Member Case Studies
The Sustainable Energy Association is technology agnostic, taking a whole house and whole heating system approach which does not favour one technology over another, but rather focuses on the right solution. We promote holistic ‘fabric first’ approaches to developing energy policy. Our membership includes energy suppliers, housing and finance providers and manufacturers, distributors, retailers and regulators of a range of products including energy saving measures, heating systems, controls and insulation.

We engage in the development of long term policy, which gives directional certainty for investors and drives market change. This case study brochure outlines a range of projects delivered by our members across a breadth of property types and across various tenures.

If you would like further information on any of the case studies included in this document or would like to see further examples of our members’ work, please contact us:

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Results of the monitoring project show the heat pump achieved an annual Seasonal Performance Factor of 4.0 and was able to provide 80% of the space heating requirements — 8,448kWh of the 10,610kWh total. Primary energy efficiency of the whole system was 131%. Running costs for space heating were £292 — against an estimated £405 if only a gas boiler was used instead. This translates to a running cost saving of 28%.

In addition to blending renewable energy with intelligent use of natural gas, the Daikin Altherma Hybrid uses smart logic that automatically selects the most energy efficient and cost-effective mode of operation, based on the user’s energy tariff.

“It was an old heating and hot water system, due for replacement. The heat was patchy and you could only ever run half a bath. We were always cold: wanted a gas central heating system, like we’d had before. With the Hybrid you don’t have to feed it fuel — it just sits there and does its job for you. It’s all computerised and works in the background to give us constant heating throughout the house, and keep the costs down.” Chris Kirk, Owner.
Amy bought her first house in 2004, a two-bedroom, ex-local authority, end of terrace property in the picturesque hamlet of Rowington, Warwickshire. The property was off the gas grid and heated using manual electric night storage heater technology which is around 30 years old, as well as an open fire.

After 11 years in the house, and despite having replaced the open fire with a solid-fuel stove, Amy and her husband Saleem researched how they could further reduce heating bills in the 1960s property, which also suffers heat loss due to poor insulation. Amy replaced one of the three storage heaters with a Dimplex Quantum heater, added a further Quantum heater to the kitchen, and also added a Dimplex Q-Rad electric radiator in the hallway.

The Dimplex Quantum system draws energy during cheaper, off-peak periods and offers controllable heat on demand, with an intelligent controller which monitors the user’s heating habits and provides easy operation. It was combined with the Dimplex Q-Rad electric radiator, which offers direct acting heat and includes a self-learning algorithm with delayed start feature so the heaters calculate when they need to start heating in order to reach the user defined target temperature, at a specified time. Together, they provide an intelligent, future-proof heating system which is already compatible with smart meters.

The project

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Specification

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Benefits

Partially upgrading a system of manual electric storage heaters to a combination of Dimplex Quantum and Q-Rad heaters is all it took for homeowner Amy Ahmed-Dolphin to cut her heating bills by more than £500 per year – and improve comfort and controllability too.

Chris Stammers, product marketing director for Dimplex, said: “Mrs Ahmed-Dolphin’s experience shows the opportunity for homeowners, private landlords and social housing providers to upgrade manual storage heaters with Dimplex Quantum, which is categorised as a high heat retention heater – the only product to be recognised in this category in SAP 2012 specification criteria.”

“The results were instantaneous. From the very first time we turned the Dimplex heaters on, we could see the benefits they delivered. We have greater control, we’re no longer relying on supplementary heaters in the evening and the house is far more comfortable, even in the coldest days of winter. At the point we upgraded the heating system, we were paying an average direct debit of £119 per month to the energy company. Now, we’ve dropped to an average of less than £73 per month. That’s a saving of more than £500 across the year – and on those calculations we’re expecting the upgrade to pay for itself in around five years.” Amy Ahmed-Dolphin, owner.
The project

Blue Lab, EDF Energy’s innovation accelerator, has partnered with Flintshire County Council and Warmer Energy Services to develop an effective and sustainable replacement for off-gas heating systems, which provide affordable heat and comfort for vulnerable tenants.

It’s estimated over 1m UK households use electric storage heaters and another 1m use other fuel types for heating rather than gas. Affordability is a chief concern for tenants occupying social housing and those in off-gas properties have few options for affordable heat, most coming with significant disadvantages.

In line with our commitment to Energy Company Obligation, EDF Energy is undertaking several consumer trials through Blue Lab, in relation to solar PV, battery storage, electric heat and electric vehicles. We are creating opportunities for start-ups to help develop and shape ideas into a reality.

In 24 of the 29 properties, night storage heaters have been replaced with the new system at an estimated cost of £15,800 per property. All installations have been provided and installed at no cost to the occupant.

Solar PV and battery storage power the heat pump in a low cost, low carbon way. In addition to powering the pump, it is estimated up to 70% of the household’s electricity will come from solar energy, significantly reducing their energy bills.

The battery allows for unused solar energy to be stored to run the heat pump in the evening and benefits the grid by shifting load away from peak time.

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Benefits

Tenants will have freedom to move away from Economy 7 tariffs, giving them a cheaper daytime tariff for general usage. A heat pump can produce three units of useful heat for every unit of electricity, making it cheaper than a storage heater on Economy 7. Unlike storage heaters, heat pumps can be used at any time of the day.

Each property will be eligible for a combined Feed-in Tariff and Renewable Heat Incentive of £10,800 over the 20 year lifetime of the project.

“The whole system’s very good. I would think we’re going to save a quarter (on our energy bill) It’s a definite improvement. The main problem with storage heaters was you didn’t have any control over it at all.” – Mr Davies, Gwaenesgor
The patented Beattie Passive TCosy (OWLS) is an exciting, new, ‘whole building’ approach to large scale retrofit and can regenerate existing housing stock to a near zero carbon standard. The residents were able to remain in situ throughout the work, so minimising disruption to their lives, before they were left to enjoy all of the benefits associated with Passivhaus. The benefits provided by these energy upgrades are numerous and include lower energy usage, cheaper bills, healthier and warmer living conditions and dramatic reductions in carbon emissions. Residents have reduced their energy bills by 85%, whilst dramatically cutting carbon emissions.

The performance evaluation tools that are being developed by Coventry University will also be beneficial for social landlords as they will enable them to better assess occupier behaviour and engage with tenants during future retrofit programmes. The Beattie Passive TCosy solution also provides training and labour opportunities to the same local communities whose living conditions it does so much to improve.

The £625,000 Innovate UK funded trial involved upgrading a block of six flats in Solihull to EnerPHit standard by way of an innovative Off-site Wrap-around Large Scale (OWLS) retrofit. The project aimed to develop a rapid, highly replicable and innovative passive approach to external wall insulation by applying modern methods of construction.

As well as managing this project, which went on to win the 2017 Midlands Environmental Business Company Award for Sustainable Construction, Encraft also acted as Passivhaus consultants, carried out energy modelling before and after the retrofit, and conducted the project.

Beattie Passive assembled their TCosy timber frame offsite. The TCosy is injected with insulation and provides a building with a highly efficient, air-tight outer layer, with no thermal bridges. When fitted, it gave the flats a completely new external façade and roof.

The flats were also supplied with high performance windows and doors, as well as a mechanical ventilation heat recovery system.

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“"It has made an incredible difference. I have only had to switch my heating on twice so far, since the work was completed a few months ago. Even when it is really cold I haven’t had to put the heating on. I budget for my energy costs and usually put £10 credit on each time. This is now lasting a lot longer than it was before we had the work done and I am even building up credit on my account.” Miss Freeman, resident.
Heating and hot water costs are approximately 25% of the previous level (COP approx. 4:1). The flats can be fully heated without big bills removing the challenge of fuel poverty and delivering associated benefits such as positive impacts on health through a reduction in damp and improved air quality and a three quarters reduction in heating and hot water emissions. The installation qualifies for the Commercial Renewable Heat Incentive (RHI) and the project is expected to payback in less than 10 years. The installation cost per flat is approximately half that of individual air source heat pumps. Having one central plant room has slashed maintenance costs and tenants are not disturbed for servicing. The cost savings and RHI will enable Flagship to invest in similar energy and carbon saving schemes.

Orchard Close consists of 30 flats built in 1986 and owned by Flagship Homes. The flats are fully occupied by tenants, many of whom are elderly.

All had electric storage heaters, which were ineffective and expensive to run. Hot water was provided by electric immersion. Energy costs for heating and hot water were very high. Fearful of big bills, many tenants were inadequately heating their homes. Heating maintenance could be challenging as residents were frequently out when Flagship engineers called.

Flagship Homes are committed to continual improvement in energy use and carbon emissions. Stuart Longbottom, Strategic Director for Asset Management at Flagship explained: “Ground source heat pumps are a low maintenance, sustainable way of heating our homes which are a fantastic solution for our customers.”

Finn Geotherm undertook a precise flat-by-flat heat loss assessment resulting in a 76kW requirement. To deliver this, they installed two Lampoassa Eli60 60kW ground source heat pumps linked to a 2000 litre thermal store. These were located within an external, insulated plant room. The heat pumps were connected to a 1600m bore hole array.

Heat was distributed via an underground insulated ring main, linked to individual heat interface units in each flat. The HIU delivered all heating and domestic hot water. Individual heat meters allowed each flat to be billed for the heat they used. The system was linked to the internet enabling remote monitoring and control.

All tenants retained heating and hot water during installation. There is no sign in the close of either the bore hole array or ring main having been installed. The entire system was delivered within the original proposed budget and the agreed 8-week timeframe.

“Our home is constantly warm throughout and I have been very impressed with its performance.” - resident
“T can’t speak highly enough of the heat pump system and the service we received.” - Matt Smith, Contracts Manager at Flagship Homes
The LE155 units are SAP Appendix Q listed and incorporate Energy Efficient EC Fans so their specification is in accordance with Kensington and Chelsea Tenant Management Organisation’s drive to provide more energy efficient solutions for tenants and reduce the borough’s carbon footprint. The JS6 remote dual control switch can be set to boost when occupants are generating more moisture through cooking or showering.

In the summer mode the LE155 can be used for extracting moisture only, but in the winter it can also be used to bring in external air for heating too.

The units cost as little as 2/3 pence per day to run and provides tenants with a cleaner healthy living environment. Another attraction for the occupants is the extremely low sound levels during operation.

The dwellings within Hazlewood Towers were originally under attack from condensation and mould growth, caused when moisture from the bathroom and kitchen migrates to the coldest part of the dwelling, including the walls, resulting in the visible effect of wallpaper peeling away.

Over 70 units have been installed within the kitchens of apartments in Hazlewood Tower to provide an energy efficient means of ventilating the properties, preventing condensation and combating the problem of mould growth which affects so many properties of this type built in the 1960s.

The project

The new LE155 Low Energy units have been installed in the kitchens above the cooker. Stale, moisture laden air is extracted from the bathroom through a grille and then taken through encased ductwork into the LE155 unit. It also takes in the moisture and smells generated by cooking directly from the kitchen.

This air is passed across a heat exchanger to remove the heat and the residue is exhausted to the atmosphere through an external grille on the apartment’s balcony. Fresh filtered supply air, with airborne particulate removed, is drawn across the heat exchanger and redistributed back into the apartment through grilles in dry rooms, including the lounge and bedroom.

Specification

The project

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Benefits

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The Burnley pre-1900, solid wall property is occupied by a retired couple in their mid-sixties. A pre–1979 gas boiler provided primary space and water heating to the home.

The area in which the dwelling is located was part of an ongoing renewal project involving property face–lifts. Consequently, restrictions were placed on any alterations to the exterior including External Wall Insulation (EWI). Thus, Internal Wall Insulation (IWI) was the only option.

Kingspan Kooltherm® K18 Insulated Plasterboard was mechanically fixed to 25 x 50 mm pre–treated timber battens faced with 100 mm wide damp proof course (DPC) strips, on the external walls. A 92.5mm thickness was selected based upon the space requirements of the property owners.

Please note there is now a new lower-lambda insulated plasterboard available – Kingspan Kooltherm K118 Insulated Plasterboard.

In some spots of the lounge, the wall temperature was up to 3 degrees cooler than the ambient temperature before the installation which could lead to condensation if left untreated. Following the installation of IWI, the U-value of the wall decreased by 89% and air-leakage decreased by 57%, this resulted in the mean average indoor air temperature rising by 0.8 degrees to almost identical to the ambient temperature, making the home warmer and more comfortable. The renovation reduced normalised actual gas consumption by 45%, meaning that the occupants saw reduced energy bills. The dramatic 45% saving in primary space heating consumption was more than twice the predicted saving modelled using SAP.

Monthly gas use data taken during the heating seasons revealed a marked change in heating pattern following the insulation upgrade, with both the intensity and duration of gas consumption for space heating events decreasing, particularly in the daytime. A defined bimodal heating pattern emerged post–installation. The use of the thermostat to maintain desired temperature levels resulted in the constant low level of gas use observed in the post–insulation period.

The renovation also had a positive impact on the energy and environmental performance of the dwelling, the building moved up an Energy Performance Certificate band and the Dwellings Emission Rate decreased by 32%, possibly increasing its attractiveness to potential tenants or buyers to whom such performance factors are key considerations.
Total fuel cost savings of £5,500 per annum attributable to reduced householder fuel bills.

£233,000 lifetime fuel cost savings (lifetime = 42 years)

28.6 tonnes of CO₂ abated per annum by insulation works completed during the project.

1,200 lifetime tonnes of CO₂ saving expected over the lifetime of the measure.

Improved sound proofing between properties, Supafil Party Wall insulation also has good sound absorption characteristics which is designed to protect occupants from noise in adjoining rooms or buildings.
Salvation Army Housing Association (Saha) owns and manages over 3,500 homes across England. When a mixture of 35 flats and houses in Brewers Yard, Southminster, in the Maldon district of Essex required an upgrade, TSG Building Services were appointed as a result of a competitive tender to install new Air Source Heat Pumps heating systems to replace the existing electric heating systems.

TSG recommended the Ecodan air source heat pump system from Mitsubishi Electric, with units installed ranging from 5kw to 8.5kW depending on the property size, along with pre-plumbed cylinders. Ecodan is designed for retro-fitting making it suitable for almost any property. It can even work alongside existing heating systems in a hybrid situation deciding when it is most efficient to use the renewable heating.

“We believe in working together with our residents, so we can help combat high energy costs and alleviate fuel poverty. We’ve already had good feedback from a customer satisfaction questionnaire in regards to savings on their energy bills in comparison to their previous electric heating systems as well as the increased thermal comfort of their homes,“ added Mr Sitton, Capital Projects Manager, Saha “Of course there is also the added benefit of being able to attract regular payments from the Renewable Heat Incentive.”
Natural Building Technologies were asked to provide insulation materials for a number of affordable homes in the village of Outwell. Hastoe Housing Association were approached by the local district council to develop 15 affordable homes to passive house standard.

John Lefever of Hastoe commented on the affordability of the properties “We have to charge what’s called affordable rents, which are slightly higher than the old social rents. So our board took the view – is there any way we can offset this? The obvious way forward is to deliver something that will ensure that [residents] fuel costs are much lower than normal. Hence passive house.”

The project was initiated with a people first approach. Thinking about the needs of the inhabitants, the materials were chosen in response.

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Specification

Natural Building Technology’s Pavatex wood fibre insulation was selected for use in the project, with 100mm of Pavatherm-Plus installed over a 140mm deep insulated timber frame. The thermal performance of building envelopes are primarily based on three main factors: U-values, airtightness and Y-values. The latter two can be improved at no cost to reduce the U-value requirement and wall thickness, eventually reducing overall cost.

The insulation was installed both within and over the timber frame to ensure thermal continuity through the immediate floor zones. Wrapping the timber frame with woodfibre not only provides better U-values but also minimises thermal bridging at floor junctions, around windows and at other similar junctions where insulating between the frame is impossible.

Properties

The properties achieved EPC ratings of B83-B86 with average space heating demands of 9 kWh/m² per year. Primary energy use was around 105 kWh/m² year. The homes achieved an average Airtightness Level (at 50 Pascals) of 0.57 ACH. The homes benefited from low U values with the walls, roof and floor achieving U-values of 0.137 W/m²K, 0.105 W/m²K, and 0.17 W/m²K respectively.

““The way we approached it was to keep it as simple as we can, use tried and tested products and material, keep the building footprints as tight as they could be to meet the housing association requirements and not put lots of fancy bolt-ons on”– David Thompson, Architects Ingleton Wood
The project

Nottingham Community Housing Association (NCHA) is one of the largest locally-based housing groups in the East Midlands, managing over 8,900 homes and housing more than 15,000 tenants in Nottinghamshire, Derbyshire, Lincolnshire, Leicestershire, Northamptonshire and Rutland.

NCHA was awarded a charitable grant of over £350,000 to deliver an innovative energy project which will help tackle fuel poverty in 74 properties across Nottinghamshire. The funding came from Technical Innovation Fund (Health and Innovation Programme), designed and administered by National Energy Action, the national fuel poverty charity.

Specification

NCHA is committed to upgrading existing homes to improve the energy efficiency and help reduce fuel bills for residents. The introduction of High Heat Retention, Smart Storage Heaters alongside further complimentary energy saving measures such as Voltage Optimisation; High Heat Retention Hot Water Cylinders; LED Lighting; alongside tenant training and tariff switching services and guidance is helping to change the habits of tenants, resulting in even further savings.

The work was completed at the end of September 2016 and the results will be fully evaluated in a two-year monitoring programme to demonstrate the impact it has had.

Benefits

The project is expected to reduce tenant energy bills and incite tenant behavioural change. Through this project the average EPC rating of the properties has increased with over 90% now rated EPC band C.

NCHA completed the work by end of September 2016 and the results will then be fully evaluated in a two-year monitoring programme to demonstrate the impact it has had.

“The new storage heaters are much easier to use, gave heat when I needed it.” - Mrs Theideman, North Nottinghamshire

“The heaters are brilliant and like the ease of use with the controls” - Mr Snell, Newark

“The heaters are a lot better than the old ones, a lot more controllable, can use them on a timer and are cheaper than the previous electric storage heaters” - Mrs Holland, Nottingham

“The heaters can be set at a warm temperature of 21 degrees, they are brilliant, more controllable than the old storage heaters. Can get the heat when and where need it” - Mr Brookes, North Nottinghamshire

| PROPERTY | 74 SOCIAL HOUSING |
| TECHNOLOGIES | HIGH HEAT RETENTION SMART STORAGE HEATERS |
| PREVIOUS FUEL | ELECTRIC |
| HIGH HEAT RETENTION HOT WATER CYLINDERS |
| LED LIGHTING | |

LOCATION: NOTTINGHAMSHIRE
The system is now fully up and running. As well as providing a consistent supply of comfortable heating and readily available hot water, it cut the farmhouse’s bills by more than £1,800 per year compared to the previous oil-based system.

The system also qualified for annual payments of up to £1,609 for seven years under the government’s Renewable Heat Incentive (RHI) scheme, making it even more cost-effective in the long run.

The intelligent controls allow Pat and Duncan to control both their heat pumps to meet their heating and hot water needs on one easy to use system. The controls enable them to set the temperature of their heating and allows it to be scheduled including a holiday setting. The heat pump is compatible with NIBE Uplink which allows remote monitoring and control over the internet, with fault notifications via email.

“*We’re delighted with our new heat pumps and are enjoying the benefits of a heating system that keeps our home warm and comfortable (even when the whole family comes to visit) without having to worry about increasing bills. The controls are really straightforward – we simply leave the heat pump running and the controls do all the work for us!*” Duncan Kirkby

**PROPERTY CHARACTERISTICS:**
- 19TH CENTURY FARMHOUSE
- FIVE BEDROOMS
**PREVIOUS FUEL:**
- TWO OIL BOILERS
**TECHNOLOGIES USED:**
- INSULATION ✓
- AIR SOURCE HEAT PUMP ✓
- DOUBLE GLAZING ✓
- SMART CONTROLS ✓
- LOW TEMP HEAT EMITTERS ✓
- HOT WATER CYLINDER ✓

**LOCATION:** KIRKBY, NORTH YORKSHIRE
Completed in late 2015, the Maritime Apartments provide tenants with more controllable and affordable low carbon heating. In addition, the project has played an important role in bringing these historic buildings back to life and contributing to the regeneration of the area.

In terms of environmental impact, the redevelopment has resulted in a significant reduction in lifetime carbon emissions of 70,000 tonnes.

“This has been a fantastic project to be involved in. We’ve worked with our partners to totally transform the buildings and delivered real benefits for the environment and the local community.”
Mark Brough, Head of Community Energy Solutions at npower
As one of the UK’s largest developing housing associations, Orbit has 50 years’ experience providing more than 40,000 quality, affordable homes and a range of advice and support services to over 100,000 people across the Midlands, east and south of England.

Its asset management strategy commits the organisation to providing warm, affordable homes. Orbit requires that all its properties will have an EPC (Energy Performance Certificate) of Band C by 2030 by upgrading building insulation, heating systems and installing renewable technologies.

The initial focus of the programme has been on upgrading insulation. So far 2,154 homes been improved since the programme got underway in October 2014:

- Loft insulation - 748 homes
- Cavity wall insulation - 391 homes
- External wall insulation - 1,013 homes

The next phase of the programme involves the installation of high heat retention storage heaters and solar PV. The most effective way of implementing internal, whole-house retrofits is also being explored.

**PROPERTY CHARACTERISTICS:**

**SOCIAL RENT HOUSES**

**TECHNOLOGIES USED:**

- LOFT INSULATION ✔️
- CAVITY WALL INSULATION ✔️
- EXTERNAL WALL INSULATION ✔️

**LOCATION: MIDLANDS, EAST AND SOUTH ENGLAND**

**The project**

**Specification**

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**Benefits**

New EPC certificates on completion of the works show that on average customers can save £227 pa from external wall insulation, £126 pa from cavity wall insulation and £118 pa from loft insulation.

A survey of customers showed that up to 83% of customers felt their homes are warmer, 43% saved a lot on energy bills and 43% no longer experience mould and damp.

**“The house feels warmer. The back bedroom used to get cold and damp but now feels much warmer and the damp has subsided. It’s made the look of the estate much better. They look like new private properties.”** - Mr and Mrs Wargent

**“The house retains heat for much longer and feels warmer, we turn the central heating off at 6.30pm and it is still warm at 9.00pm. It’s also lifted the estate, it looks nice, and we really like it.”** - Mr and Mrs Nutt
In the short term, utilising a new ‘modular’ pitched roof element significantly increased the speed of construction and allowed the client to move in to the property on schedule. Recticel’s L-Ments® panels feature rigid insulation foamed around timber rafters, plus an integral breathable membrane and counter battens. Fixing the complete roof system in one operation – the entire roof structure was completed ready to receive the external finish in just one day – eliminated time consuming tasks such as cutting and fitting insulation boards, and offered improved airtightness at the same time.

The thermal performance of the L-Ments® roof panels also contributes to the long term benefit of adopting a fabric first approach and installing high levels of insulation throughout. The near-zero carbon standard dwelling will enjoy low heating demand and energy consumption for its whole life, minimising carbon emissions and making its own contribution to the UK’s carbon reduction targets.
The 35 homes designed by Blueprint are now sold and occupied. Over the last 12 months the owners have seen utility bills that most of us could only dream of. Typically, the average gas bill on these family homes is coming in at less than £30 per month, with some homes nearer to £15 per month.

The aim of the project was to design 35 homes that delivered a high specification of fabric efficiency merged with economic use of hot water, ensuring that there was minimal wasted energy. Showersave, albeit only one element of the overall build, has contributed towards achieving the project objectives. Showersave effectively acts as insulation for the drain and is a simple, passive and cost-effective technology ideal for projects aimed at reducing energy and maintenance costs.

Showersave is widely used by UK house builders and is an ideal solution for the build to rent market as no product maintenance is required for the life of the building.

Showersave was specified by Blueprint for the following reasons:

- Showersave is recognised by BRE in SAP
- Low cost and therefore a hugely competitive £ per point in SAP
- Offers developer a cheaper alternative to Mechanical Ventilation and Heat Recovery, Solar PV or Triple glazing, yet achieves similar carbon and energy savings.
- Showersave remains one of the most cost-effective solutions to achieve the new demands of Part L 2013
- Customers benefit from reduced heating costs
- Showersave is a “fit and forget” technology, lasting the life of the building and requires zero maintenance

“Our objective was to build a quality family environment, which was competitively priced to own and run. The inclusion of Showersave has helped greatly in achieving this” Rachel Hopwell, Blueprint.
Highfield is a new ultra-low carbon detached rural dwelling. The previous property was highly inefficient with solid walls, no insulation and a 30-year-old boiler achieving a SAP rating of <30 (Band F). This 180sqm 3-bed dormer bungalow property incurred high annual energy costs, which led the consumer to seek a more efficient and cost effective ultra-low carbon solution.

Owner, Richard Hurd had a genuine interest in building a house that used the latest low carbon technology to minimise energy usage. The aim was to build a home that looked like a traditional house from the outside, but was modern and contemporary inside and did not cost any more than a normal build.

The design solution involves a mixture of efficient integrated heating and insulation solutions to negate the need for traditional boilers for space heating. A fabric first approach was taken, minimising the cost and complexity of the energy systems. Extremely low design U-values were achieved in the walls and ceilings due to the innovative twin-wall construction and Superglass mineral wool batt insulation combination.

Solar thermal panels and a wood burner charge a heat store in the summer and winter respectively, topped up overnight by an Economy 7 immersion heater to maintain optimum operating conditions and sufficient heat in the store for both hot water and space heating.

The system is further optimised using a highly efficient mechanical ventilation and heat recovery (MVHR) system linked to a passive Earth Duct, which pre-warms (winter) & pre-cools (summer) the property’s incoming supply air.

The home meets our family’s needs, it is efficient, looks great externally & internally, feels fresh at all times, has no draughts, and has a pretty constant temperature throughout the year. Also, it is very cheap to run." Richard Hurd, Owner Highfield
Monitoring data from the periodic meter readings shows that when the installation is operating, it is deriving substantial benefit from the heat extracted from the ground boreholes. The ground source heat pumps show a low monitored energy use of 8 to 16 kWh per day and 1 to 3 kWh per day for heating and hot water respectively. The amount of heat generated in the previous year was 300,000kW but due to the energy-efficient alterations made to the system—including removing the individual cylinders and fitting communal store—it is now estimated that the building will require only 240,000kW of heat. The yearly running cost is now estimated at £4,500 per year, instead of £9,900 for the previous year – a saving of over 50%.

Northwoods Housing provides retirement housing for those over 60. The apartments offer affordable, independent living with security and extra support if needed. Duncan Edwards Court contains one bed ground floor apartments. Previously, the property’s heating system comprised three 80kW conventional cast-iron gas boilers which supplied space heating to the 11 apartments. Each had their own domestic hot water cylinders also fed from the boilers.

An integrated renewables system consisting of a solar thermal array on the roof and two 22kW geoTHERM ground source heat pumps was installed. In addition, an ecoTEC plus 438 boiler provides a back-up and ensures the system is pasteurised weekly, raising the temperature from 56 to 65 degrees for an hour.

The cylinders were removed and replaced with a communal store of 300 litres, reducing the stored capacity by 700 litres. A simple secondary hot water circulation was also fitted throughout the building and insulated.

To effectively monitor the system and reduce the need for call-outs, sensors were installed in each apartment which measure the room’s temperature and feed back to a central monitoring system. A series of new radiators were also fitted (the first serial feed radiators in the UK) which should provide approximately 10.5% savings in energy costs.

“We’re extremely pleased with the installation and its performance so far. The success of the project is even starting to serve as a shining example of the benefits of renewable technologies, as we’re now attracting interest from housing associations and councils across the UK who are considering similar measures.” Bernard Turner – Principle Mechanical Engineer, Northwards Housing
Previously using electric storage heaters exclusively, the residents of West Whitlawburn were suffering from high heating and hot water bills across the estate. Situated in the bottom five per cent band of the Scottish Index of Multiple Deprivation, the West Whitlawburn Housing Co-operative (WWHC) faced a challenge in implementing a cheaper, more sustainable fuel source.

Initially, the WWHC invested £22.4 million to improve the energy efficiency of these buildings, work which included cladding, insulation, new windows and re-roofing as well as enclosing exposed balconies in six high-rise blocks. The project, part funded through the Warm Homes Fund, involved the construction of a new energy centre.

The new energy centre contains a 740 kW Pyrotec biomass boiler and 50,000 litre thermal store. The system burns woodchips or pellets at up to 92% efficiency and is fed via an automated charging screw from an underground store beneath the energy centre. Due to the combustion manager within the boiler, a greater variety of wood fuel can be used to heat the system.

The energy from the fuel is transferred from the thermal store to each property via a network of insulated underground pipes. This heats each unit’s individual heating system, comprising of a heat exchanger, radiators and hot water tank.

The West Whitlawburn scheme also uses three 1300 kW Vitoplex low temperature gas boilers to provide backup heat, providing a highly resilient system. With wide water galleries and large water content, the Vitoplex boilers require no minimum flow rate, and cater for both high and low energy demands from the estate.

"The new biomass district heating scheme is a true community energy project. We are delighted to be making a real difference to the West Whitlawburn Community." Stephanie Marshall, Deputy Director of West Whitlawburn Housing Co-operative

**Benefits**

This large scheme, completed in December 2014, is expected to bring hundreds of residents out of fuel poverty, with an expected saving of 20% on heating and hot water bills compared to the previous system. The Community project will save 1600 tonnes of CO₂ each year, equating to 48,600 tonnes of CO₂ over its 30 year lifespan.
With an approximate heating demand of 17,000 kWh, the previous annual fuel cost for these homes was estimated to be £1,044. The wood pellet biomass boilers have reduced the annual fuel costs by around £344, a saving of 30%. Tenants previously had to top up their coal heating systems twice daily in the winter and regularly empty the ashes - a time-consuming task. The homes now have full central heating systems and are all fitted with mains-fed hot water cylinders, this means that all rooms are efficiently heated and tenants can now run hot showers.

Warwick District Council working with Windhager were successful in a bid sponsored by government for funding aimed at rural homes with no access to natural gas. They were awarded a grant of £118,000 which was invested into the installation of approximately 25 biomass heating systems. The Windhager biomass boilers provide whole house heating and hot water to each individual property.

The award represented 50% of the total cost of the proposed installations and has benefited up to 25 tenants currently living in rural properties, which previously were being heated through solid fuel back boilers or electric storage heaters having no access to natural gas.

The VarioWIN is a practical complete solution, as well as being a pellet boiler it also includes a feed system and pellet store all under one shell. It has a 12kw output and provides all the heat and hot water for the property. The VarioWIN works even more efficiently with low heating demand properties, making it the ideal solution for energy efficient homes.

“We are absolutely over the moon with the new biomass system. Our house is so much warmer and we no longer dread going into a cold bathroom. Our system was installed two days before Christmas and in the first month we have made a £60 saving on our energy bill. I have been recommending it to all my friends” commented A Resident from Rising Lane.
For more information on these case studies please contact:

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