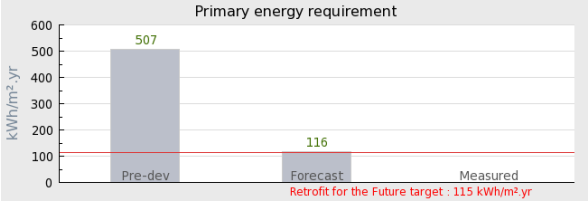
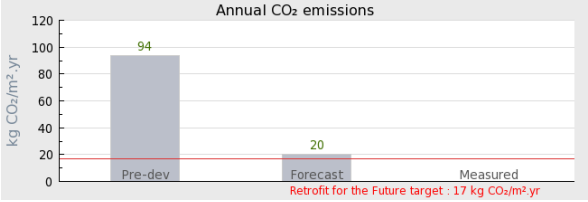
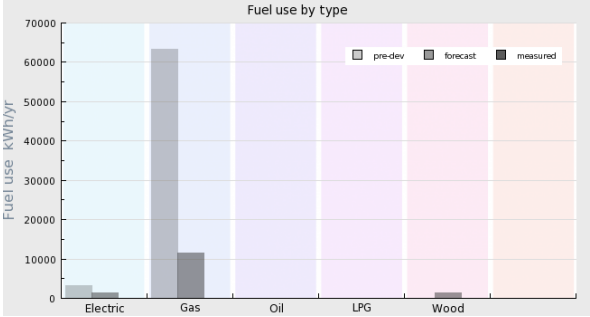
http://lowenergybuildings.org.uk

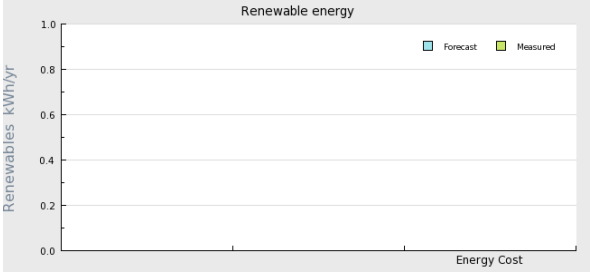
Project name Inspiration Birmingham 2020

Project summary The project will inspire and inform retrofitting of mainstream urban social housing by creating a high quality exemplar of a common housing type. It will involve retrofitting a typical central Birmingham Victorian terrace (4 bedroom, attic conversion, on the gas grid) with a whole house package of energy saving measures. The technologies we intend to use are mostly proven and well established in the UK that can be installed using local building and heating contractors. We will be looking to replicate the successful outcomes of the project into the proposed Birmingham Green New Deal (a project that aims to retrofit 5,000 properties across the city).









Project Description

Projected build start date	03 May 2010
Projected date of occupation	30 Sep 2010
Project stage	Under construction
Project location	Birmingham, West Midlands, England
Energy target	Retrofit for the Future
Build type	Refurbishment
Building sector	Public Residential
Property type	Mid Terrace

Existing external wall construction	Solid Brick
Existing external wall additional information	Uninsulated 250mm solid brick
Existing party wall construction	Uninsulated 250mm solid brick
Floor area	159 m²
Floor area calculation method	PHPP

Project team

Organisation	Balsall Heath Housing Co-operative Ltd
Project lead	Encraft Ltd
Client	Balsall Heath Housing Co-operative
Architect	Chapman Design
Mechanical & electrical consultant(s)	
Energy consultant(s)	Encraft Ltd
Structural engineer	
Quantity surveyor	Birmingham Co-operative Housing Services
Other consultant	
Contractor	Logmoor, New World Solar, Wattbox, Transcast

Design strategies

Planned occupancy	The building will be occupied by three adults and one child. One of the adults is retired and therefore the house is occupied for long periods.
Space heating strategy	The existing gas back boiler will be removed and replaced with an A grade condensing combi gas boiler. All heating to be delivered using wall mounted radiators. Performance will be maximised by including a passive flue gas heat recovery unit. Secondary heating will be provided from a small wood pellet stove.
Water heating strategy	The hot water supply will be via the gas condensing combination boiler together with a flat plate solar thermal system. There will be no electric immersion back-up. Aerated shower head and taps will be fitted to reduce hot water need.
Fuel strategy	Mains gas and mains electricity. A pellet room heater will supply secondary heating.
Renewable energy generation strategy	Not specified.
Passive solar strategy	The front of the property is south west facing.
Space cooling strategy	Natural ventilation.

Daylighting strategy	Roof windows in the attic and kitchen roof will ensure good levels of natural daylight in the top floor bedrooms and kitchen. The front of the property is south west facing and therefore daylighting levels will be good in the front lounge and master bedroom.
Ventilation strategy	Summer cooling will be through openable windows. Wet areas will be ventilated with energy efficient humidistats controlled DC extract fans.
Airtightness strategy	An air permeability of 5m3/h/m2 to be the target. Where drylining walls will be parge coated and all joints between boards will be sealed. Drylining to be continous between floors. Holes for services passing through external walls and suspended floors to be sealed.
Strategy for minimising thermal bridges	Insulation will be returned into the reveals and sofits of openings and for areas dry lined insulation will be returned (approx 0.5m) along separating internal walls. External insulation added to the rear wall and kitchen extension. Insulation to be added to ground concrete floor and suspended floor.
Modelling strategy	Whole house modelling was undertaken in SAP 2005.
Insulation strategy	-Application of external insulation to the rear wall and kitchen extension (to achieve U value of 0.20 W/m2K) -Application of external insulation and dry lining to the side passage (to achieve U value of 0.20 W/m2K) -Dry line front wall (to achieve U v
Other relevant retrofit strategies	The design will include a new to market product called VPhase for regulating the incoming electricity supply and a close to market control unit called Wattbox. The VPhase unit optimises the incoming voltage to a constant 220V giving householders immediate and significant energy savings. The Wattbox will monitor and learn residents occupancy and provide a uniquely simple interface for tenants. The innovative step is in monitoring house electrical consumption to learn occupancy from which, the controller anticipates and times space heating. Similarly, it monitors, learns, controls and optimises hot water heating so excess is avoided. It replaces the time clock and thermostat with simple buttons for more heat; or less heat.

Other information (constraints or opportunities influencing project design or outcomes)	To meet the required targets for the property chosen has been particularly challenging. The house is a large 4 bed Victorian mid terrace with a cellar and a 1980s kitchen extension and attic conversion (both poorly insulated). To retain the front brick facade external insulation was not possible. Insulating the long side passage also presented difficulties (mixture of external and internal). The gas and electricity meters will require moving to enable dry lining. The property is in a built up area and therefore opportunities to exploit onsite renewables are restricted.

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric	3151	1385	
Gas	63241	11622	
Oil			
LPG			
Wood		1463	

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m².yr)	94	20	-
Primary energy requirement (kWh/m².yr)	507	116	-

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	-	15.5
Final airtightness	-	6.81

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	-	33.5	-

Whole house energy calculation method	SAP Extension for Whole House
Other energy calculation method	
Predicted annual heating load	-
Other energy target(s)	Whole House Primary Energy Demand 119 kWh/m2/yr Overall CO2 Target 18 kg/m2/yr

Building services

Occupancy	NULL
Space heating	NULL
Hot water	NULL
Ventilation	NULL
Controls	NULL
Cooking	NULL
Lighting	NULL
Appliances	NULL
Renewables	NULL
Strategy for minimising thermal bridges	NULL

Building construction

Storeys	
Volume	
Thermal fabric area	
Roof description	NULL
Roof U-value	0.00W/m² K
Walls description	NULL
Walls U-value	0.00W/m² K
Party walls description	NULL
Party walls U-value	0.00W/m² K
Floor description	NULL
Floor U-value	0.00W/m² K
Glazed doors description	NULL
Glazed doors U-value	0.00W/m² K
Opaque doors description	NULL
Opaque doors U-value	0.00W/m² K
Windows description	NULL
Windows U-value	0.00W/m² K
Windows energy transmittance (G-value)	

Windows light transmittance	
Rooflights description	NULL
Rooflights light transmittance	
Rooflights U-value	0.00W/m² K

Project images