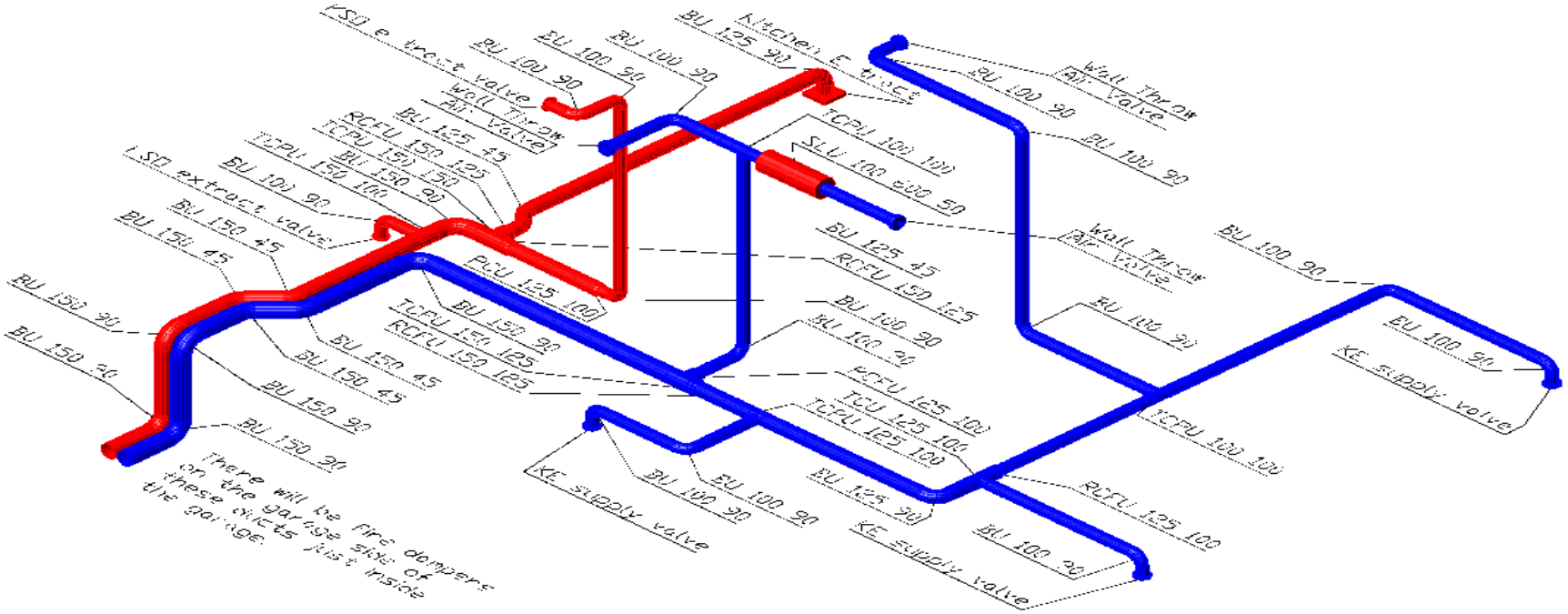




PAUL counterflow heat exchanger



Typical Ventilation System



Passivhaus – a comfort standard

- No draughts
- No cold radiant
- No summer overheating
- Fresh air always
- Whole house warm - no hypothermia
- Fuel Poverty eliminated

- all by simply improving the build quality

Passivhaus: a robust approach

- High thermal comfort and air quality
- User friendly
- Easy to maintain
- Simple and efficient technology
- Cost effective

Comparisons

ZCH issues	UK	PH
Accurate prediction of performance	?	
Complex combination of systems which perform	?	
Accurate prediction of overheating		
Good air quality ensured	?	
Performance assurance scheme (QA)		
Monitoring recent low energy buildings		
Regional variations in climate data		
High degree of urgency	Lots to do	Ready

Acknowledgements

- PHI
- IPHA
- Passivhaus Trust
- BRE
- Green Building Store

Questions?

Thanks for listening

Contact Details

Peter Chisnall

01376 531523

07515 974554

peter.chisnall@climateenergy.org.uk