Lancaster Cohousing
Passivhaus Community Housing Project

Steve Wrigley (Director & Resident)
Original Vision

- Intergenerational cohousing community
- Located in central Lancaster
- Built on ecological values
- Encourage social interaction
- Cutting edge example of sustainable design / living
- Close links to the wider community
Project History
Project History
Timeline

- April 2004: 5 friends investigate buying an old school
- Feb 2005: National Cohousing conference in Lancaster
- Dec 2005: First meeting of Lancaster Cohousing
- May 2006: Lancaster Cohousing Ltd formed
Timeline

- Oct 2008  Land found
- July 2009  Land Purchased
- July 2010  Planning permission
- July 2011  Loan Agreed
- Aug 2011  Build Start
- July 2013  Build completed
- Aug 2013  First residents move in
Eco Arc design

General Average Over all Terraces

Primary Energy Demand: 81 kWh/m².a
Heating demand: 12 kWh/m².a
Heating Load: 9 W/m²
Ventilation strategy: MVHR

U values:
Exterior wall 0.12 W/m²K
Roof 0.09 W/m²K
Floor 0.14 W/m²K
Glazed windows & doors 0.89 W/m²K
75% energy reduction

My old house:  5 yr average (2 adults)
My new house:  2 yr average (2 adults + 1 child)

<table>
<thead>
<tr>
<th></th>
<th>Av LCH house</th>
<th>My LCH house</th>
<th>My old house *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>1,180 kWh</td>
<td>1,110 kWh</td>
<td>1,626 kWh</td>
</tr>
<tr>
<td>Heat</td>
<td>2,231 kWh</td>
<td>2,093 kWh</td>
<td>11,543 kWh</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,311 kWh</strong></td>
<td><strong>3,203 kWh</strong></td>
<td><strong>13,169 kWh</strong></td>
</tr>
</tbody>
</table>

*3 bed mid terrace house with electric hob & gas combi-boiler, 12% larger floor area located 5 miles apart.
Services

- 90 kWp Solar PV
- District Heating Main
- 40 kW Solar Thermal
- 160 kW Hydro
- Private Wire network
- 150 kW biomass boiler
Construction Issues

• Air tight doors & windows warped whilst stored on site in damp weather.
• Wooden floors in first terrace fitted before house was dry, when dried huge gaps between planks (floors replaced).
• Tape sealing specialist replaced mid build, resulted in terrace D failing air tightness test.
• Transformer fitted not to design spec. Added cost to hydro installation.
Construction Issues

• Mould issues, internal fit contractors closed doors and windows to keep warm preventing house from drying. Knock on delay to handover.
Leeds Met coheating test

• Post construction whole house performance test.
• Measures whole house heat loss in an unoccupied dwelling.
• Maintain internal temp at 25 °C for 1 to 3 weeks.
• Need a delta T > 10 °C so test usually done in winter.
Leeds Met coheating test

Figure 11 Absolute difference in heat loss between measured and predicted of all of the dwellings contained within the LeedsMet coheating database.
Leeds Met coheating test

Figure 9 Measured versus predicted heat loss of all of the dwellings contained within the LeedsMet coheating database.
Leeds Met coheating test

• Whole house heat loss in 3 bed end terrace.
  – Predicted 39 W/K
  – Measured 47.1 W/K (solar & party wall corrected)

• Very small difference of 8W/K.
• One of the best performing houses in the Leeds Met database.
Thermal Imaging identified build issues

Missing insulation in roof space access
University of Sheffield
Building User Survey (BUS)

• 36 household response (100%)
• Benchmarks based on a 2011 dataset
• Aims to identify comfort & control perceptions
• Mix of questionnaire and interviews
BUS summary

• Exceptionally high scores

  – Air temp in winter (top score)
  – Conditions in winter overall (top score)
  – Comfort overall (2\(^{nd}\) highest)
  – Health; *perceived* (2\(^{nd}\) highest)
  – Noise overall (2\(^{nd}\) highest)
BUS (good points)

• Warmth
• Dry & cosy
• Light and airy
• Community facilities
• Easy to maintain
• Open plan living
BUS (negative points)

- Lack of storage space
- Bedroom & Bathroom size & shape
- Balcony platform (cheese-grater)
- Internal noise
- Lack of porch
- Floor quality
- Small bath
- Toilet flush
Controls

• Access to heating controllers poor
• Confusing light switches
• Unreadable water meter display
Training and Handover Houses

- Performed by residents verbally & online handbook
  - Heating controls
  - MVHR operation & filter replacement
  - Ventilation controls
- Shared learning
  - Night ventilation in summer
  - Use of blinds & curtains during the day
  - Creative storage solutions
Training and Handover Communal facilities

- Industrial washing machines & dishwasher
  - training provided by residents
- Boiler room operation
  - Very little handover information
  - Operation & maintenance manuals unclear
  - Learning by doing
Thank You

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