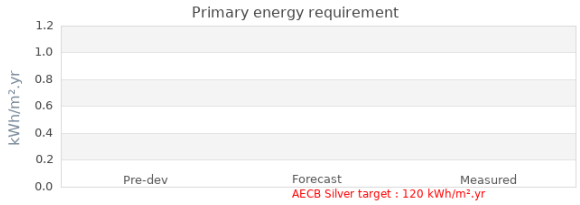
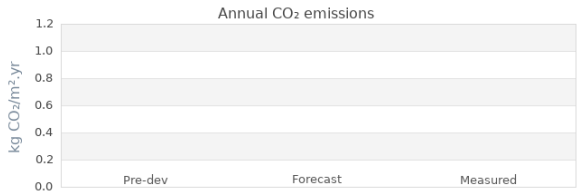
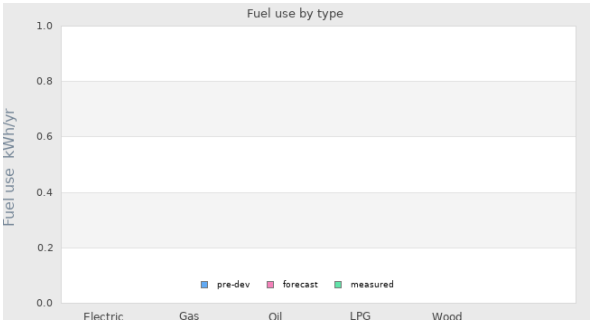
https://www.lowenergybuildings.org.uk/

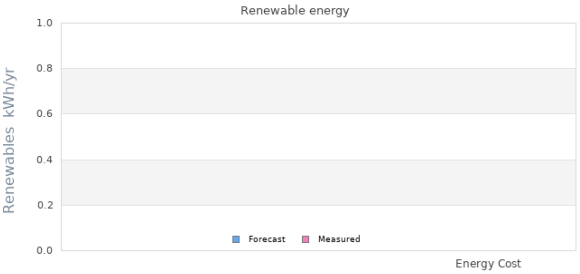
Project name Long Barn, Kiln Wood Cottage

Project summary A sustainable, new-build, fully accessable single-storey dwelling in a secluded woodland location, consisting of a large living barn, and smaller sleeping barn separated with a light well / courtyard. Careful consulation with SIGA to achieve an air tightness of 0.66 ach@50pa Constructed using the following:- FRAME : EXPOSED GLU-LAM TIMBER FRAME WITH BLACK COATED TIE BARS AND STAINLESS STEEL PLATE FIXINGS IN COLLABORATION WITH TIMBER INNOVATIONS AND INCORPORATING WOOD FIBRE INSULATION - CLADDING : BLACK BOARD AND BATTEN SQ. EDGE VERTICAL CLADDING, USING PERMACHAR 'RAVEN' CHARRED TIMBER LARCH MEDIUM FIRED, BRUSHED AND OILED. - ZINC ROOFING : GUTTERLESS OVERHANG ROOFING incorporating 0.7mm VMZinc Anthra standing seam Roof coverings at 530mm centres.- WINDOWS AND DOORS : ALU-CAD HIGH PERFORMANCE TRIPLE GLAZED WINDOWS BY NORSKENN- NIBE MVHR AND ASHP









Project Description

Projected build start date	08 Nov 2021
Projected date of occupation	31 May 2023
Project stage	Under construction
Project location	preston, Hertfordshire, England
Energy target	AECB Silver

Build type	New build
Building sector	Private Residential
Property type	Detached
Existing external wall construction	Softwood frame
Existing external wall additional information	140mm wood fibre insulation between studs, = 0.038 mK 80mm PIR
Existing party wall construction	
Floor area	181.95 m²
Floor area calculation method	PHPP

Project team

Organisation	TAS ARCHITECTS
Project lead	PAUL THOMAS
Client	MIKE AND SUSAN KELLARD
Architect	TAS ARCHITECTS
Mechanical & electrical consultant(s)	N/A
Energy consultant(s)	ENHABIT
Structural engineer	PRICE AND MYERS
Quantity surveyor	N/A
Other consultant	N/A
Contractor	BASE DEVELOPMENTS

Design strategies

Planned occupancy	Two people, retired couple but active social lifes and hobbies.
Space heating strategy	Heating from Air Source Heat pump with underfloor heating; Heat recovered from bathrooms / kitchens.
Water heating strategy	8kw Air Source Heat Pump (ASHP), feeding a 200 litre hot water storage cylinder
Fuel strategy	Mains electricity
Renewable energy generation strategy	N/A
Passive solar strategy	House orientated South, but enclosed with Deciduous trees, meaning that in the summer, overheating is reduced, and but potential for some solar gains in the winter. Overhang (gutterless) zinc roofs providing additional solar shading.
Space cooling strategy	MVHR, with natural cooling in summer, with shallow plan and good opportunity for cross ventilation. Secure light well acts as additional option for cooling.

Daylighting strategy	Clients specifically din't want rooflights, meaning Dual Aspect to habitable rooms were created, Kitchen and living rooms south and North facing. Daylight factors expected to be relatively high.
Ventilation strategy	- Comfort ventilation with heat recovery (winter)- Openable windows (summer)- Refer to space cooling
Airtightness strategy	- Clear communication and contractual definition in relation to importance of airtight layers needing to be continuous.- Clear and highly detailed junction drawings, setting out detail, but also sequence. - Mid point site strategy meeting with SIGA- Two test strategy to Air leakage tests. - Multiple meetings with SIGA to develop a robust strategy on membranes to include VCL/AT layer - SIGA MAJREX ONE-DIRECTIONAL AVCL SEALED WITH SIGA AIRTIGHT SYSTEM (the only Vapour control layer on the market with an increased one-directional drying functionality) Breather layer - SIGA Majcoat 200SOB (monolythical breather membranes have an increased lifespan over microporous membranes)- Where necessary, and due to complex build ups or roof overhangs, installing the breather membrane on the external side of the PIR insulation instead of draping it under the PIR at the location of the feature rafters. The places where the breather membrane will drop down and the feature membrane will penetrate the breather membrane this detail was sealed with SIGA Wigluv.- Tapes specified as Wigluv 20/40 | UV-resistant adhesive tape | SIGA and Wigluv black 20/40 | Adhesive tape with backing strip | SIGA- Timber frame contractor asked to include most of the batten installation including those on-site in their package to reduce risk of potential risk of damaging membranes if carried out by others.

Strategy for minimising thermal bridges	- To achieve a thermal bridge free design, multiple design team meetings between timber frame contractors, main contractors, Architects, Enhabit and Structural engineers took place. The timber frame is completely wrapped making thermal bridging more difficult. Certain details were more closely assessed.- Assessing the wall to roof junctions, having WUFI calcs done, and variables tested, due to complex roof overhangs and hybrid insulations.- At Wall to floor junctions liaising with Marmox Thermoblock to include the load-bearing heat-insulating building blocks, and significantly reducing thermal bridging at all the wall to floor junctions. Assessments were done on three variables to acheive an efficient detail using these thermally insulating Extruded Polystyrene blocks.
Modelling strategy	Whole house modelling was undertaken in PHPP and dynamic simulation was used to assess the impact of different parameters in relation to natural insulations such as wood fibre insulation.The result was a theoreticalal heating demand of 28.3 kWh/m2a. This result would allow compliance with the requirements of both AECB Standard and PHI Low energy building even with a Air leakage test allowance of 1.5 ach@50Pa.
Insulation strategy	Walls: Timber construction Insulation140mm wood fibre insulation between studs, and 80mm PIRinsulation with a U Value 0.14 W/m2 KFloor: Solid Floor with 165mm PIR insulation, U Value = 0.14 W/m2 KRoof : Timber construction 140mm woodfibre insulation between rafters with 80mm PIR U Value = 0.14 W/m2 K
Other relevant retrofit strategies	Sustainable drainage strategy : Neither Kiln Wood Cottage nor the site for the adjacent new barn has access to a main public sewer forthe disposal of foul waste. The new house discharges foul waste to a new bio pure treatment tank discharging to a drainage field in the northern part of the garden.

Other information (constraints or opportunities influencing project design or outcomes)	Whilst building is orientated towards the south it is situated within a sheltered woodland environment. The site is within an old clay pit. It lies in the curtilage of a Grade II listed Lutyens building, outside the existing development area of the village. The surrounding woodlands are ecologically sensitive and are situated in the heart of an emerging Green Belt extension.

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric			
Gas			
Oil			
LPG			
Wood			

Primary energy requirement & CO2 emissions

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

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
Space heating
Hot water
Ventilation
Controls
Cooking
Lighting
Appliances
Renewables
Strategy for minimising thermal bridges

Building construction

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

Project images