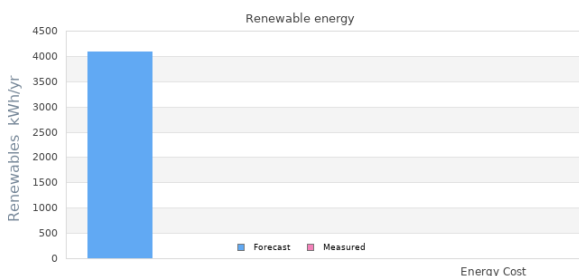
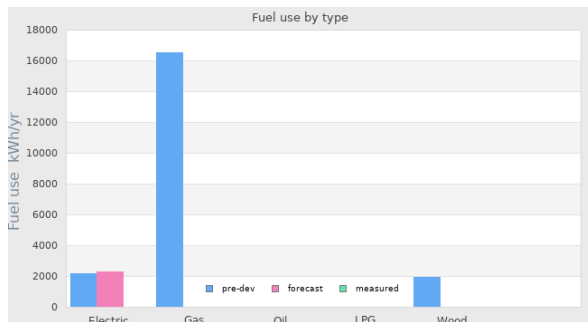
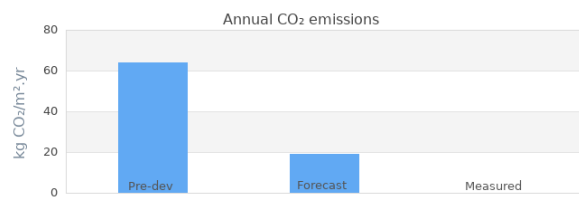
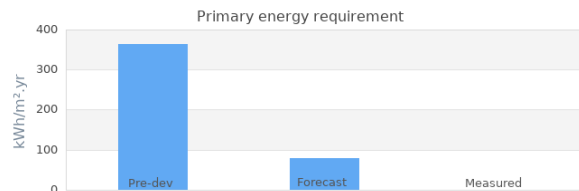


## Project name 1970s Lancaster retrofit

**Project summary** Retrofit of 1970s semi-detached house using IWI. Designed, built and certified to the AECB Retrofit Standard - Level 2.



## Project Description

Projected build start date	01 Jun 2019
Projected date of occupation	01 May 2021
Project stage	Occupied
Project location	Lancaster, Lancashire, England
Energy target	other
Build type	Refurbishment
Building sector	Private Residential
Property type	Semi-Detached
Existing external wall construction	Masonry Cavity
Existing external wall additional information	60mm cavity with existing EPS beads
Existing party wall construction	
Floor area	73.5 m <sup>2</sup>

## Project team

Organisation	ColdProof / Haus Martins
Project lead	Eric Fewster
Client	Wendy Pattinson
Architect	n/a
Mechanical & electrical consultant(s)	Adam Dadeby (MVHR), Chris Wilde (heating/DHW)
Energy consultant(s)	Eric Fewster (ColdProof)
Structural engineer	
Quantity surveyor	
Other consultant	
Contractor	Gideon & Saul Martin (Haus Martins)

## Design strategies

Planned occupancy	2 people - occupancy selected as automatic in PHPP
Space heating strategy	Air source heat pump with underfloor heating
Water heating strategy	Air source heat pump
Fuel strategy	Electricity
Renewable energy generation strategy	Existing 19 solar PV panels generating 4,084 kWh/a
Passive solar strategy	
Space cooling strategy	Using openable windows in summer
Daylighting strategy	
Ventilation strategy	MVHR
Airtightness strategy	Airtight membrane for ceilings and in front of wood fibre IWI. Plaster layer in front of Spacetherm and for partition walls. Screed for floor. Relevant tapes used for junctions (plasterable, non-plasterable).
Strategy for minimising thermal bridges	Thermal bridge modelling done for all relevant junctions, with heat loss reduced where this was possible to be mitigated. Certain junctions (e.g. party/partition wall to external wall, and partition wall to ground) remain as thermal bridges, with relevant ps values entered in PHPP.
Modelling strategy	Baseline and post-retrofit modelling done in PHPP.

## Insulation strategy

Existing 60mm cavity wall filled with EPS beads, with 100mm wood fibre IWI on most walls, but some (e.g. stairwell, bathroom) having thinner Spacetherm boards (20mm aerogel on plasterboard). Average u-value walls: 0.23 W/m<sup>2</sup>K. Suspended floor removed, replaced with 200mm EPS with screed/UFH, OSB and floorboards over. U value floors: 0.17 W/m<sup>2</sup>K. Loft insulation topped up to 390mm of mineral wool. Roof u-value: 0.103 W/m<sup>2</sup>K.

## 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
<b>Electric</b>	2199	2310	
<b>Gas</b>	16521		
<b>Oil</b>			
<b>LPG</b>			
<b>Wood</b>	1955		

Primary energy requirement & CO<sub>2</sub> emissions

	previous	forecast	measured
<b>Annual CO<sub>2</sub> emissions</b> (kg CO <sub>2</sub> /m <sup>2</sup> .yr)	64	19	-
<b>Primary energy requirement</b> (kWh/m <sup>2</sup> .yr)	363	79	-

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
-	4084	
-		
<b>Energy consumed by generation</b>		

Airtightness ( m<sup>3</sup>/m<sup>2</sup>.hr @ 50 Pascals )

	Date of test	Test result
Pre-development airtightness	-	-
Final airtightness	04 May 2021	1.36

Annual space heat demand ( kWh/m<sup>2</sup>.yr )

	Pre-development	forecast	measured
<b>Space heat demand</b>	189	44	-

Whole house energy calculation method	PHPP
Other energy calculation method	
Predicted heating load	22.8 W/m <sup>2</sup> (demand)
Other energy target(s)	AECB Retrofit Standard - Level 2

## Building services

Occupancy	2 people - occupancy selected as automatic in PHPP
Space heating	Air source heat pump with underfloor heating
Hot water	Air source heat pump
Ventilation	MVHR - Brink Renovent Sky 150, installed efficiency stated in PHPP of 74.9%
Controls	4 speeds available via digital controller for MVHR
Cooking	Electricity
Lighting	Mostly low energy bulbs
Appliances	Dishwasher, washing machine, condensation dryer, 1 x freezer, 1 x fridge-freezer
Renewables	19 solar PV panels generating 4084 kWh/a
Strategy for minimising thermal bridges	Thermal bridge modelling done for all relevant junctions, with heat loss reduced where this was possible to be mitigated. Certain junctions (e.g. party/partition wall to external wall, and partition wall to ground) remain as thermal bridges, with relevant psi-values entered in PHPP.

## Building construction

Storeys	2
Volume	182m <sup>3</sup>
Thermal fabric area	246m <sup>2</sup>
Roof description	Loft insulation topped up to 390mm of mineral wool.
Roof U-value	0.10W/m <sup>2</sup> K
Walls description	Existing 60mm cavity wall filled with EPS beads, with 100mm wood fibre IWI on most walls, but some (e.g. stairwell, bathroom) having thinner Spacetherm boards (20mm aerogel on plasterboard).
Walls U-value	0.23W/m <sup>2</sup> K

Party walls description	Plastered 100mm concrete block either side of 80mm unfilled cavity
Party walls U-value	1.32W/m <sup>2</sup> K
Floor description	Suspended floor removed, replaced with 200mm EPS with screed/UFH, OSB and floorboards over.
Floor U-value	0.17W/m <sup>2</sup> K
Glazed doors description	Existing PVC
Glazed doors U-value	1.56W/m <sup>2</sup> K installed
Opaque doors description	Green Building Store Performance
Opaque doors U-value	1.10W/m <sup>2</sup> K uninstalled
Windows description	Existing PVC
Windows U-value	1.60W/m <sup>2</sup> K installed
Windows energy transmittance (G-value)	0.48%
Windows light transmittance	
Rooflights description	
Rooflights light transmittance	
Rooflights U-value	

## Project images





















































