

Episode 47

Choosing a Suitable Property to Eco Retrofit

The show notes: www.houseplanninghelp.com/47

Intro: Let's get to our interview. It's Ian McKay from BBM Sustainable Design today and I think you're really going to find this useful because is there such a thing as a house that is ripe for retrofit? If so, how do we find it! Well, Ian is going to share his experience with us and I started by asking him for a little bit of background and also how he developed the company.

Ian: Well, BBM Sustainable Design, we've been going for 20 years. We won a competition back in 1993 for a house of the future which got built in Milton Keynes and in 1994, 20 years ago this May, it opened to the public. It set the scene for how we should be thinking about building houses in a housing expo, as it was, into the future. It was anticipating all sorts of new technologies which were emerging at the time, you know, materials which were more environmentally benign than perhaps a lot of the supply chain was providing us with at the time. We were also suggesting ways in which people perhaps in their lifestyles could be using less resources so we had a special home working environment.

It's quite interesting looking back how many of those ideas have come to fruition and what was pie in the sky, actually not very much of it was pie in the sky. The only things really looking back that were out of kilter was perhaps the timelines - they're shorter. All the things that we said were going to happen have happened but they've happened much quicker of course. With global warming and some of the accelerated changes that we've seen how are governments and so forth have had to take up this cause to get the economy off carbon and things like that.

Ben: I'm interested in retrofit because to me it seems that as a client it's very complex. There's a lot to take on board and it would be nice to say: "We'll have our upgrade." Happy days! It never quite seems to work like that.

So first up I'd like your definition of what a retrofit is and what we're going to be talking about today.

Ian: Yeah, I think that's a good question. It's good to clarify what people mean when they talk about eco retrofit. It's a phrase that people are banding around rather a lot. I mean I've heard low carbon refurbishment . . .

Basically it's just a way of taking an existing building and reducing its energy demand to make it comfortable during the extremes of weather and so forth. So you are looking at in particular adding insulation to the building or making sure the windows are nice and airtight and insulative in their own right. You're looking at maybe the heating sources, making sure they're as efficient as can be and that's before you start looking at the obviously green things like putting solar panels onto the roof. The key thing is about minimising the energy demand rather than thinking about how you're going to make the energy and that's what we try and aim our eggs at. [Ian laughs.]

Ben: Particularly I'm interested today that you've got me today as a client before I've bought a property that I would like to retrofit. Perhaps it's because I can't find the plot where I would like to build so I am thinking of going down this route.

So, when I start out . . . We often as clients want a payback in this. I know it doesn't always work exactly like that but are there any considerations that we should have in our mind right at the very beginning of how can we make this so that it can pay back as soon as soon as possible?

Ian: Yeah, that's a really good question because I think if you choose the right building, the right candidate building to start with you're a lot of the way there. A lot of the people are coming to us with very large Victorian buildings out in the countryside. They've got fossil fuel heating . . . You're talking about £7000 or £8000 a year to heat this place. Very complex forms, lots of roof shapes, lots of little bay windows, some very fussy architectural features, beautiful building but incredibly expensive to eco retrofit either putting an insulation jacket on the outside or the inside of the building. Some buildings are just cheaper to treat than others.

I did a project for my family two years ago whereby it's basically like a shoebox. [Ian laughs.] It's a two-storey timber frame shoebox built in 1969 and we just knew immediately when we first saw the building that's going to be cheap to treat. So we didn't have to spend too much money on making it very thermally efficient and

indeed we got it almost carbon neutral for - all in, including VAT, including the solar panels that we did put on - about £70,000. Not the £250,000 you sometimes do see people spending on doing a low carbon refurbishment of a residential property.

Ben: Can we clarify then what we mean? Is it just a simple form? So you mentioned in that a shoebox. Is it every extra wall that . . . strange direction . . . You wouldn't want a star-shaped house!

Ian: Well yeah. Exactly. If you speak to a quantity surveyor, you know the people that estimate the cost of a building they'll always say the cheapest buildings to make due to surface area are nice cube shape buildings - very simple shapes and geometries. Also the amount of surface area you're going to treat so if it's a detached villa you've got probably four walls and a roof and a ground floor. So a lot surface area to insulate. If you've got a terraced property, two of your main walls are actually onto another heated space probably so you only have to treat two end walls.

Ben: You wouldn't have to treat the intervening walls because they would lose energy into the neighbouring ones?

Ian: Everyone's heating their space so you haven't got -5C next door, have you? You've got another person heating their place to, say, 20C. There's virtually no energy loss unless that's a vacant property and even then it would never get down to outside air temperatures.

Semi-detached, you've got one shared wall which you wouldn't necessarily have to treat.

Ben: And that's beneficial or does it not matter too much? We're talking about fewer materials if we go down that route because you've only got those two walls and presumably fewer windows to replace.

Ian: Yeah, exactly. The plan form if it's really efficient, if all the shapes are straightforward and not complicated, if the house is quite modern. Don't forget older buildings tend to be a little bit out of plum. So, you know, when you get a carpenter down there and they're looking and, oh crikey, all the door frames are out, they're going to have to spend maybe half an hour or more hanging a door than if they're working in a modern built property where everything's still plum and the rooms are rectilinear. It's just quicker. That does get factored into contractors quotations. If it's an older property they

are going to experience more irksome little problems as they move around.

Ben: Is there such a thing as a property that actually isn't worth investing the money into it? What stage do we think we've got to knock it down or do something else?

Ian: It's difficult to give a hard and fast on that but very often we are seeing and it's a little bit of a travesty but because of the 20% VAT issue, if it's a very significant extension for instance, and a lot of refurbishment and alterations on the inside and the eco retrofit that we've been mentioning then it might make sense to look at the new build option. You've got the 0% VAT with new build but 20% with refurbishment.

Now one little loophole that people should be aware of is it's 5% VAT if it's strictly speaking just eco retrofit, low carbon refurbishment. If you are mixing it up with an extension or creating a loft conversion or extensive alterations in the house which are not to do with making it energy efficient then it makes the contract impossible to segregate out the 5% from the 20% so the VAT man will have furrowed brows when looking at that. [Ian laughs.] So the contractor has to take a view on what they take on at 5% VAT. If you can just do, strictly speaking, an eco retrofit in its own right then you should be able to get in done at 5% VAT.

Ben: You mentioned extensions there. The ones that I have seen, retrofits where they feel they've got this payback it's because they've added on space. Would you agree, is that something that we should be factoring in? I know strictly speaking it's not a retrofit, is it?

Ian: That's a real estate issue, isn't it? The UK market, real estate agents speak in terms of the number of rooms and that's crudely how they equate value. Whereas in other countries, you hear it a lot, people value the space that's created as well, not just the number of bedrooms. Notwithstanding, when people think, if we're doing a big extension we're going to get some more rooms out of this property so we'll get some more money back in the long run when we come to sell. That's in a nutshell how people see it.

Yeah, you have to make your own evaluation. You have to make an evaluation about finding a property which is I think either big enough for what you need right now, doesn't need to have an

extension, and then you can just concentrate on doing, like I say that 5% VAT-rated work. If you want to put your mark on the building and do a nice big extension as well and then do the energy refurbishment . . . I don't know, you might well run out of money.

Ben: So you could do it in two stages and then you could have your 5%?

Ian: Yeah, we have recommended that to people in the past. Do two contracts. Do your extension first and then do your eco retrofit on the old building afterwards. It's perfectly plausible.

Ben: Good advice. When we're first looking at that building, is it worth us taking advice at that stage?

Ian: Oh yeah. Definitely. If you can bring someone along to have a look at early stages it would be a good idea. If you do keep in mind some of those very basic principles about does it have any shared walls that you won't have to treat? Are the shapes easy to treat? And also the conservation area issues and historic buildings. Sometimes the front elevations, you can't really touch them from the outside. Don't forget about that as well. So if you're looking in a really nice part of the town there may be some restrictions in what you can do anyway on the front of the building. So if you have someone along with you they may be able to point some of these things out for you.

Ben: Should we be avoiding that internal insulation scenario? You mentioned that Victorian facade or whatever. It's just going to be more complicated down that route and as far as I can see the less complicated it is the easier it is. Would that be a fair assessment?

Ian: Yes, internal external insulation. We talk about particularly the treatment of the walls. You have to go back quite a long way, pre 20th century buildings really, before you start to get solid wall constructions, so in other words no cavity wall in the old masonry constructions.

Cavities were introduced around the turn of the 19th, 20th century as a break between driving rain getting through from the outside of the wall to the inside. Later on in the century, in the 20th century, they started to insulate that cavity but there was always an air gap between the insulation and the outer leaf of brick or whatever it might be.

The problem is with solid masonry construction is that if you insulated it on the inside the external wall is staying cold and damp all through the winter and it doesn't transpire its moisture very quickly. It hasn't got the ability to let go of that moisture so you get frost damage, increased frost damage issues on the outside faces of the brick and on the inside you've got a cold face up against the insulation or maybe a small air gap between but it's a wonderful place for mildew growth and spores of fungal growth which is very bad for internal air quality. It's unhealthy. If that makes it out itself past the insulation then that's trouble.

You've got to think also about how timber joists as well have to go through that zone. If you are insulating the inside face they're going to go through the insulation from the warm side into the cold, wet brickwork which stays damper longer and if they're socketed into the brickwork which is the old detail of how they did it those joists are going to rot quicker. It's always been a bit of an issue for older buildings - you have to replace the joist ends but you can imagine how that's going to be accelerated.

One rule of thumb . . . We've done a lot of research into that because sometimes you don't have any choice but to insulate on the inside face . . . One recommendation I could make is try and use an insulation product which is breathable as best you can. So there's calcium silicate boards which are quite expensive but they breathe. They're not the highest performing insulative-wise but they do allow moisture to come through that. It's applied directly onto the masonry face but it allows that moisture to come through and you put a lime plaster on the face. That also breathes. Don't, for goodness sake, put emulsion paint on. Put a mineral based paint onto the lime plaster because that also breathes. If you fill up the pores with an emulsion paint and then it can't breathe any more. But that helps to keep the wall healthy, it helps bring the moisture out of the wall into the internal heated space and then it can ventilate that way.

Another rule of thumb is don't insulate to too high a degree. If you have a very, very good U value you're going to accentuate those problems that I talked about earlier about frost damage and also the instance of having a dew point inside your construction which is not healthy.

Ben: We had this in a Google+ Hangout the other day where, I know it's a more extreme environment, but up in Toronto it was mentioned

that some people have started insulating internally and it's the same freeze thaw process. Is it down to design? Can this be avoided in any climate if you're thinking, not too much insulation because we've got to keep that wall . . .

Ian: Yes, to an extent. There's a whole raft of issues. I mean when we did the retrofit I was talking about earlier, the one we did for my family, that was a timber frame house and we insulated from the inside. We took the old plasterboard off, we actually built in the walls a little bit, so we increased the depth of the studs up to 150mm and then we filled it with sheep's wool. So that breathes, that's a nice breathing insulation, but that construction was originally designed to breathe to the outside so it's got a cladding panel on the outside and there's a ventilation path behind that cladding. It all breathes to the outside anyway. Timber frame allows you to do that. I imagine some Canadian house types, they build more in timber frame out there but over here where you have masonry construction far more, insulating on the inside is always problematic. So if you can, try and insulate on the outside.

Ben: Are there any particular materials or construction types that will make this job easier or does it not really matter?

Ian: Well . . . [Ian laughs] It's not an easy question to answer because for each instance you're going to have a different solution. So you might have a suspended timber floor. There are techniques for insulating a suspended timber floor which are relatively cheap to do, slightly more complicated if you've got to insulate a ground-bearing slab. What do you do about a big lump of concrete which has got no insulation on it? What we did was we put a little bit of perimeter insulation around that 1960s built house. It had no screed it just had a power-floated concrete slab and very low ceiling heights so we couldn't build on top. When we dug this perimeter channel of insulation at the edge of the slab before it hit the outer wall it made a little thermal break and then we made the decision to use 8mm of cork right across the ground floor which itself is an insulative material. It's also what we walk on and it's a beautiful finish. So we've revalued and revisited cork, which went out of fashion in the 1970s! [Ian laughs.]

Another solution for the ground floor where we had a ground-bearing slab was when we had very high ceilings we made a calculation that if we lifted just four internal doors about 170mm, which is the same height as the first step on the staircase, we could

insulate right up to that first step, raise the newel post at the bottom as if it was never there before. That was the way we insulated a ground-bearing slab to a very high level on a very old Victorian property which had a ground-bearing slab.

Yes, it's a tricky question. You could go around the building, look at different wall solutions, different roof solutions but everything has to be taken into consideration. Going back to one of your earlier questions about should you take advice from someone early on when you're evaluating a house that you should possibly buy that's the sort of key area which needs to be looked at. How could you treat these different technical situations?

Ben: I often look at certain buildings, council flats, whatever they might be but they're in a very good location. Are they ripe for retrofit or does a certain amount of it depend on how they've been built?

Ian: When you say a council flat, like in a block?

Ben: Perhaps not a block. Perhaps council detached houses but ones that were built some time ago, so 40, 50, 60 years ago so they're ready for something to happen. Perhaps the room sizes are not bad but they've got a core location in the town or the village.

Ian: Yeah, usually of that sort of period they were building quite simply and very economically. You've got your good rectilinear and square shapes and plans, and the walls will be true. So the contractor's not going to be concerned that they're going to spend hours and hours and hours getting that wall just right and the tiling is going to work easily and all that sort of thing.

Also I suppose is they're going to be much more open to being treated on the outside. One of the really exciting opportunities is giving an old house . . . We did one about eight years ago on a house in Hove which wasn't a particularly good-looking house. We were charged with turning it around, doing an eco retrofit on this house, and turning it into a really sexy and desirable building. So people are amazed when we say the old building is still under there. We completely changed the look of this building, slightly changed the roof profile, changed how some of the glazing worked on the building and we gave it a new insulative coat on the outside and new cladding. It turned it from being a very dour, late 50s villa into quite a swanky house for the 21st century. So that's an opportunity.

When you go into those old 1950s, 1960s council-built properties they're probably aching for a treatment like that.

If you're in a street you can perhaps start to agree with neighbours about all doing it. We've done a trial of that in fact. We did a street-wide study, only hypothetical but what if the whole street did an over-cladding of their house. The terrace in question was quite small, unit sizes, the rooms were small so an internal insulating job of that would have been really noticeable on the inside rooms. Insulating on the outside was the only reasonable thing to look at but it would need to have a very concerted effort from the whole street to do it well. I think also if you have got a contractor who can do a whole street you're looking at really, really making the numbers work much better because of the savings of buying in bulk and so forth.

Ben: Ian, this may be a good point to bring in a couple of examples and The Nook was very different because it was a period property and again, I suppose, although we've been searching for ideal properties to retrofit we may just think I've got to retrofit here so lead us through that example.

Ian: The Nook was a different kettle of fish entirely, yeah, built in the 1890s it's solid wall construction. It was in a conservation area so the front of the house was very . . . It had some sort of value to the local planning authority, although I'm still scratching my head as to what is so valuable about it. [Ian laughs.] It's a villa as well so it had four complete outer walls as well as its roof and ground floor. So we had to treat the inside elevation because of the architectural features with the two bays, we had to treat that on the inside face. That elevation is not insulated quite as well as the three side and back elevations which are treated from the outside.

But it hardly looks, if you see the building, you won't notice it having been treated from before and after which is why if you see the website you'll see the before shot and the after shot, and it's so difficult to tell the difference.

It was very expensive to do. I think although the contractor did it for as cheap as they possibly could it was about £130,000 and that was just for treating the external fabric of the building really. It did get a new boiler and it did get a mechanical ventilation system with heat recovery but you can see where the differences in cost come.

Ben: And I guess you look at that at the end of the day and think was it worth the investment or someone new coming to repeat that. Have you had anyone else who's wanted to go down that route?

Ian: Well, it's a house in multiple occupation run by Two Piers Housing Co-op and their bills have come down enormously as well and on the heating, it's achieved and exceeded the performance. On electrical use we didn't have that much control over it. It's slightly not as we planned or predicted but it achieved the target for the Retrofit for the Future programme which was roughly around that 17kg of carbon per annum per m². So from that point of view it was good but the cost benefit analysis of that is going to be a bit of a stumbling block for a lot of people. To achieve that level of performance is a lot of money to spend.

That's why this other project built in the 60s with a flat roof and it's basically a shoebox terrace, it's a much cheaper property to treat and to achieve that all important affordable warmth.

Ben: That's a good comparison. I like that but I have one more question about the old housing stock. Is there ever a line where we shouldn't touch these buildings. Clearly in the UK we have listing so we're not going to be completely refacing those but is there any theoretical line or is it down to each and every one of us?

Ian: I do think there is a case for evaluating a large amount of area to be . . . whether or not we should be trying to keep these houses. If they are really uneconomic to treat and to be able to allow people to live comfortably without busting the budget because even middle income owners are now struggling to heat their properties. It's a financial burden and it's going to increase. So I do think we need to rethink quite large areas of our towns and cities, and say these houses over here they're going to be uneconomic to treat and we possibly ought to be thinking about renewal on quite a large scale but of course that's a big commitment and a lot of money which would obviously have to be put up.

What we mustn't do is be designing new buildings which are just as energy ignorant if you like as the old buildings. That would be a disaster! [Ian laughs.]

Ben: Well Ian, thank you very much. We've had some great information today. I really appreciate that.

Ian: You're very welcome. I really enjoyed it. [Ian laughs.]