

Episode 39

Planning a Phased Retrofit

The show notes: www.houseplanninghelp.com/39

Intro: Let's get into this session's interview. The topic is phased retrofits. And Tim Shepherd and Jon Mason, I've got two separate questions from you guys, well actually quite long emails, but I wanted to thank you. You've triggered off this episode so Mark Elton from Sustainable BY Design is going to help answer them . . .

I started by asking Mark for his background in retrofitting.

Mark: So I joined ECD Architects before I worked here at Sustainable BY Design who had an ongoing track record in high-rise refurbishment tower blocks, that sort of thing. As it rose up the agenda of the sustainable architecture world I got opportunities to work on some projects that were pushing the boundaries at the time. I found it was quite challenging but quite rewarding and with so many older buildings in the UK it's an area that we as architects can't afford to ignore really so that's why it was important to me to take up that.

Ben: We've talked about retrofits a little bit but not too much on phased retrofits and I must admit I've struggled to find information on this so I did a bit of asking around and your name came up which is why I'm sitting right here. So can we start with what a phased retrofit is?

Mark: Well when we talk about retrofit of buildings we tend to talk about whole house retrofit as being the ultimate aim so that's a comprehensive package of measures which will include thermal insulation, window enhancements, more efficient heating systems and some form of dealing with ventilation and air leakage as part of a whole package. So a phased retrofit would be one where perhaps you can't afford to do the entire property in one hit and you focus on those areas that you can address initially until other funding comes along or different opportunities come later in your occupancy of that building.

Ben: I know that one of the aspects of retrofit is it's very disruptive so does that mean that going down a phased retrofit route, you're almost repeating the disruption or does that not actually end up being the case?

Mark: Some things are more disruptive than others but yeah you're prolonging the disruption and you're delaying the benefits that you will ultimately get from the retrofit because it's not until you've closed that loop and got a complete package of measures that you're really making the retrofit process work for you.

Ben: What is the first step? Is it about setting an energy target?

Mark: Yeah, I think it's about having a strategy. It doesn't necessarily have to be a target at that point but it's looking at an individual property and understanding what its constraints are, what its opportunities are, where are the trigger points? Perhaps you look at that property and it needs re-roofing, that's the first time you get in there and you focus on that bit. Or perhaps you're building an extension in 5 years time and you think, well that's my opportunity to do that bit. So it's looking for those trigger points and those opportunities, I think.

Ben: Now we've had a couple of emails that have some quite specific questions so I don't know I might read it through, if you want to stop me at any point or answer at the end? So we'll start with Tim Shepherd's which says: "Which parts of a renovation towards the Passivhaus standard create the most savings and additionally which are the most cost effective? For example which is more efficient and reduces energy requirements, an insulated slab, insulated outer wall, windows, doors or roofing insulation? I realise it can't really be done piecemeal but I am trying to get my head around which is the most useful renovation to conserve energy. Some sort of breakdown of the different elements would be great.

Mark: I can't give you exact figures on the individual percentages but clearly heat tends to rise so roof insulation is very important. That's where you can make big inroads but floor insulation, it depends on the type of floor. If you've got a solid floor your heat loss may be less in that area because you haven't got cold air coming up through those floorboards, but floors and roofs tend to be smaller areas and then your walls if it's a detached building you've got a lot of area, if it's a terraced building you haven't got so much of your external walls so that becomes less important. It's difficult to say that generically but roofs tend to be the easier bit to do. If it's loft insulation, for example, focus on that. That can be a straightforward starting point.

Ben: Is there a logical sequence? We've identified the loft but would it go loft, walls, slab . . . Does it just change on every project?

Mark: Well, as I say, ideally you're doing all these things together but the logical sequence really depends on your particular circumstances, but if those circumstances were flexible I would probably suggest starting at the top is a good way to do it. If you make your roof interventions the priority you can be maximising the level of insulation standards up there without affecting other aspects of your building.

If you're renewing a roof you can even begin to think ahead, planning ahead, how can I extend my eaves and verges now so that when I come to do external wall insulation later I'm ready for that. So there are things that you could be doing all along to enhance what comes later and I think the most important watchword is don't carry something out that's going to prevent you from continuing your strategy later on.

Ben: Maybe I should ask about who does this then, because if it's a phased retrofit are you ideally wanting one person to oversee all the different phases, even if they are years apart?

Mark: I don't think it has to be. You might buy a property and look to do a loft extension. Clearly do the loft insulation – it adds value to the property, gives you an insulated lid to that whole building, plan it so that you can come along later and do external wall insulation. That might be 5 years later and it might be an external wall specialist that does that. If you're looking at doing the external walls you might consider doing the windows at the same time because the way that the windows interact with that insulation can be quite important. So maybe that's a window fitter and an external wall insulation expert. When you're looking at floors, say if you've got a timber suspended floor it could be that you can do that yourself. You can take up those floorboards, you can lay in a support membrane, you can put a mineral wool insulation in between those floor joists and put that all back down and that doesn't require a specialist at all.

So I think, yeah, if you're breaking it up into phases look at each phase and see who's the right person to be doing that.

Ben: Do you notice the difference? I know it has to be cohesive at the end of all this but let's say you did two walls of a house and it had four walls. Would you notice anything after that first phase?

Mark: I think you would. Some rooms are going to be affected more than the others. So if you've got a north-facing room and you insulate

the north-facing wall then I think you would see some improvement in that particular room, not least because your external wall, the inside surface of your external wall is now not cold. It's a warm surface so you don't get that radiative coolth effect that you get from a cold wall surface.

If you replace windows, a lot of older Victorian properties, it could be that the street frontage has a much higher percentage of glazing, single-glazing, perhaps quite draughty and actually replacing the windows may have the biggest impact in those rooms and then you definitely will see the benefit from reduced draughts and from greatly enhanced U value performance from a single-glazed starting point.

Ben: I hear conflicting advice on this about sometimes keeping those original windows is a good idea. Do you have to choose between going down a conservation route or going for triple-glazed windows, whatever it might be that you're choosing, do you have to make that decision?

Mark: Conservation officers have an influence here. It depends on the level of heritage value of your property. I've worked on retrofits where we were looking to use vacuum glazing, so that's like very very thin double-glazing with a half a millimetre gap between it which is evacuated, but it changes the appearance of a sash type window because glazing bars have to be stuck on. Now from a distance you're not going to notice that but up close an expert would be able to tell the difference.

In this case the conservation officer rejected our ideas for that. In another case you might be able to get away with slim-line double glazing as a replacement just for the glass. Keep the original glazing bars in, but if it's that sensitive you may have to look to secondary glazing so that's an internal secondary layer of double glazing that covers the opening but means that the original windows are unaffected. It's a tricky balance and you'll find a lot of conservation architects will say that those original windows are sacrosanct and you'll find others who perhaps come from a more energy saving background who will absolutely say there are bigger fish . . . There are bigger problems to deal with here. We can't get hung up about 6mm Georgian glazing bars.

Ben: Let's move onto this second email then that says: "Hi Ben, really enjoying the podcasts. I'm contemplating an energy efficient refurbishment and house extension. What should be done first? Is there a logical order of priority – e.g. biggest gains first or most

disruptive first? Advice on how the transition from needing a heating system to potentially not needing one can be made? Do I extend first or refurb first? Lots of questions there I know but ultimately this topic area must have a wider relevance in terms of the majority of housing stock and everyone in the population.” And that’s from Jon Mason.

Mark: We’ve touched on this a bit. If you’re looking to do a roof-top extension, deal with the roof first. I think that’s a sensible strategy. Also if you’re looking at ultimately extending a property you should prioritise that first because you can make the external walls of that extension to the highest possible new build standard. If you were to do it in reverse and install a new heating system that wasn’t then sized to accommodate your new extended property potentially there’s a mismatch there.

Ben: I think you’ve lost me just there. Say that again. [Ben laughs.]

Mark: Well, let’s say you’re building quite a large ground floor extension. I don’t know in this particular instance how big we’re talking about but it may be looking to replace a boiler in the early stages in a property that’s largely un-insulated and quite small but the ultimate end game in his strategy is a much larger property that’s much better insulated. Really that’s when your heating system needs to be matched to those longer term circumstances.

Ben: Are you saying then that if you have this extension and it’s well insulated that you wouldn’t really need any extra heating because it would be okay so that when you came to replace the heating system that could be further down the line . . . I think!

Mark: Yeah, it’s a complicated scenario because how old is the boiler? It might be that it’s beneficial for you to replace it earlier because A) it’s going to break down and B) it’s highly inefficient now. You’ve got to look at each measure individually.

I think the important thing that we touched on right at the beginning was to have this end game strategy. Where am I aiming to be with this? What can I do first and foremost that isn’t going to affect things further down the line? Ultimately for a retrofit you’re looking to create a continual thermal envelope around the building and that includes the floor, the roof and the walls and the windows. You’re looking to improve the airtightness of that property to get rid of draughts but you can’t do that without thinking about your

ventilation strategy. If you were going for EnerPHit or Passivhaus the level of airtightness that you've got there really you wouldn't expect to live in that environment without having introduced your heat recovery ventilation system along the way. So there's certain measures, there's a symbiosis between them. Don't put in heat recovery ventilation until you've dealt with the airtightness because you don't get the efficiency gains but vice versa. Don't have a super airtight building that doesn't have a heat recovery ventilation system or some form of mechanical extract ventilation and make up air.

Ben: You'll also wanting to allow for where all the ducting will go and this, you might lose a little bit of space but he's just said that he's going to extend as well so that's a good opportunity to get that space back.

Mark: Yeah I mean I don't think . . . Where we've been involved in heat recovery ventilation in retrofit scenarios most of that ductwork is going at high level. If you plan it correctly you can keep those duct runs fairly short in the corners of rooms. You're just boxing out at high level. Typically you're going to try and do that in the hallway or above cupboards, above toilets so that its impact on your main rooms is minimal. Then you just need to identify suitable space for the heat recovery unit itself and like you say that might be a new build. It really needs to be on an outside wall in an insulated cupboard of some kind. So planning that ahead is a good strategy.

Ben: Are you perhaps thinking about remodelling as well at the same time because this would be your opportunity to do it so if there was a wall that needed to come out that would be the time?

Mark: Absolutely. I mean I think retrofit and a chance to redesign your home go hand in hand. They're not mutually exclusive and quite often one triggers the other. I've been doing a lot of work with the RIBA to develop the idea of retrofit coordinators so that architects will get involved in retrofit from start to finish so they will be responsible for the initial interface with a potential client, help deal with funding, help deal with finding a contractor, help deal with a handover at the end. One of the reasons why we want architects to take up this is because they can walk into a property to be retrofitted and perhaps see other design opportunities, knocking a wall down here, re-thinking this, putting in a new window there that might be beyond the scope of the pure energy bit but add value to the property at the same time. If you can add a lot of value to your

property that almost funds the retrofit measures in the first place so the two must go hand in hand, I think.

Ben: I did a blog post with Marion Baeli and one of the issues that she brought up was certain retrofits, if the property price is too low and it's unlikely to go up to a certain level if you're in a certain area, what do you think in that situation? What can you do if it's not going to add enough to the value? Are you doing it for your own comfort, just from that piece of mind of saving the energy?

Mark: Yeah, I think there's a number of reasons for doing it. Now is a great time to try and get your head around that because of the rises to fuel costs being very high up the agenda at the moment so it's very much in people's minds. So it depends how long I guess you're going to live in the property. If you're planning to spend a considerable number of years in that property, why wouldn't you want to do what you can to improve your internal environment to make it more comfortable because you're going to be the one to benefit from that. If you're doing up a property as a development project, maybe you've got different priorities in one area.

I'd like to think in the future that that changes anyway and estate agents start to value properties that have had energy efficiency improvements, so maybe in time we'll get to a point where it is much more cost effective from a value point of view anyway.

Ben: Why do you think that hasn't happened because I agree with you a hundred percent? It will get to the point that if you're saving a silly amount of money then it'll be worth more.

Mark: Yeah, I guess maybe it's only now that fuel costs are getting so high that people are really having to think hard about this and that's unfortunate that we're in that scenario.

I just don't think it's high enough up our national agenda and estate agents don't really get it. They don't really put forward your EPCs. They don't understand that. They don't promote it enough and the general public don't understand the value of that enough. Architects as a profession with the construction industry generally have got to get that message across because it's going to happen. We've got really tough carbon targets to meet in this country. Nearly 40 - 50% of those emissions currently come from our buildings so we're going to have to do some serious retrofit on a lot of buildings in

order to get anywhere close to those targets so we've got to bring the public along with us.

Ben: Some buildings have a form factor that's easier to retrofit so if we're going out and we're moving house anyway, relocating somewhere, is there anything or any other factors that we should be considering?

Mark: Well, I think people will still choose location as their main priority but I do find myself, I look at properties and I think I could retrofit that fairly easily. That would be straightforward to retrofit.

Ben: Why? [Ben laughs.]

Mark: I would tend to look towards properties that you can externally insulate. It's an easier, less disruptive process. It retains some of the thermal mass of that building on the inside. There are less tricky issues to do with interstitial condensation to deal with. So if you're looking at a property to retrofit with external wall insulation clearly you're looking for not too many obstructions on the outside, perhaps an overhanging eaves that has plenty of scope for that to work with windows that are sub optimal and you're going to have to replace anyway so I can do that at the same time as my external wall insulation. Perhaps one with not too many single storey extensions and too many bits and pieces stuck all over the side. You're looking at something that's, if you want it to be cheap and cost effective, something that's fairly rational and something that the planning officer is not going to object to you putting an insulated render solution on the outside. Maybe it's already a white rendered building. Those are the ones you look at and sometimes think, *well that would be a real snip to retrofit.*

Ben: And I imagine that there are certain properties in a good area that might be built in the 60s and now you can look at them in a different light, thinking as you say *the outside's going to change completely but what am I really interested in, the location is just right.*

Mark: Yeah, I mean, absolutely. A lot of work that I do at Sustainable BY Design is looking at post war housing stock because generally the sizes of the properties are quite good, the locations of the properties are quite good, usually it's the communal environments or the general external environment that's poor and the heating standards of those properties. They're typically solid concrete walls or maybe they've got an inch of expanded polystyrene in them and

people can't afford to heat them to a comfortable temperature, but they're the ones where a retrofit scheme actually enhances the architectural appearance and really does transform those blocks because all of a sudden people that enjoyed their interiors from a spatial point of view can now enjoy them from a thermal comfort point of view as well and it enhances the area generally.

Ben: Thinking about another approach here that again I haven't seen too often but I'm wondering for a large property that perhaps is a period property where there might be issues of expense could you have almost a side of the house that you live in or a bolt-hole that would be Passivhaus or would just give you that comfy environment that you could just use for those short months in the winter and then just live in your house as you have been when it gets to the summer?

Mark: Yeah, I guess that would work in theory. I don't know about a full Passivhaus because obviously you've got airtightness issues. As we get smaller it's much harder to make smaller buildings to full Passivhaus.

Ben: Oh right, why? Can you explain that?

Mark: Well, because the form factor of those particular . . . As buildings get smaller there's a lot more surface area than floor area so it's much harder. I always describe it like this. I always talk about people understand babies get cold because they've got small body mass for a big surface area and as we get bigger, like ourselves, the reverse is true. So I don't lose as much heat as a baby does.

Ben: A pasty or two! [An 'in' joke.]

Mark: Yeah, a pasty a day!

So Passivhaus is similar really. It's like the smaller a property is the harder it is to achieve a higher energy efficiency standard. Having said that, if you pick the back of a property, north-facing, you superinsulate that, you improve the glazing there, then there's no doubt it's going to be more comfortable than it was previously.

Doing it phase by phase, yes you will start to see some benefits but you won't see the full benefits until the whole package of measures comes together at the completion of the retrofit.

Ben: Looking at phased retrofits as we get towards the end of the interview now, are they really practical? Would it just be better to wait until we can afford to do it in one hit?

Mark: Look, I think there's no doubt that retrofitting at scale is a lot more cost effective. In an ideal world you would get all of your neighbours in the street, start a kind of mini transition organisation for your street, all get together, all agree what your retrofit schemes would be, have a single planning application for the whole street, get one contractor in, do the whole street, do it all together, share the process, share the costs. That's an ideal world. Practically it's not really going to happen and practically not everyone can afford to do a whole house retrofit in one go. Unfortunately schemes like Green Deal don't seem to have cracked that particular nut.

So I think phased retrofit is inevitable and it's okay as long as you take the time and care to do the right things at the right time, find the right trigger points and don't make mistakes in terms of doing things that mean you can't then continue your retrofit later. Don't make the building super airtight without thinking about ventilation.

Ben: There's no danger that if you did one phase – I'm going to use a really bad expression here – that it might 'go off' by the time you get to the next stage? [Ben laughs.]

Mark: No, I don't think so. I mean I guess it depends how long between stages. The sort of things that we're advocating, insulation and triple-glazed windows, they're going to last 60 years or longer if looked after. So they're not going to 'go off' in the timescale.

A boiler, if you replaced the boiler at the beginning as your first measure maybe in 15 years that's reached the end of its design life, especially if you haven't retrofitted some of the rest of the property and you've been thrashing it to the max for all those times. Yeah, then you may have to look at those replacement bits. It's usually the moving bits that are the ones that you're going to have to deal with. But that's the beauty of energy efficient retrofit is that we're talking about things that should last the life of the building, you know, insulation standards, new windows, those sorts of measures.

Ben: Do you see any one factor or couple of factors preventing most people from going out there and retrofitting? Or do they really not even know about it? They might downsize before they retrofit.

Mark: Knowledge. It's a bit of a minefield. I've been working in it for several years and I don't pretend to have all the answers to every scenario so we're still learning. If you take something like suspended timber floors there's a whole area of research there that's still ongoing and people don't even now really know exactly the optimum thing to do in every scenario. So knowledge is a bit of a problem.

There are some good resources out there now though, even outside the profession. As ordinary people you can go to your library and get a Haynes manual on doing eco homes or how to insulate your house. There's a lot more resource out there for people.

I think the whole issue of how we value our properties needs to change and until we manage to change that perception in the market place then cost is always going to be a barrier for some people.

You know, we need to do this collectively as a nation. We've got this big problem. We've got this big opportunity. Let's not forget that retrofitting our country is going to create a lot of jobs. It's going to create a lot of income for government actually through VAT, through diverting money from benefits etcetera, from diverting money from the NHS. It's a complete win win situation if only we could get our heads around that and fund it properly.

Ben: Is there anything else either around retrofitting or phased retrofitting that you think is worth adding right at the very end here?

Mark: Yeah, I think we need to have an overview of our building stock in this country. We have some great older buildings that really are the cultural heritage of our nation and we also have a lot of post war stock that's perhaps not so loved. The heritage stock we want to hold onto. We don't want to retrofit it to the extent that it damages those properties but equally we do want to be able to improve the comfort for people that are living in that stock but there's a limit to how far we can go in those properties.

Post war housing stock on the other hand, I really think we should be looking at every opportunity to go to the very best standard on that, to EnerPHit standard or Passivhaus standard to compensate for all those heritage properties but as individual organisations, building owners or social landlords or local authorities nobody is

making that bigger picture decision. We're only making individual decisions about that and it's only really a government that can have that overview and that's what I think is lacking at the moment, somebody to take that overall view of our housing stock and our non domestic stock as well and say: "This is the target we need to get to here. This is the target that we can accept here." That's what's lacking.

Ben: Mark, thank you very much.

Mark: Merasta . . . as we say in Cornwall.