# NEV Member Building Workshop

# ***Designing Sustainable Healthy Homes***

## 4th Sat of month

## (for now)

To assist members designing their home – non-members welcome

John Shiel PhD

Mark Dewsbury PhD

Mikala Dind

Please note – we are **recording these presentations** for others (we will save the questions and answers). Turn off your screen if you wish

# Agenda

1:05pm Dr Mark Dewsbury

1:35pm Mikala Dind

1:55pm 2 case studies – Geoff Cameron; Farrells

2:05pm Q&A

*2:20pm Bio-break*

2:30pm - Workshop – breakout rooms to discuss your house or questions

3pm - Final Q&A

3:25pm Closing round

# Acknowledgement of country

*I acknowledge the Guringai, Darkinjung and Awabakal people, the traditional owners of the land on which I live, and the owners of the lands of all attendees, and pay my respects to the Elders past and present.*

- NB: we are recording this for others

# Last Workshops

https://wiki.nararaecovillage.com/display/NBLS/NEV+Member+Building+Meetings+-+Help+with+your+home+design

- Feb - Stage 1 houses overview
  - Dan & Deb Mohr – 74% reduction in BASIX cooling load
    - Heat-proof home
- Apr - Lowering Cost of Building at NEV
  - Graham Hunt
  - George Gilmour & Mark Dale home – low-cost $/m2 owner builder
  - Previous seminar recorded with Jon Ellis, Geoff Samuel and John Shiel

# Next meeting

- 4th Sat
- 27/8/22
- Another member house, plus an expert in sustainable building design

1. Dr Mark Dewsbury – 30 mins

Bell - 10mins to go; 2 bells - 5 mins to go

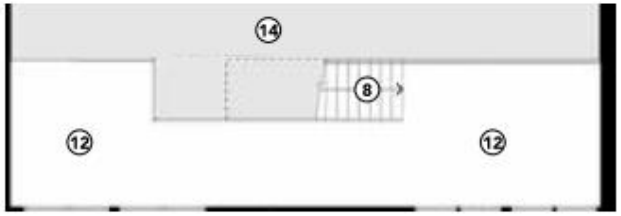
# 2. Mikala Dind – 20 mins

Bell - 10mins to go; 2 bells - 5 mins to go

# 3. Two Member Homes – 10 mins

## 1. Geoff Cameron

UPPER FLOOR PLAN




GROUND FLOOR PLAN



LEGEND

① Entry
② Bedroom
③ Living
④ Kitchen
⑤ Dining
⑥ Bathroom
⑦ Laundry
⑧ Stairs
⑨ Store
⑩ Walk-in robe
⑪ Pantry
⑫ Study/retreat
⑬ Deck
⑭ Void

- Laros Lunos e2 decentralised mechanical ventilation with heat recovery (MVHR) units - two pairs in east and west walls

Inside conditions – 19 °C

Winter's day – 5 °C overnight

Around 16 °C outside

# Video Clip

# Small, Decentralised, Affordable Energy Recovery Ventilation (ERV) System

https://www.laros.com.au/products-services/energy-recovery-ventilation/decentralised-ventilation/

## Decentralised (Non-Ducted)

Showing all 4 results

Sort by popularity

LUNOS Nexxt System – In-Wall Installation

$2,365.00 (incl. GST)

Request A Quote

LUNOS e2-60 Duo Ventilation System

$2,145.00 (incl. GST)

Request A Quote

LUNOS Nexxt System – Surface Mount Installation

$2,585.00 (incl. GST)

Request A Quote


LUNOS e² High Performance Ventilation System

~~$1,980.00~~ **$1,595.00** (incl. GST)

Request A Quote

| | | | | |
|---|---|---|---|---|
| **Air-flow** | **112m3/h** | **60m3/h** | **112m3/h** | **38m3/h** |

# Member Home 2

## Tony & Theresa Farrell Home

## Large Centralised System

## Whole house 300-400$m^3/h$

Brink – Renovent Excellent – Approx $10k

www.brinkhrv.com


Video – how it works

www.youtube.com/watch?v=Xh6hnZp_wLo&t=106s

# 4. Q&A

# 5. Bio-break

- Back at …2:40pm

# 6. Workshop – 15-20 mins

- Breakout rooms
  - to meet others interested in building in the village
  - Introduce yourselves
    - Have a round
      - Name, how long joined
    - Another round
      - Discuss your building ideas
      - Scribe to jot down questions
  - Bring any questions back to main room

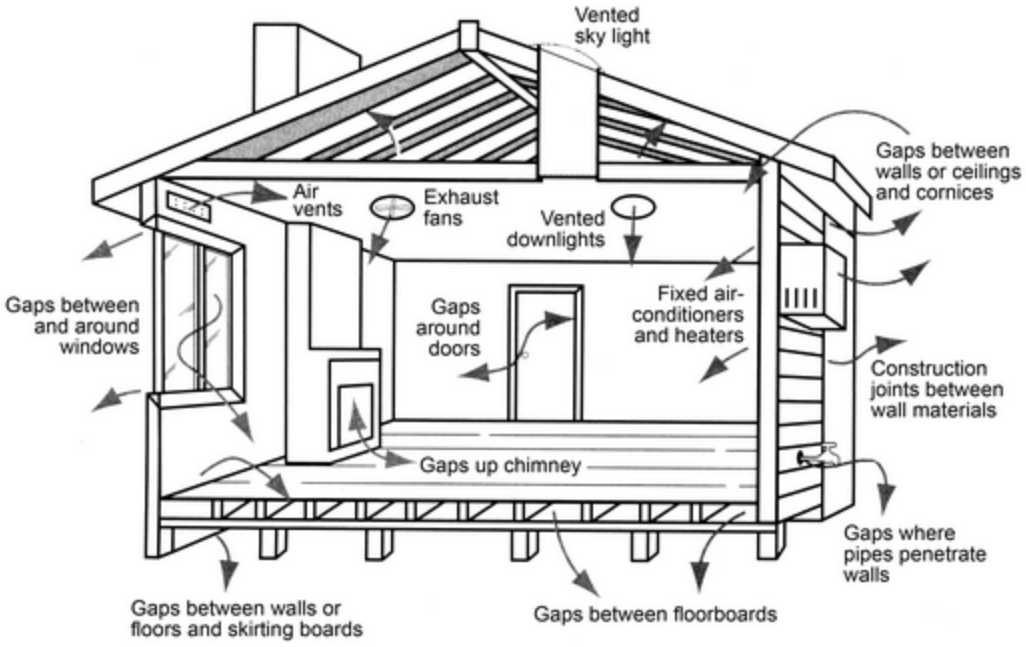
# 6. Final Panel Q&A

- Questions or Issues
  - Last 2 Workshop Issues
    - cost of materials, builders
  - Gutex – wood insulation product

# 7. Closing round

# Your Home Technical Manual

www.yourhome.gov.au/passive-design/ventilation-airtightness




**Common air leakage points**

Source: Sustainable Energy Authority Victoria

**Why are ventilation and airtightness important?**

Good ventilation of your home is essential for your health.

Good airtightness (that is, reducing or eliminating air leaks) can improve thermal comfort and energy efficiency – air leaks can cause 15–25% of winter heat loss in buildings (CSIRO 2015). Sealing your home is one of the simplest ways to increase your comfort while reducing your energy costs.

**Note:** An airtight house with inadequate ventilation may lead to condensation, mould and high internal levels of carbon dioxide.

Build airtight for thermal comfort and energy efficiency, but not so tight that it compromises indoor air quality. Consult a qualified building professional on how to achieve this.

# If too tight, and inadequate ventilation

- **Increased carbon dioxide levels** inside buildings can have negative health effects. Carbon dioxide levels are measured in parts per million (ppm) (Bonino 2016):
  - 350–1000ppm is the typical level found in occupied spaces with good air exchange
  - >1000–2000ppm is the level associated with complaints of **drowsiness** and poor air
  - >2000–5000ppm is the level associated with **headaches, sleepiness, and stagnant, stale, stuffy air; poor concentration, loss of attention, increased heart rate and slight nausea**
  - >5000ppm indicates unusual air conditions where high levels of other gases also could be present; **oxygen deprivation or toxicity** could occur.
- If not paired with adequate ventilation, increased airtightness can also lead to the **build-up of gases, toxins and pollutants**, which can also trigger respiratory health issues. Toxic substances include:
  - **carbon monoxide, sulfur dioxide and nitrogen oxide** from heating and cooking
  - volatile organic compounds (**VOCs**) and **formaldehyde** emissions from furniture, carpet, finishes and building materials
  - airborne toxins from **household cleaners**
  - **pollen, dust and dust mites.**

# Well-insulated spaces

www.engineeringtoolbox.com/air-change-rate-d_882.html

- **Air Change Rate - SI Units**
  - Air change rate expressed in SI-units
  - $n = 3600\ q / V$ *(2)*
  - *where*
    - *n = air changes per hour*
    - *q = fresh air (make up air) flow through the room ($m^3/s$)*
    - *V = volume of the room ($m^3$)*
- **Example - Air Change Rate SI Units**
  - With an air flow of *3 $m^3/s$* in a *20000 $m^3$* room the air change rate can be calculated as
  - *n = 3600 (3 $m^3/s$) / (20000 $m^3$)*
  - *= 0.54 ($h^{-1}$)*
- **Typical Air Changes per Hour**
  - Typical air changes per hour for well-insulated spaces:
  - no windows or exterior doors - *0.33 (1/h)*
  - windows or exterior doors on one side - *0.67 (1/h)*
  - windows or exterior doors on two sides - *1 (1/h)*
  - window or exterior doors on three sides - *1.33 (1/h)*

# Safe Minimum Ventilation Level?

Richard Aynsley & John J. Shiel (2017) Ventilation strategies for a warming world, Architectural Science Review, 60:3, 249-254, DOI: 10.1080/00038628.2017.1300764

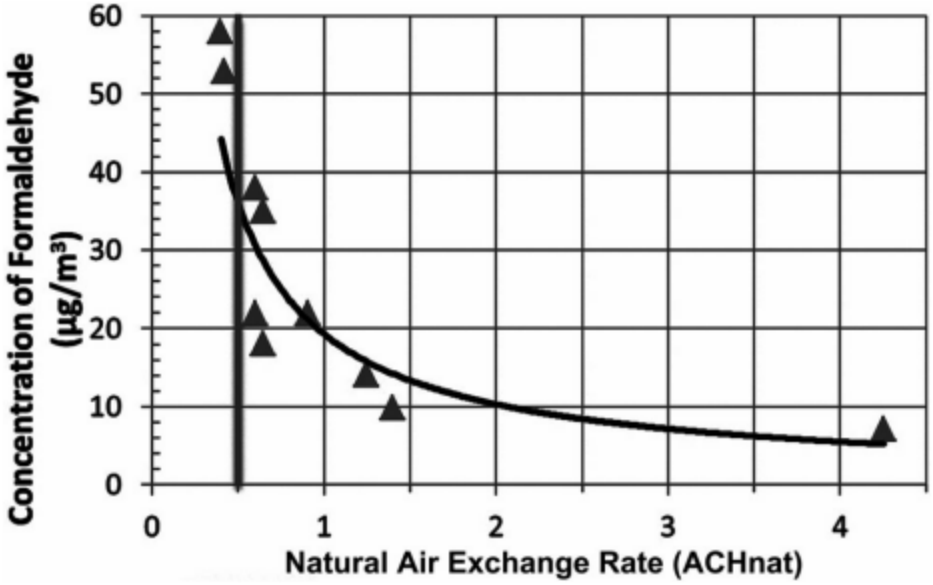
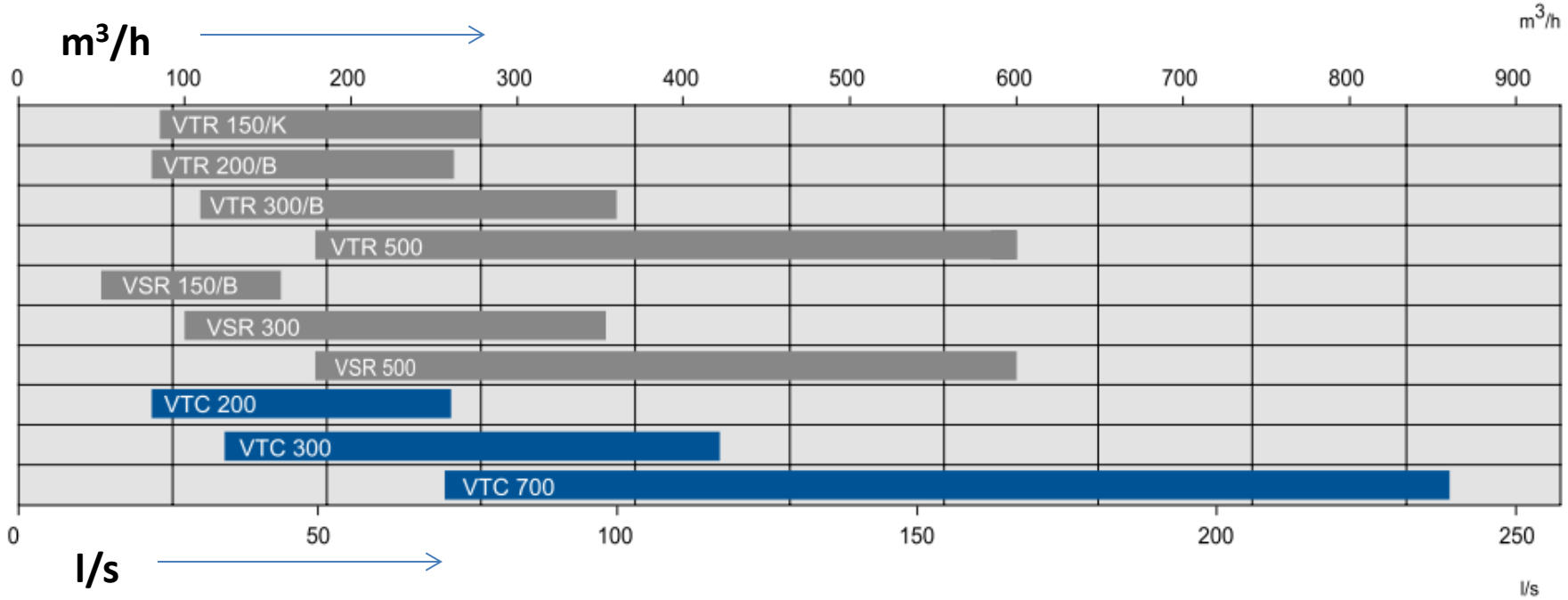



**Figure 1.** A survey of average concentrations of formaldehyde for US house air changes in natural air exchange rate (ACHnat). Source: Aynsley after Lstiburek (2013).

- 0.5 ACHnat = 10 air changes per hour at 50 Pa (10ACH50)
- For an open plan room say 15 x 5 x 2.4 = 180m3
- 0.5 x 180 = **90m3/h** (for ACHnat)

# Safe Minimum Ventilation Level?




- *"It took decades after the oil embargo for building code authorities to accept the very poor state of indoor air quality and increase minimum ventilation rates, back to around 15 L/s per person (Janssen 1999) – 60 L/s for house."*
  - From (Aynsley & Shiel 2017, p249-250)