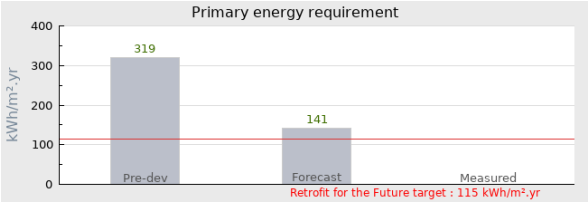
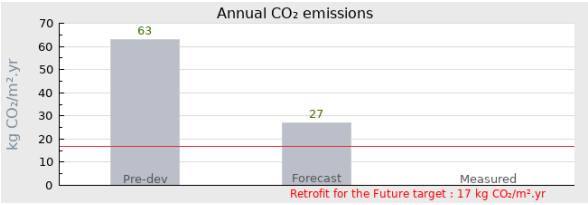
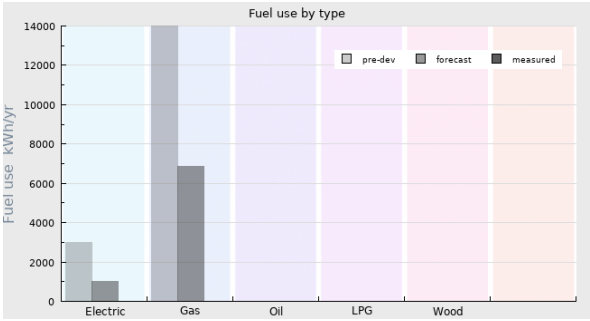
http://lowenergybuildings.org.uk

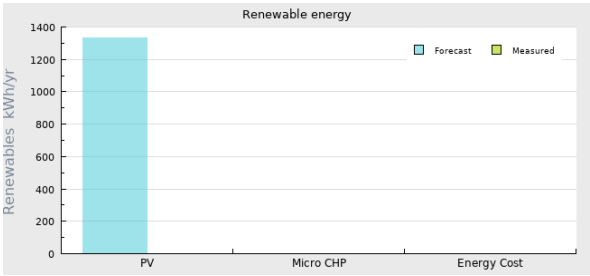
Project name Low Carbon Sheppey

Project summary The project involves 2 houses in Queenborough and Rushenden on the Isle of Sheppey in Kent, one a mid terrace 1974 built infill property, the other a post war semi detached house. The aim is to introduce technologies that are currently estimated to reduce energy demands and carbon emissions by well over 80% in each case. The technologies used for this vary by household. One will have extensive insulation, micro CHP, PV and solar thermal panels, the other will be the same but will use a biomass pellet stove instead of the CHP. We are overcoming the additional challenge of one of the properties already having tenants, and have found various solutions to work around that issue.









Project Description

Projected build start date	01 Feb 2010
Projected date of occupation	31 May 2010
Project stage	Occupied
Project location	Queenborough and Rushenden, Kent, England
Energy target	Retrofit for the Future
Build type	Refurbishment
Building sector	Public Residential

Property type	Mid Terrace
Existing external wall construction	Masonry Cavity
Existing external wall additional information	Unfilled cavity
Existing party wall construction	Masonry cavity
Floor area	74 m²
Floor area calculation method	SAP

Project team

Organisation	BBP Regeneration
Project lead	BBP Regeneration
Client	Amicus Horizon
Architect	
Mechanical & electrical consultant(s)	Swale Heating
Energy consultant(s)	Daedalus Environmental Limited
Structural engineer	
Quantity surveyor	WT Partnership
Other consultant	
Contractor	Swale Heating

Design strategies

Planned occupancy	Queenborough - currently a void, likely to be a 4 person family, at least 3 of whom out to work/school on weekdays. Rushenden - single mum with three children. Mother at home throughout the week, children all at school / nursery.
Space heating strategy	Queenborough - provided using a Baxi Ecogen micro CHP system fed using the gas network. Heat will be distributed using radiators, and controlled using programmer, thermostats and TRVs. Given expected heat loss, it is anticipated that when operating, CHP will be producing electricity (1kWe/6kWth). Rushenden - provided using a biomass pellet stove with integral boiler. This replaces the existing back boiler, and will provide very low carbon heat throughout the property using radiators. The system will be controlled using an innovative control system called Wattbox, which learns user occupancy patterns and heating needs.
Water heating strategy	In both properties this will be provided by solar thermal systems with back up provided by the main heating systems described above. There will be no electrical resistance back up.

Fuel strategy	Queenborough - mains gas and electricity, but vast majority of electricity should be generated by the property. Rushenden - biomass pellets and electricity.
Renewable energy generation strategy	Each property will be supplied with 4.64m2 of solar thermal panels providing renewable heat. Each will also have 1.6kW of PV panels to provide electricity. Renewable heat will also be provided to the Manor Road property using biomass pellets.
Passive solar strategy	Queenborough - the rear of the property faces due south. Window sizes cannot be optimised and the existing window sizes will remain. Rushenden - rear faces 30 degrees from south towards the east. Therefore will benefit from solar gain without excessive overheating faced by south west - west facing properties. Especially important as there is already a large area of glazing on this south east facade.
Space cooling strategy	Natural ventilation for most of the cooling season, with both properties able to benefit from cross ventilation. MVHR will be provided into both properties, with additional purging as required during periods of excessive heat.
Daylighting strategy	The average daylight factors in both kitchens is already at over 2%, and living rooms and dining rooms over 1.5%. Further daylighting improvement is somewhat hampered by a requirement to maintain window sizes in the untenanted property as it is located in a conservation area. The Manor Road property, which is tenanted, will also maintain its current window shapes and sizes. All living spaces in both properties have a view of the sky over 80% of the floor area.
Ventilation strategy	In the winter, ventilation will be provided by an Appendix Q rated MVHR system, with additional boost facilities to wet rooms / kitchen. Cross ventilation in the summer will be possible through openable windows.
Airtightness strategy	#NAME?
Strategy for minimising thermal bridges	#NAME?
Modelling strategy	The modelling was undertaken using Elmhurst Energy Systems SAP Modelling software for both properties.

Insulation strategy	Rushenden - Application of external insulation to filled cavity wall to achieve a U value of 0.2W/m2K - Additional mineral wool insulation across joists to achieve roof U-value of 0.1W/m2K - 10mm Ground floor Spacetherm blanket to ground floor to improve U-value from 1.5 to 0.4W/m2K - All glazing to achieve U-value of 1.1W/m2K Queenborough - As above but without external wall insulation and instead internal wall insulation to achieve U-value of 0.25W/m2K
Other relevant retrofit strategies	One of the properties is currently untenanted, the other has tenants. We are going to carry out the works with the tenants in situ to demonstrate how our approach can be much more useful in wider retrofit situations, where it will not always be possible to decant residents. This therefore will require no temporary re-housing costs. We will also be providing full and continued support to residents of both properties once retrofitting is complete, to deal with any issues and problems immediately. We will also be encouraging and assisting with other non-building related low carbon living issues, including 'growing your own' food, and other such lifestyle changes.
Other information (constraints or opportunities influencing project design or outcomes)	This project is an initial test case for a wider retrofit of 1500 homes in Queenborough and Rushenden. Should this project be successful, then we will roll out these solutions, or variations of them, into this number of properties over the next 5-10 years. The reasons why this community has been chosen for this pilot are many. Firstly, as a community in the lowest decile of the population, with many people claiming benefits and unemployment rife, there is extensive fuel poverty in the area, with many chronic health problems too. Furthermore, a recently confirmed masterplan for 2000 new homes did not include the improvement of existing properties to bring them up to the same standard, and therefore it was felt they should be addressed too.

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric	3000	1007	
Gas	14000	6872	
Oil			
LPG			
Wood			

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	63	27	-
Primary energy requirement (kWh/m².yr)	319	141	-

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
PV	1333	
Micro CHP		
Energy consumed by generation		

Airtightness (m³/m².hr @ 50 Pascals)

	Date of test	**Test result**
Pre-development airtightness	-	-
Final airtightness	15 Nov 2010	4.7

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	-	49	-

Whole house energy calculation method	SAP Extension for Whole House
Other energy calculation method	
Predicted heating load	3.27 W/m² (demand)
Other energy target(s)	

Building services

Occupancy	Manor Road: 1 adult, 3 childrenHigh Street: 2 adults, 2 children
Space heating	See H&S file attached to this DB entry
Hot water	See H&S file attached to this DB entry
Ventilation	See H&S file attached to this DB entry
Controls	See H&S file attached to this DB entry
Cooking	See H&S file attached to this DB entry

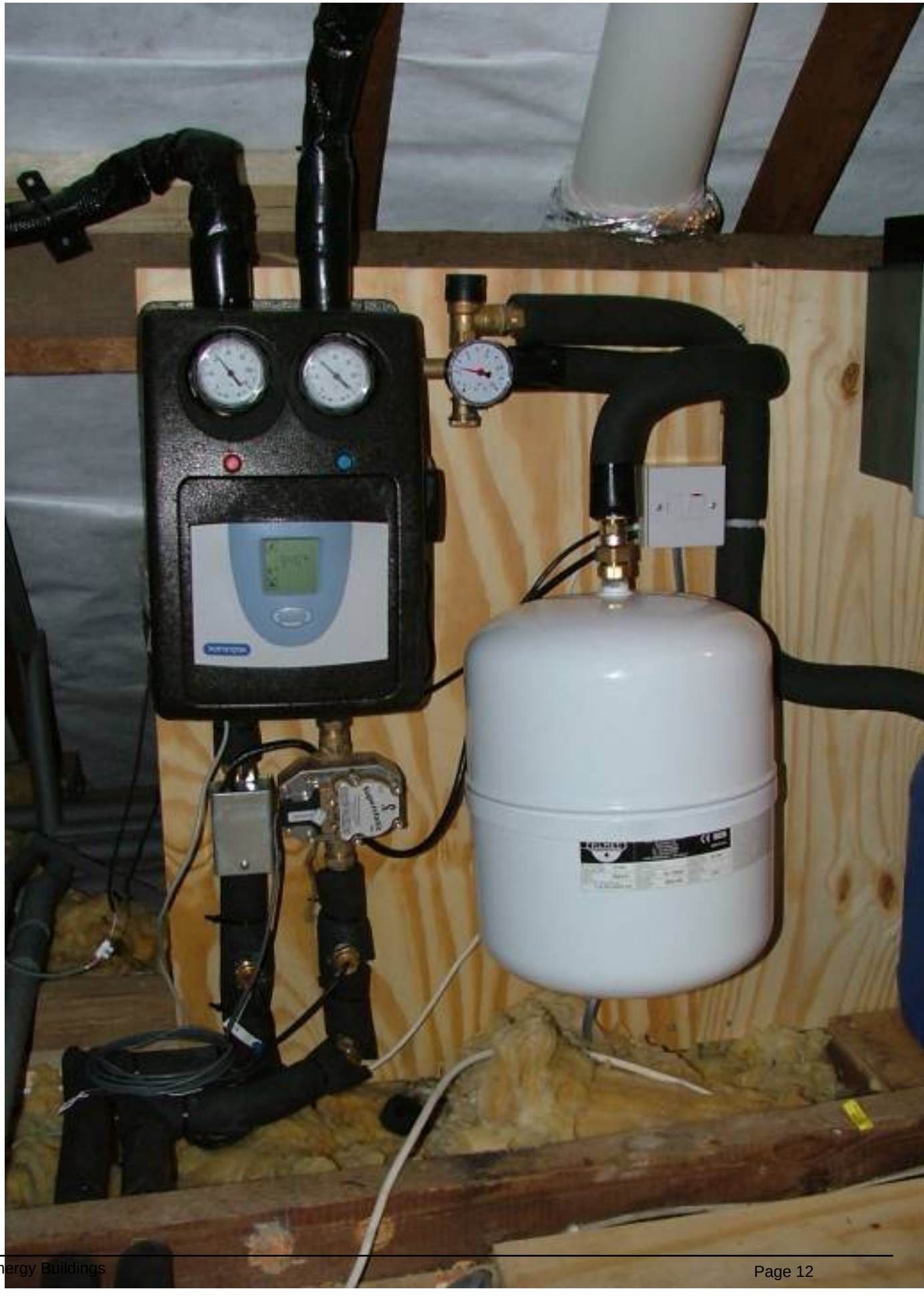
Lighting	See H&S file attached to this DB entry
Appliances	See H&S file attached to this DB entry
Renewables	See H&S file attached to this DB entry
Strategy for minimising thermal bridges	As per the design stage

Building construction

Storeys	2
Volume	
Thermal fabric area	
Roof description	400mm mineral wool blanket laid between and across joists.
Roof U-value	0.10W/m² K
Walls description	High Street: External brick - filled cavity - brick - Kingspan K17 insulated board - plaster skim - paintManor Road: External render - Kingspan K5 60mm EWB system - brick - filled cavity - brick - plaster - paint
Walls U-value	0.25W/m² K
Party walls description	Brick - cavity - brick
Party walls U-value	0.00W/m² K
Floor description	Concrete slab - Spacetherm C flooring laminate incorporating 18mm V313 grade chipboard and 10mm Spacetherm blanket - floor covering
Floor U-value	0.46W/m² K
Glazed doors description	2No. UPVC, partially glazed external doors
Glazed doors U-value	0.80W/m² K installed
Opaque doors description	
Opaque doors U-value	0.00W/m² K
Windows description	UPVC, double glazed, argon filled units
Windows U-value	1.10W/m² K installed
Windows energy transmittance (G-value)	
Windows light transmittance	
Rooflights description	
Rooflights light transmittance	
Rooflights U-value	0.00W/m² K

Project images


PREMIER

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