Transition Culture

An Evolving Exploration into the Head, Heart and Hands of Energy Descent

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11 Apr 2011

The Local Passivhaus: an interview with Justin Bere

We are now in editing mode for 'The Transition Companion' (out in September). The draft is way too long, so some bits are being cut. The following piece has been cut way down, so I wanted to post it in full here, as I rather liked it (!). First there is the piece from the book, and then the interview I did with Justin Bere, in full, a riot of delights for passivhaus/local building materials fans out there….

(http://transitionculture.org/wp-content/uploads/larch_000157opt1adjustedpv300dpi.jpg)

The 'Larch House' in Ebbw Vale, Wales.

The 'holy grail' in terms of the construction of new sustainable buildings is homes that reach the highest level of energy efficiency, whilst also using as high a proportion of locally sourced materials as possible, what we might call 'The Local Passivhaus'. Two buildings, recently completed in Ebbw Vale, known as 'The Lime House' and 'The Larch House' have moved this concept forward significantly. As part of an EU-funded project, the Welsh government wanted Wales to take a lead in Passivhaus design, to show what is possible as well as bringing low energy design into the mainstream construction industry. They ran a competition, and Justin Bere Architects won. Their proposal was for more than just a house, they saw it as the possibility of kick-starting a radically new approach to housing in Wales. As Justin Bere told me:

> *"Instead of a narrow vision to design a house, we want to get people fired up in to doing something much bigger. I'd just love to see a successful example in Wales that would encourage other people and give them ideas of how they could do their own locally made, affordable, truly low energy buildings, and maybe we could get this sort of thing happening all over the country".*

The chosen site pushed the Passivhaus idea to its limits. 1,000ft up at the head of the valleys, very cold in the winter and misty for much of the year, a climate twice as hard to design for as Innsbruck in Austria. The project also aimed to build to social housing budgets and to the Passivhaus standard, the first time this has been attempted. As well as the attention paid to the design, a lot of thought was also paid to the materials used, with a focus on using Welsh materials where possible. I asked Justin why:

> *"Local materials matter because they do two things. They reduce carbon emissions from transportation, and they increase local employment. Local employment, if it really is local, also requires less carbon emissions and travel from the factory or workshop to the site".*

The final buildings used Welsh timber (used in an innovative way to make up for its poor quality compared to, say, Scandinavian timber), Welsh-made Rockwool insulation, Welsh-made slates, local stone, and UK-made paint and sprinklers. Things that were harder to source included lime render (a Welsh company but a French lime), and woodfibre insulation, which was imported from Germany but could easily be made in Wales. The last challenge was the windows, which need to be of very high quality.

For the first house they were made in Germany, for the second house, a Welsh joiner produced them to a passivhaus certified design provided by the Scottish window designer Bill Robertson. I asked Justin if he had a sense of the local/imported proportions in the materials used. He said he thought the first house was probably around 80% Welsh, and the second house was closer to 90%. Did he think, I asked, that, as has been discussed with food, an 80/20% local/imported ratio could work for construction in a powered-down UK? "I think", he told me, "that in time people will be forced to do better than 80%!"

I also asked him about what role he saw in the future for more genuinely local materials, such as hemp, straw, cob and so on. He said that in the two houses built in Ebbw Vale, the original idea had been to use hemp/lime, but the data on its insulation properties wasn't sufficiently well done to allow them to meet their efficiency targets, and that more research is needed, but in time, they would have a vital, and increasing, role to play.

One of the things that will be central to this shift to the local Passivhaus, he told me, will be a huge reskilling of young

people and the creation of a new infrastructure of manufacturing across the UK. He told me:

> *"I think we need to start right back at school. Let me give you an example of Austria. We employed an assistant here from the Vorarlberg region. At the age of 14 he moved to a school that did the traditional subjects but alongside timber technology. By the age of 19 he had a diploma in timber construction and was skilled in using timber with his hands, skilled in using timber with machinery, skilled in drafting, skilled in structural calculations and building low energy technologies. In the UK by contrast, at the moment we've spent years dismissing technical skills as being for those who can't do anything else, and if a young person is half able to do anything, they're encouraged to go to university and not waste their life using their hands".*

The Ebbw Vale houses offer us a taste of what might be possible with some vision and some applied effort, and the potential benefits that such an approach would bring in terms of jobs, skills, local economic activity and a return to a more vernacular approach to building, where buildings are rooted in place and the local materials.

And now here, in full, is the interview I did with Justin a couple of months ago…

Could you tell us a bit about yourself and what you do?

(http://transitionculture.org/wp-content/uploads/Justin-Bere_415.jpg)
I'm Justin Bere, I'm an architect, director of Bere Architects. One of my main interests and specialisms in the practice is low energy building and in particular we've found that the Passivhaus methodology and standard gives us the best way of controlling the quality of what we are providing our clients with.

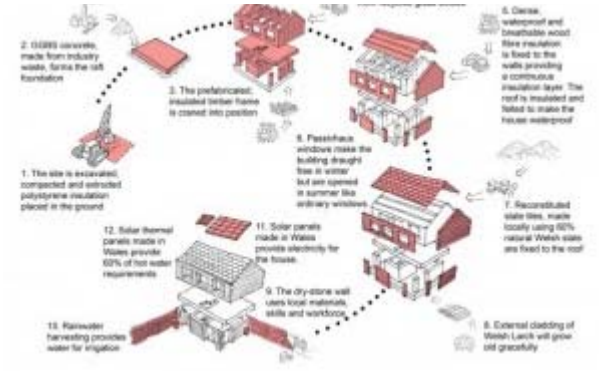
The two houses in Ebbw Vale, how did they come about and what were you trying to achieve?

They came about as a competition, which was the brainchild of Nick Tune of the Building Research Establishment to use European funding as I understand it. I'm not sure exactly how it works, but it's European funding to ensure that Wales gets the very latest Passivhaus, low energy thinking into their buildings and encourages developers to follow suit, having shown the way. There's a number of houses round there, so Ebbw Vale, or the local authority of Blaenau Gwent worked with BRE and set up a competition and found a partner in United Welsh Housing Association who would use their normal procurement route of contractor and so on to build the buildings – they were basically just given the money to do that.

Part of the exercise was to train an existing supply team and get their feedback on the viability of this. The hope, before the funding cuts, was that housing associations would have a lot more money to be able to contribute to the 700 new homes in Ebbw Vale. From our point of view, we entered that competition, and we were told that we had the best grasp of Passivhaus and technically they were confident in us succeeding. They initially also employed another architectural firm to do the other passivhaus but lost confidence in them at the same time as they got interested in our ideas of making further savings in the future on our first house, nearing completion. So we were asked to produce the second passivhaus which was a great opportunity for us to put into practice our ideas of further cost savings that came out of building the first house.

What were you trying to achieve with those buildings, what was your intent?

(http://transitionculture.org/wp-content/uploads/The-Larch-House-contruction-sequence-passivhaus-in-united-



kingdom.jpg) To show how we can get the very lowest energy consumption and the greatest comfort in building by concentrating on the fabric of the building, and also showing how we use the techniques to invigorate the Welsh construction industry locally at least. I described a vision that they all seemed to like, of starting something in Ebbw Vale and the means to that. They had funding for a skills and training centre in Ebbw Vale which was going to be run by a big commercial outfit with all sorts of funny angles and things, their pictures were about students drinking caffe lattes in foyer areas and I said, "look, this isn't about skills. What you really want is a supershed with rectangular classrooms on one side overlooking the shed." In the classrooms you have new technologies, timber technologies that are to do with the fundamentals of building timber frame buildings and one production line.

There's another one which is to do with laminating timber for window frames, there's a number of technologies there which are tiny production facilities, which the students learn to use – because there aren't many other opportunities to use these techniques in the UK and these are generally used in Germany and Austria and so on, and get them to learn and perhaps sell those products so it's a resource to sell to local industry. Then if production goes up and demand goes up then you perhaps spawn a little kind of science park for timber technology. Someone comes along and says, "Look you've created a business case. I'm going to take students, I'm going to build a shed, I'm going to buy this equipment and we'll build a production line.

So there is now, resulting from that, and quite excitingly, Nick Tune at BRE has got so far £6 million of funding committed to building a low carbon technology training centre. Maybe we will end up getting to be involved in the design of it, but my purpose is really just that it's exciting. Instead of a narrow vision to design a house, we want to get people fired up in to doing something much bigger. I'd just love to see a successful example in Wales that would encourage other people and give them ideas of how they could do their own locally made, affordable, truly low energy buildings, and maybe we could get this sort of thing happening all over the country".

The houses that were built – why were they significant and how do they move the idea of the passive house forward?

They're significant because they are designed to be passive even in this extremely inhospitable environment at the head of the valleys. People tend to think of a building regulations house being a building regulations house – same design – whether it's in Swansea, Manchester or London. What we found, or what BRE found for us, was that the weather conditions – because of the real misty conditions of Ebbw Vale, a thousand feet up and cold in the winter, are twice as difficult as Manchester and twice as difficult as Innsbruk in Austria. That is using what they call the 'extreme worst case', they were being quite cautious because they want to make sure that they do work. We have to make the building passive in that location.

In addition, we were designing for social housing, so they're the first social housing, passive house prototype in the UK. One of the primary requirements of the brief was to build them as closely as possible to the housing association average house price for a one off detached house for £1200 per square metre. We came pretty close to that. The first one, because it was a very rushed project, before we could really fully understand the cost we had to get on and build the first one, because of the opening date for the Eisteddfod.

The first house was coming out at something like £1700 per square metre. At that point we realised there were ways of saving money. We came up with the idea of doing an alternative technical approach, both Passivhaus: one is working on total annual energy consumption and the other is looking at total peak monthly energy consumption. Normally those end up looking like quite similar buildings but in extreme conditions we end up with one house, the more expensive house, more traditionally passive house design with relatively big windows – because of the low amount of sun they get very big in order to grab every bit of sun that's available and hold on to it.

The co-heating tests at the moment show that they get a little bit of sun and they hold on to that heat for 5 hours. That means that in the summer, in order to avoid overheating, you need retractable blinds, another cost. Our alternative design can be rationalised by saying well, there's not very much sun so we've got super insulated walls, 400mm of insulation, there's 600mm of insulation in the roof. These super insulated buildings can make a lot of use of the internal heat gains so we're not getting much from outside, so let's not bother much about the outside. The windows are a bit smaller – they're still bright interiors with plenty of daylight, but make them smaller than the traditional passive house and because a 400mm thick wall is going to lose less heat than a triple glazed window even. So we concentrate on holding on to the internal gains from people, their pets, their oven, their TV and so on, to supply a great deal of the warmth in the house.

The significance of the project is that we've got one down to about £1300 per square metre on the second option, and I think we can do better still. We've achieved low costs. Basically it would be about £8000 more for a two bedroom house than a standard building regulations house built over the last ten years. It's not bad considering the reduction in energy and the pay back period of about 14 years.

What about the role of local materials in the building – what have you done that's innovative in that regard? Why do local materials matter?

Local materials matter because they do two things. They reduce carbon emissions from transportation, and they increase local employment. Local employment, if it really is local, also requires less carbon emissions and travel from the factory or workshop to the site. The factory, the timber workshop that we were employing to build the timber frame, have built the factory on supplying Premier Inns around the country with horrible, cheap 140 mm thick stud walls so because Wales has plenty of these 140 mm sized timber sections. I should explain that mountain timber in Germany, Austria and Scandinavia can come in larger sections than our fast growing timbers in the UK, because our moist and relatively warm climate means that we end up with less good quality, less dense timber and it tends to twist a bit more and be a bit more sappy and is generally not regarded as being suitable over about 140 mm, that's the ideal.

At 140mm we have thin, poorly insulated walls zooming off all over the country to Premier Inns. What we needed was about 400mm of insulation and we wanted to use local materials. Now the biggest, most reasonably accessible timber grown in Wales is about 215mm as a sawn timber stud. So 215mm, as your central core of insulation, still requires another 200mm of insulation so we've found a reasonably economical way of achieving this. 215mm is in the centre – that gets built up on site – then we put 100 mm stud on the inside of that, the services zone, build that with fibre insulation, get our extra 100 and then 100 mm wood fibre insulation on the outside.

The heart of what we were trying to do was also stimulate and show markets for local timber so we weren't absolutely having to use local all the time, we didn't think that was always the best thing to do. We could, on the inner and outer surfaces, have had that 100mm zone of insulation on the inside and 100mm of insulation on the outside as Welsh Rockwool, or we could have used some horrible oil based foam insulation, or we could have used Warmcell recycled paper but the problem with that is that it's not energy efficient and we couldn't get that in 100mm studs so the logical thing to us is to use wood fibre insulation. It's really healthy, it's truly a renewable material and it's more efficient than Warmcell, so it worked in 100mm zones.

There is no wood fibre insulation made in the UK so we bought it from a UK distributor and it's made, some in Switzerland, some in Germany. As part of the exhibition, to say this is what we think a Welsh manufacturer could and perhaps should be making, does anyone have an interest out there? We were looking for opportunities of growth of Welsh industry. With the first house, the most reliable Passivhaus windows produced come from Germany and they've being doing this for 15, 20 years. They make windows that last generations that don't twist that have insulation in the frames so they remains warm, as warm as the triple glazing almost, and they're well sealed to avoid cold draught leakages. German houses are quite famous for not having draughts, just as English houses are famous in Europe for having draughts!

(http://transitionculture.org/wp-content/uploads/both-houses-

street-view.jpg) We thought we'd play it easy on the first one, we must get a draught free construction – we will be air tested so we don't want to risk it on the first one, get a British one and find our house is not certified. So we got the German windows. But then on the second one we said, "Look, now let's try and push things. We know we've made it work – we've got certification on the first one, it's not so important on the second one so let's get a designer I knew who designs passive house windows, learn his trade." We designed Passivhaus windows and the front door – got them certified in Germany (which was quite a rushed process) and got a partnership of five or six Welsh joiners together to buy in to this process.

One of the joiners went great guns for it and said, "I'm going to build these", and imported the insulation from Germany. Part of our message was that we could be making these in the UK – maybe someone like Kingspan or whoever would be able to do that with relatively small changes to their production lines. But at the moment anyway it needed to be imported from Germany and then laminated to the wood, made up and installed. So in the second house we had Welsh windows – the first UK, passive house certified windows; UK designed and made.

Are you able to put a percentage to the amount of local materials in both houses? Presumably by local, in that context, you mean Welsh?

Yes. Well I can't at the moment…do you mean in quantity, volume, cost? It's a very difficult, if not impossible question to answer. I've got a list on the two houses of the Welsh sources, which I could quickly read through, scan and send to you. Some of it's a bit confusing…

- The timber frame: I've listed the company and it's local
- Roofing: it's a local company and they were using Welsh made tiles
- Local plumber, local electrician, local scaffolder, local carpenters
- External blinds: well it's a British company that distributes them but they import them from Germany. We don't have anyone that does it in the UK – that's on the larch house. We don't have anyone who makes retracting solar blinds in the UK, it's just incredible really.
- Sprinklers: a UK company, parts probably from overseas.
- Plaster: a UK plastering company. The plasterer may be from the UK but half the plaster in the country comes from France
- Flooring: a UK, local company but who knows where the….well linoleum is British, yes. Normally they put horrible vinyl down which makes you sick when you walk in and breathe the fumes, and that's what goes into most social housing Passivhauses. Well I insisted, for a small amount of extra money that we used linoleums which is made from plant resins and smells lovely – except they put the disgusting vinyl in the kitchen and the bathrooms for some unknown reason
- Stonework – a local company and local stone
- Painting: a local company. The paint was an Earthborn, British, organic paint
- Wall tiling: a local company though not sure where the tiles came from because the design build company, United Welsh Housing said, "Normally we get rid of the architects at this point. We don't want to be told where to get our tiles from, we have our own normal suppliers." It was the same with the kitchen which is why they put the vinyl flooring down, "We always use vinyl flooring – we'll use our local people and do that."

I remember when I talked to Rob McLeod, he said that he thought the first house was about 80% and the second was about 90%. But as you say, it's of what – weight? Volume? Price? Was he getting a bit over excited?

Yeah, I wouldn't be being completely honest if I said I thought he was absolutely right, put it that way! Maybe it is 80 and 90, but if you look down the list of names here, they're all Welsh or British, but hidden behind that, for example

there's a lovely Welsh company doing the render for the Lime House. Where does the lime come from? Germany. In Wales they're really proud of Tir Mawr lime, but little do they know that a lot of the products come from Germany. It's just so frustrating.

The reason, to be completely fair to Tir Mawr, they use Welsh lime on very traditional lime rendering where there's no external insulation, straight over stonework and it's quite chunky material, thickly daubed-on stuff. However, when you're going to do a low energy building you need wood fibre insulation, or you need an insulation on the outside – it's much better than inside for all sorts of technical reasons. Then if you put a lime on, you need a very thin coat of lime. You can't use the traditional lime, so we have to develop that technology.

It's interesting, because I was talking to a guy called Mike Small who works for the Fife Diet up in Scotland where they're promoting the idea of local food. They started out saying, "You should eat all local food, all seasonal food," but then people come and say, "I like the idea of eating local and seasonal but I couldn't live without chocolate and wine and coffee." If people say, "OK, list the things you really couldn't live without", they don't make up more than 10, 15% of the diet so they now say, "90% local food, 20% imported feels like an achievable context." It sounds like with construction, you might be able to say that 80 – 20 is a rough target in terms of the target between local and imported materials, if and when we get to a stage where we have all the infrastructure in place to make that possible. Would that be reasonable?

(http://transitionculture.org/wp-content/uploads/Passivhaus-by-bere-architects-the-Larch-House.jpg) Yes, I think that is reasonable. I think that in time people will be forced to do better than 80%. In the food thing, I'm sure you know Professor Tim Lang, and I completely subscribe to his thinking. My parents ran a small organic farm in their retirement and personally I haven't been to a supermarket for 10 years or more. I would only go to the local shop round the corner, the farmers' market or Mother Earth health food shop. Mother Earth produce our lunches here and I was a bit concerned because as they winter was coming on they were producing salads with tomatoes. I went round and had a chat to say, "I'd far rather go to the market – there are some much nicer greens than you're providing. Let's forget about tomatoes." They're nice but they're importing them all from Italy.

She said she goes to the farmers' market and she's been telling her boss she would happily get the greens that come from Cambridge rather than him importing this stuff from the wholesaler. That's what she's now doing and our salads have got much better, they're much more tasty, they're fresh…and I think everyone here feels better about that and partly it's a matter of people understanding what the alternatives are and having some pleasure in doing it without chocolate…..on the other hand one doesn't want to get the message over that to be green one has to live a dull and sad existence!

If the aspiration, similarly, is that we want the buildings of the future being local, seasonal, organic, far more nutritious houses in that kind of a way – what role do you see in the idea of a local Passivhaus for some of the materials that would be more prevalent in the natural building scene in terms of hemp, straw bale, clay plasters and these kind of things….they would ultimately be much more rooted in the local vernacular of the place, so what role do we have in a rediscovery and a re-embracing of those materials in the context of a Passivhaus?

I think there's tremendous scope and opportunity. I know Rob looked at hemp insulation because we were keen to use that instead of the wood fibre, but the U-values claimed by the hemp insulation people Rob discovered were extremely dubious and he was quite shocked at how poor the testing methodology. He said, "No, we cannot achieve anything better than Warmcell – it may be not as good as that; we can't rely on it. We need to be sure our first

building are going to work." We don't want to be experimenting so much that all the opportunities to experiment in the future are lost because we blew the first one.

The approach has got to be that we build really successful, true to performance, passive houses, get that recognised as being a really good methodology. Then I'd love to work with rammed earth technologies, cob and so on and work out how we can use those really local materials, get them well insulated and draught free. I know that probably sounds controversial to some people. They'll say people have lived in cob buildings for generations and they didn't worry about the odd draught, but unfortunately we were talking about a different mindset – people that didn't mind putting pullovers on, who got up and went outside and did a lot of manual work. Even if they were Wordsworth writing poetry, he was also walking the hills, getting exercise and coming home to write poetry.

Now we expect to do no manual work, sit in jeans and Tshirt in front of a computer for 8 hours and feel warm. Because most people don't see the energy going into their houses, they're not carrying logs and buckets of coal, they're completely obvious to what's going on. If they were carrying logs in they'd be shocked at how much needs to be carried in just to keep that lifestyle going. In an ideal world, yes people would behave like our grandparents did and we wouldn't need so much insulation, but what we're trying to do with the Passivhaus is to bring people into a low energy way of living without having to compromise anything. In fact, they'll actually have better comfort in the building because they'll get fresh air through the heat recovery ventilation.

In terms of the hemp, you were saying that the testing wasn't good enough. In terms of hemp and straw bale having sufficient data behind them for you to feel confident in using them….where's that testing going to come from? Who should be doing it? Who's going to move it forward?

I think that could be done by us as architects and inventive clients. So a client comes to us and says, "We'd like to use cob because it's a local material and we're passionate about doing that", then we would think through the design in order to come up with a solution that dealt with the really positive attributes of cob and part of that would be thermal mass and it does add to insulation. I don't know how much insulation it provides, I doubt there's any data around so we would do some research and see if there's something in Germany, someone may have done some cob prototypes.

Then we'd look at how to externally insulate the wall appropriately because we'd need more insulation than the cob alone I think, but we'd need to maintain the breathability of it. That's one route, I'm not trying to shirk that responsibility but I think the best place for this work is for universities to have some good tutors – some of them do – inspiring them to think in this way and saying, "Let's build this prototype." This is perhaps the one opportunity in their lives when they're going to be able to dedicate this amount of time to experimenting and research and actually producing something that's useful at the end of it. I'm trying to encourage that.

We've started the UK Passivhaus conference and the same time we've started the UK Passivhaus student conference and that's been largely run…we did the first two years' conferences but it's now been taken over by the Passivhaus Trust, and I'm on the steering committee and we're trying to positively engage the universities, both in presenting papers and encouraging to do the research in the first place; and hopefully giving them feedback of these sorts of ideas. At the moment, no-one has said from our group to the universities, "What about research into cob passive houses?" It's a great idea but they need guidance and help from the cob experts, from people like myself doing Passivhauses and so on. The universities being aware of this as an opportunity as well and asking us and getting involved.

The idea of buildings being built to Passivhaus standard but the design starting with what materials are available, so that they're designed specific to that place, that you could almost have a way of designing Passivhauses rooted in place in terms of the materials and the whole idea scaling up – what do we need to put in place? What infrastructure do we need? You talked about the need for the windows to be made here and that kind of training, but presumably you also need woodland being planted and managed properly, you need retraining, young people – what infrastructure do we need to scale this up meaningfully?

(http://transitionculture.org/wp-content/uploads/Kaufmann-Factory.tif) I think we need to start right back at school. Let me give you an example of Austria. We employed an assistant here from the Vorarlberg region. At the age of 14 he moved to a school that did the traditional subjects but alongside timber technology. By the age of 19 he had a diploma in timber construction and was skilled in using timber with his hands, skilled in using timber with machinery, skilled in drafting, skilled in structural calculations and building low energy technologies. In the UK by contrast, at the moment we've spent years dismissing technical skills as being for those who can't do anything else, and if a young person is half able to do anything, they're encouraged to go to university and not waste their life using their hands.

If someone is utterly useless and persuaded by other people that they're utterly useless they'll think, "Oh, there's nothing for it, I'll end up in construction" and it becomes a very negative choice. We need to start by making practical things: if someone enjoys playing with water and things like that then maybe plumbing's for them. If someone enjoys fiddling around with electrics, then maybe an electrician. We should try and get a more positive approach. There seems to be from the intake here, and the applications we get, my impression is – and it may just be that they're finding us more – but my impression is there's a growing appreciation of what humanity and the planet faces, and what local communities and the UK faces. People want to do more and I'm sure that a lot of these young people feeling they'd like to do something…..although they realise construction is part of the problem, very few of them think that going off and being a builder with a load of layabouts isn't really going to get anywhere.

If we can give them a more positive view of the opportunities of working within construction, it could achieve much more. I think also that this can attract those people that don't like wearing pullovers and want to sit in an office, to show them that they can also do the Austrian thing, going off and by the age of 19 having a diploma in timber technology. I'd start right back there and get the really good people coming into the industry.

There are really good people coming in to architecture now but it's a bit more difficult in other fields. As architects, I see the role we're playing as Passivhaus architects, a lot about rebuilding by one, showing appreciation of people's interests and two, encouraging those interests. On the Welsh Passivhauses we ended up having a site manager who is now quite knowledgeable, he succeeded in achieving one of the best, or probably *the* best air tests in the country, having never done that before because we gave him sympathetic designs and training and so on, which we'd learnt in Germany, and he's really enthusiastic.

Likewise a contractor, a site manager locally here at the Passivhaus community centre, he's had training in air tight construction, avoiding leaks and draughts and so on. He's spent a career in construction, knocking things up any old how and he's really rising to the challenge of doing this and making comments and alerting us to concerns he has and asking our advice and so on. You often hear architects saying, "We don't have the skills, it's hopeless," and so on. We can't take that attitude – we have to learn those skills ourselves and teach those skills.

It'll be a slow process but we can do that. That's why, as I say with the cob building, I relish that challenge and I regard it as an opportunity to do more research and try and pass this learning on and collaborate with people and get them set on a trajectory that they master themselves and we just help to get it going. The other really strong thing about local materials is that we start to build local specialist industries and everything from the Japanese electronics industry that thrived because of the density of companies in a locality, in a relatively small nation, around Tokyo or somewhere, that were supporting each other, where anything you needed you could get – to timber where in Germany, they say, "Look, we've been around since 16th 17th century and we've got everyone from the growers to the mills, with their production line geared specifically for us. They know what we want and they supply us exactly the right materials. It means that we have faultless products that we can supply to the joinery workshops".

It's about building those connections. If you've got an area rich in timber like Wales, relative to the rest of the UK they've got 3 times as much wood per hectare as England and twice as much as Scotland – that's a place to set up that would do well by saying, "Let's use these resources, let's go to furniture shows, let's send people out to find the best furniture designers, bring them back to Wales, to offer them space, to enhance the value of the raw materials that we have, to build an industry to work locally with house builders in timber frame, and gradually you find all the machinery, suppliers, makers, maintenance people move in to the area and you get a whole buzz and the whole thing

takes off".

Vorarlberg region in Austria decided that low energy building was central to its success in achieving its ambition of self-sufficiency. If someone is building a house using local timber, and burning local timber to keep warm, if they've got a very insulated house they won't use much timber to keep it warm and that means there will be more land available for growing food. As a result, Vorarlberg has, through this combined vision of wanting to do really high quality, low energy buildings, have got everything – not just timber but they've got a really good low energy heating company, really good low energy heat recovery manufacturers, really good insulation people. All these organisations support each other.

I just think whatever the focus, it's really good to get a focus in a region and get a vision. That's what you're doing with Transition Towns – you're getting this shared vision, bringing communities together and saying, "Let's go in a direction and make a success of this" and then everyone starts supporting this. And I think local materials can fit into that because around a Devon cob industry that used to be dominant in construction in Devon and is now a niche thing, one could potentially rebuild this and we've got all the raw materials, it's really cheap, we could get young people off the streets, somehow…….people with the enthusiasm and vision that this is an exciting force.

Some people may think that's a funny thing for the future, that it's going backwards. But that's where I think potentially allying something like cob with passivhaus could actually make people think this is the future – it's not backward at all. This is a fantastic new technology, or a new way of working with cob.

If you imagine in 20 years time this has been successful and any new house built in the UK is built using 80% local materials and the structure that has sprung up to support that – can you describe that to us? How would that be different from now? What would be our experience of the building industry? Could you paint a picture of what that would be like?

One would be choosing a house from local companies and there'd be perhaps in one's locality 5 or 10 smallish companies, each with a proven track record of building wonderful, low energy houses, using local people one knows in the pub or knew at school who are running or working in these organisations and you choose between the pros and cons of the various techniques. There probably isn't a great deal between them, and some of one's choices may be made as a result of who one knows or who is nearest to one's building plot.

Those organisations or companies are buying raw materials locally that are also employing people in the area, and there's a tremendous pride in the kind of results that are being produced in that area. Traditionally, Herefordshire and East Anglia, on opposite sides of the country, have similar technologies in terms of timber frame buildings. Somewhere else you'd have stone buildings. We'd be going forward to a new regional interest, attention to detail, producing buildings, results and products for local people.

You'd have a pride in doing something well. You don't want it to fall apart and you want to do your best for the people you know and care for. We get a completely good culture, as I see it, and the same with food. It' one of the nice things about going to farmer's markets – you're buying from people who are producing and they know who they are selling to each week and they're going to make sure – they want to produce the best for regular friends that come to the market. One will want to do that for the local community, whether it's food, building, whatever and as a result we'll all have a much more enjoyable, fulfilling lives. Yes there probably will be some things that are transported around, but hopefully we'll need so little power going into our buildings that we'll be able to use some nice big wind generators to generate electricity for vehicles so that when we do have to move things around, it's done by electrically run vehicles. It'll all be low carbon, healthy and rewarding.

Categories: **Climate Change (http://transitionculture.org/category/climate-change/)** , **Energy (http://transitionculture.org/category/energy/)** , **Localisation (http://transitionculture.org/category/localisation/)** , **Natural Building (http://transitionculture.org/category/natural-building/)** , **Research on Transition**

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18 Comments

Robert (http://www.abrazohouse.org)
11 Apr 10:59am

Very interesting interview. An impressive design – building a passivehouse in cold, cloudy Ebbw Vale is no mean feat. Kudos to Justin Bere on that!

On the other hand, £1300 a square metre, affordable? Hmm. Relative to the standard market price of housing in the UK, no doubt. But not relative to the costs that are being consistently achieved in the natural building movement. I live in a 45-ish m2 cob house (not a passivehouse, but with zero heating costs since I use free local firewood) that cost about €5500 to build, which translates to about £100 a square metre.

Of course, that's not including labour, which was all voluntary in our case. But natural materials (straw bale, cob) lend themselves to volunteer labour. I'm sure you could build a passive house using straw bale and cob for this kind of price, provided things like airtightness and solar gain were well covered.

I'm not sure if the £1300 figure includes land costs – I'm assuming not (if it does, how much difference would that make to the final figure?)

Rob (http://transitionculture.org)
11 Apr 11:19am

Hi Robert,

Thanks for the comment. I think there is a fascinating interface here between the natural building movement and the passivhaus designers. Yes your house was very cheap, and indeed absolutely gorgeous, but it is not really scalable for all new houses in the UK be dependent on heating themselves with wood, and indeed as the recent paper by the AECB (http://transitionculture.org/2010/09/23/bring-me-the-woodburning-stove-of-alfredo-garcia/ (http://transitionculture.org/2010/09/23/bring-me-the-woodburning-stove-of-alfredo-garcia/)) showed it is not a zero carbon heating option. Building houses dependent on wood heating, even if they are built with fantastic local materials, is not scalable, especially in the urban context in terms of air quality.

On the other hand, there is much that materials such as cob, strawbale and clay plasters can bring to the passivhaus approach. What I love about this project is the potential it starts to suggest for the future, and Bere's keen-ness to innovate and see this as just the beginning of an exploration of local materials is very refreshing…

Robert (http://www.abrazohouse.org)
11 Apr 12:26pm

Hi Rob,

Glad you liked the house! If I can make a quick plug, we're still looking for volunteers on our current building project…

I agree wood-burning only makes sense in the context of low-density ecovillage type development. However, the urban biomass waste stream is enormous and needs to be captured. Since we're not going to see our cities reach passivehouse standards any day soon, perhaps what we really need is a new generation of clean biochar stoves for zero-carbon heating and cooking!

Definitely, a passive cob house in British-type climates would need very thick walls (many traditional cob houses have 1m+ walls, which is rare in new-build cob.) Hence straw-bale (or – since we're talking about Wales – why not hemp-bale or bracken-bale?) / cob hybrid.

Another thing I took from the interview was about the conventional attitude to education – the enforcement of a rigid mind-body duality, you might say, where the architect does all the creative work and passes down the plans to the menial construction workers.

Contrast this with the typical (Pattern Language-inspired) approach to building with natural materials, where the owner, designer and builder are often the same person and many creative decisions are made on the ground – what I like to call "thinking with your hands." Introducing practices like this would really mean a sea change in the construction industry!

Rob (http://transitionculture.org)
11 Apr 1:07pm

Absolutely… I love his example of the German model where people can start becoming a master joiner at 14….

michael Dunwell
11 Apr 6:43pm

….and learn sums and spelling because they itch to put in orders for materials, not because someone hit them or bribed them or told them they would be useless if they didn't.

Phil
11 Apr 10:14pm

Tut, stripy lawns and no veggie patches.

nick
12 Apr 11:09pm

well done Justin Bere.

Plymouth University and now Bath Uni have/are doing quite a lot of work on physics of cob/earth masonry inc thermal performance. New build cob walls are usually thicker (0.7m – 0.9m) than their historic counterparts (0.6m) in order to get to an abysmal thermal conductivity of 0.7W/m2K. Compare this to Passivhaus of <0.13W/m2K and you can see why Justin Bere is imagining a composite wall including external insulation…..BUT: dont' forget that cob needs a long time to dry; not any old mud will do; it is slow and labour intensive.

I would love to see Scottish Architect Tom Morton have another go at this fantastic project **http://www.arc-architects.com/architecture/Affordable-Eco-House.htm (http://www.arc-architects.com/architecture/Affordable-Eco-House.htm)** , but within a Passivhaus context….. locally felled/sawn timber, compressed earth blocks and windows, that just leaves the locally produced wood fibre insulation to sort out!

Jennifer Lauruol (http://www.carpe-diem-gardens.co.uk)
12 Apr 11:38pm

I would like to design the gardens for these houses. If you are interested, please contact me through my website.

Katy Duke (http://www.ecohome.org.uk)
13 Apr 6:31am

I'm liking the mash-up between the innovative but difficult-to-measure self-builder approach and the strictly controlled nature of Passivhaus design & social housing standards. We are gradually upskilling great swathes of the building industry in the arts of more airtight, highly insulated buildings in the UK through standards in Building Regs –

Ecohome, Code for Sustainable Homes, BREEAM, AECB & passivhaus. We still need to apply these same principles on existing buildings and that is so much harder.

I'm working on some of the (previous) government funded 'Retrofit for the Future' projects (and have been hugely impressed by the Technology Strategy Board) – you can see a growing database of them here **http://www.retrofitforthefuture.org (http://www.retrofitforthefuture.org)** , together with certified newbuilds, including Justin's Welsh houses.

What a huge task though, and it seems we will be scratching around for funding again…..

Scribbly
13 Apr 12:01pm

It's great — but the industrial west is skint. Working on existing structures will be 90% or more of the actual conversion on the ground.

Adam Dadeby (http://www.passivhaushomes.co.uk)
14 Apr 10:25am

We are doing a hybrid refurb and extension here in South Devon to full Certified Passivhaus standards (0.6 air changes per hour; 15kWh/m2.a annual heat demand; 120kWh/m2.a total primary energy use). There is also a refurb project in North Devon (Barbrook) aiming to achieve the new, forthcoming Passivhaus retrofit standard (1.0 air changes per hour; 25kWh/m2.a annual heat demand; 120kWh/m2.a total primary energy use). By comparison, the government's so-called 'zero carbon' standard has still to be defined in terms of energy use and airtightness. They are considering whether it is feasible to achieve around 40 to 50kWh/m2.a (annual heating demand) and around 3 air changes per hour by 2016! The current average annual heat demand is in the range 150 to 250kWh/m2.a

As has already been said, it is fine for people with time and skills and land to build in rural areas to get a lowish energy solution based on free firewood. However, this isn't an option for most people.

Even if most people were in that position, wood is not a scaleable solution, unless we can reduce heating demand to the levels that Passivhaus methodology. For Robert (poster at the top of this thread), he could have made his design more energy efficient by applying Passivhaus methodology to optimise building form. He probably could have reduced his use of building materials in parts of his build, as Passivhaus is partly about minimising waste of building materials by avoiding over-engineering.

What we have learned in our project is that, for post WW2 buildings like ours, it is much harder to avoid using nasty foam based insulation if you are doing a refurb. Unlike older buildings, they are built closer together with smaller room sizes and there simply isn't the space to fit in 300mm here and 400mm there of natural insulation. In our case, I now believe we would possibly have achieved a lower embodied energy solution, if we had demolished the building and rebuilt from scratch. Most of the embodied energy in the old building was in the form of dense concrete which – with some input of energy – could have been reformed into new building material (apparently there are people doing this in the local area).

Our new build element is most made from wood and wood products. The only really expensive Passivhaus specific product was the windows, which were made in Austria. Unfortunately, because we in the UK are behind the leading countries in Passivhaus, there is still only a small market for Passivhaus windows and doors, so when we were doing the design for our project, there were no suitable UK made products.

The factors slowing growth of Passivhaus in the UK are principally, lack of skills (point above about the brilliant technical education of the young guy from Vorarlberg in Austria) and a chronic cultural short-termism/discounting of future benefit (most people won't spend a penny more up front even if it will save pounds year after year)

Jay Banks (http://jaybanks.ca)
15 Apr 11:23am

I remember quite well when officially the first passive house was built in Canada. It was in 2009: **http://www.whistler.ca/index.php?option=com_content&task=view&id=836&Itemid=98 (http://www.whistler.ca/index.php?option=com_content&task=view&id=836&Itemid=98)**
Technology is improving and it is good to share information also from abroad because many innovations can be developed elsewhere. I have found quite interesting to involve local employees to the process as it can save the emissions from transit as well. Also the strategy to train up young people to become capable to deal with big projects in their 19 is a brave idea. It definitely can bring a lot of good turns. I believe that all system will be adopted very soon in many countries.

Robert (http://www.abrazohouse.org)
16 Apr 4:41pm

Hi all

Very interesting debate!

@nick: On the thickness of historical cob walls: I consulted with an expert who told me that 0.6m-0.8m is typical for Devon cob houses, with 0.8m being more normal. So, no, not typically >1m, you're correct.

And, yes, the thermal insulation value of mass earth is not brilliant. We've tried to remedy this in our recent buildings by adding lightweight additives (wood shavings) to the mix. (Also it helps that we live in Northern Spain…)

@Adam Dadeby: Hmm, overengineering, in a house that cost less than £5000? That's a new one on me…

Adam Dadeby (http://www.passivhaushomes.co.uk)
16 Apr 6:08pm

Robert, your figure of GBP5000 to build your house seems incredible to me. When you consider that Ben Law's house cost GBP25,000 and he had loads of free and second hand materials and free labour.
How much did you cost your time at?

Robert (http://www.abrazohouse.org)
17 Apr 8:51am

Hi Adam

Don't know about Ben Law's house but I suspect it's quite a bit bigger than ours. Also I think most building materials are more expensive in England than here in Spain.

FYI here's a rough breakdown of the materials cost for our house. This doesn't include labour, which as I mentioned in my first comment, was all voluntary.

Item Subtotal €
Wood 1063.53
Roof membrane 659.45
Windows 490.74
Plumbing 441.69
Chimney 307.83
Stove 280
Plaster 171.74
Straw 166
Earth moving 155
Gravel & sand 154.89
Electricity 150
Treatments 135.52

Furnishings 65
Drainage pipe 47.95
Fixings (screws, etc) 32.05
Cement 14.72
Total 4336.11

I've added another €1000 or so to this to account for miscellaneous costs not included in the breakdown and which are hard to quantify.

Robert (http://www.abrazohouse.org)
17 Apr 10:16am

As for how much the time we spent building was worth, that's a very tricky question, but the short answer is if you balance out our labour (a cost) against the fact that we were learning how to build (a benefit) you arrive at a net cost of zero, give or take.

Another way to look at it would be to say that the house cost us £5000 plus two years of our lives. Cheap at the price if you ask me!

Adam Dadeby (http://passivhausrefurb.blogspot.com)
17 Apr 11:55am

Hi Robert, that is really impressive. I was thinking about your build after I posted. I went to a good talk a month or so ago, with examples of very low cost builds. One had paid £100 for a leaky second hand static caravan which they'd installed under an open hay barn with a sound roof. I'm amazed that you got your windows for less than £500 – are they double glazed? How many m2 of windows did you get for £490.74?

Also, in this month's Permaculture magazine, there's an interesting article about very low cost builds – in the range £100 to £250 per m2. There isn't enough detail in the article to unpick the costs though.

Here in the UK, certainly in southern England, the main barrier for people on low incomes is the high cost and lack of availability of building plots. Building materials are more expensive here than the prices you quote, even second hand. Plus, here, you'd need more materials to achieve even a modicum of energy efficiency.

It's great to have the experience of doing the building work yourself. Most people would have to pay others to do the work.

I think that very low cost DIY building is aiming to achieve something different to Passivhaus. However, even a very low cost build could benefit from Passivhaus analysis – the laws of (building) physics still apply, whatever the budget!

Robert (http://www.abrazohouse.org)
18 Apr 11:12am

Adam, I'll email about your questions – since despite appearances this isn't really meant to be a discussion about my house…