

Episode 317

Getting ambitious with sustainability – with Kit Knowles from Ecospheric

The show notes: www.houseplanninghelp.com/317

Ben: This is House Planning Help episode 317. Hi there, 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. Coming up in this session my guest is Kit Knowles from Ecospheric, and we're going to be looking at pushing the boundaries when it comes to sustainability.

I've finally caught up on a bit of TV. I don't tend to watch a massive amount, but I do like some of the housing shows, particularly Grand Designs, and they've got various different brands of it going around now. One of them pushing custom build here in the UK. The first series of "The Street" was all about Graven Hill, and they're broadening it a bit and they've retitled it "The Streets" for the second time round. But it did start again, at Graven Hill. They're always similar stories aren't they on Grand Designs, and someone perhaps bites off more than they can chew. However, in the middle of this first episode, I almost fell off my chair, when I heard this:

Kevin McCloud:

"I did wonder whether this place would be like an architectural zoo, but a zoo is collected and organised. This is like a new life form that is growing uncontrollably. It's a town without planning. That worked in the 16th and 18th centuries, because people had limited means and materials from which to build. Now, you can build anything, which is what people are doing! I'm not sure I like it! Holy bi-fold doors. All my life I've campaigned for diversity in buildings and in architecture, and now that it's here. Don't want it."

Ben: And what I want to know is did we catch Kevin on a bad day? And perhaps he was looking at it all halfway through when it's not complete? Because he must have been to other schemes, maybe not at Graven Hill, but in the Netherlands, they've got some fantastic self build projects. And yes, it is a bit all over the place, but that's the point. Or is this really has he changed his mind on this? I

would have liked a longer sequence than 40 seconds in that programme, and then they never mentioned it again.

Let's get to our featured interview for today with Kit Knowles from Ecospheric. This actually came about well, first of all, one of our hub members, John, I think was hugely inspired by the work that Ecospheric carry out, he's doing his own retrofit project, we'll be talking about the Zetland Road Passivhaus as part of this interview today. But I was attending an Alliance for Sustainable Building Products event where Kit was up for an award, and I think they might have come off with the People's Award for the Zetland Road project. And exactly the same thing, I was just thinking, my goodness, he is ambitious. And this is exactly what we need. So this is an inspirational podcast today. I started by asking Kit to tell me a little bit about himself and how he got going.

Kit: My background is in chemical engineering, I was working for BP and AstraZeneca in the main at a level which was quite globally impactful in terms of the research that was being done. And it felt very wrong on a lot of different levels, especially schmoozing with board members and the like. It just was not where I wanted to be. And this was when I was kind of pre and during and post student at University of Manchester. And really came out the other end of quite an intense period of learning and decided that this was not where I wanted to put my attentions for the long term, which was very annoying given how much effort had gone into training up to be a chemical engineer. But at that point, my mother and my father, my cousin and my sister are all architects. So I was kind of the black sheep anyway.

And I decided that I would take the time to renovate my newly acquired property at the point while I was working out where I was going to go, who I was going to work for, et cetera, et cetera.

The property in question was a 1909 arts and crafts dwelling. And what I did at that point was decided I was going to just go hell for leather on decarb, and this was now coming up 14 years ago. With that in mind, we achieved quite amazing things there. We got an 81% decarbonisation, trialled quite a few world firsts, three world firsts I think at that time. So I was for instance with that project, the first use of Spacetherm on an EWI basis. So we used Spacetherm to make a building that was a semi-d work at very, very high levels of thermal performance without sticking out a mile against the neighbour.

Ben: Kit, Kit, Kit. I've got to slow you down here. This is the first thing you've ever done. You see, this is why I wanted you on the podcast because you're such an interesting character. Normally people that okay, they go for their decarb and they'll think, well, the key things are this and this, let's focus on this. What do the other architects in your family, are they all sustainable architects that were able to advise you?

Kit: No, not at all!

Ben: How on earth did you just dive in the deep end for project number one?

Kit: Well, because I had nothing else to do! That was probably the main reason I mean, it's, there's a problem, isn't it? I mean, there was quite a lot of internal detail, a lot of kind of features I wanted to keep cornices and the like, there was stained glass leaded lights. And I really felt that at the time that EWI was so much more effective than IWI, particularly given that I couldn't increase the thickness of my walls, both internally or externally. I felt I really needed to keep it quite high performance. And if I was going high performance, it meant non breathable, and if it meant non breathable, then I really wanted to stick to EWI. That's the kind of logic it was just running it through. But then the problem being that with EWI, I was looking at PIR boards, alternatives to the kind of standard Kingspan approach. Bearing in mind, this is 14 years ago. So we've come a very long way. But at that point, I wanted to keep it really, really slim. So I designed a detail which would take this three layers of Spacetherm with a PIR backing board, which was a render carrying board so it could go all in in 50 mil. But the equivalent was much, much thicker, and it was about as much as I could accommodate at the time.

And then that meant that when you looked at the face of the building from the frontage, it didn't stand out. And it was maintaining that aesthetic and the inherited value of what was an arts and crafts estate built on the back of the Garden City movement. You know, so it was really important for me to do that architecturally speaking.

Ben: But what training did you have before this? Are you just pulling on all of that technical, did you say chemical engineering?

Kit: Yeah, it's not exactly relevant.

Ben: So so yeah. How are you researching all of this to know that this is a good approach?

Kit: The most useful input came from two sources. One was the SuperHomes network. It's run by the NEF, the National Energy Foundation. It's a charitable thing. It was started by a gentleman called John Doggett who co founded the BREEAM standard. And the idea was that if you could reduce your carbon by 60% or more, then other people could come, look at your building, understand how it was done, and then reapply these solutions to their own property. And that was essentially what they did as a network. And I joined that network very early on.

And then that put me in contact with other people that had this kind of information, one of which was a gentleman called Charlie Baker, who lived in Chorlton at the time in Manchester, where I was based. I went round to his to see what he had done to his property. So I almost used the SuperHome network, as it's supposed to early doors to kind of get my head around what people were doing. And then in each of those cases, for wall, floor, roof insulation for the overall strategy to ventilation and for windows and doors, and just went with this one idea, which was, how far could I push this? What have people not done before?

And then went to lots of trade shows. So I guess the next one was, what was at the time called EcoBuild, now called Future Build, that kicked in at that point, brand new. And that was an incredible source of information. And just for, you know, a couple of years, I went to this and just walked around questioning people and delving into the science because obviously, I had a very solid foundation in science. So I was able to get to the bottom of the heat pump salesman and understand what they're actually talking about, right? And just kind of question and question. And that was a really, really steep learning curve.

And then I bought on a team of builders, put them in an hourly basis for payment, which gave me the ultimate flexibility. So I worked as a fourth member, or the fifth member of the team, started doing a lot of the work myself. And that was a great insight into why specification details/designs, why they were so flawed in terms of when it comes to installation and why the installation deviates so significantly in there. Therefore, obviously, your performance gap deviates significantly. So yeah, I really wanted to delve into the nitty gritty of it and understand where the solutions were going to come from.

Ben: So you've talked about your own house, you've talked about the learning. Where does this lead you then? Are there any more lessons from your house?

Kit: Yeah, well, there was a lot of lessons from the house. When I started opening my home as part of the SuperHomes network, I realised that there was a large number of problems that I'd actually managed to solve with that property that others hadn't solved, and they were really keen to know how I'd done it.

So I started a business on the back of five or six people that just said, Can you help me do this with my property? Immediately after starting the consultancy, I realised that actually the expertise that I needed that I didn't have was around timber and damp. So that was the next big learning curve. I spent the next sort of five years trying to master timber and damp, which was a really tough science, a real black art with a huge number of mistakes made.

So the idea then moving forwards was okay, if I can help these folk refurbish their property from a consultancy perspective, I'm going to be driving down carbon and I was making my services open to absolutely anybody. And as I got more projects under my belt, two points of realisation came to the fore, not particularly comfortable points of realisation. One was that the full decarbonisation of this planet is going to never be impacted by whatever I'm going to be doing on the scale that I'm doing and who I'm doing it for. And that really ties down to the types of people that you work for, you know, they're real people, they're often pragmatic and logical people.

Back in the day, a lot of people were thinking very much along the lines of an on an annualized economic basis, which of course, makes very, very little sense from a sustainability perspective, and often concluded in large chunks of my holistic plan being sort of cut out and doesn't deliver quite what you'd hope.

And then the second realisation was that those that are doing the most carbon damage, it's almost 2080 rule here, are those that are the bigger consumers. And when I was chasing the carbon, I ended up essentially going for bigger and bigger and bigger properties.

And that continued for eight years, at which point I got on one particular project, which was a real kind of final project. I couldn't do it anymore, which was for a lawyer in Cheshire, and he was building a new build. And you come on at different points in building projects, and this one I'd come on slightly later, and there were works already on site, and they'd gone down the route of ICF. And I

wanted to make this sustainable, but obviously, it was all PIRs and polystyrenes and the like. And so there was no embodied, you know, embodied was still the big elephant in the room. So at the time, it was very much around driving down energy consumption through conservation of energy principles. And with this project, in particular, they didn't really care about that. They were huge consumers, they had an indoor swimming pool and an outdoor infinity swimming pool, and they had, you know, giant house for just four of them. I think it was 1100 square meters, absolutely vast property. And what I was really keen then to do if, you know, if I can't work with passive design, and the embodied aspects, and I can't work with conservation of energy principles, what does that leave you with? Well it leaves you with renewable or efficient generation of energy. At which point what he did have is money, so I said, Fine, I'm going to try and take this in a very interesting way.

So I looked into trigeneration. A system which just had an email that pinged off to your local, in our case it's a place called Tree Station, which is a very sustainable source of arboricultural waste being turned into biomass. And that was then going to be delivered to site in an automated fashion, poured into an Archimedes screw, which charges a hopper, which then would burn this wood at quite high temperatures. 85 degrees was the kind of water temperature coming off the back of it. And what this would do is it would enable me to create not just the heat for space heating, for hot water and for the swimming pools, but also was going to generate enough energy to run a turbine with a Stirling engine, which was then going to generate electricity. And even more interestingly, it was going to have a chiller component associated with it. Because the other big problem with this building was overheating, which again, was a subject matter that nobody wanted to broach, raise or consider back at this point.

So all in all this trigeneration was going to drive down the carbon associated with this incredibly high energy. You know, this is a guy that was turning up late for meetings because his, his helicopter got delayed, I don't even know how that's possible.

Ben: But there's something interesting here, first of all, you're finding clients, people are wanting your services, obviously respecting your knowledge. But then, as you mentioned, you're in this situation where you can't do everything that you want to do really can, you?

Kit: No, it's completely down to the client and the point in the process in which you get bought on. And at the time, what I also didn't realise was how restricted I was in terms of modelled approach. So almost

everything I was doing was on the basis of kind of empirical. You know, this is before I really got in bed with Passivhaus and PHPP and the software toolset that goes with that.

So, you know, I was doing everything on the basis of air pressure testing, thermographic surveys, and really trying to understand buildings from a, a very empirical, very visceral basis. And using that knowledge and that experience of what worked on previous projects and bringing that forwards, which is it's a slightly more confused and more difficult method in terms of engineering and convincing clients to go down that route. This is a slightly bigger leap of trust, and it's already a pretty big leap of trust at this point.

So yeah, it's really compromised by all of those aspects, but the thing that really did it for me was just I kind of set this target in the back of my head that this project was going to stay on a single phase supply and not have to go to three phase. Because that's a really good target, you know, in terms of energy consumption of this property. And I designed everything to that. And then last minute, the wife of this gentleman suggested that their glass stair set had to have heating elements in it. It wasn't just happy with the underfloor heating downstairs and underfloor heating upstairs, but the stair treads had to be heated, which could only be done with direct electric, which then tipped over the whole thing. So I was like, right, that's it, I'm not doing any more.

Ben: It's interesting, because I imagine there'll be a lot of professionals who are hearing what you're saying, thinking, Now what, can I do the same, what did you do then?

Kit: So that was the point in which I went seeking for alternatives, because it just wasn't impacting. I'd already made quite a lot of money, so this was never about money. So it was, it was never a need for running successful businesses or anything along those lines. I really just wanted to deliver a decarb, a meaningful decarb, and really to move away from direct to indirect on the basis that direct is just never going to have any meaningful impact on some kind of global stage.

So the indirect then became my key focus, and there was a gentleman called Kevin Anderson, he was running the Tyndall Centre at the time, which is Europe's largest climate change centre. And Kevin came to some presentations that, you know, I was part of lots of different groups. I think SuperHomes was one that he attended. And then also there was Ccarbon Co Op, and others. I was always grilling him for you know, that I've got all of this

knowledge, all of these resources, but I just, you know, I want to deliver carbon savings, I'm just not getting anywhere, what should I do? And he was at the time very obsessed with the adoption curve, you know, studying how the iPhone became the iPhone, essentially, looking at innovators, early adopters, and then this chasm that you've got to jump to get through to the point where you are, you're getting that mass adoption. And what I really wanted to do is understand how to decarbon. He said, You've really got to understand how to get this product on the market where people are actually going to want it on mass. He said that the way that you know, the key breakthrough for the iPhone was creating something that people didn't even know that they needed or wanted and that when they had they couldn't do without. And the way you do that is with a pilot with in this case with a piece of hardware. In my case, I needed to start building my own buildings that were going to start proving points. And that was the point in which we kicked off a developments arm.

And Zetland Road was the first project associated with that, which was a real kind of Hail Mary, you know, it was absolutely everything we'd learned to date shoved into a single project to see just quite how far we could go. And we designed it on a sliding economic basis. So we had this 1% that we kept on chasing and the market, we knew we were getting a good deal, we knew that we were in a position on the market that was just kind of on this upward trend. But it did exceed expectations. And so we weren't even intending Passivhaus certification. And by the end of it, we had Passivhaus Plus certification and eight world firsts. So it was a real, real journey.

Ben: And also with that you've just said it, but I'm going to underline it again, it looks very enticing. But I think you must go into some of that ecological side, bullet points of what you managed to achieve there from those stained glass Passivhaus windows that you created to minimising waste. Yes, some of those aspects.

Kit: Yeah. So Zetland Road, by this point we're well underway with Passivhaus tool sets, we're well underway with understanding carbon on a true kind of lifecycle basis. So this was a really mature project and the targets were moving. So what we always do is, you know, up until this point was to keep track of all of the ideas we'd ever had, you know, when you see gaps in market products that should exist, solutions that we don't have. And we keep track of that. And so Zetland was really there to give us the budget and the time, the dedicated time to step through a lot of those solutions.

I'd always had this vision of using chimneys as the kind of the real original building service, you know, in a lot of these structures using chimney voids. And that was a big part of how we managed to get such a seamless transition from what was an 1895 building through to, you know, this Passivhaus Plus certified building. We were modelling, you know, reductions in electricity usage, gas usage. I mean gas we removed entirely, but it was roughly speaking, you know, and again, this is very impacted by who lives there and how they live there, but roughly speaking, coming from sort of £4000 down to minus £43 pounds a year per dwelling. There were two dwellings, two semi-d's.

But the innovations were coming from this list of problems. So we wanted to achieve a building, you know, theoretically Passivhaus have always talked about the ability to get a building so efficient, that you can heat it just using a tiny bit of energy piggybacked on the MVHR device. And that is something I'd never achieved in any other project. To get down to that level, we needed to get a space heating demand around about 12 kilowatt hours per square meter per year. And that then got us to the point where we could bring the entire heating demand for the house down to 3.1, 3.2 kilowatts, I think.

And that was also pushed past. So Passivhaus do this to minus one, I believe. And we set a minus five. And there's good scientific reason why you don't need to push that hard. We pushed a bit further, and we said, Okay, well, if we could get down to covering all of our energy demands with a post heater on the MVHR, which is, you know, very, very low heat input. So it's down at below 52 degrees centigrade, warm air just blown in around the house, obviously, it's then free of radiators, is a very clean look, and a lot less service requirements that went in there.

So these are the kinds of little innovations that we just wanted to solve, you know, and a huge part of this is around maintaining that aesthetic. It was around creating something that was an iPhone, you know, not just some kind of knockoff Android here. We were trying to get the combination of the technology with the look and feel, basically. If it's a bland Germanic box, it wasn't going to revolutionise anything. It had to be old, it had to be, kind of feel authentic and original. And it also needed really to be pretty sexy.

Ben: What are you at this stage? Are you a developer, because the developer would instantly cut the corners, maximise the money? So what's going on, on that side of business?

Kit: That arm of the business we call an experimental developments firm. We're not trying to create a pattern of something that's successful, and then rinse and repeat it to maximise kind of financial gains, that that is not what we do.

The mission is really to kind of get some indirect carbon impact. And to do that, what we wanted to do is hit the large sectors of carbon. So you take your Greek methodology for a minute, and you look at carbon as a pie. And you think, well, construction industry is kind of up to 40%, agriculture sort of 30%. So those are your two big, you know, we're not going to get into the transportations or other forms. So it's those are the two areas.

Now, we haven't really broached agriculture yet, because it is slightly outside the skill set, although I did grow up on a smallholding and work on farms all my childhood. So we have very much that in the plan for our next project. So watch out for the next five years to see us shift into food and energy.

But at this point in time, it was, you know, the big 40% chunk was in the construction industry. And then you break that down, you can look at it from new build versus existing. So you've got the 24 to 26 million buildings that already exist depending on which statistic you want to use. And those buildings need renovation because they represent more than 80% of the 2050 picture in terms of carbon. So new build really is kind of I think it's around about 18%, something along those lines of total impact. So we really need to think about how we're going to work with the buildings that we've got.

So just using that kind of what's the biggest piece of the pie, what's the biggest piece of that pie and just keep on moving down, down until you've got a very specific project that you want to work on. And that's where Zetland Road came from. And then moving out from that we got onto a bit of a trajectory. The limitations of Zetland Road was that it's probably applicable to about 8 million homes directly and indirectly, all homes in terms of some of the strategies that were taken.

But we wanted to start to get a bit more specific, so we were particularly heritage assets. We became aware of, you know, half a million listed buildings in the UK. I'm talking right now from a building called Lymm Hall, a grade II star listed building. So you've got your grade I's, which are 2%, your grade II stars which are 2% and your grade II's, which are 96% of those 500,000 buildings. But when you actually calculate the energy that's been used in terms of trying to keep maintain a 20 degree comfort level across the whole

building, it's something like 470 kilowatt hours per square meter. And this is a big home right? So that's accounting for the fact that it's already 580 square meter building.

Ben: It's interesting you mentioned comfort there, because I know, the Society for the Protection of Ancient Building sometimes go to, well, you've got this big building, perhaps it's not going to be practical to get it all up to a good standard. Why don't we retreat to a certain area for the winter, maybe do the upgrade on that small bit and then live in the building differently in summer?

Kit: Yes, so zonal heating system. We don't recommend that for a number of reasons. Well, there are some circumstances. Every case is different. But the main issue with a truly zonal heating system is you still need to put the expense into creating a localised envelope, which you retreat to. And that localised envelope still carries with it a lot of the cost and a lot of the complexity of insulating and adding airtightness within that kind of zone.

What you also need to bear in mind is the ventilation is the most compromised aspect, you know, because you're focusing on just that zone, and it's difficult to find something which compartmentalises well in these old buildings between your living spaces and your bedroom. So for instance, if you've got buildings that are pre kind of 1870s, generally kitchens were very, very separate. And they were put into the worst parts of the buildings the furthest away, you know, service quarters and the like. So that really doesn't shoehorn in with a modern day open plan kitchen living dining space.

In Lymm Hall for instance, the kitchen is in one far point, the living rooms on another far point, and the bedroom is upstairs. And even those are at two far points. So creating a concise envelope is nigh on impossible.

And then the really difficult thing beyond that is, of course, you've got a heating system which is operating predominantly just for one zone, which means that the rest of those zones are literally left to rot. You know, so below 16 degrees you've got potential dewpoint issues throughout the year, and the ventilation side of things, making sure that that is kept up to scratch.

I mean, a National Trust approach, which is significantly better, but still pretty high energy, is to heat to relative humidity. So rather than heating with a thermostat, and that's much better for the building

health, and it certainly consumes less energy than a 20 degree thermostat throughout the building.

Ben: So just having a think about this, it's a long time ago that I broached this subject. But if you've got renewables and bumped up the heating, is that what you're talking about? So if you had a ground source heat pump or something like that, and you then got the heat up that way. Okay, a lot of its going to leak out of the building. But is that also a kind of approach or a half half? What do you think and what have we got to?

Kit: It always comes down to a prioritised approach. So my prioritisation can be broadly categorized in three levels, so that the top level is what we call passive design techniques. Now, passive design techniques, most people know of orientation, glazing ratios, etc, etc, you know, looking to seek free heat. And obviously, there's a lot more you can do with the new build than a refurbishment, but don't think that there aren't things that you can do with refurbishment. There are still plenty of heat integrating aspects associated with those kinds of formats of building.

And so the reason I focus on those first is, they can be really quite impactful. Particularly shading devices, we often find, are incredibly impactful on the performance of a building. The other thing being that they're essentially on plan, right. So obviously, there might be some associated costs with a given strategy or methodology. But broadly speaking, there's no cost in just thinking about how you're going to approach something differently. That for us is a really important distinction, where you're just getting a really quality roadmap together that's focused on getting as much for free as possible. Whether we're talking about free energies, or whether we're talking about conservation of energy, but just using the design, anything that's on paper, those are your passive design aspects.

Then, once we've gone down that route, and we've got as much as we can for free there, we then rely on, well most people call it fabric first, I call it fabric second. It's a lot less catchy, but fabric second then gives you this idea that you can improve on airtightness and insulation levels throughout the building, and that's a really critical aspect. We can then between those two things, the first and second priorities, we can really, you know, push to extremes. And that's, you know, Passivhaus philosophy embodies a lot of that.

And you can get to the point where you're collapsing your energy demand by you know, 90%, or something at which point who really

cares about the third category, which is around efficient or renewable generation.

Then, the flip side to that being there are cases, whether it's client led, or building led or situational, where you can only go so far with the first. The second, you can only go so far on again, because of whatever listings or restrictions. And so you're really left in an environment at the back end of that, which is still very high energy, right? And if you've got a very high energy environment, then what choice do you have, but to focus on efficient and renewable generation of energy?

Ben: That makes sense. Okay, well, you've got all sorts of projects, different types of buildings, new build as well, concrete-free foundations, all sorts of things going on. So maybe we could just have a taste of some of these projects?

Kit: Yeah. Okay. So we're trying to branch out, so it's not just domestic retrofit. We've got a lot of different projects on. On the domestic retrofit front, after the Zetland Road property, we ended up doing quite a few other Passivhauses on and more complex buildings. One was a 1909 manor house, stone built called Fox Low. And this property was taken to EnerPHit standards, quite complex, a lot more frieze work, a lot more decorative aspects and very much more convoluted than Zetland Road. And we also worked on a number of projects in a similar ilk.

We focused then on grade II listed buildings and trying to get those across the line, with real struggles as always but yeah, that's another kind of string to the bow. And those were client jobs. So we only have so much handle on you know, in terms of control over those sorts of projects.

But what we decided was that it was a COVID based decision. We were thinking about moving more countrified as a family anyway. And we found a project. We're very much on the mindset of opportunism. If you really knew us, you'd know just almost every decision we make is on a basis of opportunism.

So we came across a property called Lymm Hall. This is a building built in 1570. It has a moat that surrounds it that was built, probably by Queen Ethelflaed in 875. It has a moat bridge that goes over the top of that, it has an ice house that was one of the first after King Charles II brought them to the UK. It has cockfighting pits. All those are kind of ancient scheduled monuments, the bridge being listed.

So it was a really fascinating site. And it also very intriguingly had a paddock with planning permission for five detached new builds.

And we took that on, and we were setting some targets. So the targets we set for the Lymm Hall itself was, you know, this being this highly controlled in terms of it being the top 4% of all protected buildings. We were hoping to take this to a zero energy sort of performance level. Passivhaus was off the cards from our initial estimates, bearing in mind, we were starting at 470 kilowatt hours per square meter.

Ben: Did you measure that? I mean, how do you know it was 470?

Kit: Well, we've modelled the whole thing in PHPP. And so what that does is it creates a common basis. It is not based on bills, because of course, even if you wanted to you couldn't heat this building to 20 degrees at almost any time of the year. It's freezing cold, even at the height of summer. I mean, it's 700 mil thick walls in most places. The idea of what Passivhaus is doing is it's trying to put everything on a common basis. So you can get a kind of like for like efficiency comparison. And that's what we did. And then we were applying various strategies to see how far down we can come. And that's actually led to some really fascinating innovations.

So one is around the air pressure testing technique. We're looking to start up a PhD using a new type of air pressure testing called Pulse testing. And what this does is it measures the air pressure, the air leakage rate at four Pascal as opposed to 50 Pascal, and that conceals a lot less of what... You know basically the ATTMA guidelines for the way in which we measure air pressure in buildings, you know, and the CIBSE guidelines even, the latest CIBSE guidance that's superseded it, they're all pretty massively flawed in terms of understanding the true performance of a building.

Again, I'm not going to get into it but I theorise it's much more tied down to what we call permanent draft pathways. So a litre of air extracted from the building means a litre of air brought into the building. And this is all driven by items like chimneys, where a single flue can evacuate the entire volume of your house once every eight hours. And the vast majority of the air that replaces this extracted air comes from your sub floor void where you think your air bricks allow flow of air from the front to the back, via that sub floor void, but actually, it's not cross flow ventilation. It's stack effect that draws air in through all of those air bricks and up through your floor, which brings with it incredibly high humidities, which then lead to things like rising damp in these buildings, you know, and all sorts

of other myths that we basically have to bust before we can get clients to understand what's truly going on in terms of moisture flow, airflow and heat flow in buildings.

So, the innovation was that once we were able to use this Pulse testing, I'm trying to develop a method where you can co-pressure test using pulsing, which means that you don't have to complete a whole building, you can just complete one room. Which means that we can complete different rooms in different ways and compare directly what their performances are like. And some of the rooms we can do properly, as in using tried and tested methodologies with, I don't know underfloor insulation or wall insulation. But there are some floors where we simply cannot do the traditional, because we don't have any sub floor void height, or we have decorative floors that must be maintained as part of the listing or whatever it might be.

So what we're looking to do is treat these elements in different ways and have a scientific method of comparison. For the first time, we'll actually have granularity over which components of upgrading a building made the most significant difference, because up until now, as a consultant, I can say, well, if you combine all these things together as a holistic approach, you will go from X to Y in terms of performance, but what I can't say is specifically out of those 10 things we do, you know to your building, which is the first and the second and third most effective. It's very, very difficult to get that granularity which this will offer.

So that's an example. But then that also translates to meaning that we can actually trial new things. So on the floor for example, we've got this one room which is a principal room and it's got a knackered old wood wormy, very low significant pine board floor and what we're looking to do is take a festal rail saw and cut one centimeter out the bottom of the entire perimeter of that wall you know skirting boards and all the decorative aspects all second fix. Yes, that's slightly difficult to do from a planning perspective. But the beauty of it is that that centimetre you retain it, you cut it with a two millimetre blade, and so you retain that centimetre that you can put back again. But what that does is it gives me access to the actual substrate, the wall behind, because you can't bring a membrane onto plaster board or skirting boards. You have to take it through to the substrate to get the cap on that floor.

We've got a developed method that's going to enable us to connect this membrane to the perimeter of the wall and then apply a floor overlay, a very skinny floor overlay to the top of that in a much

more kind of, they call it carpet parquet, which is a very nice timber finish, which is fully breathable, works with the intelligent vapour control layer that we're putting underneath, to create a truly airtight solution. We hope, but it's not been trialled or tested. So that's what we're going to do here as a solution that will then, that the kind of the carpet parquet covers that gap so that the one centimetre goes back again. So the whole thing goes back as if you couldn't notice it anyway. And then you put this overlay, so it all disappears, you really can't see the difference. You've got a massively improved upgraded floor in terms of performance and aesthetic. And it should also be incredibly low disruption for a property and massively cheaper. So all of these kinds of things offer a really interesting solution, but how effective is it.

Ben: This whole conversation really for me has been around your innovation, your energy. How do you build a team around you that doesn't go Oh, my goodness, you won't believe what Kit's just said?

Kit: Well, you can't, everybody says that on a daily basis! So the only option is, you know, and also what we're doing here in terms of what we're learning and how we approach buildings is it's not taught anywhere. So that's something we need to change. But in effect, you can't get an architect or a building service engineer or whatever, and just bring them in and expect them to hit the ground running here.

So we have sort of a two year training programme and where we bring people on, we really employ on a cultural fit. So every single person that works for us, and that's we have a kind of in-office team and site team, there are two separate teams, and there are some bridges between them. But both of those teams are on board on the basis of understanding that sustainability is core to their lifestyles, so that the cultural fit is the most important aspect for employability.

Ben: Well, I feel there's lots more we could chat about, and I'm sure it would be interesting, but I'm gonna call a halt to the conversation here. Is there anything you'd like to close on, any final thoughts?

Kit: Just to be aware, you know, there are so many different solutions out there across all the different building formats. I'm barely finishing sentences because we have so much going on. Just the highest level, I wanted people to be aware of the kinds of projects we're working on so that if that sounds of interest, you can get in touch if you want some more information. We have Lymm Hall which is going to that, you know that extreme with the listing and that extreme with the performance around zero energy. We have

the paddock which we're building five detached buildings using no petrochemicals and, and no concrete as you said, but we're also doing so with a standard known as Passivhaus Premium. There aren't any Passivhaus Premiums in the UK at the moment. I think there's one that may be certified any moment. We're trying to build five on one site, and that hasn't been done anywhere globally. So that's the new build side of things using modern methods of construction.

We are also, we've got a barn or a series of barns which we're focusing on, true off grid. So off grid water, off grid electricity, off grid waste – foul waste and actual waste. There's all sorts of aspects there that are very, very intriguing. And that's really tying into the ecotourism side of things.

And then we've got a property in Levenshulme, which is an old post office sorting office, which we are trying to create the world's first zero waste, zero energy food hall. So that has sort of five kitchens, five restaurants, a big brewery, a big tap bar to go with that, and a coffee roastery and development kitchen and a zero waste deli. So again, looking at kind of hospitality which is an area which is really untouched.

The other two projects we've got, I'm doing a lot of the kind of big commercial builds with clients and we're doing a lot of work around moving into food and energy. So this is around agroforestry in the main, looking at building products and food production, and also large scale energy production from kind of estate lands.

Ben: Kit, been a pleasure to have a chat. Thank you.

Kit: No worries. You too. See you Ben.

Ben: Head online to take a look at the show notes that accompany this session: houseplanninghelp.com/317 where you can review the key points once more, in our summary we always give you one. There are photos too, including the Zetland Road project that we talked about, that I actually visited. I was up in Chorlton where one of my best friends lives and I thought you know what, let's find out where this is, and it was five minutes walk, very central, very easy to find and a stunning retrofit project. If you've got a comment or you'd like to ask a question, either do that within the show notes, or we'll give you all the social media links so you can chat to us there. [House planninghelp.com/317](http://houseplanninghelp.com/317).



My call to action is to check out The Hub. This is our membership community that we run alongside House Planning Help. It's the same themes. It's if you're building a house, and you want to make it really sustainable, really energy efficient. Or if you're retrofitting one, then it's like minded people in here. All of our regular features, from the courses to the live training sessions. You can chat to me during office hours, and pose me any questions that you might have on your project. We've got our in depth video case studies as well, and our members only forum.

Now back to the case studies for a moment because we have added yet another chapter to the Kinver story. This is our retrofit project. It's a Victorian terraced property, mid terrace as well. And they're aiming for very high efficiency. But now it's on to the pretty standard stuff. They're now looking at first fix electrics and water supply as well. There's also this flat to bear in mind. So they've separated off a section of the building for this apartment that they're going to rent out. So what do they do with the electricity and the water in this scenario? What makes sense? So that is our latest update on the Kinver story.

If you would like to join The Hub, then more information is found at houseplanninghelp.com/join.

That's it for today. Thank you so much for listening. The House Planning Help podcast is produced by Regen Media: content that matters.