

Episode 34

Balancing Environmental Design and Low Energy Design

With Architectural Designer Wilf Meynell

The show notes: www.houseplanninghelp.com/34

Intro: We have focussed a lot on low energy design but not as much on understanding environmental design so that's what we want to get stuck into today and we're going to chat to architectural designer Wilf Meynell – he's my guest. First up I asked him how he'd come to work in this area.

Wilf: I started architecture at Brighton University and went and did a diploma at University of East London where I was tutored by Sofie Pelsmakers who I have to credit a lot for where I've moved to and I think my main interest in environmental design was, I was brought up in the countryside and always had a connection myself with the environment and my surroundings. You know when I was young I could feel the hot sun coming through a south facing window or I could open a door and feel a draught come through. That connection with the environment has pushed me to try and get that into architecture of the future.

Ben: And do you feel that the way things are going they are moving more towards low energy design? Is that the point of this?

Wilf: I think so. I think as technology improves we're finding that buildings can monitor themselves better, they can ensure that we don't overheat or we don't get too cold and I think, I guess we are starting to lose the connection between opening a window or putting a log on a fire where it is very clear that we are trying to control our environment ourselves.

Ben: Is this an idealistic thing really to be focusing on the environment when in fact we could be walking out of the door whenever we fancy? The point is that we want the low energy design, we need to, we have to get to this point.

Wilf: In some ways I guess it is a bit idealistic but I think that because we are so focused on low energy design which I think is great, in a way, we are starting to lose focus on some very very simple basics of environmental design in terms of the right specification of the right local sourced materials, looking at the sun and where we can get as much energy from the sun, obviously prevailing winds and natural ventilation. I think we are starting to lose that a bit as we focus so much on trying to get the percentage of energy demand down by 80%, 85%, 90% and I think it would be good if we could start to try and combine the idea of low energy design and proper environmental design.

Ben: Maybe we could take this to an extreme so if we neglected this how do you think it would manifest itself?

Wilf: What might happen is that we end up having buildings which really do control themselves in the sense that no one even has a control panel anymore and buildings monitor themselves constantly and change the temperature and all sorts and I think although that might be a good thing, on a human scale we will start to really lose that connection with our environment. We will start to lose the connection with what our sun's doing, how it moves, where it is, you know things like that. I think the more you lose connection with the environment the more that can have a knock on effect on things like recycling and landfill where our environment is a body in which to store things we don't want. I think that could be a danger of the way that low energy design is pushing us.

Ben: Maybe we could look at an example then of how you have implemented this into Springfield House which is a project that's hopefully underway in the coming months?

Wilf: Yeah, Springfield House was interesting because we didn't have a site initially which was, I guess, quite good from an environmental design point of view because it meant we could spend some time choosing the site to have as much from nature as possible and the site we choose is on a slight bank, it's south facing, there's a woodland around it which is well managed so there is plenty of timber both for construction and also for fuel. So I guess the starting point for Springfield House was let's try and get as much from the sun, we know where the prevailing winds are let's try and get as much natural ventilation, let's look at the materials of the buildings straight away to see what we can use for cladding, what we can use as a fuel source. Those key environmental concepts really help push Springfield House towards Code for Sustainable

Homes level six before really considering the so called green technologies.

Ben: Talk me through natural ventilation because a lot of the podcasts that we have done have been on Passivhaus and of course in that case you are really controlling the ventilation so natural ventilation is a nice idea you are obviously going to be very in touch with the environment around you but it's this control thing again. Control can sometimes be good sometimes? No, you are wanting it natural.

Wilf: Absolutely, absolutely, natural ventilation can be quite complex when you've got obviously very high insulation values and very high airtightness. One of the most important considerations is the depth of plan so obviously if you've got a very deep plan of building you've got a lot of air to move from one side of the building to the other so Springfield House is a u shape effectively so the plan never reaches a depth of more than 4 metres. Also high ceilings stop obviously your heat building up at the top of the ceiling space and also things like having a high façade can start to pull a lot of air and wind around a certain area so you can start to use that to try and bring that into the building.

One of the other things you should always look at with natural ventilation is the stack effect so if you can get a high level opening window, Springfield House has one single velux over the stair which is in the core of the building. That really helps to bring all the air from a low point in the extremities of the building up through the core and out through an openable window.

Ben: I'm sure I'm asking a silly question here but what when the wind changes direction?

Wilf: It's not all based on the prevailing wind. Springfield House is angled towards the prevailing wind to get maximum use of natural ventilation but because you've got a high level roof light which is giving you the stack effect whichever direction it's going in it's still going to pull air out of the building and wick it out of the building. Obviously you're not always need to be ventilating your building constantly through the winter as it won't be so hot but you will want to occasionally purge the air so you will want to have, quickly open that window for 10 seconds, wash all the smelly air out and bring all the fresh air in, then close it and you've lost very little heat.

Ben: Do you notice that a lot in terms of how you feel the air? Is it almost like having a breeze coming through?

Wilf: I guess that depends slightly on the wind speed and the wind direction. It will very much depend on which low level windows you have got open, that's very important. Springfield House's core separates the two living spaces so if you want to you can close off living spaces and just flush out the core or you can open them up and flush out the whole building so obviously you could have a danger of becoming draughty but if you are controlling it carefully by opening it for 15 seconds then it's just an immediate draught, an immediate wicking through of the air.

Ben: As someone who puts my top priority building a house as energy efficiency I know this will concern me so how does this affect the energy efficiency? Clearly it can't be an airtight structure, or can it be, if we've got the natural ventilation coming through?

Wilf: It can be quite an airtight structure, in fact there's no reason why it couldn't be getting close to Enerphit, Passivhaus but one of the dangers of that is that firstly you can have a problem with the quality of the air in smaller rooms that on the extremities of the building. One of the other things is that Springfield House is looking to use timber to heat some of the spaces and there's one small stove that's going to be in the main living space and obviously when you are very very hermetically sealed you have to bring in an intake externally from the building which adds cost and complication and obviously more gubbins means more embodied energy so try to avoid that as much as possible.

Ben: Where is this balance then between the low energy design that Passivhaus clearly offers and getting it right with the environmental design? How do I know that this is a good route to take? You mention about the embodied energy, fair point, but how do I balance all that up?

Wilf: Part of the problem is in the conceptual phase of the design often the environment isn't considered enough so we don't think about exactly which way we are facing, we don't think about are prevailing winds. We don't think about designing with a certain plan depth, we don't think about using trees for solar shading and we don't think about solar shading in general, it's one of those things that often gets plugged on. So I think if we were to start with the environmental concepts of very basic environmental design and then start to push it towards Passivhaus I think then you would get a halfway house between the two which I think at the current moment in this country would be better. Maybe in ten years' time, when we have the supply chains and the manufacturing of high end Passivhaus standard materials in this country, I think it would be

fantastic if we could really push towards Passivhaus but at the moment so much stuff is coming from Central and Western Europe and the embodied energy created in all that shipping and all that production is huge.

Ben: What about if you're in a town or city, which I imagine a lot of us will be, does all this then go out of the window?

Wilf: The same concepts can always apply because they are very basic but obviously if you're talking about a retrofit and you've already got a site then you have to be a bit cleverer because you might not be facing south. So you might need to think about having less windows, less glazing, trying to keep any glazing on the north and the west and to some extent the east, keep those apertures very small and try and find ways to bring the sun in maybe looking more at thermal mass. When you do get the sun in you really get it in the building, you store it there, then you can start looking at the use of green technologies to help improve the environmental performance but I think that's always got to be the second stage.

Ben: I know that you use the strapline "Low Tech, Low Cost, High Performance" clearly the way we all want to go but what do you mean specifically in terms of low technology when we look at Springfield House?

Wilf: I think it goes back to again the very basic environmental principles that are used. I touched briefly upon, for example, solar shading. Springfield House has two periscopic entities that look out over the site and not only is that a part of the design that you can focus on these nice bits of the landscape it is also about exactly what angle is the sun going to come in at in the summer. So you want to stop as much of that as possible so the overhang is about 1200mm which is perfect for stopping all the sun coming in in the summer. Then as soon as the winter comes and the angle drops to about 16° most of the sun can then pierce through the building, heating it up so that's a very low technology that's been in existence for hundreds of years.

Then using trees is a nice way to improve the efficiency of the building. Obviously in the summer when the trees are in bloom you're stopping too much sun getting in and then as soon as they drop their leaves in the autumn you then get a lot more sun coming into the building to heat it up. And if you can then combine that with thermal mass so you have a heavy big dense structure behind some glazing especially for the winter. Obviously you can then begin to store some of that heat inside the building so that at night

when it cools your heat comes off and then you've got a more stable environment.

Ben: Is this instinctive to use, as the person as the occupant of the house or, I'm wondering whether people might just be very lazy and tend to want this control that more low energy design gives you?

Wilf: I think definitely in a lot of cases that is correct but for Springfield House my client came to me wanting something that was very much hands on approach to environmental design where she could really monitor the building very carefully but not in a sense where you are trusting a control panel to do that. It's more a case of she's been around enough to know that if you open a window you will get some draught come through and if you close the curtains on a hot summer's day you will stop too much sun coming into the building but I definitely agree that there is a danger that let's say she moves out of the house in ten years' time and someone else comes in they don't quite know how it works as a system. But I think there is a very similar danger with something like Passivhaus where people will be opening windows a lot in the summer, in the winter especially and that tends to throw off a lot of your building dynamics to some extent.

Ben: Isn't that the point though that you have that freedom to open a window? There's nothing to say that you can't other than what you want as the user and I know that you have been in a Passivhaus office before I wonder whether that might be why you have come to this conclusion. There will always be an argument in an office as to whether you have the window open or closed.

Wilf: I think there is a very big difference between mechanically ventilated very very fresh healthy air and air that you get directly from the outside and there is something about it. I don't know whether it is the same for everybody but I actually really like the experience of feeling some actual fresh air coming directly from a window onto my face if you see what I mean and although in theory some of these pull systems, for example, are incredibly efficient and also provide incredibly healthy air again you start to lose touch with your environment, you don't smell the smells that are outside the building you don't experience what is going on outside the building and I think that's something it would be sad if we lost that completely.

Ben: Just moving to low cost, because cost is a massive issue even if you're wealthy and perhaps you're wanting a bigger house no

doubt costs will creep up on you again so how is this low cost is it because is locally sourced?

Wilf: A lot of that so there has been a lot of work that has gone in at the front end to try and find sources for materials that are local and also hoping to keep the cost down so for example Springfield House is going to the local woodland which is 300 - 400 metres away from the building and we've already gone round the woods and we've earmarked three western red cedar trees which we are going to use to clad the building. They're not going to be taken away to a sawmill. Instead we're going to bring a mobile sawmill onto site so there's very very little mileage indeed for all that cladding material to move. So that's one very small element of Springfield House that keeps it low cost. The other thing is it is built into a bank, all the spoil that's going to be excavated will be used to re-landscape on the site so there will be no spoil going off to landfill, that obviously reduces a bit of cost. By digging into the bank not only are we improving the acoustics coming from what is a very loud main road behind it but we are also starting to get a bit of extra buffer temperature from the soil at the back of the building.

Then also by trying to rely mainly on the sun as your heat source and by having plenty of thermal mass you have to put less into your heating system so in Springfield House we have just got a log boiler and a solar thermal panel which is basically giving you both winter and summer heating or winter and summer hot water without having a mechanical ventilation system which is expensive but it also has a maintenance cycle whereas the sun doesn't.

Ben: Aren't there issues with using a log burner that you would want to move away from that if at all possible or are you including that just because it gives you this palpable sense of heat in the house?

Wilf: The log boiler is now recognised by the Renewable Heat Incentive so its efficiency is incredible. You're getting efficiencies of between 90 and 95 percent now with some of the log boilers. In the days of old when you've got an old stove burning away you're getting a hell of a lot of smoke coming out of the chimney at the top so it's not burning very efficiently so you are getting a lot of off-gassing as well whereas these new log boilers are incredibly efficient and they buffer big thermal stores which can then keep the heat for up to 48 hours sometimes. So looking at some of the stats you get from these systems actually my belief is that these are much more efficient than using gas, using oil or to some extent trying to rely on too much solar thermal.

Ben: You mentioned thermal mass there and I was wondering what that is in this scenario if you are using your locally sourced timber what is providing the mass?

Wilf: I guess concrete has a very bad rep and rightly so in environmental design. We haven't got any concrete in this building until we get to an in situ stair which is an in situ concrete stair. It's right in the centre of the core of the building and although it is not an environmental material we'll try and get a specification which is as good as possible but what that will do for us it will take in as huge amount of the sun's heat. Actually the stair is oversized and has a large concrete wall as well which pierces through both floors so it will take a lot of the sun's heat during the day especially in the winter and it will just give back gently to the building. Also in the summer it will provide cooling because rather than that heat being in the air it's in the concrete and because it's in a core that core can be shut off from the main living spaces so it can be quite a good way of providing a very natural control system for the heating.

Ben: Are there any other aspects of the environmental design that we haven't touched on?

Wilf: I'm sure this has been touched a lot in your previous podcasts but fabric first is really important. You've really got to consider not only let's try and cram as much insulation in a wall as possible but also the building dynamics of that. What materials you use, how much it can breathe, are you going to get moisture because you put the insulation too much internally and not externally?

So with Springfield House we are looking to build the whole thing out of timber frame and also we are looking to build it as a stick build which basically means we're going to build on site using timber rather than bringing in a prefab frame from Ireland or wherever it might be. By using a timber frame obviously what we are trying to do there is to sequester carbon inside the timber. You know, if this building lasts for 200 years you could argue that then that timber isn't rotting for 200 years which is slowly starting to bring the balance of carbon in the atmosphere back down again which is one of the problems we've got with global warming. So timber frame in the construction industry is fantastic, I think if you can you should and then insulation wise we are looking to use natural insulation on the inside of the building so the air quality is very healthy internally. Obviously we're looking to do a low cost design, we're going to have to look at using things like mineral wool internally but I think a lot of buildings from my experience when they get value engineered the mineral wool goes back in and I think

there is no point in trying to pretend that we can afford that with this particular scheme.

Ben: So what does that mean for Springfield House the airtightness you will hope for?

Wilf: We are looking to get an airtightness of around three which is about three times better than building regs and about three times worse than Enerphit. We're not looking to get too airtight as we've got obviously a stove working and we want to ensure that we're not going to get issues with moisture based on it being too hermetically sealed effectively.

Ben: OK I probably should have brought that in earlier but it just suddenly popped into my head. How are we doing here?

Brilliant, I think we've covered quite a lot of ground today so Wilf is there a final thought that you would like to leave us with?

Wilf: Yeah, I think in some ways what I would like to say is it's amazing that we are moving towards Passivhaus and there is so much momentum behind it because it is obviously a real exemplar of low energy design. But what I would like to say is that can everyone who is designing them and people who are specifying, can they try and find local sourced materials as much as possible and not just rely just on certified materials that come from Austria and Switzerland because I think it really needs to be considered the embodied energy that goes into those materials in the transport and their production.

Ben: Wilf, thank you very much.

Wilf: Thank you.