



## Community based advanced retrofit *'learning by doing'*

### NHMF Conference - January 2011

Peter Evans, Paul Ciniglio & Andrew Godwin, Radian Technical Services



### Introduction to Radian:

- **Formed in Dec 2006** (merger between Swaythling, Windsor & Drum as equal size partners)
- **Own & manage 17,500 homes in South East**
- **Build approx 500+ new homes pa**
- **Construction spend approx £100m+ pa**  
(new build, maintenance and repairs)
- **Radian Services (DLO)**
- **Asset Management Strategy**

to retrofit and recycle old homes  
or to build new?





## Community based retrofit

- Radian and its DLO have diversified to gain experience of retrofitting to exemplar standards (Radian's Sustainability Manager will present case studies shortly).
- Radian was the first RSL in UK to secure European Regional Development Funding towards retrofit projects / research securing £700,000 in EU grant funding 2009.
- We have expertise at identifying and securing grant funding support sustainability.
- Our DLO have undertaken and project managed the retrofitting of 33 homes to advanced environmental standards.
- Radian has extensively trialled and monitored various types of innovation revealing interesting findings that now influence our retrofit design strategy (Heat Pumps have been especially problematic).

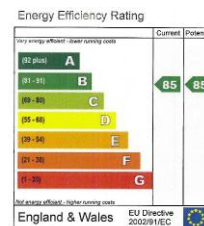
## REEMA retrofit phase I Highfield Road, Petersfield



- 20 REEMA PRC homes, 17 taken to core package of C70 and 3 to C80 with solar package
- Gas baseline reduction: C79% in regulated emissions  
(C67% against total household emissions)
- Electric baseline: C85% regulated (C76% total emissions)
- UK Government target is for 80% reduction against total emissions!
- Occupier behaviour is a key factor



**EcoHomes XB = 81**



New EPC for advanced package



## 'Retrofit South East' project

### *Building capacity for low carbon retrofit in the SE region.*

- Application submitted under SEEDA ERDF round 2 in 2009 'Promoting sustainable production and consumption' category.
- Additional ERDF funding secured 2010 for a new project




## REEMA Retrofit phase II



### Borough Grove, Petersfield

- Centrepiece of project is the exemplar retrofit of community of 14 social housing properties to
  - C75 - C82 energy efficiency standard
  - Best practice water efficiency and construction waste techniques

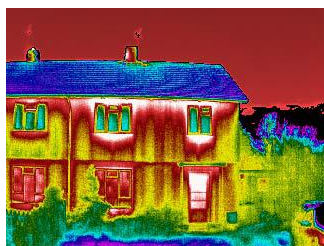


How C80 was achieved (full SAP modelling)					
Scenario	SAP 2005 Rating	EPC / SAP Band	Annual Regulated CO2 Emissions kgCO2/yr	Approx cost of measure £	Percentage Reduction in Regulated CO2 Emissions %
Baseline as extg (Gas)	49	E	5,868	-	-
+ 100mm Phenolic foam EW Insulation	69	C	3,461	9,000	41%
+ Double loft insulation to 300mm thick	70	C	3,284	250	44%
+ 50mm vertical floor raft edge insulation	71	C	3,219	1,500	45%
+ A-energy rated windows and doors	73	C	2,792	6,000	52%
+ Improved air tightness & heat recovery ventilation	74	C	2,650	2,000	55%
+ New 'A' rated boiler & cylinder plus controls	80	C	1,965	4,500	67%
+ 100% low -e lighting	81	B	1,923	250	67%
+ 2.1 kWp solar PV	91	B	972	9,000	83%
+ Solar thermal 3msq	92	A	816	4,500	86%
+ 20mm aerogel ground floor insulation	93	A	692	5,000	88%
<b>Sum of all measures</b>	<b>93</b>	<b>A</b>	<b>692</b>	<b>£42,000</b>	<b>88%</b>

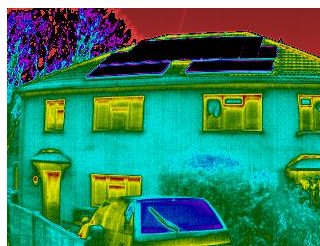
## Specialist testing & monitoring



- Pre and post air tightness pressure testing
  - Show home q10.3 before q5.4 after (m3/m2/hr@50pascals)
  - Specialist smoke pencil intermediate stage testing
- Pre and post thermal imaging surveys
- Acoustic testing to party walls
- Internal and external temperature loggers
- Baseline & post retrofit energy consumption monitoring



Before



After



## Key 'Retrofit SE project' activities

- BREEAM refurbishment pilot project
- Show home open for 9 months through NEF & SEA (*home 77 of 82, first RP home*)
- Free retrofit business assistance (*BTEC retrofit skills training to 100 SME's*)
- Development of new funding mechanism '*Retrofit Revolving Guarantee Fund*'
- Regional retrofit benefits study
- Retrofits pioneers RP/LA network
- Carbon modelling and monitoring
- Case studies and dissemination
- Shared learning through Radian Retrofit Conferences
- Community energy behaviour change
- 2 homes with full RW harvesting using different systems.
- Water flow meters and revenue meters
- Site Waste Management Plan (waste segregation & recycling)



## FREE RETROFIT BUSINESS ASSISTANCE!

- Retrofit skills training
- One / first module free for SME's based in SE region.
- BTEC accredited (6 of 8 modules)
- [www.parityprojects.com](http://www.parityprojects.com) for course booking info



parity projects  
enabling sustainable development

Parity Projects presents our new:  
Eco-Refurbishment Courses

FREE COURSES AVAILABLE\*

Whatever your trade or profession, be amongst the first to offer meaningful services to clients to help them reduce their utility bills, reduce their energy use and help them to help the environment.

Corner the market in the SE area.

\*To reduce energy bills and cut carbon by 80% by 2050 in the South East region requires 45 retrofits per hour costing £1,000,000 per working hour!

"Inspiring and informative - thank you!" - *Becks & Bread*

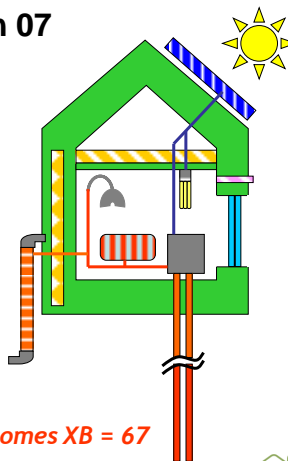
**Other retrofit projects:**



**“Generation Homes” project**

**Woodfield, Kingsley – Dec 06/Jan 07**

- Partnership with EST & Camco to demonstrate significant household CO<sub>2</sub> emission reductions on 6x1950's homes (min 60% target, 75% modelled)
- Aim to reduce residents running costs by up to 50% (as high as £1,300pa before)
- Good monitoring installed
- Average cost £25,000 per property (50% grant income, EST, LCBP & CERT)



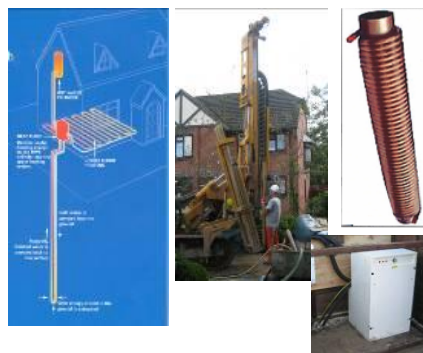
EcoHomes XB = 67



**“Generation Homes” project, Kingsley**

**Package of measures installed:**

- **Energy efficiency:**
  - Cavity wall insulation
  - Loft insulation 300mm
  - Double glazed windows
  - Low-energy light bulbs
  - Draught proofing & heat recovery ventilation
  - Waste water heat recovery
- **Renewables:**
  - Ground source heat pumps
  - Solar Photovoltaics 1kWp





## Feedback on 'Generation, Kingsley Homes' project - 6 x 1950's homes 2007

- Independent review undertaken by Camco (Covering social, economic and environmental aspects with interviews of residents)
- Study findings (based on 2 years post completion data)
  - CO2 emission reductions in use: **43 - 74%**
  - Running cost savings: **0 - 56%**
  - Resident satisfaction is mixed
  - Further briefing to residents required



The 2007 South East Low Carbon Awards

## TSB Retrofit for Future project

- Sunergy endothermic roof (hybrid solar and air source heat pump system)
- Trial of Heat Engine to generate electricity



Roof based energy collector



Thermal Stores





- C80 'open home' with SEA
- Features: Solar PV 1.85kWp, Solar Evac tube, ASHP, 'A' rated windows, heat recovery ventilation, LED/CFL lighting, improved insulation and air tightness (2 bed mid-terrace).
- Cost: £30,000 for energy efficiency related works: £7,500 grant funding South Downs JC and LCBP. (£40,000 total cost of retrofit project).

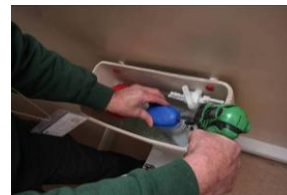


Before, May 2009



## Water efficient retrofit

- Important to consider water conservation as part of whole house retrofit projects (clear link between water and energy saving)
- 28 existing homes (built in 1970's)
- Water consumption meters fitted
- Eco-beta fitted to WC's (reduced water consumption by 21%)
- Showers and water butts fitted
- Surveys on household beha







## Retrofit key learning points

- Expectation versus outcome e.g. running costs, energy savings
- Resident briefing / user manual & energy change campaign.
- Baseline position - % reduction versus kWh/m<sup>2</sup>/yr.
- Understanding the home and selecting strategy – whole house or piece meal at trigger points.
- Devil is in the detail
- Community liaison and decant process, impact of residents (Typical 8-12 week duration per home).
- Project Management (programme/ sequencing, integrating trades)
- Keep unproven innovation to a minimum. TSB?
- Follow energy design hierarchy – Thermal, services, renewables
- Evaluation of project - social economic and environmental
- The hidden costs of retrofit, also pursuing grants, PR etc

## Radian Services

*Innovating and diversifying for the future of retrofit*

- After paying for retrofit, construction skills is the next biggest barrier to large scale advanced retrofit!
- Radian Services staff underwent BTEC retrofit skills training (Parity Projects).
- Have upskilled on the job and understood the importance of continuity of air tightness and insulation.
- Employed apprentices on site.
- Learnt about solar micro-generation.
- Have taken pride in their work.
- Using our DLO has helped to contain overall project costs against using an external contractor.



# THANK YOU



The 2007 South East Low Carbon Awards

