HOUSE PLANNING HELP

Episode 233

How to choose a construction system for a house build – with Mike Hardwick

The show notes: www.houseplanninghelp.com/233

Mike: Well, oddly enough I never had a background in construction. I was in the Royal Air Force for twenty-six years, and in the Air Force you tend to move around an awful lot and we'd had something like fifteen houses in the time we were married. So, a lot of moving around.

Kids had turned up and I decided that they were going to have somewhere they could call home. So, we decided to go and find somewhere, put down roots, I'd move around with the Air Force and the family would stay in one place, so we could get continuity of schooling.

We couldn't find anything that really fitted what we actually wanted. There were lots of houses out there on the open market but nothing which actually fitted what we wanted to do. And that was when the great idea of building our own came into it. So, I stuck a pin in the map, which was basically an hour away from all the RAF bases I could have possibly served at, and that came out at Junction 17 of the M4. That's not a brilliant place to build because there's a lot of traffic and all the rest of it, but just outside of that we found this little plot here in Great Somerford. We ended up putting a bid in for it, we got it and we built the house.

Ben: But it didn't really stop there, did it?

Mike: Well, it didn't. It carried on from there. Because when you're going through the process of building your own house, particularly when you're surrounded by colleagues in the officers' mess bar and you tell them that you're building your own house, quite often you get the response of, 'I've always thought about building my own home too. How do you do it?'

And that's what happened. So, I'd end up propping up the bar telling people how to go about it, the trials of what we were doing and the process of what we were doing here, and I never got bored of doing that. I realised, when I came out of the Services in 2005,

that what would I really like to do? I thought what I'd really like to is get more people interested in building their own homes. It's something I knew about and it's something I was passionate about, so I thought, why not make a business out of it? So, I did.

Ben: When did you build the house?

Mike: This one here, we bought the land at the end of 1999. We got the planning permission over 2000, moved into it in March 2002.

Ben: How have things have changed then over the course of a couple of decades really, that you've been in to this?

Mike: It's become a lot more popular. You can date the time when we built this house from about the first series of Grand Designs. I'd come back home at the end of plodding around the site here, come home and switch on the telly and there was Kevin McCloud with the very first episodes of Grand Designs. We'd sit back and we'd either be sympathising with people on the TV about, 'that just happened to me today,' or 'I can see why they did that,' or 'I know why they did that wrong.' And also picked up a few tips about things that we should be doing with this house as well.

It was that series which sort of started people talking about self-build and it redefined the whole scope of it. It had always been seen as being something for the very wealthy, people with access to their own land, people with oodles of money and it was always going to have to be something on a grand scale. And I think Grand Designs, although it typically does have larger houses on there, it also covered smaller, more modest properties as well. And it's that sort of thing which has triggered people into thinking, 'maybe I could have a go at doing that.'

Ben: And Grand Designs can put you off sometimes as well. It can certainly ground you in reality. They love a story.

Mike: They do. Jeopardy is always in there and I used to say on the self-build courses, a stock phrase I had, is that I've got the production rights for the new TV series. It's called Sensible Couple with Reasonable Budget Build Modest House On-time and On-budget with a Competent Builder. It's never going to get commissioned.

Ben: That's why I thought it might be interesting to have a chat with you because when I've been to the National Self-Build and Renovation Centre, just pretty much sharing my journey as I've gone along, I often bump into you there and I see a bit of your presentation and you're talking about build systems. Then I've seen you host a panel. So, you've been through this material lots of times and I guess

you've probably heard all the questions that come up. So, I thought it might be a good idea just to dig into some of this, what you've learnt through giving these talks, hearing members of the public maybe at different stages of their build. Does that sound like a plan?

Mike: Yes, that's no problem at all. Let's do that.

Ben: Where shall we start?

Mike: Let's start with build systems, if you like.

Ben: What is a build system?

Mike: A build system is what we're constructing houses out of. It's the structural element of the house. It's the bit that's holding everything up. And the confusing bit with a build system is that just because what's on the outside of a house looks like maybe a brick, it doesn't necessarily mean that it's a house made out of bricks structurally.

What we're talking about is usually, most houses in the UK – I say most because it's not all of them – have a twin-leaf construction. You've got an inner leaf, something doing the supporting work; and you've got something on the outside making the house look pretty. It might be bricks, it might be timber cladding, it might be tile hanging, render, or something for the outside. But the actual work of holding the roof up and holding the internal floors up and taking that weight down to the foundations is done by this inner leaf, and that's the building system that we're talking about.

It's what the services run through, it's what they're bolted on to, it's what's holding up the structure of the house and is the main material that's used in that construction.

Ben: This is clearly an important decision, but how would you rate it in terms of decisions in the whole project?

Mike: I think it's a really important decision. The important thing about the build system is it's your choice. This is one of the few decisions in the whole process that you can decide on. Because the building system you use doesn't usually dictate the external appearance. So, the planners aren't interested in that. And so long as the building control guys are happy that what you're doing is within building regulations then you can have whatever building system you want on the inside. So, it's your call.

Some systems are better than others. Not just in terms of cost or in performance or what have you, but in terms of what you actually

want the house to do. There are lots of reasons, pros and cons shall we say, about each of the building systems. They all work, that's the important thing to say. There's no right or wrong decision on this. It's just that some are going to be better for you and your project and the way you're going to live your life.

Ben: Shall we start with masonry then? For some reason, this seems to have been what we loved doing for years and years and years, again, whether it's right for you or not. Maybe you could outline this one?

Mike: Well, masonry construction is what we understand as the way we build houses in the UK. For instance, when you go and get your house insurance or you're asking for a mortgage, one of the first questions they're going to ask you, 'is it a traditional masonry house with a tiled roof on it?' Because they like that. It's going to be solid, it's not going to fall down. It's got that substance to it and they think this is a safe thing to invest against. And if you sell it, then somebody's going to buy it because they're going to be happy that it's something that's going to be sellable. They like the idea of this.

Ben: And this idea, is this Three Little Pigs? Why this one system do they think is the safe option?

Mike: It's the way that we've actually done it over the years. We've developed this system. We think actually it's the way that everyone builds houses. Now, if you actually analyse who builds in what we think of as traditional construction – breezeblocks and bricks on the outside – there's Wales, there's us and a little band across Northern Europe that does this.

If you go further north to Scotland, Scandinavia, they're all building in timber frame. If you go to North America, they're all building in timber frame. If you go to the Mediterranean countries, they're building in poured concrete, shuttered concrete, to get the old thermal mass up there, to keep the heat out rather than keep heat in.

So, there's just us doing this weird little way that we do it. But it's the way that we've trained our builders, it's the way we've been conditioned to think about how houses work, and it's what we fall back to. So, they're easy to insure, they're easy to mortgage against and they're easy to sell. Which is why people still do it.

Ben: How does it compare in cost?

Mike: It's very difficult to start comparing costs on this. It's the question everyone wants to know. I think every time I've walked into the

centre at Swindon – I think I'm right in saying every time I've walked in there to do any sort of show, presentation or whatever, at some point somebody's asked me, 'how much does it cost to self-build? And it comes down to cost, if you know, is brick and block more expensive than timber frame, or whatever.

Actually, when it comes to the building systems, you're talking quite a narrow band of cost. The thing which actually costs in a house, and the bit which makes your budget fly out of the window, is all the detailing. It's the stuff that you put in it. It's the kitchens, the bathrooms, the flooring, the door handles – you can spend a fortune on these things.

So, the actual physical structure of the house, the shell, if you like, there's not a huge amount of difference between timber frame or masonry. When the cost does go up is when you trade in the materials for speed of construction. Then you're paying for off-site stuff. We'll talk about that later, I'm sure. But things like, you might remember from Grand Designs, the Hufhaus. Remember that? The big timber frame …

Ben: Six days or something? It might have even been less than that.

Mike: Seven days from arriving on site to moving in. But the trade-off against that is the house was virtually complete and finished in a factory in Germany. So, when you actually constructed that house and you could move into it, you've paid an awful lot of money for a factory and lots of very experienced people who can design it, build it, and put it all together. So, your cost is much, much more in those terms.

So, when you talk about the cost of brick and block, and timber frame, certainly as a baseline for constructing your own home, it is at the lower end of the cost platform. So, particularly if you're working on a modest budget and you want to get the most bang for your buck, then working in a masonry type build or indeed a timber build is probably going to be the starting point for where you want to be looking.

Ben: From an environmental perspective, what are these blocks actually made of and like?

Mike: Traditional breezeblocks, as we call them, are actually made out of cement covered cinder. They were big, heavy concrete blocks. Modern blocks are lightweight. They're made out of pulverised fuel ash, basically. Fuel ash. It's the detritus that comes out of a coalfired power station mixed up with resin and turned into a block.

But think of it in layman's terms, it's like a Crunchy Bar basically. It's got that aerated block in the middle. It's trapping air in it, which is where they get the insulation from. That also makes it lightweight because a lot of it is just fresh air. So, lightweight blocks are what we now use. They're erroneously called breezeblocks sometimes, but they look like them so, that's what people call them. But that's what we tend to use. They are quick and easy to build, relatively cheap to buy and they're easy to handle, and easy to cut up with a saw. So, that's why people like using them.

There's a downside to this at the moment which is that there's quite a shortage of these things because we don't have many coalfired power stations left in the UK. So, we actually have to import the raw materials to actually make these lightweight blocks now.

Ben: Anything else we should think about, pros and cons of masonry?

Mike: I'll give you the pros and cons.

The pros, everyone loves it and you'll have no trouble insuring it and you'll have no trouble getting a mortgage against it and you'll have no trouble finding someone who can build a house in masonry. It's what everyone knows to do.

You will get the satisfying thud of the front door because in a masonry house you've got that, to paraphrase the Volkswagen advert, when the door closes you get that satisfying clunk. You get that with masonry because you're building a solid house. You can wet plaster on a masonry house like this. In fact, we're sitting in a masonry house now. This is what I built, all those years ago.

Another thing is, this ceiling that we're looking at, at the top there, hasn't got timber beams in it. It's got a beam and block floor in it.

Ben: How common is that, to have beam and block? We've got beam and block as our ground floor but then we go Posi-Joist and …

Mike: That's right. You go to Posi-Joist there, typically if you're building in lightweight structure like timber frame. Then you haven't got the structural integrity in the wall to carry the additional weight.

I've actually got beam and block on the upper floor. It cost me a bit more to do it. But what it has done is to allow upstairs to be also in wet plastered masonry walls. I have no stud walls upstairs. And the pattern of the rooms upstairs doesn't have to follow the downstairs pattern of the wall, apart from the supporting walls. So, I've got flexibility upstairs.

Even my en-suites are solid masonry walls. So, I can get up in the small hours of the morning and have a shower and I'm not disturbing my wife who's going to sleep away without hearing me singing away in the shower on the other side of this wall, which is a really positive thing.

That's one of the positive side of masonry, is that you've got strength and you can put these beam and block floors in there. The other positive side of it is thermal mass. When the sun is shining, it will actually beat down the side of your house and it will remain relatively cool inside because the mass of the walls is actually absorbing all of the sun's energy. And when the sun goes down at the end of the day, all that heat in the walls will come out gradually and give you an even temperature when it comes out in the evening. So, you'll have a cool house in the daytime and a warm house in the evening. So you get a very stable temperature throughout the house. Timber frame doesn't do that because wood doesn't hold heat in the same way that a brick does. So, that's one of the benefits.

Also with masonry, you've got flexibility of design. You can build just about anything you want in a masonry house. And by using steels and other such things, you can get some quite large open spans which means you can get the open plan feel that a lot of people want to get in new houses.

Ben: Let's move on to timber frame. We've already mentioned it a little bit. What is it, some of the pros and cons?

Mike: Timber frame is basically replacing that breezeblock element of a house, that inner leaf, with a structural framework of timber.

Timber covers a multitude of different things. You might have seen the John-Boy Walton and how they all come out and pull up the stick frame house, the barn and the raising ceremony, putting up a frame. That's stick frame. We don't do stick frame in the UK. Maybe some people have done it or still do it, but it's very much a minority sport.

These days, timber frame is moving on much more to become focused on environmentally friendly, high quality, accurate, off-site manufacture. So, you get speed of construction and a very effective and efficient living machine to build your house out of. That's what attracts people into the whole world of timber frame: quick, clean, economical and renewable.

Ben: And I should think that's environmentally, one of the best ways?

Mike: Well, that's it. You plant a tree, chop it down, you plant another tree and the cycle continues.

Timber frame is carbon neutral which couldn't be said so much for maybe the masonry side of things, which of course has quite a high embodied carbon into the manufacture of it. And again, there is a trade-off of these things.

People can see anything concrete based as the enemy. It's seen as very environmentally unfriendly, but there are alternatives: limecrete and other things can do it. But nothing quite does what concrete does. So, until we've got a suitable alternative, I think we're stuck with it for a while. But timber, by the very nature of it, is a flexible material. You can build walls out of it, ceilings out of it, floors out of it, windows, doors, stairs – everything out of it. You can really use it.

And don't forget, even when we're talking about a masonry house now and we think timber frame, 'I don't want a house made of wood. There are all sorts of things that might happen with that. Termites can eat it all, or whatever' – just think of your standard masonry house. What's your roof made out of? Probably your roof trusses are made out of timber, your windows are made out of timber, your stairs are made of timber, your skirting and architraves are made out of timber.

Ben: And think of history as well. You go back so far and you've got loads of timber buildings still around.

Mike: The point I'm making is about sixty-five percent of what we would call a masonry house is actually made of timber. So, all we're talking about is that inner leaf, that inner structure of the wall becoming made out of timber or some variation of engineered timber to do the structural work of keeping the house up.

Ben: You have mentioned, when you're talking about masonry and your house here, that actually, you have a nice sound separation in the rooms upstairs. Would you say this is a downside of timber frame? I know you can put sound insulation in and all those sorts of things, but I know kind of what you're saying.

Mike: Yes, this is the thing. You asked me earlier on about what's the cheapest method of building. If you held my feet to the fire, I would say that timber frame is probably the cheapest method of actually constructing a house. If you put a basic timber frame up with no frills, that's probably the most economical way you're going to do it. But if you put a timber frame up without doing anything to attenuate

the acoustics – because there's no density in that structure to stop noise from travelling.

Certainly, if you talk to people who have bought a modern house on a large estate which is primarily comprised of stud walling, particularly in the upper rooms on there, almost the number one complaint is the noise. Babies crying, dads snoring, kids playing or whatever. The noise transmits all the way through the house and it's if there's no partition between the rooms, noise travels so much. That's one of the reasons why self-builders can do something to attenuate that.

Now, if you build out of timber frame, building regulations, Part E, say that you've got to start putting noise-deadening material in. It's not a very stringent level to meet, to be honest, and what self-builders tend to do, if they're building out of timber, is to actually go that step further and do things like double-skimming the plasterboard or cramming everything full of rockwool, good sound-deadening insulation. Or going to the specialist companies that are out there that specialise in deadening sound, particularly when it comes to upper floors, bedrooms and what have you, where noise can transmit down into lower rooms.

Of particular import this is, if you're converting into flats. People living in separate spaces down there with noise transmitted from foot movements, heels and all sorts of stuff coming through the roof. There's special deadening material made out of rubber, horse hair and all sorts of things which deaden that impacting sound and stops it transmitting.

Now, when I say that timber frame is the cheapest method you can build, now if you want to get up to the sort of level of sound attenuation you get as standard with a masonry house, then you're going to have to spend that additional money on the soundproofing stuff, which then puts you probably on a more expensive path than the masonry side of things.

This is what I'm going back to when I was saying about how certain systems, it's all about what's right for you, okay? Now, if you want the environmental stuff but you don't want a lot of noise transmission, timber frame with noise attenuation is a good thing but it's going to cost you more than it will for a masonry house straight out of the box. This is where you need to start making your calculations about what you actually want, how you're going to live your life, and what you're trying to get from the home that you're building.

Ben: Shall we move on to insulated concrete formwork now?

Mike: Yes. ICF – insulated concrete formwork. You might have seen it and certainly it's appeared on Grand Designs a few times. It's the polystyrene blocks. The same sort of stuff you unpack when you're taking your flat telly out of the box, but fire-proof basically. Fire retarded.

This is formed into structures which are basically hollow. If you can visualise an inner wall and an outer wall with a gap in the middle of it, and a carcelate top and bottom of this thing, which makes the block akin to a grown-up block from Lego, the blocks will basically slot together in the same sort of style. These carcelations fit together leaving you a solid outer wall and a solid inner wall with a gap in the middle which is filled with poured concrete.

When that concrete sets and cures, you end up with a waterproof insulated solid monolithic wall which is highly insulated, highly airtight and with the strength and density of a masonry wall.

It's got some real advantages. One is speed of construction. It goes up incredibly quickly. Second is you don't need to be particularly skilful to use it. If you can put Lego together, then you can put insulated concrete formwork together. And the performance of the structure out of the box, as soon as you put this thing together, you're going to have high levels of airtightness, you're going to have high levels of thermal performance which are hard to replicate with other systems, which makes it really popular with people who are trying to build to Passivhaus standards.

It's also good in areas where you might be prone to flooding, for example, because you've got these polystyrene blocks on there. By taking simple precautions like raising power sockets above the ground a bit, if you are unfortunate enough to get flooded out, then all you've got to do is chip out and reposition the plaster and that's it, you're sorted. Because the polystyrene itself is waterproof, your building in that sort of longevity. If you imagine you've got timber, you're going to have all sort of nasties soaking into that timber with smells and all sorts of things that will take ages and ages to get out. You won't have that with ICF.

The downsides of it? Some people don't like the fact that the polystyrene blocks are based on basically plastics. So, the embodied carbon of these things is seen as being quite high. The reality is, actually, that something like ninety-eight percent of a polystyrene block is actually fresh air. There's very little actual structure in it. So, the amount of carbon, if you speak to the

manufacturers, they'll say that it's actually quite low. But still, the perception is that it's got a high embodied carbon content.

There are alternatives out there: Durisol Blocks and what have you, which are made out of chopped up timber, which use exactly the same principle of having these blocks which slot together, filled with concrete but without the polystyrene foam as the insulant.

Ben: Does it use the most concrete out of any build system? I know it can be quite thin, that bit in the middle, but still, I'm trying to think of another one.

Mike: Yes. Pretty much so, unless you were going to, like I mentioned, the Mediterranean things, the poured concrete and things. But I don't know many people who do that in the UK. There's no great reason to. So, yes, this is going to use quite a lot of concrete on that.

But before we start thinking, 'oh, concrete, horrible, nasty stuff, and EPS, horrible nasty stuff,' just think about the energy that the structure saves. Because when you've got this airtight structure and you've got the high levels of thermal performance, you're heating the place with a candle. So, most people will be burning out gas or using electricity or burning oil or whatever to actually heat their homes. With an ICF type home, particularly when you're building it to the Passivhaus standard, you aren't putting so much energy …

Ben: But you can do that with any build system though.

Mike: You can, but what I'm talking about is the ease of it. This happens pretty much straight out of the box. Without any alteration, just building …

Ben: It's just taping the windows really, isn't it?

Mike: Exactly right. It's just sealing up the gaps and not putting a cat-flap in. And you've got an airtight, well-insulated box.

You're absolutely right, you can build Passivhaus out of any of these build systems, but you're going to have to do an awful lot more with, say, a timber frame structure, and even more with a masonry construction, to actually stop the air from just leaking out through the porous walls and what have you. It becomes more difficult to do. This happens as part of the way it's constructed.

Ben: Anything else we should think about with ICF?

Mike: Putting another door or window in after the event can be quite hard work. How do you put a lintel into a concrete wall? That's one thing

to think about. And also, things like hanging wall units and your flat-screen telly. If you've just got a polystyrene wall behind there, there's nothing to actually take the weight. So, you've got to think about future use.

What a lot of people do with ICF is put in things like either marine ply or Thermacell type fibreboard instead of plasterboard in key areas like the kitchens and where tellies are going to hang and what have you, to give you something you can actually screw into the wall and actually put your units up there without fear of them actually falling off at a later date.

Ben: Concrete and also this polystyrene, I imagine they both last a long time. Is this one of the most durable or do we go back to saying timber frames last forever if maintained well?

Mike: How long do you want your house to last for?

Ben: Is it a good thing it lasts that long? I don't know.

Mike: Absolutely. How often do we keep houses going on for that long?

You mentioned timber frame. It's one thing people have in their head, if you build timber frame, how long is it going to last? Is it going to last as long as a brick and block house? Well, I did a bit of research the other day on trying to find the oldest continuously inhabited timber frame that I could find, and I found it in Tibet.

It's an old monastery. It's been continuously occupied without being rebuilt – I think it's about seventeen-hundred years. It's certainly over one-and-a-half-thousand years. But this is just a timber frame structure, it's in high altitude, snow, all the rest of it. The reason it's kept in the condition it has been and hasn't had to be knocked down and rebuilt is because it's been kept dry. Timber that's kept dry will go on forever. And that's the key to when you're building anything in timber frame.

Now, I mentioned we've got the timber frame panels and stick built timber. What most people are building in now is either in cassettes or what's known as structurally insulated panels, or green oak. All come under the encompass of timber framing. But all of the methods of timber frame that you'll have will work on a similar principle which is that you keep the moisture content in the structure down to minimum level. If you manage that moisture content and allow moisture to escape so it doesn't build up, then it will go on forever. And this is the key thing.

So, with timber frame, the key thing to remember is that on the inside, on the warm side of the house – that's the walls of your kitchen – underneath all the plasterboard there will be a vapour control layer. There will be a non-breathable sheet of polythene basically, which stops any moisture that is occurring within the property from boiling a kettle, cooking, showing, or breathing, all that moisture can't get into the structure of the wall.

On the other side of the wall, is the cold side of the wall, which will be the side underneath the render or the brickwork on the outside of the house. On there underneath the finishing layer, will be a breathable membrane. Now, a breathable membrane is a similar sort of product to Gore-Tex, the sort of thing you'd have on your hiking jacket, so when you go out walking up and down the hills, if it starts pouring with rain, you stay dry because the water can't get in but moisture generated by your exercise, the sweat and water vapour, disappears through the Gore-Tex and keeps you cool and fresh. That breathable membrane does exactly the same thing. It's the same principle. So, any moisture which does get into that timber frame cavity, into the structure there, it's got somewhere to go.

So, you're trying to stop it getting in, in the first place, with that polythene sheet. It's not going to be one-hundred percent effective because there'll be little perforations, nail holes, screw holes, all sorts of things. There'll be ways that some moisture will get in. But so long as you've got room and a route for this moisture laden air to get out through this breathable membrane, out into atmosphere, then your timber is always going to stay at around about eight percent moisture content, something like that, which is the level where it's just going to stay intact.

Now, the thing that's going to make you throw your house away and start again – what's the oldest house that we're going to have? The only reason we buy really old houses is because they've either got period features or quirkiness or something which says, 'I'd like that.' The thatched cottage sort of thing. It may be the oak frame house, the old mansion or whatever. But typically, an estate type house, do you really think that in a hundred years' time, people are going to be looking at – we're already looking now at Sixties and Fifties built estate houses and thinking, 'they're looking a bit tired now.' They're all very much of their time. And people are picking those up, throwing them away and starting again.

So, there is probably a design life in a new house of about eighty years, something like that. Somewhere between sixty and a hundred years, averaging at about eighty years, where people will look at a house and say, 'it might still be functional, it might keep

the weather out, it's still warm and you can still live in it, but it doesn't look like it's a house I want to live in. It doesn't meet our lifestyle standards.' And it's that, typically, which is making people knock them down and start again.

We're doing it now in the self-build world where people are buying these houses which are at the end of their design life, built for a different generation – the post-war generation who were happy to have a little bungalow or a household somewhere, and it was home; a home for heroes thing – but they're all now coming to the end of their days. We're picking these up now and saying we want open plan living, we want to have lots of light, we want to have high ceilings, we don't want pokey little rooms around the place. We want nice sized bedrooms, we want en-suite bathrooms.

These didn't happen in the Sixties and Seventies houses. These are all things that we expect to have now. So, the easiest thing to do with that is to flatten those old houses down and build new ones.

So, how long do you want your house to last for? I think the design life of a typical house in any sort of domestic environment that we've got now, I'd be working on no more than a hundred years.

Ben: Slight aside, but I'm sure I've been in a conversation with someone who has designed, developed houses and they say the design life is thirty years or something. But I'm just throwing that in. We don't need to talk about it.

Mike: I'm sure you're talking there about modern estate houses.

Ben: Yes, definitely. Cutting the costs right down. And who knows if that's correct or not.

Mike: Absolutely right. It could be. One thing I would say though, when we talked about these various build systems on there, and I've done a number of these panels explaining this, one thing which always comes up when it comes to the longevity of houses is from the oak framers. The guys have got a point there when they say, how many people do you know who have ever knocked down an oak frame house? That's one you actually build with the idea of it maybe sitting there for centuries and actually maturing and being developed. Nobody knocks down an oak frame house.

Ben: Because it's a real feature, isn't it? Both inside and out.

Mike: Yes. And it's designed to last. Those oak beams will last forever.

Ben: Does that fall under timber frame or is this something slightly different?

Mike: I'd put it under the timber frame. It's now falling under something different because the oak frame structures, they've fallen foul of a thing called the SAP assessment – the standard assessment procedure – which is the mechanism by which we assess from the drawings of a house how energy efficient and how it's going to perform. It's part of the process for getting your building regulations through.

So, when you've done the design of your house, a specialist will be there with a laptop computer and an algorithm in there taking all of the details of how your house is constructed, what it's made of, how many windows it's got, the glazing to floor ratio, the energy and how it's being powered, what it's being fuelled by, and cranking a handle against this algorithm. It expects a modern house to have things like a cavity wall in it with lots of insulation in there.

Now, when you're building an oak frame house, if you built in what's erroneously called the Tudor style where the wooden timbers on the outside are the same as what you see on the inside, it's just this single wall of oak, it doesn't get through the test. You can't get it through the test because there's no cavity insulation there. So, it assumes it's going to have cold bridging all the way through.

It's been a perennial problem for the oak framers to try and come up with ways of making their system, which is perfectly acceptable as a building system, just to get it through the modern tests to be approved. They very successfully have come up with lots of solutions now. But the chief thing that you'll find with oak frame now is that you will build an oak structure for the aesthetics on the inside and you'll encapsulate that whole structure in probably another sheath of timber frame of some description. It might be SIPs panels, it might be a timber frame or whatever. But that's going to be the thermal envelope, and the bit giving you the wow factor is the oak on the inside.

Ben: Enjoy it on the inside.

Mike: That's it. And that's where you do get the wow factor. The bit that has gone is when you look at the standard pictures of oak frame houses where you had the exposed oak on the outside …

Ben: You can't have it all, can you?

Mike: You won't see that now, unless it's been artificially added on to the outside of the house.

Ben: You mentioned SIPs at the end there. Let's move on to that, shall we?

Mike: Yes, SIPs – structurally insulated panels. Again, another modern method of construction, like ICF, a relatively new method of construction, but still very much in the timber framing world.

The basic principle of SIPs is you're building a sandwich of what we call OSB – oriented strand board] – it's basically chipboard. It's the big-flake chipboard stuff. And in between that is urethane foam which is just that expanded urethane insulation foam. What you end up with is something that looks a bit like – if you remember when you were a kid and you had an ice cream wafer where you had the two slabs of wafer with a bit of ice cream in the middle of it. It looks like one of those but on a huge scale.

These are produced as blanks, usually about one-point-two-five metres wide and usually about seven or eight metres long, out of the factory. And what that is, is a structural panel which you can chop down, cut and fix together with other panels in various forms of cassette work to make a complete housing structure. And you can build just about anything out of it.

But again, like ICF, what you're building is something which has been off-site manufactured, so the accuracy is there. It all goes together. Everything fits at ninety degrees. Everything is relatively airtight. You've got watertight and highly insulated panels in there which all fit together beautifully. So, you've got speedy construction. These things will go up in maybe three to five days, something like that, for a typical house, and it's going to be pretty much wind and water tight at the end of a couple of weeks.

It's a superbly quick way of building. And really very popular with self-builders at the moment. It's good for everything. I was going to say the only difficult thing to build is curves, but I've seen people building round structures just with lots of strips of thin SIPs being put together to make a circular structure. So, you can build pretty much anything out of it.

Ben: How are they joined together then? It's obviously a quick process.

Mike: The actual panels themselves, the insulation doesn't quite go to the edges. There's a little gap, a couple of inches of gap. So, remember that ice cream wafer that I alluded to earlier on, think of it in those sorts of terms. The ice cream doesn't go all the way up to the edge.

When you put the two panels together then, you end up with a little gap between those two panels, and inside that is a fillet which is

just a little mini SIP, if you like, which is put between the two. It's that which the screws go through either side to hold those panels together and that gives you continuity of insulation and continuity of strength of the structure as well.

Ben: Now, this one, I don't know why, but I always feel a little bit funny about it being the structure of the house. Obviously, lots of other people have got past this.

Mike: Yes. The way to look at SIPs is not just in terms of each panel doing its own thing. The whole thing is designed to be a complete structure. When it's all put together, the whole house is acting as its own structural integrity. So, it's really important that it's designed and put together by people who know what they're doing, basically. Which is why a SIPs company is what you're going to do.

Basically, you take your plans to that SIPs company, they will look at what you're trying to achieve, they will put this into a computer-aided drawing system and using that computer-aided system, they will come up with a series of cuts, fillets and cassettes of SIPs panels which are then fed into a machine on the shop floor which actually punches everything out. The panels come out, are put on the back of a truck and assembled in accordance with the structural calculations on your site.

So, all of those panels themselves will be working with the panels around them to actually put the structural integrity of the house. So, it's no weaker than any other structure. To be honest, it's all held together beautifully. And you'll find for large expanses, things like jetties and balconies and what have you, you'll find steelwork in there to actually hold everything up. So, it's not necessarily just going to be all the timber actually holding everything together. There's going to be steelwork where it's required in the whole thing.

But you can't stress more the accuracy of what comes out of these things. That's what's so good about these things. Because it's being manufactured by these machines, everything is millimetre perfect.

And going back to the masonry category, if you like, as a comparison of this, when you're building a masonry house, you're building an enormously complex jigsaw puzzle. You've got thousands of components in the average house. Each brick has to be individually laid and it all has to be lined up with the brick next to it. And that takes skill. So, the quality of the overall house that you build when you're building with masonry is really much down to how good your builder is. If they're not very good, you're not going to get a very good house.

When you are building out of a SIPs panel, or indeed out of ICF, it's very difficult to go wrong with it because it's got to go at ninety degrees where it's designed to go at ninety degrees. Which means that your walls are going to be straight, everything is going to fit together, and everything is going to be nicely airtight. Which means it's great for fitting out afterwards because your kitchen units are going to fit squarely against the wall and all your tiles are going to fit squarely against the walls.

So, it makes life a lot easier, particularly for those guys who are going to be project managing their own builds and trying to keep the costs down by doing more of the work themselves. Because everything fits, everything works. The guesswork is taken out of it.

Ben: And again, it's going to be difficult to change around, I assume, if you want your window here now?

Mike: Yes, that's a very good point. Because of the structural aspect of it, when it's actually been designed, if you start punching more holes in the structure or are wanting a wall moved somewhere, that has an effect on the entire structure. So, if you're going to start thinking about changing your mind on this, don't think about using SIPs.

With brick and block, you can move a wall just as you're building it. You can ask someone to move it six inches to the left and it's not going to be too much of a crisis. With SIPs it can have a major impact on the overall design.

The advice I would give to anyone contemplating building in SIPs is to spend a really long time thinking about what you want and what's going to go into your house, and the design of your house, and then say, 'that's it, no more changes. We're happy with this. Go and provide this house.' Because once it goes into the computer and they pull the handle, then that's what you're going to get. If you suddenly say, 'about that wall there, can we have another one here or another window here? Can we have that door moved to the left?' that's going to be expensive, it's time consuming, you've got to start again and recalculate the whole thing in the worst cases.

Ben: I know you don't like answering the cost question. Anything on cost?

Mike: Again, the costs are coming down. ICF and SIPs used to have a bit of a premium on them because you were basically paying for a new factory for all of these things. So, there was a lot of overhead involved with the manufacturing of these things. It was all relatively new. They weren't selling so much of them so, of course, the sellers

of these products had to make their money somewhere. So, they could be less than competitive with brick and block and standard masonry.

But as more and more people are adopting these systems and it's becoming more and more acceptable, and certainly the lenders and what have you realise now that this is now mainstream – we're talking about with self-build – the costs are starting to come down now. And certainly, with ICF, I think speaking to the manufacturers up there, they've assured me that they can now build an ICF for about the same costs as you would do for traditional brick and block.

So, there used to be about a ten percent premium. I think that's coming down now.

Ben: Let's move on to straw bale construction. I always think of this as something that a lot of people perhaps would like to go down this route, but are we moving a bit more specialist now?

Mike: You mentioned earlier on, you took my line about the Three Little Pigs, because that's what normally happens when people talk about straw bale.

You couldn't be further from the truth. I'm a convert for straw bale.

I suppose ten years ago when I got into this game, it was very much seen as a fringe thing. It was an alternative technology and not something you'd consider for the mainstream.

The way we're moving now and the focus that we've got on environmental building and building stuff which is going to be energy efficient and stuff which is going to be warm and it's going to be cosy and it's using natural materials, and all of the ease of construction and what have you that we talked about with all these major things, straw bale ticks all those boxes.

Of course, there are always these big questions that come out about, well, 'straw bale, surely you could blow it down, or what if it catches fire?' It's not seen as being as long living a material, if you like.

You can dispel those myths straight away. The thing with straw bale is you can do two things with it. You can either use standard straw bales that you're going to get out of a farmer's field and use them as insulation, and just use a straw bale as something to use as an insulant for the structure, or you can use straw bale as part of the actual structure. So, there are two different ways to look at it.

I'm talking here about using structural straw bales. These aren't the things you're going to pick up at the farmer's field. These are processed and they're compacted. And when they're all put together, it's a block which is almost like a log, okay?

Now, when you talk about trying to set fire to these things, I defy you to try and do this. If you took a match and tried to set fire to a log that you've just cut off a tree, you wouldn't get very far. You'd use a lot of matches and wouldn't get very far because you just can't get enough heat into it to make it light. The same sort of thing happens with a straw bale. You might get some wispy little bits of straw at the edges going up, but it's not going to catch fire. When you encapsulate this within a lime water and plaster that you would normally be using with this build, you've got something which has got no oxygen. So, it doesn't catch fire. It doesn't. It's just a really good carbon neutral method, environmentally friendly way of getting all that insulated wall which looks really good as well.

If there's a downside, you end up with thick walls. But actually, that's what a lot of people actually want now. Rather than having these thin walls, you end up with deep reveals for windows and doors. It looks like a solid house, it feels like a solid house. And with the lime plasters and what have you going over the top of it, you get that natural feel, a rustic feel, which goes with it.

Ben: How are we with insurance? I was trying to think of some downsides of this – things like mortgage, insurance. I was chatting to Barbara Jones who was on Dragons' Den recently and that was one of the things that came up there, although she disputed it a little bit.

Mike: Insurance, well, we've had straw roofs on houses, thatched roofs for centuries, and you can still get insurance on thatched roofs now. The same principle will apply to straw bale.

Now, like I try to say to anybody I deal with on this, as self-builders, we tend to be on the fringes. We tend to pick up the alternative. We're early adopters for all of these new technologies. If you went into a High Street lender, just asked for one of their standard mortgage products and said, 'I'm building out of straw bales,' they'd probably say, 'we don't do that. Why are you building out of straw bale? Why don't you use bricks like everyone?' And they probably would reject you. Now, if you go to somewhere like the Ecology Building Society or one of the smaller building societies out there, they are desperate to try and get more and more people building in these new renewable things. They see the benefits that go with it and they will lend against it.

A simple test to do is an outfit called the Council of Mortgage Lenders, the CML. These are the guys that actually work out whether systems are mortgageable. If you go on to their website, particularly with things like ICF and straw bale and what have you, you will find almost on page one of these things, there will be the CML certificate saying, 'yes, you can lend against this. We're happy to use this as a building system.'

Ben: What else have we got left? We've touched on manufactured of various different systems, but the fully formed, the package build?

Mike: Yes, the prefabricated, the system builds, there are all sorts of names. Most of the factories for these are in continental Europe. And what you're doing basically is going out and buying the prefabricated kit which is assembled on to your site to your designs.

The ease, the quality is really what you're buying into on this. The quality that comes out of these things is superb. Everything fits together so well. The materials used, the finish, the quality, everything is absolutely top-notch. But it's not the cheapest way of doing it. Again, if you're on a really tight budget, you're going to be struggling to make your money stretch to build what you want to do on that. So, it tends to be the preserve of maybe the larger, grander projects and what have you.

But there is a huge market for this. We see a lot of these, I do the Build It Awards, and a lot of the systems that we see coming through there are these Baufritz and the Hufhaus houses and they're these wonderful continental places. So, there's certainly a market for it.

And for those people who want to be hands-off with the self-build rather than actually getting involved and really worrying about how the bricks go and how the timber frame is constructed, they can sit back and basically say, 'here's the house I want. Build me one of those. Here's where I want it.' And somebody else goes and does it for you. You pay for the privilege of doing that, but the stress levels are going to be a lot lower than somebody who's actually project managing their own build all the way through.

So, certainly a market and if you've got the money to do it and you want the easier life then it's the route to go. And you get some superb houses out of it.

Ben: And that's one of those ones where you've got to do all of your decisions up front and then press the button?

Mike: Absolutely right. Change costs money and that's what you've got to realise. The three words which strike the fear of God into the average supplier are, 'we've been thinking' from the clients.

Ben: Yes. Now, I always get to the point when I'm going through the build systems that I start to forget the last few. Anything else? Steel frame? What else is there?

Mike: Actually, steel frame is coming to the fore a little bit now. I went through a long period of saying that whilst steel frame was an option, in my early days of this, steel frame was seen as a substitute for stick panel timber frame. So, instead of using batons of timber, you would use channels of pressed steel, basically, to construct.

In the UK, it never took off. I think one of the main reasons for that was that the way we're trying to build now, with building environmentally friendly and trying to keep those insulation levels in, timber doesn't transmit heat like steel does. If you have a steel structured house and are trying to stop cold bridging, you're starting from a losing position. You'll find a lot of the steel structures had slotted steel in there and the idea of the slots was to make sure the heat actually tracts around the slots to lessen the cold bridging effect, which didn't convince an awful lot of people, I think. It was just never going to work.

The Australians build a lot of steel frame, where there's not a lot of natural timber around the place. It's the natural thing to do. But it tends to be warm climate.

However, with the planning regulations as they changed recently, where permitted development allowed people to take farm buildings and convert them into residential dwellings with less hassle than it used to be, steel frame has come to the fore a little bit because a lot of farm buildings are steel frame.

Ben: So, you're doing a conversion though. You're living with what they're built …

Mike: But if you're amending with that, you're going to be expanding in the same structure that you're actually starting with, which is a fairly sensible thing to do. So, steelwork actually starts becoming part of the many extensions or whatever to the conversion project.

So, yes. Steel is coming a little bit more to the fore. I'm seeing more of it. Whereas to say, I've never known anyone who's built out of steel, there are probably a handful now that I could say are actually using steel as the medium.

Ben: Let's move on then. Were there any other build systems that you can think of?

Mike: There are variations on the masonry theme now. What I didn't mention earlier on was things like the speed of construction, how quickly you can put the blocks together. You've got to wait for everything to dry out, it's messy, and you can only build so many blocks high before the weight of the top blocks starts squeezing all the mortar out. So, it can be a relatively slow process. Also, freezing conditions is not good for laying mortar or pouring concrete. The curing process is very much hampered by freezing conditions. So, it can be weather dependent. And again, this quality side of things. When you're putting all the bricks together on a ten millimetre bed of mortar, it's very much down to the quality of the builder as to whether or not it's going to work.

The masonry industry has recognised this, and they came up with a variation of the masonry theme, and it's called thin join. The idea is that it's using the same principles – in other words, you've still got these cinder blocks, these aircrete blocks, but they're actually slightly oversized. And instead of using a mortar, this usual sand and Portland cement mixed with mortar, it's held together with an adhesive, a glue basically. So, instead of that ten millimetre bed, you can have a two millimetre bed of mortar. And these blocks are accurately cut and when you lay them and stick them together with the glue, we're back to this Lego analogy again where when you put these blocks one on top of the other, because they're so accurate, so long as you're putting the right amount of adhesive on this thing, you're going to build a straight and true wall and it's very simple to do.

But by taking out things like the mortar bed, you're taking a passage for air to get through, and when air can get through, noise can get through. So, by taking that mortar bed out, you're putting better airtightness into it, putting more insulation into the wall and you're taking away some of the need for skilled construction to put it together. So, again, it's one of these things you can have a go at yourself.

So, by using that thin join system, we've taken away a lot of the negatives of masonry. It's cleaner, you don't have big piles of sand and cement, you've got a bucket with some adhesive in it. You don't end up with these huge globs of mortar and wheelbarrow loads of mortar at the end of the day all around the site. So, it's bringing masonry up into the modern world.

Ben: If we could make a build system that would just be perfect in every respect, what would it look like? Not physically, but what would be the pros?

Mike: It would be something with a low carbon footprint, relatively easy to construct, something which doesn't need skilled labour, something which is acoustically sound, and which is thermally sound. So, you can build something which goes up rapidly, quickly, keeps heat in and keeps noise out. That would be perfect.

Ben: How do we decide then?

Mike: Well, it's looking at what's right for you, I think. You'll know where you are. If you're going to be building a passivhaus then if you're going off with building just straight out into a traditional masonry construction, you're going to have to do an awful lot of extra work to build, fill the gaps, to get the insulation levels, to get all of the specification of the house correct, to mean you have minimal running costs.

So, I wouldn't particularly start with a masonry type build if I was trying to get that sort of level of performance. I would be looking at SIPs and ICF which comes straight out of the box as being efficient and with the performance guaranteed basically, because of the accuracy and the quality that's coming out of the factory on there.

You'll know where you are on the spectrum of build. Do you want to build the cheapest possible house, or do you want to build a super-efficient mansion at the other end of the scale? Somewhere on there is going to be the right system for you.

So, if low cost is your priority then you need to be looking at the traditional masonry or the timber frame setup. If you've got family and you want a bit of peace and quiet, you want some separation of noise, acoustic attenuation, then the masonry end is probably the way you want to be looking at.

If you want energy efficient, you're environmentally aware, and you want high efficiency and low running costs, then timber frame is probably where I'd be looking at. That's at the lower end of the spectrum on there.

And as you go up the performance scale, that's when I'd start looking at the ICFs and the SIPs panels. They might cost you a little bit more to build but again, there's a trade-off there against the cost of the materials and you need less labour to put it all together.

So, there are swings and roundabouts with all of the systems on there.

At the very top end, if you really are a hands-off builder and you want the sort of quality which just comes with that continental standard, then these system builds that we spoke about, hand over the money and let these guys come and build it. You'll have a house which will be good enough to feature in the magazines. But you will pay for that privilege.

Ben: Did you pick the right system, or have you changed over the years?

Mike: Funnily enough, this isn't the house that we were originally going to build on this plot. The first house I was going to build was timber frame. The only reason we didn't end up building that timber frame was the planners. We were using – can I mention names?

Ben: Go for it.

Mike: It was a Potton design, one of their Heritage range. Very lovely and coincidentally called the Hardwick. So, there was something serendipitous about this.

Ben: You were being drawn.

Mike: Yes, that's it. We were being drawn. But actually, it was the perfect house for us. We had the plans drawn up, but it was an East Anglian design and we were in a North Wiltshire conservation area. And when we put the plans in, they basically gave us a flat no. It was the asymmetric sloping roof that this design had, and it was impossible to design that out from the structure.

We were basically kicked back at the planning stage on that one, and we thought, 'what do we do?' We almost gave up there and then, to be honest, because we really did want to build that house.

It was then, we were actually on holiday sitting on a beach and I said, 'why don't we go and build our own? Why don't we design it from scratch?' And that's what we did.

We did a little competition amongst ourselves, went out to a number of companies out there. The one that won it in the end was Design and Materials. Their chief designer, Beverly Pemberton, just absolutely nailed it for us. And that's basically the house you're sitting in at the moment. This is a Beverly designed house. And she got it right. But they designed it in masonry, their package was a masonry package, so that's why we ended up doing the masonry package that we did.

I look back on it, and I still like it.

Ben: Would you be interested in doing something else, when you talk about this all the time? That's something I think, that I'd love to go building another house, but I don't see the point.

Mike: You've hit the nail on the head there. I do get asked an awful lot, for somebody who's in the self-build housing game, why am I not just constantly building house after house after house? The answer is, I like to say, we got it right first time. We're in a lovely house in the right place and it's home.

Alison, my wife, and I will often talk about when do we pack up and move somewhere else? Do we go and build another one? I've always wanted to go and build an oak frame somewhere, probably down in Devon or Cornwall, something like that, a sort of retirement place. It may still happen. You never know.

Ben: Well, that's a reason, isn't it?

Mike: Yes. It actually gives you something to look at. But, you know, this is a very comfortable house for us and it meets all of our needs. It wouldn't be perfect for everybody but it's perfect for our family. And that's the beauty of self-building for me, is that you get what you want and not what somebody else is second guessing.

Ben: That's what it's all about.

Mike, I've really enjoyed chatting to you today. I appreciate your time, thank you.

Mike: Ben, thank you very much. It's been a pleasure.