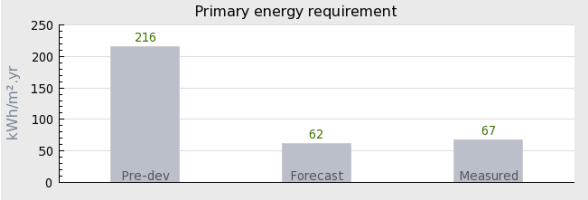
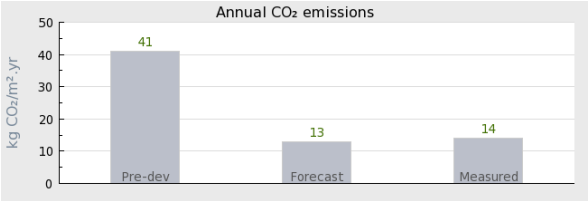
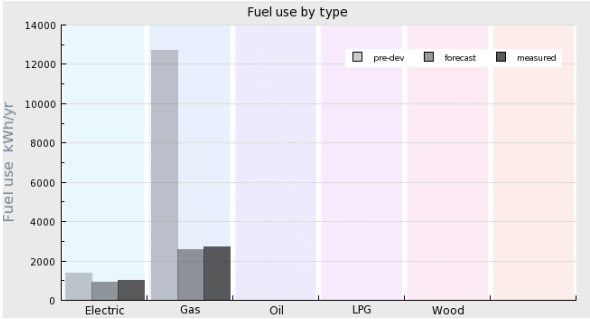
http://lowenergybuildings.org.uk

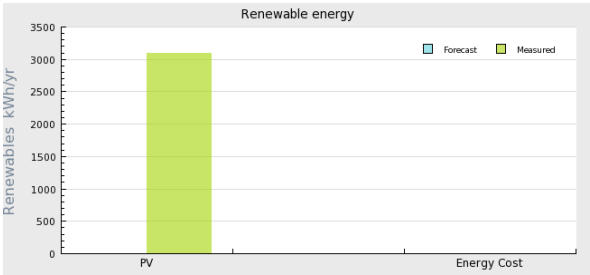
Project name 5Pev

Project summary Deep retrofit of 1961 linked detached









Project Description

Projected build start date	01 May 2014
Projected date of occupation	01 Dec 2014
Project stage	Occupied
Project location	Chorlton, Manchester, England
Energy target	other
Build type	Refurbishment
Building sector	Private Residential
Property type	Detached
Existing external wall construction	Masonry Cavity
Existing external wall additional information	Brick and hollow block with 50mm UF filled cavity
Existing party wall construction	
Floor area	84 m²
Floor area calculation method	SAP

Project team

Organisation	Waxwing Energy
Project lead	Gervase Mangwana
Client	Sonia Mangwana
Architect	none
Mechanical & electrical consultant(s)	
Energy consultant(s)	Nick Parsons
Structural engineer	
Quantity surveyor	
Other consultant	
Contractor	

Design strategies

Planned occupancy	Two Adults and one baby born 6 months after occupancy. One adult working at any one time not always away from home during day.
Space heating strategy	Mains gas system boiler 12 kW. Underfloor heating to ground floor. Rads in office and bathroom. Bedrooms unheated. Mechanical Ventilation with Heat recovery.
Water heating strategy	150l cylinder heated via gas boiler. Surplus generated electricity from PV array diverted to immersion when available.
Fuel strategy	Mains Gas. Mains electricity. PV electricity
Renewable energy generation strategy	3.3 kWp array installed 2011
Passive solar strategy	House within 15 of south. Glazing not optimised. Overheating now occurring.
Space cooling strategy	Natural ventilation for most of the cooling season. Daytime use of MVHR with night purging during heat waves.
Daylighting strategy	Unknown
Ventilation strategy	MVHR via radial semi flexible ducting system supplying 5 habitable areas and 5 wet rooms
Airtightness strategy	Target of 2 m3/m2/h. The full strip out gave the opportunity to complete a total airtight layer.
Strategy for minimising thermal bridges	Designed out as far as possible. Ceiling joists run through to eaves. One continuous bridge on front plinth wall where aerated block is used to mitigate.
Modelling strategy	Very basic heatloss calculations

Insulation strategy	Internal PIR to cavity walls. Same to timber frame front and back with woodfibre external to allow vapour to permeate outwards.
Other relevant retrofit strategies	Attempted to reuse as much as possible from original house. For example staircase was removed and stored in the garden whilst the internal walls were insulated.
Other information (constraints or opportunities influencing project design or outcomes)	The biggest constraints were a self imposed budget of 60,000 (actual 75k) and project length of 6 months (actual 7). These precluded extensions that were considered. Also affected choice of glazing.

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric	1400	900	1003
Gas	12700	2600	2707
Oil			
LPG			
Wood			

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	41	13	14
Primary energy requirement (kWh/m².yr)	216	62	67

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
PV		3100
-		
Energy consumed by generation		

Airtightness (m³/m².hr @ 50 Pascals)

	Date of test	**Test result**
Pre-development airtightness	05 Dec 2013	15
Final airtightness	04 Dec 2014	0.75

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	-	20	-

Whole house energy calculation method	SAP Extension for Whole House
Other energy calculation method	
Predicted heating load	1800 W/m² (demand)
Other energy target(s)	

Building services

Occupancy	2 adults one very young child
Space heating	As design
Hot water	As design
Ventilation	As design
Controls	as design
Cooking	Gas hob, electric oven
Lighting	Led throughout
Appliances	A+++ washing machineA++ Fridge freezer
Renewables	As pre build
Strategy for minimising thermal bridges	As design

Building construction

Storeys	2
Volume	210m³
Thermal fabric area	206m²
Roof description	Cold roof insulated at ceiling height with a mix of mineral wool and PIR at the edges where roof slope limits full fill
Roof U-value	0.10W/m² K
Walls description	Cavity walls pre filled and then internally insulated with PIR. Stud walls internally insulated with PIR, filled with mineral wool and externally insulated with wood fibre.
Walls U-value	0.15W/m² K
Party walls description	none
Party walls U-value	
Floor description	Dry screed raft on PIR
Floor U-value	0.12W/m² K
Glazed doors description	uPVC 40mm triple glazed
Glazed doors U-value	1.00W/m² K uninstalled
Opaque doors description	None
Opaque doors U-value	
Windows description	Downstairs uPVC 40mm triple glazedUpstairs existing double glazed frames reglazed with low-e, warm spacer, argon filled 28mm units
Windows U-value	1.00W/m² K

Windows energy transmittance (G-value)	0.58%
Windows light transmittance	0.74%
Rooflights description	none
Rooflights light transmittance	
Rooflights U-value	

Project images


INTELLO


Bobcat