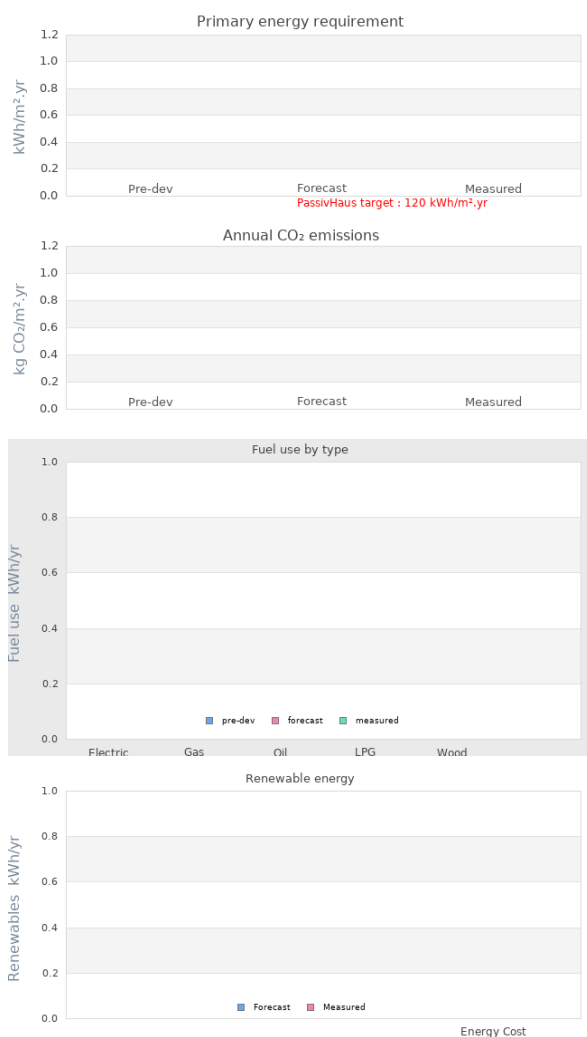


Project name Richardson House

Project summary This house is the third certified Passive House completed by Paul McAlister Architects and is styled in a traditional barn-like aesthetic typical of the Ulster rural countryside dwelling. The site has been divided by the placement of the house so that the two-storey element forms a boundary to the approach road and creates a south facing private garden making the most of the sunlight and privacy. The primary living space within the house is the kitchen dining and living room area which has a high vaulted ceiling. This space is flooded with light from large windows looking out unto the garden. Also, high level electrically operated roof-lights in the sloping ceiling creates a bright and airy feel to this most used of family spaces. The house is highly sustainable using the ultra-energy-efficient Passive House (Passivhaus classic) standard of construction. It also has a 4kW Photo Voltaic array on the rear of the garage roof producing electricity.



Project Description

Projected build start date	29 May 2017
Projected date of occupation	05 Feb 2019
Project stage	Occupied
Project location	Portadown, County Armagh, Northern Ireland
Energy target	PassivHaus
Build type	New build

Building sector	Private Residential
Property type	Detached
Existing external wall construction	Masonry Cavity
Existing external wall additional information	
Existing party wall construction	
Floor area	203.6 m ²
Floor area calculation method	PHPP
Building certification	Passivhaus certified

Project team

Organisation	Paul McAlister Architects Ltd
Project lead	Paul McAlister Architects Ltd
Client	Private Client
Architect	Paul McAlister Architects Ltd
Mechanical & electrical consultant(s)	Paul McAlister Architects Ltd
Energy consultant(s)	Paul McAlister Architects Ltd
Structural engineer	George Dawson Ltd
Quantity surveyor	NA
Other consultant	Earth Cycle Technologies
Contractor	Cairns Builders

Design strategies

Planned occupancy	Five people, all out to work or school on weekdays.
Space heating strategy	Heating from wood burning stove; Heat recovered from ventilation exhaust.
Water heating strategy	Air source heat pump to provide hot water
Fuel strategy	Mains electricity.
Renewable energy generation strategy	4 kWp photovoltaic panel installed .
Passive solar strategy	Window proportions optimised using PHPP.
Space cooling strategy	NA
Daylighting strategy	NA
Ventilation strategy	Comfort ventilation with heat recovery (winter) Openable windows (summer)
Airtightness strategy	Airtight membrane over roof structure sealed to outside face of external masonry wall. Masonry wall plastered to provide continuous air barrier with membrane.

Strategy for minimising thermal bridges

Thermal bridging analysis undertaken for all primary junctions interfaces Junctions assessed include: Ground floor junction, external corner, party wall, party roof, party floor, eaves, verge, window jamb, head and sill, door jamb, head and threshold.

Modelling strategy

Whole house modelling was undertaken in PHPP and dynamic simulation was used to assess the impact of our proposed solar combi heating system with the results fed back into PHPP.

Insulation strategy

NA

Other relevant retrofit strategies

NA

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

NA

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/m ² .yr)	-	-	-
Primary energy requirement (kWh/m ² .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	04 Dec 2018	0.38

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	-	-	15

Whole house energy calculation method

PHPP

Other energy calculation method

Predicted annual heating load

-

Other energy target(s)

Building services

Occupancy

Space heating No central heating, 2no. wood burning stoves

Hot water Heat pump centrally located in plant room

Ventilation Mechanical Ventilation Heat recovery

Controls Room thermostat, set points for MVHR

Cooking Electric hob (induction preferred) and oven

Lighting 100% LED Fittings

Appliances A+ Rated fridge, freezer and washing machine to each unit

Renewables Solar PV Installed

Strategy for minimising thermal bridges Psi values have been calculated for internal and external values. External psi-value have been entered into PHPP.

Building construction

Storeys 2

Volume 509m³

Thermal fabric area

Roof description Warm Roof Construction

Roof U-value 0.10W/m² K

Walls description Cavity Walls

Walls U-value 0.12W/m² K

Party walls description NA

Party walls U-value 0.00W/m² K

Floor description Suspended Pre cast concrete slab, insulation and sand/cement screed

Floor U-value 0.09W/m² K

Glazed doors description Triple Glazed PVC

Glazed doors U-value 0.74W/m² K installed

Opaque doors description NA

Opaque doors U-value

Windows description	Triple Glazed PVC
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Windows U-value	0.74W/m ² K installed
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Windows energy transmittance (G-value)

Windows light transmittance

Rooflights description	Quadruple Glazed PVC
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Rooflights light transmittance

Rooflights U-value	0.58W/m ² K
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Project images





