Nearer to Zero: Central London
8th July 2014
Zero Carbon new build and retrofit

8th July 2014
Overview

• Zero Carbon New Build
  – Homes
  – Non-domestic

• Low carbon retrofit
  – Homes
  – Non-domestic
Zero Carbon – New build
Costs - detached house

- 2006 to 2008/9: £40k
- 2008/9 to 2011: £20k
- 2011 to 2014: £12k
- 2014 to true zero: £\,?\,?

kg CO₂ m² year

2006  Part L
2010  Part L
2013  Part L

True Zero Carbon
Four benchmark house types

- Detached houses: 118 m²
- End terrace / semi-detached houses: 76 m²
- Mid terrace houses: 76 m²
- Apartments (low-rise): Average floor area 56.5 m²
Fabric, technology + allowable solutions

<table>
<thead>
<tr>
<th>2010</th>
<th>2013</th>
<th>FEES</th>
<th>Adv’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV</td>
<td>SHW</td>
<td>ASHP</td>
<td>Gas</td>
</tr>
</tbody>
</table>

Allowable Solutions

CAP of £1,800 per tonne CO₂
Assumptions

Q2 2013

Traditional construction

>100

Average for E&W

Prelims  OHP  Contingency
12%  4%  5%
Breakdown of additional cost – yesterday

Cost over Part L1A 2013

<table>
<thead>
<tr>
<th>Housetype</th>
<th>Allowable Solutions</th>
<th>Heating and LZC technology</th>
<th>FEES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached house</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-detached house</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-terraced house</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low rise apartment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Benchmark costs – over Part L1a 2013**

**Lowest cost option = FEES + Gas + PV**

<table>
<thead>
<tr>
<th></th>
<th>Detached</th>
<th>Semi detached</th>
<th>Mid Terrace</th>
<th>Low Rise Apt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>e/o cost</strong></td>
<td>£7,100</td>
<td>£4,000</td>
<td>£3,600</td>
<td>£2,300</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>£6,200 - £6,700</td>
<td>£3,800 - £4,100</td>
<td>£3,500 - £3,800</td>
<td>£2,200 - £2,400</td>
</tr>
<tr>
<td><strong>Per m²</strong></td>
<td>£55</td>
<td>£52</td>
<td>£47</td>
<td>£42</td>
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</tbody>
</table>
Breakdown of additional cost – today

Cost over Part L1A 2013

<table>
<thead>
<tr>
<th>Housetype</th>
<th>Fabric</th>
<th>Heating and LZC technologies</th>
<th>Allowable solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached</td>
<td>£2,000</td>
<td>£4,000</td>
<td>£6,000</td>
</tr>
<tr>
<td>Semi-detached</td>
<td>£2,000</td>
<td>£4,000</td>
<td>£6,000</td>
</tr>
<tr>
<td>Terraced</td>
<td>£2,000</td>
<td>£4,000</td>
<td>£6,000</td>
</tr>
<tr>
<td>Low rise apartment</td>
<td></td>
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</tbody>
</table>
Zero carbon – non domestic

- Target zero study
  - Low Zero Carbon
  - BREEAM Outstanding
  - Low Embodied Carbon

www.targetzero.info
City centre office

Energy efficiency
• Carbon Savings of ~20% on Part L 2013
• Cost uplift ~2%
• NPV savings over 25 years

Total onsite
• Carbon savings of ~45% on Part L 2013
• Cost uplift ~6%
• More expensive over 25 years
Industrial warehouse

Energy efficiency
• Carbon savings of ~35% on Part L 2013
• Cost uplift ~3.0%
• NPV savings over 25 years

Total onsite
• PV or wind
• Carbon Savings of ~45% on Part L 2013
• Cost uplift ~3-15%
• NPV saving over 25 years
Retrofit
Minimum energy performance standards

• Forthcoming regulations

• Prohibit private rent of properties failing to meet minimum energy performance standard

• Likely to be E

• Owners of F or G property must make ‘cost effective’ improvements
## UK housing stock

<table>
<thead>
<tr>
<th>Tenure Type</th>
<th>1996</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner occupied</td>
<td>~950,000</td>
<td>down from 4M</td>
</tr>
<tr>
<td>Private rented</td>
<td>~390,000</td>
<td>down from 800k</td>
</tr>
<tr>
<td>Local authority</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-housing assoc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All tenures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Diagram

- The diagram shows the percentage distribution of different tenure types in the UK housing stock for 1996 and 2011.
- The colors represent different categories: A/B/C, D, E, and F/G.

### Notes
- The number of owner-occupied homes has decreased from approximately 4 million to 950,000.
- The number of private rented homes has decreased from 800,000 to 390,000.

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**Source:** English Housing Survey, House Report 2010-11
Costs of addressing F and G rated homes

- Cross tenure sample of
  - ~500 G rated homes
  - ~2,500 F rated homes

- ~45 measures to improve performance
Costs of improvements

Average cost ~£1,350

Average annual saving £410

Over 70% of properties improved for <£1,000

Less than 1% >£10,000
400,000 EPC’s
19% (75,000) are F/G rated
17% (67,000) are E rated
6,000 new EPCs lodged per month
## 14 Archetype buildings

<table>
<thead>
<tr>
<th>Type</th>
<th>Sector</th>
<th>Servicing</th>
<th>Fabric / Glazing</th>
<th>Notes</th>
<th>EPC</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Industrial</td>
<td>Heating</td>
<td>Poor fabric / no insulation</td>
<td>Original services</td>
<td>G</td>
<td>212</td>
</tr>
<tr>
<td>2</td>
<td>Industrial</td>
<td>Heating</td>
<td>1990 Part L / limited insulation</td>
<td>Mid range lighting</td>
<td>F</td>
<td>137</td>
</tr>
<tr>
<td>3</td>
<td>Industrial</td>
<td>Heating</td>
<td>Late 90s / early 00s (insulated)</td>
<td>Poor lighting</td>
<td>F</td>
<td>137</td>
</tr>
<tr>
<td>4</td>
<td>Industrial</td>
<td>Heating</td>
<td>1990 Part L / limited insulation</td>
<td>Modern lighting</td>
<td>F</td>
<td>134</td>
</tr>
<tr>
<td>5</td>
<td>Retail – shop</td>
<td>Air con</td>
<td>Poor fabric / lighting</td>
<td>Original services</td>
<td>G</td>
<td>162</td>
</tr>
<tr>
<td>6</td>
<td>Retail – shopping centre</td>
<td>Air con</td>
<td>Poor fabric / lighting</td>
<td>Original services</td>
<td>G</td>
<td>162</td>
</tr>
<tr>
<td>7</td>
<td>NV Office</td>
<td>Heating</td>
<td>Poor insulation &amp; glazing (1980s)</td>
<td>Original services</td>
<td>G</td>
<td>171</td>
</tr>
<tr>
<td>8</td>
<td>NV Office</td>
<td>Heating</td>
<td>Pre 1995 / double</td>
<td>Original services</td>
<td>E</td>
<td>121</td>
</tr>
<tr>
<td>9</td>
<td>AC Office</td>
<td>Air con</td>
<td>Poor insulation &amp; glazing (1980s or before)</td>
<td>Original services</td>
<td>G</td>
<td>209</td>
</tr>
<tr>
<td>10</td>
<td>AC Office</td>
<td>Air con</td>
<td>Poor insulation &amp; glazing (1980s or before)</td>
<td>Replaced services - post 2000</td>
<td>G</td>
<td>189</td>
</tr>
<tr>
<td>11</td>
<td>AC Office</td>
<td>Air con</td>
<td>Pre 1995 / double</td>
<td>Original services</td>
<td>G</td>
<td>157</td>
</tr>
<tr>
<td>12</td>
<td>AC Office</td>
<td>Air con</td>
<td>2002 / double</td>
<td>Original services</td>
<td>F</td>
<td>148</td>
</tr>
<tr>
<td>13</td>
<td>AC Office</td>
<td>Air con</td>
<td>2006 / double</td>
<td>Original services</td>
<td>E</td>
<td>120</td>
</tr>
<tr>
<td>14</td>
<td>AC Office</td>
<td>Air con</td>
<td>Pre 1995 / double</td>
<td>Replaced services - post 2000</td>
<td>F</td>
<td>125</td>
</tr>
</tbody>
</table>
Cost of improving ratings

• Generally <£10 per sq ft

• Costs higher where windows / fabric upgrades required

• Only required to invest in ‘cost effective measures’
Cost effective improvements

Some buildings can achieve a D but not a lower rating of E

‘Cost effective’ measures insufficient for air conditioned offices
How significant are the costs?

- Significance varies by circumstances

- For most F/G EPCs, MEPS obligations are equivalent to <12 months rent

- For some industrial buildings in low value locations costs could equal 2-5 years rent
In conclusion

- Opportunities for cost effective efficiencies in both new and retrofit projects

- Zero carbon
  - Homes ~£2-7,000 above Part L2013
  - Non domestic – TBC

- Retrofit - Achieving a minimum EPC of E
  - Homes – typically <£1000 (very few >£10,000)
  - Non dom – typically <3-6 months rent (very few 2-5 years)
Thank you