

## Episode 80

# Behind the Scenes of Our Documentary

The show notes: [www.houseplanninghelp.com/80](http://www.houseplanninghelp.com/80)

Intro: We're going behind the scenes of the documentary today. Not so much to tell you what camera we used or elaborate on the special effects – not that there were any – but for more detail on the houses.

I started my chat with Paul Jennings by asking him if he'd enjoyed making the documentary.

Paul: Mostly! [Ben laughs.]

Ben: Apart from getting ill?

Paul: Well getting ill wasn't great but also it's quite stressful. It's remarkably tiring doing this kind of stuff.

Ben: It is isn't it? No one quite appreciates that. Particularly for you, you've got the physical stuff, all of the kit to move around and then all of the thinking that goes along. But I really thought that this was worthwhile having a chat through some of the sequences in the documentary, because in the documentary we have to move quite quickly and perhaps can't go into a lot of depth where as in a podcast we can have a chat about it. So maybe you can describe the first location that we went to and the test that we did.

Paul: Yes, it's a 1950's semi-detached house. Brick built so masonry construction. Had the windows replaced in about 2007 with uPVC windows, double glazed obviously, and was known to be fairly leaky because of discomfort and draughts. And as one of the residents is disabled, of particular concern.

Ben: So we did the test and what did we discover?

Paul: Well we put the fan equipment, the test equipment, in the back door and basically sucked air out of the house and went round looking for where it came back in. And some of the locations were expected and some of them were unexpected. The loft hatch was pretty poor, that wasn't really a surprise. But how bad the bay windows on the

front which had been replaced and how much leakage there was under the window sill was a surprise.

Ben: Maybe you could tell us how we found those leaks, so you're sucking air out of the house and so it's coming in through the cracks, how did we see it visually for the film?

Paul? Yeah, we're sucking air out, we're applying a pressure of 50 Pascals so it's about the same as a 20mph wind, so essentially exaggerating the draughts. So a lot of them you can just feel on your hand, on the back of your hand, but what we also use is chemical smoke, stage smoke, which exaggerates them, you can see them. And we also use a velocity metre, an anemometer, to measure air velocity through particular locations, which gives us a sense of how bad they are, how significant they are.

Ben: Then we moved on to a different house. Now this was a more recent developer house.

Paul: Yes, this was so called affordable housing built by a developer in about 2006/2007, and well basically it was very poor. It only just met building regulations. You know the building regulations will talk about an air permeability of 10, and it was over 9 so it was getting close. And the resident said she couldn't afford to heat it, couldn't afford to keep warm.

Ben: This was an interesting point wasn't it, because if it's within building regulations and she's not willing to heat it, what does that say about the regulations?

Paul: It says that the regulations are the lowest common denominator. They're about making sure the building won't fall down, they're not making sure the building is fit for use at all.

Ben: But is that right for regulations? Should we not have regulations that are more about having a good quality of life for the person who lives in it? That's what I would assume the regulations are about. Or if they're not there, ramping up to that point?

Paul: I agree, and especially as this was actually built as affordable housing. It's laughable! It's pathetic, that volume house builders, well respected volume house builders, continue to build such rubbish, houses that people can't keep warm in without spending huge amounts of their disposable income, maybe more than their whole disposable income.

Ben: The one thing that we can't do though is completely generalise because we've only tested that one house, but in your experience have you seen this quite a lot? I don't know, how many developer houses have you tested over the years?

Paul: Well it's certainly true that most of my testing isn't developer houses. It's self builders, it's Passivhaus, it's at the better end of the spectrum. But I've done quite a few and the key thing is almost it's not about developer, it's about the construction type. The fundamental weakness of so much of these properties, these houses, these flats, is plaster board. Plaster board on dabs. Plaster board, most commonly stuck to blockwork because it's cheap and easy construction but it's also very vulnerable to air leakage.

Ben: Let's compare these two properties then that we looked at. So we've had a modern developer house and something from the 1950's, yet the airtightness results were actually better on the older building.

Paul: Well true, but they were both pretty poor. You know an airtightness result above 8 is not a comfortable building. One of the things that people forget, what we're talking about, an airtightness of 10 which is the maximum under the building regulations, basically means if you have a 20mph wind blowing, after 6 minutes in the hour your hot air is gone.

Ben: Yeah, that says a lot. That's a good fact. I was pleased to work that into the documentary. So on the 1950's house you were keen, you suggested this, that we ought to do some remedial work. How did we go about this?

Paul: Well essentially we got a team of specialist sealers. People I've worked with on Passivhaus projects so I know they're good at sealing.

Ben: Paul, I've got to say this, we've nicknamed them the Gunge Brothers. I don't know whether that's fair at all, that's Mike the cameraman to blame! Sorry, keep going!

Paul: Yeah, well if you meet them you will see their clothes are covered with mastic. That's where the Gunge Brothers comes from! To be fair, particularly on these jobs, they didn't use that much mastic. So there you go.

Ben: What did they use?

Paul: They used, as is always the case, use a variety of things. One of the big issues in the 50's house was the window sills on the front bay, so essentially they took off the plastic windows that had been glued on as part of the window replacement back in 2007 and put nice solid wood window sills on and sealed around the edges so they basically, instead of having a plastic cap over a hole, they had a proper window sill sealing it up.

Ben: And in terms of blocking up all of these holes, the materials that we're using, are these environmentally friendly or have we got to look at the bigger picture?

Paul: Well I mean they vary, as is always the case with these things. And there's a trade-off between environmental friendliness and speed and ease and application. And I'm afraid a very common use for this sort of remedial sealing is expanded foam in various grades and of various types, because it's quick and it's easy and it works to a degree, although you have to be careful, so it's not the best. But anything that's going to make a house last an extra 20/30/50 years, you know the embodied energy, the environmental impact, versus what you'd have to do to replace that house if it was deemed completely unusable. You know it's an orders of magnitude difference.

Ben: Is this durable material, a proper fix we're doing?

Paul: It's fairly durable. I mean I wouldn't want to bet on it being there in 50 years, but it will be there for the life of 20/25 years yes, should be. You have to remember that houses are subject to maintenance. You know if you have a gas boiler you will be expecting to replace it on a 15-year or thereabouts timescale.

So there is ongoing maintenance and one of the huge issues in this country with such a big private rented sector is inadequate maintenance, poor maintenance, even no maintenance and the building stock getting gradually worse over time to get to the point where there's quite large quantities that are actually unfit, shouldn't even be allowed to be used.

Ben: Some of these cracks, are we suggesting that they have developed over time or that actually they were there initially?

Paul: Well, again they vary. One of the things we found was quite a lot of leaks around the electricity cables coming into the house and going to the consumer unit just inside the front door, and that's probably been there from day one. You know it may have been modified

over the years but fundamentally that would have been leaky from day one. A lot of the other leaks though were associated with the window replacement so this house got worse.

Ben: Do you know that or are you guessing?

Paul: I mean I don't know it because we didn't do a test before the windows were replaced, but absolutely 100% certain that house got significantly worse when they put new windows in. Basically, quick and easy nobody understands the difference between quality window replacement and cheap affordable window replacement. And they had big gaps under the window sills which were draughty and uncomfortable. We found on the French doors at the back there was actually a hole at the bottom, essentially open to the cavity which had newspaper stuffed in it. The newspaper gave us the date the windows were installed! [Ben laughs.]

Ben: I just don't understand why? Why do these companies have these standards? Or how do we make sure we pick someone who is going to do a good job that it will be sealed and it will be better than it was before?

Paul: Well I mean, as always is, buyer beware. And more knowledge, more awareness of the householders, the people who are purchasing improvement works will help.

It's also true that we have a fundamental problem with our whole refurbishment industry. And there's a lot of attention at the moment about refurbishment because there's so much needed, but my concern is that we're going to see, continue to see, very poor refurbishment, refurbishment that makes properties subject to water problems, moisture problems, mould in the walls.

They call it interstitial condensation and it's basically condensation occurring in the building fabric, in the walls. Particularly in timber frame buildings that can actually cause the building to fail. It's very damaging in the long term. And it's an expensive remedial fix to deal with it. So we have concerns. There are people trying to promote excellence in refurbishment but of course they're fighting an uphill battle.

Ben: How did we do then, when we carried out the remedial work?

Paul: Well, we haven't finished so we don't know the final after works at the moment, but basically we improved the airtightness, we cut the air leakage by about 25%, by about a quarter in a couple of days

work. We tackled the gross leaks, the most uncomfortable leaks, the leaks for example, the window sill in the bedroom where the disabled person sleeps, which is actually good for their health, not just their fuel bill.

Ben: Will this have a significant impact on their fuel bill or could it almost just be a trade-off that they didn't put on the heating before and now they might be more tempted to put it on?

Paul: You never know with occupant behaviour as we call it in the technical term. How do households respond to improvement works?

The fundamental thing is they can be warmer at the same price or they can be even warmer than that but paying more or, you know, there's lots of wrinkles on that. The main thing is they have the power over it. They can choose. You know they could now which they couldn't have done before, have the disabled person's bedroom warmer than other rooms because it's not subject to that huge draft anymore.

Ben: One thing that Liam said to me that has stuck in my mind was about how when you do air pressure tests and you've sealed up some of the leaks, sometimes the air just takes a different path. So could you explain that?

Paul: When you're measuring the air leakage of a building ultimately you're measuring the resistance to leakage, resistance to air getting through holes. What you find is that as you seal up the most obvious leaks, the biggest leaks, the leaks that have the lowest resistance to air coming through them, some of the other ones which have a greater resistance, may start leaking. Usually what you find is something around half of the air gets stopped and half of it comes out somewhere else.

And obviously it's an incremental process, you can keep going. But it's one of the reasons why we're strongly pushing airtightness testing before people start doing refurbishment, especially if they're doing refurbishment of estates or terraces because there's so much knowledge and appreciation and understanding you can inform what you're doing. And you can actually prevent huge wastage of money. This government, previous governments, have wasted a lot of money by investing in insulation materials without making buildings airtight, because then the air just goes through the insulation and takes the heat away.

Ben: And a lot of the time as well we're saying that it's fine if you can get down to 3 air changes an hour, you don't need to think about the ventilation too much?

Paul: Yeah, and even below that. At 3 air changes or 3 air permeability which is the value building regulations use, you can pretty much rely on opening windows and the sort of leakage that's just occurring naturally around cracks and gaps. It's still quite a lot of air movement and you'll be perfectly safe in a property at those sorts of levels. With the big exception is if you've got open fires. Or gas fires that are taking air from the internal space because then you do need combustion air, a source of combustion air.

So you do have to be careful about this that's for sure, but certainly down below 3 you can get in more than enough ventilation by opening windows, just by the ventilation you get when you open the front door to go in and out, you know, it adds up.

Certainly if you're going a lot lower you have to start thinking you need extract fans in kitchen and bathroom, the wet areas, to get rid of moisture at source. But you know, the need for the very sophisticated heat recovery systems, that's down below 1.5 or even 1 air changes and by the time you've got there you've got a pretty airtight property.

Ben: So in that case are you suggesting that more properties should be doing what we did? This type of remedial work?

Paul: Yes I think we should. Because mostly to get to a reasonable level of airtightness, to get between 5 and 3, which is probably halving it in most properties, you can do that relatively easily. Not many days work, not much disruption, and we like to see the full refurbishment when the whole house is insulated and all the rest of it, but we need to accept that resources are limited, people don't want so much disruption and there's always a trade-off between what they can afford to spend on their bills, and their concern about that and keeping warm, and what they can afford to invest in their property.

And of course with so much rented property there's little incentive if you're a tenant. There are things, and airtightness is one of the things you can do as a tenant, some measures in airtightness are so cheap and so cost effective that it's worth doing even as a tenant. And we've done work with transition groups, for example to support them in doing that kind of work, but mostly you need to have some ownership to be willing to invest.

Ben: And Paul, perhaps one of the reasons why you have this croaky voice could be the hard work that you've put into the demonstrator, so probably this is all connected! [Ben laughs.] You're laughing away here! Just a very quick outline of what this demonstrator was. It probably we've covered some of these points in our chat so far.

Paul: Well the thing about airtightness we've seen over the years, how much that direct experience of seeing a building and seeing where it leaks makes a difference. You know I've had so many site managers, people on building sites say: "That's amazing." Amazing is usually the term they use because they've never understood where buildings can leak. Even if you're just testing their site hut which sometimes we are, because it's the only thing they've got, and they don't appreciate air leakage until they feel, put their hand against an electric socket, a door key, anything like that - things that you don't expect to leak. Obviously if you see a door and you see daylight around it, you expect it to leak. But there's an awful lot of things people don't expect to leak.

The idea of this demonstrator is make that available to people more easily. You don't have to come to a test. I mean what we're hoping is to basically take it on tour around the colleges and universities and do that so basically you can come along and you can see a leak and you can see the same leak sealed up properly. Maybe we'll even do it so you can try it yourself.

Ben: So it's really just comparing, this is done in a bad way, this is done in a good way?

Paul: Yes, because it's got removable panels it's flexible too, so we can change what it's doing.

Ben: And it looks like it could be a good place to keep an exotic bird or something in the middle!

Paul: I was thinking of recalcitrant children but you know.

Ben: [Ben laughs.] Fair enough! Okay, and a couple more things to mention. You came along to Mike Coe's house, and this is actually where it all started. We set the scene at his house and obviously this is an exemplar property so what are we looking at here? Perhaps put into perspective the values that we've been talking about so far and then the number of air changes per hour that this one was tested at.

Paul: Well, I mean Mike's house is exceptional. It's a Passivhaus, it's autonomous and when we tested it, it's a couple of years ago now, it achieved 0.36 air changes. So that's 20/25 times better than routine testing of existing houses. And of course at that level it takes very, very little heating. You know heating bills in the tens and twenties of pounds per year - ludicrously low in a lot of ways. And it's very comfortable inside because there's absolutely no draughts.

And that really is the difference and certainly I aspire to a house like that, and I imagine you aspire to a house like that. I mean I don't understand why if Brussels, the city of Brussels, can say that every new building will be a Passivhaus, you know it's not a small town, it's a big city and it's a vibrant, modern capital. Why isn't somewhere in the UK, why are we not doing initiatives like that in the UK?

Ben: Well, maybe one day. You know hopefully not too far off. And you're right, it's a case that we could be doing this and I suppose that that's one of the sadder sides of this documentary is just seeing how many bulk standard developer houses have gone up and almost every town, quite a lot of villages as well, have a scar [Ben laughs] of one of these places!

So in the documentary I was keen to bring in Ashley Vale, which is a self build scheme, again we've covered it on this podcast as we have with Mike Coe's house if you head back into the archive you can find out more about both of those projects. But Ashley Vale I thought interesting because a) they'd fought off the developers, and because it had been set up 15 or so years ago they actually hadn't paid as much attention as perhaps they might have done to airtightness.

Paul: Yes, and they probably regret that now. And certainly those buildings, because a lot of them are timber frame, are at risk of moisture problems in the long term because of where air leaks through the buildings it will take moisture with it and if it's condensing in the walls, which it could well be because they've got high insulation levels, then they need to be concerned about problems. But you know, it's not just Ashley Vale it's the whole country. You know there was very little awareness, it didn't come into the building regs at all until 2002.

Ben: That's another sequence in the film that we wanted to demonstrate, that the diversity of what they've done there, the self build scheme. I suppose I did detect almost some of the elements of cohousing and I know that Lancaster Cohousing was one of the ones that you

kept an eye on in terms of airtightness. Now that was a completely Passivhaus standard development, so are we going to see more schemes like that?

Paul: Yes we are. You know, without a shadow of a doubt. Cohousing has considerable advantages in terms of sharing resources. You don't need so many vehicles, you don't need so many washing machines! Personally it's a lifestyle I like and Lancaster, yeah, it's 44 Passivhauses. We tested them all and they all passed.

Again this is another difference because in mainstream construction you don't test every house, you test sample houses. So there's always the concern, in fact there's always the knowledge that the builder won't do as good a job in the houses that aren't being tested. And you know, building control are under resourced, not enough training, and they don't understand the need to go and do random checks to hold the builders to account.

Ben: As we step back from all of this, can you see any theme developing, anything that we're going to walk away from this documentary saying we've learnt. We haven't tested lots of properties, perhaps another time we'll get the budget to be able to do something on a bigger scale where we can have more conclusive data, but is there anything that you would point to having gone through this experience?

Paul: I suppose the key thing is providing people with a demonstration, with an appreciation of where air leaks and what we clearly need is a, well basically we need a national database of house types, where they leak, where the problems are in the insulation and what's worked and what hasn't worked in fixing them.

Ben: And does that vary hugely? Is that why you're suggesting a database, because my impression when I often ask you this question, is do you know how this house is going to perform before you do the test and you say well I never ever guess it because you just can't tell. So is a database going to help for something like that?

Paul: Well the thing is, there's always a variation between houses that are near identical, but if you're doing a street, a terrace of Victorian houses, obviously they've all been modified in different ways but there will be certain fundamental airtightness issues which you can expect to be common throughout. You know, same is true, although harder to tackle, if you've got 80's/90's spec built out of town, well

Noddy boxes really, which have such huge problems I suspect we're not going to be able to fix them. But they are definitely there.

Ben: Paul, really appreciate your time yet again, always a pleasure, and thank you very much.

Paul: Thank you Ben.