

Episode 4

The Passivhaus Standard #2 Dr Wolfgang Feist

The show notes: www.houseplanninghelp.com/4

Ben: I'm with Dr. Wolfgang Feist and today we're going to be finding out more about the Passivhaus standard, but as we like to do with our guests as we get them onto the podcast, we just find out a bit more information. So my first question to you is about energy efficiency and how you became involved.

Wolfgang: Well, I'm a physicist and we were working in the 70s on how to deliver the growing demand for energy in the world and when we looked a little bit more thoroughly into what the energy is used for, the surprising result was that most of the energy is just wasted. So it's a good idea to first improve the efficiency we use the energy and there's a big potential for improving efficiency.

Ben: And is that the best method to go for energy efficiency first and then to deal with how you meet those energy needs?

Wolfgang: Yes, of course it is. It's like every other things first to look for what really need, the services you really need and then you can design say a building in a way that it uses far less energy than you are used to in that past.

Ben: What were the early challenges that you faced?

Wolfgang: Of course it's all a scientific issue and so first thing to do was to look how is it possible and how far is it possible to improve the efficiency but it very soon

turned out that that is scientifically speaking quite easy. So the more important issue at the end is how to get that through to the market because we are used to do it in a different way and that's far more difficult than the scientific part.

Ben: So this brings us to the Passivhaus standard which is gathering momentum at the moment, what is it on its simplest level?

Wolfgang: Well, it's a very high energy efficiency, mainly by improving the building's envelope to reduce the energy losses you normally have so that you only need a very low amount of heat to keep it warm and of cooling to keep it cool; and that's in the range of 1/10 what we used to need in the past. So that's the main background and the surprising thing is that it not just reduces the amount of energy you need but it also improves the comfort in the building.

Ben: Are there any other benefits on top of that? I mean, they sound like pretty big benefits already.

Wolfgang: When you look into the results of the existing Passivhauses, it's not only the better comfort and the reduced energy demand, it's also that you have a far higher quality of the building envelope and that means that it will last longer; and there's another benefit that it's simpler than the normal way of doing it, so at the end it's improving the way we maintain the building in the future.

Ben: Does it have to look in a specific way or have a specific style?

Wolfgang: Well, if you look at the Passivhauses already been realised, you won't be able to tell that it is a Passivhaus, that's the other side. You can build any building style. You can build any type of building. You can build offices, swimming halls, schools and

dwellings, whatever you want, and you can use any kind of material. You can build in a masonry construction, you can build in timber construction, you can build load-bearing structures with concrete, whatever you want.

Ben: I keep wondering why this hasn't moved further, how come the construction industry hasn't jumped on this?

Wolfgang: The construction industry is a very conservative industry so they try to do what we've done all the time and it's not so easy to change the habits of that part of industry. This is different from automotive and others. But still it's going really fast at the moment because it's not so different from what they have done in the past. So they can learn how to do it but they have to decide that they want to learn.

Ben: If we didn't do anything do you see any big problem with energy coming and if there is a date for that, how soon do you think it would be?

Wolfgang: You already have it. Energy is much more expensive than it was 10 years ago. A lot of people have problems with paying for their heating bills so we already have that problem. In addition, we have problems with the consequences of that very big amount of use of fossil fuels in giving carbon dioxide to the earth's atmosphere so this is also a growing problem so we really need to change the way we use energy.

Ben: And by using less energy, we will also reduce our carbon footprint, is that correct?

Wolfgang: Yes, that's the main background. The highest amount of energy being used in the UK, in the European Union, and worldwide is fossil fuel. That is more than 80% of all the energy being used. So if we reduce the

amount of energy we need, we'll reduce the amount of fossil burned, and by burning fossil fuel we emit the carbon dioxide.

Ben: Is there a particular place in the world that this standard is best suited or are you saying it could be introduced anywhere in the world, any temperature range, it's a standard that is a world standard?

Wolfgang: It is a world standard but we have to be cautious. It's not like you've built a building in say a factory in Japan and you drop it by helicopter at any place of the world and it will work. That won't work. It's more a method. It's a method of how to design a building compatible to the climate you are in. So a Passivhaus in Jakarta looks significantly different from a Passivhaus in Saint Petersburg. But the method how to do it is the same, so there's a design method how to design for good indoor climate, depending on the climate you are in. That's mainly what a Passivhaus is.

Ben: So what are the key differences in how you alter the house to make it reach this Passivhaus standard?

Wolfgang: Yeah, so let's go back to the UK's situation because the measures are a little bit different if we are in UK or we are, say in Turkey. So let's go back to the UK situation. The most important thing in the UK is insulation. The second important thing is insulation; and to make the insulation in a way that we really avoid thermal bridging. The third important thing is airtightness. This is a little bit new for the UK because the buildings haven't been airtight in the past but we've seen it's not such a difficult thing to do. Then there are improved windows. Window quality has a very high influence on the energy balance of buildings, and the next thing is if we build an airtight building and you'll have to build airtight buildings in the future, you need ventilation because people need

fresh air. So that's the forth part and that's mainly that's it, insulation, airtightness, good windows and the ventilation.

Ben: What opportunities will be coming out of Passivhaus being introduced more widely?

Wolfgang: Well, the most important thing is of course we get independent of those foreign energy sources. Yeah, that's a big problem for the European Union, importing lots of fossil fuel from the outside and that's why the European Commission is behind that development. They want us to get efficient buildings and there's another thing. In order to do that we have to improve the buildings, so it's an improved building envelope. Now, the interesting thing is that the products needed for that and the production of the buildings, that's all taking place in the European Union so this is also creating employment. That's the other reason why lots of governments are behind that type of development. The third thing is that by improving the building envelope, comfort is better so this is an advantage for users in the building and you don't have to talk for me, it's best way is to talk to some of the occupants of existing Passivhaus premises to see what they say and it's very interesting what they say in the UK so you can ask whomever you want. You'll get very interesting answers about how they feel in their Passivhauses. This is a win-win situation for all of us and so that's why I think it's a very good idea to go this path of better efficiency, not only for buildings, it's also possible for office equipment, for cars and so on.

Ben: I've always been someone who's very interested in energy efficiency, when you build a house, the process that I'm going through at the moment it's all about what choices you can make and it seems to me that energy efficiency is a very black and white issue. There are other things that are more confusing

but this is something that we should strive towards on and to me it is just very simple. I know you have lived in a Passivhaus for quite long time and you've talked a little bit about how you feel but if I'm someone who is buying a Passivhaus, how do I know to begin with that it's been built properly? Is that what the standard actually is that if I buy a house that is a Passivhaus standard I know it's been constructed and will operate to this efficiency or do I have to live in it first?

Wolfgang: Well, there is an organisation founded here in the UK called the Passivhaus Trust. They are offering certification for Passivhauses so if you want to be sure you can get a certified Passivhaus and that's very important to have that thing available. That means that now if somebody has an advertisement, he is selling you a Passivhaus it's well known what this means so if there is a problem later it might go to the court and then the decision will be, well, it's well known what the Passivhaus is because there is a certification available so nobody can come and say this is a Passivhaus and it's far from what it is. So we can't stand behind everything what is happening in all parts of the world but the Passivhaus is one of the developments that you can be quite sure that it's done in a proper way.

Ben: What do you stand to gain from this? What is your motivation?

Wolfgang: Well, the Passivhaus Institute is a small research facility so we are working in research, for example, developing improved components like better windows. We are working now together with the city of Frankfurt building the first Passivhaus hospital. So we live from working together with those who get these things realised, the components got on the market, and the government and the European Commission who want us to create a future which is worth for living in.

Ben: You mentioned about the governments there, is there anything they should be doing to help along the way?

Wolfgang: Yes, there are lots of instruments the governments are already using. What we've seen from all around the world, the most important is to create a background where innovation is accepted. Very often this is not easy to do innovative things and to be able to do innovative things you need a tolerant environment. That's one of the most important things to get these things done. The second thing is if a government really wants to help that development coming forward, the best thing to do is to give some incentives. Those incentives don't need to be money. In one example from Italy, the government decided that if somebody is building a really energy efficient building, he is allowed to use a bigger part of the land he is building on. So that does not cost the taxpayer any money but that is a big incentive for investors to do energy efficient buildings. So there are lots of examples of what the governments could do. Also they could distribute the information about how to improve efficiency in new construction and in refurbishment of existing buildings.

Ben: That is a big issue too, isn't it? The retrofitting of all of the existing stock which I suppose is a large percentage of the houses that we have because, of course, we can't build everything brand new.

Wolfgang: Yup.

Ben: So what does that challenge mean? I'm assuming that's a lot tougher.

Wolfgang: Yes, it is definitely. It definitely is. The most important thing is that you have to see that the existing building stock is not static. It's developing. You always exchange a window, you fix a roof, you fix a wall and

so on. Now we have to realise that these moments that you fix a roof anyhow that's the very moment you have to improve the insulation otherwise it's too expensive. So that's a way to go, to improve everything at the very moment when the scaffolding is going up. That's the moment you should decide about improving the components. And if you improve a component, you should go to the best available because it's again it will be 30 years, 40 years, 50 years until you do it again. So that's the philosophy behind improving existing buildings. Now there are big differences between existing buildings, so on the one extreme, most buildings in Europe have been built in the 60s, 70s and 80s. That's the main part of the building stock and they are quite easy to refurbish. Well, if they are worth refurbishing, they are quite easy to refurbish. Then there are the buildings, the older ones. Some of them listed buildings and that's a little bit more difficult because we also have to take into account the history of these buildings and the fact that we want to preserve these historical issues. There is a lot of ongoing research so there are a lot of measures of what we still can do with these other old ones.

Ben: We haven't really talked money but what is the cost of all of the technology that we need, we've mentioned the windows etc. the insulation.

Wolfgang: Let's take for example a window. Normal windows cost in the range of, I think in the UK it's £300 per square metre, something like that. So now if we go to a component which we would call a Passivhaus window, that's triple glazed, well insulated frame, airtight window. That might be £80 more. So we are discussing a difference of £80 between the normal ones and the Passivhaus ones on the market at the moment. We are working on reducing that difference. But if you calculate for the life cycle cost of this investment you'll see it's hard to find any investment

today which has a better internal interest rate than such an investment. So it's good to do that. It's a different thing, that's always done wrong way, you won't exchange this window just for saving energy, because that will cost £380 per square metre and that won't work. So it's again showing that it's very important to do it at the very moment where you exchange your window anyhow, that's the decision to be made and afterwards it's done.

Ben: What are your goals for this? You've been working on this technology and this standard for such a long time. Do you set yourself yearly goals or are you just knowing that when the time is right it will happen?

Wolfgang: To be honest, we are a research institute so our influence is mainly an indirect influence. We can help the industry and we can help the government to do that better, but of course we are not the ones who will change the policy or will be able to move the whole direction of the development. Although a lot of things in the past that happened were somehow induced by examples we were able to give. So we are concentrating on really good demonstration projects to show what can be done. We are concentrating on producing tools for the architects or for engineers to make it easier for them to design such an energy efficient building. We help organisations like the US Passivhaus Trust to gain members and to gain knowledge and to make that knowledge available. So those are the things we do and I think we are quite successful at doing that.

Ben: One final question and it's around the future of energy efficiency. You've obviously done a lot of work and we're hoping that it's going to move in a specific direction but does it just go on and on what we can save. Will we look back on the past and think how wasteful we've been?

Wolfgang: Based from a physical point of view, no need to use energy for having comfortable temperatures and things like that. We could, from a technical and physical point of view, reduce it, not to zero but to almost zero. On the other side, there is again no need for that because there is a certain amount of renewable energy available from wind power, from solar, from water energy so the development that we have had so far with the Passivhaus is to a point where we call these buildings nearly zero energy buildings. That means that the consumption is 1/10 of what it has been in the past and that means that the energy you need is so low that it will be available from regional sources of energy anywhere in the world without a big problem. So at the end there is no need to go much further than that but of course it could happen and we already see some parts of the development happening. It could happen that we get, say, even more efficient windows which will allow for building buildings which consume less energy than they do without increasing cost very much. It's hard to say what will happen in the future but one thing is clear, the whole perspective of better energy efficiency opens a path in the future where we won't need fossil fuels any longer on the big scale.

Ben: Dr. Feist, thank you very much.

Wolfgang: Thank you.