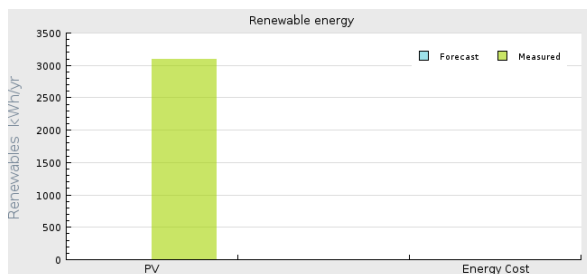
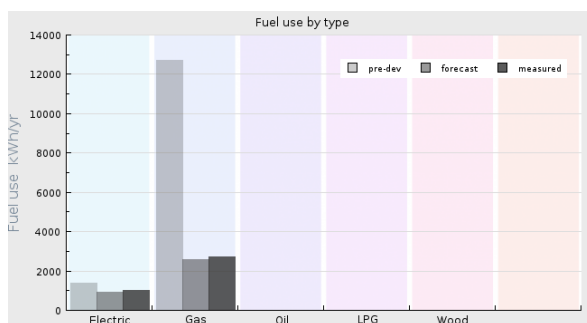
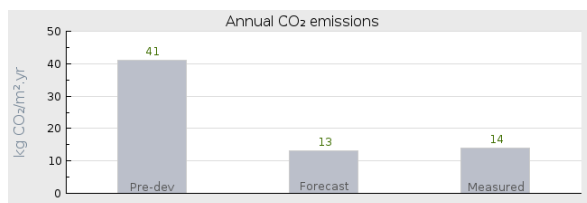
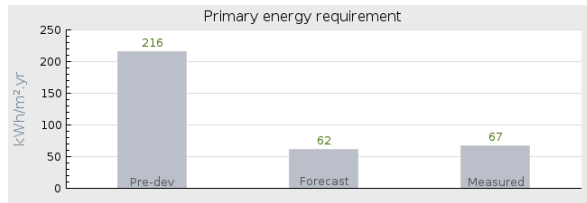


Project name 5Pev

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 m ² |
| 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 m ³ /m ² /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/m ² .yr) | 41 | 13 | 14 |
| Primary energy requirement (kWh/m ² .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/m ² (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 | 210m ³ |
| Thermal fabric area | 206m ² |
| 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/m ² 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/m ² K |
| Party walls description | none |
| Party walls U-value | |
| Floor description | Dry screed raft on PIR |
| Floor U-value | 0.12W/m ² K |
| Glazed doors description | uPVC 40mm triple glazed |
| Glazed doors U-value | 1.00W/m ² 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/m ² K |

| | |
|--|-------|
| Windows energy transmittance (G-value) | 0.58% |
|--|-------|

| | |
|-----------------------------|-------|
| Windows light transmittance | 0.74% |
|-----------------------------|-------|

| | |
|------------------------|------|
| Rooflights description | none |
|------------------------|------|

| | |
|--------------------------------|--|
| Rooflights light transmittance | |
|--------------------------------|--|

| | |
|--------------------|--|
| Rooflights U-value | |
|--------------------|--|

Project images



















