BPE Case Study
Cross Lane, Barnsley, South Yorkshire

Building Better Buildings
Hull
1st December 2015

Fin O'Flaherty
Centre for Infrastructure Management
Sheffield Hallam University
Introduction - Cross Lane Development, South Yorkshire
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Plot 5

Dining
Kitchen
Living Room
Hall
Store
Living Room
Hall

Plot 6

Dining
Kitchen
Living Room
Hall
Store
Living Room
Hall
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Plot 5

- Bed 3
- Bed 2
- Landing
- Bed 1
- Bathroom

Plot 6

- Bed 3
- Bed 2
- Landing
- Bed 1
- Bathroom
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As-designed characteristics

- Level 4 of the Code for Sustainable Homes
- As-designed space heating requirement: 3,797 kWh
- Air changes per hour: 0.60
Testing

- Co-heating study
- In-situ U value study
- Thermal imaging
- Background ventilation
- Resident Surveys
Testing: Co-heating & in-situ U values
Testing: Co-heating & in-situ U values

Circ. Fan
Circulation Fan

Fan Heater

°C
Temperature

Th
Thermostat

03
Heat flux sensors

Bed 3

Bed 2

Bed 1

Bathroom

Landing

09 08 07

06 05 04

03 02 01

01

Bed 3

Bed 2

Bed 1

Bathroom

Landing

09 08 07

06 05 04

03 02 01

Bed 3

Bed 2

Bed 1

Bathroom

Landing
Testing: Co-heating & in-situ U values
Results: Co-heating test

Heat Loss Coefficient

$y = 103.12x$
$R^2 = 0.96$

As built: 103 W/K
As designed: 108 W/K
## Results: U values

### Comparison of U-values

<table>
<thead>
<tr>
<th></th>
<th>West</th>
<th>North (party) wall</th>
<th>South wall</th>
<th>East wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Average U-value (W/m²K)</td>
<td>0.12</td>
<td>0.24</td>
<td>0.15</td>
<td>0.11</td>
</tr>
<tr>
<td>As-designed U-value (W/m²K)</td>
<td>0.14</td>
<td>0.18</td>
<td>0.14</td>
<td>0.14</td>
</tr>
</tbody>
</table>
Results

Thermal by-pass effect

33% more heat loss
Results: Thermal imaging
Results: Thermal imaging

North (party) wall
Results - Background Ventilation
Results

Daily ACH

Average: 0.58 ACH
St Dev 0.049
Coefficient of Variation 8.4%
Results

Daily HLC (W/K)

Average 103 W/K/day
Stand Deviation 2.9
Coeff. of Var. 2.8%
Next Steps

Major contributors to the Performance Gap (ZCH 2014)

(i) Detailed Design
(ii) Procurement
(iii) Construction & Commissioning
Thank You for listening!

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