

**SOUTH SHROPSHIRE CLIMATE ACTION GROUP
BUILDINGS RETROFIT CASE STUDY**

ECO-FRIENDLY RENOVATION OF MEDIEVAL HOUSE



This house is a classic example of the difficulties which an historic property poses in combining conservation with modern standards of insulation, comfort and reduced energy consumption. The house dates back to about 1400 with 16th century alterations. Further additions in the Victorian era created problems through shoddy workmanship and the use of pine and, worst of all, cement. These factors and the failure to carry out on-going maintenance made the roof vulnerable to water ingress causing damage to the walls, not least where the additions joined, and where the walls consisted of separate skins of stone, lathe and plaster and wattle and daub.

The current owners bought the house in 2002 with a view to completely renovating it and making it ready for climate change. They planned it as a retirement project

which would depend substantially on their own labour. When they moved in the property was found to be in a much worse condition than expected. The roofs and valley gutters leaked badly, the leaded windows let in wind and water, the lack of insulation caused widespread and very destructive condensation, and the parlous state of the electrical installation created a fire hazard. Improvements to the environmental performance of the house therefore had to begin with urgent structural repairs. These required not only a huge investment of time, skill and heavy labour by the owners and various contractors, but also the expert advice and goodwill of the then South Shropshire Planning Officer, which proved invaluable. The result of their co-operation over many years is a tribute to their amazing energy and patience, and a demonstration of what

is possible in adapting a truly challenging building to the Zero Carbon future.

The work was prioritized and carried out between 2002 and 2018 in the following stages:

- The electrical system throughout the whole property, including the outbuildings, was completely renewed, and the fire hazard of debris (including wood shavings, mortar and rat and squirrel nests) was removed from the underfloor cavities.
- Replumbing enabled a new 34 radiator central heating system to warm the house and reduce condensation. An air-source heat pump was considered but found inadequate at that stage, so the present system is oil-based as there is no gas in the village.
- To prevent water ingress and reduce energy wastage the entire roof was renewed. This required:
 - the replacement of the lead-lined valley gutters by far more durable hip tiles;

- the replacement of damaged beams with recycled ancient timbers wherever possible;
- the repointing of all the chimneys;
- the installation of Kingspan insulation boards and breathable membranes between the rafters;



- the filling of roof spaces with Rockwool insulation;
- the complete retiling of the roof to replace the many broken tiles. As many reusable ancient tiles as possible were retained.



- the treatment of all woodwork with Rentokil and preserver;



- The rotted pine timbers of structurally unsound Victorian additions were replaced by oak framed panels backed with Kingspan and faced with lime mortar.



- New sewer connections have enabled four new bathrooms to be installed (with maximum insulation), and disposal of all foul water that was previously emptied into the stream.



- Rotten timbers in walls and at footings have been replaced and Kingspan insulation installed behind new lime mortar panels.

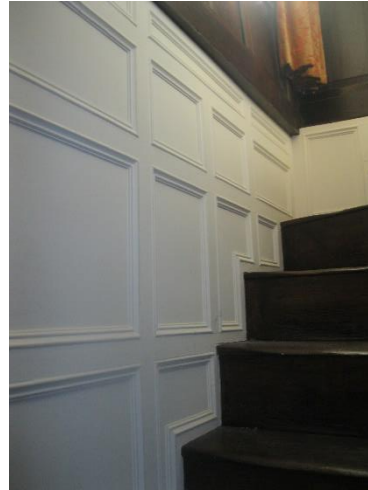
- The windows were renewed by replacing rotten frames and broken leaded lights. Double glazing panels are now installed behind most windows to provide triple-glazing.
- The drainage system was replaced:
 - Broken stone troughs round the walls were replaced by pipes to discharge rainwater into the adjacent stream.



- Multi-fuelled closed stoves have been installed beneath the ancient chimneys in the dining and sitting rooms, allowing the chimneys to be sealed and filled with vermiculite without any detrimental effect. (NB Some advice sheets say that
- Cold air from the end of the house used to enter the kitchen through the back stairs and cause considerable condensation on the landing window, destroying the window ledge and affecting the surrounding wall. This problem was very effectively solved by cladding the back stairs with paneling covering Kingspan.

vermiculite filled chimneys can cause damp problems.)

- The redundant Victorian bathroom block was demolished, allowing windows, wooden artefacts, tiles and decorative motifs to be re-used elsewhere.



The result of these extensive renovations is that the house is now dry, warm and comfortable to live in. A heat survey concluded that its carbon footprint is comparable to that of a well-insulated modern property, making it Zero Carbon ready once the oil-fired central heating boiler can be replaced by a non-fossil fuel alternative. Structurally the future of this remarkable ancient property is assured, either as a family home or as an attractive guest house or B&B.

In addition, the south facing roof of the main outhouse would be ideal for a Solar PV array if the Planning Authority could be persuaded to reverse its opposition to the two listed building applications and the Appeal which have already been made for this purpose.

