

THE CONVERTED

John and Helen Parsons' hunt for a self-build plot concluded in the conversion of a redundant listed barn into a thoroughly eco-friendly family home

Details Eco barn conversion, Berkshire, Sep 2007 – Oct 2010
Project Cost Undisclosed
Designer Mathewson Waters Architects

John and Helen Parsons dreamt of building an oak frame home and spent 14 months looking for the ideal plot. Yet, one of the first sites they stumbled across was a semi-derelict listed barn on a farm in the Berkshire countryside. A conversion was not even on their minds, but there was something about the barn that the couple connected with. "It felt like home," says Helen.

Their self-build plot search continued for a further 12 months until a new agent re-introduced them to the barn. "The appeal was just as strong on the second visit, and I had really never stopped thinking about it. The barn was just a big empty space and obviously a huge challenge, but it had so much character, the position was great, and being in a group of just four other properties was very attractive," Helen explains. ▶

A thoroughly 'green' home John and Helen (left, with their children, eight-year-old Alex and Luke, six) took on a listed barn, utilising the existing building as an envelope inside which they have added a new green oak frame. This enabled the couple to create a highly insulated airtight structure, without compromising the existing outer shell. A mechanical heat-recovery ventilation system and solar thermal panels provide heat for the hot water and underfloor heating, with a 15kW wood-pellet boiler providing additional warmth in colder months.



Words: Tim Pullen
Photography: Darren Chung



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1: Blending old and new
Old beams sit side by side, almost unidentifiable from the new green oak frame in the kitchen. The kitchen units were designed by Helen and main contractor Sean Bishop, and then constructed by Sean's carpentiers

2: Voluminous spaces
The open plan living and dining space, with gallery above, is the centre of the house. The green oak frame, from Oakwrights, and change in head height bring definition to this large open space. A chimney breast also acts as a room divide between the living and dining spaces — the woodburning stove rotates, allowing it to be used in both areas

3: Natural, breathable walls
The window openings reveal the thickness of the walls, which have been lined with insulative Pavatherm wood-fibre boards — made from waste FSC wood — which are breathable. The walls have been finished in a breathable lime plaster

Obtaining planning permission would take another 12 months of design and negotiation effort. This was in part due to the barn's listed status, but also the result of the couple's ambitions; from the outset they wanted to ensure this would be an eco conversion. As such, Helen and John, who are both solicitors, knew the benefit of a cautious approach and taking good advice. They dedicated hundreds of hours speaking to experts, asking questions, and researching the products and materials they would go on to specify.

"We had three objectives that we kept firmly in mind: we wanted to use as many eco products as financially sensible, we wanted to maximise insulation to reduce running costs and we wanted the house to be comfortable," John explains. "We also wanted to reduce our environmental impact, and with each product or idea we would see how many of those boxes it ticked."

The couple began to realise that the potential existed to build a really energy-efficient and airtight house. The existing fabric of the barn was not strong enough to support a first floor, and one of the first and most significant decisions was to build a green oak frame inside the barn and use the existing timber frame as an envelope. This provided an opportunity to install 350mm of sheep's wool insulation in the walls with 150mm of polyurethane under the floor. ▶



And so the couple needed to find a main contractor that could take on their eco conversion. Sean Bishop, who had undertaken the conversion of the barn next door, seemed an ideal candidate. "At first I thought no, too much hassle!" smiles Sean. "But then I thought that maybe this is the way of the future and this project would be a good opportunity to learn, to get to grips with new ideas and new methods."

Work on the conversion finally began in March 2009 with the groundworks and clearing the inside of the barn. The opportunity was taken to install two rainwater harvesting tanks with a total capacity of over 6,000 litres.

Sean's biggest challenge was getting the airtightness right. "It was not something I had ever really thought about before, but when I went through the figures with the Parsons' eco expert I could see where he was coming from," he says. The original target was an airtightness of $5\text{m}^3/\text{hr}$ – twice as good as that required by the Building Regs – but with diligence and some ingenious ideas, Sean managed to achieve a figure of just $2.67\text{m}^3/\text{hr}$.

This same attention to detail was extended to all aspects of the project. There is plentiful oak on display, some old and some new — the latter so well crafted that it can be difficult to tell which is which. The house is also full of interesting features like a half-size door between the children's bedrooms, a bath set in front of a full-height window to enjoy the spectacular view, and a woodburning stove that can rotate to face either the living or dining room.

JOHN AND HELEN'S BARN CONVERSION

Construction Timber frame
outer skin: oak inner skin
Size 412m²
Build Time 13 months
Build Route Main contractor
and self-managed
Plot and Build Cost
Undisclosed

John and Helen have turned that huge, echoing space into a warm, welcoming and beautiful home. Now the house is finished the couple recognise that it could have been done quicker and cheaper, but they have no regrets. "This is the house we want to live in," says Helen. "I never imagined that we would own a house like this, but we do. As project manager I had to balance the budget with the schedule and the design,

so we decided to spend on the fabric and save money on the things that can be replaced." And judging from the result, it is a methodology that has worked.

Using Natural Finishes

Part of the reason for installing natural insulation was to build breathable walls — walls that help maintain a steady internal state and prevent unhealthy low levels of humidity. The Parsons realised that to finish the job the internal walls had to

be lime plastered, as gypsum plaster (and plasterboard) are not breathable.

Sean Bishop's team had not used lime before, and it can present problems to the inexperienced. However, help and advice provided by the lime supplier enabled the team to get to grips with its application. The lime plaster was applied to Pavatherm wood-fibre insulation board, which is also breathable. "We only needed the base coat to get the finish we wanted, so it was relatively quick. It looks great and it does not crack," Sean reflects. Lime can absorb and slowly release relatively large volumes of water, so it is not as susceptible to drying cracks as gypsum.



4 & 5: Warm and spacious
A neutral palette presides with timber used throughout — not just in the frame, but the staircase, window frames and doors. Underfloor heating has been laid throughout the ground floor in Flo Screed — a pumped screed that's not only quicker to apply than conventional sand and cement, but uses a finer grade of material. This means it can be laid thinner (just 50mm) and denser, making the underfloor heating work more efficiently



USEFUL CONTACTS: Architect Amanda Wheeler of Matheson Waters Architects: 01488 73131, mw-architects.co.uk. Steel construction, kitchen and joinery Sean Bishop: 07970 202747. Lark consultant WeatherWorks: 01269 822373. Heating system Windrager UK: 01249 446516. Oak frame Oakwrights: 01432 353353. Insulation Black Mountain Insulation Ltd: 01745 361911. Lime plaster Natural Building Technology: 01844 338338

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An Energy-Efficient Heating System

The Parsons put a lot of effort into designing the heating system. One of the underlying principles was that running costs should be affordable in the long term. So the high levels of insulation and airtightness were geared directly towards reducing the heat load. With the final design the predicted peak heat load was slightly over 10kW and the predicted consumption some 25kWh/m²/yr — compared to 55kWh/m²/yr if the couple had stuck to the Building Regs standard.

A lot of thought went into the best option: heat pumps were considered, as was biomass and solar. With high levels of airtightness, mechanical ventilation was a necessity, and adding heat recovery to the system seemed to make sense. The final decision was for a combination of heat-recovery ventilation with three solar thermal panels (approx 6m² in area) with a 15kW wood-pellet boiler, from Windhager. It was felt that this would give the best of both worlds; it is anticipated that the solar panels, being slightly oversized, will provide all of the heat and hot water needed from April to October and that the wood-pellet boiler will only be needed for the colder months — November to March. This will minimise the fuel bill, use renewable energy, and ensure there is enough capacity for the really cold days or when guests need lots of hot water.

In addition, the underfloor heating was installed to the ground floor only, with towel radiators in the bathrooms being the only heating to the first floor. The rationale was that with the insulation, together with the heat-recovery ventilation, additional heating distribution to bedrooms would be redundant. It was a bit of a leap of faith, but it has worked. 🌱



6: Spacious bathing

A free-standing bath sits beneath oak beams and a rooflight in the family bathroom. Note the attention to detail applied in matching the timber panel on which the bath thermostat sits to the wood used for the rooflight surround. Spotlights have been incorporated in the flooring, illuminating the feature bath, and lending a soft glow at bathing time.

7: Master bedroom

with masterful views. Glazing features extensively in the barn — filling the existing openings — to create light, airy interiors. The full-length windows provide views over the surrounding farmland from the master bedroom. The glazing continues down to the ground floor level, lending light to the entrance hall below. The timber four-poster bed also works well in this room — making the most of the high vaulted ceilings and lending to the grandeur of the oak frame.

Photographs were taken at numbered positions

High Volume Living

The heart of the house is the semi open plan living and dining room — open to the eaves — above which a large gallery landing doubles as a place to sit. A ground floor en suite bedroom future-proofs the house, in addition to providing extra guest accommodation. Upstairs, there is a study, three further bedrooms and a master bedroom — the latter has the added luxury of both an en suite and a dressing room.

