HOUSE PLANNING HELP

Episode 68

Is a Green Roof a Good Choice?

The show notes: www.houseplanninghelp.com/68

Intro: Dusty Gedge is the current president of the European Federation of Green Roof Associations. He's also the founder of Livingroofs.org and he's done lots more besides.

I always like to record on location wherever possible and we went to a house that architect Jon Broome had designed some years ago. It was a lovely house with a green roof. It was tipping down with rain so it was actually very green in colour! Perfect setting.

I first asked Dusty how he came to focus on this area.

Dusty: Well, it's quite simple. I was involved in an ornithological study of a neighbourhood of South East London, way back, 20 years ago, and we found a rare bird. They were going to build on these sites so we decided why don't we put the habitat on top of the roof. Of course we were just a bunch of anarchists, ecologists, working, suddenly coming face to face with the built environment professionals like architects and engineers and things like that, who said you couldn't do it. So I went out and found out how I could do it. I went to Switzerland, came back and over the last 20 years I've become recognised as a bit of a UK, European, world authority on it. But it was only because of wilfulness and a bird! [Ben laughs.]

Ben: What exactly is a green or living roof?

Dusty: Well a green roof - in terms of a living green roof – is basically vegetation and soil on the roof. That is fundamentally what it is. It's not painted green, it's not copper, it's vegetation and soil. There's different types of green roofs but in the main, the kind of green roofs most people are interested in, in terms of a small building, a house or a shed, what technically are called extensive green roofs, essentially they're quite thin. They're only about four to six inches, down to two inches.

Ben: When you think about a green roof – let's take a new build to begin with, what have you got to bear in mind? Is it things like climate and the strength of the roof? Take us through that process.

Dusty: Well, there's three basic principles of any green roof on whatever building it is. A roof mustn't collapse, a roof mustn't leak and in a green roof context, you must be able to get the water that falls on the roof off the roof when there's too much.

Ben: Oh, I like that. Incredibly concise. So what are the benefits. Why are we having a green roof? Sometimes I look at it and I think, this isn't a gimmick, is it? What are the reasons we're doing this?

Dusty: Well, 20 years ago people thought I was nuts and my colleagues were nuts. Now we have a policy in London because the main reason we have a policy in London, I'm just using London as an example, is because for a lot of cities and urban areas in temperate climates we've got lots of issues with climate change.

There are two things with green roofs, two, three things with green roofs that are beneficial in terms of climate change. First of all we're getting these very, very intense summer rainfall storms, which are causing flash floods. We've had a few this summer already. So if you've got soil and vegetation up on a roof, that can slow the amount of rainwater and the rate that that rainwater leaves the roof, which it can take up to four or five hours for the roof to even start draining which can ameliorate against flash floods.

The other one for cities and urban areas generically is we're having a lot of urban heat island effects and a lot of heat excesses. So vegetation and soil evapotranspirates and therefore that can help cool the city. Now the sub bit to that is because they evapotranspirate, in periods of heat excesses where buildings can get quite hot, especially in cities, you know, the ambient temperature can increase and become very uncomfortable. Having a vegetation and soil level can keep buildings incredibly cool. Now we know, not only anecdotally, we know practically that also in the winter, particularly in dry winters, when you've got soil and vegetation on there it's extra thermal mass, so it's insulation. The issue technically for building scientists is when the green roof is wet in the winter it isn't a great insulator because it's wet. But most people who have a green roof actually say their fuel bills are significantly cut in the winter but I have to do this technically because the building scientists won't accept the insulation value of a green roof because of the wet in the winter.

Ben: And it never freezes?

Dusty: It could freeze. If you were in somewhere like Scotland where you get very, very heavy frosts, you may get permafrost. Certainly in the Canadian, mid Canada, they do freeze. It's not an issue. You get permafrost and when it does freeze it actually acts as insulation. That's not a technical issue, it's just an issue of maybe the plants can't survive if you've chosen the wrong plants. That gets into horticultural issues then.

Ben: Let's talk about the plants because I have an extension which is a single-storey, it's a terrible job really. The roof was put in at the wrong pitch. So the lowest possible tile – I've always been told – is about 12 degrees and this roof is at six and a half. So we've had leaks the whole way along and it just suddenly popped into my mind, we're re-doing this, could we put a green roof on it?

And so, my one concern in all of this is maintenance, that if we ever came to rent out this property, what maintenance do you need for a green roof?

Dusty: Well, maintenance is always a very, very interesting subject. The type of green roofs that I really promote and colleague John, who I work with and we've written this online guide on, is that we're trying to get relatively natural systems up on the roof which should be relatively self-maintaining.

Now the issue there is if you get a very, very long hot summer you're going to have a brown roof. This is what happens. There's a big brown roof near here which is John's house. It suffers quite badly in the droughts but if you're relatively relaxed about it looking like that, then it's fine.

Now the other important thing that I always say about maintenance is when we talk about maintenance, is really at the back of the mind of most people is that, oh if I don't maintain it it could harm my building. The issue with maintenance on any roof, I do roofs now, is all drainage outlets and gullies and guttering on any building – commercial, housing, social housing, private housing – should every year be checked to make sure they're free from vegetation and soil so actually, basically, the maintenance of a green roof is normal maintenance.

The issue with the plants and soils is if you want it to look highly decorative you want to treat it like a garden, then you're going to maintain it like a garden. In reality 98% of people who put a green roof up never maintain it. That is the reality, buying into the idea that the roof is going to change. Then we get into a technical issue

or it's a decision-making issue. Because there are green roofs, partly through people like me, have become quite mainstream, the main issue for the built environment professionals who are not interested in the soil and the vegetation, because they are built environment people, it's so often commercially the way that green roofs go, is to try and make them light and as thin as possible. That works for the architect and for the engineer. So what we do is we have a lot of thin, lightweight systems that are being sold commercially . . . They're not bad but they're broadcast often as significantly low maintenance. Well, they're so thin and so shallow that when we get droughts you need to irrigate those things nearly every day.

So if you're a self-build person or you've got a shed or you've got an outhouse that you fancy doing, what you've got to keep your mind away from is not light - what do you want? If what you want is a relatively self-sustaining, pretty wildflower rich, with some Sedums, then that's the decision that you take. That's what you want. Then what you have to do is you have to say, well if I'm stripping off my roof and re-doing it, how can I make that roof a little bit stronger? So I put a little bit of my money into making it stronger and to be honest, most small extensions you're only doubling up the rafters. Probably in your case, you've got tiles so you've got no wood deck, well if you put the wood deck on, the marine ply deck on there, you've already given it lateral strength.

Let's say you've got an extension, hypothetically, where you've got 4 x 2 joists, probably let's say there are 600mm centres, yeah. Well what you'd say to yourself, what I'd do is I'd just actually put in a series of 4 x 2 at 300mm centres. Essentially, and this is not technically correct but it's a flippant way of saying, what I'm going to do is I'm going to design this roof so I can park a Mini on top of it. And really, let's say you've got a small extension, maybe 10 metres long and you've got to put in 10 extra joists. In terms of a budget, it's not a lot of money really. Yes, it's a bit of work. Then you put your marine deck down and then your ply down and then you put a waterproofing level on it.

Jon Broome, who we were talking about earlier, we took this from him. He's a friend of ours. You don't really need a high-end, proper waterproofing treatment. Essentially for the self-build, which is the Walter Segal method of waterproofing, you can use a pond liner because a pond liner is actually waterproofing treatment. The great thing about pond liner is you can get it prefabricated how you want it from the pond liner manufacturer and it rolls up, you lay it, you loose lay it. So there's no technical heavy waterproofing. Now if you

want added confidence you could use Sarnafil or a single ply or whatever. Then you get your specialist contractor to come in and do all that, yeah.

In terms of the green roof element you want to make sure that all they're doing is they're waterproofing. They may want to sell you the layer that protects the waterproofing or the pond liner from impact when you're putting the green roof up, which is normally a puncture resistant textile. I mean, there's a few technical edge details and things like that which is too difficult to go into in a podcast but essentially once that waterproofing is protected then you could put your soils and your vegetation on.

For us, particularly in terms of the self build because a lot of people who are in the self build world want to be relatively sustainable and so there are lots of nonsense products in the green roof industry world. If you can put your roof on a slight pitch it's really quite amazing, you know, even a slight pitch - water does run down hill. You get into this issue of how do you drain water off a roof when there's too much. So for the commercial industries we've had all of these special products, which really quite a few of us think are slightly dubious anyway. The way we try and say is think creatively about how you can drain your roof.

There's a roof just above us where we're sitting here, which is a great example of it. If you were to go up onto this roof you'd see all this low mounds of soil and you'd see these valleys which are basically filled with shingle which are about 20mm which are dry river beds. So when there's too much rainwater that dry river bed which meanders through the soil takes it to the outlet and drains the roof. You can cut out a lot of plastic and a lot of stuff that is said necessary, conventionally, and it's called convention, because we have guidelines and standards, but actually the only convention is a roof must drain at 2 litres per square metre per second. I know all of this being the president (of the European Federation of Green Roof Associations). As long as you're being creative, as long as I know how that water gets to that outlet, then why do I have to use all this complicated engineered stuff.

So once you've got this geotextile on, you've got your dry river beds, then you put your soils on – we don't really call them soils on, we call them substrates or growing mediums. Generally they're nearly 80% like a brick or a stone or an aggregate and only about 20% organic, because on a roof . . . I'll just pause there. A lot of people when they imagine a green roof and it's the term, they think, oh I'm going to have this really nice grass, bright green roof, yeah.

Well, really in a drought, grass goes brown. The best green roofs are really the ones that are flower rich. Now flowers, strangely enough, and the gardeners won't like me for this, flowers really do best where there's as little top soil as possible – in a natural environment. What you do is you get a substrate which is really, really poor in organic material because the grasses don't like that so much and the wildflowers prefer that. What you'll find is often those wildflowers are much able to suffer the droughts and the changes in our weather and therefore they're more resilient, which is a big term in terms of sustainability.

So you've got this brick-based or aggregate-based substrate up there and then you can seed and plant your plants and add your Sedums. Now I've said Sedums twice because I'm sure many of your listeners, if they're interested in green roofs, have gone out there and gone I need a Sedum roof. Well that's partly the product of the commercial construction industry desiring a lightweight system to meet the building science.

Ben: How many different things can you have on your roof? Is it just endless? You could have your flower bed up there.

Dusty: You could have your flower bed up there but that's when you get into maintenance and you probably need a much stronger roof, that's where you're really loading it. That's where we get into what we call an intensive roof garden process. You could do that but you need to be really strong. Most people aren't going to go to that level, to be honest. If you want a food grow, you're in the same process, you've got to make a much stronger roof.

The point that I'm trying to make is it's what they call the rockery Alpine community that we really use on a green roof. Sedum, Sempervivums, a lot of the wildflowers you'll see along the edge of roadsides in the United Kingdom, if you go to chalk grass. All those flowers are appropriate and they're tough, hardy plants that can deal with stress. At the end of the day most people who want a green roof aren't gardeners. Even the gardeners won't want to go up on the green roof. So what you want to put up there is something that is self-sustaining.

The thing why I bring Sedums, you don't need a Sedum roof, what you need is a roof that is full of flowers that are appropriate to a green roof. It's kind of like the Ikea mentality that *I buy this product I solve my problem* and it's very, very unimaginative. There's a very good reason why this word 'Sedum' roof is used and it's to do with the commercial systems, wanting to buy, mass-produce, buy

whatever they want. They're not wrong but it's actually not that clever and often the pre-grown ones are quite expensive. Putting a green roof up and I'm thinking of the person who may want to do that, she or he may want to do it because they just actually want a green roof. She or he might want to put it up because the other benefit of green roofs is they're great for wildlife if you do them well. What we like to say to people is if you're going to build a green roof and you're going to invest your time, if you're doing it, and you're also going to invest some money why not do it in a way that it's not instantly green but it evolves in front of your eyes. What happens with people is if they grow with their green roof they get used to the changes in climate.

2011, it was dry from February until May in South East England, no rain, unprecedented, trees were going to fall down, yeah, well green roofs would have struggled. Then you're going to get August 2012, rain all summer, la la la. We try to say to people, try not to go for a product try and go for a process that you can live with. The thing is, if you keep the nutrients really, really low, even to 10%, the organic material, you watch that and you go alright, I think I'll add a little bit more organic material. Now the problem is what a lot of people do is they have too much organic material and once you have too much organic material you have to take the whole lot off. So it's always better to start with the least amount of organic material. If you don't like it, you can add organic material. If you put too much organic material in, you've got to take everything off. People in their desperate urgency to see success, it ends up being disappointing because actually watching something grow is a much better way of coming to a really good green roof. I'm really appealing to your, the kind of people who may listen to your podcast because they're probably people who have an interest in building their own house, wanting to do things that are relatively within an environmental frame. Buying products off the shelf, which give an instant glow, you will find that you'll be doing a lot of maintenance down the years.

Ben: What do you mean by that, products that . . . ?

Dusty: Well, you can buy instant blankets, instant meadows and instant things which are pre-grown and you shove up there and you do what you do, yeah. What we think in green roofs is it's much better, if you're in a self-build in Cornwall. We helped a guy do one in Sennen. He bought our online guide, we helped him, he's a friend of John's and we told him, go around the cliffs of Cornwall, pick all the flowers from the cliffs of Cornwall, throw them on your roof. Get local granite aggregate, because that's Land's End for you, do that,

shove it up there. You've got the right aggregate, you've got the right plants, you know, you're going to make a reasonably local green roof. And it worked.

Next door somebody bought a Sedum blanket and he's still going to us, "Well, he's got this instant green thing." I said: "He irrigates it all the time, he has to fertilise it all the time and yours looks natural." So that's our attitude. If you're going to do this and you want to be sustainable, why don't you make it regional, local, and you can buy wildflower seeds and you can buy wildflower plugs. You can buy those and there's lots of good companies that do that.

I meet a lot of people who aren't really, who were never seriously into nature as I am who've said to me: "When you wrote in your guide, why don't you collect some seeds of wildflowers that you like the look of and throw them up, it actually gave us a route into understanding our environment." That's far more interesting than going: "Okay, I'll buy this thing, it was grown in Poland and apparently it works and I'm satisfied by the products," and it goes up. Then three or four years later there's a massive drought and you're going, "What have I bought!"

Ben: You mentioned drought and I think that is a key point with climate change. You look in California . . . Is there ever a place where really they should not bother with a green roof?

Dusty: Well, it's not my view. We have another colleague we work with, Gary Grant. He did a lot of work on trying to persuade countries and cities in the Middle East like Qatar and in Abu Dhabi that what they really needed to think about is not actually having green roofs as in bright green – it's the desert! – is to have what he called ephemeral desert roofs. So what you do, again, is you use the right kind of substrate up there and what happens in the desert is, certainly in the Wadis, when the rain does come, it doesn't come very often, but when it does come, is in the Wadis which are these stony, river valleys, it's where all the boulders are, you get all these plants. I've been into these Wadis and you get all these beautiful butterflies. So the idea with that, using that context, is maybe once every four weeks it's seeded with the plants of the desert, every four weeks it's irrigated as if it rained, so it might not rain for 12 years. These seeds are sitting there and it rains and all these flowers come up. So on the dry, desert roof, yeah, what you do is you maybe irrigate it once every 3 weeks, you get two weeks of the bloom, you get a week where it's not there, two weeks of the bloom.

Now in that context that's really about biodiversity and also giving some colour for the person whose roof it is, but the green roof still works in terms of its thermal mass. It's still doing all the other sustainable things but we're not manufacturing a system. A lot of the green roofs that are being put out in somewhere like the Middle East, they're northern European systems which are being irrigated every day. People there, I suspect, think oh that's what we need to achieve green roofs.

Not far from there relatively, halfway between the two, we have a colleague in Greece who's been making indigenous Greek green roofs which are based upon a Greek mountainside. He does irrigate some of them in July, August, but some of them he doesn't. He says: "The Greek mountainside in July, August is not in bloom." So it's this thing we have to fight this culture that everything has to be green all the time. I happen to live in London on Blackheath. If you were to go to Blackheath over the last four weeks and it happens every year . . . I have friends all over the world who presume that England's green all the time. Well, actually Blackheath is brown.

Ben: Not today though! [Ben laughs.]

Dusty: Not today. Well, it probably is actually, because it's sort of grey, brown because of the rain. At the end of the day our countryside in August is naturally brown. This idea that everything's got to be green all the time is this strange thing.

On that, because you mentioned California because we have friends from California . . . There's a very famous green roof there. I met a guy who's actually from England and he said: "Oh yeah, we've got one of those so-called green roofs – it's brown!" Well I was there in June and I said: "Well, look." We were on a boat, looking over California, this is San Francisco. I said: "Well what colour is California?" Well he said: "It's brown." I said: "What colour is it in January and December?" He said: "It's green." I said: "What colour is a green roof in January and December?" He said: "It's green." I said: "And what colour is it at the moment?" He said: "It's brown."

I said: "Yeah, because it's designed as a cascade mountain grassland community which looks like that mountainside at the moment." But because it's on a building people go, oh hang on, it's on a building, therefore it's got to be green all the time. It's again, we're forcing our aspiration onto something that actually really naturally wants to do what it does, just like everything else naturally wants to do what it does.

So we try to encourage people to fight that compulsion that we've been almost bullied into. Things have their natural progression. To add to that, we're looking out of the window here at my colleague John's house there. He built that 20 years ago. He used site soil from the footing, shoved it up, because that's what he thought was a good idea then and that's what Jon Broome thought was a good idea. What happens is that gets very, very grass dominant and it's now pretty brown at the moment but what's interesting about using that roof as an example, depending on the climate one year you might have Oxeye Daisies, next year it might be brown from April all the way through to September with a few Sedums on the edge. Then about three years ago he was up there and he went: "What are these?" He discovered that he's got a Bee Orchid colony up there. It appeared after 17 years! So the point there is there's no real right and wrong, I mean, the principle is try and keep the nutrients as low as possible. What you've got to do is accept that the roof will go with the climate. If you buy into that it becomes interesting because actually what it is, is a dynamic situation.

The trouble is in the built game we always want everything static. My brick will not decay. My metal will not rust. But vegetation and soil changes.

Ben: That's definitely a point that I had never thought about because you're right, green roof, what's the first thing you expect from it – to be green – which I suppose is why living roof is a better description. Let's move on now and think about if we wanted to get this done for ourselves and we're looking to someone to do it. How do we go about it? Who do we know that we can trust, and so on?

Dusty: Well, the problem currently is green roofs are a relatively mainstream industry now but they're really mainstream for the big commercial jobs in our cities and in the built environment. So there's very, very few small-scale green roofing companies in the country at a regional town or district level. I mean there are a few. There's a couple in Brighton, one in Oxford, the really good ones, they're not everywhere. So a building contractor, I'm sure would love to do it but they're generally, I suspect, will then go to like the Viking manual or who's going to supply me with this, this is what my client wants. You're getting something that is relatively generic and it may not actually be what you want. So in a way, it's not the building contractors fault and it's not the client's fault, it's just disjointed.

Ben: Is there a reason why this hasn't developed more to have individual people who are specialists in this? Obviously it has in certain parts, perhaps where there's a big enough target market.

Dusty: I think it's because it's not quite as mainstream as putting up a photovoltaic panel. It's not mainstream like roofing felt or tiling. Most building contractors, to be fair to them, they would normally, the garden would be preserved by the landscaping contractor and I'd do the bricks and the mortar. You know, the green roof is not bricks and mortar, it's plants and sand, and there's a building element. So you've got a building contractor and a landscape contractor interfacing over a roof edge.

It's very difficult to advise people without promoting a certain activity that we've done, because we've written this online guide which does cost money which goes through every single step that you as a builder, self-build, can use or you as the client can show to your builder so that the decision can be made to do what you want. If your extension wants a rooflight, there's a little bit about how you do the green roof with the rooflight. You've got a flue . . . So the builder and the client can make the decisions that they want and actually save money, and in many ways save money both for the client and for the builder, because the builder's not wasting money on expensive stuff, the client is saving money because he's not buying in expensive systems and you can make decisions about saying right, I'll make the roof stronger, I'll put the plywood deck on and I'll actually source all these products locally. Essentially what you need, you need the liner, you need a geotextile membrane, you need some substrates, you need some plants. Really, that's it.

Ben: Well, I've found it fascinating. I think we have to round it off here. Anything you want to finish on, anything people get wrong or a final thought?

Dusty: Do it. Make sure you do it and you get everybody else in your street to do it because it will actually make our urban environments a much, much better place and you'll get so much pleasure out of it. That's the thing. You build a house and then you live in it but actually when you look out of your bathroom every morning when you're cleaning your teeth and every stage of the year you see this green roof and it changes. Most people I know put one in, the amount of pleasure that I got, the money was well spent.

Ben: Dusty, thank you very much.

Dusty: Not at all.