SuperHomes

The SuperHomes Network & Rating Scheme

Natureplus late lunch session #2 – 29th June 2022

The Retrofit Opportunity

Paul Ciniglio – Refurbishment Lead, NEF
INTRODUCTION

• About me & NEF

• The UK retrofit context and challenge

• Presentation content:
  • Background to SuperHomes
  • SuperHomes network & retrofit rating scheme
  • Mini project case studies
SUPERHOMES HISTORY

• Started in 2007
• A SuperHome was originally retrofitted to reduce CO$_2$ emissions by at least 60%
• 222 homes reached SuperHome status
• Accessible to the public to learn and be inspired by their peers
• Largely dormant for the last couple of years
OUR AMBITION

- Encourage net zero retrofits
- Share best practice through SuperHomes Network membership
- Evidence the link between property value and retrofit
- Work with homeowners and social landlords on financing retrofit
- Reach one million SuperHomes by 2030
The SuperHomes Rating Scheme
a benchmark of retrofit achievement
Two stage assessment process & customer retrofit journey

**Stage 1**
- **Customer Journey stage 1**
  - Design phase (Predicted SuperHome rating)
  - Customer registers as a member of the SuperHomes network
  - Customer pays NF for SuperHomes design stage assessment ($150.00)
  - Assessor & customer review draft retrofit plan together, agree on proposed measures and a final version of plan is issued
  - SuperHomes Assessor performs detailed SuperHomes rating assessment
  - SuperHomes confirms predicted SuperHomes rating to customer
  - Assessor carries out customer consultation and a home survey
  - Assessor issues a draft Whole House Retrofit Plan to customer
  - Retrofit work is designed, procured and completed

**Stage 2**
- **Customer Journey stage 2**
  - Evaluation phase (Verified SuperHomes rating)
  - Customer pays NF to commence the evaluation stage ($250.00)
  - SuperHomes confirms predicted SuperHomes rating to customer
  - Monitoring commences to collect performance data for 12 month period
  - NET issues SuperHomes certificate confirming the star rating level achieved
  - NFFS SuperHomes team performs verified SuperHomes rating assessment
  - Monitoring data evaluated and sent to SuperHomes Customer completes post-retrofit evaluation survey

**SuperHomes**

superhomes.org.uk
My home retrofit phase 1 – Hampshire

- Built 1989, retrofitted 2009 (phase 1)
- Insulation upgraded, reduced air leakage with heat recovery ventilation, ‘A’ rated double glazing
- Solar PV and solar thermal
- ASHP with fan coil radiators
- Total emissions = 0.27 tCO₂ in year 2
- Water consumption 68 l/p/d
- Adding ground floor insulation & additional PV currently
- Over 500 visitors, many took action!
My home retrofit phase 2

- Current live project 2022!
- Refurbishment with home office in roof space and alterations
- New natural slate and inset solar PV, existing PV relocated (solar thermal removed)
- Use of natural roof insulation products sourced via ASBP
- Ground floor insulation (aerogel blanket)
- Triple glazed rooflights x 3
- SuperHomes level monitoring
My home retrofit phase 2

- Breathable natural wood fibre insulation
- Sourced from ASBP member ‘Back to Earth’ [www.backtoearth.co.uk](http://www.backtoearth.co.uk)
- Steico FLEX timber wool between timbers (0.036 W/mK)
- Ampatex Solero UV stable VCL membrane and Ampacoll INT interior airtightness tape
- Beltermo ULTRA rigid board under / on face of timbers (0.042 W/mK)
- Lime plaster internal finish
Ground Source Heat Pump

>1kM of ground loop in 4 boreholes

superhomes@nef.org.uk
Solar Photovoltaics (PV)

15 kW optimised array
- ~100m² to South, East & West facing roof slopes
- Semi-roof integrated mono-chrystaline panel modules
- E-Manager to synchronise with GSHP
THANK YOU FOR YOUR ATTENTION!

ANY QUESTIONS?

www.superhomes.org.uk

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Technical Performance Standard:

For information only

### ENERGY AND EMISSIONS
**AIM:** Deliver retrofits which balance fabric efficiency, low carbon services, and affordable running costs

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space heating demand (kWh/m²/yr)</td>
<td>&lt;950 kWh/m²/yr</td>
</tr>
<tr>
<td>- fabric efficiency of the building</td>
<td>&lt;900 kWh/m²/yr</td>
</tr>
<tr>
<td>Carbon emissions (tCO₂/yr)</td>
<td>&lt;2.0 tCO₂/yr</td>
</tr>
<tr>
<td>- regulated emissions as per SAP**</td>
<td>&lt;1.0 tCO₂/yr</td>
</tr>
<tr>
<td>Running costs</td>
<td>&lt;0.5 tCO₂/yr</td>
</tr>
<tr>
<td>- EPC rating used as a benchmark for running costs</td>
<td>&lt;0.3 tCO₂/yr</td>
</tr>
<tr>
<td>Energy and emissions key points</td>
<td>&lt;0.1 tCO₂/yr</td>
</tr>
<tr>
<td>- All metrics calculated by SAP 10 reflect updated carbon/fuel emission factors and energy suppliers costs</td>
<td></td>
</tr>
<tr>
<td>- More detailed modeling in PHPP software or similar may be required for projects targeting space heating demand &lt;50 kWh/m²/yr</td>
<td></td>
</tr>
</tbody>
</table>

### HEALTH, COMFORT AND WELLBEING
**AIM:** Deliver retrofits that achieve a comfortable indoor living environment, benefitting occupant health and wellbeing

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Comfort</td>
<td>21°C living rooms, 18°C other rooms</td>
</tr>
<tr>
<td>(Maintained 9/24hrs and min 16°C)</td>
<td>Overheating not exceeding &gt;25°C for more than 1% of annual hours in bedrooms 10pm-7am</td>
</tr>
<tr>
<td>Moisture Comfort</td>
<td>Relative Humidity 40-60%</td>
</tr>
<tr>
<td>- 0.5 ACH or 8 litres/sec/person</td>
<td>(± 2 days pa at &gt;65% RH)</td>
</tr>
<tr>
<td>- 1 day pa at &gt;75%</td>
<td>Indoor air quality</td>
</tr>
<tr>
<td>CO₂ levels</td>
<td>&lt;1000 ppm CO₂</td>
</tr>
<tr>
<td>NVOC’s and selected pollutants - optional</td>
<td>&lt;1500 ppm CO₂ time limited periods</td>
</tr>
<tr>
<td>User-friendly controls</td>
<td>Design statement</td>
</tr>
<tr>
<td>Daylight (compulsory at 4 and 5 ⭐️)</td>
<td>2% daylight factor for habitable rooms</td>
</tr>
<tr>
<td>Acoustics (optional at all levels)</td>
<td>‘Design led’ project specific targets</td>
</tr>
</tbody>
</table>
‘Whole House Retrofit Plan’ (WHRP)

- Medium Term Improvement Plan to BSI PAS2035 “Retrofitting dwellings for improved energy efficiency” – Gov endorsed approach

- Produced by an accredited ‘Retrofit Coordinator’ (Level 5 Diploma)

- Retrofit blueprint towards net zero by 2050
  - Risk assessment
  - Options appraisal
  - Benefits and impacts (energy modelling – emissions, running costs etc)
  - Phasing plan of work
  - Cost effectiveness assessment and more
**10 Where you are now**

Below is the estimated baseline of your home’s energy performance, from which we evaluate improvements:

<table>
<thead>
<tr>
<th>Energy Rating</th>
<th>Fuel Bills</th>
<th>Tonnes CO₂</th>
<th>kWh/m² Heat Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
</tr>
<tr>
<td>A rating of your home on a scale of 1 – 100. The rating is calculated based on your home’s modelled running costs.</td>
<td>Fuel bills – this estimated cost includes the energy used for heating your home, providing hot water, ventilation and lighting. It does not include energy costs for household appliances. When making a comparison remember that your energy bills will include costs for household appliances.</td>
<td>Carbon dioxide emissions from energy use are a significant contributor to climate change. Fossil fuel heating systems using gas, oil or coal will have high CO₂ emissions. Low carbon heating systems such as heat pumps will perform well here.</td>
<td>The is the amount of energy needed to heat your home. Because this figure is calculated before the type of heating system and its efficiency is considered, it’s a really good way to look at how good the fabric of your home is before thinking about the type of heating and renewable energy systems to use.</td>
</tr>
</tbody>
</table>

**72°C**

| £580 | 2.32 | 78.0 kWh/m² |

The national target for all homes by 2035 is C.

Modelled using SAP1

The UK average is £1,184

The UK average per home is 3.50

A measure of how much heat your house loses, above 150 is typical, below 70 is excellent.

Your estimated current energy use, bills & emissions:

![Energy Use Chart]

- Renewables
- Lights
- Hot Water
- Draughts
- Doors
- Windows & Fully Glazed
- Doors
- Floor Losses
- Walls Losses
- Roof Losses
- Heating Inefficiencies

Footnote: Figures are net after revenue/adjustments from any renewables; *Clean Growth Strategy, OFGEM, Catapult* (See References).
11 What you can achieve

Below are the projected energy performance improvements for your home, based on our evaluation:

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Energy Rating</th>
<th>Fuel Bills</th>
<th>tCO2</th>
<th>kWh/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>72 C</td>
<td>£580</td>
<td>2.32</td>
<td>78.01</td>
</tr>
<tr>
<td>After</td>
<td>91 B</td>
<td>£150</td>
<td>1.27</td>
<td>57.68</td>
</tr>
</tbody>
</table>

**Your potential energy use after your retrofit**

- Current House
- Retrofit Package

12 Phasing your improvements (continued)

The measures recommended below aim to significantly reduce your energy use, annual energy costs and CO₂ emissions. This demonstrates a good range of the possibilities available. We can of course limit recommendations to your more immediate needs to fit within your current budget.

**Phase 1 Measures**

- Estimated Costs: £580
- Energy Rating: 72 C
- Energy Bill: £580
- tCO₂: 2.32
- kWh/m²: 78.01

**Where you are now**

- Per Measure
- 72 C
- £580
- 2.32
- 78.01

- Low energy lighting
  - £300
  - 73 C
  - £540
  - 2.27
  - 79.73

- 300mm loft insulation from 100mm
  - £350
  - 74 C
  - £530
  - 2.17
  - 74.59

**Phase 1 After Measures**

- 74 C
- £530
- 2.17
- 74.58

- Package Cost & % Improvements
  - £50
  - 5%
  - 6%

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**Phase 2 Measures**

- Estimated Costs: £530
- Energy Rating: 74 C
- Energy Bill: £530
- tCO₂: 2.17
- kWh/m²: 74.58

**Phase 1 After Measures**

- 74 C
- £530
- 2.17
- 74.58

- PCDT boiler reference from generic SAP boiler information
  - £0
  - 75 C
  - £520
  - 2.14
  - 71.80

- Draughtproof doors and windows
  - £70
  - 75 C
  - £520
  - 2.13
  - 71.23

**Phase 2 After Measures**

- 75 C
- £520
- 2.13
- 71.23

- Package Cost & % Improvements
  - £70
  - 2%
  - 2%

**Cumulative Cost & % Improvements**

- £720
- 10%
- 8%

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12 Phasing your improvements

Summary of Packages

<table>
<thead>
<tr>
<th>Phase</th>
<th>Estimated Costs Per Phase</th>
<th>Energy Rating</th>
<th>Fuel Bill</th>
<th>tCO₂</th>
<th>kWh/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>£580</td>
<td>72 C</td>
<td>£580</td>
<td>2.32</td>
<td>78.01</td>
</tr>
<tr>
<td>Phase 2</td>
<td>£70</td>
<td>75 C</td>
<td>£520</td>
<td>2.13</td>
<td>71.23</td>
</tr>
<tr>
<td>Phase 3</td>
<td>£11,880</td>
<td>91 B</td>
<td>£150</td>
<td>1.27</td>
<td>57.68</td>
</tr>
<tr>
<td>Combined</td>
<td>£11,880</td>
<td>91 B</td>
<td>£150</td>
<td>1.27</td>
<td>57.68</td>
</tr>
</tbody>
</table>

Trees you could plant to bring the remaining 1.27 tCO₂ to zero: 55

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How the phasing affects your annual bills & emissions

- £580
- £520
- £150
- £150