5x4

Hayes Lane Project

Where is it?

BARLEY STORE 5x4

abrasive project
The Project

The site
- 5m x 4m site which is currently occupied by an 80 year old lean-to shed
- End of a laneway with limited access

The showcase
- Combine different materials and processes to achieve the smallest ecological footprint, whilst providing the highest level of performance.
- Carbon neutral dwelling in dense city living using commercially available technologies
- Sharing the process, the outcome and legacy of the project

“Low Energy is Not Low Impact”

ONE PLANET ACTION PLAN

Zero carbon
- Health and happiness
- Zero waste
- Sustainable transport
- Sustainable materials
- Local and sustainable food
- Sustainable water
- Land use and wildlife
- Culture and heritage
- Equity and local economy
Zero Carbon – Energy Targets

- Annual Carbon Emissions = 0 Net
  - Carbon emitted in 1 year - onsite PV = 0

- Equivalent Performance of 9 Star NATHers

- Total Annual Energy consumption = 65 MJ/m² (Elec. And Gas)

  How do we achieve these figures?

---

Zero Carbon – Building Envelope

[Diagram of a building diagram showing neutralising envelope gains]
Zero Carbon – Building Envelope

2. MULTIMODAL OPERATION: PERFECTLY SEALED WITH OPENING OPTIONS

Zero Carbon – Building Envelope

3. SUPEREFFICIENT VENTILATION. WHEN BUILDING IS SEALED, AIR IS EXCHANGED 24/7.
Zero Carbon – Building Envelope

High Levels of insulation and low leakage

Targeted R-Values:

- Walls: R4-5
  - Vacuum insulated panels
    (Can achieve R8 @ 100mm)
- Roof: R6-7,
- Floor: R4,
- Windows: U= 2.0, SHGC = 0.4
- Phase change materials to add "mass" to a lightweight building

Zero Carbon – Building Envelope

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>26.3</td>
<td>37.4</td>
<td>49.7</td>
<td>34</td>
<td>4</td>
<td>2</td>
<td>0.6</td>
<td>2</td>
<td>0.6</td>
<td>2</td>
<td>0.6</td>
<td>2</td>
</tr>
</tbody>
</table>

Infiltration due to air changes per hour at 50Pa
Designing against air and moisture leakage

How is it done?

Iterative testing and analysis of design philosophy
Zero Waste

- Construction
  - Prefab as the Solution

- Can Design for Waste Minimisation
  - Design and build in factory – minimise wastage

Sustainable Transport

- Scooter used for personal transport
- Ralph’s habits to be monitored to establish base case
- Accurate recording of emissions using smartphone technology
Sustainable Materials

• Life Cycle analysis
  – University of Melbourne – Robert Crawford
• Minimise materials through prefab strategy
  – FSC Timber
  – No PVC/Plastic
  – Less Metals
  – Less Cement
  – Less Glass

Local and Sustainable Food
*Normally biggest single contributor to a person’s ecological footprint*

• Immediate Target is 15% reduction in Eco footprint
• Food sourced from Local Markets < 1km
• Local Food sourced:
  – Richmond Markets
  – Abbotsford Convent
  – Brunswick (CERES)
  – East Melbourne community garden
  – Aim is to minimise purchasing from supermarkets
Sustainable Water

- Philosophy is current best-practice WSUD guidelines
- Neighbouring rainwater systems to be connected
- Electronic temperature control on heating valve to minimise hot water wastage

Land Use and Wildlife

- Philosophy
  - Improve ecology of existing site
- Improve bio-diversity
  - Attract birds etc. via wallscaping and roofscaping
  - Urban Beekeeping?
Culture and Community

- Philosophy:
  - Think “beyond the building”
- Laneway Architecture
- Response to Urban Density Issue in Melbourne
- Facilitate Sustainability Knowledge

Equity and Local Economy

- Philosophy – an Exhibition of exemplar practice
- Open House?
- Community Level Education
- Social Equity
- Local Workforce Employment
Health and Happiness

- Rooftop Spa!
- Comfortable Environment
- Excellent Indoor Air Quality
- Erode cultural divides between builders and engineers
  - Fostering a more collaborative approach

Ecological Footprinting

Me (slightly better than average):

- Daily meat intake
- Packaged food from supermarket = waste
- Public Transport Daily
- Private Vehicle Weekends
- Edwardian (Leaky!) House
- Medium-Sized House with 3 Occupants

Target is 1.9 global hectares
Ecological Footprinting

Ralph (Upon commencement):
• Limited meat (max once a week)
• Limited Dairy
• Local Food from Market
  – (limited packaging)
• Public Transport
• Scooter
• Carbon Neutral Residence
• Etc.

Target is 1.9 global hectares

What would you cut out?