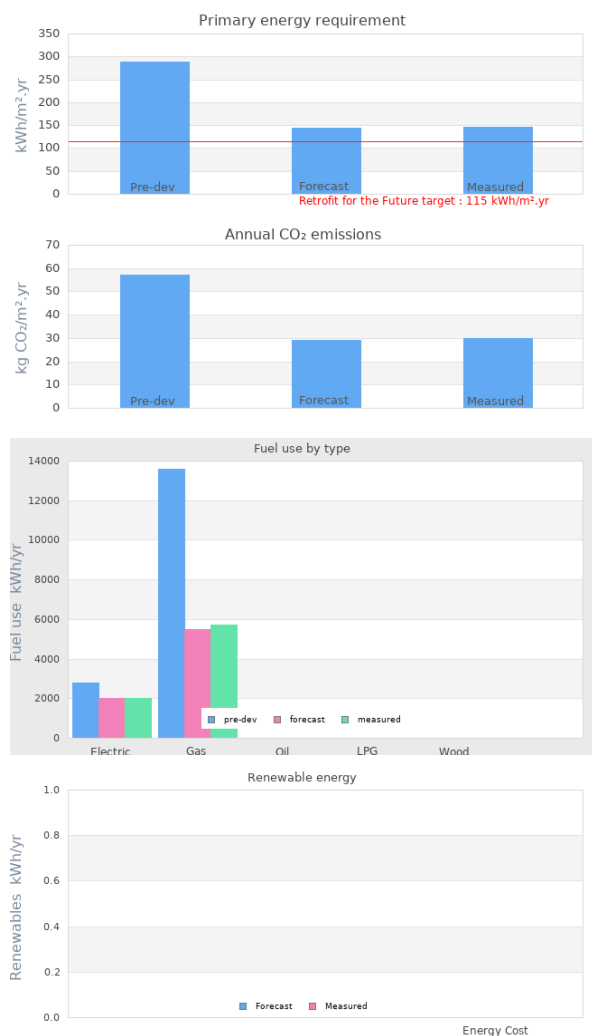


Project name Low Energy Home - Hay Tor

Project summary Energy upgrade of 1950's concrete bungalow. We were trying to achieve the best available insulation (u-values) in all areas and good airtightness within budget restrictions. We are very pleased with the result just over a year after the start of the Retrofit, which makes the home much more comfortable.



Project Description

Projected build start date	17 May 2010
Projected date of occupation	10 Dec 2010
Project stage	Occupied
Project location	Shrewsbury, Shropshire, England
Energy target	Retrofit for the Future
Build type	Refurbishment
Building sector	Private Residential
Property type	Detached
Existing external wall construction	Concrete frame
Existing external wall additional information	30mm thick panels fitted into posts at 1.8m centres
Existing party wall construction	

Floor area	78.5 m ²
Floor area calculation method	SAP

Project team

Organisation	Best Carpenters
Project lead	Claus Best
Client	Albus - Best
Architect	
Mechanical & electrical consultant(s)	
Energy consultant(s)	
Structural engineer	
Quantity surveyor	
Other consultant	Andy Simmonds Simmonds.Mills
Contractor	

Design strategies

Planned occupancy	Two people with mixed day-time use, but at home evenings and weekends.
Space heating strategy	Heating with mains gas - Viessmann system boiler with weather compensation feed supplying radiators with TVR's. Wood stove heating the main living area.
Water heating strategy	Solar hot water - 4m ² flat panels heating 200L insulated tank, with gas condensing boiler as back up.
Fuel strategy	Mains gas and wood.
Renewable energy generation strategy	No
Passive solar strategy	East and west elevations have large windows. On the south elevation the window spaces are reduced due to close proximity of buildings.
Space cooling strategy	Natural ventilation during warmer periods plus use of MVHR.
Daylighting strategy	I can't give percentages, but the building is a very light home.
Ventilation strategy	MVHR all-year round plus openable windows during warmer periods.

Airtightness strategy

Airtight membrane fitted to all ceilings in bungalow and taped to walls with grummetts for cables and pipes. Tapes fitted to new windows and door frames and plastered over in reveals. A pre-finish air-tightness test achieved 2.05@50Pa. The tester agreed that we would get below 1.5@50Pa at the end of the retrofit project.

Strategy for minimising thermal bridges

Due to having fitted internally opening windows we could fit 50mm external wall insulation against the frames of windows and doors. Most of the metal pipes breaking through the building envelope have been converted to plastic ones.

Modelling strategy

No specific modelling strategy, just went for best achievable outcome within budget.

Insulation strategy

Fitted 100mm Kingspan wallboards to achieve u-value of 0.21 W/m²K. Used polyurethane sprayfoam under felt in the attic to minimise loss of storage space and achieve a u-value of 0.19 W/m²K. Triple glazed windows and doors with u-value of 1.0 W/m²K.

Other relevant retrofit strategies

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

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric	2808	2000	1995
Gas	13605	5500	5684
Oil			
LPG			
Wood			

Primary energy requirement & CO₂ emissions

	previous	forecast	measured
Annual CO₂ emissions (kg CO ₂ /m ² .yr)	57	29	30
Primary energy requirement (kWh/m ² .yr)	289	144	147

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
-		

Renewables technology	forecast	measured
-		
Energy consumed by generation		

Airtightness (m³/m².hr @ 50 Pascals)

	Date of test	Test result
Pre-development airtightness	-	-
Final airtightness	19 Oct 2010	2.05

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	136	50	-

Whole house energy calculation method Other

Other energy calculation method Guestimate, extrapolated from 6 months run with all insulation and airtight measures in place.

Predicted annual heating load -

Other energy target(s)

Building services

Occupancy	2 people mixed day time use;
Space heating	wood stove plus gas central heating;
Hot water	4m ² solar panels feeding 200l tank plus gas boiler as back up.
Ventilation	ltho Eco 4 MVHR working constantly - 92% efficiency;
Controls	Main thermostat, TRV's on radiators, 2 set points for MVHR;
Cooking	Gas hob and electric fan oven
Lighting	mostly compact fluorescent with some LED lights;
Appliances	A rated fridge/freezer, dishwasher and washing machine;
Renewables	solar thermal panels;
Strategy for minimising thermal bridges	no fixed strategy for minimising thermal bridges, but tried as best possible within the budget;

Building construction

Storeys	
Volume	197m ³
Thermal fabric area	80m ²

Roof description	clay tiles on battens over bitumous felt, 125mm polyurethane foam under felt.
Roof U-value	0.19W/m ² K
Walls description	plaster on 75mm medium weight blocks with 125mm filled cavity, external skin consisting of concrete post and panel system with posts at 6' centres, panels are 25mm thick/100mm Kingspan wallboard fixed to external skin with acrylic render;
Walls U-value	0.21W/m ² K
Party walls description	None
Party walls U-value	
Floor description	Solid concrete floor slab with either parquet floor fitted or 18mm chipboard with carpet.
Floor U-value	0.67W/m ² K
Glazed doors description	fully triple glazed back and french doors, half glazed front door
Glazed doors U-value	1.00W/m ² K uninstalled
Opaque doors description	
Opaque doors U-value	
Windows description	triple glazed wooden windows
Windows U-value	1.00W/m ² K uninstalled
Windows energy transmittance (G-value)	
Windows light transmittance	
Rooflights description	
Rooflights light transmittance	
Rooflights U-value	

Project images











