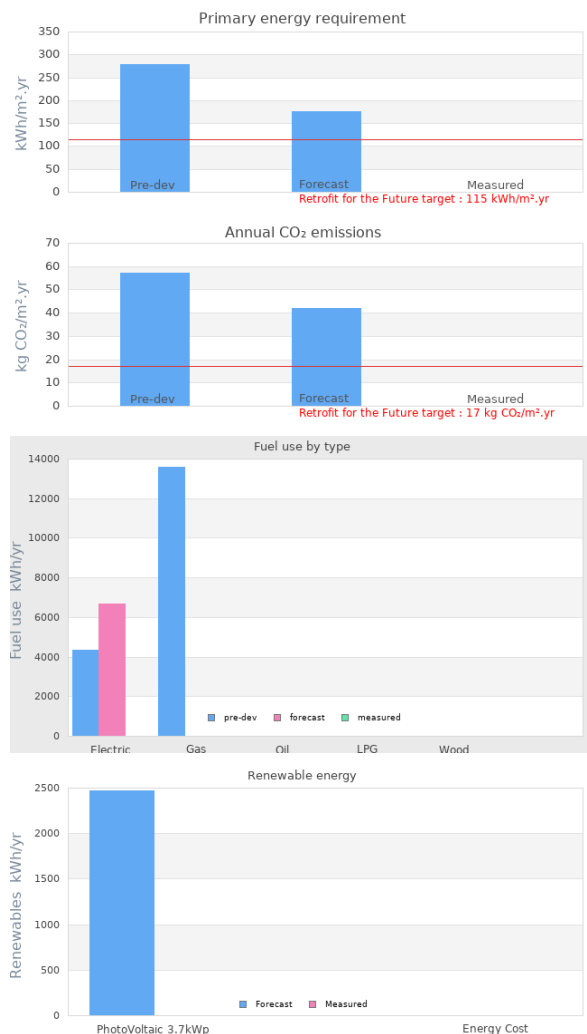


Project name Eco-retrofit Orpington - a multiple house solution

Project summary This whole-house AND MULTIPLE HOUSE solution is applicable to both void and tenanted homes that may or may not be at Decent Homes standards and makes most benefit from shared external spaces between houses. The UK-based SME supply chain includes an innovative ground source heat pump system that does not require a separate hot water tank, reducing disruption to tenants as the borehole is made in external land not in the residents' gardens, potentially bringing a district or shared energy network to the estate.



Project Description

Projected build start date	05 Apr 2010
Projected date of occupation	30 Nov 2009
Project stage	Under construction
Project location	Darrick Wood, Orpington, Kent, England
Energy target	Retrofit for the Future
Build type	Refurbishment
Building sector	Public Residential
Property type	End Terrace
Existing external wall construction	Masonry Cavity

Existing external wall additional information	100mm (approx) cavity
Existing party wall construction	Insulated 250mm masonry cavity wall
Floor area	95 m ²
Floor area calculation method	PHPP

Project team

Organisation	Keniston Housing Association
Project lead	Keniston Housing Association
Client	Keniston Housing Association
Architect	Broadway Malyan Ltd.
Mechanical & electrical consultant(s)	
Energy consultant(s)	Broadway Malyan Ltd.
Structural engineer	
Quantity surveyor	
Other consultant	
Contractor	TCS Group

Design strategies

Planned occupancy	Two adults occupy the property almost continuously, other than the 'school run'; on weekdays. A further two adults and one young child visit the house on a daily basis for 4-6 hours.
Space heating strategy	Ground source heat pump solution serving radiators with LTHW @55 deg C. Radiators proposed as slimline low water radiators with low efficiency, high output.
Water heating strategy	Instantaneous hot water via integrated thermal store within indoor Ground Source Heat Pump unit.
Fuel strategy	Ultra low all electric solution, offset by roof photovoltaic electricity generation.
Renewable energy generation strategy	High efficiency ground source heat pump. Roof mounted photovoltaic electricity (3.7kWp as a maximum - this figure is constrained by the input of the efficiency with SAP for the ground source heat pump, which runs at 400% and not 320%, as inputted.
Passive solar strategy	High performance low solar transmission glazing on the property which has windows on South-East and North-West elevations. A garden to both front and rear increase likelihood of tenants opening curtains.

Space cooling strategy	Comfort cooling is possible via reversible ground source heat pump operation. Openable windows for natural ventilation for most of the cooling season.
Daylighting strategy	No changes to the fenestration were possible in this retrofit proposal, but the new heating system with slimline radiators does allow more flexible planning of furniture, which could allow better daylight access through the existing glazing.
Ventilation strategy	Passive ventilation via openable windows and trickle vents. Extract fans in kitchen, bathroom and ground floor toilet.
Airtightness strategy	Significant improvement to gaps and cracks in envelope, targetting 3m ³ /m ² hr.
Strategy for minimising thermal bridges	Areas considered include junctions between external walls and roof, where refurbishment has taken place since the original construction. Window to wall junctions and door jamb are considered using specially fabricated "Passivhaus" windows and doors that address thermal breaks.
Modelling strategy	Whole house dynamic modelling was undertaken in an iterative manner using ies ve software, SAP 2005 9.81 + SAP extension - see energy forecast below. ies ve software used with SAP interface (SAP2005 9.81 via JPA Designer vr 4.04b1 build 002).
Insulation strategy	High performance TARGETTED roof insulation upgrade following detailed thermo imaging report and air tightness testing undertaken during phase 1. Triple glazing with target u-value of 0.7W/m ² k is the proposed upgrade to the existing double glazed windows.

Other relevant retrofit strategies

We are planning to carry out our package of retrofit measures with tenants remaining in the dwelling during the proposed works. We intend to demonstrate our approach can be undertaken with minimal disruption to the tenants and with no associated temporary re-housing costs. Due to the Landlord owning and managing all external land in between properties, there is the opportunity to install external ground source loops for up to 5 properties with potential to activate 1 property in Phase 2 leaving four ground loops capped off for future use. (subject to funding availability). Low energy lights, appliances, cooking and water-saving devices are also going to be supplied and installed.

Other information (constraints or opportunities influencing project design or outcomes)

Additional data logging devices and clear metering for easily controlled technology proposed to provide enhanced monitoring feedback to exceed TSB base specification is proposed, following discussion with current tenants that they are not especially energy-conscious at present and would benefit from support in this regard. The tenants have lived in this property for decades and have habits that might be challenged by the retrofit!

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric	4361	6680	
Gas	13603		
Oil			
LPG			
Wood			

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	57	42	-
Primary energy requirement (kWh/m².yr)	279	176	-

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
PhotoVoltaic 3.7kWp	2467.459961	

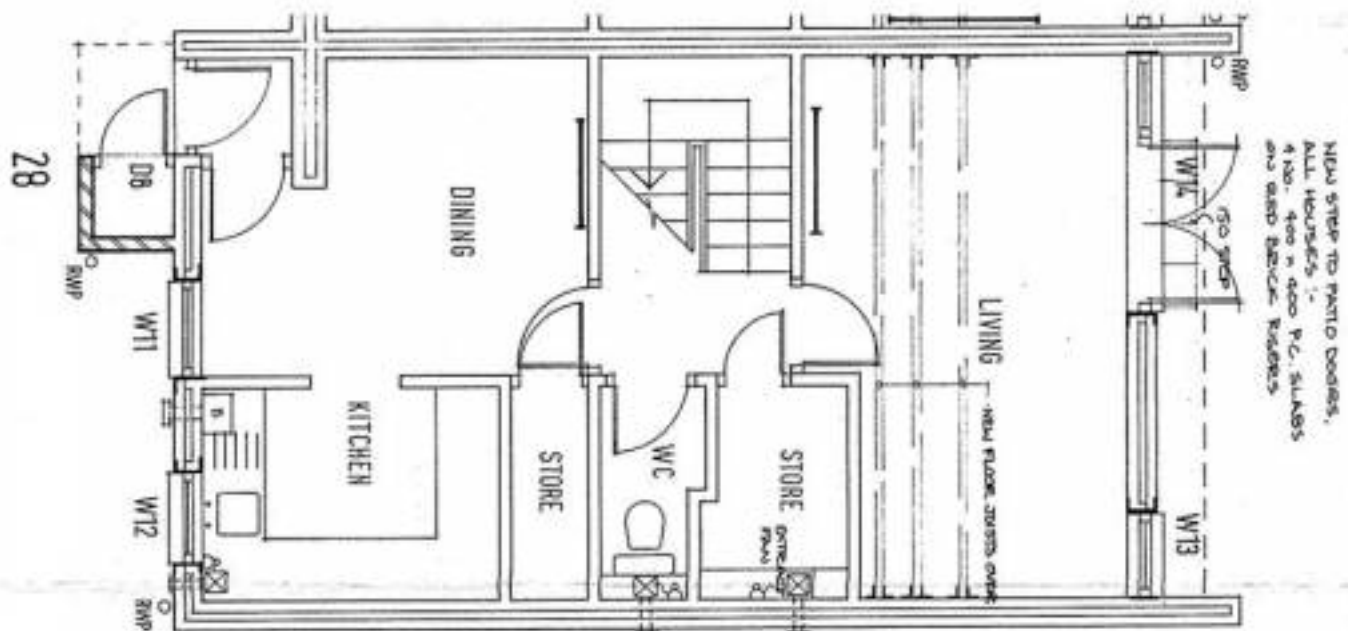
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Walls U-value	0.00W/m ² K
Party walls description	NULL
Party walls U-value	0.00W/m ² K
Floor description	NULL
Floor U-value	0.00W/m ² K
Glazed doors description	NULL
Glazed doors U-value	0.00W/m ² K
Opaque doors description	NULL
Opaque doors U-value	0.00W/m ² K
Windows description	NULL
Windows U-value	0.00W/m ² K
Windows energy transmittance (G-value)	
Windows light transmittance	
Rooflights description	NULL
Rooflights light transmittance	
Rooflights U-value	0.00W/m ² K

Project images



External images

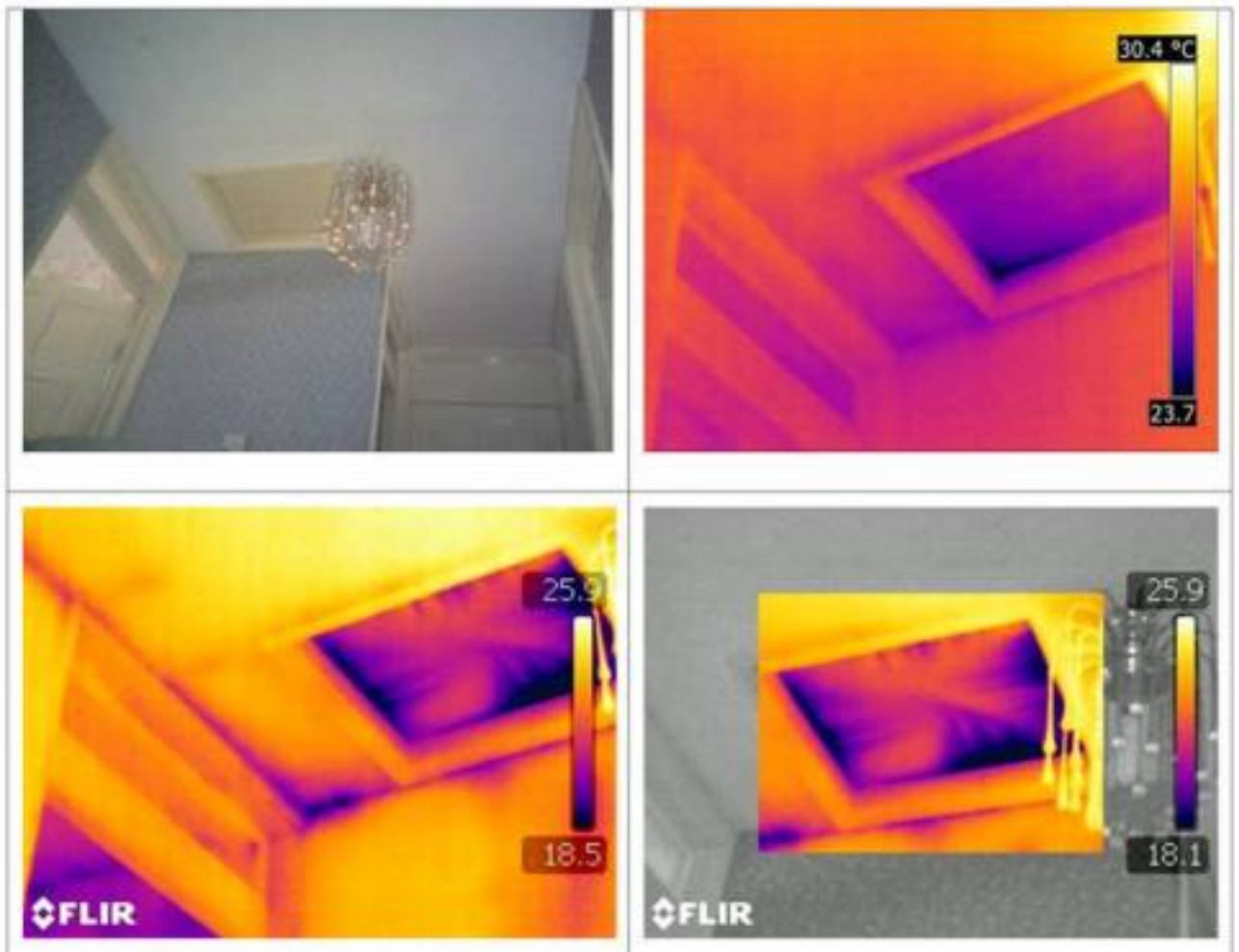


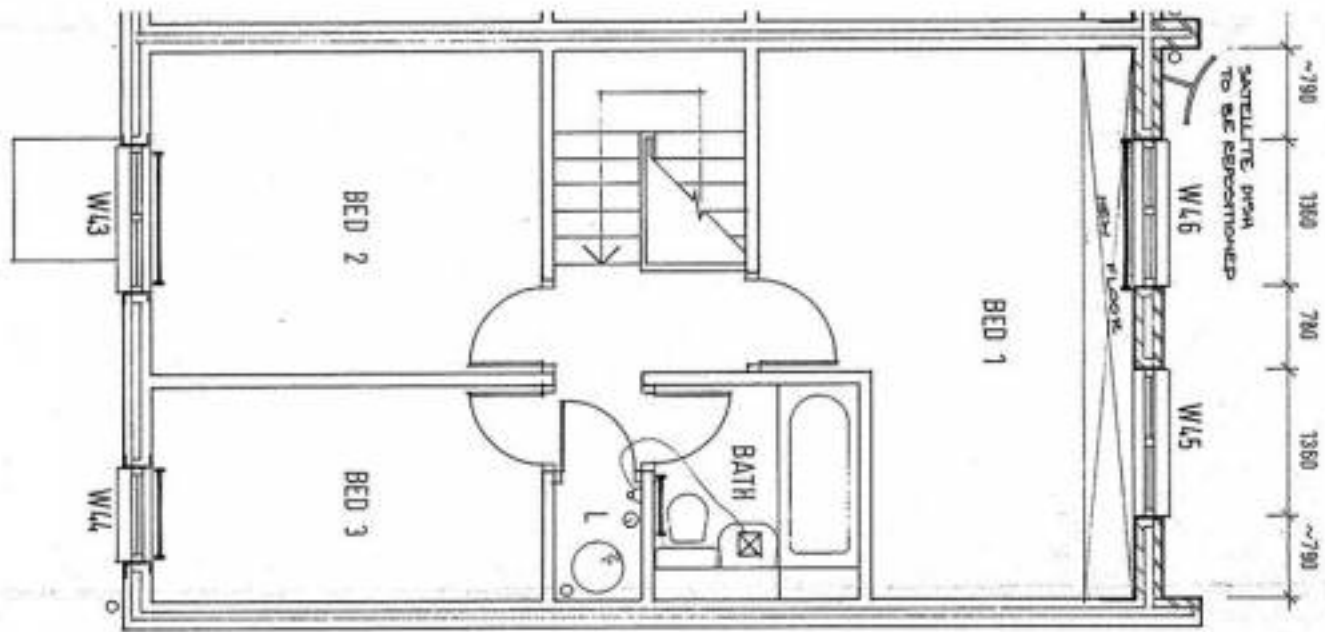


Lounge



Stairwell & Landing





Bedroom 1

