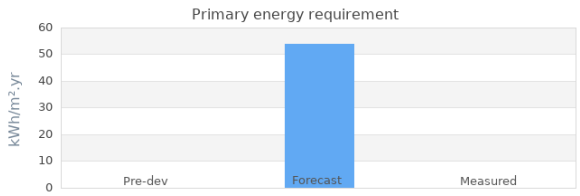
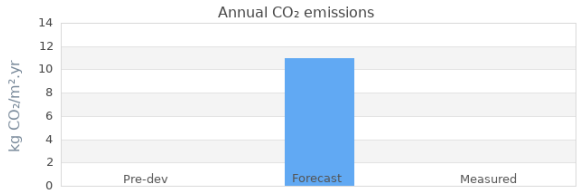
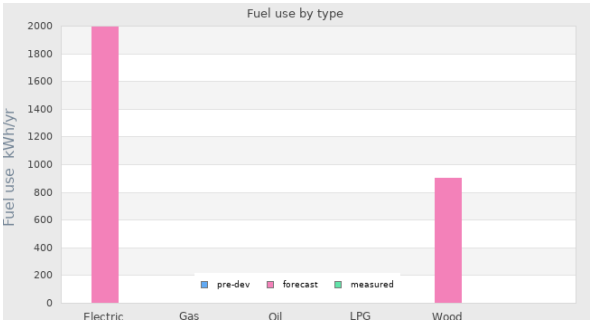
https://www.lowenergybuildings.org.uk/

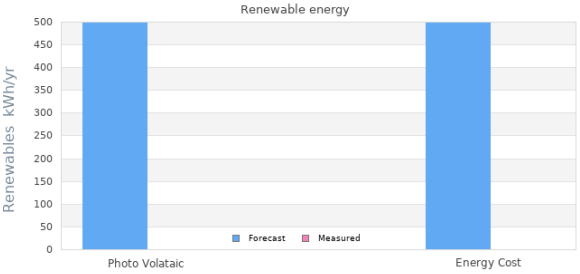
Project name Steijger Solar House

Project summary Timber framed, super insulated detached dwelling with whole house ventilation and heat recovery. Rainwater harvasting system and P.V. on south facing roof.









Project Description

Projected build start date	17 Jul 2001
Projected date of occupation	30 Mar 2002
Project stage	Occupied
Project location	South Normanton, Derbyshire, England
Energy target	other
Build type	New build
Building sector	Private Residential
Property type	Detached
Existing external wall construction	Softwood frame
Existing external wall additional information	red cedar cladding
Existing party wall construction	
Floor area	110 m²

Floor area calculation method	SAP

Project team

Organisation	Silvercrest Energy and Automation
Project lead	Claremont Construction, Cromford
Client	Mr. L. Steijger
Architect	A. Newton, Idridgehay
Mechanical & electrical consultant(s)	
Energy consultant(s)	Silvercrest Energy and Automation
Structural engineer	
Quantity surveyor	
Other consultant	
Contractor	

Design strategies

Planned occupancy	Two adults, mostly working from home.
Space heating strategy	Solid bio-fuel stove, due to super insulation and air circulation little other heating is required.
Water heating strategy	Air source heat pump, extracting heat from excess in the dwelling.
Fuel strategy	Mains electricity, bio-fueled stove
Renewable energy generation strategy	1 kWp. photovoltaics on south facing roof.
Passive solar strategy	Large due south facing conservatory with overhanging roof provided heating in the winter whilst preventing overheating in the summer.
Space cooling strategy	Due to incorperating all factors into the design, not required. One of the standard features of MVHR now is to bypass the heat recovery during warm periods.
Daylighting strategy	Strategically placed windows on east and west provide sufficient daylight most whole year round, whilst preventing too much solar gain in summer.
Ventilation strategy	Mechanical ventilation with heat recovery in winter, summer bypass and opening windows in case of extreme heat.
Airtightness strategy	Blown in insulation material ensured that all possible gabs are filled. Foam filling between window ledges and windows ensured air tightness at these points.

Strategy for minimising thermal bridges	Use of masonite beams reduced the thermal (wooden) bridges between inner and outer leaf.
Modelling strategy	Lumped parameter modeling, later design confirmed with modelling package TRNSys
Insulation strategy	Blown in woodfibre (Warmcell) ensured an insulation value below 0.13 W/m2'C
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		2000	
Gas			
Oil			
LPG			
Wood		900	

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	-	11	-
Primary energy requirement (kWh/m².yr)	-	54	-

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
Photo Volataic	500	
-		
Energy consumed by generation	500	

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	-	10	-

Whole house energy calculation method	Other
Other energy calculation method	Lumped parameter calculation, SAP was not able to incorperate all the features of the house
Predicted heating load	100 W/m² (demand)
Other energy target(s)	

Building services

Occupancy	2 people, mostly working from home
Space heating	Central 9 kW woodstove
Hot water	WWK 300 heat pump Stieble Eltron
Ventilation	ITHO MVHR
Controls	Not required
Cooking	Induction hob
Lighting	Mainly low energy, Halogen in living area
Appliances	All appliances A or better rated, apart from condensing dryer. However, the heat is transferred in to the house and not lost as such.
Renewables	1.02 kWp PV
Strategy for minimising thermal bridges	Masonite beams in external walls

Building construction

Storeys	2
Volume	374m³
Thermal fabric area	
Roof description	Pitched at 40 degrees for optimal solar collection
Roof U-value	0.13W/m² K
Walls description	Timber frames, mesonite wall
Walls U-value	0.13W/m² K
Party walls description	
Party walls U-value	
Floor description	floating concrete floorslab with expanded polystyreen insulation.
Floor U-value	0.15W/m² K
Glazed doors description	Timber doors with either double glazed or timber plate.
Glazed doors U-value	3.00W/m² K installed
Opaque doors description	
Opaque doors U-value	

Windows description	Turn and tilled double glased units. All windows have a close fitting thermal lined curtain. The U-value is estimated at 3 W/m2'C with the curtains open and 1.2 with the curtains closed.
Windows U-value	1.20W/m² K installed
Windows energy transmittance (G-value)	
Windows light transmittance	80%
Rooflights description	
Rooflights light transmittance	
Rooflights U-value	

Project images