

Retrofit for the Future Northfield, Birmingham

'Bringing Wates homes into the future'

LEP AREA: BIRMINGHAM and SOLIHULL

Location: Northfield, Birmingham

Number of houses: 2

Typology: 1950's Wates System House

Project Team:

Contractor: Tomlinson Housing

Client: Birmingham City Council



PROJECT DESCRIPTION

A Wates system house of prefabricated reinforced concrete large panel construction built in the 1950's was chosen as the demonstration project. They undertook an inclusive feasibility study of a range of construction techniques and a 'holistic energy strategy' examining renewable energy technologies, including heating, ventilation, window and door design, heat recovery, energy controls and energy monitoring. They also sought opportunities to use the external skin to improve energy conservation, air tightness and to integrate new plumbing and ventilation with minimal intrusion whilst the residents remained in residence.

Challenges for this stock included:

- Lack of thermal insulation to walls and roof
- Condensation and mould problems
- Single glazed, wooden windows
- Only 50% of properties had central heating

LEARNING POINTS / STRATEGIES

The main drivers for the project were to deliver a cost effective structural and low energy refurbishment optimised;

- To deliver significant carbon reductions (circa 80%); refurbish and upgrade properties whilst retaining the residents and communities in-situ; to better the CO₂ target of 17 Kg/m²/yr and Primary Energy Target of 115kW/m².yr.
- The solution was a logical approach where the household's energy needs and carbon dioxide impacts were considered as a whole, with energy conservation and energy consumption reduction initiatives being used jointly to complement each other.
- Monitoring of the property will now be conducted for a further 2 years.

Retrofit for the Future Beausale, Warwickshire

'Rural Innovation for the Future'



LEP AREA: COVENTRY and WARWICKSHIRE

Location: Beausale, Warwickshire

Number of houses: 2

Typology: Non-adjoining social semi-detached

Project Team:

Consultant: Encraft

Client: Warwick District Council

PROJECT DESCRIPTION

TSB funded project delivering a uniquely rural solution to cut carbon emissions and primary energy demands in hard to treat social housing by 80% against 1990 levels. A non-invasive renovation package allowing tenants to remain in their homes throughout the works carried out with four distinct modules:

- Non-invasive insulation module
- Extremely low carbon heating module
- Combined solar module
- Lighting, appliances and control module

Each module could be installed as a standalone project but together they form a whole house solution. The modules were carefully designed following a detailed cost benefit analysis of all potential measures to improve energy efficiency. The focus is on delivering a rural solution that takes advantage of the space available and makes use of a local fuel supply chain.

LEARNING POINTS

The way in which whole house retrofit projects are presented to tenants requires careful thought and planning and preferably a dedicated tenant liaison officer. A balance must be found whereby the number of site operatives and the length of time onsite govern whether tenants are decanted or not. Each module of our retrofit kit is not too invasive when installed individually but the entire work package, when presented as a whole house retrofit does have a big impact and probably requires tenants to be decanted. The scale of the project in financial terms did not warrant a continual site presence (e.g. from a site based project manager) but in reality this was certainly needed, especially from a tenant liaison point of view. Tenants became too involved and at risk of forming misconceptions as to the reason or scale of the problem due to their relative lack of experience about building projects. Similarly it was initially thought that the scale of the project in financial terms did not warrant a full programme of works or a full and detailed specification of works. However experience has shown that timescales and problems arising onsite could have been reduced if more time had been spent on forward planning before and during the work onsite.

Decent Homes Programme Gower Street, Wolverhampton

'All Saints Eco Voids'

LEP AREA: BLACK COUNTRY

Location: Wolverhampton

Number of houses: 12

Typology: c1900 - Solid wall Terraced houses

Project Team:

Wolverhampton Homes; Decent Homes Partner Contractors; All Saints & Blakenhall Community Development; Wolverhampton City Council; Wolverhampton University



PROJECT DESCRIPTION

Turning 12 ageing houses in one of the city's least desirable areas into eco-homes. The houses are all in the All Saints area of the city which has remained in low demand.

Insulation: 27mm of internal thermal boarding to – external wall insulation was not in keeping with the area. Loft insulation was increased to 400mm.

Heating: Some of the properties had had the gas supplies removed and the Nibe fighter heat recovery systems with mechanical ventilation was installed. The other properties received other technologies including a micro combined heat and power unit, air source heat pump, solar thermal, photovoltaics.

Other Measures: windows were replaced with double glazed units where required and other eco measures including, planters, bat boxes, cycle anchors were included within the scope of works.

LEARNING POINTS

- **Contractor's point of view** - Recycling was taken into account from the removal of existing structures, to the installation of new. Limited use of skips etc kept down the carbon levels for the each of the contractors. Working on void properties rather than tenanted properties enabled contractors to keep to the programme and they benefitted from gaining **MCS** (Microgeneration Certification Scheme) accreditation for a number of the installations.
- **Wolverhampton Homes point of view** - It is vitally important to establish data from residents to judge if a certain technology out performs another and gives tenants a true benefit in reducing fuel costs. This then needs to be recorded against the installation costs before establishing roll out across the stock. Physical access for monitoring purposes became difficult over time. Need to install remote systems.
- The project was funded by public budgets but the contractors gifted renewable and the white goods to keep project with budget.

Retrofit for the Future St. Luke Street, Stoke-on-Trent

'Passivhaus Retrofit'

LEP AREA: SOT & STAFFORDSHIRE

Location: Hanley, Stoke-on Trent

Number of houses: 1

Typology: C19th - Terraced house

Project Team:

Organisation: Sanctuary Group

Client: Sanctuary Group



PROJECT DESCRIPTION

The project is a whole house retrofit that is achieved through detailed application of passivhaus principles to the refurbishment of a C19th terrace house, which prioritise insulation of the fabric, achieving excellent air tightness with a minimal space heating requirement, and whole house heat recovery ventilation.

The aim is to make the house easy to inhabit with a low carbon footprint. The existing building has been carefully surveyed, and proposed fabric and services have been analysed using the Passive House Planning Package, which allows designers to test assumptions thoroughly the project.

LEARNING POINTS

- Passivhaus is usually associated with new build. There a small number of accredited passivhaus projects in the UK currently. This is the first passivhaus retrofit.
- Passivhaus is increasingly recognised as best practice in low energy demand construction for housing with super airtight construction and minimal heating requirements. However, it is critical that design and construction details are accurately specified and built.
- This project demonstrates that that natural materials, despite being more bulky than synthetic materials, can be used in whole house retrofit with internal space maintained by removal of chimney breasts as compensation for the depth of internal insulation. This project also demonstrates how a 'hard to treat' property with no cavity can be made energy efficient.
- Natural materials used included Hydroscopic Sheepswool and use of such materials can help support a developing UK industry.

Homes & Community Agency Arley, Warwickshire

'Hill Top Cottages'

LEP AREA: COVENTRY and WARWICKSHIRE

Location: Gun Hill, Arley, Warwickshire

Number of houses: 33

Typology: 1906, Terraced houses

Project team:

North Warwickshire Borough Council
Waterloo Housing Association



PROJECT DESCRIPTION

Hill Top is a street of 40 terraced houses called Hill Top Cottages built in 1906 to accommodate miners in the local coal colliery. Thirty-three of the properties have undergone an extensive refurbishment with some extended to include additional bedrooms. Renewable energy sources have been fitted to the properties to reduce the carbon emissions, improve the thermal comfort and reduce residents' bills.

The landscape has been designed to encourage principles of self sufficiency and an enhanced community for residents through shared outdoor spaces. Challenges included:

- Solar Thermal Panel and Loft Insulation
- Cavity Wall insulation and Solid wall insulation
- Underfloor Heating and rigid floor insulation
- Ground Source Heat Pump

LEARNING POINTS

- Around 97% of the built environment's carbon emissions are created by the existing stock and Hill Top demonstrates that it is possible to make them perform to modern standards.
- It is estimated that the houses were emitting approximately 5.1 tonnes of carbon every year. The refurbishment reduces that to 1.3 tonnes - a reduction of 75% as well as potential energy bill savings of around 50% for the residents.
- This project also demonstrates how "a hard to treat" property with no cavity can be made energy efficient.

Retrofit for the Future Shrewsbury, Shropshire

Low energy home Hay Tor

LEP AREA: MARCHES

Location: Shrewsbury, Shropshire

Number of houses: 1

Typology: 1950's Detached bungalow

Project Team:

Organisation: Best Carpenters

Consultants: Simmonds Mills



PROJECT DESCRIPTION

1950's detached bungalow with 85m² external wall boundary with tiled roof. The wall construction is a concrete post and panel system, a quick and economic post war system with cavity and 75mm light weight blocks internally on a raft foundation with internal 75mm light weight block walls.

The aim of the retrofit was to reduce energy needs, mostly heating to a minimum requirement and therefore save costs and CO₂, but also to improve the comfort level of residents working in the follow areas:

- Triple glazed windows and doors
- Air-tightness
- MVHR
- Roof insulation
- Thermal solar panels
- System boiler
- External wall insulation

LEARNING POINTS

- No full monitoring data over a winter since work carried out but partial data show reduction of Electricity by 40% and Gas by 30%.
- For a private householder, experience shows that such a project can only be undertaken with a lot of personal research and commitment. There is not enough information or experience of different housing types and for refurbishment of private properties to make retrofit an easy and automatic solution. More guidance and training is needed and more support for local companies who might be involved in retrofit and Green Deal.
- The airtight membrane, new windows and roof insulation were installed before the start of last winter (2010) and achieved by themselves a major improvement in comfort levels a reduction in Electricity by 40% and Gas by 30% for the running year.

Decent Homes Programme West Bromwich, Birmingham

High Rise Refurbishment

LEP AREA: BIRMINGHAM and SOLIHULL

Location: West Bromwich, Birmingham

Number of Flats: 72

Typology: High Rise Buildings

Developed by:
Sandwell Decent Homes Partnership



PROJECT DESCRIPTION

Refurbishment of 2no. high rise residential dwellings, Beaconview Road and Wyndmill Crescent. The blocks were constructed in the 1960's using a concrete frame with brickwork / blockwork infill panels.

Under the Decent Homes Programme both blocks have been refurbished to a high standard to include some of the following elements:

- External insulated render and tile cladding following structural repairs.
- Replacement timber/aluminium composite argon gas filled double glazed windows.
- Aluminium pitched roof on a steel frame.
- Low energy lighting to communal areas
- Balcony refurbishment.
- New secure front and rear entrances.
- Refurbishment of the lifts, communal spaces and landscaping to achieve DDA compliance.

LEARNING POINTS

The final appearance of the blocks is the result of considerable consultation with the residents and the finished result has not only fully transformed the way that the blocks look but has also enhanced the surrounding areas.

There were a number of issues considered during the design of the blocks. These include:

- The new pitched roofs were designed to accept future solar thermal or photovoltaic panels.
- Brickwork cladding was constructed up to first floor level rather than extend the insulated cladding down to ground level in an effort to reduce the problems associated with impact damage.
- All windows are tilt and turn pattern to enable cleaning and glass replacement to be carried out from the inside.
- A positive ventilation system provides fresh air to all rooms within the flats.

Ofgem Community Energy Saving Programme, E.ON Pensnett, Dudley

LEP AREA: Black County

Location: Pensnett, Dudley

Number of houses: 211

Typology: 1920's Solid Wall

Project Team:

Organisation: E.ON Energy Solutions Ltd

Client: Dudley MBC



PROJECT DESCRIPTION

Upgrading of council properties, in the first of possibly four schemes, for Dudley MBC. Work included the replacement of old G-rated boilers with efficient new heating systems, installing external wall insulation to all 211

houses, which were built of solid wall construction in the 1920's and topping up loft insulation to meet new building standards.

The scheme was delivered under Ofgem's Community Energy Saving programme in partnership with Dudley MBC providing energy-saving measures to low income households in the Pensnett area of Dudley. The aim is to improve the thermal efficiency of each house - or its U-value. The tenants will experience noticeably warmer homes and lower energy bills. The largest part of the project - external wall insulation - involves fitting thermal boards to the outer walls, and covering them with a render coat and pebble dash finish, before finally fitting new canopies and sills which transforms the external appearance of the houses.

LEARNING POINTS

Conclusion and Benefits

- Reduction in heating bills and carbon emission in the future
- A cost effective solution to demolition and re-building
- Reduction in unnecessary heat loss and condensation
- Low maintenance
- Minimal inhabitant disruption
- No reduction in internal living space
- 25 years minimum life expectancy
- Sustainable and fully recyclable products
- BBA certified system

Issues resolved Winter weather.

Solution Added 4 weeks to the programme to ease tenant issues with scaffold.

Outcome Caused 4 week overrun.

Warming Worcestershire

Loft & Cavity Wall Insulation

LEP AREA: Worcestershire

Location: Worcestershire County

Number of houses: tbc

Typology: tbc

Project Team:
Worcestershire County Council

warmer
worcestershire



PROJECT DESCRIPTION

Worcestershire County Council have made £40,000 per district available for an insulation scheme. The funding will be available for loft and cavity wall insulation for residents over the age of 60 years old until Spring 2012. After this time any remaining funds can be made more widely available.

The project is being delivered using the existing Warmer Worcestershire branding which is well recognised across the County. The funds have to be spent by the end of December when the Green Deal will take over.

A variety of insulation and renewable energy grants have been coordinated by district councils in Worcestershire in previous years.

LEARNING POINTS

The project is just starting so there is limited information about this at present.

- Learning from previous projects that has helped to inform the development of this project is that in Worcestershire, the district council is seen as a trusted organisation compared with a private business.
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- There are opportunities to boost local employment and skills development for the local area through this kind of project by specifying this as a requirement in the procurement process.



Innovation in the Built Environment at centres across the West Midlands

The West Midlands is well placed to lead on building retrofit nationally and can boast a number of centres of excellence including demonstrators of research and innovation in the built environment run through our Universities and in training and skills development run through by a range of providers.

Research and innovation projects include:

Sustainable Building Futures—Coventry University

Zero Carbon Retrofit - Centre for Low Carbon Research—Birmingham City University

European Bioenergy Research Institute—Aston University

Arbor, RETS, RESCO and CoRE—Staffordshire University

WMCCE—Wolverhampton University

Skills and training in innovation in the built environment providers include:

Walsall College—Social Housing Retrofit Programme

Staffordshire University—CoRE—national training centre for refurbishment excellence

ACT UK—a pioneering form of simulation training for construction

Professionals with every nut and bolt on a construction project visible and real pressures and decision-making induced in trainees



EBRI - European Bioenergy Research Institute

UNIVERSITY: ASTON University

More information:
www.ebri.org.uk



PROJECT DESCRIPTION

The European Bioenergy Research Institute will carry out world class research into all aspects of bionenergy ranging from fundamental research through development to deployment of innovative technologies in collaboration with industry - as well as offering unique opportunities for joint activities between industry and researchers from all over Europe.

- ◆ EBRI will promote and manage the implementation of bioenergy technologies at local, national and European level.
- ◆ It will provide operational and test facilities up to demonstration scale for industry and at the same time, will provide heat and power to the local Aston Science Park.
- ◆ EBRI activities and complementary research at Aston University will integrate the work of local and national Universities.
- ◆ It will act as a focus for pan-European activities on scientific and technological aspects of biomass production, conversion and utilisation of products used for renewable power, heat, transport fuels and chemicals.

Feed material	Pretreatment	Processes	Products	Post treatment	Final use
Biomass - clean - contaminated e. g. wheat-, rice straw, rice husks, olive stones, residues from the olive oil, coconut oil, nut oil, wine and beer production, coffee, residue mixtures from composting Availability - cultivation - crop Logistics - storage - transport	Pretreatment - decontamination - extraction (mineral nutrients) - washing (mineral nutrients)	Pyrolysis - rotary kiln - ablative reactors - screw systems - fluidised bed	Coke	Upgrading	Activated carbon
			Oil		Reforming
				Slurry → Gasification	
			Gas		CHP → power generation
		Gasification (H₂ supply)	Syngas → H₂, synfuel, methanol		
			Fertiliser		
	SiO₂				

Zero Carbon Retrofit - Centre for Low Carbon Research

UNIVERSITY: BIRMINGHAM City
University

More information:

Dr. Lubo Jankovic
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PROJECT DESCRIPTION

Birmingham Zero Carbon House is the only retrofit zero carbon house in the United Kingdom. Birmingham City University Centre for Low Carbon Research at BIAD/TEE is conducting performance analysis. The method applied to a BCC hard to treat house.

The emissions before were +26,422 kgCO₂/annum and after -295 KgCO₂/aunnum .

Investment: £27,200

Payback: 5 years

25 years gain: £48,600

Low Carbon Retrofit Design involves optimisation of existing buildings to make them surpass current energy performance standards using advanced design methods, advanced materials and renewable energy. In this context we adopt a 'cradle to cradle' approach analogous to processes in nature, where waste from one process becomes the source for another process. This approach involves the design and interaction of supply chains and includes consideration of design for disassembly, eco-efficiency (doing more with less), and design of infrastructure. Low carbon retrofit, which is also driven by legislation, looks into new materials that facilitate seamless refurbishment of existing buildings and eco-efficient design of complex manufacturing processes.

Sustainable Building Futures

UNIVERSITY: COVENTRY University

Funding: European Regional Development Fund

More information:

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PROJECT DESCRIPTION

Coventry University have secured business support funding from ERDF from 2011 to 2015 to provide West Midlands businesses with facilities to test and demonstrate innovative products, software/control systems, services, and best practice to a range of SMEs and other public and private sector organisations. Real-time monitoring data will allow analysis of the impact of both product and human behaviour on environmental performance.

New facility will be housed within a new £52m BREEAM Excellent Engineering and Computing building operational from early 2012 and will provide support in three main areas related to;

- Business engagement and product development support for SME's
- Designated spaces for 'plug and play' product development/comparison
- Accessible Building Instrumentation/Data and performance/occupancy monitoring

Exemplar installations include:

- Biomass boiler
- Server room heat recovery systems and lighting/surface energy saving strategies
- Solar thermal/photovoltaic panels
- Green roof
- Rainwater harvesting
- Waste water recycling systems.



STAFFORDSHIRE
UNIVERSITY

Research and Expertise - Staffordshire

UNIVERSITY: STAFFORDSHIRE University

More information:

www.arbornwe.eu
www.rets-project.eu
www.resco.org.uk
www.core-skills.com

Project: ARBOR Project



DESCRIPTION

The ARBOR project (Accelerating Renewable Energies through valorisation of Biogenic Organic Raw Material) looks at the whole biomass energy supply chain from manufacturing to energy production, focusing on improving the implementation of technology available into sustainable supply chains.

Project: RETS



DESCRIPTION

Renewable Energies Transfer System is a three year RETS project funded through the INTERREG IV programme and is a partnership of 12 organisations in nine countries. The aim of the project is to improve the knowledge and competencies of local and regional policymakers in renewable energy systems and facilitate a greater deployment of effective renewable energy policies at local and regional levels.

Project: RESCO Project



DESCRIPTION

The Renewable Energy Supply Chain Opportunities programme has been established to provide businesses in the West Midlands with the support they need to enter or expand into the supply chain markets of low carbon and renewable energy technologies.

Project: CORE Project



DESCRIPTION

Centre of Refurbishment Excellence will be the first centre of expertise for sustainable refurbishment in the region, raising the profile region, assisting it in taking a lead and attracting national organisations, their expertise and resources such as BRE, Construction Skills and BASF. It will contribute towards energy efficiency, global warming, urban regeneration, community regeneration, innovation and knowledge transfer, business support and inward investment, employment creation and the provision of modern workforce