

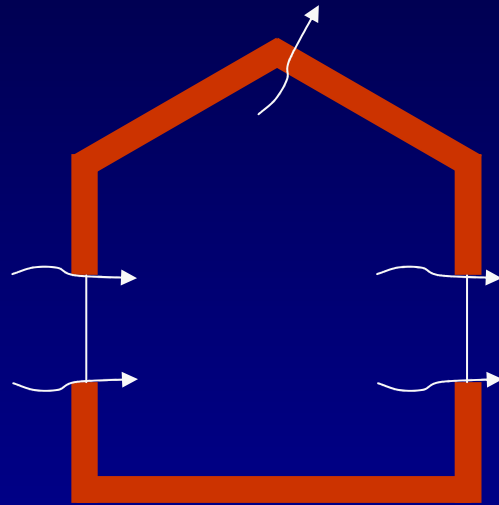
Breathing and Airtight?
Is this possible...

AECB 2006

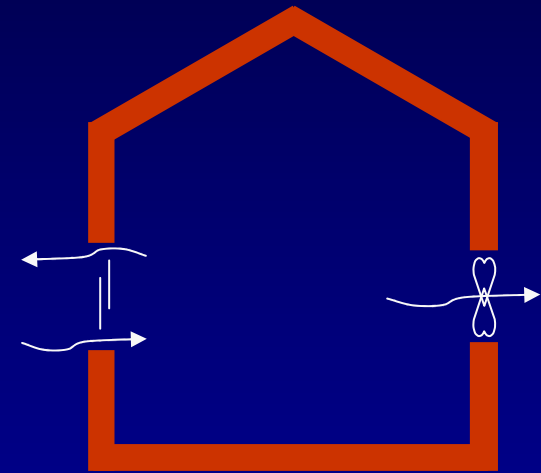
Peter Warm

Buildings Energy Consultant

Definitions

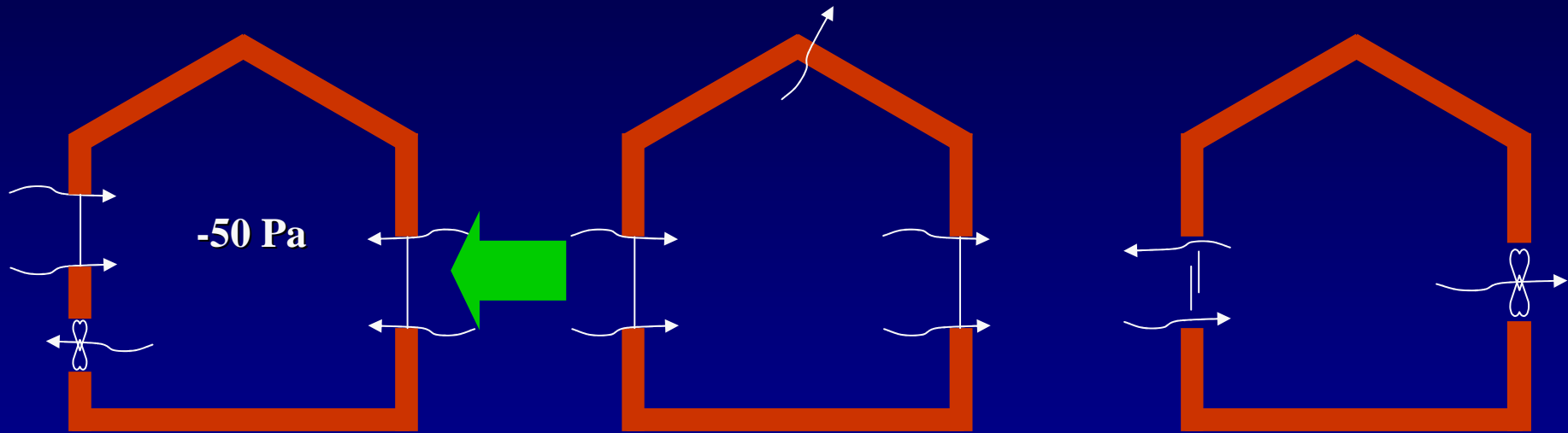


Infiltration



Ventilation

Definitions

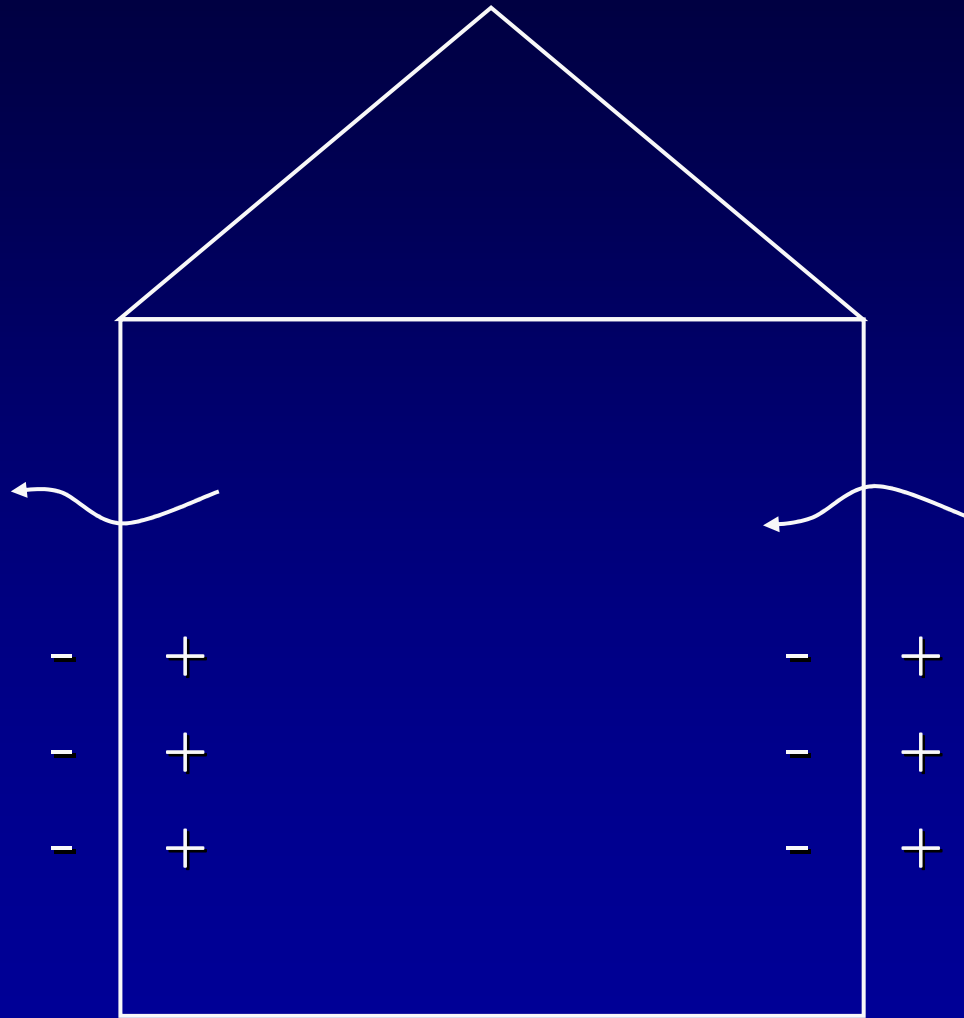


Air Leakage Test

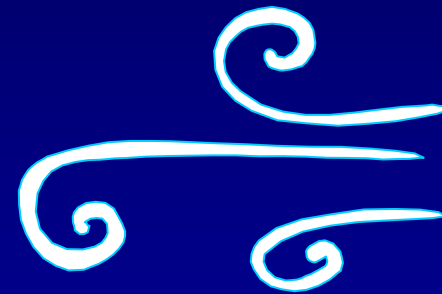
Infiltration

Ventilation

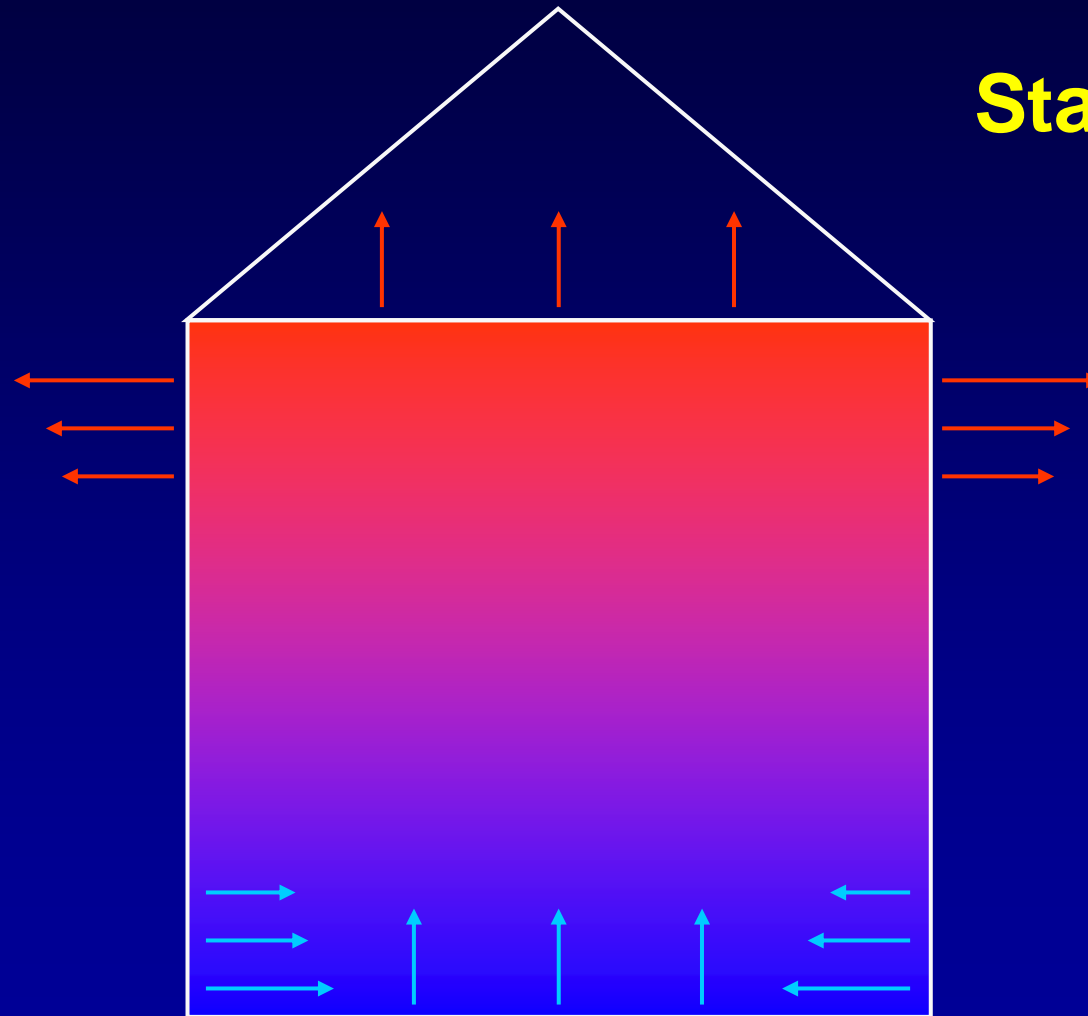
How does infiltration occur?



Wind effect



How does infiltration occur?



Stack effect

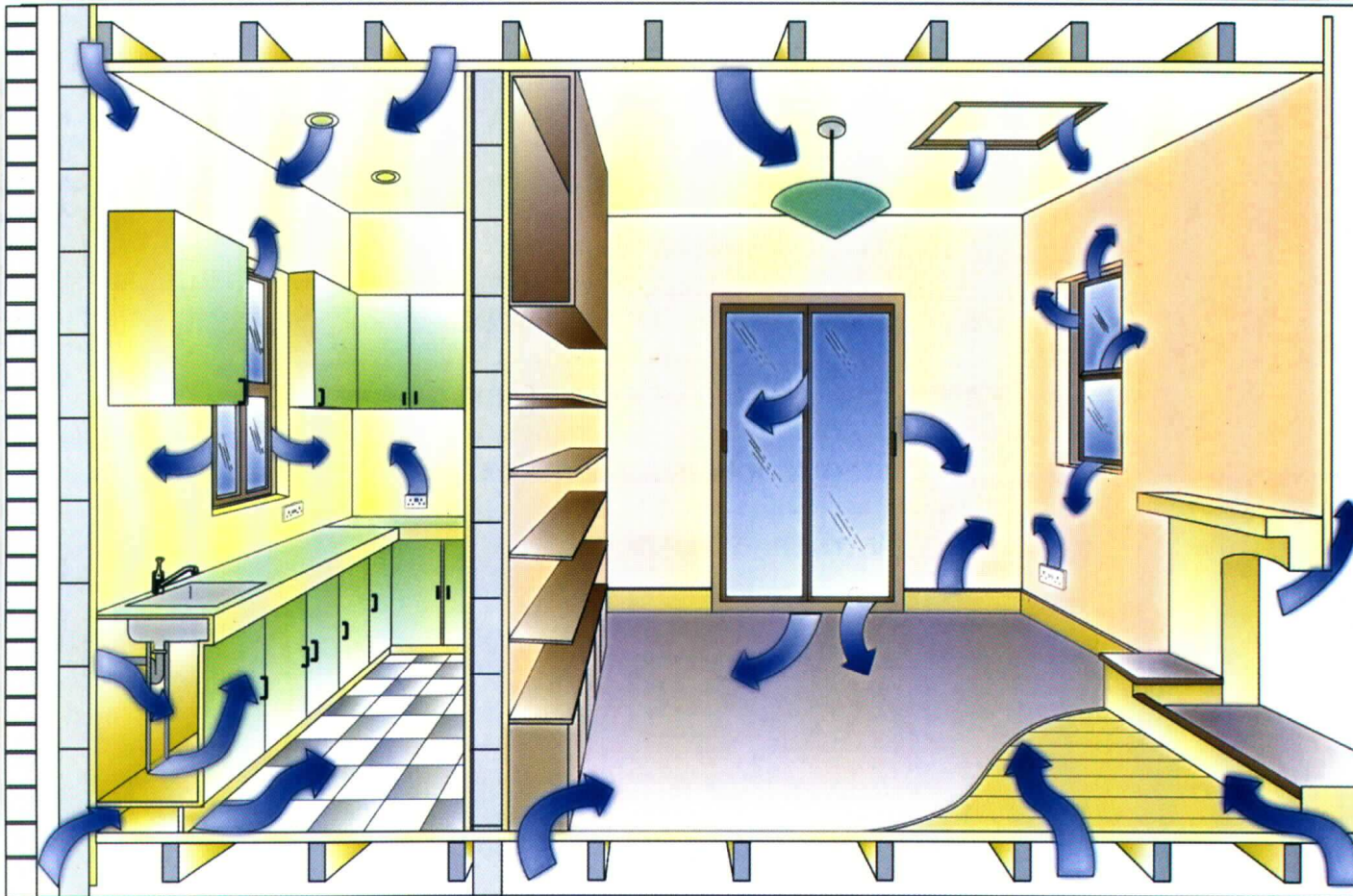
Air Leakage test



Air Leakage vs. Infiltration

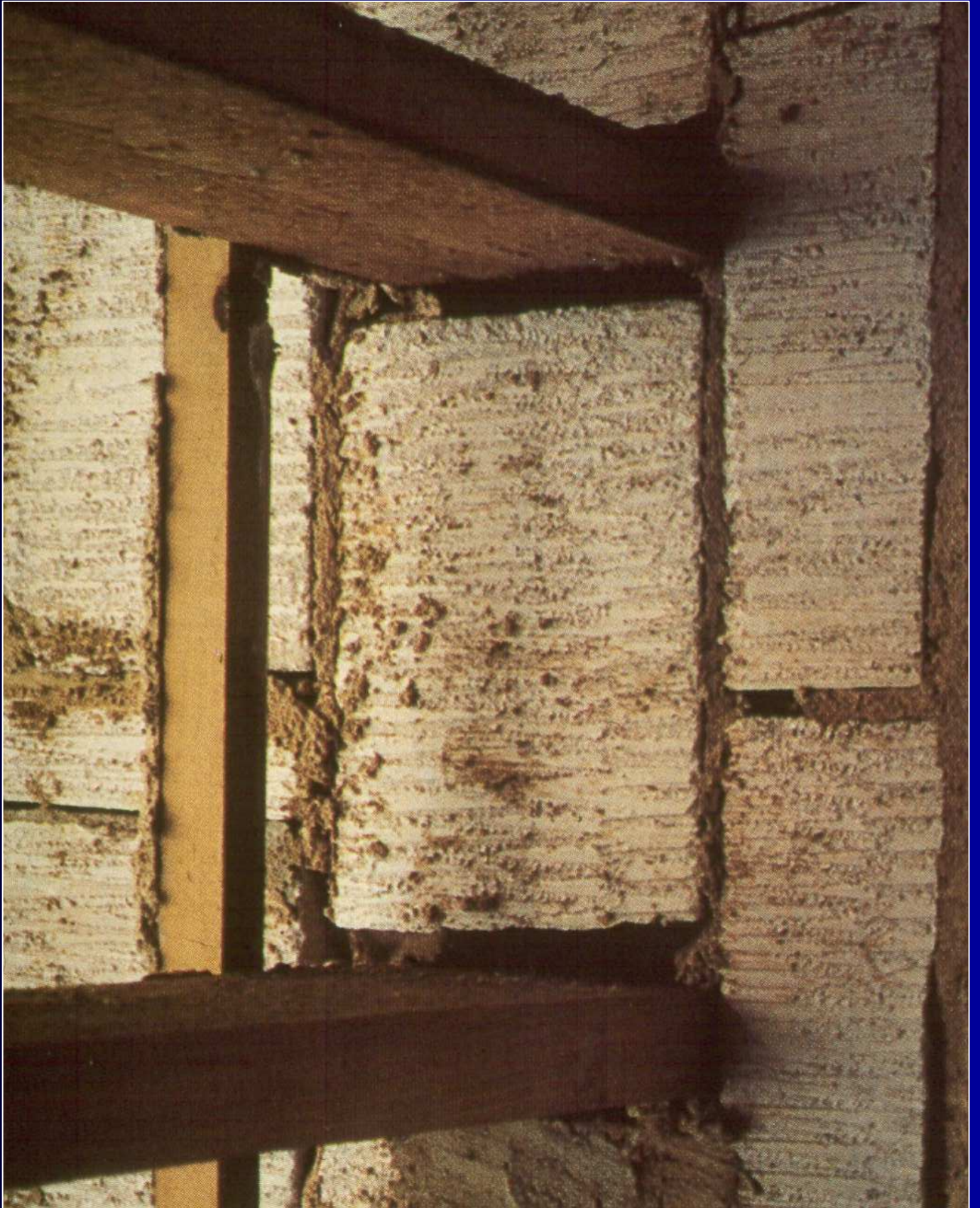
	Air changes at 50 Pa	Approximate normal air changes
Typical UK house	15	0.75
Good UK practice	5	0.25
Scandinavian & Canadian practice	< 1	< 0.1

Infiltration routes



Joist Hangers

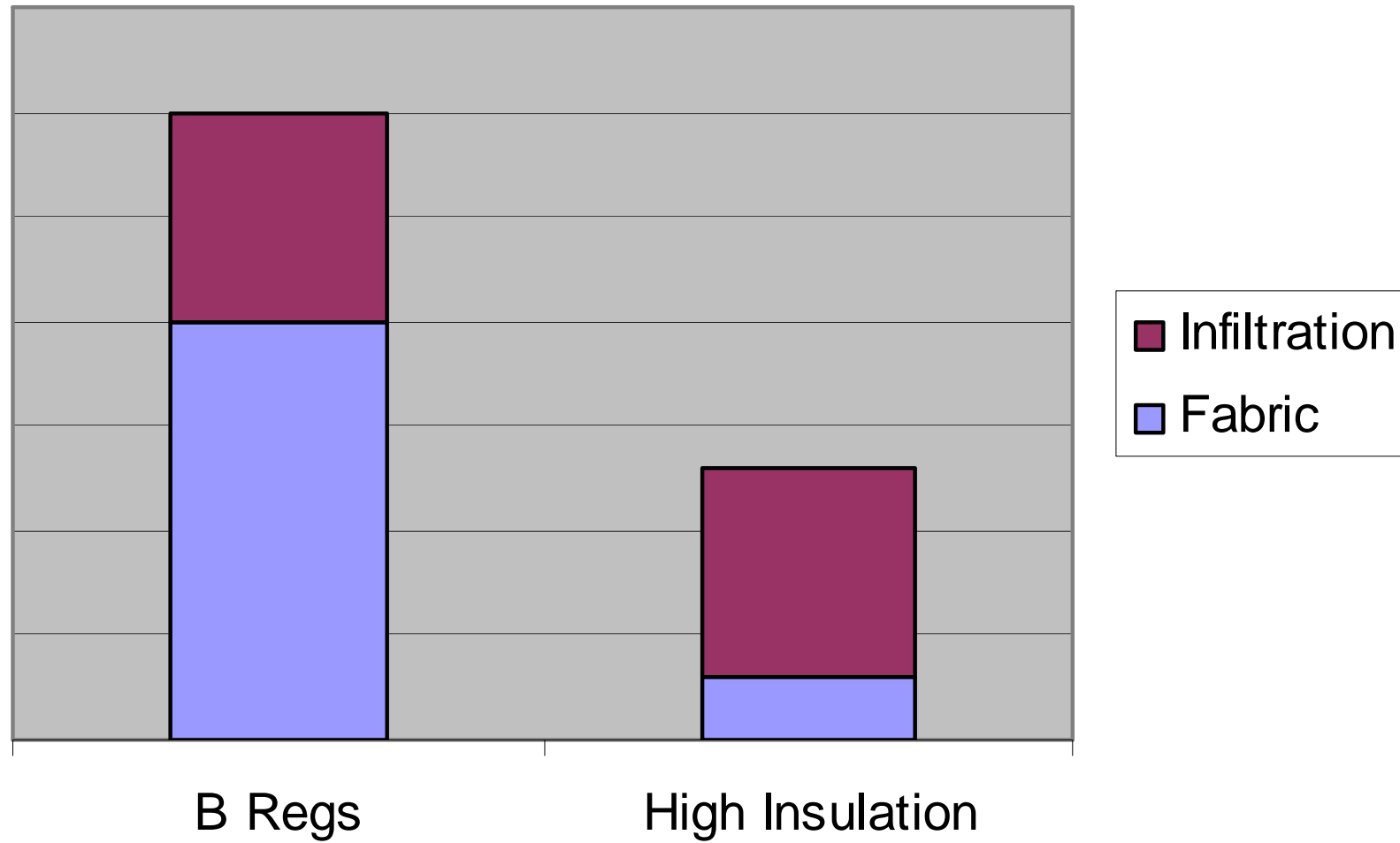




Why is airtightness desirable?

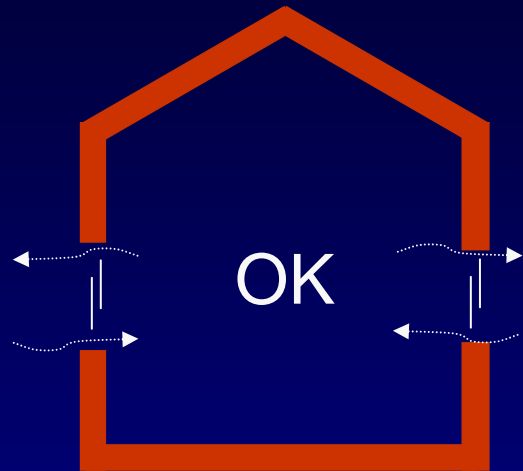
- Reduction in heating energy
 - Reduction in fossil fuel pollution

Fabric and Infiltration Heat Losses



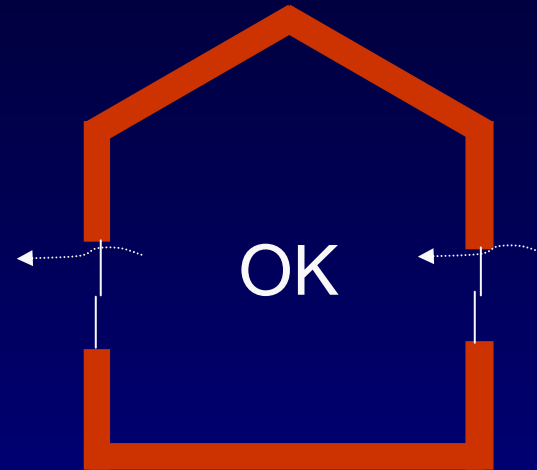
Why is airtightness desirable?

- Reduction in heating energy
 - Reduction in fossil fuel pollution
- Buildings more comfortable
 - Reduction in draughts



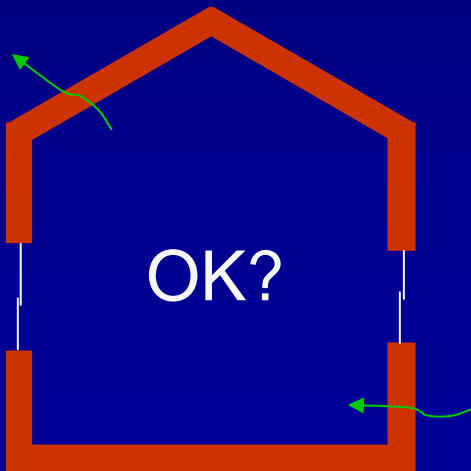
calm

Airtight



windy

Airtight



calm

Leaky



windy

Leaky

Why is airtightness desirable?

- Reduction in heating energy
 - Reduction in fossil fuel pollution
- Buildings more comfortable
 - Reduction in draughts
- But ventilation still required for good air quality
 - Some systems not worth installing in leaky houses

Ventilation systems

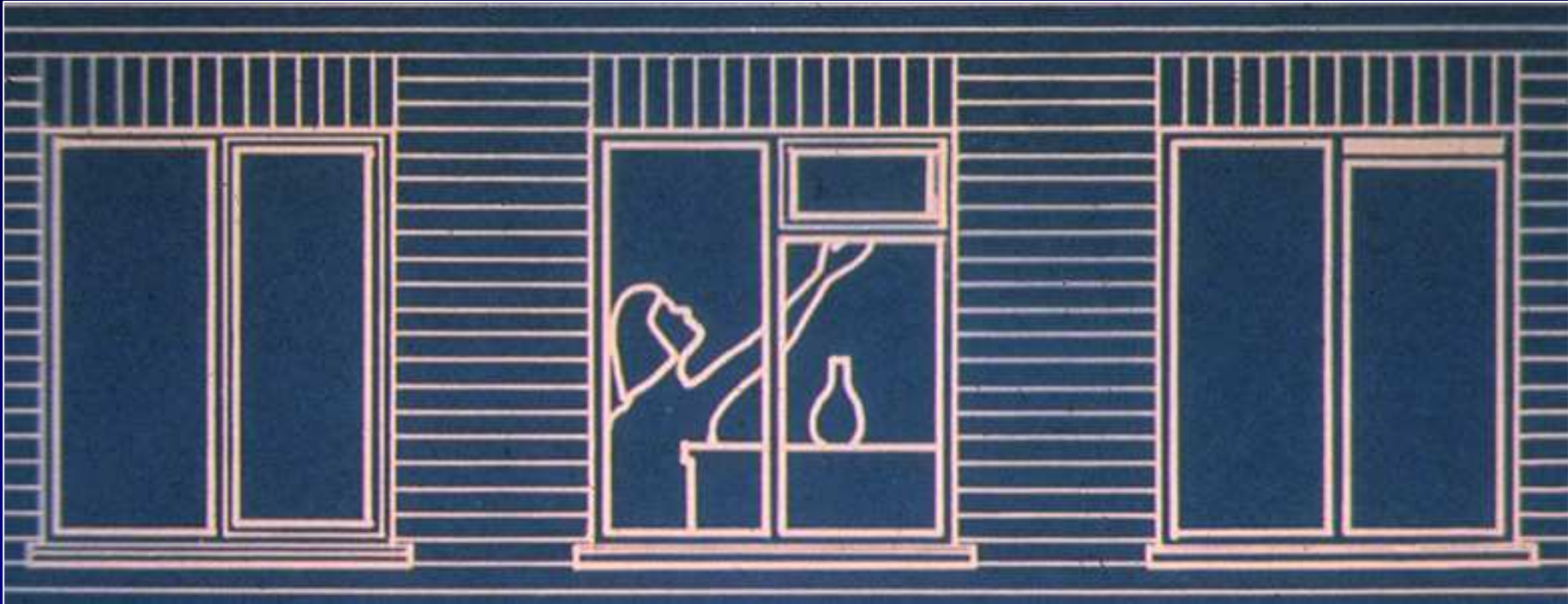
Natural ventilation

- Trickle vents
- Opening windows
- **Passive stack ventilation**

Mechanical

- Extract fans
- **Whole house extract**
- **Room ventilator with heat recovery**
- **Whole house mechanical ventilation with heat recovery**

Windows

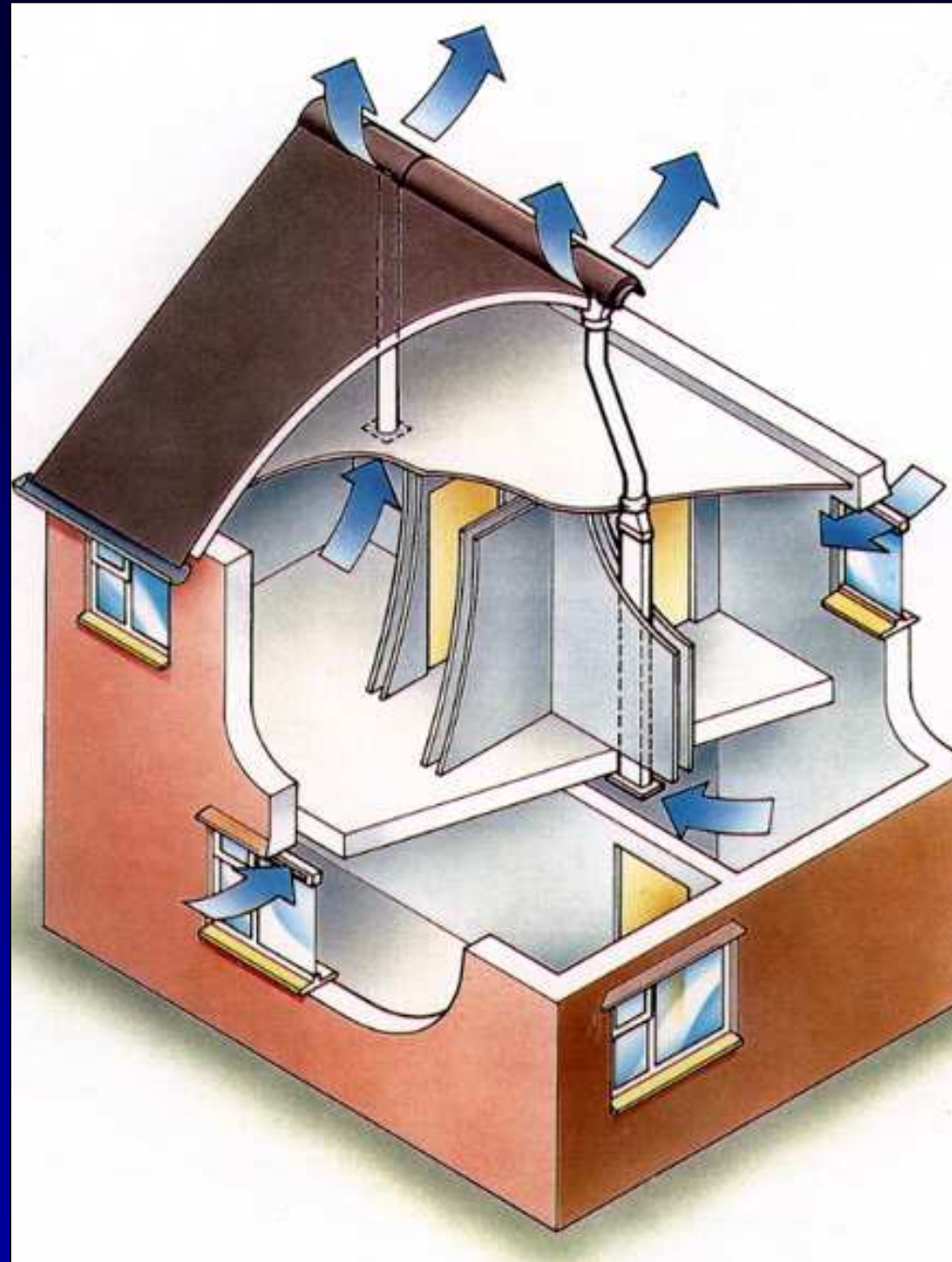


Poor control
cannot be
left open

Can be left open
but
often cannot be reached

Ventilator gives
better control

Passive Stack Ventilation



Mechanical Ventilation



Introducing the
revolutionary new
Vent-Axia LoWatt
fan range



Vent-Axia.

Whole house extract systems



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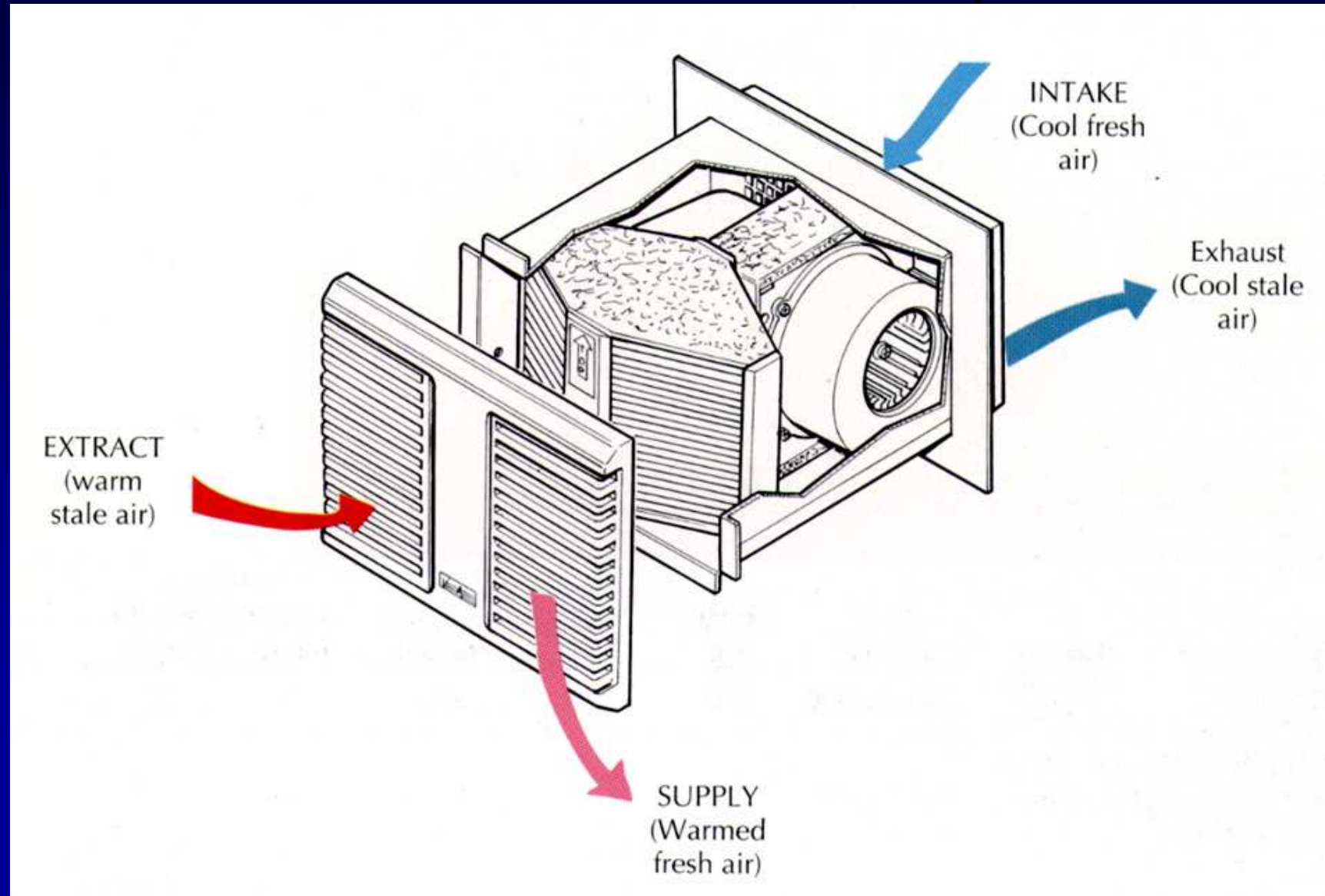


speed to suit
welling, which is
h. As a guide, in a

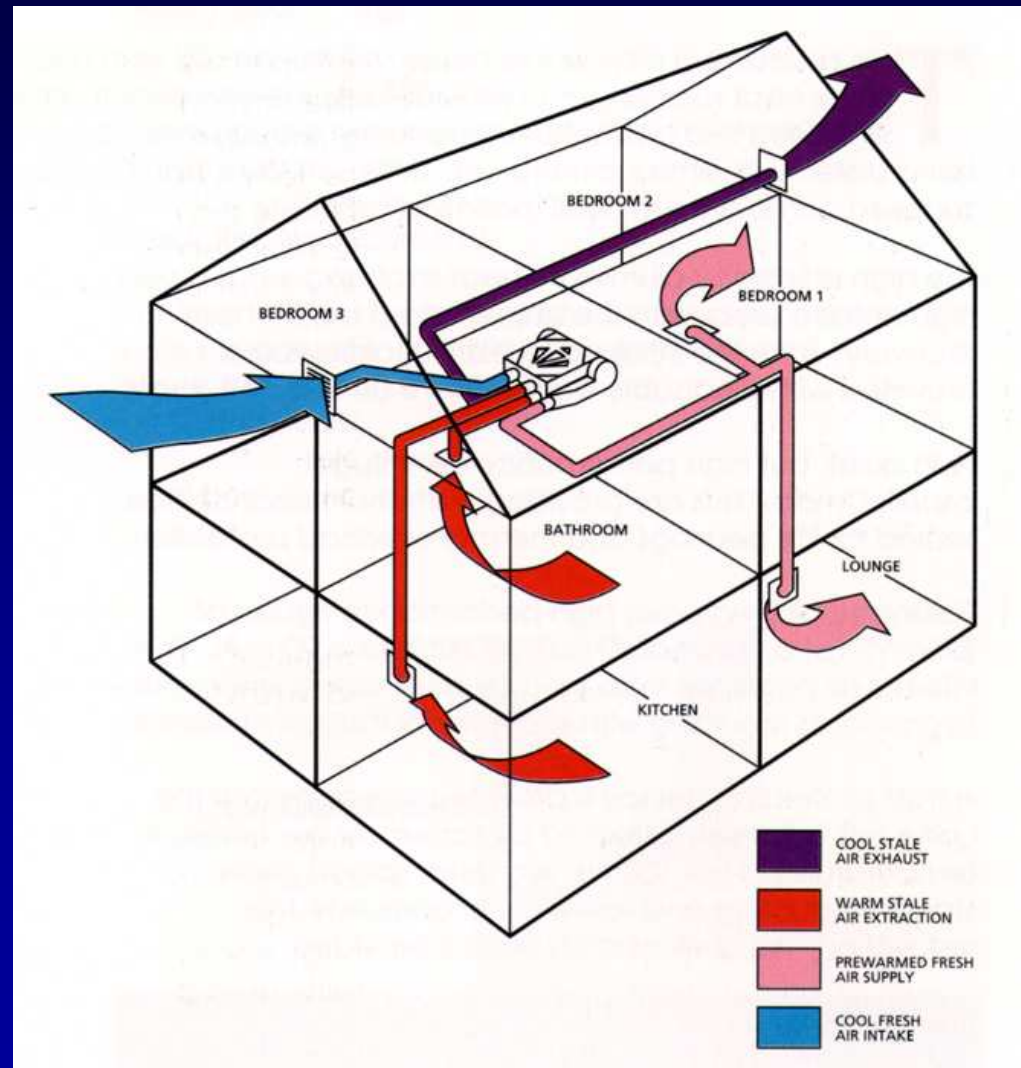
Room ventilator with heat recovery



Room ventilator with heat recovery



Whole house heat recovery ventilation



Conclusion: Airtightness

- Essential for energy saving, global warming
- Essential for comfort
- Needs a ventilation system to be designed

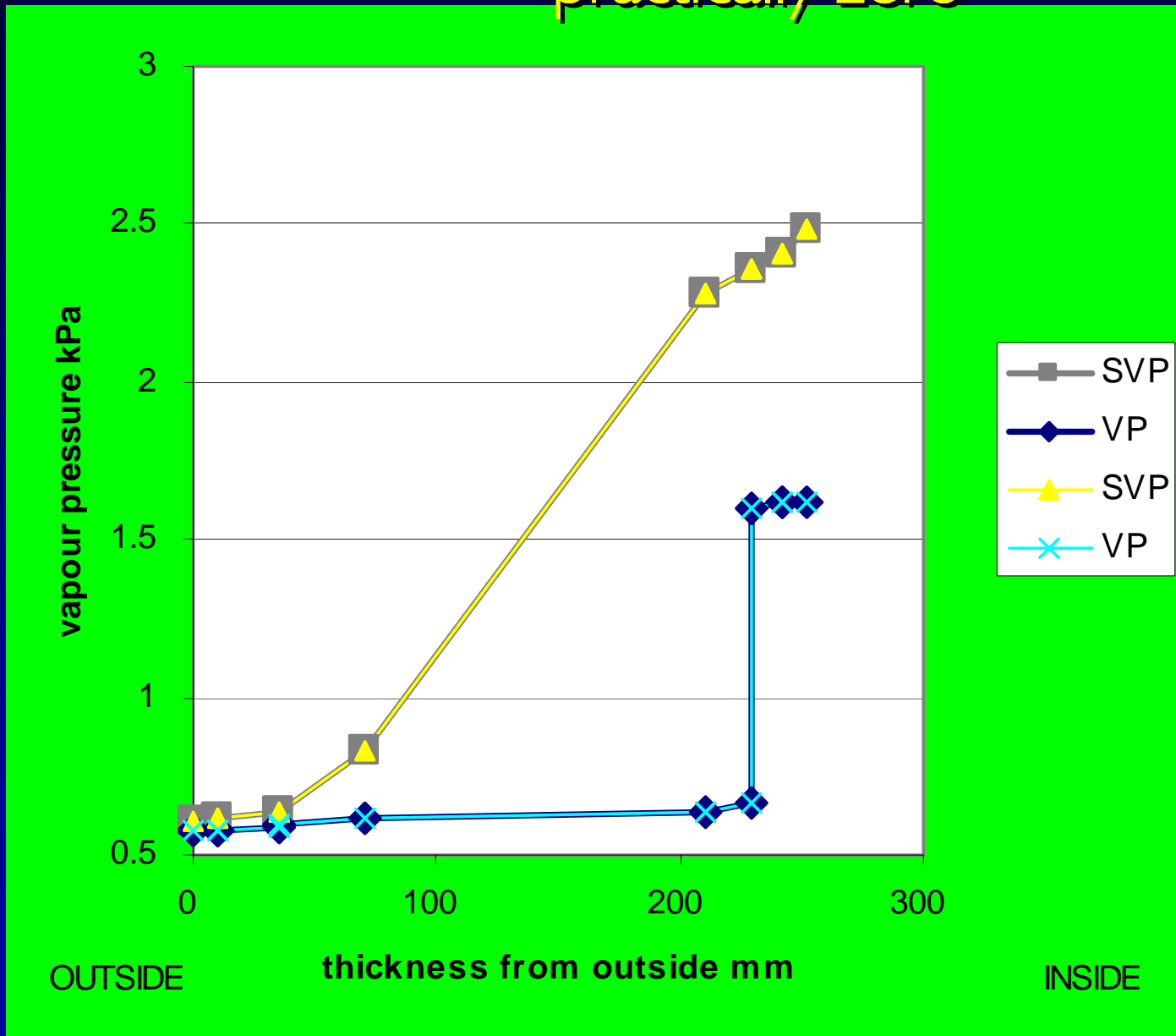
Why is Breathability desirable?

- No absolute moisture barriers
- No trapped moisture
- Provides evidence of building failure
- Self healing from building defects



Vapour movement through wall

– practically zero

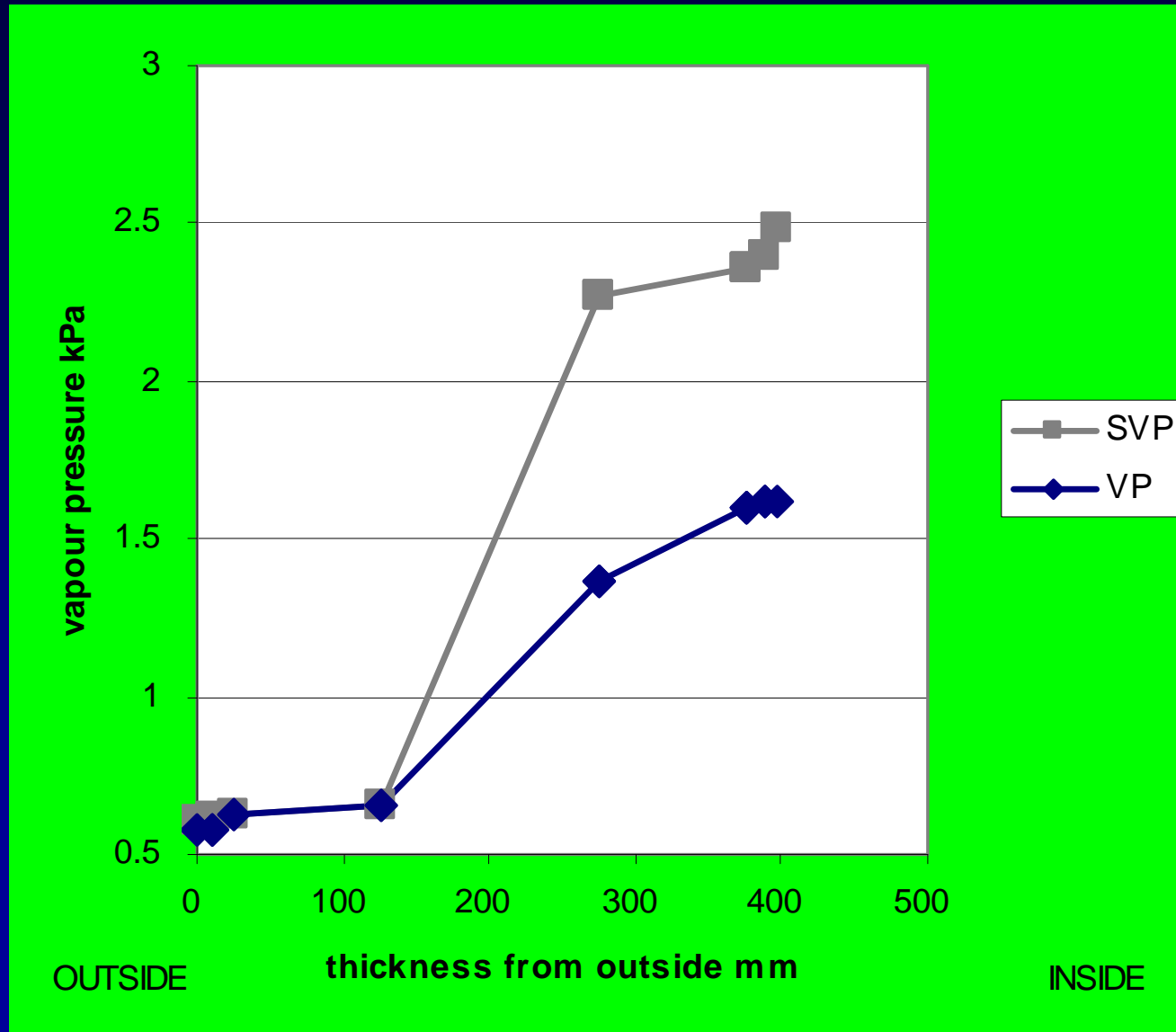


Fully Filled Cavity



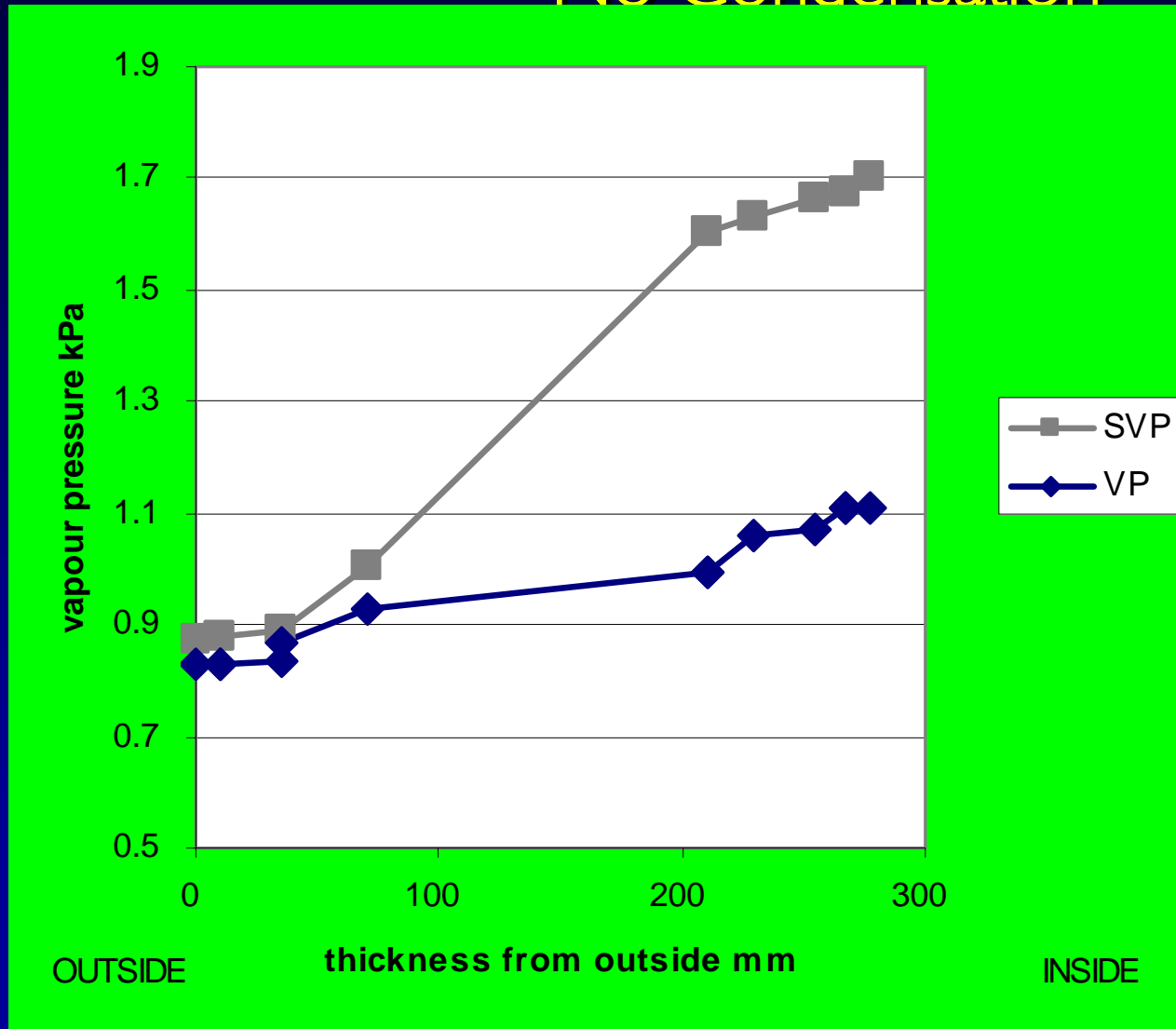
Vapour movement through wall

– Interstitial Condensation occurs



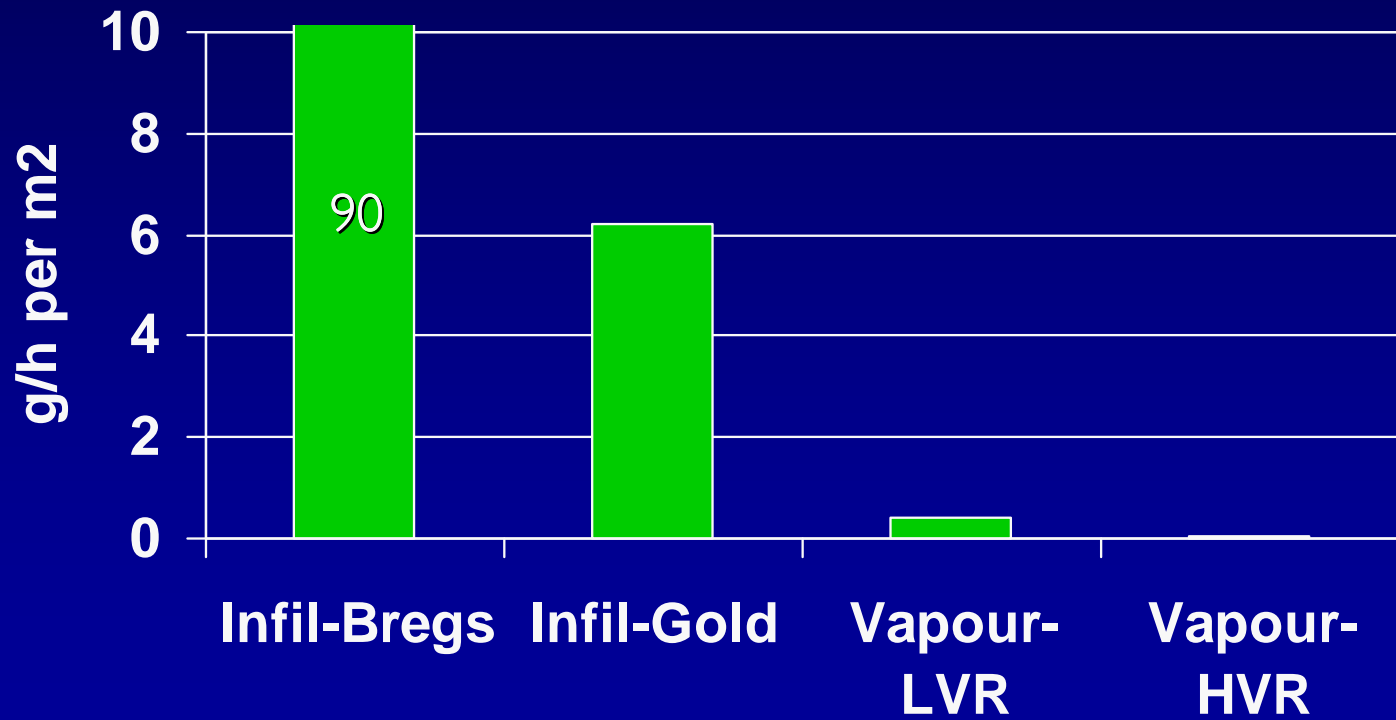


Vapour movement through wall – No Condensation



Breathing and airtightness possible?

Mass flow through fabric



A breathing structure can still be extremely airtight

Healthy buildings

- Avoid formaldehyde-emitting materials
 - Solvent based adhesives & paints
 - Man made carpet fibres
 - Chipboard, plywood, OSB
- Use natural, non-toxic paints
- Treat timber only off site and where absolutely necessary
- Avoid uPVC if possible

Practically every decision affects energy consumption

Airtightness strategy

High levels of insulation

Power to the shower

Low energy lights

Controls

Airtightness details

Thermal bridges

Hot water supply

Solar water heating

Heating strategy

Passive solar

Warm roof, cold roof?

Ventilation

Central heating?

Glazing performance

Services penetrations

MVHR
PSV

Appliances

Indoor air quality

Water

Daylighting

Pressure test



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The End