Ecobuild – 3 March 2015

Practical solutions to meeting zero carbon standards
Lyndhurst project

Paul Ciniglio, Sustainability & Asset Strategist
About First Wessex

• Hampshire and Surrey based HA
• Formed 2005
• 20,000 existing homes
• Build around 300 new homes each year

Working in partnership with Zero Carbon Hub

• Rowner research project
• Design versus as built performance
• Allowable solutions
• Overheating
• Design brief review
• 2016 demonstration project - Lyndhurst

www.firstwessex.org
Lyndhurst project - overview

- Aldershot, Hampshire
- Redundant garage site
- 4 x 3 bed family homes
- Affordable rent
- Due to commence 15 April
- 6 month programme

Partnership comprising

- First Wessex
- Zero Carbon Hub
- St Gobain
- D84 architects, Baqus, Blair Raines, SRE, GG assocs, Tensor/BRE, Rushy Brewster, SGBD & First Wessex Homes

www.firstwessex.org
Project aspirations

• **Compliant with 2016 zero carbon housing standards**
  - According to ZCH definition recommended to Government

• **Preparing for next year - a live demonstration project**
  - Gain insight, experience & knowledge
  - Sense check of proposed ZC standards and costs in practice
  - Performance in use data released for winter 2015/16
  - Demystify what compliance might look like
  - Close the ‘Design versus as built performance’ gap

www.firstwessex.org
Project aspirations cont’d…

- **Liveable and loveable**
  - Ease of operation & control/reduced occupant input
  - Limited innovation & hence risk
  - Very low running costs
  - Comfort & health at forefront of design

- **Replicable**
  - A ‘Greenprint’ for FW, potentially for wider housing sector
  - Within 10% of cost of CfSH level 4
  - Traditional appearance – re volume house builder/consumer ‘buy in’
  - Buildable – skills gap?
  - Futureproof – electric heating, water efficient
Project aspirations cont’d…

• Evaluation
  • Advanced remote monitoring package - user dashboard
  • Min 2 years performance in use data
  • Key stage on site construction reviews - toolbox talks
  • Full photographic survey & filming – practical ‘how to guides’
  • In-situ site tests and IRT
  • POE survey and study – intensive occupant support
  • Allowable solutions retrofit
  • Comparison with identical homes built ‘business as usual’ to CfSH4
  • Embodied Carbon study

• Full dissemination activity
What’s in the box?

## CORE COMPONENTS OF ENERGY DESIGN STRATEGY - LYNDHURST

<table>
<thead>
<tr>
<th>Component</th>
<th>Type</th>
<th>Performance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground floor</td>
<td>Beam &amp; Block</td>
<td>0.15 W/m²k</td>
<td>120mm insulation</td>
</tr>
<tr>
<td>Roof</td>
<td>Traditional tile and truss</td>
<td>0.10 W/m²k</td>
<td>400mm insulation, loftzone, 0.3 Wm²/k hatch</td>
</tr>
<tr>
<td>Walls</td>
<td>Traditional cavity</td>
<td>0.19 W/m²k</td>
<td>150mm full fill cavity</td>
</tr>
<tr>
<td>Party Walls</td>
<td></td>
<td>0.00 W/m²k</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td></td>
<td>1.20 W/m²k</td>
<td></td>
</tr>
<tr>
<td>Doors</td>
<td></td>
<td>1.00 W/m²k</td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td>Electric</td>
<td>Y = 0.045 W/m²k</td>
<td>High heat retentive storage heaters, Economy 7</td>
</tr>
<tr>
<td>Thermal bridging</td>
<td></td>
<td>Y = 0.045 W/m²k</td>
<td></td>
</tr>
<tr>
<td>Air permeability</td>
<td></td>
<td>3 m³/m²@50pa</td>
<td></td>
</tr>
<tr>
<td>Ventilation</td>
<td>SRHRV (through wall)</td>
<td>75% efficiency</td>
<td>SRHRV not SAP appendix Q - 2 units WHMVHR</td>
</tr>
<tr>
<td>Solar PV</td>
<td></td>
<td>2.5 kWp</td>
<td>Diverter to HWC immersion - Not SAP app Q</td>
</tr>
<tr>
<td>HWC</td>
<td>Pre insulated</td>
<td>240 litres</td>
<td>Pre heat from waste water heat recovery</td>
</tr>
<tr>
<td>WWHR</td>
<td>Heat exchanger</td>
<td>tbc</td>
<td>Heat recovery required for carbon compliance</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED</td>
<td>100% provision</td>
<td></td>
</tr>
</tbody>
</table>

### FEES

- **45.9 kWh/m²/year**
  - 90.2 m² floor area
- **Carbon Compliance**
  - 10.5 kg/m²/year
  - 90.2 m² floor area
- **Residual emissions (Allowable Solutions)**
  - 947 kg/year
  - Perhaps £1,705 per house or for e.g. domestic retrofit
Mark Allen
Head of Technical, Saint-Gobain
Starting Point: Comfort and wellbeing

- If the fabric is not balanced the energy resistance is not balanced —
  - Leaking bags

- Mould growth occurs on these poorly designed parts
  - Respiratory problems.

- Poorly designed fabrics create cold internal environments
  - Increase the heating to compensate
  - Leads to performance Gap

- No more than 10% increase on standard build.
  - Cost Optimal
Design considerations

- Keep solutions simple
- Air tightness of blockwork – 3m$^3$/m$^2$/hr@50pa.
- U-Values alone will not solve the problem
  - Beam and block
- Metal through walls
  - Don’t use steel lintels from one side to another
  - Try to separate or use thermal laminate
Wall Solutions

• “Tea Cosy” effect

• Wall tolerance

• Cavity boards to prevent mortar falling.

• Full fill solution to take account of these variations.
Roof solutions

- Pinch points on roof eaves
- Bobtail trussess reduce mineral wool compression & improves thermal bridging
- Sequencing of installation
  - Eaves to be done before completion of breather membrane
Understanding materials

• Understand specified materials
  – Drying out times: more concrete = greater drying time
• 2 common issues with traditional (thick) screeds & floor installations: Shrinkage & Curling
• Solutions
  – Pour first / power float finishes / Thin screeds (e.g. Weber)
Achieving These Solutions: Air-Tightness Details