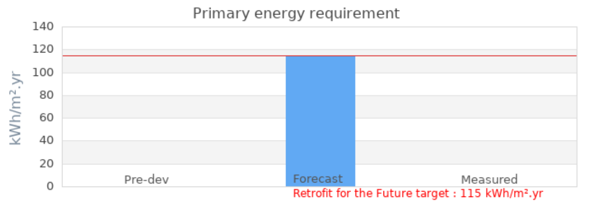
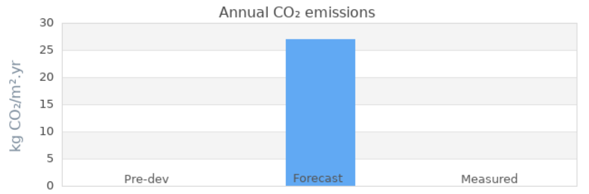
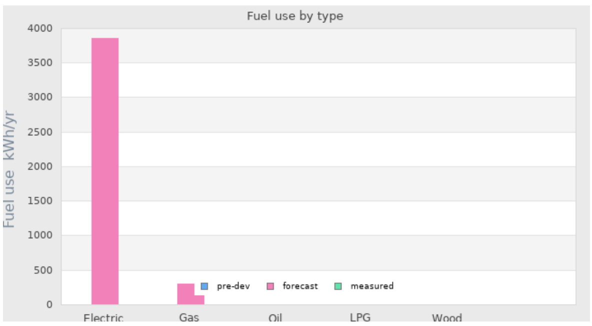
https://www.lowenergybuildings.org.uk/

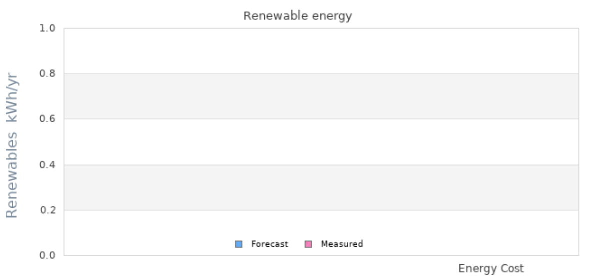
Project name Retrofitting a post Decent Homes Standard, timber frame property to reach one-eighth of the existing energy use and carbon emissions.

Project summary Fabric first retrofit of mid terraced 1970s timber framed dwelling, using innovative materials such as aerogel insulation, and technologies such as a compact service unit and waste water heat recovery system. Thermal bridging and airtightness will be radically improved in line with Passivhaus principles.









Project Description

Projected build start date	01 Jul 2010
Projected date of occupation	01 Jan 2011
Project stage	Under construction
Project location	Hailsham, East Sussex, England
Energy target	Retrofit for the Future
Build type	Refurbishment
Building sector	Public Residential
Property type	Mid Terrace
Existing external wall construction	Softwood frame
Existing external wall additional information	Partially tile hung

Existing party wall construction	
Floor area	87 m²
Floor area calculation method	PHPP

Project team

Organisation	Home Group Ltd
Project lead	Len Davies
Client	Home Group ltd
Architect	Home Architects
Mechanical & electrical consultant(s)	
Energy consultant(s)	BRE
Structural engineer	
Quantity surveyor	
Other consultant	
Contractor	

Design strategies

Planned occupancy	
Space heating strategy	Air heating from compact service unit - integrated system that combines an air source heat pump, mechanical ventilation with heat recovery, and a thermal store.
Water heating strategy	From compact service unit
Fuel strategy	Electric
Renewable energy generation strategy	None
Passive solar strategy	Maximisation of gains via internal layout remodelling. Triple glazed windows primarily selected for heat retention, although g-value is reasonable allowing good solar gains to be made.
Space cooling strategy	Passive cross ventilation; secure lockable night time ventilators will also be supplied.
Daylighting strategy	Full daylighting audit and calculations to accurately specify required lighting levels. Internal layout remodelling to remove existing obstructions and facilitate light penetration within the dwelling. Light coloured decoration and finishes to aid light reflection around internal spaces.
Ventilation strategy	Mechanical ventilation with heat recovery

Airtightness strategy	Comprehensive airtightness audit coupled with multiple air tests and smoke pencil diagnostics. Airtight membrane to walls, fully lapped with new DPM in replacement floor. Sealing to all surfaces and penetrations. Target to achieve 5m3/hr.m2
Strategy for minimising thermal bridges	Installation of roof, wall and floor insulation at the internal surface ensures near continuous insulation at wall/ceiling and wall/floor junctions. Internal and external reveal insulation will minimise thermal bridging around openings. The most significant thermal bridges are at internal walls and the upper floor plate. These have been individually estimated by calculation within PHPP, then converted back into a global bridging value. The result is slightly better than y=0.04. As the project enters the next phase we will undertake full numerical thermal bridge modelling to accurately calculate individual psi values, and to effectively target the proposed remedial measures.
Modelling strategy	Full SAP and PHPP calculations were carried out, including PHPP overheating calculation (0% risk). Retrofit for the Future extension spreadsheets were utilised to include appliances/cooking etc.
Insulation strategy	80mm Spacetherm aerogel insulation board to walls; dedicated PU loft boards over 50mm mineral wool in roof void to maintain storage capacity, excavation and rebuild of solid floor incorporating 240mm PU below screed, to maintain thermal mass. Excellent bridge detailing in line with Passivhaus principles (see section above). Triple glazed windows and thermally efficient doors.
Other relevant retrofit strategies	Showersave waste water heat recovery system will be installed. Savings has been appraised via SAP Appendix Q scheme.
Other information (constraints or opportunities influencing project design or outcomes)	

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric		3850	
Gas		295	

Fuel	previous	forecast	measured
Oil			
LPG			
Wood			

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	-	27	-
Primary energy requirement (kWh/m².yr)	-	115	-

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
-		
-		
Energy consumed by generation		

Airtightness (m³/m².hr @ 50 Pascals)

	Date of test	**Test result**
Pre-development airtightness	-	6.37
Final airtightness	-	-

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	-	15	-

Whole house energy calculation method	Other
Other energy calculation method	Both SAP and PHPP modelled. SAP extension Total PE consumption = 120kWh/m2/yr. SAP extension - CO2 Emissions = 19 kgCo2/m2/
Predicted heating load	26 W/m² (demand)
Other energy target(s)	

Building services

Occupancy	NULL
Space heating	NULL
Hot water	NULL
Ventilation	NULL
Controls	NULL
Cooking	NULL
Lighting	NULL

Appliances	NULL
Renewables	NULL
Strategy for minimising thermal bridges	NULL

Building construction

Storeys	
Volume	
Thermal fabric area	
Roof description	NULL
Roof U-value	0.00W/m² K
Walls description	NULL
Walls U-value	0.00W/m² K
Party walls description	NULL
Party walls U-value	0.00W/m² K
Floor description	NULL
Floor U-value	0.00W/m² K
Glazed doors description	NULL
Glazed doors U-value	0.00W/m² K
Opaque doors description	NULL
Opaque doors U-value	0.00W/m² K
Windows description	NULL
Windows U-value	0.00W/m² K
Windows energy transmittance (G-value)	
Windows light transmittance	
Rooflights description	NULL
Rooflights light transmittance	
Rooflights U-value	0.00W/m² K

Project images