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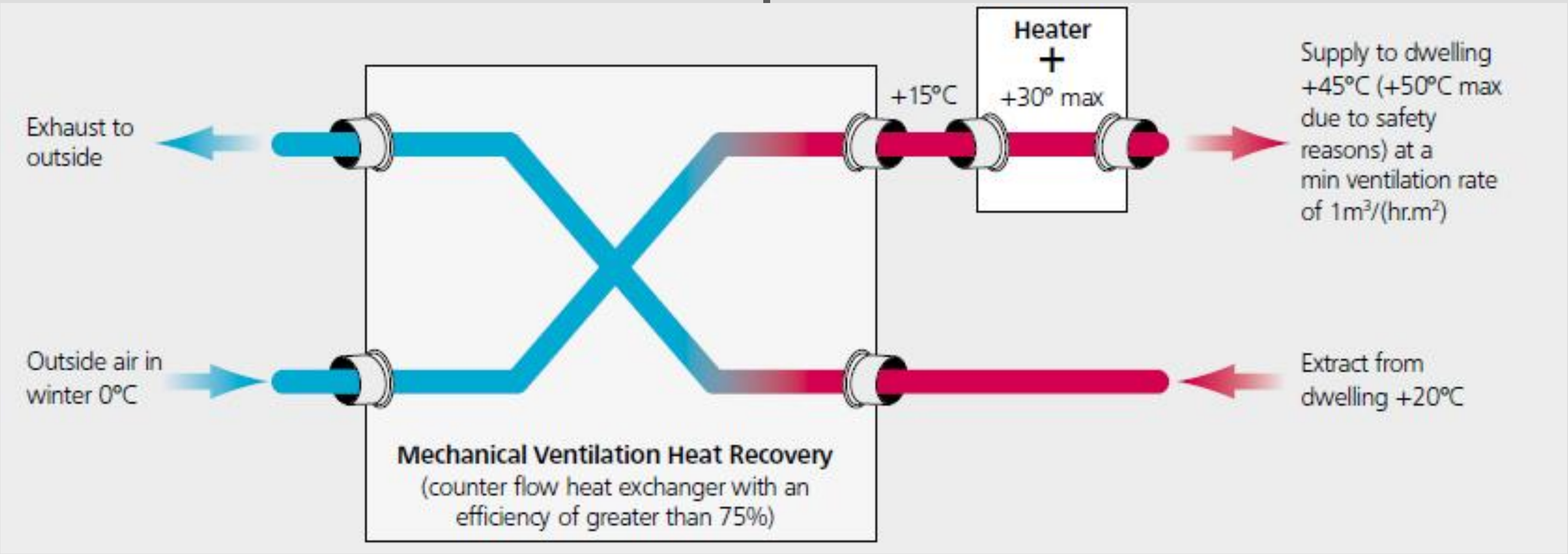
Mark Elton

HEAT RECOVERY VENTILATION | AN ARCHITECT'S PERSPECTIVE



WE NEED AIR TIGHT FABRIC

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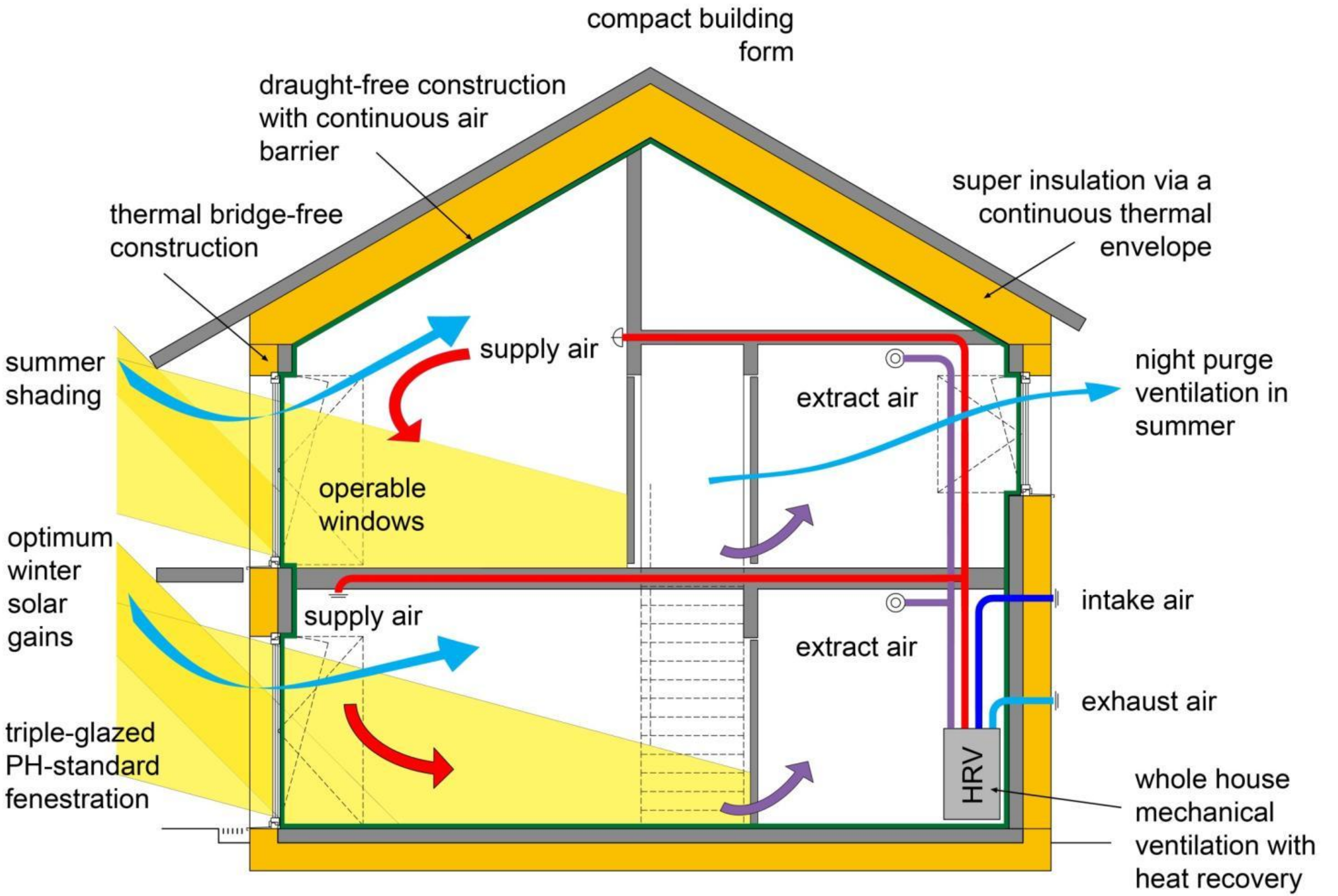
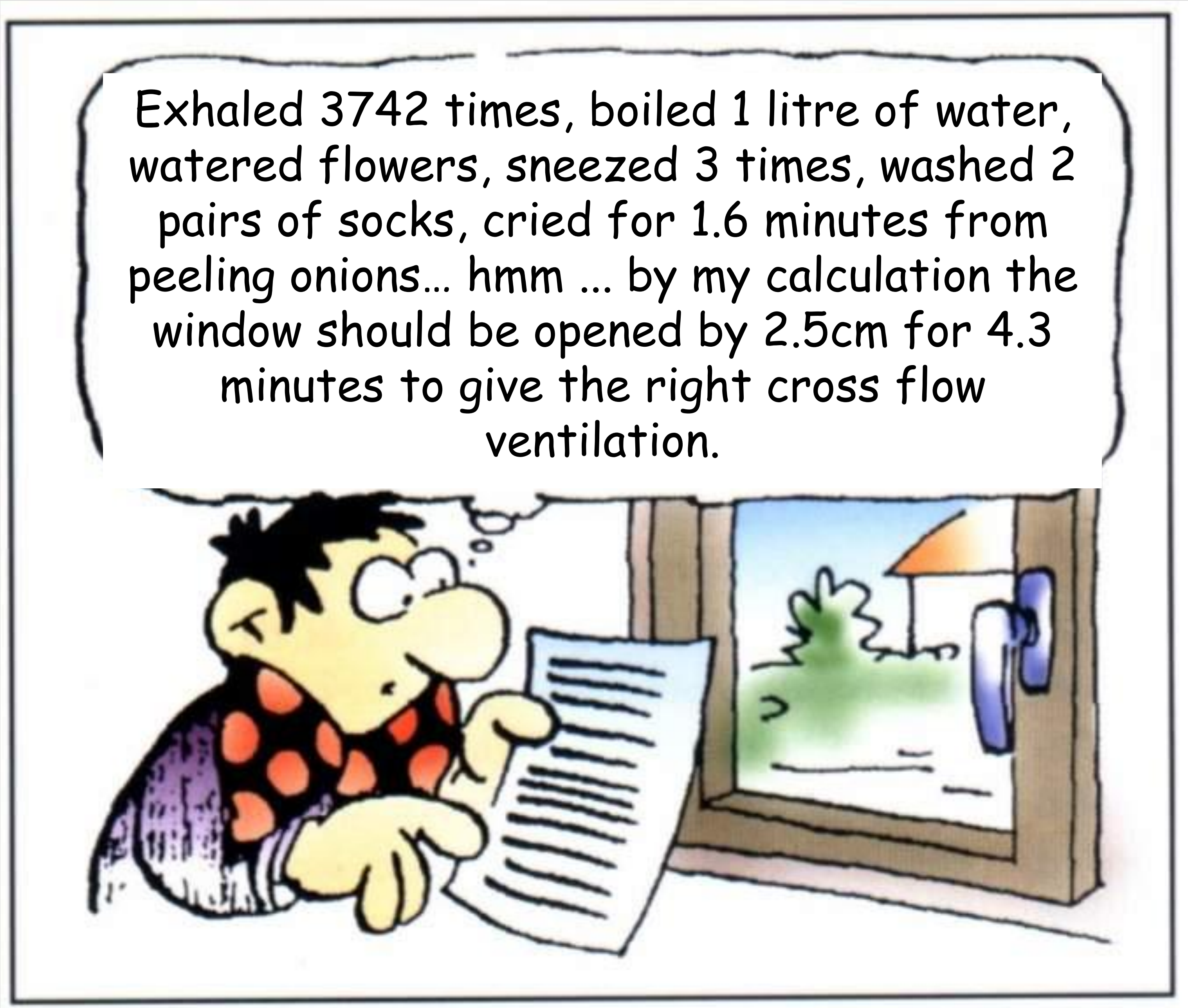


WHY DO WE NEED HRV?

- Energy
- Reliability
- Health

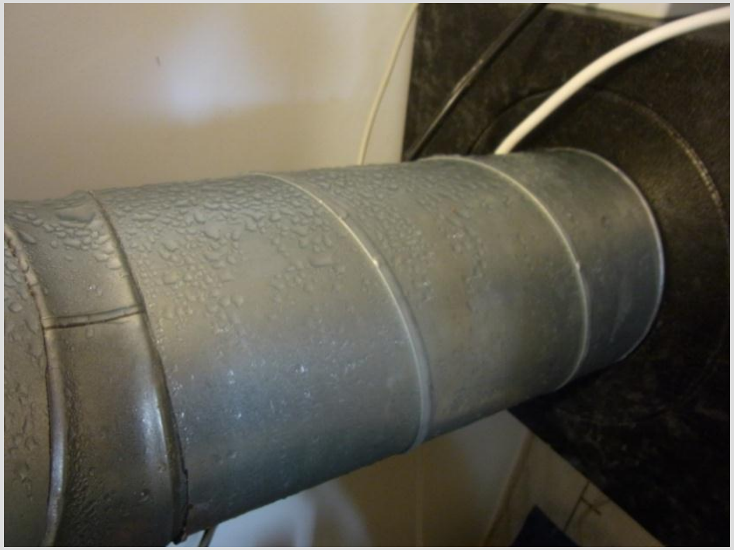


WHY DO WE NEED HRV?

SUCCESSFUL HRV DESIGN STARTS WITH THE ARCHITECT

- Essential part of Passivhaus design
- Crucial design considerations
  - location of heat exchanger (filter access, noise break out, length of intake/exhaust)
  - design of the duct layout (inlet design, fabric integration, silencers, return paths)
  - diffuser/vent/inlet strategy (coanda effect, cascade design)
  - efficiency (balanced supply and extract, summer bypass)
  - controls (simple, visible, feedback)

Totnes Passivhaus – Janet Cotterel, Adam Dadeby



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Ditchingham Passivhaus – Parsons & Whittley


Denby Dale Passivhaus – Green Building Store

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SUCCESSFUL HRV DESIGN STARTS WITH PHPP

- Choose certified HRV units
- Input design parameters
- Instant feedback on modelled performance
- Can be used as sole heating source?

Effective Heat Recovery Efficiency of the Ventilation System with Heat Recovery

x	Central unit within the thermal envelope.				
	Central unit outside of the thermal envelope.				
	Efficiency of Heat Recovery	η_{HR}		0.88	atmos 175 DC - Paul
	Transmittance Ambient Air Duct	Ψ	W/(mK)	0.483	Calculation see Secondary Calculation
	Length Ambient Air Duct		m	1	
	Transmittance Exhaust Air Duct	Ψ	W/(mK)	0.483	Calculation see Secondary Calculation
	Length Exhaust Air Duct		m	1	Room Temperature (°C): 20
	Temperature of Mechanical Services Room		°C		Av. Ambient Temp. Heating P. (°C): 7.6
	(Enter only if the central unit is outside of the thermal envelope.)				Av. Ground Temp (°C): 11.6

Effective Heat Recovery Efficiency	$\eta_{HR,eff}$	82.7%

Effective Heat Recovery Efficiency Subsoil Heat Exchanger

SHX Efficiency	η^*_{SHX}	
Heat Recovery Efficiency SHX	η_{SHX}	0%

CERTIFIED HEAT RECOVERY UNITS

No.	Heat Recovery Unit	Heat Recovery Efficiency %	Electric Efficiency Wh/m³
1	- User defined -		
2			
3			
4			
5			
6	Compact unit as selected in Compact work	kg/a	
7	Reco-Boxx COMFORT - AEREX	85%	0.35
8	Comfoair 500 - StorkAir	88%	0.42

Secondary Calculation:
Ψ-value Supply or Ambient Air Duct

Nominal Width	150	mm
Insul. Thickness:	25	mm
Reflective? Please mark with an "x"!		
x	Yes	
	No	
Thermal Conductivity	0.04	W/(mK)
Nominal Air Flow Rate	51	m³/h
Δϑ	12	K
Interior Duct Diameter	0.150	m
Interior Diameter	0.150	m
Exterior Diameter	0.200	m
α-Interior	4.70	W/(m²K)
α-Surface	3.34	W/(m²K)
Ψ-value	0.483	W/(mK)
Surface Temperature Difference	5.533	K

Secondary Calculation:
Ψ-value Extract or Exhaust Air Duct

Nominal Width	150	mm
Insul. Thickness:	25	mm

HRV MYTHS?

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- HRV uses too much energy - **Passivhaus and PHPP performs as predicted. Designed right, it is a fraction of energy saved.**
- HRV systems are too noisy - **Passivhaus requirement. Racecourse found no discernible noise breakout!**
- Indoor air quality suffers with HRV - **Passivhaus HRV is healthier. Camden PH improved on external air quality!**
- A house needs natural ventilation to be healthy - **Wolverhampton schools improved pupil alertness. Interserve office reduced sickness absence. Racecourse reduced asthma and arthritis.**


Racecourse Passivhaus – LEAP


Camden Passivhaus – Bere


Wimbish Passivhaus – Parsons & Whittley


Denby Dale Passivhaus – Green Building Store

HRV CHALLENGES?

- Integrated design.

  Architect has to lead

- IAQ source control.

  Specification of materials crucial

- Controls and user interface.

  Consider change of filters, boost button, summer mode etc

- Overheating.

  Design for night purging - intuitive, stratified and secure venting