HOUSE PLANNING HELP

Episode 105

How Far Should You Go with a Low Energy Retrofit?

The show notes: www.houseplanninghelp.com/105

Intro: Bob Prewett is a director of Prewett Bizley Architects, who specialise in low energy architecture, both new-build and retrofit.

However, Bob has a particular interest in the retrofit side, and I started by asking him why.

Bob: The building stock in the UK uses about 40%, or accounts for about 40% of UK carbon emissions. About 27% is due to homes but there's still a big percentage due to other buildings, so all buildings of all ages too, and all classifications on the planning scale. So from the unloved 1960s to the much cherished Georgian, I think all have their part to play in terms of energy efficiency.

Ben: How do you define retrofit? Is it renovation?

Bob: Actually there's quite a good definition in my partner's book about retrofit - Marion Baeli, who did Residential Retrofit - 20 Case Studies. And she drew the distinction quite deliberately that renovation and refurb are really usually more about smartening things up and making them look good and dealing with the top 3mm of construction, which I think in the UK you can find people that can provide that top 3mm of stuff quite well, but I think retrofit's much more about getting under the skin of things, and sorting things out at a fundamental level, at a building physics level. And ideally an architectural level as well at the same time, and delivering something that's much more transformative.

Ben: And is it something that is a minefield really as a homeowner? Going into this you've got your building - or perhaps you haven't. Perhaps you're thinking about well what do I want to do here. How do you get started?

Bob: I think it is difficult to a lay person to appreciate at the start how complex things may become if they don't have a clear plan of how they're going to action a strategy. So I think for most people, getting

some advice at an early stage and trying to create something like a whole house plan, which identifies sort of where the energy savings might be, and also identifies perhaps the risks involved in tackling those issues is important, and ideally having a clear plan about how you might action those. A strategy to deal with those things, either all at once or over time as a sort of incremental approach. So I think for the DIYer you need quite a lot of knowledge about buildings, building physics, to do things by yourself.

Ben: You've mentioned a plan. Are all plans equal?

Bob: Are all plans equal! [Bob laughs.] I don't think so. I don't think all plans are the same. I don't think they're all equal in terms of content. Some plans can be very simple. Some buildings are very simple to solve and sort out, others usually as a sort of correlation of their age, usually the older the buildings are, the more tricky they are to deal with because their building physics is a bit more complicated. And usually there's many more layers of action over time which create a much more sort of fragmented jigsaw puzzle for us to unpick at the start, and then deliver some sort of holistic plan for. So no. And each building is a bit of an individual I think and one size fits all in retrofit I think is a big danger and where probably a lot of work is going wrong at present.

Ben: Just before we focus on historic buildings perhaps, because I know that you've done a lot of work in that area, do you look at all buildings, and I have almost asked this, and think they can be retrofitted, or do you look at some and think they've got to be demolished?

Bob: I remember being asked if listed buildings should be retrofitted a few years ago, and I thought at the time probably not, because there's not so many of them. But since then I've changed my view on that and I think actually many listed buildings should be retrofitted, whether they're Georgian or 20th century or whatever.

But I think, there are some buildings which when one finds are in such poor condition then demolition might be an option, but I think that's probably very much a minority of buildings, but I'm sure they exist. We've not found any yet that we thought should be torn down completely.

Sometimes we'll take a significant lump off a building if it's in very poor condition and sort of rebuild rear extension. So those sort of incremental additions are often sort of very poor construction and are better being started from scratch.

Ben: I'm going to raise the topic of money here at this stage, because you're going to need a lot of money to get going on this and to make sure you're going to come out the other side.

Bob: I think it's not for the faint hearted, either in spirit or in finance. So I think deep, low energy retrofit is always going to cost tens of thousands of pounds. And I don't think there's any two ways around that. But you are putting into a building, usually the thing that's been left out, which is normally insulation and good windows and so on. So there is a whole load of stuff which you just can't avoid paying for and that's where most of the money is.

But, the upside is the transformative effect that it has in terms of quality of life. While I appreciate not everybody in western society could afford a deep retrofit, I think probably a lot of people could and it's about prioritising where one spends ones money.

Ben: Before we dig into it, there is a historical angle too. So where is this balance? And I know it's something that affects you and your practice of deep retrofitting and not ruining the building at the same time?

Bob: I think the balance is about understanding the quality of the building that you have at the start. I suppose at present I'm slightly nervous about some of the work being done to late 20th century buildings where there's sort of a feeling that this architecture is so bad we can't possibly do any worse to it, and actually carrying out quite poor works to those buildings which in some cases I think does make them worse actually and you've spent a lot of money getting there. And I think that's a real waste of money.

But yeah, understanding what the quality is of the building and then I think designing and planning very carefully to not upset that balance, either in building physics or either in architectural quality. So planning where, how you line buildings with internal wall insulation can be done very sensitively. It can be done and even add architectural character I think. But it can also be done very carelessly and there's some sort of a whole bunch of evidence emerging at the moment of really poor quality external wall insulation on properties of all eras. And it's just done so ham-fistedly, partly because retrofit is usually a design free zone, that whatever the quality the building was before it has been made worse certainly in terms of visual terms. And often in terms of building quality, building physics, so letting in moisture and trapping moisture in particular are some horrendous building defects which

are emerging from thoughtless and careless retrofit. And retrofit that's been done on the cheap to try and save money, but ultimately costing somebody a load more money in the end because taking stuff off and retrofitting again, that really is an expensive business.

And I think we'd do well to look at Germany and how they've proceeded slowly over time just doing generally doing good quality retrofit. And always spending the money up front and doing it house by house, rather than trying to do a thousand houses badly or cheaply.

Ben: What's interesting about Germany is that in some respects they seem to just go for it in terms of not being afraid to make these upgrades, whereas in the UK I think there is more caution, perhaps because we worry about that history.

Bob: I think there's caution from all angles, so there's caution from will we lose our heritage. There's caution of will it cost us too much money, and I think we often end up doing things which are a sort of a compromise.

Whereas I think perhaps countries like Germany still have a confidence about the future and progress and a belief that just doing things well now is an investment for tomorrow. Sort of a sound financial head, and also accepting that our environment will change over time. It should change over time and it should reflect the culture we live in. The culture we live in now is one which has the spectre of climate change hanging over it, and I think for that not to be reflected in what we build would be quite perverse, and that's something I spend quite a lot of time debating with planning officers!

Ben: I can imagine that's fun! [Ben laughs.] Going back to your initial planning and surveying of a building, I wanted to ask you whether you just come up with *we've got a target, this is where we're aiming for*, or whether that is a dangerous way to begin?

Bob: I think the short answer is yes. That sort of approach I think we probably do consider as a bit dangerous now.

I think a lot of people a few years ago, and including us when we started off in retrofit and we were getting knee deep into Passivhaus design and learning from that, there was a bit of a chasing the numbers attitude, and you know let's be the first Passivhaus this, the first Passivhaus that, without sometimes

thinking about the effects that pushing a building that far might have.

Ben: Can we talk about those quickly? So what do you mean?

Bob: So trying to drive all walls to a U-value of better than 0.15 so that it's going to tend to lead towards very low energy results or trying to hit 15kWh per square metre or even a 25kWh per square metre per year for EnerPHit Passivhaus retrofit standard.

I think actually it's very very hard for most buildings, and some buildings will go there relatively straightforwardly. Certainly my own house which we're hoping to retrofit later this year I think will eventually get there without being pushed too hard, but buildings with a different sort of form or a different construction, solid wall buildings and historic buildings, are going to probably not want to go there.

And I think we're interested in taking the building to where it's going to sit happily, and that might be a little bit higher, and so we speak about between 15kWh per square metre per year and 40. And we think that actually most buildings would probably sit somewhere in there. The retrofits would probably be towards the 40ish kWh per square metre. But there are no rules and each building will find its own place.

Ben: Of course. So I like that idea, but then I also like the idea of saying well look, every time we do an upgrade we're going to hit this energy target and over time things go down. So can you explain your way of looking at it? I think it's just because I don't really quite understand the examples and we are just talking about this so it's going to be difficult, but maybe you can try!

Bob: Certainly most buildings if they don't have insulation in and they don't have good quality windows then I'd expect most buildings to easily achieve say 60% energy reduction, and perhaps going up to 80 or even 90% in some cases. So that's sort of the range I would expect to work in.

I also think there are dangers in going in too light on buildings too, because then I think actually it's probably not going to be an energy saving at all. People just take perhaps a little bit of comfort out of that, which you know can be appropriate for some people.

Certainly people who are elderly or who need better comfort then there's a logic in that. But in terms of energy saving, taking a

building to a holistic whole whereby you're dealing with insulation well, you're not leaving in loads of cold bridges, you're dealing with airtightness well so that you're not building in interstitial condensation problems. You're dealing with your windows at the same time as you're dealing with your walls and roofs and floors and so on. Then actually as soon as you follow that kind of holistic, joined up thinking approach, you're probably going to be in the territory of at least 50% energy savings I would have thought. And if you're going to put 20mm of insulation on a wall then it's probably economic to put on a bit more so long as that's not going to cause you internal space planning problems.

But it's a case of understanding the building as a whole, having a plan for each building element and understanding how all those elements interact and work together. And that's the most important thing, and I think the outcome of that will probably be quite deep energy savings, but not saying at the start I'm going to aim for 90% energy saving so that I can do at least as well as Kyoto. I think that's a bit wrong-headed. Some buildings will be predisposed to very high energy savings, some will be predisposed to doing a bit less.

Ben: I'm in a situation where I want to build a new house, but I'm struggling at this stage to find land. It's been very frustrating and I think if I was more flexible and could move somewhere else that would be fine. But is there a case of moving to a building and retrofit it regardless? Or looking for a building that in some sense thinking this is going to work and it's not going to cost me the earth?

Bob: I think if you're looking to end up with a house that's a low energy house and a high comfort house, then certainly buying a site and building it from scratch will probably lead you to the ultimate result and the most satisfactory result. But like yourself because I live in London I was hoping to do the same one day, but actually just gave up looking for a piece of land because there's a million different small developers doing the same thing and there's no way I was going to be able to compete with them. So we knew from the start that we'd have to look for an existing building.

And then I think for us there were two factors which led us to the property we bought. One was what can we afford, so that's a big driver for most people in London, most people in the UK full stop. But we were strategic about the building we were going to buy in terms of would we have freehold, so if we've got freehold then we've got rights to fit external wall insulation probably. Are we buying something which has got planning restrictions? So we

looked at some amazing houses but then found out very quickly they were listed and at that point I found that very unattractive because I thought any energy saving measures were going to be very difficult to achieve and it would be higher risk approach. And we also excluded buildings from certain periods of history because the market was just paying too much for them, and so we wouldn't be left with money to do the retrofit.

So in the end we deliberately chose a 1960s little terrace house which was a bit unloved and we were able to buy it and have just enough money, we hope, to do a decent retrofit on it. So, and we knew that there would be planning fairly straight forward, and also the formal construction would be quite simple to do so we can do a lot of work with cavity wall insulation for instance which is very cheap, very low impact approach. So we're hoping to do the whole project in a shorter period than I would normally expect.

So yes, I think if low energy is your goal and you're looking at buying existing buildings then finding the right sort of target and being quite strategic about that is something you probably should be thinking about.

Ben: The insulation itself, it can be put on the outside, in the middle or on the inside. There are downsides with all of those I suppose, so maybe you could explain that a little bit? And upsides!

Bob: Okay. Yeah, absolutely, downsides and upsides.

So most people would go for external wall insulation I think because it seems like the most simple thing to do and the safest thing to do building physics-wise. So potentially you can do an external wall insulation job and live inside so there's very little disruption potentially. And you're cloaking the building and keeping it warm and keeping it dry, so you're much less likely to suffer with moisture problems. But, the big but about external wall insulation, is if you're a terrace house you can only go up to the boundary and you end up with cold bridges left over through the party walls. If you're a terraced house or a semi-detached there may be planning restrictions because you're going to change the look of your building. So EWI (External Wall Insulation) has a lot of advantages but its main drawback is it completely transforms the building architecturally. And that may be something you don't want or planners don't want, so that's the sticking point with that one usually.

Internal wall insulation which is the complete opposite, obviously has very little effect on the outside so is planning very easy, but it probably means you have to move out of those rooms, or possibly out of the whole building while you're doing it. It may mean taking off all the plaster and re-plastering and putting on layers of construction, so it can be quite slow and time consuming. That may affect other things like services, electrics, water pipes, heating pipes, ventilation pipes, the whole gamut of things. Insulating around joist ends is sort of a bit of a bête noire in the retrofit industry in there's lots of sorts of risks and pondering goes on as soon as you do that. And then as soon as you come to any junction like a window then you're thinking about how do I get a cold bridge free junction on those sorts of things. So there's a whole bunch of hidden stuff I think which comes along with internal wall insulation.

And then there's the middle ground, so if you've got a cavity wall, so later 20th century stuff, then filling the cavity may be a good option. But if you're on the coast facing direct to sea and you've got porous bricks or bad pointing then cavity wall insulation may be a big problem. And not always taking the word of the installer that your wall is suitable for cavity wall is I think an important thing and to think about that carefully. Incidentally, I mentioned my own retrofit will be using cavity wall insulation but we're very clear that we'll open up those walls and clean them out before any insulation goes in.

Ben: I'm trying to visualise that in my mind. How would you do that without taking down the whole wall?

Bob: Well we've got to do the roof anyway so we'll take the copings off the top of the wall, so we can see straight down and we can potentially pass sort of brushes down the wall. And at the bottom of the wall on the inside we can take out a few bricks every metre or so, so that we can blow out any debris that the last builders left or that we end up cleaning out.

Ben: And that would really help?

Bob: For me it would mean I'd sleep very well at night knowing that I've not got a building defect ready to happen or a cold bridge due to loads of rubbish at the bottom of my cavity wall. So it's about partly just doing a job well. Clearing up after someone's mess from 20 years ago, might not be a problem now but may be a problem when you fill it with insulation. And eliminating any potential cold bridges which we don't want because we're going to spend money so let's

make sure that we don't build in problems or little defects which undermine that.

Ben: If we're coming to do this as clients I think that one of the core issues of putting all this money in is how do we know we've got someone who really understands all of this and is going to do a good job? Because it's not necessarily just the architect that's helping you, it's the contractors who are in and we're all going to be doing this slightly blindly?

Bob: Sure, and I think at the moment it's very difficult for clients and homeowners to know who to trust really because it's an emergent part of the construction industry. There's no proper guidelines or protocols or qualifications.

I mean one thing I'm involved with, an institute know as CORE - the Centre of Refurbishment Excellence in Stoke-on-Trent, they're producing one of the first training qualifications for something called a retrofit coordinator which is a term that we dreamt up a few years ago. As a somebody who could help nurse a retrofit from the start to finish. They might not be an expert in every stage but they'd understand how all the stages interlink and they can provide continuity.

One of the main problems in retrofit and even in general construction is the lack of continuity from initial inception to handover and completion at the end. And it's a very fragmented process and that can work okay for simple building projects but I think the complications of retrofit mean that slippages between the different stages can often mean that what you get at the end bears very little relationship to the bright idea at the start of the process. So the coordinator, retrofit coordinator, is hopefully somebody that can help join the dots and make for a much smoother process, somebody who understands the interactions and interdependencies between different things and different parts of the process. So that's an initial sort of bit of light at the end of the tunnel.

But yeah, I think as a homeowner asking lots of questions. If you don't understand, ask more questions, and employ some sort of professional throughout the process. They might be an architect or they might be a retrofit coordinator. They might be both of those things at the same time. But having somebody that you trust and who gives you good clear answers to your questions and keeping them on board from start to finish is a start at least. You can do far worse than that.

Ben: At this stage perhaps you can give us an example of a retrofit that you've done for one of your clients?

Bob: Well one of our first deep retrofits was for a project in Hackney. Actually we still call that the 80% house although percentages are things which I'm less bothered about now as I said earlier on. And that was a classic Victorian three storey terrace house in a conservation area. So it had all the planning issues associated with it. It had lots of building physics questions associated with it which we were wrestling with at the time about moisture in walls and joist ends in walls and so on.

The great thing about it, it had a client who understood a lot of those issues himself and who just wanted excellence and ultimately every choice we'd give him we'd give him sort of a good choice or a better choice, he'd usually elect to go for the better choice and he ended up with a really great house. It costs him almost nothing to run. It's always 20 degrees in there, the air's always super fresh.

So he ended up with a lovely house but he invested a lot of time and a lot of money, and a lot of trust in us actually at the time doing that. So I think that set us on a track, and that project we learned a lot about the pitfalls and the dangers as well as the upsides. It taught us about how we might go about different future projects too in terms of setting up the right processes.

Ben: How have you improved? You talked a little bit earlier in terms of your philosophy's changed a bit, but anything else? Any other learnings from it?

Bob: I think one of the big changes we've made in terms of process is doing quite a lot of work right at the start so feasibility studies. So most architects perhaps get a rough plans and some tracing paper and test some planning options and look at layouts and square metres and that sort of stuff, which is all important.

But we're very keen that when we start a project that as well as having some drawings we also spend quite a lot of time on site understanding how the building is made, at quite a finite level. And understanding what defects there may be that are existing already and what other people have done to that building over time so that any proposal we make we can quickly see what the interactions are and the complications there might be to the process, or what hidden costs there might be too.

So we try and do a building physics appraisal at the start, a planning appraisal, an insulation and whole house energy plan appraisal, and a cost appraisal, all at once very quickly. So, often quite quick and dirty exercises but we can give feedback on a number of issues to our client as quickly and as economically as possible so they can make the right choices as early as possible in the process. That we don't end up getting planning approval for a scheme which we then actually realise doesn't work very well. I think that's probably how a lot of people still operate because they don't want to invest enough at the start.

Ben: We're virtually out of time, however is there anything else that you'd want to chip in that goes in with this conversation that perhaps we haven't mentioned?

Bob: I think for me having been doing this for several years now, the big kind of change or eye opener was when we were in the closing stages of the first retrofit project, the one that I discussed earlier on, the 80% house in Hackney.

And the heating system hadn't been commissioned and it was that terrible winter a few years ago where the snow and the ice didn't clear from the streets for more than about two weeks, even in London it stayed below 0 for quite an extended period of time.

And I remember going home every day and actually not enjoying arriving at home because it was very cold. But in the day, my day to day job I'd go and visit that site, the heating system hadn't been commissioned, the painters were there doing the final decks, and just them, their radio and a couple of halogen lights was pretty much heating the whole house to about 18 degrees and they were in t-shirts. And just the quality of the environment, even then without all the systems running was so much better than my own home that I thought well okay, the energy stuff is great and it's about ethics and it's about climate change, but this is just a completely different environment. This is a better environment than most buildings I've been into in my life. And that for me was kind of the crystallising moment and why we continue doing these projects in the office. Especially because I think it's just such a big difference and it's something you can't put in a photograph or even on the radio but it's something you can only feel. But if you do it really well you just get this amazing quality of life, or amazing quality of environment as a backdrop to our life.

Ben: Bob, thank you very much.