HPH355

Ben Adam-Smith 00:00
This is House Planning Help episode 355. Hello, I'm Ben Adam-Smith and this is the podcast for you if you're interested in self build or retrofit. I'm exploring what houses we should be building in the 21st century, and try to break down the major roadblocks that may get in our way. Coming up in this session, it's the return of Lloyd Alter, we're talking about his new book, 'The Story of Upfront Carbon'. What is upfront carbon? Why should we care? How's it applicable to our projects, and what we do? That is coming up. I should mention though, that this episode is not entirely on housing, it's bigger picture, because upfront carbon is generated by all of our activities and endeavours. And so we probably should reference Lloyd's first book, we also did a podcast on this so we'll link everything in, 'Living the 1.5 degree lifestyle: why individual climate action matters more than ever'. And I really enjoyed that. Tried to embrace some of the lessons as I suppose we maybe all do as we head through life, some things are easier than others that is for sure. And I thought I'd insert a fun fact here, because later on, we're going to be talking about burgers as part of this. And I am still yet to eat at a drive thru. There we go. That's my fun fact, or spelled the word through T H R U, yeah never done that either. But for me, that's not difficult. I'm not really challenging myself, it's much harder to do some of the other things. In fact, I think the things that Lloyd perhaps has found a challenge too, one of them being flying. So let's get into our conversation. I started by asking Lloyd for a recap of his last book, and what lessons he turned into habits since then.

Lloyd Alter 01:45
Well, that book came about after reading a report that said, we all have to try to live a 1.5 degree lifestyle, which means emitting, on average across the world. 2.5 tonnes of carbon per capita at 2030, getting down to one tonne per capita at 2050. And so I tried to live that 2.5 tonne limit, which comes out to 6.8 kilogrammes per day of carbon emissions and changed my life to do that. I had it easier the year that I was doing that because there was a pandemic. So I wasn't able to go out and burn a lot of carbon easily and I couldn't fly very much. When you ask what have I done, that I still maintain from that book? Well, I'm talking to you and in London, so I'm clearly gotten on aeroplanes, and the one aeroplane flight is equivalent to about four months of carbon, it would have eaten up a third of my year. So this isn't something that you can do regularly. I do occasionally have red meat, but not very often, it's off the menu. I don't buy nearly as much stuff as I used to I'm very, very careful. I never look at anything without thinking, I shouldn't be doing this maybe because of the carbon footprint. Right now, this is a silly story, you know, I was asked to come here to speak at two conferences, and I'm being interviewed by the BBC on Monday about kitchen design, and I came here wearing really crappy clothing and walked by the store and bought a suit. You can see it hanging there, the first one I bought in 30 years. And then you fall into this thing that's called the Diderot effect that if you've got a nice suit, well, maybe you need a nice shirt to go with it and... shoes. No, I'm not buying new shoes. No, I'm not doing this. You better get a haircut, I got a haircut. You know, once you fall into consumption, it's very, very difficult to get out of it. And so I probably shouldn't have bought that suit. But here I am.

Ben Adam-Smith 04:00
I try to do my best as well with a lot of the decisions I make. I suppose I can only hope that each year that goes by that we're on an improvement line rather than falling off the waggon.

Lloyd Alter 04:13
I can definitely say this is my last suit.

Ben Adam-Smith 04:18
Okay, so that was the last book, we'll put the link in the show notes to the chat about that because it's well worth doing. But you didn't stop there. In fact, you came out of it almost with this idea thinking I know exactly what I've got to do next. So why?

Lloyd Alter 04:32
Well, because what I learned in my first book is where I started measuring every teaspoon of milk that went in my coffee and saying, Oh, I've got to switch to oat and all of these little things that are a couple of grams of carbon, but that what made the big difference were the big things and primarily they were consumption based. If you buy a car you're buying 14 tonnes of upfront carbon emissions, the emissions of making that car. Everything you buy has these issues and people would talk about efficiency, efficiency, efficiency. But efficiency is pointless without sufficiency, without deciding how much do you really need or as the phrase really what by Samuel Alexander, the Australian philosopher is "efficiency without sufficiency is lost, it's meaningless". So you can use my favourite example, say I'm going to build a super efficient Passivhaus. But if you build it at 500 square metres, you're using a lot of material and because its energy is measured on a square metre basis, you're using 10 times as much energy in a 500 metre square building than you are in a 50 metre square building. So sufficiency really matters far more than we give it credit for. And that's why this book has its subtitle, 'how a life of just enough offers a way out of the climate crisis'.

Ben Adam-Smith 06:05
I'm sure during this conversation, we'll get to grips with what that might mean. But any tips at this stage what is just enough?

Lloyd Alter 06:15
Well, I've did find in my last book, for instance, in transportation that we are in the middle of an electric transportation revolution, where E-bikes, let older people, people who aren't as fit or people who just have to go further, or people who live with hills, do things that were almost impossible to do on a regular basis comfortably on a bicycle. And in my year, and in my life, since I just basically stopped driving a car and use an E-bike for everything, it is sufficient. And people say, oh, you can't go to a lumberyard and not all of these things that you need cars for but you can afford if you're not paying for a car to have them deliver it for you, you know, this infrastructure all exists, you can cope without a pickup truck, and even in North America. So sufficiency is just deciding what is enough to do the job. I have an iPhone 11 Pro, I used to get every upgrade of every Apple product as soon as it came out. The iPhone 11 Pro was the first that came out with a wide angle lens and taking pictures of buildings and inside rooms in that I just jumped at that 11 Pro, but I look at every new camera since and say what has Apple done to entice me to upgrade to the 12, 13, 14 or 15. And when I start weighing it against A the

money, they're expensive and B the carbon, well every year that I keep that 11 going, I'm amortising that upfront carbon over a longer period, and it's getting less and less and less. So that's what you have to do, you have to get things that are good quality, you have to maintain them properly. You have to keep them as long as you possibly can. That's like the single best thing that you can do to actually reduce your emissions.

Ben Adam-Smith 08:07
When you had your iPhone and you were replacing it each year, what happened to the one that you'd just finished with? Because was it just handed down the chain? Are you actually making any difference at all?

Lloyd Alter 08:20
Oh, because the Apple does take them back. They do recondition them, and they do sell them. This is in fact a significant point that they do last longer than you think. But you're still creating the need for the input, the new one has to be made, they've got to go find the rare earths, they've got to go find the titanium that they make the case out of. So even though my old one is still going, we have to reduce primary demand for all of this stuff, we have to say, okay, maybe the world doesn't need the iPhone 15 or the newest MacBook. Like I do word processing. I can't imagine needing to replace my little Macbook Air ever really it does what I need for what I do. So this is the problem because yes, my old iPhone, I don't need to feel guilty that it's just going into a shredder into the garbage. But I do have to worry about the materials that are being mined to create the new one.

Ben Adam-Smith 09:19
And you'd have to worry as well if it just sat in a drawer after you'd finished with it, which I think a lot of them do. I have met this guy who has helped me with some computer issues I've had and he basically says all these computers are absolutely fine. There's nothing, no problem with them. You just need to know how to speed them up and do all these things. So it is a case of keeping them going. But I have another question here because I've got a car that's 15 years old. That's diesel, I was told at the time that this was the way to go and I just look at it and think should I be replacing this should I keep it going? It's a little car I don't use it that much. It does the job. Should I keep it or should I get my new electric one?

Lloyd Alter 09:59
Well this is a very difficult analysis to do. But it totally comes down to the number of miles or kilometres a year that you drive. If you drive for instance, like we do in our house where, because I live in a part of town where we can get everything within walking distance and only use the car really in summer, we're putting like 5000 kilometres on a per year. If I said, okay, I want to buy a new Tesla, I'll get this smallest one, the model three, it's got 14 tonnes of upfront carbon emissions for making the car. Even though the electricity in Ontario, Canada, where I live is very clean, almost all coming from hydro electric and nuclear. So once I own that Tesla, it's the cleanest car on the road. But I have this eight year old Subaru and if I amortise out those 5000 kilometres a year, it doesn't make sense to replace it. It just keeps going. It's a wonderful car. And if I was driving like 30,000 kilometres a year would be a completely different story on the carbon emissions. But you've got to take those carbon emissions from making the Tesla you've got to amortise them over the life of the car. And you'll find that every kilometre

you're still putting out a couple of grams from the embodied carbon amortised and it's probably still better to keep the old car going.

Ben Adam-Smith 10:08
How are we coming up with these numbers? And can we always rely on them?

Lloyd Alter 11:27
No, you can't rely on them. These numbers are often picked out at the air. There are different ways of looking at things. There are different systems there are the checks and balances aren't all there in building products, they've tried to standardise it but with everything else, all these companies are making up their own rules all the time. Unilever said all of their food is going to be carbon neutral by such and such. And then they gave that up because they actually couldn't figure out in the whole supply chain, what everything actually was. There is a motorcycle company in Sweden that said they were going to build a zero carbon motorbike, electric motorbike and they threw up their hands and gave up because inside that electric motor were 500 parts from all over China, and they couldn't get the data on anything. And they said, well, all we can tell you is the footprint of the basic frame of the bike that we make. So when you get into all of these things, it gets very complicated and opaque and hard to figure it out. There's few standards, especially when you get out of the building industry, there are no standards. And so you just have to muddle through.

Ben Adam-Smith 12:53
Have we fully explained what upfront carbon actually is?

Lloyd Alter 12:57
Good point, we should do that. That common term in the industry is embodied carbon. You know, many years ago, 20 years ago, everyone used to talk about embodied energy, the energy that went into making something. And then with the Paris accord, and with everything like that people started thinking, well, we used to really worry about energy, now we have to worry about carbon. And so whereas embodied energy was the energy that went into making something. And body carbon is the carbon that is emitted making something. Embodied by definition means it's in it. And I said, No, it's not in it. It's in the atmosphere. You can't call it embodied carbon, it's gone. And I was having a Twitter discussion about this with a New Zealand architect, Elrond Burrell and an Australian architect Jorg Chapa. We say we've got to come up with a better name and vomited carbon, spit carbon, all of these disgusting images which we wanted. And finally, Jorg said, you know, let's not get so rude. You know, what about just upfront? And I thought this is great and I started saying let's call embodied carbon upfront, and it wouldn't have gone anywhere except Jorg was part of a group in the UK, the World Green Building Council that wrote a pamphlet called Bringing embodied carbon up front and inside the is up front. And now in most of the world, the term upfront is used for a portion of embodied carbon up to the point where a building is occupied. I think it should be used for everything but I'm just happy and many people credit me with it, but it's really Jorg and Elrond and Twitter and the three of us together but it is the carbon that is emitted up front before you unpack your iPhone before you step over the threshold of your new house, which is usually the deadline where it stops being upfront carbon, you take delivery, it's yours. And some people argue well should be early or should be where it comes out of the factory because delivery could be to all different places. And that's impossible to calculate. I just say, think of at

the point that it's in your hands. I had a student who actually analysed a pencil for her class and it was a brilliant brilliant examination because the staedtler pencil was made in Nuremberg, from clay from Pennsylvania and graphite from Turkey, and cedar from California. And all of these things came together in a pencil. In Nuremberg, which was shipped to the store in Aurora, Ontario, North of Toronto, and the carbon emissions from her driving to the store and bringing it home were twice as big as the whole manufacturer of the pencil and shipping everything all over the world. So this again, tells you a story about upfront carbon, it's important, but you've got to know you got to bicycle to the store to pick it up, or it's all worthless.

Ben Adam-Smith 16:01
So you've got a whole section in the book, which is going to dig into that more and the specific process that you get. It sounds like it's a few things, it's if you're getting the materials to begin with, it's the movement about that transportation do they fall into categories that we can list, or?

Lloyd Alter 16:19
They do. I mean, the the building, people have actually figured all this out, where they have categories from A1 to A5, which is mining, which is manufacturing, processing, which is delivery, and which is building into the building, and the A4 and A5, the delivery and the assembly of the buildings are the ones that are really hard to calculate, because they're obviously different in every case, or as this kid driving to Aurora and then going home that would be in that transportation thing, which would be huge for her pencil. In buildings, it's much less so and there are huge arguments going on right now about what is it actually, some people say, well, it's only 3%. And other people say no, it's 30%, you're just not counting it, right? It's all very controversial. What I come back with every single time as the one thing that is true of absolutely everything that if you use less stuff, you're going to be putting out less upfront carbon. And it's the conclusion that I come around to in almost every issue. Now obviously, if you are building something out of straw, it's going to have lower upfront carbon emissions than if you Build It out of aluminium and foam insulation, that we have to think about using the lowest upfront carbon materials and everything that we make, like I will always buy a wood pencil rather than a mechanical metal pencil just if you have a choice. And I will always use a bicycle instead of a car if I have a choice. The ultimate thing is just how much of everything are we using?

Ben Adam-Smith 16:24
Well, I don't mind underlining that a few more times. Since we're in this construction area. Let's knuckle down on a couple of things here. I know you mentioned your apartment section of the book of when you were looking at. So can you describe that for us?

Lloyd Alter 18:12
Well, again, the problem is in building design, people think oh, if I just build it out of the right materials, say mass timber, then I will be doing the right thing because mass timber has a lower upfront carbon emissions than steel and concrete. But mass timber, for instance, can be used really inefficiently. I know one architect in the states who wanted a 10 metre 30 foot grid, because that's what traditional offices are. And it's more flexible if you want to convert it to other uses. And he was very proud of these giant wood beams that it took to build it to this 30 foot grid, huge chunks of wood. But he thought that was okay because wood sequesters carbon. So if I'm using big beams, I'm storing more carbon. This is

an argument that a lot of people who use wood, say all the time. But again, you know, people aren't sure how much of it is really stored in the wood, how much of it is left in the ground in roots? Or how much is just the slash the small branches and the leaves that are left on the ground? does it actually work to your benefit to use more wood? And the consensus is no, the consensus now is generally no, you want to use as little as possible. And there's one architect in London, one of the pioneers in mass timber construction, Andrew Waugh of Waugh Thistleton, who's really been the world leader in it. And he knew that I'd been writing about this and I would have thought he was getting mad at me for always saying, you know, you got to use less wood you got to use less wood, but he took me to his absolutely gorgeous black and white building in London that opened last year. And the first thing he said was, look at these columns we're using 40%, less fibre 40% less material per square metre than we did 10 years ago. We're constantly refining and revising, and learning so that we can use less material less fibre, because he really, you know, if you're going to sequester more carbon, you're chopping down more trees, you got to plant more trees. And nobody knows exactly how much carbon is emitted and how much is sequestered. And after my last trip to the UK, where I was speaking to everyone I could about wood, I went back and spoke to a Canadian wood expert. And I said, I'm so frustrated, I'm trying to figure out what is the carbon footprint of a cubic metre of wood. And nobody will tell me, nobody seems to know. And this guy said, you never will find out because it's impossible. Every forest is different, I could take you to 140 different forest types just in the province of British Columbia in Canada. And this one has deep roots, and this one has shallow roots. And this one got a lot of rain and the thing develop this way. And this developed this way that every tree is different, every forest is different. Every way they cut it is different. The only thing that we can say is make sure that you get certified wood from FSC certification where you know, it's going to be carefully harvested and replanted. And again, use as little as possible. So that means you're going to see buildings with sort of tighter grids are not going to try for the 10 metre grid. You should see simpler boxier buildings, we should stop this insane competition to be aware that tallest wood building in the world said no, you don't want to be the tallest wood building, because then the columns are getting bigger and bigger and bigger, and you're putting in more and more fibre. And you've got to deal with harder fire regulations and all of these things. And there was a wonderful study by Professor Hannes Gauch, I forget which English University where he built this great computer model and twisted all these dials and basically came up with you want boxy buildings about six storeys high with wood construction with windows that are pretty small and flat facades and no brick. And this has like 50% of the upfront carbon of every other building. And if you go to Austria, or you go to much of Germany, and you look at all of the new apartment buildings they're building, that's what everything is, you can do this. So when you start looking in terms of upfront carbon architecture really changes but Architects like big windows, architects, like lots of glass, it's easier to design.

Ben Adam-Smith 18:37
One thing I will say here is this hope for the future that when new architects new builders come up that they can almost take the baton from where we are, rather than trying to make all the mistakes all over again and come up with these things. Because there's so much just logic, common sense and simplicity in some of these things that feels like have been discovered. But then it's the communicating side of getting it out there.

Lloyd Alter 23:26
Well, yes, like the one person I when I came to London, this time, I didn't spend a lot of time running around to meet people. But there was one person I really wanted to meet an engineer named Steve Webb of Webb Yates, who has been exploring the possibility of stone. And I asked him when I was writing an article for an American publication to send me a letter and he said these things that were just amazing. He said, you know, look at concrete, how do you make concrete? You take limestone, you grind it up into a powder, you put it in a kiln at 1450 degrees Celsius, you then mix it with a bit of clay an aggregate to make what stone, you're basically making artificial stone. So if I go to a quarry, cut out the limestone, cut it into blocks, drill a hole and put a cable through it as reinforcing. I can make a beam out of stone that stronger than the beam out of concrete with a 10th of the upfront carbon emissions. And it will last five times as long, I said why aren't we doing this? Making concrete is perverse. And he's absolutely right.

Ben Adam-Smith 24:44
There are a couple of other things that you wanted to get to, what's heat pumps?

Lloyd Alter 24:48
Ah heat pumps, this is a really, really interesting thing because there's a big conflict going on heat pumps, you know, everybody's had heat pumps for as long as we've been alive. Because if you've got a refrigerator, you've got a heat pump, it's moving heat from inside the box to outside the box. That's what an air conditioner did, move the heat from inside your box to outside the box. What a heat pump is, is you're just putting the air conditioner in backwards and it's taking the heat from the outside air and bringing it into the inside air. And everybody says that they don't work at cold weather, there's not enough heat, and is it really, zero degrees Celsius is 270 degrees Kelvin, going right back to absolute zero. And you know, 20 degrees Celsius is 293. I mean, the difference between 293 and 273 is very, very small as a percentage, there's still a lot of rapidly moving molecules with heat in them. And I was doing a whole thing in my LinkedIn thing. So wow, it's a balmy 270 degrees in Toronto today, you know, three cells below Celsius. And that. And when you think about that said, No, there's lots of heat to pull out of the air and to move. And so that's what heat pumps do. And there's a big argument going on. Now that was started by a Canadian who looked at people doing really efficient buildings with urethane foam insulation. And urethane foam insulation has huge, huge upfront carbon emissions from making it from the gas that they use that they blow up the bubbles in the foam with. And he pointed out that if I just done the thing to regular crappy building code over its life, over 50 years, it would still have the crappy Building Code house, even gas fired would have lower carbon emissions than the super efficient one. And I first learned this seven years ago, and it made my head explode because it meant that everything we were doing was wrong with sort of going super insulation, insulation, insulation, reduce energy consumption. But if we were doing it with foam, the cure was worse than the disease. And in Europe here, they quickly figured this out and banned those gases that were used before. And so foam has gotten much, much better. But this is why you're seeing so many people getting so interested in insulations like cellulose and straw, and wood fibre because they don't use any greenhouse gases. The point is, is that now suddenly, people were saying, well, if we've got heat pumps, and we've got clean electricity, which electricity grid is getting cleaner and cleaner, then really we don't need to worry about efficiency. We're not worried about energy, we're worried about carbon. And if I've got a heat pump and I've got zero carbon energy has slapped that in together then why bother insulating so much? And the

answer is, I read this I heard this from an engineer named Toby Cambray wrote about Passivhaus plus magazine and it also said well, do we have to rethink this? Do I have to rethink deep energy retrofits do they make sense? Another Canadian who works in the UK Kelly Alvarez Doron said no, you look at the embodied carbon of triple glazing compared to single glazing and the energy of you look at it over the life of the window and it'll take 200 years for the triple glazing to pay for itself. Because the frames are heavier, the glass is heavier, everything is multiplied when you go triple glazed, and a lot of people reacted negatively to this to point out that there's no such thing as zero carbon electrons. Even if you live in Ontario, where I live, they're part of a bigger grid, they sell electricity to the state. So electricity comes back. We're all in a big pool. And still people are still generating electricity from coal in some places. And if you don't burn it here, then it can be exported to replace some coal that they're burning in Poland. So you still have to reduce energy consumption as much as you can. You can't just ignore it and say, I'm going to heat pump-ify, this was Toby, Toby Cambray's thing which do we need more of insulation or heat pump-ification? Which became my new term heat pumpification and the answer is you need both.

Ben Adam-Smith 29:16
You need both. It's just one can come first content so long as your plan.

Lloyd Alter 29:20
Yes, that's what the AECB and other organisations are saying, well get the heat pump first. I said no, no, no, because the heat pump you're gonna get is bigger than you need it to be. And the refrigerants that go into heat pumps are really dangerous greenhouse gases, and they leak they leak much more than people know. Like they leak 2% to 5% per year and if you've got a crappy installer coming to fix it, it can all blow out in one shot and there are new refrigerants that they call natural. I don't call propane natural because it comes from natural gas and that but that are not fluorocarbons and have very low greenhouse Gas Emissions like just three times carbon dioxide, whereas the artificial refrigerants are like 303,000 times, but heat pumps can only be a certain size because propane is flammable. So it's limited to I think a kilo. And that means that's a limit on how much area can heat or cool. I don't care what you do, if you get up to the point you can still use and R290 or propane heat pump. And the two ways you can get down to the size of an R290 heat pump is use more insulation for more efficiency, or build less stuff live in a smaller space. And so once you start thinking of this whole picture, yes, you can go heat pumps, but no, you've got to go with a low greenhouse gas refrigerant, which limits the size of the heat pump. These are the things you have to weigh.

Ben Adam-Smith 30:56
I think there's always a logic of going down the fabric first route, because it will give you health and comfort and all of those things.

Lloyd Alter 31:05
Yes, you always have to remember comfort.

Ben Adam-Smith 31:07
And what about if the grid fell over one time, you still get those to a degree, obviously, ventilation might not work, but it so yeah, there's lots to consider.

Lloyd Alter 31:17
Well, that's another point that I make in my book that everyone forgets about, I have this whole chapter of things that you can do in words ending and Y, one of them is intermittency. The thing about this new world we're getting into where we're relying on renewables for everything that's renewables are intermittent. And if you live in a draughty old 1913 house like I do when the furnace goes off, which I should very briefly explain happens quite often in my house because my boiler is connected to my water heater. And if in the middle of the winter, my daughter takes an hour long shower, it empties the water heater and the furnaces computer insists on going to the water heater before it goes to heat. And I can't fix that. So turn off the heat in the middle of winter because my daughter has a shower. And you can just see the temperature in the house drop like three or four degrees and a couple of hours. Now, if you live in a really well insulated or Passivhaus, if the furnace goes off, or if the utility actually decides to use your house as a thermal battery and pay you to turn off the heat for a little bit of time, which they can, will suddenly you can start shaving the peaks, you know, they have to design an electrical system for the country not to do the general demand. But they have to cope with the peaks, the coldest darkest days of winter, if they can't do that, like what's the point. So we have to get really smart about shaving the peaks. And we shave the peaks by designing our houses to be really, really efficient so that if the heat goes off for an hour, and the hot water heater goes off, you don't notice it. And someday, it'll be so smart that we'll connect our electric car to the house. And all of the electric cars with the 1000s of batteries. And those electric cars. And the electrical system can then for the whole country be designed around the fact okay, it's January, and it's dark, and it's the middle of winter. And for the next six hours, we're just going to keep everybody warm by running it off their cars and not needing much energy because our buildings are so efficient. This is the world we have to look for because electricity, batteries can only store so much, but we're putting huge numbers of batteries into our cars. And if we take advantage of all of that, then you know everything changes. So this is why designing for intermittency is so important. And the way you design for intermittency is with lots of insulation and good quality windows.

Ben Adam-Smith 34:00
I'm going to move us on a bit now because I know you're getting hungry. It's nearly lunchtime. So let's talk about hamburgers!

Lloyd Alter 34:05
Okay!

Ben Adam-Smith 34:08
You wonder where I was going there?

Lloyd Alter 34:09
Yes. I said no, no, I can keep going. I can keep talking. But yes. One of them things that I really wanted to do with this book and I say all the time. It's not about buildings. I was at a building conference just the other night and then LinkedIn. The other people say oh, we have to talk more about embodied carbon and somebody said I can't wait for Lloyd Altars book, is it? No, no, no, no, it's not as much about building materials. I also talk about puffer jackets and hamburgers. And hamburgers I find fascinating

because in my first book, I talked about them simply because the carbon footprint of beef is very high. And eating a hamburger will kill your daily carbon allowance because each one is oh, I think it was about five kilogrammes of carbon emissions just from the hamburger. But what the chapter in my book was about was really about the societal importance of the hamburger. And this is, I think, more an American/North American story than a British one. I think there are British equivalent foods. I keep hearing about butties. I don't know exactly what a butty is? But

Ben Adam-Smith 35:17
You might have a bacon butty or something like that a roll/sandwich.

Lloyd Alter 35:22
But you eat it with your hands. That's the point?

Ben Adam-Smith 35:24
Exactly.

Lloyd Alter 35:25
And the hamburger was actually invented in a World's Fair in the states in the 1880s. And it was called a hamburger steak. And it didn't become a hamburger until all these stands started opening up outside factories, where the Hamburg steak was squeezed between two pieces of bread and later a bun. And this was portable food. And what portable food meant was that post the Second World War when people were driving everywhere, because they suddenly had highways, and they suddenly had cars and they were all moving to the suburbs. Basically, McDonalds was able to open and they were able to, running a restaurants expensive when you have seats and you have waitresses and you have waiters, and you have dishes to clean and all of that. And it takes a lot of space. And these guys opened up a stand where you came up to the window and you got your burger wrapped in a piece of paper, and they offloaded all the real estate of us restaurant to you sitting in your car. And so the hamburger post Second World War became a story of the evolution of the car in North America to have cupholders for everything and fold down trays. And I was just taking pictures at an auto show of a new pickup truck that actually had the centre console folded out and you could lay out a whole dinner on the space between the driver and the passenger seat, it was insanely huge. And it's one of the reasons that these vehicles just got bigger and bigger and bigger because they're now mobile dining rooms. And this is how people eat so much of their food in North America in their cars. And so what started as like a piece of meat between two pieces of bread actually is a profound influence on our entire lives on you know, how we eat, where we eat, what we eat, has all become every one of them incredibly and carbon intensive. I looked at a study about the average emissions for idling in your car waiting to get up to the takeout window and it was close to a kilogramme of carbon just in emissions from your average american pickup truck which everybody's driving till they get to the gate. It's not as much as the hamburger but it's huge. Not to mention getting the bigger cars met these vehicles have much more metal, much more stuff in them. They've switched from making them out of steel to making them out of aluminium, which has all its own issues of making aluminium. The whole thing you start with the humble little hamburger and it's well, Carl Sagan then one of I think his most brilliant lines: "If you want to know how to make an apple pie, you have to invent the universe" but basically said, you know, everything goes back to the fundamental roots. Well, where did the apple come from? Where did photosynthesis

come from? Where did the sun come from, you know, it never ends. And it's the same with carbon. It's the same with the hamburger. You know, you can follow things back down. This is actually a line from Mike Berners-lee in his book about boundaries, like where does it stop in your calculation? If you start going down the rabbit hole of carbon it never ends.

Ben Adam-Smith 38:54
Is there any way to visualise the carbon? Because we talk a lot about the weight don't we in our allowance?

Lloyd Alter 39:00
No, it's it's very hard. It was a very funny thing. And I found it particularly with my students, because carbon dioxide is a gas so you don't visualise gases as having weights because they float up in the air and ever since we started worrying about carbon, people have been doing things to visualise it so you'll see cars with giant balloons behind them and they're showing the balloon the size of the carbon and another person envisioned balloons and showed them all piling up around the Empire State Building on all of this and balloons I thought okay, that works. And the cake motorcycle company designed a box the size of the carbon and hung their motorcycle in the middle of an I don't have the volume isn't the way to do it. And one of my students win this assignment where they had to pick an object and they picked a piece of paper and the manufacturer of the paper was so many grammes and the logging of the tree was so many grammes and then the transport of the piece of paper by train was 27 kilogrammes. I said, Well, wait a second, wait a second, how can transport you're off by a factor of maybe 10,000 on this people don't visualise weight. So I tried to think of things. You know, in my book, I was going to have a bunch of symbols by everything, like, I started with barbells you know, my watch has 80 kilogrammes of carbon and it's so you know, 80 kilogrammes of weight so people could visualise that but it got awkward. And then I thought joking I always remembered from high school that love son of J. Alfred Prufrock were Prufrock says, I've measured my life in coffee spoons. So I went and measured a coffee spoon and figured out what the carbon footprint of a coffee spoon was. But their little it was only 26 grammes. So that wasn't going to work. I'd need 1000s of coffee spoons. And then I just thought of old road runner Wile E. Coyote movies and Lufthansa an anvil. They weigh about 200 pounds, that's about 100 kilogrammes. I'll just measure everything in Anvils. And I started doing this with my students. I said that piece of paper, you know, you got this wrong is like 60 anvils here worth of and when they started visualising things in terms of anvils dropping on Wile E. Coyote's head, they started thinking about the picture differently. So my MacBook Air computer, it's an air because it was light as air, right? That's why it was called that. But it's an anvil and a half, My watch is half an anvil. And when you start thinking of things in terms of anvils, instead of vague kilogrammes of carbon, you begin to realise that it's heavy, it matters, it makes a big difference. And that your card that you may think only weighs three tonnes, or 30 anvils is really 200 anvils and it's like giant piles of iron everywhere. And I thought this was a more useful way to visualise things.

Ben Adam-Smith 42:11
We've talked through a few different examples, and I know there'll be more in the book, which we can explore. But maybe we could just finish up today with looking at some sufficiency strategies. You've mentioned the obvious one, which is just buy less of everything and keep size down.

Lloyd Alter 42:30
Right, I think that we have to start right now rethinking the way we do standards and codes and everything which everything is done. For instance, the Passivhaus standard says you can have so many kilowatts of power per square metre, our building codes say your wall should be so much resistance a U value or R value and that and they should be this high. Cars are all sort of fuel efficiency, so many gallons per kilometre, I think we have to start figuring out instead of relative standards, we have to start thinking of everything in absolute standards. How much carbon is each of us entitled to in a year or in our lifetime? What is our carbon alottment? I hate to use the word ration but it's the word that we may have to start using. And say, okay, if you want to build a house, that's going to be only 50 square metres, or 80 square metres, which was what everybody built after the Second World War families were raised in 80 to 100 square metres, then you'll get a carbon allowance for heating and cooling, especially if it's a heat pump of this much energy. Well, that house because if you've got your energy allowance, it could actually be built less expensively. That person could be comfortable with a little less insulation, double glazed windows, it's not going to be as comfortable as triple glazed, but it's better than leaky, terrible things. So if you're building lower cost housing, you could maybe say slightly lower standard because it's small. But if someone wants to build 500 square metres and has the same carbon allowance, they're going to have to really be careful and they're going to have to build it to a really high standard. And then if you start saying oh, by the way, this isn't just you don't just get an operating allowance, but you'll get an upfront carbon allowance. You're only allowed to have this much carbon allowance to build your whole house. Well, then they're suddenly going to be looking at saying the only way I can build my mansion is if I built it out of straw and hemp on woodpile foundations. You're telling me I can't do my as they say in North America, my McMansion? What do you use for a McMansion? In the UK? Do you use that term or do you have something else?

Ben Adam-Smith 44:58
We know what that is, a McMansion, but I think it would just be a mansion.

Lloyd Alter 45:03
Okay. And you know, What materials do we have, as Steve Webb was telling me, you know, if you cut a brick out of stone cut the same piece of stone out to the same size, you've got a 10th, the carbon emissions. And then he said why are we using stupid bricks anyway? How did we come up with bricks? It's because it's a guy can pick it up and deal with it, it makes no sense to have such a small unit. And why are we rethinking all of this? And I look at all British houses, and why do you use so much brick in the first place? It's incredibly carbon intensive. So suddenly, when we start thinking about these say, Well, I have to use materials that are lower carbon, and I have to use less of them. It's amazing what good designers can do with small spaces if they're good and are thoughtful about it's amazing what good architects can do when you numb say, Oh, I can't make the window. So small, the housing look terrible. But good architects manage it all the time, you just have to have an eye for proportion and detail. There's Goldsmith street Passivhauses. They're absolutely brilliant. And I was talking to the architect about them. And if you look at the window of them, the window opening in the brick is that big, but the bottom third of it is actually a panel setback. So your eye reads it as a bigger window. But the window itself is small. Or the engineer Nick Grant said, you know, let's just design windows for light and view and connection to the outdoors. Whereas every architect I've ever known, always designed, it's first, you know, how do we make this facade look good, you know, the window gets to be this big,

without giving us much thought to going from the inside just saying, how do we make it as small as we can get away with to do the thing we need it to do?

Ben Adam-Smith 46:55
Well, I think we've covered a lot of ground today. Is there anything you'd either like to add or just highlight from our conversation today?

Lloyd Alter 47:04
Well, I think the main thing that I want to highlight is that we've all thought about we've had for 50 years since the sort of oil crisis of the 70s. We've had been obsessed with efficiency, efficiency, efficiency, efficiency. And in this new world of upfront carbon, we have to turn that on its head and start thinking about sufficiency. How much do we need? And this goes through everything? How much clothing do I need? How much food should I be buying? How big is my car? Do I need a car? How big is my house all of these things? Should everything we do we should look at it. And I often say my phrase and I start my book as, when you look at the world through the lens of upfront carbon, everything changes. You just start thinking differently about everything you do and everything you buy. And I'll leave it at that.

Ben Adam-Smith 47:59
I always enjoy our chats. Thank you, Lloyd.

Lloyd Alter 48:02
Thank you.

Ben Adam-Smith 48:03
Get more in our show notes today, which will include a summary. Also some links to where you can buy the story of upfront carbon, Lloyd on socials. That's probably where we should continue the conversation. All of this at houseplanninghelp.com/ 355. My call to action is to check out The Hub particularly if you've never done this before. Why have you never done this before? It's where we continue providing information, content, resources, that will be really useful as you go about either building new, or retrofitting an existing dwelling. And so much of it is in the preparation, which is why we're always focusing on the decisions that are being made, and how you get yourself in a good place. So access our digital archive full of different things. In fact, hold on, we've added one here. This is a live training session, we like to bring in guest experts, and it's with architect Josh Wood. We're going through the process of going from site appraisal, looking at client brief, and then how concepts come out of that. So he's going to explain how he works as it's always slightly different but it's just interesting to see that side of things because you may well when you start interacting with design professionals not have a clue, where did these come from? So that's what we explored in that session. We've got all our other bits and pieces, ask the expert, the courses, the forum, the in depth video case studies, and office hours. Find out more houseplanninghelp.com/join. Kym Mead is my guest next time we're looking at Passivhaus certification. How does it fit into the whole process? Where do we engage? Do we even need it? How much does it cost? Everything you need to know next time? Thanks so much for listening. The House Planning Help podcast is produced by Regen Media: content that matters.