

# HPH327

## **Ben Adam-Smith 00:06**

This is House Planning Help episode 327. Hello, I'm Ben Adam-Smith and this is the podcast for you if you're interested in self-build or retrofit. I'm exploring what houses we should be building in the 21st century, and trying to break down the major roadblocks that may get in our way.

## **Ben Adam-Smith 00:25**

Coming up in this session, my guest is Es Tresidder from Highland Passive. We're going to be finding out how he upskilled in DIY, and this was on his own retrofit projects.

## **Ben Adam-Smith 00:30**

Now, every so often on the podcast, I put out the feelers for potential projects that we could film all the way through for our membership community, The Hub, and that just gives us a much deeper understanding of what we're getting into here. And the last time I did this, I remember Es reaching out to me and saying, I'm just about to start this retrofit project. Probably what I didn't realise at the time, was how interesting, how many different aspects of this would be incredible to follow. I knew it was always going to be difficult because he's in Scotland, I'm in England, there was a slight glimmer of hope. My friends, Mike and Lizzy, and Mike used to be an ITV News cameraman. He's been on the podcast several times before. But unfortunately, around this time, he was working on the back end of his own self build, and just it wasn't going to happen. So that was a shame.

## **Ben Adam-Smith 01:28**

But we have had a chance since then, to follow some of the progress at least. And we made a video report of really the early stages of this project, when Es was doing all the DIY himself having never done this before, and then the plan was to hand over to a builder. So we'll find out how all of that has gone today. But if you want to watch that first video, [houseplanninghelp.com/327](http://houseplanninghelp.com/327). We'll put a link in today's show notes.

## **Ben Adam-Smith 01:56**

Just before we begin, I wanted to mention something that I haven't talked about for a while: my mechanical ventilation system. Ah, my love hate relationship with this. I'm going to give you an update, because I suddenly realised I never concluded the story. If you've been with me for a while, you might have heard the first bit where I was complaining, oh, no, not again. And then there was an issue in terms of it wasn't going to be resolved for many months, because there was a worldwide shortage of fans. Well, there was more to this story, and I will conclude it after our chat with Es.

## **Ben Adam-Smith 02:30**

So Es Tresidder, Highland Passive, is a Passivhaus consultant and we're going to find out more about his own learning journey up until this project, and then all the DIY skills that he's picked up during his

own retrofit. And you might know the expression, location, location, location. Well, that's how we start today, because Es is blessed with a wonderful location.

**Es Tresidder 02:54**

Yeah, so we're just near Fort William and the front of the house face is Ben Nevis so we've got a fantastic view of Ben Nevis. And that's why we're here basically, is because we wanted to live in the mountains so that it was easy access for climbing and running and skiing.

**Es Tresidder 03:07**

And so we moved here in 2016, we wanted to buy a house as we moved because it's really hard to rent family sized houses around here. And we ended up actually buying a house that we thought oh well, that won't be a retrofit project, but maybe we'll move and do a retrofit or, or do a new build in due course. But the location is really fantastic. It's right next to a train station, is five minutes walk to a train station, so I can get the train to Glasgow for work, which I do, maybe once or twice a month. It's cycling distance from town, a safe cycle route as well, it's safe enough that I allow my 11 year old to do on his own now. And it's walking distance to primary school and walking distance to high school as well. So finding anywhere with that combination of things is really difficult. Certainly for a new build plot. Most of the new build plots are in places where if you move there, then you're going to spend a significant part of every day driving your children to places.

**Es Tresidder 04:05**

So we kind of thought, well, we want to stay here and the house was getting too small, and so we looked at different options. And that's how we came by retrofitting it and completely changing the upstairs to give us more room and better room.

**Ben Adam-Smith 04:21**

I think it's worth underlining how useful it is to have all those things, those amenities on your doorstep, and it will lead to a greener lifestyle. As you say you're taking the train to work, the kids are able to cycle around so that is always what I guess we would like if we possibly could. So can you describe the house and why you didn't pick it as a possible retrofit to begin with?

**Es Tresidder 04:48**

Cosmetically it was in quite good condition. It had double glazed windows that had been recently replaced. You know it wasn't in a state that was such that it would mean it was cheap to buy and ideally, if you're buying a house to do a deep retrofit on it needs to be, it should be a house that needs a lot of work, even to somebody who isn't interested in energy performance, because then you'll get it relatively cheaply and that will help offset the cost of doing a deep retrofit on it. And it wasn't in that situation. Although once you started taking it apart, you realised that it was, it was in need of some tender loving care. Yeah, certainly this type of house in this cold, damp environment that we're in here.

**Es Tresidder 05:29**

So it's a timber frame house, which is very common for houses in this part of the world. But the structure of the house is 100mm deep timber frame wall. Outside of that is a rendered blockwork wall. So that's what keeps the weather off is a rendered blockwork wall. And then there's a ventilated cavity

between the blockwork and the timber frame. And it's what's called a one and a half storey house, which is again, really common around here. The ground floor is obviously full size, but then the roof slopes down so that the eaves are at the height of the ceiling and the ground floor effectively. And that means that you lose a lot of space upstairs. I didn't measure it, but I think it's like a metre and a half at each side.

And so the house was too small. And we knew that when we moved in. When we moved in, we had two kids, but we knew that we were going to try for a third. And we knew it would be a bit small for three kids; it only had three bedrooms. So we knew that two of them would be sharing. That's fine when they're young, but becomes more awkward the older they get. And you know, the rooms weren't big either.

**Es Tresidder 06:33**

So we wanted more room. And also, the other thing about the upstairs was that you have this fantastic view to the south. But the bedrooms upstairs didn't have that view at all. The two main bedrooms had a view to the east and west. And one side of it was a not very nice tree that was four metres away. And on the other side, it was the neighbour's gable wall, which was also four metres away. And when you've got this kind of amazing view to the south, even if you weren't interested in solar gain and all that sort of thing, you're in a bedroom that doesn't have a view at all. It's crazy.

**Es Tresidder 07:07**

So yeah, the really radical thing we did was to take the roof off and rebuild the first floor as a one and three quarter storey house, which means that at the front and back of the house, internally, the rooms are two metres high, and there's a small section of sloping ceiling up to the main 2.4 metre high ceiling. So you've still got a bit of reduced head height at the eaves. But you know, for a normal height person that's not problematic. I can walk right to the edge of the room and I'm nearly six foot tall. Crucially, you gain one and a half meters of space that you didn't have at all before. And also, the last metre or so of the space in the house that we had before was not nice space. I had to bend down to get around the bed to get into bed. It's that sort of space. So yeah, that was a really radical thing to do, and I'm still not sure if it's the right thing to do. It was really expensive. And we knew it'd be really expensive.

**Ben Adam-Smith 08:02**

Well I was going to ask you, were there other options, and how do you feel your choice was?

**Es Tresidder 08:10**

So the other options were to extend, rather than to redo the roof. But if you'd extended, the house wouldn't have worked as well, because you would have had a bedroom off the side that would have been accessed through the living room. It might have been tricky to build as well I think, because of the way the site is. It wouldn't have been as good a house as it is now for sure. And if you'd wanted to improve the rooms upstairs, there still would have been substantial cost in doing that. Maybe that would have been putting in skylights, but a skylight versus a vertical window in terms of a view, it's not the same is it really.

**Es Tresidder 08:44**

I guess the other option would have been to knock the house down and rebuild it from scratch! I'm pretty sure that would have been more expensive, although with the ridiculous thing where if we'd done that we wouldn't have paid VAT on the materials, whereas because it was a retrofit, we did pay VAT on the materials. I don't think it would have been cheaper. Just you know, we didn't have to build any new foundations. We didn't have to build the ground floor walls, we didn't have to build the ceiling. It seems likely that what we did was the cheaper way of doing it. Or the other option would have been to sell and move somewhere else. And then we wouldn't have got such a good place for sure. So, tricky. It's done now. We're fully committed, so we're just going to enjoy it!

**Ben Adam-Smith** 09:22

Well, we'll maybe come back to that and your thoughts on what you've done at the end of it. But I actually want to do a full rewind now and go back to how you upskilled in the first place, because it never happens all in one hit. So what has your journey been?

**Es Tresidder** 09:42

Yeah, so it's quite round about, my journey. And in terms of building knowledge, you're about to hear my career progression and it's up until now all been very, very modeling based, theoretical. I work behind a computer and I tell people what will happen if they do things to their building in terms of the thermal performance or the moisture performance. And until I started this project, I had absolutely zero practical experience of actually doing it on site.

**Es Tresidder** 10:10

So, yeah, I did a degree in ecology at Edinburgh University. I was very concerned about climate change from kind of early teens I think. At the end of the degree, I didn't want to go into being an academic as an ecologist, just studying ecological problems, it's quite tough. You know, you're just studying systems that are in decline, and that's upsetting and difficult to deal with, I think from a staying happy point of view. And what I do now, I didn't set out to plan it this way, but what I do now is much more focused on solutions, and how we can improve our lives at the same time as addressing the climate emergency. For me, that's much easier to deal with in terms of mental health and staying happy. Obviously, I think the work that ecologists do is, is often hugely important, but I didn't want that for myself.

**Es Tresidder** 11:03

So I did a degree in ecology, and then I slacked about a bit, trying to be a semi pro climber, I guess. It's quite difficult to be a pro climber in the UK. I was doing like alpinisme, so big mountains and winter climbing in Scotland. I was going on expeditions, a bit sponsored, but not really making money out of it that way. And I was funding it by riding a cycle rickshaw in Edinburgh. That's completely not useful for where I've ended up in terms of my career really in direct skills, but lots of good, indirect skills in terms of not getting punched by drunk people at night! Being good at negotiating with aggressive people!

**Es Tresidder** 11:47

Then I started teaching kids about recycling in schools in a local authority for a recycling company. So I was going in and teaching them about recycling so that they could improve the recycling from the schools.

**Es Tresidder 12:01**

So that was kind of I got basically got into environmental education, which I quite enjoyed. And from that, I saw an advert for a job in a demonstration earthship in Fife, an earthship's like an earth-sheltered building made out of car tyres rammed with earth. And the idea is that it doesn't need any heating or cooling, and it generates all its own electricity, and it has rainwater harvesting, and greywater recycling and sewage water treatment, and so on. And so they'd built like a small demonstration project of this in Fife. And I was running it as a visitor centre. And that was my introduction to low energy buildings, really. And it was my office as well as a visitor centre. I worked one full winter and one summer there. It was cold. It did need heating, for sure. I remember reading about it and thinking it sounded amazing. It's basically a kind of mass and glass approach, like lots of south facing glass, lots of thermal mass, and the idea being that you harvest enough solar gain that you don't have to have any heating at all. But it didn't work sufficiently well for it not to be too cold in the office. So I kind of got to the point where I was like, well, this sounded convincing. It sounded like it would work. Why doesn't it work? And that got me really interested in building physics basically.

**Es Tresidder 13:22**

And I went to do the MSc at CAT Center for Alternative Technology. A friend had done it and recommended it. I thought that sounds like it's worth a go. And that was amazing, really, really good experience. At the end of that my master's thesis was looking at optimisation, applying artificial intelligence algorithms to optimise building design. And I contacted a company called Design Builder, who were the simulation software that I was using and said, "Are you interested in funding me to do some more research on this?" And they said, "Well, possibly, but we're actually also funding a PhD on exactly this topic". So I ended up doing a Technology Strategy Board funded project at De Montfort University, Leicester. So I did my PhD on optimisation of low energy building design. And at the end of that I didn't want again, I didn't want to stay in academia.

**Es Tresidder 14:22**

I was initially really sceptical about Passivhaus. It's quite interesting. And I got into it through Twitter, actually! I think I got into Twitter, and I started following some Passivhaus people on Twitter. And I started thinking that these people seem to be speaking sense. And I thought, well, I'll do the Passivhaus course and see how it goes. And that and I did it. I started it. Still quite sceptical, really, and was just really impressed by it. Yeah, I've done a PhD but I still I've learned more about building physics, I think in the two weeks of the Passivhaus course than I had on my masters and my PhD, which is not the way it should be, but is just a testament to how physics focused the Passivhaus course is. And I think that's really good.

**Es Tresidder 15:06**

I'm not saying that the PhD and the masters were a waste of time, I learned loads of other things. I think I got better at thinking and I got better analysing and all that sort of thing. That's good. But in terms of pure building physics, I learned more on the Passivhaus course, I think. So that was me as Passivhaus consultant, but still, like, really reluctant even to do any DIY. It used to bug me that as the man, it was me that was, it was my job to fix things like, Well, I'm just as useless at fixing things as you are. So why is it me fixing things?

**Ben Adam-Smith 15:36**

This is where we need to have a little chat before we get into this, because I find myself in this exact same position. And I suppose in some ways, I am thinking, do I need to upskill somewhere? So I know, it would be, as I'm sure we're about to find out as you continue your story, absolutely fascinating to get involved physically on a project. Or do I try and do the more theoretical side like you have, or is even that necessary, because I quite like the position where I am, where I'm still more of a client in some respects. So I can't go beyond that. So I can speak to other people who are in a similar position. But I do feel I should be moving forwards into my next project. And at the moment, I'm struggling to get there. So with all that in mind, back to your DIY, and why did you want to do this?

**Es Tresidder 16:28**

I guess is it cognitive dissonance? Is that what you'd call it? You know, like I was working in a, in a shed, basically. In the winter, I was working in a shed in a sleeping bag. If I left my mug of tea in there overnight, some days I'd come in, and it'd be frozen. And doing that, while you're designing something really comfortable and healthy for someone to live in is, is really hard to swallow. And then you go back into your house and the clothes are a bit damp in the cupboards and everything gets steamy when you run a shower.

**Ben Adam-Smith 17:00**

Well, I'm always really impressed when you have certain architecture firms, just coming to mind is Architype. And I've interviewed about three or four of their members of staff who've gone on to do what they do in their day job. So you're exactly in this position.

**Es Tresidder 17:15**

Yeah, I think partly, it's just that I can't know how good buildings could be and live in this house. It's just too distressing. And it was expensive to heat to any comfortable standard. So basically, we were just colder than we wanted to be most of the time, partly because of money and partly because of being conscious about the climate crisis. And even if you heated it, it wasn't that comfortable, you know. In order to get it hot, you had to have burning hot radiators that you were worried about your children touching, and the other side of the room would be freezing because you had a timber frame wall with 10 millimeters of insulation in it! As it turned out when I took the wall apart! So I think that kind of motivation for me was really strong.

**Es Tresidder 17:58**

And in retrospect, doing it when we did it, if it went on much longer, you know, my eldest is 11, and he's still great, but at some point, he's going to turn into a teenage monster, probably, and trying to retrofit a house and live in it! While we've been doing the house, we've been living in a small chalet at the bottom of our drive, which we normally Airbnb, and it's just way too small for us. And the kids have been great. They've been really understanding and there's no like, "Oh, come on dad, why haven't you finished it yet?" They're just interested. Whereas I think, when they're like 13/14, you can imagine they'd be like, "Oh, Dad, why are you doing Passivhaus? Why don't we live in a normal house like normal people?"

**Es Tresidder 18:38**

So I think doing it when we did it was good. And it also just feeling like this place in terms of the location is somewhere that I could see myself and my family, or certainly my wife, I guess the kids might leave. I'd like to live here for the rest of my life. And so, you know, I may as well do it now and make the most of it - make the most of that time, if I'm going to do it at some point.

**Es Tresidder 19:02**

And then in terms of upskilling, yeah, I basically had very little DIY skills. I could use a screwdriver, I could wire a plug, I could change a light bulb, I could unblock a sink, that's about the limit of my DIY skills before we started this! But my dad was a joiner, a carpenter. So I'd seen him doing some stuff in the workshop. Unfortunately, I didn't really gain any of those skills from him, but I did have a useful person to ask things in him. And I guess I've got quite a logical brain in terms of working out the consequences of doing something. And obviously I had all the theoretical knowledge in terms of insulation and moisture control and all that sort of thing.

**Es Tresidder 19:50**

But I think yeah, identifying people who know more than you do, and asking them stuff and listening to what they say is useful. So my dad was one person and then a couple of neighbours, one of whom is doing DIY in his house all the time and knows loads of stuff about how to do stuff. And YouTube is the other thing. I watched lots of YouTube videos about how to do stuff.

**Es Tresidder 20:12**

But also worth saying that the really complicated things on our house, I wasn't doing - the builders were doing that. I was tearing stuff down, pulling floorboards up, I was doing all the insulation, all the airtightness. And I'm now doing the MVHR installation as well. So I wasn't taking the roof off and building a new wall and doing all that stuff that the builders were really skilled at. Maybe I could have done if I'd spent five years doing it. But yeah, certainly couldn't have done as good a job as quickly as they did.

**Ben Adam-Smith 20:42**

But I know that if I started doing that taking apart the house, I'd be thinking, Oh, my goodness, the builders gonna get here and going to say, "What have you done?" So did it not feel foreign at all what you were doing? Or were you just really pacing yourself?

**Es Tresidder 20:59**

Yeah, I'm sure they thought that about some of the things I did. And yeah, so a couple of other things. So early on, I learned the value of having the right tools. You won't have any tools when you start. All I owned before this was like a screwdriver, I think. So I quickly bought like a good quality drill, like handheld drill that's been really useful.

**Es Tresidder 21:21**

And one of the first jobs I did was there was this fake stone wall in the gable wall of the living room. It's a timber frame house, but inside it looked like this wall was a stone wall. And it wasn't - it was bits of concrete. And they were stuck to a mesh, a wire mesh that was fixed to plywood, which was fixed to the timber frame wall. So getting that off was really difficult. And I started doing it with a chisel and a lump

hammer. The first day I got maybe half a square meter off, and my arms felt like they were going to drop off. It's just such hard work, like, yeah, a crowbar, a chisel, and a lump hammer.

**Es Tresidder 22:01**

And I did maybe a week or two of that, and I just was like this is gonna take forever. And so I started asking people what I should use. And the next thing I got, someone lent me this thing that was like a classic middle aisle of Lidl purchase! It looked like a road drill, and it was really heavy, but really powerful. If you're doing something downwards, it would have been fine. But I had to like lift it up and hold it horizontally. And it was so heavy, that I could only hold it for like a minute and a half or something. So I'd do like a minute or half of destruction. And then, I'd have to rest and then do another minute and a half destruction.

**Es Tresidder 22:38**

And what I needed was an SKS drill, and I ended up borrowing one of those. And I still had half the wall to do and it took me an afternoon. And I was just like, I should have had this from the beginning. I've wasted two weeks! And from that point, I was just like, well, if it's clear that there's a tool I need, I'll just buy it. And if I don't need it at the end of the project, I'll sell it on eBay. And I was borrowing lots of tools as well. If I can't borrow it, I'll buy it. And if I don't need it at the end of the project, I'll sell it. And I haven't had to buy that much stuff. I've got friends who've got lots of tools and have been generous to lend me them. But that was a good thing.

**Es Tresidder 23:15**

And then the other thing is, if you know that you've got to do lots of one thing, the first time you do it, do it somewhere where it's not critical that you get it right, because you might end up doing it two or three times to work out exactly how to do it first of all, and that's fine. And there was quite a lot of that going on.

**Es Tresidder 23:32**

But yeah, there's certainly a lot of teeth sucking on the part of the builders and plumbers when they saw what I'd done. But some of that was just, was not because I'd done it all wrong. It was because I was doing it the Passivhaus way. They were like, well, this is how we would have done it. And like I had a friend, a builder who's a friend, early on in the project just said, "Why don't you just put foam backed plaster board on all the walls?" But once I started taking the walls apart, it was just so disgusting, the mold and damp in the walls that if you did rigid insulation internally of your existing wall, which is probably already moldy, and you're just sticking more insulation on and you're not really doing anything about airtightness, then you're just going to make that problem worse, because you've just made what was already damp, you've just made it damper because you've made it colder. And so it's just a really risky thing to do. And lots of times during the process I've been thinking what I'm doing here is really, really radical. But to do it less radical would just be rubbish in terms of the performance that you'd end up with. And that's maybe a bit particular to timber frame houses.

**Ben Adam-Smith 24:48**

Just going back to the mold for a second, and the damp. Was this all hidden from view or did you have a sense of what was going on?

**Es Tresidder 24:59**

Yeah, so it was all hidden from view. It was all behind the plasterboard. Apart from there was one room that felt a bit damp - a downstairs toilet that felt a bit damp. But we didn't have any surface mold, except in cupboards. We had some surface mold in the back of cupboards like behind where you had clothes. You've got a situation there where the clothes are effectively insulating the wall from the room. So the wall is colder than it is elsewhere in the room.

**Ben Adam-Smith 25:24**

I've seen this before. Yeah, when we had a rental property I couldn't figure it out, it's exactly this, that you've got this cupboard that was just as we moved there, I think they'd done a paint job or something. But oh, so it's insulating.

**Es Tresidder 25:37**

Yeah, so there's several things happening. So the clothes act as a bit of an insulation. And you sometimes see it behind sofas, if you've got a sofa against an external wall, you'll see mold behind the sofa for the same reason. But also, it's reducing the air circulation in that area. So because the wall's cold, you get higher humidity next to the wall, and elsewhere in the property that might be dealt with by the air circulating. But there's less circulation there. So the high humidity stays and you get mold growing there.

**Es Tresidder 26:07**

So yeah, the only place we had visible mold, I think was in the cupboards. So it didn't seem that bad. But as soon as you took the plaster board off, it was just really lots of black and white mold, and especially in places where there was an obvious path for air leakage. So there was no service cavity.

**Es Tresidder 26:30**

The electrical sockets were just in the plasterboard poking into the 100 mil stud wall. So wherever there was an electrical socket, there was air able to get in around that electrical socket. So any section of wall that had an electrical socket in it had much worse mold than other parts because the air was able to get in there. So you've got your air, let's say your room's at 20 degrees and 60% relative humidity, which is maybe even 60 or 70 in a poorly ventilated house. And then that air leaks through the structure. And as it cools, because it's going away from the warmth of the room of the house, if we're talking about a winter situation, as it cools, the relative humidity of the air goes up because cold air can hold less moisture than warm air. You don't have to get condensation, you just have to go above about 80% relative humidity, and then you'll get mold growth.

**Es Tresidder 27:21**

So yeah, there was a lot of mold, nothing structurally dangerous, mostly. It hadn't rotted the timbers. But that mold is not good for you. And on first thought you think well, that's okay, because it's behind the plaster board, I'm not breathing it in. But if the air is getting in there from the room, then you just need the wind to blow the other way and it's going to come through from outside and past the mold and into your room. So that's where your fresh air is coming from.

**Es Tresidder 27:51**

And I've got a selection of photos that I'm planning to put together for when people say "Oh, well, I don't like the idea of mechanical ventilation." Well, this is what most people have is like leaky houses. And if you think it's reasonable to breathe air that's been on a path through all of this nastiness, then, you know, you maybe need to think twice. So yeah, lots of mold.

**Es Tresidder 28:13**

I think in terms of the skills, I don't know, I guess I have a tendency to bite off more than I can chew and then work out how to get myself out of that situation!

**Ben Adam-Smith 28:23**

That's fairly common, though, isn't it? I think that if you're going to be doing any DIY, you will find yourself in deep water at some stage.

**Es Tresidder 28:32**

Talking about deep water, I had a good deep water incident as well. It was a good learning point. I was taking all the radiators out and draining them as I went. And I had like a tool for cutting the copper pipe for the radiator. And you'd do that and you'd have like a bucket to catch the water and it would come out fast at first and you'd get a bucket full and then you'd put an end cap on it. And then you go and empty the bucket. And then you do it again. And maybe you'd have to do it three times. But each time it came out slower and under less pressure. And that was all going fine. And then I cut one pipe and it just came out really fast, and I thought that's normal. That's normal for the first bucket. And I had to like fight the end cap on. I filled the bucket got the end cap on, went and emptied it, and then I took the end cap off and like it was gushing out. When's this ever gonna stop running, and I had to force the end cap on again, and I got sprayed again. And then on the third time, I was like, this isn't a radiator pipe, this is a mains water pipe! And I've not turned the mains water off! So I'd like completely soaked myself!

**Ben Adam-Smith 29:35**

You took on a lot. I know you say you're going to hand over to the builder. But yeah, what is that range of work that you've done that if I said to you, what are your skills in DIY today, what would you say to me?

**Es Tresidder 29:46**

I'd maybe just talk you through what I did in the order that I did it in. So I started off by taking all of that fake stone wall down. And then I started taking the plaster board off the walls. And again, each of these tasks like when I started it, were just ridiculously slow, and I had to work out how to do it quicker. And sometimes that was just through trial and error. And sometimes it was through friends showing me what they'd done when they'd done something similar.

**Es Tresidder 30:11**

So I took all the plasterboard off the walls, nice. I took some of the plasterboard off the walls, and then I decided it'd be better to do the floor first. And part of the reason for doing this, I should have said this at the beginning, part of the reason for doing this was because I was really interested and I wanted to

upskill as a professional. And I wanted to learn more about doing retrofit, so that I could help people who are going to do it.

**Es Tresidder 30:34**

And my feeling is about these sorts of timber frame houses, if you've got a keen DIYer, in combination with someone who understands building physics, you could do a lot of it yourself. I think that's true. I don't think any of the skills that I've learned are particularly advanced, but some of the things in terms of the design, in terms of moisture robustness, there are some risky things that I had to avoid through knowing stuff. And I had to sit down and think about and how to model them. And I think doing what I did without the theoretical knowledge would be really risky.

**Es Tresidder 31:11**

So in terms of a DIYer, I think it's a really big ask for them to upskill enough on the theoretical side of things. Most people will need some professional input to do that safely, to do a deep retrofit safely if they're doing it themselves.

**Es Tresidder 31:26**

So the reason I switched from doing the walls to doing the floor first was that I realised that because what I was planning to do with the walls was to insulate between the studs, which is what I did, and then to add another 40mm of insulation inside that, and then have an insulated service cavity. So altogether, I'd be adding 80mm of insulation, internally. I didn't end up insulating the service cavity just because it would have been a nightmare. But in any case, I was adding lots of insulation internally that wasn't there before.

**Es Tresidder 31:59**

And so if you think about where the floorboards were going to be sitting, they were going to be sitting on the cold side of 80mm of insulation that I'd added. But they were going to be inside the airtightness layer. The airtightness layer was going to go around the floorboards and then come back out and then up the front of the insulation. And that meant that the ends of the floorboards were in a position where, as I was taking it apart and thinking about how it's going to go back together, I realised the ends of these floorboards are going to be in a position where it's possibly very cold. And when I modelled it, if it's zero degrees outside and 20 degrees inside, the ends of the floorboards were going to be sitting in a place that was about 10 degrees. And because they're inside the vapour control layer, they're vulnerable to moisture from the house moving through. And so basically those floorboards, the ends of the floorboards would have been at risk of rotting.

**Es Tresidder 32:54**

So, I had to build a structure in the floor to hold the ends of the floorboards a bit out from the wall, if that makes sense, so that they were on the warm side of the installation rather than on the cold side of the installation. That was why I switched from one to the other. But that sort of thing. There were a few things like that that happened that I think, and those things will be different on every project. But I think your average DIYer, probably wouldn't spot so it's hard to tell. But yeah.

**Es Tresidder 33:25**

So I lifted the floor. I lifted the floorboards and I lifted them carefully because I was going to reuse them. And I cleared out the floor, there was loads of junk in the floor, old cables, really bad wiring. There was an old air heating system, blown air heating system, which I think was probably original. The house is 1975 build, and I think they were into that sort of heating then. But it wasn't functional anymore.

**Es Tresidder 33:48**

And there were two bits where there was like a cast concrete block that needed dealt with. And that was when I borrowed my friend's massive road breaker again and that was very helpful. And so basically I stripped out the ground floor walls, I stripped out the ground floor. I did that in one room first. I did that in the living room and that was because that was the one room that we could afford not to go into because it wasn't on the path to anywhere else. So we were still living in the house at that point. Once I'd done that I'd practiced and I'd got quicker at doing things. Then we moved into the cabin and I started doing it on the rest of the house. And yeah and I insulated the floor in the sitting room before we moved out of the house as well.

**Es Tresidder 34:33**

So I insulated the floors, I put the floorboards back, I insulated the walls, and then the builders moved in. And then we took the roof off, and then we had the wettest May anyone can remember. And all my insulation in the floor got absolutely soaked and I had to take it all out, bin it and put new stuff in which was extremely painful. And we lost all the floorboards that I'd lovingly taken up and, and they all got completely soaked and warped. And so that was a painful, a painful learning experience.

**Ben Adam-Smith 35:11**

Was there a way around that?

**Es Tresidder 35:13**

Yeah, the way around it would have been to wait until we replaced the roof before we lifted the floor. But there were reasons for doing it the way I did it. But they weren't as good as the reasons for not doing it, with the benefit of hindsight.

**Es Tresidder 35:26**

I don't know if maybe I couldn't have done as much of it myself if we'd done it that way around, because I can't go nearly as fast as the builders, partly because they've got more skills than me, but also because there's between four and eight of them, and they're working full time, and I'm trying to do it in the evenings.

**Ben Adam-Smith 35:43**

Do you think it would have helped to have had someone with a good level of DIY working with you? Or in some respects would you have lost that learning of facing those issues and trying to solve them yourself?

**Es Tresidder 35:59**

No, I think it would have been really helpful. And I did consider employing someone. A friend had built a cabin with a boat builder, and she'd got lots of skills doing that, that she seemed to have the right mix of

practical skills of building stuff and attention to detail. So I was quite keen to employ her to help me do it. And that didn't work out. And I think the main reason for that was that when I started the project, I was working for myself - I was running my own consultancy - and my plan was that I would drop to three days a week, and I would work two days a week on the house. And then in the middle of the pandemic, I got offered a job by the company who up until then had been one of my main clients. And I took that, and originally that was three days a week. And then it just got really busy. And I just, I couldn't do the amount of work I wanted to do in three days, so I went to five days a week. So I couldn't really employ someone to work, you know, come and help me and I'll be starting at four, and I'll be finishing at eight in the evening.

**Es Tresidder 37:06**

It sounds like I did it all on my own, but I actually had a few friends who came and helped me quite a lot. One helped me a hell of a lot actually, and has since done his Passivhaus designers course so, and he had much more building experience than I did. So having him to point me in the direction of how to do something better than I had been struggling to do was useful, or to discuss ways of doing something was really useful. So I did have some help. But it wasn't like a full time professional person working at the same time as me all of the time. It was someone helping me maybe 30% of the time or 20% of the time. But it was very helpful.

**Ben Adam-Smith 37:43**

Did it feel strange handing over to the builder after you'd done all that work?

**Es Tresidder 37:48**

Yeah, I found it really traumatic actually. I'd been working away steadily and steadily and steadily, and they turned up and the first thing they did was took the porch down. And you know, they did that in like, half a day or something. This is what I paid them to do. And then you know, it took them a long time before the roof was actually built and watertight. So there was a long time where you're like, I've been paying them for two months, and all I've got is half the house I had before! That was really, really frightening!

**Ben Adam-Smith 38:21**

Well don't stop paying them, you want the roof back up again! And how did you do that? What is it made of? Is it timber frame, I-beams and so forth on the top there?

**Es Tresidder 38:30**

Yeah, so it's an I-joint wall, and an I-joint roof upstairs. And there was a bit of complication structurally in terms of making a platform that was solid enough to build a 300mm deep I-joint wall on top of a 100mm timber frame, solid stud timber frame wall. So we had quite a lot of input from the structural engineer on that.

**Es Tresidder 38:55**

But having the builders in, I couldn't keep up with them. I was like I'm doing the airtightness, I'm doing the insulation, a) because I want them to be done really well, and b) because I want the experience of doing them and knowing what's hard so that when I'm working as a consultant, I know what makes a

good airtightness detail. And I know what makes a difficult airtightness detail, and I know how to solve problems about airtightness or insulation. And it's been brilliant at that, but I wasn't able to go fast enough. So things happened in the wrong order quite a few times. So the first is that we haven't done an interim air test because you need to do an interim air test when the airtightness line is still visible. Otherwise, you'll see a leak but it's behind some plaster board. You don't know whether it's leaking there or if it's just leaking there and then going along for a couple of metres and then out somewhere else. So once the plaster board's up, it's pretty pointless doing an interim air test really. But I hadn't finished the insulation in some parts of the house when the builders were already wanting to put plaster board up on the rest of the house. And I couldn't tell them to wait because they want to get going and I want them to finish the house.

**Ben Adam-Smith 40:03**

This is so common though this particular point, I don't know what the solution is. But say, for example, you wanted them to stop, could they move on to the next project and come back, I mean, it stops their flow, doesn't it?

**Es Tresidder 40:18**

They probably could have done and there was a bit of that that happened as it was. But I don't want them to take longer than they have to. I don't like living in a house that's in a cabin that's too small for me, I want to be in as soon as possible. So the airtightness, for example, I know I've done as good a job as I could have done. And maybe we would have found some leaks that we could have fixed. But I'm pretty confident that it will do well anyway, because I've done it really well.

**Es Tresidder 40:44**

But the alternative to that, I think would have been for me to say at the beginning, right, I'm going to help you upskill in airtightness. I'm going to teach you how to do airtightness. And I'm going to supervise your airtightness work really closely. But you're going to do the airtightness. And you're going to do the insulation. Same thing for insulation, I'm going to teach you how to do insulation properly. And you're going to do the insulation. And if I'd done that, they could have scheduled it so that they finished all of the airtightness at the same time. And two days later, you get an interim air test.

**Es Tresidder 41:18**

The difficulty with that, is that because this was a retrofit project, some of the airtightness was just unbelievably fiddly. And even a motivated contractor is not as motivated as the homeowner. I spent so long doing it that I find it hard to imagine that they would do it to anything like that level. But I might be wrong.

**Es Tresidder 41:45**

And the other thing about, so some of that was the necessity of getting an air tightness line through floor joists is really fiddly, you have to tape each floor joist to the membrane or to the board. So we had that going from the ground floor to the first floor. But then because we had a warm roof, and because I didn't want a cathedral like open roof, I wanted to have some storage space in the loft. And because the roof angle, the pitch on the roof got much more shallow, because the planners didn't want us to raise the ridge height very much, that angle as it gets more shallow, the forces pulling apart the roof

become stronger. So that the engineering of those ties across the roof, the horizontal ties that form the floor of the loft, yeah, they're massive, they're really chunky. And then the connection to them was really, the structural engineer was really specific about how they had to connect and what sort of glue was to be used and what bolts to be used and all that sort of thing. So that connection is really fiddly. And I couldn't just tape it because there was this bracket in the way, so I had to tape membrane around the bracket and then tape around that. If the contractor had agreed to do the airtightness for a fixed fee, it would be a contractor that was losing money that was doing it well. Yeah, it took me hours and hours and hours.

**Es Tresidder 43:06**

So that's going into the loft, but going from the ground floor to the first floor, I had to tape round the joists on each long side, the front and back of the house, each long side of the house. But also because of the way that we'd built what they were going to build the the upstairs walls on, we had these outriggers on the gables as well. So I also had to tape around those as well. It was as if we had joists on four sides of the building. So there was just lots of really fiddly airtightness. So yeah, there was that.

**Es Tresidder 43:38**

And then I think also, something I found awkward that I think as a professional on site, or on a project where you're recognised as the professional and someone's paying you to give your expertise, that's one thing. But being the client, who also happens to have professional knowledge is really awkward, because are you the client, or are you advising professionally? And I found it really awkward to step in and say what you're doing here is wrong. It needs to be done like this, this and this. So it was kind of easy just to do those things myself. But it feels a bit like a missed opportunity. Because the contractors who were doing it, yeah, they want to do Passivhaus stuff in the future. Well, Scotland's just announced that they're going to be doing Passivhaus for all new builds within two years. So they're gonna have to anyway, but they you know, they're keen to upskill. And they haven't upskilled in terms of airtightness on this project, because I did it all. And yeah, that's a long winded way of saying that, it was difficult to. There were some scheduling issues that if they'd been doing everything then maybe it would have been easier.

**Es Tresidder 44:50**

The other way it might have been easier is if I'd been project managing everything. And you know if I'd been saying right, well, I'm going to pay the guy to do the plasterboard and I'm not going to do that until I've done finished the airtightness. And I'm going to pay the person to do the plumbing, and I'm not going to do that until I've finished whatever else it is I need to do. But I'm not doing that, you know, the contractor is project managing everything. So, maybe if you're doing that it would be easier, but it would certainly be longer. So yeah, it's not an easy problem to solve. I think.

**Ben Adam-Smith 45:20**

Now you haven't quite got to the end. But have the contractors finished and handed back to you? Or are they taking it right over the finish line?

**Es Tresidder 45:30**

No, they're taking it right over the finish line. I've had enough! I've had enough of not having my own free time. But also work is really busy and really stressful at the moment and just managing both is, it's just really, really tough. So no, they fitted the kitchen, I'm talking in the kitchen as we speak, and that's done. I guess it needs to be wired and maybe plumbed, but, but it's in basically. They're gonna fit the bathrooms. They're gonna paint next week. And while they're doing this, I'm doing the MVHR and then they're gonna do the flooring. And then I guess we're about done. Yeah, so it's close. But now all the things that people traditionally do like painting, no I've had enough, I don't want to do them!

**Ben Adam-Smith 46:13**

How do you feel about your DIY skills then now?,

**Es Tresidder 46:16**

For the things I've learned, I'm pretty good at them. I'm good at airtightness, I'm really good at airtightness actually. I really enjoyed doing the airtightness myself, but there were a few days where I think it was when they were doing the roof, and they were like "We need to finish this. We can't finish it until you've done some insulation and airtightness here." It was because most of upstairs was blown in loose fill wood fibre insulation. So that was done by a professional outfit that came in with their machine and blew it into the walls and the roof. But there was a bit at the eaves where we couldn't blow it into there. So I had to fill that by hand. And they had to do that before they put the board over on the roof.

**Es Tresidder 46:56**

And so I was up there with them. I was doing the insulation. It was a nice atmosphere on site. It was a bit of banter, radio playing, it was sunny. And I just thought, it would be nice to have a bit of this in my life. Like I don't want to do this all the time. But it'd be nice to maybe do like two or three days of work - theoretical sat behind a computer doing calculations doing stuff that is, you know, but architects I'm doing stuff that in terms of low energy buildings, and it's pretty cutting edge. We're doing swimming pools and retrofitting schools, old sandstone, Victorian schools to EnerPHit standard, and, yeah, leisure centres. We don't have an ice skating rink yet, but we nearly had one. Yeah, that sort of thing that is really at the cutting edge of what's known about low energy buildings.

**Es Tresidder 47:49**

So that's really exciting. I like doing that theoretical stuff. But five days of it, of sitting behind a computer is quite full on. And I think it would be nice to have a bit of actually doing stuff and teaching other people how to do stuff in terms of insulation and airtightness. So maybe that's something I can do a bit of in the future.

**Ben Adam-Smith 48:08**

Well, finally, maybe you could just reflect on the DIY side of things. If someone else is coming in to tackle this, they're in the same position as you, about to start on a building. Do you have anything that we haven't mentioned, that might be useful advice for them?

**Es Tresidder 48:28**

Yeah, don't panic, I think! And I really noticed this when I was doing airtightness. When you're doing airtightness tape, you've got this really expensive tape that's incredibly sticky. And you're doing it in

fiddly places. And as soon as you start trying to rush it, it all goes wrong. It feels a bit like the same mentality you have to have for dangerous climbing I suppose, where as soon as you get into a point where you're in a position where if you fall, it will be very serious, but the climbing is still difficult, you have to go into a mindset of doing everything very calmly and methodically. If you don't, if you start to panic, that will make things much worse. And it's kind of similar when you're doing fiddly airtightness I think. As soon as you start to panic, you end up sticking things where they shouldn't. Either getting wrapped up in tape yourself, or sticking bits to the wrong bit or something like that. And yeah, I think that's important, especially with taping but with DIY generally, I think.

**Es Tresidder 49:31**

Like, it's quite dangerous, DIY. People are always having DIY accidents. And I used a friend's circular saw. And whenever I used the circular saw I had this kind of mantra that I would start: This thing is capable of maiming me - I am going to be extremely careful while I'm using it. And every time I used it, I said that sort of thing to myself. Even clever, experienced DIY people have cut fingers or arms off with a tool like this, I need to be extremely careful. So I think that's worth doing.

**Es Tresidder 50:04**

Yeah, ask for help, I think ask lots of people for help, talk to people about what's working, what's not working. And don't be afraid to look on YouTube a lot.

**Es Tresidder 50:16**

Yeah, I think in terms of someone with DIY skills, it's probably worth doing something like the Passivhaus contractor course. Maybe doing the full Passivhaus designer course is overkill, unless you're wanting to work in that field. It's expensive, and it's two weeks, but the Passivhaus contractor course is two days or three days, I think, and gives you a pretty good grounding in the theory, and also a good grounding in some of the skills.

**Ben Adam-Smith 50:46**

Well, Es, thank you so much for coming on to the podcast today. There is tons of useful information in this episode. So thank you very much.

**Es Tresidder 50:55**

Absolute pleasure, thank you

**Ben Adam-Smith 50:57**

Get more in our show notes, which you can find today at [houseplanninghelp.com/327](http://houseplanninghelp.com/327). We've got a summary for you as ever, we've got photos, so you can look at the house through its various stages of the retrofit. If you've got a comment or a question, you can leave that either at the bottom of the show notes, or we'll give you social media links: Es on Twitter, Highland Passive website, and also we mentioned John Gilbert Architects so let's put that in the show notes as well - [houseplanninghelp.com/327](http://houseplanninghelp.com/327).

**Ben Adam-Smith 51:28**

Earlier on, I mentioned I would give you an MVHR update. This is asking you just to switch off now isn't it. But around about, it's almost coming up to a year ago, my mechanical ventilation system stopped working and you get the red light and you think oh no, what's happening now. So you go through all the process of I need someone out to fix it and normally has an error message which will tell them what has gone wrong.

**Ben Adam-Smith 51:53**

And this one, there was a clue actually, it got very noisy for a while and then very quiet. That was there when the red light was on, because the fan had broken. And I'm told that it's normally the exhaust fan, because that has a lot of hard work to do. It's bringing all the moisture down. So that was the situation that I was in. And the company that came to fix it, we were very upfront saying there is a worldwide shortage of fans, it could be up to nine months. Of course, that didn't stop me every couple of months, "You haven't just happened to have it sitting on your desk at the moment," because it's you just want everything to be working normally. So I did know it would take a long time. And it did only take seven months in the end. But that's quite a lot of waiting.

**Ben Adam-Smith 52:39**

I suppose the one good side of this is that as a user of the house, because we still had one fan going and we've got a very airtight house, I do feel that it was working much as it would normally, just probably not as efficiently, and it just shows you some ventilation in the house, it was still pushing air through, the smells were disappearing, the moisture was going so from a user's perspective, other than the annoying red flashing light, we could cope with this, which was good.

**Ben Adam-Smith 53:10**

So having it replaced, pretty uneventful when, after seven months, the man came to fix it and do a few other things, clean it all out as part of the service. Happy days.

**Ben Adam-Smith 53:22**

Now, it was probably around about this point that I was going to tell you, it's all fixed. And then, just as I was getting to the point of recording, the red light came back on again. And I put my head in my hands in despair thinking No, what have I done to the God of MVHR, it just really hates me. So we went back to all the usual channels, thinking oh, no, how many more months is this going to be. But this is I suppose the good part of the story.

**Ben Adam-Smith 53:50**

So what had happened was, the sensors had now broken. No idea why it should happen just after everything was fixed, but there you go. And we were able to get hold of some new sensors, they must have been in stock straightaway. So that was within a couple of days. And then it was my turn to become the repair man. I've done it a couple of times before and that is one good thing. My friend, Alan Clark, who designed the system here says Ben you're probably starting to realise it's a very simple system. And it is, but when you start taking it apart, you still get slightly worried Alan! But it was okay because they supplied me with a YouTube video of what I needed to do. And as we've heard in today's podcast, YouTube videos, they're really good aren't they! Just showing you specific tasks that maybe not many people will go through but when that happens, it's a lifesaver.

**Ben Adam-Smith 54:41**

So back up and running, four days, happy days. And then maybe the reason I haven't told you, given the update straight on after that, I've just been is it going to give me a red light again. So I've just let it rest and I come around the corner every so often, still green, still green, I'm okay. So for now, fingers crossed back to normal. I will keep you up to date. No doubt there'll be another chapter of this story.

**Ben Adam-Smith 55:03**

Let's finish on a hub update. This is the membership community that we run alongside at House Planning Help. And we've just added another chapter of the Kinver story, probably only a few more of these to go before we finish up. So this one looks at the last bit of external work that's finally complete. Second fix is well underway. So it's really about getting the house back. I know at this point of the project Guy was really keen to move back in. So that's our current episode. We've also got our live trainings, we've just added a new training session with Tabitha Binding about her retrofit. We've got our members only forum where you can network with like minded individuals, people doing similar projects to you. The courses where we try and lay it out. Or if you fancy a chat with me during our weekly office hour then I am on hand. So all of that: [houseplanninghelp.com/join](https://houseplanninghelp.com/join) to find out more.

**Ben Adam-Smith 56:00**

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