There is no boiler as such,” says Bill Powell, as he explains how his ordinary-looking four-bedroom house in Stapleford is heated. The house had been run down – “When we inherited this house, it needed fully rewiring,” – and needed lots of work to bring it up to a modern standard. Bill spent six months reading, and decided that the way forward was an exhaust air heat pump, connected to underfloor heating and four fan-assisted radiators.

It sounds like magic. Air-source heat pumps extract warmth from the outside air and compress it, and then this heat can be used to heat up water for a heating system. You may have seen ground-source heat pumps being installed on dramatic television programmes; air-source pumps are similar, although without the drama of digging up a garden. Bill’s system, however, required neither drama nor digging. His exhaust air source heating system extracts air not from outside, but from a warm part upstairs to the airing cupboard (see picture), tank of water. The system keeps this water warm for through a compressor, and is used to heat a 300-litre upstairs bedroom, as well as providing the hot heat pumps being installed on dramatic television compressor in your house already: your fridge works heat pump is quite sufficient, and much like anyone with relatively recent central heating, he uses a radio-controlled thermostat to set various temperatures, in various rooms, throughout the day.

The amount of time and energy Bill has investigated in researching and designing his system is clear. His background, as an electrical engineer, clearly helped – but it’s his enthusiasm for restricting energy consumption as much as possible in as practical a manner as he can that’s driven his project. “When we inherited our house,” he says, “I saw the opportunity for an eco project, and to make the two gas fires for the next fifty years – to make it ‘future proof’.” Had he done building projects before, and had builders to draw on! Not particularly, he says: his builder was not especially knowledgeable about ‘eco’ projects – but he was keen to learn and to use the materials Bill had researched. And the plumber Bill asked to install underfloor heating and the exhaust air source heat pump! “Recently qualified,” says Bill.

My own house, by virtue of its steel-frame construction, has virtually no insulation (except in the roof) and so insulation is one thing I’m very interested in learning more about. Did Bill go to special efforts to insulate his house? “It was incidental in many ways,” he explains. The cavity walls were already insulated; the new walls in the modest extension and roof were insulated to current building regulations. The house has a suspended timber ground floor, so the floorboards were removed and 50mm Celotex insulation laid on battens before the underfloor heating pipes were installed. The underfloor heating pipes are laid in a 25mm dry sand and cement ‘pug’ mix. The windows needed replacing anyway, so modern double glazing was fitted.

Now, I’m not a clever technical person; my science knowledge stopped at GCSE. I don’t fully understand this system, so my apologies if I’ve explained it incorrectly. But what I can see is the practical side: Bill’s system combines separate bits that work together to make a highly efficient whole. With the heat pump and heating from below at the core, you could adapt other elements to suit your own home. For example, a wood-burning stove might replace a gas fire, and the heat pump would ensure that heat was circulated throughout the house. Or solar water panels on the roof might heat the water in addition to the exhaust air heat pump. Or fan-assisted radiators might replace conventional radiators, and be heated by a conventional boiler – which, at a later date, could be replaced by an exhaust air heat pump like Bill’s. He’s recently added photo-voltaic panels to the roof, which provide some electricity for the system.

What most struck me, though, was his enthusiasm for doing the research and keeping track of the numbers. It makes me think that it would be possible to find improvements to suit my own home. His approach seems to be one of working out the desired end point, and working back from there to calculate individual requirements – which is an approach anyone could learn from.

Bill’s heating system required neither drama nor digging.”