

Eco-homes workshop: Insulating your home Thursday 7 January 2021

Organised by Transition Chesterfield, and Derbyshire Climate Coalition
With Graham Truscott, Dave Warren, Alastair Meikle and Margaret Hersee

Introduction

The UK has a poorly insulated building stock, which is responsible for a significant fraction of the UK's greenhouse gas emissions. Out of a total housing stock of around 27 million, 71% or 19 million homes in the UK are considered to have low energy efficiency (an EPC rating below C). The UK is ranked worst overall of 16 European countries across a range of housing and fuel poverty indicators. If you want to reduce your carbon emissions and keep your energy bills low, there are many simple yet effective ways to insulate your home, which can significantly reduce heat loss while lowering your heating bills.

This was a virtual workshop with four owners from across Chesterfield, Derby and Derbyshire who have installed different types of insulation in their homes, including external wall, internal wall, floor and loft insulation. The owners talked about what they had done and answered questions. A summary of the presentations follows while a recording of the session can be found here

<https://www.youtube.com/watch?v=8RaHhFqbRdQ&feature=youtu.be>

Graham Truscott

Type of house: 1960s detached house in process of being refurbished.

Insulation installed:

Roof insulation. Removed old rat-infested fibreglass insulation and replaced with several different types of insulation (see picture right): (1) Knauf recycled glass (note not plastic) (brown and fluffy) (2) thermafleece (sheep wool) (3) Rockwool (made of rock, recyclable) (4) superfoil (stapled up against the rafters) – 40mm of foil has equivalent insulation as 100mm Knauf.

Pros: Knauf recycled glass the cheapest and easiest to work with.

Cons: Thermafleece – difficult to work with the tools (old breadknife) that Graham was using. Rockwool – 3 times the price of the Knauf but no advantage.

[comment from Ian in chat: Best tool for cutting sheep's wool insulation are sheep shears, c. £30, dead easy to cut then]

Date installed: still in process of installing

Impact on heating bills: Although too early to tell the electric bill (including heating/hot water with ASHP) last month (before insulation) was £397 and expecting this will come down drastically.

Other recommendations: used an old bread knife and carving knife for the Knauf, rockwool and polystyrene. Household scissors for cutting the superfoil. Experiment and see what works for you.





Graham also showed images of the Whistlewood Common Roundhouse a strawbale community building which has unusual floor insulation (see image right) consisting of 9000 neck down wine bottles in sand, covered with limecrete, a membrane, another layer of limecrete and membrane, plywood and lino. The load bearing strawbale structure has been in operation for around 2 years. See www.whistlewoodcommon.org for more on the roundhouse and project

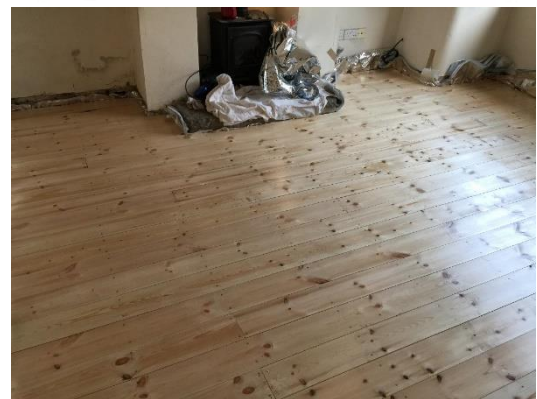
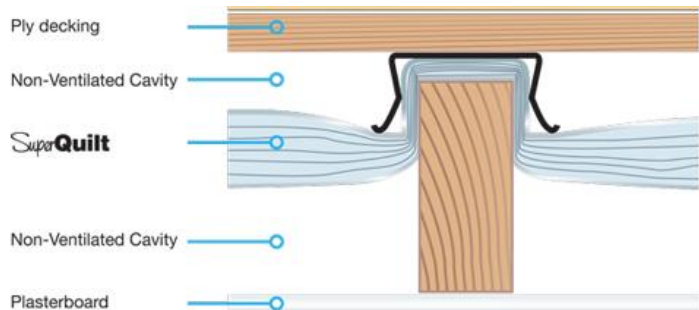
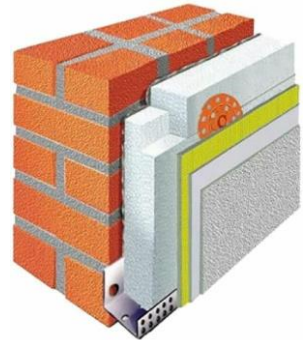


Dave Warren

Type of house: 1930s semidetached house, double brick with no cavity, and with a poor state of render when first bought

Insulation installed:

- (1) External wall insulation: Alumasc – they supply a system of 90mm expanded polystyrene fixed in the wall with nylon plugs and rendered over (see right), with a U value of 0.3. Dave used building contractors AF Construction Services Ltd based in Mansfield to install, as part of Green Deal Home Improvement Fund in 2015. Cost £9,900 but got grant of £4,700 so net cost £5200 which made it the same price as regular render. Took a month to install by the time scaffolding came down. No building work inside was required except fitted new soil pipe to toilet. Insulation guaranteed for 20 years by Alumasc.
- (2) Underfloor: Replaced all the floorboards with Supaquilt (right), made in the UK made of 19 layers of aluminium foil, wadding and foam. No dust, easy to work. Took 2 days per room including renewing the skirting boards. Dave made as airtight as possible by trapping the edges against the walls and taping the joints (see picture right). Take care not to block vents otherwise joists will rot.
- (3) Roof/loft insulation – in 2010 temperatures went down to -10°C and the pipes of the solar panel froze. Used foil/bubblewrap style insulation stapled to the rafters which raised the temperature inside the loft from -5 to +5°C. Where loft was boarded in the middle of the room there was the original 4 inches of rockwool. Could add loft legs which allows for another layer of Rockwool, and reboard.
- (4) Floor insulation – kitchen floor had quarry tiles on top of rubble and zero insulation. Dave dug up kitchen floor and replaced with Kingspan insulation



- (5) Heat recovery ventilation – if making house airtight then need to install heat recovery fan. This uses continuous power of 40W but possibly recoups 300W in heat (and keeps house cool in summer). £350 unit cost including pipes/vents

Pros:

Cons: Some of the detail of the external insulation can look a bit clunky up close

Date installed: 2015

Impact on heating bills: 1.2KW. Annual cost of heating £550/y

Other recommendations: Good double layer curtains make a huge difference (warming in winter, cooler in summer – when 32°C out it's 25°C inside with curtains drawn. With 6m² south facing windows the solar gain would be equivalent to having a heater on). Loft insulation gives the greatest improvement for the least cost.

Check Dave's website out at <https://www.decarbonize.solutions/> (about how to live a zero carbon life)

Alastair Meikle

Type of house: End terrace house, built 1895, originally 2-up 2-down with extension on side built in 2000. House bought in 2005.

Insulation installed

- (1) Internal insulation – on all outside walls (double layer of brick with 1 inch gap) built a stud wall and filled with 100mm sheep fleece (easy to cut with sheep shears). See image right. Some rooms have additional foil insulation. On party wall also put 1 inch recycled rubber tiles for sound insulation (need lots of glue!). This made a huge difference to noise.
- (2) Front door: build a wooden frame covered with foil insulation which is pushed into the door frame (don't use front door)
- (3) Underfloor: Concrete floors – insulated with dampproof layer, 5mm cork, 18mm wood fibre insulation board, underlay and wool carpet (wool from Chatsworth sheep) [needed to trim the door bottoms]. Alastair found insulating the floors made one the biggest differences and floor always feels warm.
- (4) Kitchen floor: dampproof layer, 18mm wood fibre insulation board, 6mm plywood and cork tiles. Useful to cut insulation board to run electricity and water through to new central island so its hidden in the floor.
- (5) Attic – converted to bedroom and fitted 200mm sheepswool to vertical wall which wasn't easy as there were long screws to get through the batons. For sloping bits of roof used Celotex between the rafters and boarded over.
- (6) Strawbale extension (tight bales from farm in Sutton in Ashfield) with green roof: between original house and extension (see image right). Alastair wanted to use limecrete slab but the nearest person he could find to do this was in





Devon and worked out it was a lower carbon footprint to use concrete sourced locally than for someone to drive up from Devon! On floor used 100mm Celotex, then polystyrene, then the concrete slab was poured. Oak posts & rafters (from Derbyshire) were used as the frame (as straw couldn't be load bearing) and strawbales for walls, but had to pack straw in at the top where there was a gap so not quite as air tight as bales.

- (7) Roof in extension: Found plastic recycled bottle insulation supplied by company in Mansfield. Rafters 200mm deep. Made false ceiling below that so could get 400mm insulation
- (8) Windows: all windows (Green Building Store) and two skylights (Fakro) triple glazed – made big difference.
- (9) Hot water tank –. Immersion heater. Mains pressure coil at top to supply shower. Input coils from wood burning stove and solar panel. In summer this makes a huge difference and immersion heater barely comes on in summer. Tank is super-insulated.
- (10) Central heating - replaced original solid fuel back boiler with an electric-powered wet system using existing radiators – an 'electric boiler' with 3 heating elements replaced the back boiler.

Date of installation: approx 2008

Pros: Apart from foundations for straw bale extension all the work was done by family. Lots of volunteers helped with straw bale build after advertising on 'green' forums.

Cons: Took a long time!

Impact on heating bills: Significant fall in water heating power consumption after the superinsulated tank and solar water heating was installed. Fall in central heating consumption after the insulation and strawbale extension were completed.

Other recommendations: Painting the house dark green made a huge difference. Sometimes attempted to get 'professionals' in for certain jobs but almost impossible to find anyone prepared to get involved, especially plumbers. Did find a more open minded electrician who did the wiring for the central heating (it can take up to 12Kw for a few minutes when it initially comes on so we needed a bigger main fuse), he also did wiring for attic conversion. In fact we keep in contact and he has installed a few more 'unusual' systems.

Architect that got planning permission and building regs sorted for straw bale extension was James Norton in Sheffield who has done other straw bale builds and has a community eco housing project.

Margaret Hersee

Type of house: Edwardian 1910 house

Insulation installed:

Underfloor insulation. When they moved in they sanded and sealed the floors because they liked the style and have children who are asthmatic (understood that carpets bad for dust mites etc). They used foil insulation but then got woodworm (possibly from replacement to bay window area) and had to replace and treat some floorboards. After joining a Transition Buxton webinar run by Carbon Co-op (Manchester) on retrofitting, decided to use Jute insulation made from recycled coffee bags under the floorboards (see image right).

Date of installation: 2020





Pros: easy to install

Cons: Because quite expensive they went for a lower level grade of jute but could have done with a higher grade.

Costs: Fairly expensive but postage cost was reason why we went for lower grade.

Impact on heating bills: Made a difference to room temperature

Questions and Answers

Q. re loft insulation - is there a comparison between U values of the different materials (apart from the aluminium roll mentioned already)?

A. [Graham] use equivalences – he used 40mm superfoil which is more of a quilt for the base layer, and on top put 200mm of Knauf. Mixed and matched but net result was equivalent of 300mm of Knauf everywhere and quilt on apex.

Q. Can I ask David and Alistair for input regarding ventilation when insulating loft rafters? A lot of sources mention ventilation important because of damp issues – is that why installed a heat exchanger?

A [Dave] Heat exchanger only moves air in the house. For venting between foil and tiles, if use breathable roofing felt (open mesh) you shouldn't have a problem as the wind whistles through. [questioner had clay tiles onto slats] If modern house tile vents on joists.

A [Alastair] We have slates on batons. Made sure Celotex fitted exactly in between rafters. Did it 12 years ago and have no problems.

A [Graham]: We ended up having to replace the roof because the original felt was so damaged by rats/mice, so my loft has the modern breather felt.

Q. any reason why the gas pipe is not hidden by the external insulation? Regulations, or just ease of access?

A [Dave]. Pipe not hidden due to building regs – need access to gas pipes

Q: do you have any more info about connecting your wood burner to your hot water tank?

A. [Alastair] : Wasn't easy to connect the woodturner, its a long pipe run but just made sure they were on an angle, it uses gravity (hot water rises) not a pump.

Q. do you need an expansion vessel for it?

A. [Alastair]: Its gravity fed from header tank in attic. Solar panel is sealed system with an expansion tank

Q. Has anyone solved the problem of draughty cat doors? I can't find an insulated one!

A. [Alastair]: No, I have two either side of a lobby but they both leak air – they worked well at first, have magnets that hold the flap in. [comment from Laura – beware putting magnets on cats as they can pick up stray bits of metal]

A. [comment from Dorothea in chat]: on the cat door: we first stuck it right into the prevailing wind (fail!) and have now put it towards the side which gets less wind...learned the hard way...There's a cat flap brand that responds to the microchip of the cat - this works well for us. I think it's called Petsafe. The flap clicks back into place after her. a bit of draft but not an open hole! Make sure you get it mains connected as else it eats batteries too fast

Comment from Karl: If anyone is considering insulating under timber suspended floors, have a look at Q-Bot which uses a wheeled robot inserted under the floor and sprays phenolic foam over



the underside of the floorboards and the joists. The robot checks if moisture is <17%. Not very eco as the foam is oil based but achieves very high thermal resistance and no need to remove floor boarding, just one short section to lower the robot into the floor void. It eliminates any air gaps and thermal bridging through the joists. Cost effective as don't rip up the floor boards. He is going to get it done when the pandemic is over – cost £2185 incl VAT of which we will pay one third, the balance being paid for under the current Green Homes Grant under which Q-Bot is an approved contractor. his will cover the cost of insulating both downstairs living rooms which are each 13 square feet approximately.

Q. on a tv program, someone in wales was collecting expanded polystyrene packing, and then using a big hopper machine to crush them up into small pieces to use for insulation. Any idea where I can get a device?

A [Alastair] perhaps a garden shredder?

A [Graham] I just cut waste packaging and put it direct into the rafters [questioner wanted to put it between the joists and so wanted something fluid he could blow in]

Q. Alastair can you tell us the name of the manufacturer of the recycled plastic bottle fleece insulation please.

A Not sure if it is exactly the same but there are products from Diall, Thermafleece and Loftify.

Comment from Dorothea : I am no DIY person but I learned a lot when I had to negotiate with my builder which materials to use. I spent some time and for a while I was an expert on different R and U values. All insulation materials come with them - I found it very worthwhile to do some research before speaking with my builder who was sceptical of anything he had not used before.

Comment from Laura: I have lived in several early 1900 end terraces, with tricky walls. Found external insulation worked really well to solve the damp and keep warm but warned about cowboy builders. Also floor insulation solved the problem of chilblains.

Comment from Karl: In his 1920s house with 9inch solid brick walls, 3 years ago he knocked off the limeplaster from the lounge walls and had it dry lined by professional plasterers who put aluminium foil and foam based plasterboards on and skimmed it, with finishing plaster and this made a huge difference. £800 for the whole room. This room measures 13 feet by 13 feet approximately with 8 foot high ceilings.

Several other people on the call had found foam based plasterboard very effective but someone warned to be careful to check price – some places were charging £80/sheet whereas you should be able to get it for £40

Comment from Dave: In his front room 2 walls have external insulation, and 1 of those also has internal insulation, while the front wall (stone) has no insulation. When you put your hand on the 3 walls you can really feel the difference.

Q. Has anyone used Thermocell –loft insulation from recycled newspaper?

A. no one had

Q. Has anyone used a thermal imaging camera?



A [Karl] I borrowed a camera and took pictures so you can not only see where the heat loss is but have got a record. Very good technique, and recommends it. Can hire them from toolhire places.

Q. We have hot water pipes running the length of the house in a shaft up to the roof but difficult to reach – wondering what could be used to insulate as losing heat out of the top?

A [Alastair] could blow recycled newspapers down?

A [Dave] would block top end down – all heat would dissipate into the house.

Other useful sites and information

Dave Warren's website: <https://www.decarbonize.solutions/>

Zero carbon house – award winning ecohome in Birmingham
<https://zerocarbonhousebirmingham.org.uk/>

Simple Energy Advice – government endorsed website
<https://www.simpleenergyadvice.org.uk/>

Free energy advice phone line for Derby and Derbyshire residents – includes advice on making your home more energy efficient
<https://www.communityactionderby.org.uk/latest/news/stay-warm-this-coming-winter-free-energy-advice-line>

The Haynes "Home Insulation Manual by Ian Alistair Rock MRICS - a great one stop shop detailing all the eco techniques. *[recommendation from Karl]*

Acknowledgements

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