

Episode 11

Building Houses That Alleviate Fuel Poverty

The show notes: www.houseplanninghelp.com/11

Ben: I'm with Dr Brenda Boardman here at the Environmental Change Institute of the University of Oxford. Hello.

Brenda: Hi. Good to see you.

Ben: And I think this will be fascinating for a lot of people, but I've just found it's got to the point in my research where I need to ask some bigger questions. It is all about house building and trying to get that energy-efficient home but I have some wider questions.

Before we go there though, I want to know a little bit about you, and hopefully you can tell others how your career path has gone and some of the amazing literature that you have written and where you feel things have gone.

Brenda: Right. Well, I've been here at the University of Oxford since 1991, always in the Environmental Change Institute. My academic career has always focussed on reducing the demand for energy in the home and that's electricity and gas. It's particularly focussed on the UK because I don't think we should be entering into international agreements unless we've got our own house in order. So I have focussed on the UK and I've also done it within the context of Europe because, despite what some politicians say, an amazing amount of our environmental legislation actually starts in Brussels and we wouldn't be anywhere near as good on energy-efficiency and environmental issues in the UK if it wasn't for Brussels.

How did I get here in 1991? I have a very odd trajectory, which I will sketch in for you. I actually started my first degree at the age of 30 and I did it through correspondence courses at the Open University, so I'm an Open University graduate. That took me 9 years. By the time I'd finished that degree I had a husband and two children and was living in East Sussex in Lewes and the very prestigious science policy research unit of the University of Sussex was just along the road. So I went to them and said: "Look, I'm 40, I want to do more research on this topic, which is the energy-efficiency in low income households." It had got focussed on low income

households by then. In the end they accepted me so I did my doctorate at SPRU [Science and Technology Policy Research] at Sussex. That was 1983 to 1988.

I then made my doctorate into a book called Fuel Poverty: From Cold Homes to Affordable Warmth. Then in 1991 there was this job advertised at St Hilda's College, sponsored by POWER-GEN, and I got it and here I am.

Ben: So you will have seen a lot of change. You will have written about it first of all and then seen the direction that things have gone. How are we doing?

Brenda: We're not doing at all well in the UK. I would stress that I've been fortunate to have an interdisciplinary brain [Ben and Brenda laugh] which means in the simplest of terms I like words and numbers, and have always looked at issues in a very overview sense, helicopter type view sense. So, I do quite a bit of economics, I do quite a bit of policy, do the sociology, do the technology. I try and understand what you and I have to cope with on a daily basis rather than subdividing it into lots of little disciplines.

In some ways we're doing well because when I started, the subject of fuel poverty was definitely not on the political agenda. The Thatcher government refused to even utter the words. It couldn't exist. There wasn't peanut poverty so why was there fuel poverty.

Fortunately the Labour government when they came in in 1997 did understand the issues and accepted fuel poverty right from the beginning, which is brilliant.

Just for your listeners, the real difference between poverty and fuel poverty - and it applies to with everything to do with energy, which is often forgotten - is when you use energy you actually have to have a piece of capital equipment to turn that energy into the service you want. Now that could be a car, it could be a light bulb, it could be a house, it could be a boiler, a cooker, it doesn't matter. But the role of capital equipment and expenditure on capital equipment in fuel poverty is crucial for differentiating it between ordinary poverty and fuel poverty. You can cure poverty by giving people more income, you cannot sensibly cure fuel poverty by doing that because it just recurs and recurs and recurs, whereas a one-off big capital investment in energy-efficiency could take somebody out of fuel poverty.

So my doctoral research and my first book and a lot of my subsequent research, although sometimes intermittently, has focussed on a social problem which has its foundation in energy-inefficient homes. What I've done subsequently is add in the whole climate change agenda and again originally there was a debate, should we focus on fuel poverty or should we focus on climate change? Well actually we need to do both at the same time. There's lots of synergies and there's some real problems if you don't bring the two together.

So, in terms of fuel poverty, Britain has some good targets but absolutely no government commitment to achieving them, which is really a bit heart breaking. In terms of the energy-efficiency of our housing stock, I think it would probably be true to say that we've still got some of the worst in Europe, even though we've had programmes since 1976 we haven't actually made a substantial amount of difference.

Ben: Now, I went to an eco home from 1981 a few weeks ago. I didn't know at the time about the Homeworld exhibition. I imagine you, of course, will know about it in Milton Keynes, but it just struck me as funny that they had a lot of the answers and I know having spoken to Dr Wolfgang Feist as well, and had a few episodes, we seem to know how we can reduce the energy, so what has been stopping us over the last 30 or 40 years?

Brenda: It's absolutely not the technology. You're absolutely right on that. We know what to do, we know how to do it, we just don't do it and that's a failure of government and people's lifestyles to come together. I think we've made quite a big mistake in the past at just looking at the amount of running costs that an energy-efficiency measure, a boiler or insulation, would save. Increasingly those don't justify the expenditures so you could justify loft insulation or cavity wall insulation because it'll save you some, usually some gas, but if you start looking at solid wall insulation it's much more difficult. This comes back again to my running costs versus capital issue.

I think if we, as a society, valued energy-efficient buildings and I mean value in the monetary sense, if we really valued them so that an A or B-rated property was worth quite a lot more than an F or G-rated property, those are the bands on the energy performance certificate, then putting money into your home would have a double benefit. It will save you costs, running costs, and it will increase the value of the property and I think we've made a big mistake ignoring that aspect of energy-efficiency so far and it's one of the things that I've been promoting in my most recent publication, Achieving Zero.

Ben: Is it a marketing problem? Let's say we build them as 'low running cost houses' something like that and forgot about the eco side because sometimes people, they're just not interested and so effectively you give them an eco house but you call it something else that will tempt them in. Is that evil of me?

Brenda: No, it's not evil of you. [Ben and Brenda laugh.] But I really don't know the answer. I think it is probable that different people in the population will respond to different messages, that some people will respond to being green and helping the planet, some people will respond to reducing their running costs, some people will just respond because it's a much nicer environment inside. You don't have cold patches. You do have a very comfortable environment. You don't have rooms you can't use in winter. It's just better. Some people will respond, as I say, perhaps because they think it adds value to the property and it does.

So I think there are all sorts of different reasons why people respond. One of the other aspects about emphasising the impact of the value on the property is that at the moment if you've got a house with a cavity that is not filled, why should you do it? There's no sort of deadline. There's no absolute requirement. Nobody can see whether you've done it. You might be a bit warmer. You might actually think that you'd rather spend the money on a summer holiday. There's just what sociologists call 'agency'. This agency enables you to complete the circle and my best example of agency is what's happened certainly in north Oxford and lots of other places over recycling.

It used to be that you could have a plastic bag in your sitting room and you filled it up and occasionally you put it in the boot of your car and you took it off somewhere. That was all a bit messy and a bit of a hassle and not terribly satisfactory. You could get a bit of a warm glow but not a big one. Now we've got blue boxes, green boxes, brown bags – all sorts of things and not only are you encouraged to fill them up, they don't have to sit in your sitting room they can sit on your doorstep and somebody comes and takes them away and empties them for you. So the whole thing is now a very neat, complete circle. It's made easy for you to recycle.

We don't have anything like that with our homes. We don't have anything that makes it really easy to do the insulation, the energy-efficiency improvement. There's no guidelines as to what standard to try and achieve. It is, as I say, open-ended.

Ben: Well, you mentioned the word standard there and I'd be very interested to know your views on the Passivhaus standard because that is creating a very narrow target and I know that a lot of people feel that we need to have that narrow target, really. What is your opinion? If we just continue as we are, where are we going to end up?

Brenda: I think I'm going to give you a long answer to that one.

Ben: Okay. [Ben and Brenda laugh.]

Brenda: When I started doing Achieving Zero, this is looking at how to get all energy use in all buildings in the UK to result in zero carbon emissions by 2050. That is actually part of our legislative obligation under the Climate Change Act. People talk about 80% of greenhouse gases but actually when you get down to CO₂ in buildings it's virtually 100%.

The government and the committee on climate change both think that this will result from:

- a) You and I switching to electric heating and using heat pumps whether air source or ground source.
- b) Building a lot more nuclear and power stations and putting carbon capture and storage on other power stations so that we've got the decarbonisation of the electricity industry.

Well I don't actually like or agree with either of those assumptions and that became very clear to me writing Achieving Zero. So I got to the stage of thinking, well, I don't think we're going to be able to do it through the de-carbonisation of the electricity industry. I just don't think it's going to happen. I don't think it's going to happen fast enough and if it did happen it might be extraordinarily expensive, the resultant electricity and therefore not good for the fuel poor.

So I don't like that approach and what I'm trying to do is to reduce the cost for all of us and especially for the fuel poor who are often cold. And if you do energy-efficiency, you don't put up the prices for the fuel poor because you're not building more power stations that are expensive. You've reduced the costs. The price may still be high per unit but you've reduced the cost because you've reduced the need to buy so much gas or so much electricity.

So, having rejected the government's opinion on these things and then end up with thinking, I want super-efficient homes. I don't want to do it through the supply side, I want to do it through demand reduction, just what can be achieved and actually with Achieving Zero my proposal is that every house and every building in the UK is Passivhaus standard by 2050. I have eradicated the need for any heating systems. There are a few wood stoves, there are a few little bits of under-floor electric heating or electric heaters on the intake of your air for your mechanical heat recovery but basically there's no heating systems.

So looking at the very big picture of where we've got to be, we the UK as a whole, as an economy and society have got to be by 2050 I ended up with Passivhaus for everybody.

Ben: Mmmm, that's interesting. Just before I move on a little bit further, can I ask about 2050, is this just something that's been plucked out of the air?

Brenda: Oh no. Most of climate scientists are absolutely horrified at how little the world is doing to reduce carbon emissions. We know that we want to try and keep climate change, global warming, to two degrees centigrade increase, over the Industrial Revolution level. There's almost no chance that we can achieve that now and we're heading for three and four degrees. Four degrees warmer is perceived to be risking catastrophe: really nasty extreme weather in really unusual places, just the sort of extreme weather we've been getting with winter droughts and flooded summers and heat waves in Russia and droughts in America, you know, melting of the Arctic ice cap much too quickly.

All of these things could be just indicators of the sort of climate we're creating for ourselves, because bear in mind there's almost no such thing as natural weather any more, it's all what we are forcing on ourselves. So if we don't like it we know who to blame.

Anyway coming back to 2050, it is absolutely brilliant that the British Government has accepted this hugely challenging target. They probably don't realise how challenging it is! [Brenda laughs.] Sometimes, politicians being a little bit ignorant is useful, but it is a fantastic example about what a country is trying to do. It's a very important lever with Europe. Europe has got some challenging targets, particularly for 2020, which is after all only 7 years away.

One of the most challenging is that, for the UK 15% of our energy, all energy, whether it's oil, gas, electricity, whatever it is, 15%

should come from renewable sources by 2020. We are nowhere near that target. That's a really, really difficult one and the British government, that's you and me as taxpayers, have to pay quite hefty fines every year that we miss it. So that's not good.

So the whole set of targets, the 2020s, the 2030s, the 2050s, are absolutely spot on if not unambitious enough. The policies and people's perspectives aren't yet delivering them.

Ben: I've had a few conversations with people where they've almost done a bit of scaremongering and predicted doom for the world but what is the energy situation? If we wanted to keep on using fossil fuels how long would it go on for or would we reach a stage where the prices are too high, back to fuel poverty again, I suppose?

Brenda: The reality is that we shouldn't use these fossil fuels for climate change purposes. Something, I'm not good on the actual numbers, but something in the region of a quarter of the oil, gas and coal that we know about can we afford, as a world, to use.

Ben: For the climate?

Brenda: For the climate. Nothing to do with price, just for the climate. The implications of changing the climate, as Lord Stern proved, could be hugely expensive and disruptive. So we might be worried about . . . Well, it's running costs versus capital costs again. We might all be worried about the price of our energy in future whereas actually what we've got to be worried about is the effect of the climate on our infrastructure, our lifestyles, our choices, you know. How many buildings are going to be flooded? What's going to be the rate of sea level rise?

Ben: But you think we can avoid that still?

Brenda: Ah well. I'm a born optimist don't forget, Ben. [Ben and Brenda laugh.] And a bit of me . . . a bit of me . . . realises, horribly realises, just how difficult what I'm suggesting is, but sometimes you can be quite positive about this.

I mean, one of the reasons that I like the Passivhaus standard is because I have more faith in its modelling and algorithms than I do in the Standard Assessment Procedure (SAP), which we use for our Energy Performance Certificates (EPC) etc. Anyway, just dealing with the Standard Assessment Procedure, SAP, over the last I think it's something like 30 or 40 years, if you go back, we have improved the energy-efficiency of our housing stock by one SAP point per

annum. The average now, the maximum is 100, and the average now in England is about 54. So that means by 2050 I think we should all be 100, SAP of 100. I think we should all be A-rated, emitting zero carbon from what our lifestyles are in the home. So, if we've got to get to 100 from 54, that's 46 points in 38 years, it's not much faster than one SAP point per annum. It isn't impossible to imagine we could do it.

So, my brain is quite schizophrenic about this. At times I'm optimistic because we could do it, stroke, we must do it, and other times I'm totally pessimistic because of how little we're actually achieving.

Ben: I think it is getting to the point though, it's a crunch point, and it's not that far off. And throughout history people have got up and reacted to that and have managed to get over anything that has been really challenging society and I think we're getting close now.

Taking a look at your book for a moment here Achieving Zero: Delivering Future-Friendly Buildings, what would be in that for, say for example people listening at the moment wanting to build their own house or retrofit their own house?

Brenda: Well, I think the first thing to do is if you like pretend, if not accept, that you are going to get it to an A-rated building. This is especially true of retrofit and then think okay, how many attempts am I going to have to do that? Am I going to do it room by room? Am I going to do nothing for 5 years, then move out for 6 months and do the whole lot? What's the trajectory for this building to get it from where it is now up to an A-rated property over the next 38 years?

That's where it's so much easier if you build brand new. You aren't in the building, you aren't being messed around, you haven't got to move out somewhere temporarily, you haven't got to disrupt the kids' schooling or whatever it is and it's all done within one go. So that is all brilliant.

I think retrofitting is more difficult and I'm actually going to a meeting this afternoon discussing the pros and cons of one big retrofit versus lots of little incremental retrofits. I suspect that lots of the little incremental retrofits, like you're doing the kitchen so you do internal wall insulation on the kitchen at the same time, and that causes all sorts of problems about the junction with the floor, the junction with the ceiling, the junction with the adjoining rooms. I suspect that the skills we have in society are even less good at some of those awkward junctions. We don't have masses of skills in

terms of delivering A-rated homes but I think that's demanding even more.

Ben: But starting with maybe the new builds, not all the new builds are Passivhaus standard.

Brenda: No, no.

Ben: A fraction of them.

Brenda: Yes, I know and there's a further problem about design versus delivered that we're not very good at building the properties that we do build, the new ones we build, to the standard that is in the architect's drawings. Increasingly I hope we're going to be moving towards standards based on the property as built, just as Passivhaus requires you to do an air test, air change per hour test, air leakage test after it's built.

There is discussion now within the government about what the Zero Carbon Hub have proposed, which is a slightly lower standard than was originally being promoted by the Code for Sustainable Homes 6. They've got a lower standard than that. On the other hand they're going to make it tougher because it's the as built standard, not the as designed. So that will start getting our builders to be more aware of the issues and more able to deliver.

But I just want to step back a wee bit and whether you're talking about retrofit or new build I just want to highlight the difference between gas use and electricity use as we conventionally employ them in this country.

Most of SAP is actually based on gas usage. When we talk about an energy efficient home, we normally mean better insulation, better boiler, reducing gas use. Now it is absolutely correct that 85% of our energy, measured as energy, is gas use and the other 15% is electricity but because electricity is both carbon intensive and expensive on peak electricity because that's what we're usually using in our lights and appliances. If you look at expenditure or carbon it's about the same, something in the region of nearly half of the carbon and nearly half of the expenditure goes on electricity and that's another reason why I like the Passivhaus. It does include all those ancillary uses of energy in one of its measurements. I don't think it's anywhere near tough enough. I think it actually allows us to have too many pieces of equipment and inefficient light bulbs, well semi-efficient, CFLs (compact fluorescent lamps) rather than LEDs (light-emitting diodes), that sort of thing.

So I would like the Passivhaus energy standard as opposed to heating standard to be toughened. If you are really looking at a zero carbon house, you've got to look at the way you use electricity. You know, have you got A-rated appliances, etcetera, etcetera.

Ben: Well, it's been a fascinating chat that we've had today. Thank you very much for that but is there a closing thought, something that you want to leave in our minds?

Brenda: Just continuing with the theme of all energy and not just gas. I'd like everybody to be a little bit more politically active. When was the last focus on the environment in any general election or local authority election? How much does the government really know about what you and I are really concerned about? Are we actually hidden from policies and politics?

So for instance just recently the government, I think it's for the third time, has refused to pass any legislation on what's called consequential improvements, so that if you extend your house, build a conservatory or whatever, you don't have to worry about the impact on the rest of the building. Whereas if we had employed consequential improvements we would have made it so that even with the extension, even though that is low carbon, low energy, the total impact on the whole house would be lower consumption. We haven't done that and I think that's because politicians are too worried about the Daily Mail headlines, which means that you and I are seen to be the fringe and not seen to be the future and it would be very nice if we could start changing that.

Ben: Dr Boardman, thank you very much.

Brenda: Thank you.