Andrew Orriss Innovare Systems

Design Engineer Manufacture Supply

Erect

The Real Cost of Sustainable Homes

20th May 2009



www.innovaresystems.co.uk

Who / What?

- Innovaré are owned by Osborne
- Innovaré
 - Design Engineer Manufacture -Supply – Erect
- Dry structure based on i-SIP a structural insulated panel building system
- Incorporated in 2005
- O Supply Chain Integrators
- Manufacturers since 2008
- O Suppliers to open market
- Responding to The Code for Sustainable Homes



Rising to the challenge –

The Osborne story

Mid Street Achieving Code Level 5





Overview of presentation

- O Experience
- O Mid Street Background
- Code 5 refresher
- Option Appraisals
- O Design & Technical Solution
- O Component Information
- O Costing Information
- Monitoring & Tenant issues
- Recognition
- The Future





Our experience

- Osborne was founded in 1966
- O Current Turnover 08/09 is £350m
- More than 1000 employees
- O Subsidiary Company
 - Innovare Systems SIPS
- Design and Build general needs homes for RSLs & Local Authorities
- Care Homes, housing for the Elderly & Children's Homes
- Land Remediation
- PFI & Estate Regeneration
- Demonstration House at BRE -reworked to remain on Innovation Park another 2 years - 4 in total





Our experience

- MMC agenda
- O Sustainability agenda
- O CSH
- Energy conservation
- "Fit and forget"
- Thermal values from
 0.27 W/m²K to 0.11 W/m²K
- Residential- social and private/education/leisure
- O Manufacturing



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Mid Street Background

- Osborne partnering arrangement with Raven Housing Trust
- Raven's visit to Osborne demonstration house at BRE
- SIPs-built with modern components. 13 points in excess of EcoHomes "Excellent". (83.4 against 70)
- O Approaches Passivhaus standard
- Achieves Code 3, retrofit to Code 4
- For Mid Street we embraced four key principles to deliver Code 5
 - Reduce energy demand
 - Maximise passive solar gain and capture
 - Maximise renewable energy
 - Minimise fossil fuel usage





Mid Street Background

Partners and Funders:

- Raven Housing Trust
- O Tandridge District Council
- Housing Corporation
- The Energy Saving Trust
- BERR (former DTI)
- Osborne
- Innovaré systems

2 Flats, 70 and 65 sq m, 2b4p G/L access Detached building, rural location Expensive site abnormal costs Detailed Planning obtained prior to Code 5 decision





Code 5 - a refresher

- Achieve a minimum of 84 points (code 3 is 57)
- Two mandatory areas
 - 100% reduction on carbon emissions
 - Reduction of water consumption to 80 litres per person per day
- Remaining points from
 - Materials
 - Waste
 - Surface Water Run-off
 - Pollution
 - Health & well-being
 - Management
 - Ecology





Option Appraisals

- Objective was to find the most cost effective solution to deliver Code 5
- All options focused on getting the building fabric right to begin with (common across all options)
- Chose a Structural Insulated Panel System (i-SIP) via Innovaré:
 - High thermal performance
 - Low air leakage
 - Minimal thermal bridging
 - Performance consistent across panels





Option Appraisals

- Renewables:
 - Solar water heating
 - Photovoltaics
 - Heat Pumps
 - Biomass Boilers
 - Wind turbines
 - Mechanical ventilation heat recovery
- Maintenance and usage implications
- BRE sponsored by EST assisted in assessments of the options to ensure compliance with Code 5





Design & Technical Solutions

- Structural Insulated Panels
- Additional wall insulation
- Upgraded roof insulation
- High Performance Windows
- Air leakage sealing
- Heat recovery unit
- Biomass Boiler
- Underfloor heating
- Photovoltaic Panels
- Rainwater Harvesting
- Water saving devices
- Bicycle Racks

- Data link
- Environmental planting
- Traditional Elevations





Wall Construction

Innovare Structural Insulated Panel System (SIPS)

SIPS Panels for external walls -

12mm Orientated Strand Board either side of 150mm Low lambda Expanded Polystyrene (EPS) insulation.

Total thickness 174 mm

Further 50mm layer of EPS insulation within the cavity

The extra layer of insulation was needed to achieve the U-Values of 0.14W/m2K

Building erected and watertight in 7 working days





Electricity

Photovoltaic (PV) Modules generate approx. 900 kWh/ year of electricity directly from sunlight

An electric current is generated by the PV cells then converted for use by passing through an Inverter

The system is fully automated, operates silently and is without any moving parts or batteries

The 'Green' Power is treated no differently than Grid supplied Electricity within the building.

Every unit (kWh) generated by the PV saves over half a kilogram of CO2 emissions





Water saving features

Rainwater collected and filtered in an underground storage tank

Pumped to cylinders in the roof space, where it serves the W.C's, washing machines and garden tap

Less mains water consumption - the system will always draw on the rainwater first

Measurable consumption

Low water usage sanitary ware:

Galerie Flushwise W.C - UK lowest flushing WC using 2.6 -4 Litres of water per flush saving 6 litres per flush compared to standard W.C

Shallow bath

Digital shower to monitor water useage

Aerated flow and and thermo static mono sink mixer taps







Heating System - Boiler

Mescoli Combifire2 automatic wood pellet boiler, blown feed hopper and automatic 'de-ash' and automatic clean

Provides heating and hot water via thermal stores in each flat

Utilises locally produced clean carbon neutral wood pellets to DIN standards

Sustainable: wood pellets are produced locally from pure waste sawdust, which generates a saving of approximately 4 tons of CO² per annum.

Heat output up to 28KW - fully controllable

Delivery via tanker blown into external store via air-tube with automatic auger feed

Wood pellet consumption will be focused around winter months with little or no consumption from May to September, due to provision of other technologies

Similar to traditional gas-fired boilers, requires single annual maintenance and clean out of storage hopper







MVHR

An Xpelair Xcell 270 Long Life Heat Recovery Unit has been installed to save energy and function reliably with extremely low running costs

They provide a constant background flow of fresh warmed air to the living spaces whilst extracting condensation, smells, tobacco smoke and volatile organic compounds via kitchens, bathrooms and toilets.

Choice of ten preset performance programmes enables flexible control over air quality

The units have efficient Longlife Low Running Cost DC Fans

The resultant lower humidity deprives the house dust mite of the conditions in which to breed, thus contributing to a healthier environment.

Maintenance is kept to a minimum by integral filters which make access to the cell un-necessary





Costing/Funding

- Price for Mid Street is approximately 20% more than the equivalent unit built to Code 3.
- 24% more than current Building Regs

Over Budget!Needed a little help from our friends

The Osborne Carbon Offset Fund

Help reduce our Carbon Footprint!

The Osborne Carbon Offset Fund will be used to reduce the natural resources we use and to improve the environmental performance of our operations and the buildings and structures we construct.

The fund will be in excess of an initial £30,000 annually and this is now available for all staff to apply to. The types of areas the fund is available for include:

- Training courses in energy saving technologies
 Analysis of building construction
- Investment in new or alternative techni
- Assist a local firm to develop a product that
- we currently source from overseas
- Review alternative specifications utilising recycled or low energy products
- Help a client to achieve an improved BREEAM or Ecol Jomes score.
- ese are only a few examples of way which the fund could be used and we are looking for practical ideas and suggestions from staff.



OSBORNI

If you have any ideas for reducing our carbon footprint, please contact Caroline Oldroyd by email or mobile on 07736 597063



Extra over cost £81,700 total

Innovare Sips & insulation Air Leakage tapes Windows Sanitaryware Rw harvest & attenuation Heat Recovery system **Biomass Boiler** Underfloor heating Photovoltaic cells Hw cylinder mods Suspended ceiling Additional fees BWIC Per Flat £40,850 Per sq m £605

£12,800 £ 1,000 £ 7,000 400 £ £ 6,500 £ 3,600 £12,100 £ 6,100 £19,000 £ 2,000 £ 1,000 £ 7,600 £ 2,500





Typical Examples

0 CSH 3

Expect at least +£4,000 per unit (95 m2 floor area)

0 CSH 4

 Expect at least +£10,000 per unit (95 m2 floor area)

0 CSH 5

Expect at least +£27,000 per unit (95 m2 floor area)



Monitoring

- Mid Street will be monitored for 2 years
- By the Energy Saving Trust
- Via an ACIS wireless data link
- Monitoring
 - Heating heat output from Wood Pellet Boiler
 - Water Consumption meter readings from rainwater harvesting
 - Electricity generation from photovoltaic panels







Tenant issues during first 3 months

- Turned off MVHRs "to save the cost of electricity" (7p a day)
- Tried to turn off thermal stores -"didn't need all that hot water" (thought it was like an immersion heater)
- PV inverter tripping out (excess electricity generation not being resold to Grid)
- Pellets ran out Raven now have regular schedule (extra use during commissioning and demo period)
- MVHRs maintenance of filters schedule now set
 - (£5 pw service charge)





Recognition - 2008

• Shortlisted for :-

 Building Magazine –
 Sustainable Building of the year (Single Project) (18 November)

 Inside Housing Low Energy Social Housing Project (11 November)

 Inside Housing –
 Sustainable smaller Social Housing Project
 (11 November)





Code 6 and Beyond

- What are the things we have to do to achieve Code 6?
 - Achieve a minimum of 90 points under the rating system
 - All Energy: Zero Carbon producing
 - Water: Reduction of water consumption to 80 litres per person per day
- Some new technologies needed:
 - Heat Pumps Ground or Air source
 - Green energy or private wire
 - More efficient Photovoltaic Cells







After Mid Street – what next?

• Gallon Close, Charlton

7 houses for Family Mosaic - Code 5 costs £1.5m - £216,000 unit but....

HCA says not value for money

• Eden Grove, Woking

12 houses for Accent Peerless - Code 6 costs £2.15m – £179,200 unit

O Ashford Exemplars

29 units for Hyde - 20 Code 5 and 9 Code 3 on two separate sites

O Cotney & Peartree, Stevenage

8 houses for Home - Code 5/6 costs £1.8m - £225,000 unit

 Working up from prototypes to scaleable delivery







Summary

- Code 5 IS achievable!
- O Building Fabric is key
- Original design and orientation retained
- Elevational flexibility
- Resident education
- Affordability & Codes 5/6





Rising to the challenge? -

"To reach the port of heaven we must sail, sometimes with the wind and sometimes against it, but we must sail and not drift and not lie in anchor"

Oliver Wendle Holmes



