Basic Facts

HOUSE BUILT: 1934

HOUSE RENOVATED: 2005/6

WORKS CARRIED OUT:

- Floors, external walls and roof heavily insulated
- New double glazed timber windows
- Solar thermal panels for hot water
- Natural flooring throughout
- Low energy lighting
- Low water use

CO2 REDUCTION (OHSH calculation 2009):

- Before: 15.6 tonnes of CO2 per year
- After: 4.7 tonnes CO2 per year = **70% reduction**

29 Redland Hill.

Eco-Renovation Features

1. **External Works:**
   - Existing compost
   - Gardening/recycling garden 'waste'
   - Fence posts & doors
   - Willow fences
   - Porous paving
   - Existing herb garden
   - New vegetable garden
   - Heat treated timber cladding
   - Green oak canopy over deck
   - Reclaimed timber decking
   - Aluminium rainwater goods

2. **External Envelope:**
   - Airtightness test
   - New high performance timber windows
   - Cellulose insulation under flooring
   - 2x insulation in roof with breather membrane
   - 80mm external wall insulation and render
   - Draft proofing front door

3. **Heating/hot water:**
   - Gas condensing boiler
   - Solar panels
   - Passive solar/conservatory

4. **Lighting:**
   - Use of natural light
   - LED/compact fluorescent lighting

5. **Interior finishes:**
   - Natural & clay paints
   - Reuse of existing floorboards on 1st floor
   - Reuse of existing 1930's interior doors
   - Reclaimed flooring on ground floor with natural oil finish
   - Slate, sea grass, linoleum

6. **Water:**
   - Dual flush WC's
   - Low flow shower
   - Water butts outside

7. **Waste:**
   - Bristol Wood recycling project
   - Firewood
   - Garden waste
   - Skips
   - Yard sale
   - Cardboard packaging

29 Redland Hill.

Eco-Renovation Features

8. Technical data available:

- Architects drawings – existing and proposed
- Construction details of external envelope (walls, floor and roof) – before and after
- Photos (before and after)
- U-values (before and after)

9. Data collected after occupation:

- Airtightness test
- Thermographic imaging
- 12 months of bills (water, gas and electricity)
- 12 months temperature logging with graphs illustrating the outcomes
- 12 months solar thermal panel output
- Energy Performance Certificate
- SAP rating
- NHER rating

10. Other post occupancy information:

- Food growing
- Waste reduction
- Transport

11. Lifestyle

- No tumble dryer
- Open fire
- Veggie box

March 2010

29 Redland Hill.

Before and after

	BEFORE	AFTER
WALLS	225MM SOLID WALLS WITH WHITE EXTERNAL RENDER (U-VALUE=+/- 2W/m2K)	80MM POLYISOCYANURATE INSULATION ON TOP OF EXISTING RENDER + NEW RENDER SYSTEM(U-VALUE=+/- 0.22W/m2K)
GROUND FLOOR	NO INSULATION	150MM CELLULOSE INSULATION + AIRTIGHT MEMBRANE
ROOF	NO INSULATION	200MM MINERAL WOOL INSULATION (BETWEEN AND ABOVE RAFTERS) + AIRTIGHT MEMBRANE
WINDOWS	ORIGINAL METAL SINGLE GLAZED FRAMES	DOUBLE GLAZED, LOW E COATED, ARGON FILLED TIMBER FRAME WINDOWS BY RATIONEL
HEATING	GAS BOILER AND SINGLE PANEL RADIATORS WITH ELECTRIC HEATER BACK-UP	VAILLANT ECOTEC GAS CONDENSING BOILER WITH DOUBLE PANEL FIN RADIATORS
HOT WATER	IMMERSION HEATER	4M2 SOLAR THERMAL PANELS FROM MAY-SEPTEMBER, BOILER FOR REMAINDER OF YEAR
LIGHTING	ALL INCANDESCENT BULBS	MIXTURE OF LED'S, COMPACT FLUORESCENT & HALOGEN/INCANDESCENT
WATER	13 LITRE WC'S	LOW FLUSH, DUAL FLUSH WC'S, WATER BUTTS & BEHAVIOUR
WASTE	UNKNOWN	UNCOOKED ORGANIC MATTER IN COMPOST; COOKED FOOD, CARDBOARD ETC TO MUNICIPAL WASTE COLLECTION; PLASTIC TO 'REFRESCO' BINS; REUSABLE CONTAINERS & BAGS
FLOORING	CARPET THROUGHOUT PLUS VINYL IN BATHROOMS/KITCHEN	RECLAIMED TIMBER ON GROUND FLOOR; EXISTING BOARDS ON 1ST FLOOR; NEW FRENCH OAK ON 2ND FLOOR; LINOLEUM AND SLATE IN BATHROOMS & UTILITY ROOM.
PAINTS	UNKNOWN	CLAY, NATURAL AND CONVENTIONAL PAINTS

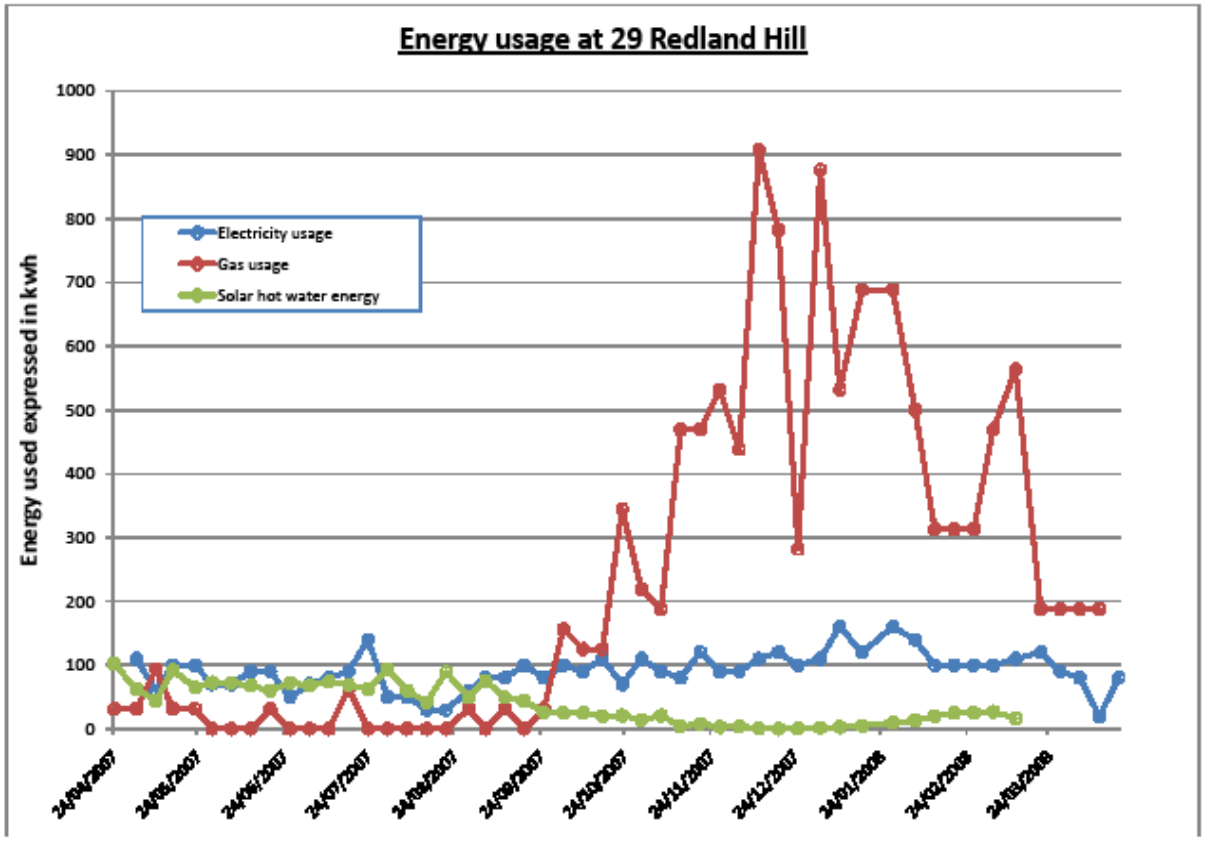
29 Redland Hill.

External Envelope details

NOTE: Materials are listed from inside to outside

- **External walls: wet plaster; 225mm original brickwork; 80mm polyisocyanurate insulation boards; 3 coat render system**
- **Chimney breasts and first floor of front elevation (with wall hung tile external finish) internally lined with 20mm foam backed plasterboard**
- **Ground floor: reclaimed T&G timber floor boards; airtight waterproof membrane lapped up sides of all external walls; 150mm cellulose insulation in between joists; breather membrane holding insulation in.**
- **Roof: plasterboard; airtight waterproof membrane; 100mm Rockwool underlay insulation between rafters; 70mm Rockwool overlay board on top of rafters; Tyvek breather membrane; original clay tiles reused.**
- **All windows by Rationel: double glazed, low e coated Argon filled cavity.**
- **Front door: original with double layer of draught proofing and foam backed plasterboard within panels of door on inside.**

Energy consumption over 12 months



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Energy consumption for 29 Redland Hill

- Average m2 of typical 3 bedroom house 89 m^2 (Energy Savings Trust)
- 29 Redland Hill = 216 m^2 = 2.4 times larger than the average house

- Typical GAS consumption for a 3 bedroom house: 16,000 kWh* x 2.4 = 38,400 kWh
- Typical ELECTRICITY consumption for a 3 bedroom house: 4,800 (5,480 kWh)* x 2.4 = 11,520 kWh

- Typical GAS consumption for 29 Redland Hill including office: 15,308 kWh
- Typical ELECTRICITY consumption for 29 Redland Hill including office: 4959 kWh

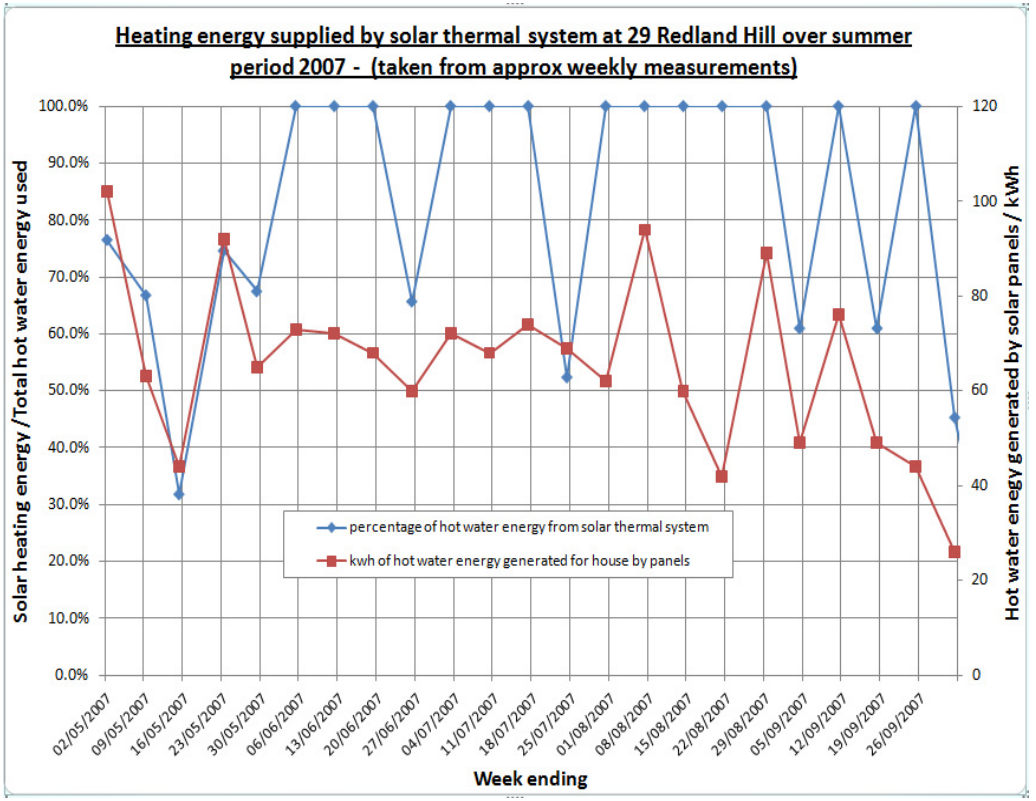
- Typical GAS consumption for offices = 79 kWh/m^2** x 40m^2 (say) = 3160m^2
- Typical ELECTRICITY consumption for offices = 54 kWh/m^2** x 40m2 (say) = 2160 kWh

- Typical GAS consumption for 29 Redland Hill excluding office: 15,308 - 3160 = 12,148 kWh
- Typical ELECTRICITY consumption for 29 Redland Hill excluding office: 4959 – 2160 = 2799 kWh

*Energy Saving Trust (Strathclyde University) figures ** CIBSE Guide F

29 Redland Hill.

Solar thermal panels



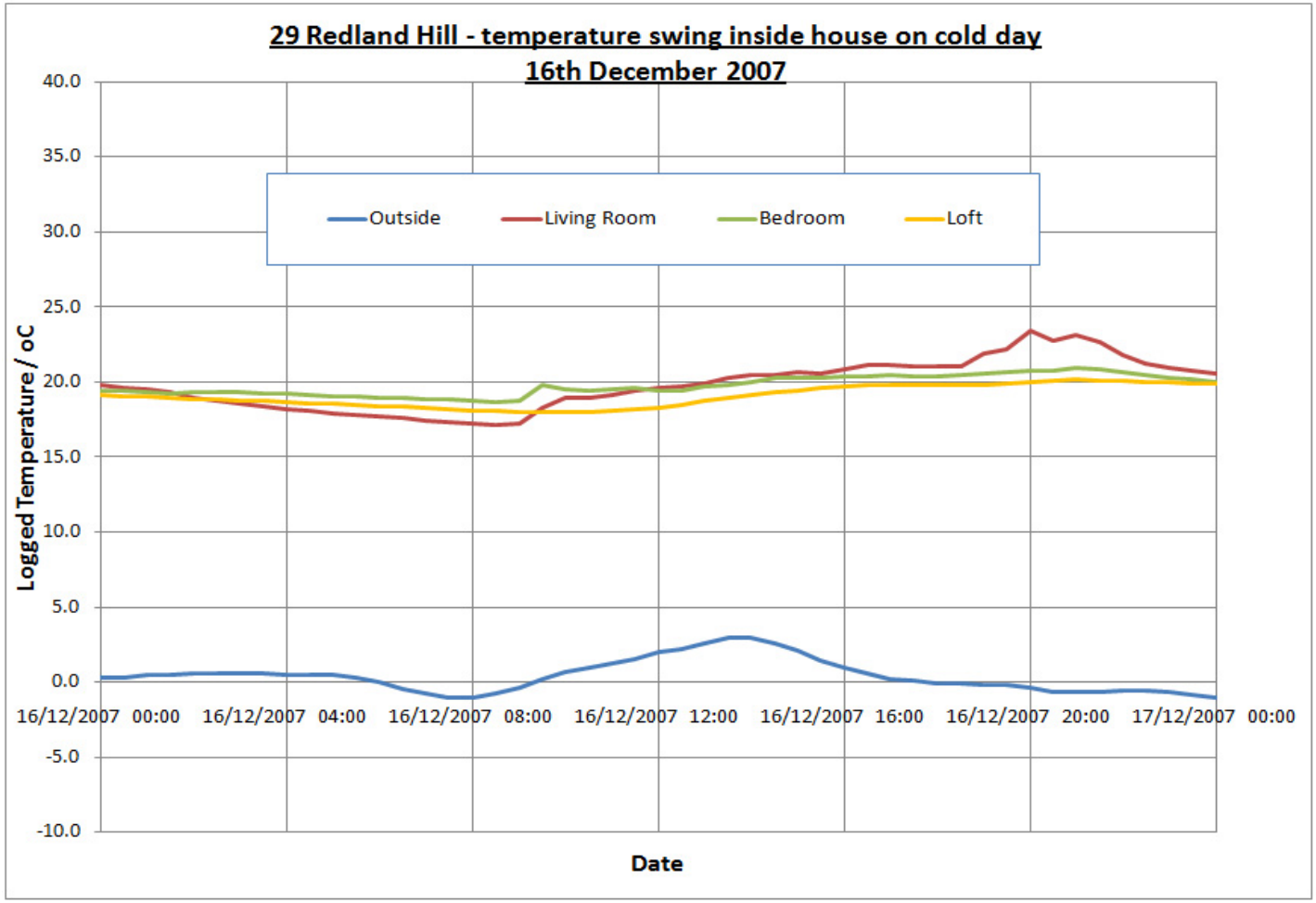
29 Redland Hill.

Photovoltaic panels

7 photovoltaic panels were installed on 1st September 2010 with an installed capacity of 1225W – about a quarter of the total electricity demand of the house and home office with three people.

29 Redland Hill.

Temperature swings over a 24 hour period



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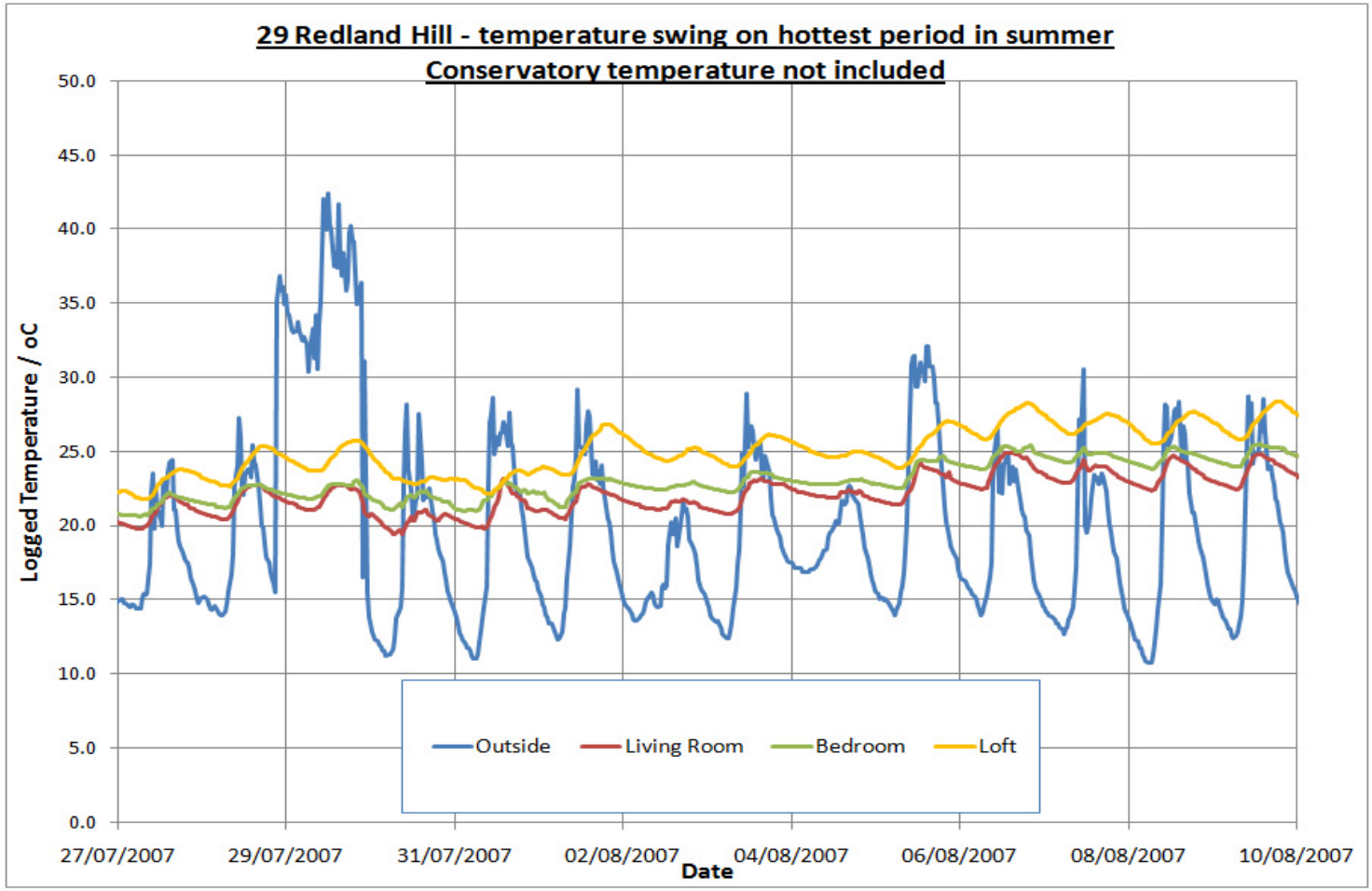
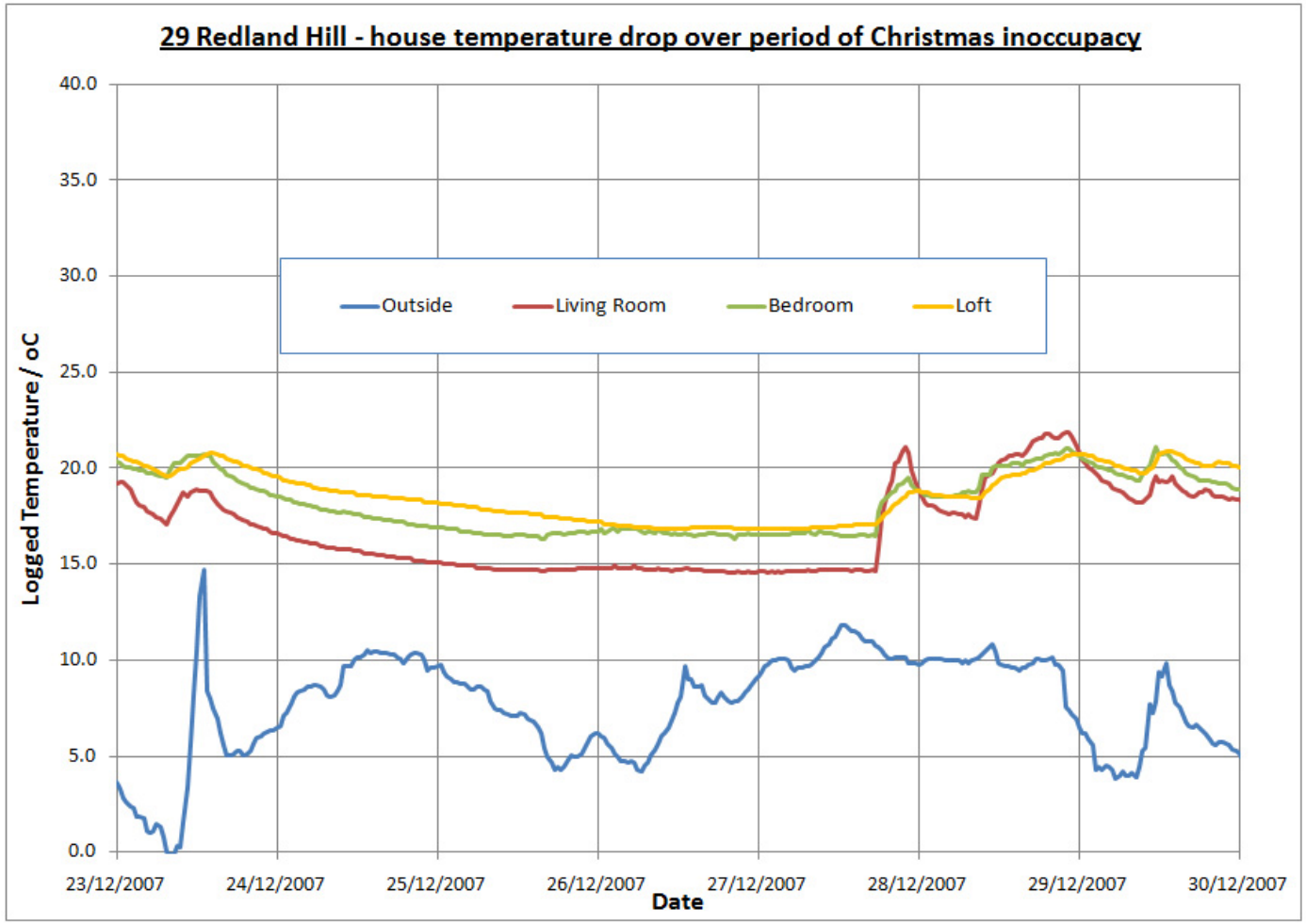
Thermal mass



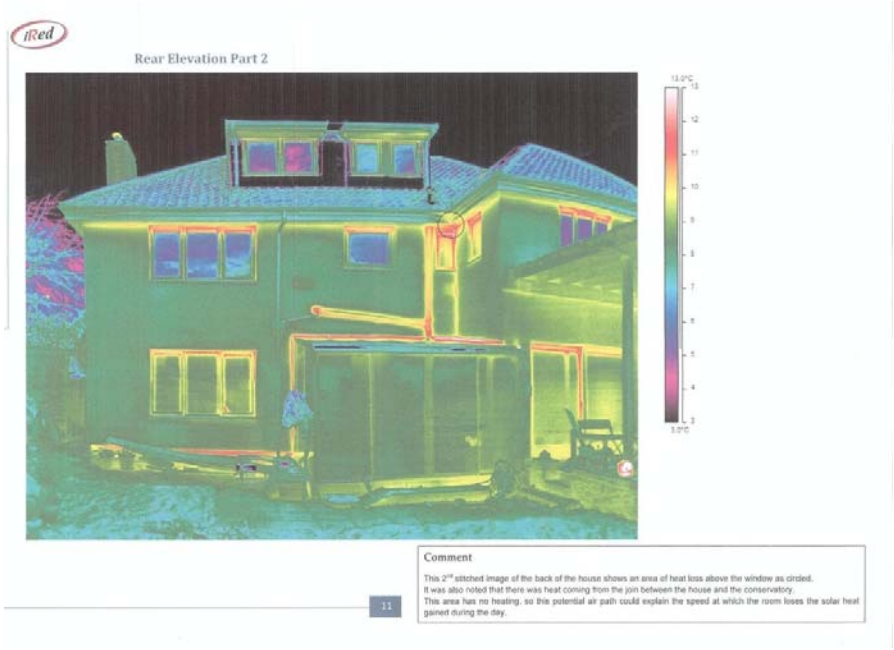
29 Redland Hill.

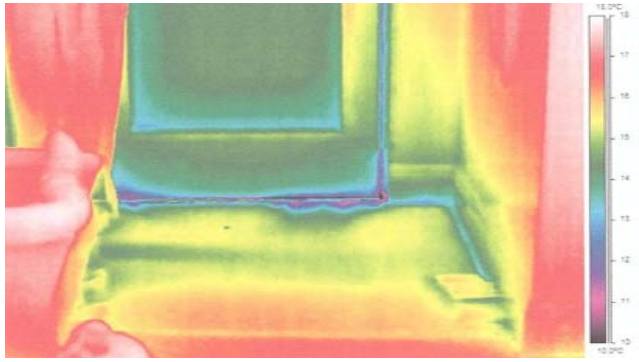
A week away at Christmas

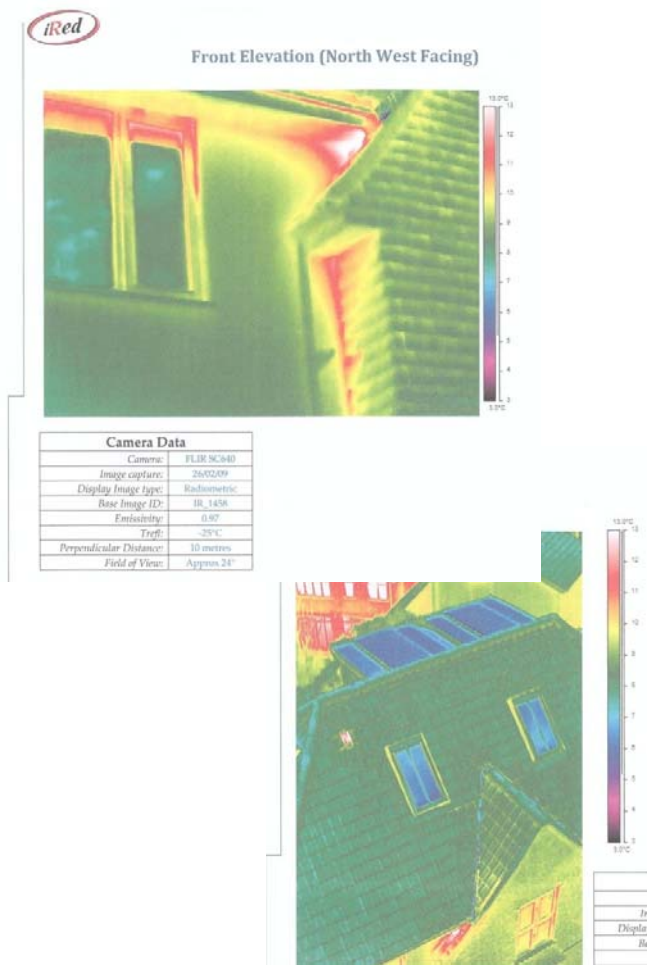


29 Redland Hill.

Thermographic images







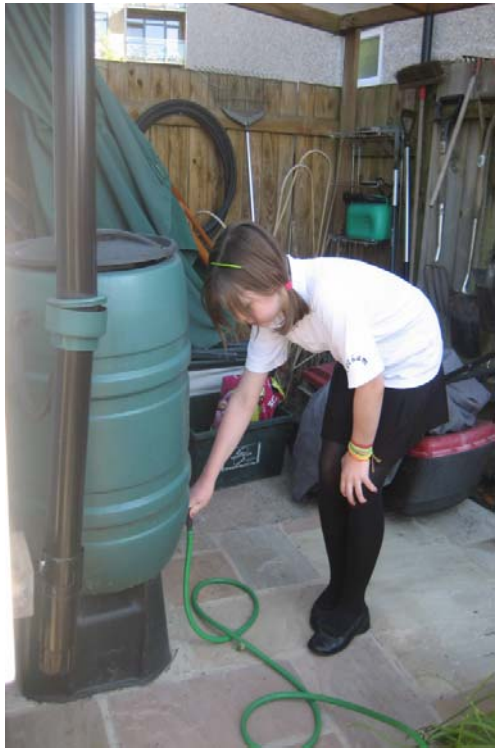
29 Redland Hill.

Low energy lighting

Light Type	Typical Efficacy (lm/W)	Usable optical Light (lm/W)	Lifetime (hours)
Incandescent	17	10-17	3000
Halogen / HPL	20 / 25	12-20	10,000
T12 fluorescent	60	45-50	20,000
Compact Fluorescent	62	31	10,000
Metal halide	70	<40	< 15,000
T8 fluorescent	74	55-60	20,000
High-pressure sodium	91	<50	< 24,000
T5 fluorescent	100	80	20,000
Best High Power white LED in 2007	105	85	> 50,000
Low-pressure sodium	120	65-70	18,000
Record LED -	150	120	TBD

29 Redland Hill.

Water



Average water consumption per person in the UK

= 150 litres/day

Average water consumption per person at 29 Redland Hill

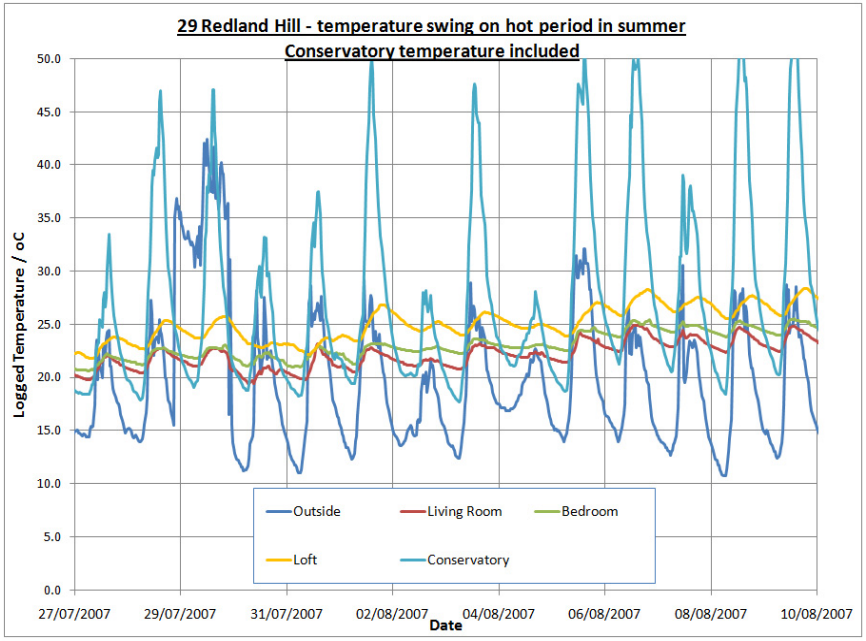
= 71 litres/day

Achieved through:

- **Showers not baths & low flow shower heads**
- **Low flush dual flush WC's (and not flushing every use!**
- **Rainwater harvesting for garden irrigation**
- **Water meter**

29 Redland Hill.

Conservatory



29 Redland Hill.

External works

- Existing & new compost bins (from pallets)
- Gardening/recycling garden ‘waste’
- Willow hurdles
- Existing herb garden
- New vegetable garden
- Heat treated timber cladding
- Green oak canopy over deck
- Reclaimed timber decking
- Aluminium rainwater goods

29 Redland Hill.

External works

- Porous paving..?

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