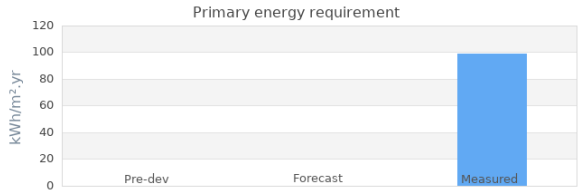
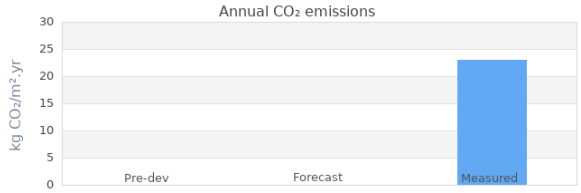
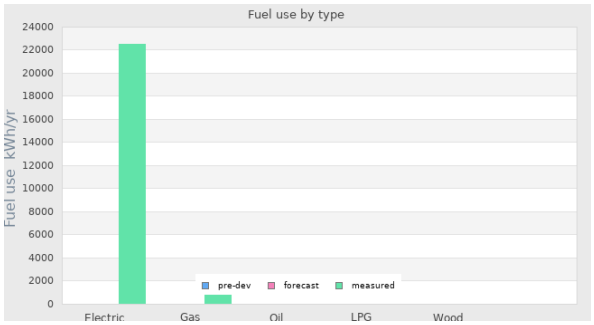
https://www.lowenergybuildings.org.uk/

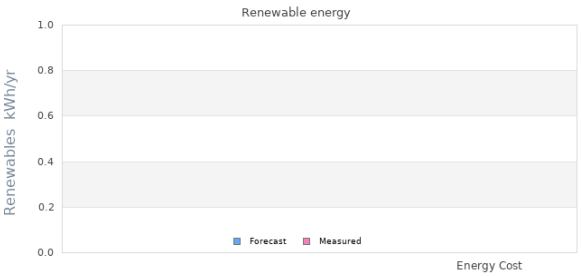
Project name The Oxlet

Project summary The project is a single, detached dwelling on a 5 hectare site that is part of the Wye Valley Area of Outstanding Natural Beauty and is located on the northern fringes of the Forest of Dean.









Project Description

Projected build start date	01 Dec 2003
Projected date of occupation	04 Jun 2006
Project stage	Occupied
Project location	Bishopswood, Forest of Dean, Gloucestershire, England
Energy target	other
Build type	New build
Building sector	Private Residential
Property type	Detached
Existing external wall construction	
Existing external wall additional information	
Existing party wall construction	

Floor area	290 m²
Floor area calculation method	APPROX

Project team

Organisation	
Project lead	Neill Lewis
Client	David and Felicity Wadge
Architect	Neill Lewis
Mechanical & electrical consultant(s)	Conservation Engineering Ltd
Energy consultant(s)	David Olivier of Energy Advisory Associates
Structural engineer	Allan Pearce
Quantity surveyor	Colin Jones
Other consultant	Wall, James and Davies (Planning Consultants)
Contractor	Self-built

Design strategies

Planned occupancy	2 occupants for the majority of the time.
Space heating strategy	Ground source heat pump feeding underfloor heating.
Water heating strategy	Dual immersion heaters with supplementary heating provided by evacuated tube solar hot water panels. Some adjustments to be made to heat pump to assist in heating hot water.
Fuel strategy	There are no mains services to the site apart from electricity and water, therefore electricity was planned to be the main fuel source.
Renewable energy generation strategy	The owners plan to install a 1.5 kW(e) micro hydro generating plant, which utilises the 45 m height difference between the house and the stream entering the site at the top of the hill. It will be grid-connected. The upper reservoir will be the remnants of two 22 m3 former fish ponds. Between them, this reservoir is able to store about 3 kWh(e).
Passive solar strategy	Window areas were larger on the south and east elevations and minimised on the north and west elevations.
Space cooling strategy	There is no active cooling system. In heatwaves, the windows are to be opened by night and closed by day. The curtains are also to be closed by day to reduce the level of solar gains entering the building.

Daylighting strategy	Some first floor spaces in the house are double-height and are lit from above by rooflights.
Ventilation strategy	Mechanical heat recovery and ventilation (MVHR) was proposed to deal with ventilation requirements.
Airtightness strategy	The main air barriers in the design are a wet plaster finish to the internal masonry walls and the vapour barrier on those sections of wall that are insulated internally.
Strategy for minimising thermal bridges	
Modelling strategy	
Insulation strategy	
Other relevant retrofit strategies	
Other information (constraints or opportunities influencing project design or outcomes)	The site had a chequered planning history. This included several refusals for barn conversions or holiday let(s). The owners first planning application, in 2001, proposed to demolish the existing cottage and milking shed and to replace them by a single much larger stone and rendered house, built partly into the steep east-south-east-facing slope. This position was felt to be more suitable than siting the replacement house within the curtilage of the original stone cottage, which was very close to the B road. The planners were sympathetic to this scheme. Subject to numerous conditions, it gained approval under their delegated powers.

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric			11237
Gas			492
Oil			
LPG			
Wood			

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	-	-	23
Primary energy requirement (kWh/m².yr)	-	-	99

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	-	-
Final airtightness	-	-

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	-	-	-

Whole house energy calculation method	
Other energy calculation method	
Predicted annual heating load	-
Other energy target(s)	

Building services

Occupancy	Predominantly as designed - 2 people.
Space heating	A Kensa ground source heat pump supplies underfloor space heating. There are fewer pipes in the screed than normal thanks to the reduced heat load. For a house with 290 m2 of treated floor area, the M&E engineers calculated a peak space heat demand of 6 kW(t) at -1C, based on continuous cold weather heating. This low loading of 21 W per m2 compares well to previous UK low-energy projects, such as the Elizabeth Fry Building at UEA.
Hot water	The main DHW tank is 0.165 m3. It is insulated with 50 mm of PU foam and has one solar coil and twin electric immersion heaters. A further 0.56 m3 heat dump store, with the same level of insulation, accommodates output from the solar system at times of surpluses. The factory level of insulation is felt by the owners to be a bit inadequate, but it was all that was available at the time. The owners have fitted loose mineral fibre jackets on top of the foam. So the effective overall level of insulation is probably equivalent to 60-65 mm PU foam. The DHW pipes are insulated throughout the house with 19 mm of foam insulation.

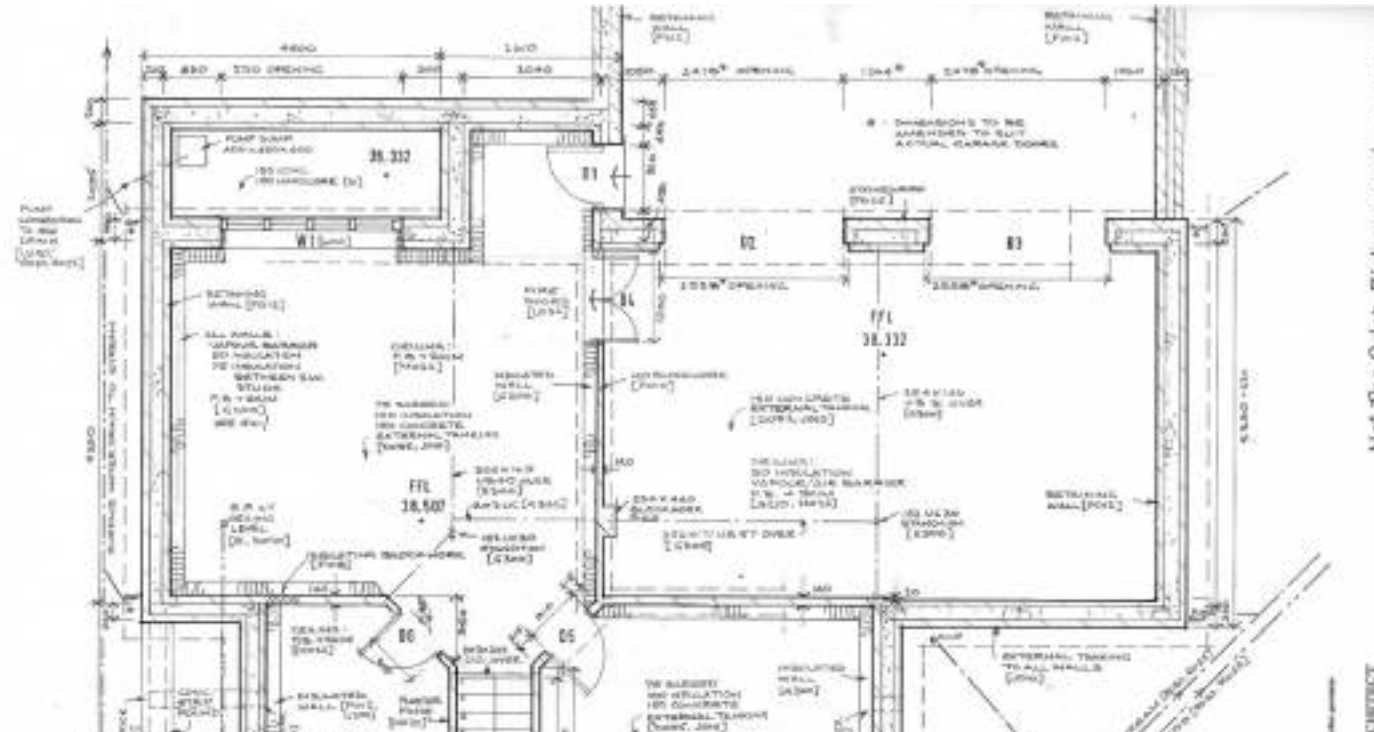
Ventilation	A Regavent 650 DC MVHR system with electronically-commutated DC motors.
Controls	
Cooking	Mostly LPG, two 19 kg bottles per annum, each containing c. 250 kWh. Gas hob and electric oven.
Lighting	Extensive use of 7 W compact fluorescent downlighters.
Appliances	A+ models were purchased wherever possible. There were some, even in the early 2000s.
Renewables	
Strategy for minimising thermal bridges	

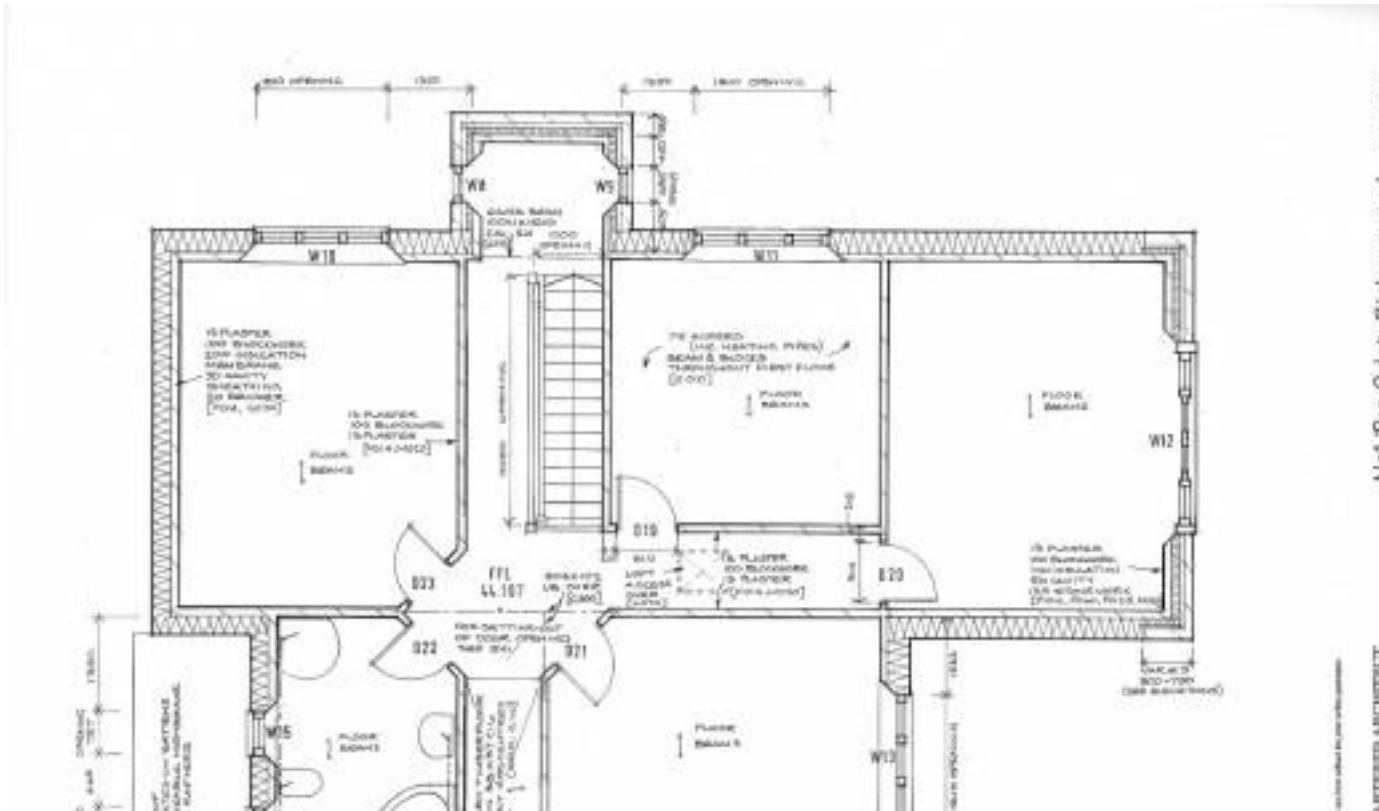
Building construction

Storeys	3
Volume	725m³
Thermal fabric area	
Roof description	Reclaimed Welsh slate, felt and battens, breather membrane, 250 mm deep OSB-webbed I beams on 600 mm centres, filled with 250 mm blown cellulose fibre. Polyethylene membrane for airtightness, sealed meticulously at all seams and sealed to the plaster on the walls. 38 mm PU foam internally, bonded to 12 mm plasterboard, skim coat of plaster.
Roof U-value	0.13W/m² K
Walls description	Wall type 1: 13 mm dense plaster, 100 mm dense concrete block, 70+50 mm Kooltherm phenolic foam slab, 25 mm residual cavity, 135-150 mm local sandstone. (U value 0.16 W/m2K)Wall type 2: 13 mm dense plaster, 100 mm dense concrete block, 200 mm blown cellulose fibre between TJI I beams on 600 mm centres, 9 mm Panelvent sheathing, breather membrane, 50 mm cavity, 20 mm render on stainless steel lath. (U-value 0.21 W/m2K)
Walls U-value	0.21W/m² K
Party walls description	
Party walls U-value	
Floor description	Basement: 75 mm sand-cement screed, 100 mm EPS insulation, DPM, 150 mm concrete slab, 150 mm hardcore. (U-value 0.31 W/m2K)Intermediate: 50 mm sandstone flags, 75 mm sand-cement screed containing underfloor heating pipes, 175 mm beam-and-block floor, 38 mm softwood battens, 90 mm Kingspan Thermopitch TP10.
Floor U-value	0.31W/m² K

Glazed doors description	Ecoplus brand supplied by Green Building Store Ltd. There is an insulated wood-faced panel and the glass above is warm edge, low-e, argon-filled double glazing.
Glazed doors U-value	1.40W/m² K uninstalled
Opaque doors description	
Opaque doors U-value	
Windows description	Danish oak-framed windows, by Vrogum, with 16 mm argon-filled low-e double glazing.
Windows U-value	1.40W/m² K uninstalled
Windows energy transmittance (G-value)	
Windows light transmittance	
Rooflights description	Velux double-glazed argon-filled low-e
Rooflights light transmittance	
Rooflights U-value	4.80W/m² K uninstalled

Project images

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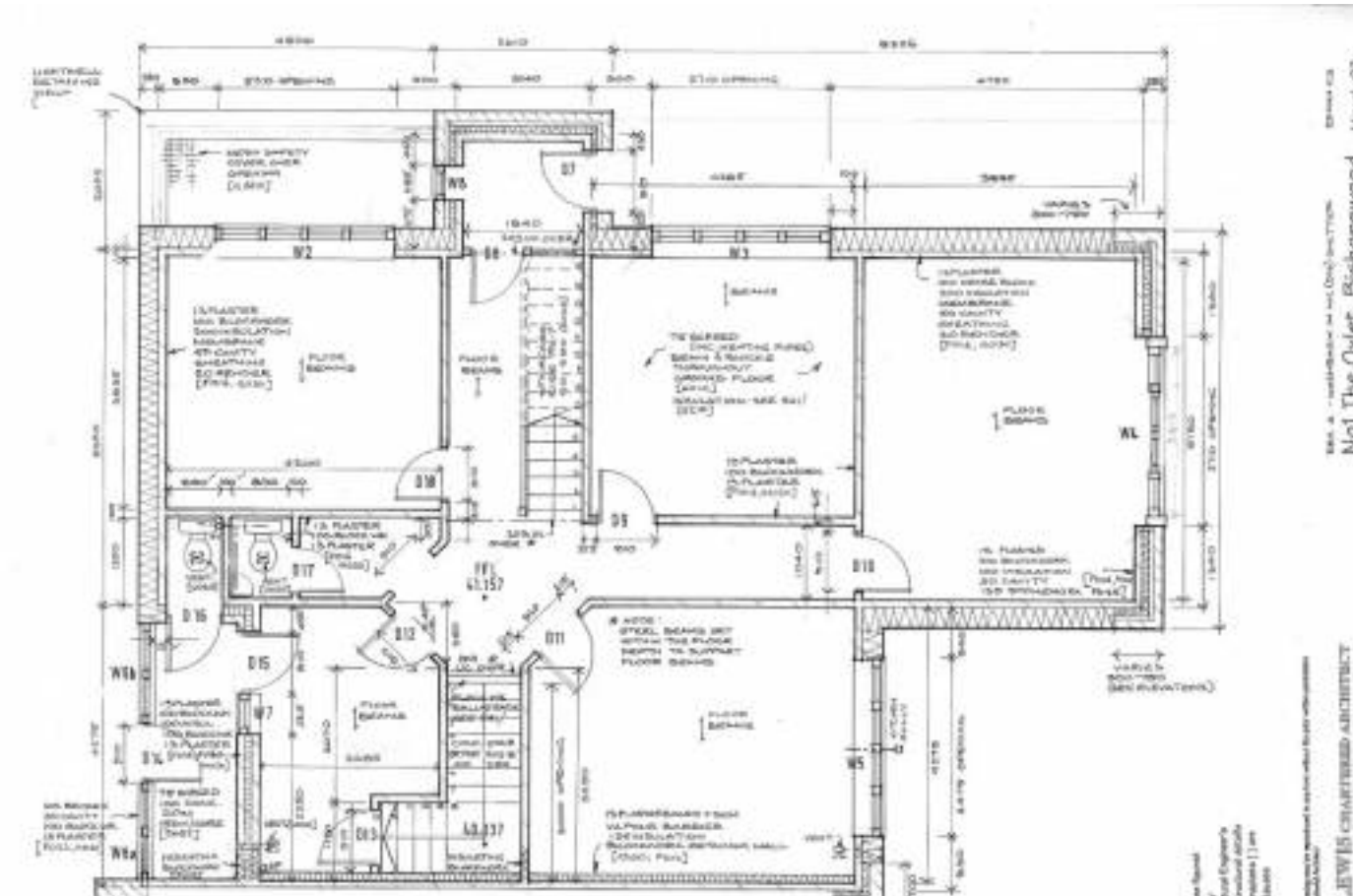

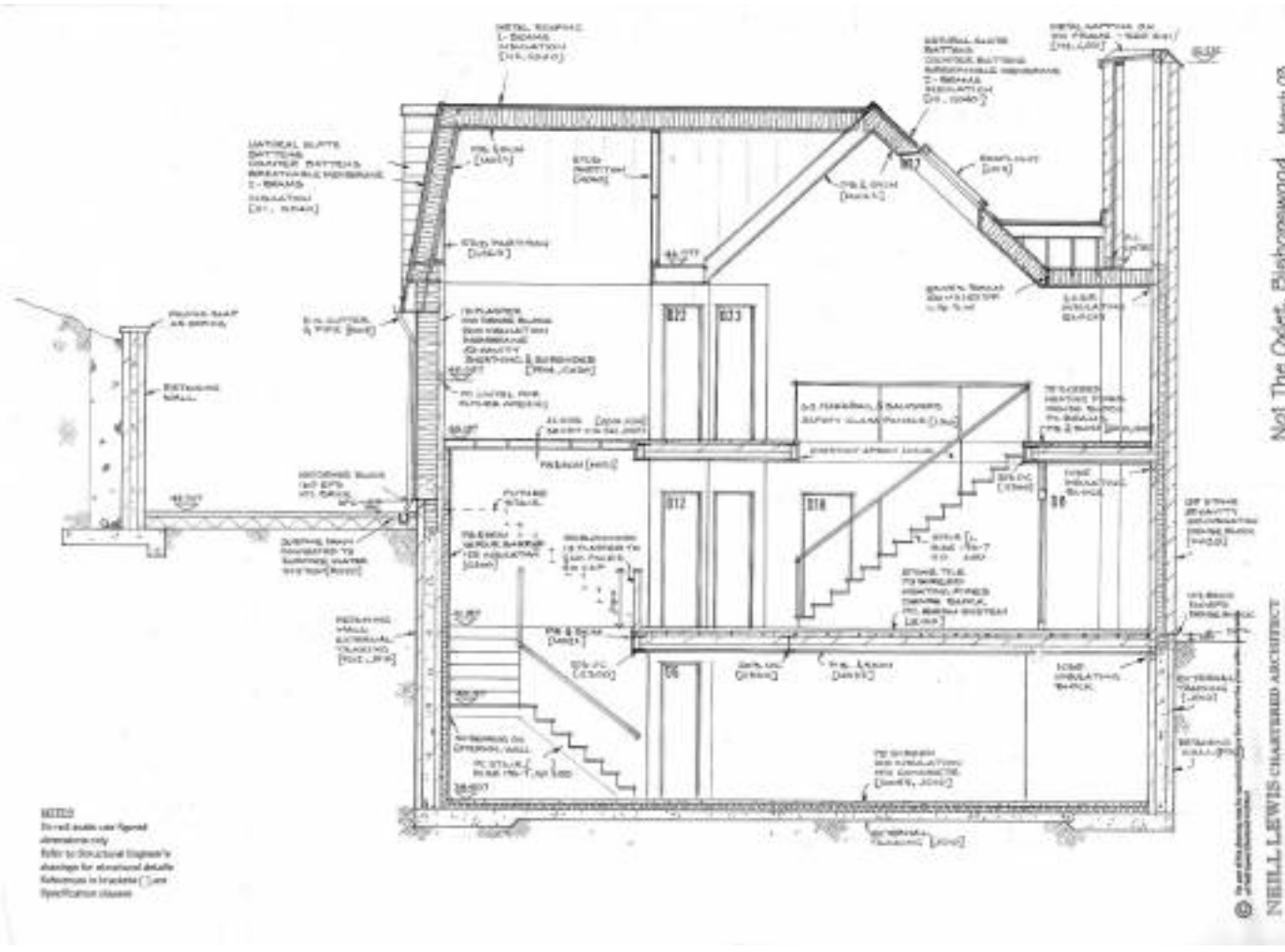
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