



## **NATIONAL HOUSING MAINTENANCE FORUM BEST PRACTICE AWARDS**

### **BEST DLO AWARD 2011– RADIAN SERVICES “DIVERSIFICATION OF DLO ACTIVITY INTO RETROFIT”**

**Innovation:** Radian Services, the DLO of Radian Housing, has diversified their repairs and maintenance service by stepping up to the challenge of the Government’s ‘Retrofit Agenda’ aimed at bringing about an 80% reduction in climate change emissions from all existing housing by the year 2050. In order to achieve this target more than half a million existing homes must be tackled every year which equates to more than a £10 billion per annum of expenditure in this new and rapidly emerging market. This task demands new and innovative ways of approaching traditional repairs and maintenance activity in order to make the transformation to the whole house retrofitting of homes to advanced energy efficiency standards. Radian Services is leading the way in rising to this challenge having managed and undertaken the retrofitting work to an advanced environmental standard of 33 houses in two communities in Hampshire over two phases.

Our application submission for best DLO focuses on the second phase of the project under which 14 homes are being completely overhauled to exemplar environmental standards. The first phase of the project won “Sustain” magazine’s energy award in 2010 in respect of the retrofit strategy applied to 19 homes. We are now seeking recognition of the DLO who undertook the work for both phases and who were central to the project’s success.



The homes in question are prefabricated REEMA PRC homes built in the early 1950’s which were fuel poor homes without insulation and central heating that were failing the Decent Homes Standard. The work that Radian Services have undertaken is the centre piece of Radian’s ‘Retrofit South East’ project which is the first project of its kind in Europe to have benefitted from European Regional Development Funding for retrofitting social housing and was secured via SEEDA / DCLG. The overall aim of the project is to build capacity for the low carbon retrofit market in the South East region and beyond through dissemination. *This submission document should be read in conjunction with the attached interim project case study.*

Many social housing providers have undertaken one off retrofit projects to their stock. This urgently needs to be scaled up and Radian Services are showing how to do this by retrofitting an entire street due to complete early 2011 and having learnt lessons from the 20 homes completed to similar standards in 2010. The innovative retrofit strategy applied by Radian Services comprises a systematic package of measures that together bring about up to an 88% reduction in regulated household carbon dioxide emissions from 5.9 tonnes per annum slashed to 0.7 tonnes, an immense achievement.

The package of measures installed and managed by Radian Services include: 100mm external wall insulation and render finish (Radian Services underwent training to become approved installers of the system); Upgraded loft insulation (300mm thick); fitting 'A' energy labelled windows and doors; installing Spacetherm aerogel ground floor insulation (invented by NASA); vastly improved air tightness and removal of thermal bridges (DLO learnt new skills of how to address these critical aspects following 3 stage air and smoke pressure testing and thermal imaging), fitting whole house and through the wall heat recovery ventilation systems; installing SEDBUK 'A' rated condensing boilers; 100% low energy lighting; Solar thermal panels with both traditional cylinders and thermal stores and photovoltaic (also invented by NASA) installations of up to 17m sq per home transforming an unsightly row of homes into a new and highly impressive solar street that really is applying rocket science! Radian Services have also installed performance monitoring equipment and collected data from temperature sensors, meters and solar display equipment throughout the process.

The innovative approach not only addresses energy efficiency but also water efficiency including the retrofitting of two different types of rain water harvesting systems including the 'Flushrain' system which is the first domestic installation trial in the country and was installed and commissioned by Radian Services. Water flow meters and kWh meters to pumps have been fitted to every outlet in one home to not only record the total amount of water used in each home but also exactly where it is being used in the house, this is all valuable learning for the sector.

Radian Services have also got to grips with drawing up, operating and monitoring a full Site Waste Management plan following training of the DLO and have coped well with segregating waste into labelled skips on a site with limited space so that recycling opportunities are maximised. At least 80% of site waste produced through the retrofit project has been fully recycled.

Radian Services have also completely refurbished the entire homes with new kitchens, bathrooms with new low flow showers & dual flush W.C.'s, re plastering, heat distribution, electrical rewires, new joinery and full decoration.

**Benefits:** The two principle barriers to main stream retrofit on the scale required are the absence of sustainable finance and up-skilling of the workforce. A team of over 20 Radian Services staff have been engaged in the exemplar project on site and have acquired new skills that leave the DLO perfectly placed to meet the increased demand that is required in retrofit and will inevitably follow. Radian Services funded eight of their staff members directly involved in the project to be trained in advanced retrofit skills and they have attained BTEC certification in Retrofit, the first course of its kind operated by the award winning 'Parity Projects'.

Radian Services, through taking the retrofit agenda seriously, have diversified their operations to a point that the business will be able to continue to grow sustainably and attract new staff. The DLO

are receiving praise and respect for their work and its quality. Further, they are already taking expressions of interest for their whole house approach to retrofit from other housing associations and local authorities in respect of both the public and private sector housing markets. Consequently both Radian and Radian Services are realising highly positive PR locally, regionally, nationally and even internationally as a result of the EU funding which supports the project. Chris Huhne the Secretary of State for Energy and Climate Change has been secured as the key note speaker for the project closing event in 2011 demonstrating the level of praise and support.

Residents have significantly benefitted as a result of the retrofit work. The average pre retrofit running costs were between £1,200-1,500 per annum and energy modelling reveals that these are expected to reduce by 50% delivering affordability to residents and helping to eradicate fuel poverty. Health benefits to residents are also expected to arise with the new insulation and heat recovery ventilation eliminating historic mould growth. The standard of finishes internally are of an equivalent standard to Radian's new build homes and one resident said *"I was born in this home 50 years ago and it is like moving back into a completely brand new home"*. The resident decant process for the 10 week duration of each home retrofit is a very emotive time for residents to handle and Radian Services worked closely with all residents and the community support officer based on site to reduce the stress associated with this upheaval.

The neighbourhood locally has also received a positive up lift. The pre retrofitted homes were unsightly and had suffered from anti social behaviour. The completed homes give the community something to be really proud of and the project has bonded occupants together through their common experience of going through the refurbishment work.

One of the 14 homes was opened on 25<sup>th</sup> November 2010 by John Duggart the chairman of the Sustainable Energy Academy. This show home will be open to the public for a period of 6 months and Radian Services will be passing on their learning to visitors including building contractors. The show home becomes the 77<sup>th</sup> home in the 'Old Home, Super Home' national network of open homes operated by the National Energy Foundation in the UK which are designed to inspire visitors of the benefits of domestic retrofit.

In addition to the social and economic benefits, the project environmental benefits of a reduction of around 73 tonnes of carbon dioxide emissions annually and reduced water consumption should not be forgotten.



**Finance:** Exemplar retrofit doesn't come cheap! The project overall represents a capital works budget of approx £1,200,000. This is an average cost of £92k per dwelling. Of this, the sustainability features described above accounted for an average of £40,000. The cost of decanting residents to nearby properties during refurbishment work accounted for an average of £13k per property and the staff time involved with project management and community liaison is a considerable element of

the costs. Some grant funding was obtained from the EU and (£6,500 / home) and also 50% from the Low Carbon Buildings Programme towards the solar panels. Radian Services have also helped to manage the grant compliance and claim procedures.

The performance of the homes in use will be monitored for a period of 2 years. While it is not possible to evaluate the (financial) benefits accurately until the end of this period, it can be seen from the above that the benefits in terms of running cost savings to residents and new business opportunities for the DLO are likely to be considerable. The cost savings realised as a result of the energy efficiency improvements will accrue to the occupants of the home. Once the results are known, the benefits of each measure will be evaluated in terms of 'carbon value' (e.g. £x spent equals xtonnes of CO<sub>2</sub> saved). The project evaluation will be undertaken independently by our expert consultants CAMCO and results, good or bad, will be publicised to aid honest learning in this crucial new area of construction activity.

Savings as a result of health benefits are hard to accurately predict as is the expected increase in the business of the DLO, although a 5% increase in annual turnover during the next few years is the aim.

Additional costs have been invested by Radian in promotional activity. A DVD of the retrofit project is being made to help with dissemination.

**Replication:** The scale of the retrofit challenge is outlined in the Innovation section above. Assuming that there are 4 million affordable homes in the UK, 100,000 of these will require whole house retrofit every year in order to reach the legislative target of 2050. The programme of learning and dissemination that Radian Services has commenced upon with its parent organisation coupled with the show home means that potentially all DLO's in the UK could benefit from visiting the project to improve their understanding of the retrofit agenda and understand the new market retrofit is creating. Similarly, private building contractors and construction professionals have the ability to learn from the cutting edge retrofit work undertaken by Radian Services.

The training, skills and experience that Radian Services obtained through the phase 1 project (2009) prior to starting on phase II (2010) have greatly helped the project to succeed and meet the original design expectations. Air tightness testing is evidence of this with the DLO's careful attention to detail enabling a doubling of improvement in the pre to post retrofit testing in the second phase to be achieved. Having gained this and other learning, regarding detailing for continuity of insulation at junctions for example, the operations and performance on the phase II project was enhanced.

While Radian and Radian Services are committed to putting sustainability at the heart of all they do, other DLO's should now be expected to rise to the challenge and push the boundaries of eco-retrofit. The Radian Services Foreman and his team demonstrated a positive willingness to diversify their normal service and gain new knowledge throughout the project and this mind set was key to the overall success. Radian Services are now classed as retrofit pioneers and the desire to share their experience with other organisations in our opinion makes them a worthy contender for the NHMF Best DLO award in 2011.

*For full project information refer to: [www.radian.co.uk/sustainability](http://www.radian.co.uk/sustainability)*

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# Borough Grove Low Carbon Refurbishment

## Interim Case Study

### Background to Project

In 2009 Drum Housing Association, part of Radian, began work on an exemplar low carbon refurbishment demonstration scheme at Borough Grove in Petersfield, Hampshire. The thirteen 3-bed semi detached properties, of concrete REEMA construction, were in need of substantial upgrade, having reached the end of their envisaged useful life.

As part of the 'Retrofit South East' project, part funded by the European Regional Development Fund secured via SEEDA, Radian enhanced the specification of this upgrade to encompass a package of low energy and sustainability measures sufficient to reduce carbon emissions by 77% in seven properties and 86% in the remaining six. In addition, further features were incorporated into one showhome property for which funding was secured to keep it open for demonstration purposes until June 2011.

The Borough Grove refurbishment forms the centre piece of the 'Retrofit South East' project, whose aim is to develop a model for low carbon retrofit of social housing that will help to transform businesses and reduce carbon emissions from existing housing stock across the South East region. Further information is available on the Retrofit South East website:

[www.radian.co.uk/201004072131/retrofit.html](http://www.radian.co.uk/201004072131/retrofit.html)





# The Existing Properties

The properties on Borough Grove form part of a former council estate in Petersfield built in the early 1950s. The precast reinforced concrete (REEMA) homes were built in the wake of the Second World War, to provide a speedy solution to the housing shortage at the time. Their original useful life was envisaged to be 30 years. Having considerably outperformed this, they had a number of defects which made them unmortgageable and in need of considerable investment to bring them nearer to modern standards.

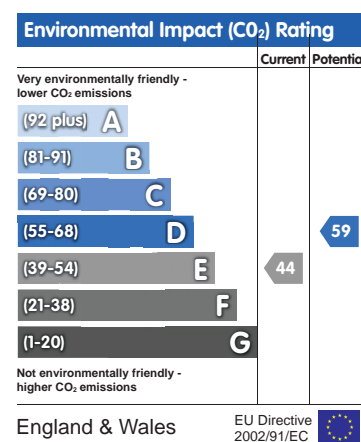
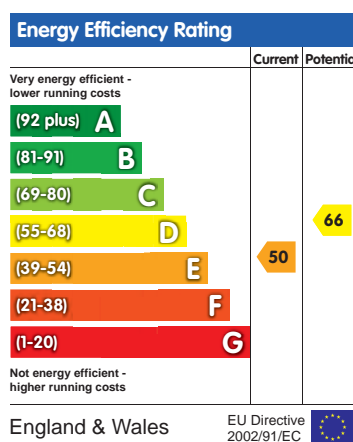
The properties were all 'E' rated, with residents' energy bills typically ranging between £1000-£1500 per year, and many failing to achieve thermal comfort. Carbon emissions for space heating, hot water & lighting were typically 6tCO<sub>2</sub>/yr or 7.2tCO<sub>2</sub>/yr in total, including appliance based electricity use<sup>1</sup>. A typical Energy Efficiency and Environmental Impact Rating can be seen here.

In practice, some characteristics of homes varied slightly in terms of boiler age and some built form characteristics (for instance some properties had conservatories attached while others did not).

In keeping with REEMA type construction all homes have hollow precast concrete walls, solid concrete floors and concrete ceilings, with pitched roofs clad in concrete tiles. Prior to refurbishment the properties had approximately 100mm loft insulation, no floor or wall insulation, double glazing installed in the mid-90s, and gas boilers in need of replacement (some still with back boilers and very low efficiency). One property on the estate had been sold previously under 'right to buy', and while an opportunity to participate in efficiency measures, such as external wall insulation was offered, funding could unfortunately not be provided by Radian or the private owners, meaning they were unable to participate at this time.

Radian's objective with the refurbishment was to demonstrate low carbon refurbishment techniques in practice and show how, with advanced measures, the performance of these homes can be improved towards the standard of modern new build.

<sup>1</sup> Based on Standard Assessment Procedure and Code for Sustainable Homes methodology for electricity.



**Right: Energy Efficiency and Environmental Impact Ratings for No 8 Borough Grove, prior to refurbishment. Note the 'potential' Energy Efficiency Rating and Environmental Impact Rating is to improve the property to a band 'D' – the final result goes considerably beyond this!**

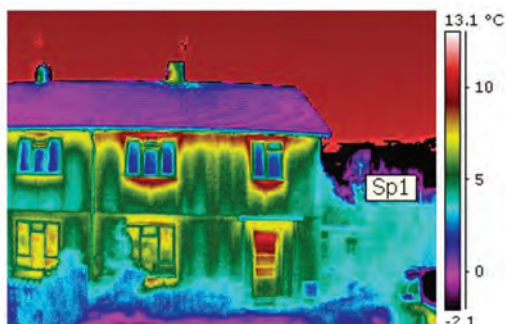
## New Build or Refurbish?

**In 2006 Drum Housing completed an award winning redevelopment of 148 new eco-homes, constructed to replace 58 precast concrete REEMA homes on the site adjacent to Borough Grove in Petersfield.** The 'Privett Green' development followed a period of extensive consultation with residents, with the majority expressing a preference for redevelopment. It has achieved an overall site rating of BREEAM EcoHomes 'Very Good' (although if individual units were to be assessed, 10% of the homes would achieve and 'Excellent' rating, or Code for Sustainable Homes level 3 or 4, by virtue of micro-renewables installed).

At neighbouring Borough Grove, residents preferred not to have their homes developed, leading Radian to develop a programme for refurbishment instead. Building on success with award winning experience at Kingsley (Woodfields Generation Homes Low Energy Refurbishment), and nearby Highfield Road (a low carbon refurbishment of 20 REEMA dwellings in 2008), funding was secured for an advanced refurbishment programme which would substantially reduce carbon emissions and enhance sustainability, driving the properties towards the standards achieved by the new build properties at Privett Green.

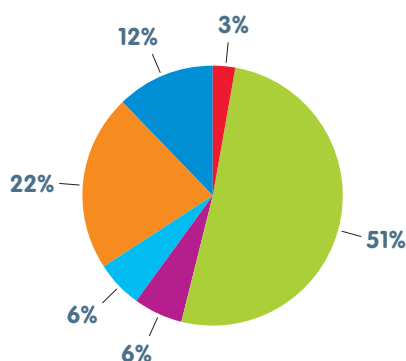
# Sustainability Features

The refurbishment programme at Borough Grove involved a complete upgrade of internal and external finishings to make the homes Decent Homes compliant, including new kitchens and bathrooms, re-wiring, re-plastering and re-roofing. While work was being carried out, residents were temporarily decanted into nearby properties at Highfield Road, which were recently refurbished to a high energy performance standard in 2008-9. Building on the experience at Highfield Road and elsewhere, a substantial package of low energy and sustainability features was included. The key features of this package are described below.

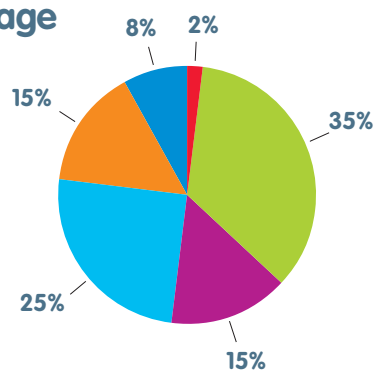


Thermal Infrared image of the front East-facing elevation of No 14 Borough Grove, prior to refurbishment, showing substantial heat loss through uninsulated concrete walls, ground floor window and single glazed wooden door. © Horton Levi Ltd.

## Where was heat being lost prior to refurbishment?



## UK average



- Windows
- Doors
- External walls
- Ground floors
- Roof
- Draughts

Extract from Parity Projects' Home Energy Masterplan for number 14 Borough Grove, before refurbishment, showing substantial heat loss through the uninsulated concrete walls. © Parity Projects

## Walls

The chart (left) shows that over 50% of the heat loss from these properties was through the uninsulated concrete walls. Insulating walls externally is generally preferable to internal wall insulation, where possible, as it helps reduce heat loss through thermal bridging as well as maximizing thermal mass within the dwelling, which helps maintain a more even indoor temperature.

External wall insulation was applied to all properties, comprising of 100mm Kingspan Kooltherm phenolic insulation with a Wetherby K-silicon wet render finish. This has reduced the wall U value from 2.34W/m<sup>2</sup>K to below 0.3W/m<sup>2</sup>K, cutting heat loss by a factor of nearly ten. Insulation was returned around corners to meet door and window frames to a thickness of 25mm to minimize cold bridging in these areas.

## Floors

Around the concrete floor slab 'edge' insulation, in the form of 50mm extruded polystyrene board, has been applied to a depth of 300mm below the first floor level, covered with weatherproof Trespa cladding panels. In the showhome an additional 20mm Aerogel insulation bonded to 18mm chipboard has been applied above the ground floor to further reduce heat loss from the concrete floor, requiring repositioning of all doors and stairways. This has reduced the floor U value from its original level of 0.68 W/m<sup>2</sup>K to 0.58 and 0.30 W/m<sup>2</sup>K respectively.

## Roof

Original loft insulation was removed due to age, as well as to enable re-wiring, and replaced with a depth of 300mm mineral wool laid between and across joists. A small 3x4m decked area was provided to allow storage of residents' belongings without compromising the insulation, and a new insulated and draughtproofed loft hatch installed.

## Windows & doors

The application of external wall insulation required the repositioning of windows and, since they were 15 years old, the decision was taken to replace them with new higher performance alternatives. This also enabled

slight resizing to enable a better fit with the insulation thickness at window reveals. All windows were replaced with BFRC rated 'A' or 'B' windows, with U-values 1.3 and 1.4 W/m<sup>2</sup>K respectively. The previous single glazed wooden doors were replaced with 'A' rated GRP doors supplied by Steelwood Doors.

## Air tightness & ventilation

An air tightness target of 5m<sup>3</sup>/m<sup>2</sup>hr was specified as part of the refurbishment programme and a range of measures employed to achieve this level. Precast concrete properties like these REEMA homes are typically more air tight than traditional masonry construction and pressure tests indicated leakage rates below 8m<sup>3</sup>/m<sup>2</sup>hr prior to refurbishment. Measures were employed to reduce this, including sealing all service entry points to the dwellings; ensuring areas around windows and doors were properly sealed; and sealing the area where floor joists met precast concrete wall panels, which was shown by a smoke test to be an air leakage weak point.

Improvements to air tightness need to be combined with means of controlled ventilation in order to maintain indoor air quality and prevent excess humidity accumulating. To support this, through-the-wall mechanical ventilation with heat recovery fans (Vent-Axia HR25 and HR200WK) were installed in all kitchens and bathrooms.

## Solar photovoltaics

All properties were re-roofed as part of the refurbishment and the opportunity taken to install solar photovoltaics on all properties. Dulas Engineering supplied and installed the Kyocera polycrystalline panels, with a generation capacity of 2.1kWp on the six South East facing properties and 1.48kWp on remaining seven properties (East-West facing). The expected output from the systems is 1680kWh/yr for the 2.1kWp systems and 1180kWh/yr for the 1.48kWp systems. Residents will not receive the Feed In Tariff since systems were installed with grants from the Low Carbon Buildings Programme. However, they should still benefit from electricity bill savings of up to £80-120/yr (depending on system size), assuming they are able to time demand to coincide with periods of maximum output<sup>2</sup>.

## Solar water heating

In addition to solar PV, 3m<sup>2</sup> Solartwin solar water heating panels were installed on the six South-East facing properties with a new mains pressure Gledhill thermal store with integral insulation. Electric showers were replaced with new mains hot water low flow shower fittings to help make maximum use of available solar heated water. The systems should provide around 50% of residents' annual hot water demand, which, combined with the low flow shower heads and taps, should realise a substantial reduction in residents' hot water bills.

<sup>2</sup> This assumes an average of half the total annual output can be consumed internally over a year.

## Heating systems and controls

All gas heated dwellings were fitted with Ideal icos HE18 condensing gas boilers, with seasonal efficiency 90.3%. They were also provided with new controls including room thermostat, boiler interlock and TRVs on all radiators.

## Lights & appliances

All internal and external lights were fitted with low energy CFL light bulbs. Rotary dryers were fitted in gardens to enable open air clothes drying. The showhome is additionally being fitted with A-rated appliances including cooker, fridge freezer and washing machine. All homes will be provided with a Wattson display electricity meter, which glows different colours to alert residents of different levels of electricity use. The meters are fully PV compatible and allow residents to download full history of electrical consumption and generation to enable data to be viewed graphically, via their 'Holmes data sleuth' software.

## Behaviour & lifestyle change

A resident liaison officer was employed throughout the early stages of the project to support residents through the process, and has worked closely with them to communicate the implications of energy and sustainability improvements on the houses. An important feature of the resident support was to provide a permanent site office in one of the void properties, providing the opportunity for residents to easily drop in with questions or concerns. Following the completion of all properties, residents will be invited to a day long event in the showhome organised by the successful and locally based 'Greening Campaign', which will include training and guidance on living in their new low energy homes.

## Water efficiency

All homes have been fitted with low flow taps, low flow showers, dual flush WCs, and a 200 litre water butt for rainwater storage in the garden. Water meters have been installed in all properties by South East Water, enabling accurate remote meter reading, and offering residents the option of being billed on a metered basis, if they so choose.

Two homes will have full rainwater harvesting systems. The showhome (number 16) incorporates a new system called FlushRain which has not been used before. This system collects water from the gutter downpipes into a tank in the loft that supplies the toilets by gravity. A pump in the roof is alerted by water sensors in the collectors and draws the rainwater into the roof tank, filtering it on the way. A back-up mains supply is provided for when there is insufficient rain. Another property (number 8) will feature a rain water harvesting system with a tank located in the ground and will also incorporate additional water flow meters to transform it into a 'water exemplar' property.





## Waste

The refurbishment programme has been subject to a site wide waste management plan, and throughout the refurbishment accurate quantities of materials have been ordered wherever possible. An off-site recycling facility means that on average 85% of waste materials are being recycled. For individual homes, recycling facilities are being provided by the local authority.

## Monitoring

In addition to the water metering and display energy devices mentioned above, monthly electricity, gas and water meter readings have been taken for each individual property since autumn 2009, and will be continued until after residents have all moved back in, to allow evaluation of the effectiveness of the refurbishment works. Tiny tag temperature data loggers have also been installed in all properties since before the work began and will be used to help evaluate improvements in terms of thermal comfort.

# Results

The chart below shows the effect of the low carbon measures described on the homes at Borough Grove, in terms of SAP rating and annual carbon emissions. The seven East facing homes achieve a high 'B' rating, while the six remaining South East facing homes, with extra PV and solar water heating,

achieve an 'A' rating, including the showhome (whose extra floor insulation earns it an extra SAP point taking the overall rating to 93). This reduces carbon emissions for 'regulated' energy sources (heating, hot water, lighting and ventilation) by 77%, 86% and 88% respectively.

| Energy Performance Specification<br>For Show Home Showing Incremental<br>Improvements | EPC band | SAP rating | El Rating | CO <sub>2</sub><br>emissions<br>(kg/vr)* | % CO <sub>2</sub><br>reduction |
|---|----------|------------|-----------|--|--------------------------------|
| Baseline Home   | E        | 49         | 43        | 5868                                     | 0%                             |
| +100mm phenolic wall external insulation  | C        | 69         | 64        | 3461                                     | 41%                            |
| +300mm mineral wool loft insulation (top up)  | C        | 70         | 66        | 3284                                     | 44%                            |
| +50mm XPS vertical edge floor insulation  | C        | 71         | 67        | 3219                                     | 45%                            |
| +A-rated windows and doors  | C        | 74         | 71        | 2792                                     | 52%                            |
| +Improved air tightness & MVHR  | C        | 74         | 73        | 2650                                     | 55%                            |
| +high efficiency gas boiler & cylinder insulation                                     | C        | 80         | 80        | 1965                                     | 67%                            |
| +low energy lights throughout   | B        | 81         | 80        | 1923                                     | 67%                            |
| +1.48kWp solar PV   | B        | 87         | 86        | 1328                                     | 77%                            |
| +extra (2.1kWp) solar PV  | B        | 91         | 90        | 972                                      | 83%                            |
| +extra (2.1kWp) solar PV and 3m2 SWH  | A        | 92         | 92        | 816                                      | 86%                            |
| +20mm aerogel floor insulation  | A        | 93         | 93        | 692                                      | 88%                            |

\* for space heating, hot water, lights & ventilation, using SAP 2005 Summary of effect of low carbon measures incorporated at Borough Grove on SAP rating and carbon emissions.

Absolute CO<sub>2</sub> emissions are reduced to below 1 tonne per household for the South East facing properties. Adding in appliance based electricity takes total CO<sub>2</sub> emissions to around 2.5tCO<sub>2</sub> per household for East-facing homes and 2.0tCO<sub>2</sub> for the South East facing homes.

Following completion of the refurbishment on all properties, the monitoring strategy above will enable analysis of actual performance in use, in terms of both energy and water efficiency, to see if these predictions are being realised in practice.



# Costs

The total budget for all refurbishment work undertaken at Borough Grove was £1.2million, or an average of £92k per dwelling. Of this, the sustainability features described above accounted for an average of £36k per property (£32k for the East facing properties, with no solar water heating and a smaller area of PV, £39k for the South East facing properties with solar water heating and more PV, and £46k for the showhome). The cost of decanting residents to nearby properties during refurbishment work accounted for an average of £13k per property.

Investment for the scheme was provided by a combination of Radian's planned maintenance budget, support from the European Regional Development Fund (as part of the 'Retrofit

South East' project), grants received from the Low Carbon Buildings Programme for solar water heating and PV, and some funding for basic measures provided through the Carbon Emissions Reduction Target (CERT).

## Next Steps

Completion of the refurbishment works at Borough Grove is expected in February 2011. Following this, Radian will publish a follow up Case Study which provides further detail on costs, lessons learned, and evidence of energy and water consumption in practice, based on feedback from the team, contractors and residents.

# RETROFIT South East

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## Project Partners

Radian (lead partner) – [www.radian.co.uk](http://www.radian.co.uk)

Camco – [www.camcoglobal.com](http://www.camcoglobal.com)

Parity Projects – [www.parityprojects.com](http://www.parityprojects.com)

GESB – [www.gesb.eu](http://www.gesb.eu)

## Project website

[www.radian.co.uk/201004072131/retrofit.html](http://www.radian.co.uk/201004072131/retrofit.html)



Project partners are:

