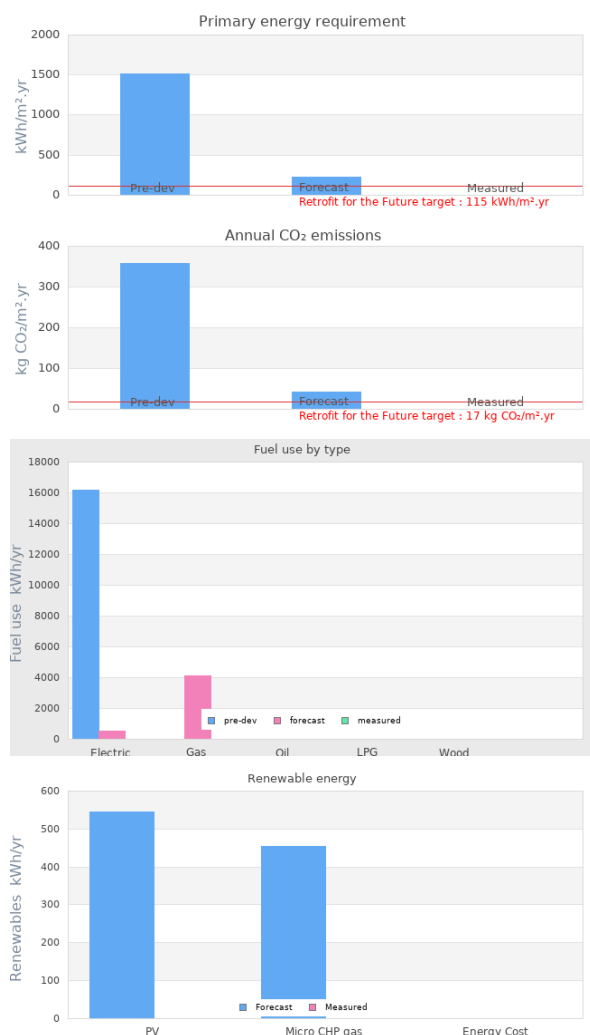


Project name Almshouses, Cambridge

Project summary This project will focus on a mid-terrace, 1-bed almshouse property in Cambridge. Our approach to energy saving and CO₂ reduction is to follow a lean-clean-green hierarchy: seeking to minimise heat losses from the property thermal fabric and ventilation method; to supply residual space and water heating using replicable, low carbon technology; to minimise lighting and appliance energy loads; and finally to consider micro-generation using proven, renewable energy systems.



Project Description

Projected build start date	01 Feb 2010
Projected date of occupation	28 Jun 2010
Project stage	Under construction
Project location	Cambridge, Cambridgeshire, England
Energy target	Retrofit for the Future
Build type	Refurbishment
Building sector	Public Residential
Property type	Semi-Detached
Existing external wall construction	Solid Brick

Existing external wall additional information

Existing party wall construction	Solid Brick
Floor area	26.8 m ²
Floor area calculation method	PHPP

Project team

Organisation	Cambridge Housing Society
Project lead	Cambridge Housing Society, Endurance House, Chivers Way, Histon, Cambridge, CB24 9ZR
Client	Cambridge Housing Society, Endurance House, Chivers Way, Histon, Cambridge, CB24 9ZR
Architect	Energy Conscious design, Studio 3, Blue lion Place 237 Long Lane, London SE1 4PU
Mechanical & electrical consultant(s)	Environmental Design Associates, 31 Wick Road, Teddington, Middlesex, TW11 9DN
Energy consultant(s)	ECD Project Services, Studio 3, Blue lion Place 237 Long Lane, London SE1 4PU
Structural engineer	Carter Clack Partnership, 49 Romney Street, Westminster, London, SW1P 3RF
Quantity surveyor	The Keegans Group, Studio 2, 193-197 Long Lane, London, SE1 4PD
Other consultant	Public Participation, Consultation and Research, Studio 2, 193-197 Long Lane, London, SE1 4PD
Contractor	Roalco Ltd, Ardleigh House, Dedham road, Ardleigh, Colchester, Essex, CO7 7QA

Design strategies

Planned occupancy	Property is currently void, but suitable new tenants will be found who buy into the monitoring strategy. They will be fully briefed on their new home and given a simple home information pack to explain the various technologies and controls along with local community facilities, recycling centers and public transport.
Space heating strategy	Heating will be provided by mains gas via a micro CHP unit and new radiators. Heat will be recovered from exhaust air via the use of mechanical ventilation with high efficiency heat recovery unit.
Water heating strategy	Hot water will be provided by mains gas via a micro CHP unit and new hot water cylinder
Fuel strategy	Mains Gas, Mains electricity

Renewable energy generation strategy	Onsite electric production by 0.7 kWp photovoltaic panels and low carbon electricity production via gas fired micro CHP unit.
Passive solar strategy	As this is a retrofit of a historic building within an area of architectural merit , options for reconfiguration of fenestration to improve passive solar gain will not be possible.
Space cooling strategy	HRV with summer bypass combined with natural ventilation for summer period. Night purging during heat waves.
Daylighting strategy	As this is a retrofit of a historic building within an area of architectural merit , options for reconfiguration of fenestration to improve daylight levels will not be possible.
Ventilation strategy	Heat recovery ventilation and additional natural ventilation by opening windows during summer months as required.
Airtightness strategy	All existing vents and chimneys blocked up. New air barrier created by OSB board at ceiling level with taped joints and perimeters taped to masonry walls and plastered over. Service void created below this to eliminated penetrations. Windows, floors, junctions and all penetrations sealed with proprietary air tight tapes, membranes and grommets. All voids such as cavities filled to mitigate thermal bypass.
Strategy for minimising thermal bridges	Continuous insulation maintained throughout. Geometric thermal bridges minimised. Junctions assessed include: Ground floor junction, external corner, party wall, party roof, party floor, eaves, verge, window jamb, head and sill, door jamb, head and threshold. Internal insulation has been returned on party walls.
Modelling strategy	Whole house modeling was undertaken in SAP, with the use of extension sheet produced for this competition. Dynamic simulation was used to assess the impact of our proposed micro CHP heating system with the results fed back into the SAP extension sheet.
Insulation strategy	- The existing solid floor will be insulated with a thin layer of aerogel laminated chipboard to achieve a U-value of 0.54 w/m2K - The existing solid walls will be dry lined internally with a high performance aerogel laminated board to achieve a U-value

Other relevant retrofit strategies

We propose to fit an intelligent heating controller designed to save energy and improve comfort in residential buildings. The system controls both central and water heating, reducing energy consumption by automatically monitoring and learning occupant behavior and preferences. It also provides an easy to use and simply user interface as well as covering all energy monitoring requirements. We also propose to carry out additional monitoring of the innovative heat saving thermal blinds.

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

Cambridge Housing Society manages over 2200 homes and provides care and support services for 520 people. This project will focus on a particular housing archetype - the almshouse - and will seek to establish a complementary and replicable set of measures which significantly reduce energy use and CO2 emissions. The challenges to low carbon retrofit presented by this property typify many of the issues prevalent in this housing type: uninsulated solid wall construction, poor quality single glazing, sensitive architectural character etc. It is intended that the findings will inform the remainder of Cambridge Housing Society's historic properties and will thus be widely applicable to other social landlords or building owners with similar stock.

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric	16193	506	
Gas		4093	
Oil			
LPG			
Wood			

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	357	43	-
Primary energy requirement (kWh/m².yr)	1511	223	-

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
PV	544	
Micro CHP gas	453	
Energy consumed by generation		

Airtightness (m³/m².hr @ 50 Pascals)

	Date of test	Test result
Pre-development airtightness	-	6.8
Final airtightness	-	3.74

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	-	79	-

Whole house energy calculation method	SAP Extension for Whole House
Other energy calculation method	
Predicted annual heating load	-
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/m ² K
Walls description	NULL
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

















