HOUSE OF COMMONS

Environmental Audit Committee

Oral evidence: Sustainability of the built environment, HC 76

Wednesday 20 October 2021

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Watch the meeting

Members present: Philip Dunne (Chair); Duncan Baker; Mr Robert Goodwill; Helen Hayes; Cherilyn Mackrory; Jerome Mayhew; John McNally; Dr Matthew Offord

Questions 57 - 110

Witnesses

I: Dr Jannik Giesekam, Chancellor's Fellow (Lecturer), Department of Civil and Environmental Engineering, University of Strathclyde; Peter Conboy, Development Director, igloo Regeneration Ltd; and Dr Alice Moncaster, Senior Lecturer, School of Engineering and Innovation at The Open University.

II: Dr Alice Owen, Professor: Business Sustainability and Stakeholder Engagement, University of Leeds; Caterina Brandmayr, Head of Climate Policy, Green Alliance; and Robert Lambe, Fellow, Chartered Institute of Building, and Managing Director, Melius Homes Limited.

Written evidence from witnesses:

– Dr Jannik Giesekam

– Igloo Regeneration Ltd

– Built Environment Group, School of Engineering and Innovation, Open University

– Professor Alice Owen

– Green Alliance

– Chartered Institute of Building

Examination of witnesses

Witnesses: Dr Jannik Giesekam, Peter Conboy and Dr Alice Moncaster.

Q57 **Chair:** Welcome to the Environmental Audit Committee for our second oral hearing in our inquiry into sustainability of the built environment. We have received 140 written evidence submissions, which is a great many for one of our inquiries. In the last oral session, we looked at an overview of the state of the UK built environment and the sustainable build policy landscape. What we are going to look at today are the definitions around the embodied carbon assessments, retrofit and reuse issues.

We have two panels before us today. I am pleased to welcome the members of our first panel. Before I do, I should say to any members of the public who are watching our proceedings that there is quite a lot of active business going on in the Chamber today and we may have to suspend proceedings in order to go and vote at some point, but that will become apparent as and when. We will try to conclude our proceedings quite briskly today so that we can limit the disruption.

Welcome to our first panellists. I am going to ask you to very briefly introduce yourselves, the role that you have and why, therefore, you are a suitable witness to give us evidence today. I am going to start outside the room with Dr Alice Moncaster, who is joining us from the Open University.

Dr Moncaster: Good afternoon. I am Dr Alice Moncaster from the Open University. I have been researching low carbon buildings, particularly embodied carbon, for well over a decade. I am also the UK expert on the International Energy Agency annexes—annex 57 and annex 72—which look at embodied and whole life carbon and energy of buildings. I was also the academic partner in the group developing the RICS professional statement, which is the current accepted methodology within the UK.

Chair: We are also joined by Dr Jannik Giesekam from the University of Strathclyde.

Dr Giesekam: I am Dr Jannik Giesekam. I am a Chancellor's fellow at the University of Strathclyde. I have been doing research on embodied carbon and consultancy on it for a little bit over a decade now. I have been involved in the development of various industry guidance and standards over that time period, as well as various forward-facing route maps and so on for the industry.

Chair: We are also joined by Peter Conboy from igloo, and you are a practitioner and a developer. Perhaps you could tell us a bit about what you do at igloo and what it does.

Peter Conboy: Good afternoon. I am Peter Conboy from igloo Regeneration Ltd. We are a development management company. I am a chartered surveyor of 30 years' experience in the development industry. We have been developing sustainable housing across the country for the past 15 years. We are particularly interested in the reduction of embodied carbon in new homes, and that is the evidence that I submitted.

Q58 **Chair:** I would like to start with an overview from each of you. It is fortuitous that we are holding this session the day after the Government have finally published their heat and building strategy, which obviously will have relevance. I am not expecting any of you to have read it cover to cover, but I would appreciate your top-line reactions to it. Perhaps we should go round in the order we have just done. Alice, what is your reaction to the strategy?

Dr Moncaster: I understand that I am not a politician so these things are quite hard to get into the policy documents, but I was a bit disappointed that there was not more about embodied carbon. There were mentions of it, but there was nothing saying that we are now going to start regulating and calculating embodied carbon. That is a shame.

I was also interested at the grants available for heat pumps—and heat pumps is one solution—but we need to insulate most of our buildings before we apply heat pumps. Those were my top reactions.

Q59 **Chair:** Jannik, in addition to the heat and building strategy, the Government also published their net zero strategy and their net zero review; it is about 3,000 pages of relevant information.

Dr Giesekam: I did my best attempt to speed read about 1,500 pages of it last night, and I have summarised all of the elements relating to embodied carbon on Twitter, for anyone who is interested in those segments.

What we saw yesterday was a step forward on embodied carbon in terms of there being some future commitments around it, but the timeline for development of those was very vague. In particular, in the net zero strategy, we had the statement that, "Government aims to support action in the construction sector by improving reporting on embodied carbon in buildings and infrastructure with a view to exploring a maximum level for new builds in the future." That was backed up by another section on demand-side measures, which intimated something might be forthcoming in the last 2020s.

That is more than we have had previously on this. We also saw, in the Government's response yesterday to the annual progress report from the Committee on Climate Change, a commitment again around embodied carbon but, again, with no timeline stating when they intended to enact this or what the details of that would be. However, both of these are a step forward from the equivalent responses last year to more or less the same recommendation from the Committee on Climate Change in their 2020 report.

Q60 **Chair:** Peter, from a practical point of view, was there information in that that was useful to you, encouraging you to do more?

Peter Conboy: I did a word search for "embodied carbon" in the documents because I did not have time to read them all. Similarly, it is a step forward in that there is more of a reference to embodied carbon. Within igloo, we were disappointed that the Future Homes Standard

made no reference whatsoever. That is a point of particular concern to us, in that it potentially means that solutions for the Future Homes Standard, which the industry may adopt, may lock in embodied carbon emissions into those solutions. Ideally, we wanted to see a reference to measurement, in particular, and then regulation of embodied carbon, particularly upfront carbon in the new home fabric alongside the Future Homes Standard.

I would like to bring the Committee back to SAP—the Standard Assessment Procedure—for energy and operational carbon. That was introduced in 1995. It took to 2008 before EPCs were introduced. We are not even at 1995 on embodied carbon at the moment. We do not have 13 years.

Q61 **Chair:** That is a sobering and helpful analogy for us to crack on with, with what we need to cover today. I would like to go back to Alice. You mentioned in your introductory remarks that you have been involved with the RICS methodology for assessing carbon in new buildings. If you were one of the authors of it, I assume that you would argue that it is fit for purpose, but do you think that is a widely shared view?

Dr Moncaster: It absolutely is fit for purpose. I know that Simon Sturgis, who is the main author, is also in your room at the moment. It is useful to reflect on what other European countries and countries around the world are doing on this. There is a real focus on what our colleague from igloo just said: regulation for the upfront carbon. This is up to the end of construction carbon. The RICS standard explains how to use BS EN 15978, which is the standard that sets out the methodology. It is the European standard but it is linked also to the international standards that set out the methodology for the whole life of the building.

If we focus on the embodied carbon up to the end of construction, that is what we need to reduce down. I was doing a few sums around this. If we assume that our average embodied carbon for building is something like 250 kilograms per square metre, if we now build 300,000 new homes of an average size of 76 square metres—which is apparently the current average size—that would be something like 6 million tonnes of carbon that we are emitting up to the end of construction. That is the area that we need to focus on at the moment.

Q62 **Chair:** Is the methodology being consistently applied across the built environment sector or just by members of RICS?

Dr Moncaster: Certainly not just by members of RICS; it is more to do with the size of the company. I have not done a survey in this area but other people have done surveys, and they have done them across Europe as well as across the UK. The bigger design companies—the Arups, for instance—and the bigger contractors, such as Mace, are all using their own tools or using consultants' tools, such as One Click LCA, to calculate embodied carbon.

No, it is not consistent. It all matches up to a certain extent with the RICS methodology, because it all matches up to a certain extent with the

British and European standards. However, there is nothing to gather that data and there is nothing to assess that everyone is doing it consistently yet, because there is no regulation.

Q63 **Chair:** Peter, as a practitioner, do you use the RICS methodology when you are assessing embodied carbon?

Peter Conboy: Our consultants use the RICS methodology. I agree completely with what has been said there. I do not believe it is consistently applied. It is out there, but it is all a bit random at the moment. Some consultancies will use different approaches and different databases. Apart from One Click, the other one is eTool. It has different numbers in there.

We have a particular area of concern in relation to building services, so there is very little environmental product declaration data in respect of building services. CIBSE have produced a methodology called TM65, which is a complex methodology for measuring embodied carbon in building services. This needs master's level people to do this. We need to be doing this at a lower level. The manufacturers all need to produce their EPD for A1 to A3 from the methodology, which is raw material extraction, transport to factory, and manufacturing. That data can then be incorporated into the RICS model by people who do not have a master's level of technical education.

Q64 **Chair:** We did a previous inquiry looking at the existing built environment, and looking at retrofitting for energy efficiency. We spent quite a bit of time looking at the energy performance certification scheme, which had a number of flaws in it, not least the difficulty for householders to predict what might happen if they were to undertake a particular type of retrofitting. From looking at the alphabet soup of different schemes and standards and advisory guidance that is available here, it does look as though there is a bit of a yawning gap, in terms that you have just identified, of having some kind of standard that people can recognise and can then apply. If you are considering alternative products to put in to do the same job, how do you know which one has the least embodied carbon? Jannik, is there any hope that this might happen?

Dr Giesekam: Certainly. What you have to do here is look at how that has been achieved in other countries. The folder to my left contains all the regulations and methodologies that have been passed in other countries on this same topic, of which there are quite a few, as you can see there. What other countries have done to deliver that consistent assessment is set out this long-term procedure for when these standards for assessment are going to be brought in, when those will subsequently be used to set limits in regulations and so forth, and give the market clarity on what that is going to do.

Some of them have brought in complementary measures to try to solve that issue of availability of data. For example, in France for a number of years they have had the requirement that, if you want to make an environmental claim about your product, you have to produce an EPD to

back it up. That is a very simple way of counteracting greenwashing, but it also means they are streets ahead of us in terms of data availability to inform the assessments that they are doing.

What you are not going to have is a situation in the UK where all of the inconsistencies and applications, which have been talked about by the previous two speakers, are suddenly resolved on the basis of voluntary action. What we have had over the last decade is essentially the development of the RICS methodology, and a huge body of guidance that you alluded to from all of the professional institutions, various voluntary initiatives and so on, that have attempted to put in place all of the key bits that you need to do this consistently.

Fundamentally, they have been hindered by the fact that all of that has been done on a voluntary ad hoc basis. It has not been co-ordinated through some central policy or regulation that is driving it. It is much easier, if you are a practitioner in any of the other countries that have developed this, to do these assessments, because I have a standard national database I go to, I have a set of tools that are accredited to it, I have one standard in national methodology that I use. It is very simple. We do not have that in the UK and we are not going to develop that on a voluntary basis. That will only be done through regulation.

Q65 **Chair:** Your recommendation to the Government is that they should regulate in this area to create a standard methodology that everybody understands?

Dr Giesekam: Yes. I am one of the authors of Part Z. If you go to part-z.uk, that summarises a set of industry-led proposals on how that could be done. That has been endorsed by over 100 construction companies in the UK. If you go there, there are statements of support for the regulation of embodied carbon and also statements of support from many of the professional institutions; the RIBA, the ICE, the IStructE, CIBSE and many others.

There is a significant body of the industry that recognises the need to take action here, who want to do the right thing on this, is finding it difficult frankly because of, as you mentioned, the alphabet soup of information that is out there and the level of knowledge and skill that you need to be able to keep up with it, but would like to see regulation brought in to overcome that.

Chair: You have touched on other countries so it is a handy segue for Duncan Baker to pursue that line of questioning.

Q66 **Duncan Baker:** We are going to turn to other countries. As Dr Jannik said yesterday, we are getting our foot in the door almost. Embodied carbon was mentioned. I certainly mentioned it when the Energy Minister was giving his net zero strategy report. With what you have just said, there is a willingness there in the industry and our foot is in the door, and it is now our job to keep pushing on it.

One of the first things to bear in mind is what is happening in European

standards and other areas of the world. That will help to drive what perhaps we do as well. First, to Dr Jannik, how do you think that the UK embodied carbon assessment methods are comparing with other countries?

Dr Giesekam: We are a few years behind in terms of our development in this. If you rolled back a decade, you would decide the UK was one of the leaders on this at that stage. We have been overtaken. The Netherlands has had this in regulation since 2012. France, Sweden, Denmark, Finland, Norway and a few other places are currently in the process of bringing in requirements on this. All of them have been engaged in multi-year processes to develop their national methodologies, their databases, the things that will support the assessment procedure and the regulations that will come in with it.

Many of them are in the relatively early stages of that. For instance, countries like Sweden have set out a roadmap that is very clear on the dates by which they will bring in requirements for assessments, which is next year, then the dates by which the boundaries of those assessments will be expanded out to include some of the things that are quite difficult, like services at the moment. That will be in 2027. At that point, they will also be bringing in limits—for example, how many kilograms of CO_2e per square metre you can emit. Then they set out a timeline beyond that for a stepping down of those limits.

That sort of approach of saying, "Yes, there is a lot of uncertainty on this but there is a lot that we can get on and do in the meantime. We can set out a clear trajectory that signals to the market what we are going to do on this in the future," has been emulated by a number of European countries. We do not have anything similar in the UK.

Q67 **Duncan Baker:** Turning to Dr Moncaster as well. In countries where mandatory embodied carbon assessments have been introduced, what has been the impact on decision-making processes in the construction industry? Have we seen those changes that we want to impact by legislating for these things?

Dr Moncaster: I absolutely agree with what Jannik said but I would not say that European countries are that far ahead of us. In fact, the Netherlands did include a requirement to measure embodied carbon from 2012. I know that there were a lot of complaints within the Netherlands because there was not the data to do that measurement. On how much difference it has made, I do not think we have enough evidence to show that it has made that much difference yet, but I think it will do. It inevitably will do. We are not quite as far back as Jannik said.

I was talking this morning to Tove Malmqvist, of KTH, who is the person writing the roadmap for Sweden. She has been heavily involved in developing the regulations for Sweden. They are coming into force at the beginning of January 2022. Those are the regulations to calculate embodied carbon; not yet to reduce it. The regulations to require reduction against a certain reference value in 2027 will be based on

reference values that she and her team are developing at the moment. They have average values for buildings across Sweden based on their methodology, which is the agreed methodology.

It would not take us very long to catch up with this. I do not know if Jannik disagrees with that. Therefore, yes, the proof is difficult—

Q68 **Duncan Baker:** Perhaps in Holland then, where the Dutch are so much further ahead of us—which we are probably all in agreement with—are we seeing the changes there? Are we seeing materially more sustainable buildings that are embracing embodied carbon far more than other countries? If we say the other ones are ahead of us but they are still in the early stages of getting their regulations drafted up, is there a material shift in Holland? Are you seeing it?

Dr Moncaster: I would say on best practice, you are seeing it—a bit like when the BREEAM system came out and people wanted to prove that their building was the best. We have case studies that we can see where designers have decided to reduce their embodied carbon by 50%, and they have done this through changing materials at the design stage. Across the board, I do not know.

Q69 **Duncan Baker:** I know the Chair is keen to keep us moving, so thank you for that. Going back to Dr Jannik, you recommend that the UK establishes a formal knowledge exchange platform so the UK can learn from a range of international approaches to the whole life carbon assessment. Do similar knowledge platforms exist for other build environment policy areas?

Dr Giesekam: There have been various different kinds of policy observatories that have been established by academic and NGO-type groups on different topics in the past. The knowledge exchange platform that I was proposing was intended to serve two functions. One is to support the civil servants who are developing the policy on this space because—as Alice I am sure will be familiar with—the teams developing this in most of these countries are quite small. In Finland, for instance, it is a team of three that are tasked with developing all of this.

There is a lot that can be learnt from the experiences of other countries through those direct exchanges. It also would lead to a situation where you do not have enormous variations occurring across regions, which many of the companies that are having to comply with this will be constructing across. If we can get them co-operating from the outset on this, that serves a purpose.

There is also a secondary purpose around what works. On your previous question, in the Netherlands, yes, the assessments were first introduced in 2012. They did not then introduce a limit value until 2018. It has been more recent where you have been required to meet a limit. As Alice alluded to, in many of the other countries that are bringing this in, the point at which you will be restricted on the value that you have to achieve is still to come.

What we do have is a big natural experiment over the next five years where these regulations come into force across all of the countries that I mentioned. All of them have very slightly different approaches to the assessment methodologies, with very slightly different approaches to what is included or not included. Also, there are little eccentric details, like in Finland they ask you to do a carbon footprint and a carbon handprint. I suspect the majority of people in this room or watching this will not know what a carbon handprint is.

What we have is basically a natural experiment over the next five years, from which a wealth of knowledge can be accrued from if we have someone in place to do it. My experience from giving teaching sessions through the embodied carbon group to BEIS and MHCLG, or the Department for LUHC—or whatever it is renamed as now—and the Government construction metrics working group, is that there is not currently anyone with an obvious watching brief of what is happening in these countries. The number of questions that you receive about that suggested that this is not being monitored. We are not making any concerted effort to learn from it. That is something that we need to rectify.

Duncan Baker: Is that why you use the term "a natural experiment"—that you prefer a knowledge platform approach rather than a Government Department monitoring international best practice?

Dr Giesekam: Yes; we do not know which of these approaches is going to be the best yet. There is a lot of uncertainty there and there are a lot of things that could work or might not work. The important thing is that we learn from it very quickly. The climate crisis means this is an issue we have to address very urgently. If we do not get it right first time, we have to rectify that fairly quickly. Other countries will be in the same position on that and it is important that we take on board that learning.

Q70 **Helen Hayes:** I have some questions about the costs of various different aspects of sustainable construction. Starting with a question to Peter Conboy and then Dr Giesekam. How costly is it to undertake a whole life carbon assessment, and typically who bears the cost of doing that work for any particular given development?

Peter Conboy: A developer bears the cost. If the developer is specifying a certain level of embodied carbon emissions, if they regulate a standard up front, then that has to be measured and then the contractor has to respond to that target.

It is significantly more costly than an EPC. An EPC—12, 13 years after the introduction—is now down as low as £30 a home sometimes, depending on the house type. It might be double that if it is a more complex house type. We are not anywhere near that level; we are talking hundreds per home.

As I mentioned, it is generally done at quite a high level of technical expertise—master's level. The master's level people are doing this because, as the other witnesses have described, there is no set

regulatory process for measurement of embodied carbon and therefore it is unnecessarily complex. We are talking £200 to £400 a property, minimum. It will come down but it will only come down when we standardise.

In my case study that I submitted as evidence, we were not setting a particularly challenging target for embodied carbon. It was embodied carbon coupled with passive house standard. We were seeking to minimise energy intensity—carbon intensity—from operation of the home, as well as embodied carbon. It went out to 12 contractors and all 12 declined initially. We have moved on and we are in negotiations with one of those contractors. They were a combination of nationals and mid-sized regionals. In discussion with them, it was the perceived risk of delivering what our brief was that caused the concern. That risk brings perceived cost, and that is the issue.

If we had a firm regulatory framework in which the measurement of embodied carbon was very well-defined, and supply chains were working on that basis, then that would bring down the risk to the construction sector and they would be able to respond to our kind of brief.

Dr Giesekam: I would certainly agree with everything that was said there. There are probably two points I would add to that. First, the costs are really variable. What are you assessing, when is it being done and how? Are you paying external consultants to do it? Are you using tools to support your assessment? Are they free ones or are they licensed ones? Is it your first time doing an assessment, in which case it is going to be very time-consuming and costly? Or are you just updating the standard design that you already have? If I am a house builder and I do 10 standard designs, am I just tweaking that for the location it is going into? It varies a lot. In terms of cost at the moment, I agree that the only way to substantially reduce that is by regulating and making the process more routine. That is something that can be done.

The other point is that you have to consider these costs relative to scale. The approach that most of the countries we have mentioned have taken is setting a cut-off in terms of size at which you would be anticipated to undertake one of these assessments.

Similarly, in the Part Z proposals we have set a suggested cut-off of 10 units from a housing point of view, or 1,000 square metres for non-domestic. If you are doing large-scale developments such as this, the cost is relatively negligible compared to the overall cost of the scheme. What I would not propose doing is bringing this in as a requirement for anyone who is doing a single house or anything like—it would be overly onerous to do that.

Q71 **Helen Hayes:** As a follow-up to that, in terms of standardising the process, given that we are talking about whole life carbon assessment, is the point of construction the only appropriate point at which that assessment should be made? I am thinking about things that happen along the way in the lifetime of a property, potentially around

refurbishment. I heard an example recently of a passive house where the residents moving in got annoyed by the sound of the pump and switched off the pump. Then the whole system is compromised and they are heating their home in a different way. As part of a standardised process, is there a role for some kind of ongoing monitoring or regulation at the point at which there is a refurbishment taking place or somewhere along the line, or do you run the risk by doing it only at the beginning that you get an assessment that does not reflect the carbon that is consumed in the whole life of that building in a realistic way?

Peter Conboy: At the moment, the most pressing requirement is A1 to A5 in the RICS process, which is to completion of the home. That is where you are going to have the biggest carbon impact at the moment.

Embodied carbon emissions could well be 50% of all emissions in the built environment—that is carbon now, if you see what I mean—whereas operational carbon is a graph over the life. Carbon now is worse than carbon later in terms of global warming potential.

I have one point to add on other countries. Most of those countries are ahead of the UK on offsite manufacturing. Offsite manufacturing will be a good way of standardising products and, therefore, standardising the measurement of those products. A contractor ordering a SIP panel—which is a timber panel with insulation in the sandwich—could know exactly what embodied carbon there is in that panel. It does not need a master's level person to measure that—it is quantity times carbon.

Dr Giesekam: With regard to what other countries have done on that, there are some bits that factor into what has just been said. For instance, on the idea that it is carbon now that matters, most of the limits that have been proposed are on the upfront part. Some countries are doing slightly esoteric things around that. For example, France has a weighting towards carbon now against carbon that is emitted in the future—what we would call a dynamic carbon assessment. France is implicitly saying it is more important to save the carbon now than the carbon 20 or 30 years down the line. That is one way in which you could embed an approach that emphasises that if you wanted to.

Some of these regulations will apply to the large scale retrofit of properties. Some of them will not and it is just new build. It is certainly the case that you could seek to do it at points of major retrofit as well.

Q72 **Helen Hayes:** My next question is for Dr Moncaster. What are the benefits of undertaking whole life carbon assessment?

Dr Moncaster: As everyone in this Committee is probably aware, the embodied carbon of construction is a major part of our UK carbon emissions and our global carbon emissions. Global carbon emissions from construction are 11% of all emissions, by which I mean greenhouse gas emissions, not just carbon dioxide. Across Europe, it is about 9% because we develop a bit less than high-developing countries like China, where it is about 17% but it is still more in the UK than the carbon emissions from aviation.

If we all see that reducing our carbon emissions is fundamental to the future of life, we have to reduce carbon emissions from construction, as well as from the buildings once they are constructed.

Q73 **Helen Hayes:** That is clear, thank you very much. Peter Conboy, you have spoken a little bit already about the barriers to the wider use of carbon accounting in the UK in terms of the level of skill that is required, the lack of standardisation, and those kinds of things. Is there anything else that you would like to add on that theme of the barriers to rolling out this approach more widely across the construction industry?

Peter Conboy: When we went out with that particular brief from the case study, we were quite surprised and disappointed at the lack of product choice out there in MMC—in offsite manufacturing. It is about the lack of regulation because there is no requirement to measure at the moment, therefore the supply chains are not measuring. It is happening on an ad hoc basis. We are now in discussions with a particular manufacturer of a SIP panel, and they are just doing their environmental product declaration now. We were surprised that they had not already done it because we thought that would be the basics.

Similarly, we are in discussions with a building services manufacturer for air source heat pumps, and they are only just doing their EPD as well. Those are barriers because the data are not there essentially.

Dr Giesekam: Just on that point, you had Jane Anderson in front of this Committee at your previous session, who I am sure might have already highlighted the number of EPDs available on environmental product declarations. You only have a few hundred that were produced in the UK, compared to about 10,000 or so globally. Countries like France have much better data availability than we have in the UK at present, partly because of the requirements that they have had in place for a number of years now. Overcoming that barrier will require some degree of intervention.

When the Swedish did their cost-benefit analysis for the policies that they were bringing in on this, one of the areas they highlighted, in terms of the greatest cost or most affected group, was the smaller product manufacturers that were most likely to be hit with the cost of producing the EPD. Some countries are pursuing an approach of providing subsidies or some sort of financial support for smaller manufacturers to get this data done and make it available. That is something we could easily pursue here.

Q74 **Helen Hayes:** I want to ask Dr Moncaster next: does reducing embodied carbon lead inevitably to additional costs?

Dr Moncaster: It should not do. If you reduce embodied carbon there are two ways of doing it. You can choose to use less material, which should cost less. The other is to use a lower carbon material, which on the whole means it has used less energy in its manufacture so again should cost less.

Once it becomes normal, the costs of the low embodied carbon building should be lower than the cost of the high embodied carbon building, however it is obviously down to what is normal in industry and what skillsets people have. If we replace a concrete frame and all brick and block houses with timber-framed houses, then you can reduce embodied carbon by about half. However, if you do not have the skillset to do that, and if you do not have the supply chains to provide that, you will not realise those cost savings. In theory, it should be a cost saving.

Helen Hayes: Are there supply chain issues at the moment that mean that those cost savings are not available?

Dr Moncaster: I suspect so, but this is not my area. Maybe Peter would answer better.

Peter Conboy: Just to add to that, in my case study there was a particular insulation material that we wanted to use. It is hemp that can go in the timber sandwich. It does not have approval by NHBC. The process of regulatory approval needs to be sped up. For some of the small businesses that are starting to bring forward these products, they need venture capital support to get these regulatory approvals. You need something called the BBA approval, which is run by BRE. If you do not have that then you cannot get a mortgage on the house.

That particular material—which is the lowest form of embodied carbon insulation that is available—at the time that we did this, had not got those approvals so we could not use it.

Q75 **Helen Hayes:** My final question is to Dr Giesekam. What incentives are there to undertake carbon assessments and sustainable construction at the moment, and what further incentives are needed?

Dr Giesekam: At the moment they are largely voluntary. You have a number of large commercial clients who have their own CSR or ESG commitments that have driven them to introduce requirements around embodied carbon assessment. You have some voluntary commitments that are made by design firms and contractors through things like built environment declarers, where they have voluntarily undertaken to do these routinely on their projects. Then you have some requirements coming in on public projects. For instance, the construction playbook at the end of 2020 brought in requirements for social infrastructure to start considering this. Previously that was more limited to economic infrastructure: roads, rail, and so on, which have had approaches on this for a long time. This now requires the Department for Education and the Ministry of Justice and everything else to start considering this.

The challenges there are about implementation. I don't think those Departments have a huge amount of internal knowledge on whole life carbon assessment or how to do it. Some of them are better than others but it is a matter of rolling that out now.

Those are the kind of incentives that are in place at the moment, which are mostly voluntary and weak. It would be a mistake to see this best-in-

class coalition of voluntary practice emerging and to assume that that is going to become standard practice in the absence of regulation, which I think is the substantive incentive that we need.

As I have alluded to previously, it is widely accepted that that is the route to do it. As I mentioned, we have over 100 statements of support for the regulation of embodied carbon from construction firms on the Part Z website. Even the future homes taskforce delivery plan that was released earlier this year said that we are essentially in this kind of inevitable process of policy translation that ends up in dealing with embodied carbon. That is the report from the mass house builders, who you would expect to be the most reticent within the industry to do this. Even in there, they were talking about an ambition of trying to deliver a 50% reduction in embodied carbon.

That is not going to happen without regulation. That is not something that is going to be achieved on a voluntary basis.

Q76 **Chair:** Can I just pick up on a comment you made there, Peter, about the time it takes for a new product to get accredited? You gave an example of a BRE product; I am not quite sure what that means.

Peter Conboy: Building Research Establishment; they produce the BBA, which is the approval of the material to be used in the construction process, and mortgage lenders will look to that.

Chair: How long does it take them to approve a new product?

Peter Conboy: I don't know, to be honest. The issue was that the product we wanted to use had not got through that process at the time, so we could not use it.

Chair: That is quite an important feature in adopting innovation.

Peter Conboy: It is an absolutely critical step.

Chair: Perhaps we will come on to that later.

Q77 **Cherilyn Mackrory:** Peter, if I could stick with you for a moment. You talked a little while ago about the benefits of the whole carbon assessment. I am going to ask a few questions to the panel on resources for the carbon assessment transport costs in construction and the waste sector. You mentioned that the upfront carbon was the costliest, but this is going to concentrate on the rest. What information is required for a whole life carbon assessment and is this information freely available?

Peter Conboy: Ideally, as we talked about, it is the EPD. If I can use an analogy, a body builder knows exactly what they are putting into their body in terms of carbohydrate, protein and fats. A builder does not know what carbon they are putting into their building because the EPDs are not—we only have hundreds of them and we need them for all air source heat pumps, for all mechanical ventilation and heat recovery systems, for all modern methods of construction products that have been produced in factories and brought to site, such as flatpack homes. That data is not consistently available.

Cherilyn Mackrory: Are you saying it is not available or that it is too vast and too inconsistent to be useful?

Peter Conboy: It is not consistently available. Some manufacturers are there, but if a builder is asked to produce a home with 300 kilograms of CO_2 emissions maximum per metre square, they need to know what the embodied carbon is in all the materials. Like the body builder wants to know what he is putting in his body, the builder wants to know what he is putting in the house and they do not know.

Dr Moncaster: This is absolutely true, but it is also true across the European countries we have been talking about, that not all EPDs exist for all products. What people do is use generic data. We have developed generic data for specific products and that is absolutely fine at design stage. It is much harder for Peter when he is trying to demonstrate that he has reduced his embodied carbon by a certain amount, but it is quite good at early to mid-design stage. I just wanted to say that.

Q78 **Cherilyn Mackrory:** That is useful. If I can stick with you, I want to talk about procuring globally, which has to be done because the building environment sector is a consumption-based sector. You gave an example of importing bricks to Ireland from the UK. How can these global procurement practices be taken into account in national territorial carbon budgeting arrangements, such as in the UK?

Dr Moncaster: This is tied up with the generic data. If we go back to the generic brick EPD for UK bricks, because Ireland produces very few of their own bricks at the moment—they mostly import bricks from the UK—they will use that EPD for brick from the UK brick and say, "This is the EPD for brick." That EPD—the Environmental Product Declaration—includes the manufacture of the brick but also the transport and construction energy costs.

I think the transport they use is 100 kilometres, so it is an assumed distance that the brick has travelled to site. However, for Ireland, if you calculate for the full distance—as Jane Anderson and I did—that comes out as much higher than that. Obviously, it is a much longer distance and the impact on the carbon emissions of that brick is to multiply it by 50%. Therefore, bricks moved from the UK to Ireland are one and a half times as carbon intensive as if they are used in the UK.

This really matters and it isn't currently captured by the EPD. It needs to be captured by the tools we use to calculate the A1 to A5. This is about A4—the transport stage.

Q79 **Cherilyn Mackrory:** Dr Giesekam, can I bring you in on that as well?

Dr Giesekam: I agree with what Alice has just said. It might be helpful to think about this in the round as well in terms of numbers. We are currently putting together the UK Green Building Council's net zero roadmap for the built environment that will be getting launched at COP26 shortly.

We have done an assessment of what the embodied carbon of the construction industry is to the boundary that is set out in that, and what proportion is roughly UK territorial emissions versus consumption basis imported products. It is about 43 million tonnes for the most recent year. We have data of carbon dioxide equivalent for embodied carbon total for the sector. Of that, around two-thirds roughly is territorial—that is incurred in the UK—and one-third is imported. That is the current split on the whole. How that might evolve over time is a big question. Obviously, in the past we have had historical evolution in where we have imported materials from and so forth.

The one thing that I would say is the historic trend on embodied carbon as a whole for the sector has not really made any substantive reductions since 1990, with the exception of the years directly following the global financial crisis. That essentially happened because we stopped building. We had the worst and fourth worst drops in annual construction output on record in sequential years. That is the only thing that has substantively reduced our total embodied carbon figure over that time period; the rest of the time it has been gradually going up.

Q80 **Cherilyn Mackrory:** Out of interest, have you had any figures on how Covid has affected that?

Dr Giesekam: There are some figures. We don't have an equivalent number for that total because the consumption-based figures that we use essentially come on a two-year backlog, because of the datasets that are used for them, so we will not have those for another period yet. The territorial figures you have are the estimates of those but, because that is only about two-thirds of the total, it is misleading to quote those numbers.

Q81 **Cherilyn Mackrory:** It would be interesting to know, because construction continued—it was one of the priorities to continue—but obviously we would not have been importing.

Dr Giesekam: Yes, it will be fascinating to see it once we have the data for it.

Q82 **Cherilyn Mackrory:** Dr Moncaster, how is the carbon impact of waste assessed and what overall impact does this have on the carbon footprint of a building?

Dr Moncaster: Waste is assessed during construction, so construction waste is assessed as part of the EPD again. Each material will have its waste impact as part of its EPD, so your average waste for each material. You are applying the same across all construction sites, and there are for and against that, of course.

There is also the waste from demolition and its transport off site and its processing after the end of that process, so that is calculated at the end of life of the building. That is stage C. My concern is that—I think I am right in saying—if you come to a site as a developer and you demolish a building in order to build a new building, there is no assessment within

the LCA process of that. We are producing a large amount of construction waste and, as you know, construction is responsible for about one-third of the waste in the country, and more if you take into account mining or quarrying, so we are not assessing that and that does not currently come into that LCA because it is outside the life span of the building that you are doing the LCA for. Does that answer the question?

Q83 **Cherilyn Mackrory:** Are you calculating module C at the beginning of the life of a building then and making assumptions on how that will be demolished and disposed of?

Dr Moncaster: That is what the full LCA process and the full methodology suggests. However, other countries—with which I and Peter and perhaps Jannik agree—think that we should only concentrate on A1 to A5 for a building and ignore what happens in the future at the end of the life of the building for now. It is not that we should not be interested in it, but it is so far in the future and so unpredictable as to how we will manage waste in the future when that particular building gets demolished.

Q84 **Cherilyn Mackrory:** Jannik, would you like to comment?

Dr Giesekam: I agree with what Alice has just said. I am in agreement on that position. I think the challenge with this is obviously that the future is inevitably uncertain. All you can do is look at different scenarios for what will happen to those products at the end of life based on the data that you have that is available. The default assumption tends to be that it gets disposed of in the same way as it would be disposed of now.

I strongly suspect that 50 years from now, if you are knocking down a new building, the waste sector will look substantially different to what it does now. If it doesn't, I do not see how we are going to achieve the net zero targets that we have set. It may be that that current default approach is a little bit misleading, but it is the sensible one in the absence of any robust way of saying, "This is definitely how it is going to change in the future."

Q85 **Cherilyn Mackrory:** Is there any research going on about how that might look? We are going a little bit off on a tangent.

Dr Giesekam: Yes, there are a lot of people working on that topic. I think there are a lot of different views of what it might look like. For instance, we were recently involved in doing a number of resource productivity scenarios for the UK for DEFRA that explore different futures, but it is very uncertain. What you can say for certain is that there is a lot of innovation to be delivered there and a lot of people looking at innovative uses for products at end of life, coming up with new things like cross-laminated secondary timber and products like that that are very much experimental or niche at the moment but could be mainstream in 50 years.

Cherilyn Mackrory: Brilliant. Thank you. Back to you, Chair.

Chair: Thank you, Cherilyn. Just to conclude this panel, John McNally.

Q86 **John McNally:** Thank you, Chair. My questions are on material use and training. I cannot help but think we should have had this Committee meeting about a year ago, because I am in the middle of building a house and I might have been able to ask some more searching questions to which, from what I have heard so far, I would probably have not gained any answers.

My first question is for Dr Moncaster and then Peter. Can you describe how the choice of materials, both new and recycled, affects carbon accounting? If you could expand on that for us, please, Dr Moncaster.

Dr Moncaster: If I understand your question correctly, I would say that this is one of the main thorny issues for LCA. As part of the calculation, the timber industry is very keen to include sequestration, which is the carbon absorbed by timber when it is growing. The steel industry is very keen to include the fact that you can recycle steel at the end of life. Indeed, a vast amount of steel and concrete is recycled at the end of life. I am not sure what the concrete industry are keen on including, but they all have different ways.

John McNally: Carbonation.

Dr Moncaster: Yes, carbonation during the life, but I don't really believe in that. It is a very good question. It is another reason why you need independent regulation that says, "We are just going to measure this. This is the actual carbon that we think is being emitted for these processes during this time period." I could go into great detail on which lifecycle stages benefit, if you like, the use of different materials and which don't.

I think experts in carbon accounting—the master's and PhD level people, as Peter was saying—understand these issues but, as someone who isn't an expert in them, it is very difficult to understand and so you would need to be given a fixed methodology. Did that answer your question?

Q87 **John McNally:** Yes. You spoke a bit about this earlier on, Peter, so could you—

Peter Conboy: If a finance person talked about discounted cashflow or net present value, we need to think about carbon in the same way. Carbon now is worse than carbon later. In terms of cost-benefit analysis of your carbon budget, we need to look at embodied carbon versus operational carbons saved, because there is a carbon cost to the building and the materials in it might be saving operational carbon later.

For example, an air source heat pump as compared to a gas boiler is saving operational carbon emissions. However, an air source heat pump has embodied carbon in its manufacture and we need to look at that cost-benefit analysis. As a practitioner, we cannot do that at the moment because that analysis is not generally available. We need to get to the point where that is almost automatically done as part of the new build process, so you can look at what the carbon budget of your construction project is against the operational carbon saved, because there is a flex

there. It might be better not to use an air source heat pump; there might be something else that you can use instead, such as a heat battery. If it is a small house, do you need an air source heat pump? That data is not available and it needs to be.

John McNally: Builders could probably not make that calculation.

Peter Conboy: No. Builders will use consultants to do those things but the consultants that can do that kind of thing are master's level probably. It is not like an EPC anyway. Everybody knows what an EPC is now and you get your EPC with your new house, but that is all about energy and operational carbon emissions. It is not about what carbon is being used to build that house.

Q88 **John McNally:** Dr Moncaster, what building materials are most appropriate to limit the need for heating and cooling buildings within the UK?

Dr Moncaster: Obviously, insulation is what limits heating and cooling. I do not think the structural materials make as huge an impact as some building material manufacturers would like us to believe. I think if you insulate a timber-framed building, or if you insulate a concrete building, or a steel-framed building, or a brick building, you will get pretty much the same operational energy impact. Was that the right answer?

John McNally: Yes, having read the brief, it was quite difficult to understand the different types of material you could use. Some larger buildings would not lose heat. Smaller buildings might keep the heat but the climate we have here is a bit different, particularly in Scotland where I live. It can be different again depending on exactly which community you are living in. I can understand why there would be an entirely different set of circumstances in the middle of London, whereas you might find this different in some parts of Scotland.

Dr Moncaster: This is the argument that concrete has a high thermal mass, so it helps to regulate the temperature throughout the lifetime of the building over its operational period. I have not done the research myself but I have read the papers on this, and the thermal mass works to a certain extent if the concrete is exposed, which it usually isn't—certainly in domestic buildings we don't have exposed concrete—but if it is exposed, what it does is absorb the heat that you are putting into the room and re-radiate it outwards, so that has two effects.

If you are cooling a room, that is great. If you live in a hot climate that can work very well, but if you live in a cold climate, as we do, and as in Scotland, it does not work so well at all because you have to heat the wall as well as heat the room, so you can end up putting in more heat in that situation. I am not sure that it is a valid argument for using more concrete in buildings generally, let's say. I think that is what I was trying to get across in my evidence.

Q89 **John McNally:** My last question is to Peter and then to Dr Giesekam. This is of particular interest to me as well because I think the heart of the

matter is—as you touched on earlier—what sort of education or training would help developers and contractors move towards net zero, and how can upskilling be delivered most cost-effectively? I think this probably goes to the whole curriculum and how we start from primary school through to secondary. We have touched a lot on that within this Committee, so could you give us your thoughts on that matter?

Peter Conboy: It is a huge issue—massive. It is the biggest challenge, I think, in delivering net zero. The educational routes into the industry need to be more aligned with the apprenticeship route and day-release, and we need huge numbers.

John McNally: Huge numbers?

Peter Conboy: Huge numbers, yes, because the construction industry is significantly ageing. If you go to a construction site and you look at the people on the site, there are nowhere near enough young people coming in.

John McNally: Why is that?

Peter Conboy: I just don't think it is an attractive option at the moment. It is not selling itself correctly. I think we need to sell the industry to young people on the basis of net zero and on the basis of averting climate change. We need a lot more people going into technical areas, but not necessarily needing a degree at master's level. We need to be getting into sixth forms hugely now. We need to be doing that now. I think it is a really pressing priority. In the short to medium term, the biggest constraints facing net zero are going to be resource and skills.

Q90 **John McNally:** Dr Giesekam, can you comment? We are talking about training trainers here, I guess.

Dr Giesekam: Yes, I think there is a challenge of upskilling people in this. There is a broader challenge that Peter is looking to across the industry as a whole, on embodied carbon in particular. Yes, there are a relatively limited number of practitioners doing this at present in the industry. We certainly need to broaden that out and it certainly needs to be a simpler process.

At the end of the day, it could be a very simple process if it is to do a basic assessment with a tool. At the end of the day, it is multiplying quantities of stuff by a factor and adding it up together. It is not rocket science. The problem is getting hold of all the data in the first place and knowing how to conform to the different guidance and standards that are out there, which are spread across a lot of different locations. Then, if you want to do something like benchmark your project, you have to go looking for all that data as well.

That is where the complexity and the difficulty come in at the moment. I think this is a process that we can teach very easily. Indeed, we do teach it at universities and so on at the moment to graduates who are coming through, but it is something where we need to make much better and simpler resources available for the industry to be able to do it.

In order to do that—we go back to this point of regulation—you need to have one standard approach to doing it. That is the only way you are going to be able to make a simple resource that explains all the things that are currently out there, because that is not possible at the minute—as you say, it is an alphabet soup.

John McNally: Back to you, Chair.

Chair: Thank you, John. We have a final question from Robert Goodwill.

Q91 **Mr Robert Goodwill:** Just a quick follow-up, Peter, following on from John's question. How are we going to prevent double or even triple counting? We all understand that using wood is a great way of putting carbon into a building but, if I am the farmer who is growing the tree, I will have taken credit for that carbon in the tree. I then sell it to a builder and he then puts it into the house and gets credit there. Maybe even at the end, when the demolition contractor knocks the house down, he will capture the wood and use that in some way that is also sustainable. As products move down the food chain or the production line, how are we going to prevent them being counted every single time?

Peter Conboy: The academics are probably going to have to answer that question. In simple terms, in terms of construction and the measurement of embodied carbon into the home, it is a relatively simple calculation based upon the product. Where you may have double or triple counting is if there is some kind of offset, but that is at an economic aggregate level rather than at a building or construction site level.

I think the triple counting might come in if it has been used as a carbon offset, for example. That is not going to impact at my level—the developer level—if you see what I mean.

Dr Giesekam: There is a question here of: do we have the standards to do it and then is there a way of enforcing those standards? I think the answer on the standards point is, yes, they exist. The question is then, do you enforce them? If I want to claim the carbon credit for a bit of woodland that I have planted and I am doing something like the Woodland Carbon Code, there are a set of requirements that I have to meet in order to get the money for that. If that is being enforced you are complying with that.

When it comes to accounting for carbon sequestered in natural materials and buildings, we have standards that tell you what to do around that. Again, it is a case of: are we using the standards on that? Typically, that involves reporting the sequestered carbon separately from the other elements in the process so that you can weigh that up appropriately.

When it comes to the end of life, again, it is a question of doing scenarios for that when you are assessing it at the start of a project. For instance, if you are using something like the Wood for Good Lifecycle Database for timber products in the UK, it will give you a set of different scenarios for different disposal methods for that wood. You would essentially assess all

of those: "Is it going to energy recovery? Is it going to landfill? Is it going to be recycled?"

What you cannot know is, in 50 years' time, when someone else owns the building, what they are going to do with it at that point, so you make the best, informed decision you can do at the time. I think the best practice on this is not to take the benefit of the sequestered carbon into account in the headline number for the building. It is a separate bit on the side.

Mr Robert Goodwill: We almost have a dual market for timber that has already had the carbon sold to British Airways, and timber that is free, which you can then use in credit against the building that you are building.

Dr Giesekam: Sorry, I think Alice wants to come in on that.

Dr Moncaster: As I understand your question, it is farmers who are getting credits for growing trees on their land and growing bits of woodland and rewilding, but that is different to farmed forests that are FSC—Forest Stewardship Council—certified, which says that they replace trees that they cut down for timber. That timber is different timber. That is the timber that we use in buildings—farmed timber. We don't go and cut oak trees down, on the whole.

The sequestration that we are talking about assumes that that timber will be regrown as well as—as Jannik says—at the end of life the processes of that timber will not then re-emit that carbon into the atmosphere. I think they are two separate things. I don't think there is double accounting going on.

Mr Robert Goodwill: Thank you.

Chair: Thank you, Robert, and thank you very much to our first panellists, Dr Alice Moncaster, Dr Jannik Giesekam and Peter Conboy. Thank you very much, indeed, and if we could move swiftly into our second panel.

Examination of witnesses

Witnesses: Dr Alice Owen, Caterina Brandmayr and Robert Lambe.

Q92 **Chair:** I would like to start by welcoming Dr Alice Owen remotely from the University of Leeds. Perhaps you could explain your background to the Committee.

Dr Owen: Hello, I am Dr Alice Owen. I am a professor of business, sustainability and stakeholder engagement at the University of Leeds and I research the practicalities of delivering sustainable construction. The evidence I submitted to the inquiry is particularly concerned with the behaviours of small construction firms—the builders and installers who are responsible for the repair, maintenance and improvement of the vast number of existing buildings.

Chair: For whom navigating the alphabet soup is quite challenging. Thank you, and welcome back to Caterina Brandmayr from the Green Alliance.

Caterina Brandmayr: Thank you, Chair. I am Caterina Brandmayr, head of climate policy at Green Alliance, which is an independent think-tank and charity focusing on achieving ambitious leadership for the environment. As part of our policy analysis and advocacy, we have also been looking at the role of tackling embodied carbon in buildings in achieving the UK's net zero emissions target.

Chair: Welcome to Robert Lambe who is with us in the room from the Chartered Institute of Building.

Robert Lambe: I am a fellow of the Chartered Institute of Building and am representing it today. In my day job, I have worked in the construction industry since leaving school. I am part of the ageing population of the industry that Peter mentioned a few moments ago. I spent my whole career in the industry, mostly within large businesses. In 2016, I left a senior position to set up a new small business focusing on the delivery of low-energy homes, retrofitting new build using off-site manufacture. I am involved in the joint industry Government Green Construction Board and a member of the CO_2nstructZero programme board that is led by the Construction Leadership Council.

Q93 **Chair:** Thank you very much. I think the focus of this panel is very much on looking at the differences between new build and retrofit, and how we can try to get our heads around what is better practice where we can. I will start by asking each of you for your headline. You might want to reference the publications of the net zero strategy or the heat and building strategy earlier this week. How do you see the preferences between reusing and refurbishing buildings balanced against the clear requirement to add new housing stock to the country, as the Government have an ambition to build 300,000 houses? Alice, can we start with you?

Dr Owen: Thank you. I think there is no doubt that the comfort and housing of our population requires both—retrofit and new housing. I would argue that dealing with the existing housing is a different set of processes to the ones involved in building new housing. They should be held to similar standards of sustainability in the round, but they do involve different workforces, different processes and different assessments. I think we just need to recognise that those are two big programmes of work.

If I could link it to the heat and building strategy, that document shows a level a level of ambition that is perhaps not quite what many of us who have been waiting months to see it might have hoped, but it is still a level of ambition we have not seen before. That clearly puts most emphasis on the existing building stock, which I have a lot of sympathy for because it is where most people are living now. However, it focuses on a technology, which I know is easy to communicate, but heat pumps in a draughty home do not deliver on good housing in terms of comfort or

cost. Neither do they deliver on the things that motivate the small building firms to change what they do—particularly guarding their reputation through looking after their customers.

Given that the division bell may curtail debate, I will just make one of my real headline points here, which is that to achieve sustainable construction in the built environment we have to understand the more than 300,000 people who are already working in the sector, and work with the grain of what they can do to repurpose the £10 billion-plus a year that is already spent on existing properties, alongside creating an additional workforce that is going to create amazing new homes fit for the future.

Caterina Brandmayr: Commenting on the strategies that were published yesterday, picking up on what Alice was saying, I think we need to both look at existing buildings and make sure that those are future-proofed, and also make sure that, whatever new building is designed, it is with the highest energy efficiency standard, with clean heat embedded at the start and also tackling design so it promotes low-carbon materials and designs.

With regards to the strategies yesterday, the heat and building strategy provided some welcome steps in terms of promoting clean heat. We think it should have gone much further in terms of funding the switch to heat pumps. It also lacks the kind of motivation and comprehensive programme to really get energy efficiency and buildings with the highest energy efficiency standards.

It was also somewhat disappointing that the Future Homes Standard is to come into force in 2025, because we think that will lead to a lot of buildings being built before that with low energy efficiency standards, which is a missed opportunity.

The strategy when it comes to embodied carbon—which, again, is a very significant area that has so far been overlooked—to some extent acknowledges that this needs to be addressed, and that is welcome. As the previous panel pointed out, it does not go far enough in setting clear commitments for how it plans to address this. We think that instead, very urgent action is needed to make measuring and tackling embodied carbon the norm. That means developing new buildings with low-carbon materials and low-carbon designs, but also promoting building reuse and material reuse much more.

There are numerous examples of buildings where we can upgrade the building and make sure that both embodied carbon and carbon emissions are minimised, compared to demolition and new builds. Beyond that, promoting reuse as opposed to demolition and new builds, really helps to address other impacts of demolition and construction, including, for example, the fact that it is a very risk-intensive sector and that it is a very wasteful sector. The waste generated from construction and from demolition is significant, and we should seek to mitigate that if we want

to address both the climate impact and the wider environmental impacts associated with buildings and construction.

Therefore, we need to put much more emphasis on reusing and upgrading existing buildings as part of our efforts to provide housing going forward.

Q94 **Chair:** That is the crux of this panel. I would like Robert's perspective, as a practitioner, on the challenges of adapting existing buildings versus new build.

Robert Lambe: Thank you. I would certainly endorse everything that has been said by Caterina and Alice already. The requirement for additional homes is clear, whether it is 300,000 or any number in that order, but there is certainly a requirement for more homes and they should be good quality homes. They should be homes that people want to live in. We have the whole challenge facing us of the existing stock, both in terms of living conditions and the carbon agenda.

We absolutely have to focus on the challenges that we face in both strands. The fact that we have 600,000 empty homes, the fact that we have lots of empty buildings and the changes that we see—even as an impact of the recent difficulties we have had with Covid and different patterns of living—have to be reflected in what we need as a society going forward and what we do with community spaces and the whole place-making agenda. We need to take stock of where we are and we need to ensure that we are not building new houses for the sake of building new houses, at the cost of bringing existing buildings into better use. That has to happen alongside dealing with the existing housing stock.

To comment on the strategies released yesterday, as an industry we have been waiting with bated breath in anticipation for many months for the heat and buildings strategy, with a hope that it would give us at least the basis of a long-term, coherent plan to deal in particular with the retrofit of existing housing stock. There is strong recognition in the documents that were released yesterday that there is an absolute importance in dealing with the existing building stock. The absolutely urgency is recognised in those documents. They also recognise what the challenges are.

Where they stop short, disappointingly, is in putting more in place to deal with that in a coherent, long-term way, which Caterina referenced. The opportunity to have a basis for a strategy or a plan—I will reference the national retrofit strategy, which is being developed in draft by parts of the industry, and maybe we will come back to it—is what is lacking. That is what would bring all the threads together. If we do get the opportunity to come back to the retrofit strategy that we think is needed, there are a number of strands to that, all of which are important. If we only have some of them, we will not achieve what we want to achieve.

Q95 **Chair:** That is very helpful. Can you describe to the Committee the

circumstances in which you think it is appropriate to demolish an existing building and rebuild on the site, in relation to the carbon impact?

Robert Lambe: Yes, in terms of general thoughts, there are clearly going to be situations where buildings will not be fit for purpose and the right option is to demolish. In making that decision through the regimes of planning and possibly other regulatory regimes, it should be incumbent on a developer to make an assessment that addresses the whole life carbon. That should deal with the demolition, as well as the build, as well as the in-life operational energy impacts. There should be, as part of the planning regime, a requirement for a full carbon assessment to demonstrate that demolition is the right solution for that particular site.

We are involved in some schemes that in my opinion would fit the bill that it is appropriate, where we are looking at redundant garage sites and redundant land that needs to be brought back to life within communities. Demolishing garages to build new homes within existing communities is an area that makes sense to do demolition. There should be a requirement to do a proper assessment of what is the most appropriate approach before simply going forward and demolishing a building.

Q96 **Chair:** Alice, in a similar vein, we heard evidence in our previous inquiry about the cost of bringing old buildings up to modern standards. It is very, very expensive to renovate a house to passive house standards. Does your organisation have views on the relative cost of new build versus renovation?

Dr Owen: "How long is the bit of string that you want me to assess the length of?" would be an appropriate response to that. It can be more costly, but having said that, there are more components to both cost and value than simply the capital cost, the labour cost or the cost associated with carbon. Circling back to your previous question, one of the things to be very wary of in deciding to demolish existing structures is whether carbon is given more weight than social aspects, cultural value and other aspects of place.

To return specifically to what you asked about comparing the two, currently one of the reasons why retrofit is often more expensive per square metre is because it is always bespoke and always special, and this is an industry that has been driven to reduce costs, to reduce specialisation and to drive down labour costs as far as possible.

There is an opportunity to think about introducing value back into the construction proposition and to think, therefore, about how you might increase the knowledge, skills and innovation brought to each and every retrofit project, which could over time bring down some of those other capital and labour costs for the total project.

The other thing to recognise in terms of cost—particularly with existing buildings that are being occupied at the moment—is that sometimes you get a cost inefficiency because you can only operate room by room. A whole-house approach is needed, but it might be that you can only implement that a room at a time, as part of a whole-house plan over

time. That is necessarily costlier overall, but it might be affordable to an owner-occupier or a landlord on a year-by-year basis, so we need to be a little careful about assuming that it is always costlier to do retrofit.

Q97 **Chair:** It has disruption elements too if you are trying to do a property one room at a time. That is not easy to live with.

Dr Owen: Absolutely.

Chair: I am going to move on to Caterina. I would like to ask you a question about Government policy and whether Government policies in areas like permitted development rights are skewing or getting out of balance the challenge of comparing retrofit with new build in order to deliver the housing that we need.

Caterina Brandmayr: I would say that there are a number of policy areas that are undermining efforts or are not providing the right incentives for making better use of existing buildings and materials. These are related to the planning system, permitted development rights, building regulations and taxation. The planning system, for example, does not provide a requirement, as a standard across the country, for whole life carbon assessments and for justifying why a building should be demolished and built anew rather than be reused. There are some local authorities doing that. For example, the Greater London Authority is requiring that projects in London are referrable to the Mayor, but that is an exception. If we want to enable other local authorities to follow suit, we cannot expect them to always have the resources, the power and the leverage that London has to make sure that the developers meet higher standards.

On permitted development rights, there are certainly concerns that they are leading to poor-quality development. On the one hand, it is about a lack of scrutiny as to the standard of the new developments, with concerns around health and wellbeing for the residents. There are also expansions of the permitted development rights that are potentially allowing for demolition and new build without the proper scrutiny that the planning system should ensure.

There are also aspects related to the building regulations, which currently do not require developers to address embedded carbon. Again, linking back to the Future Homes Standard, it is a missed opportunity that the standard does not address embedded carbon, because that is at least one place where developers could start to adopt low-carbon designs and materials, including promoting the reuse of materials. Finally, on taxation, we are applying VAT of 20% on building renovations and upgrades when new buildings have zero VAT. That is a disincentive for upgrading and making more effective use of existing buildings.

If I can comment on a point that Alice made earlier around cost, we have to look at cost more widely. If we are going for demolition and new build, there are more disruptions related, for example, to air quality. More destructive excavation of sites will also lead to air pollution, as will having heavy machinery on site. More deliveries to the site will also be required,

which will contribute to air pollution and congestion locally. Those aspects should also be considered in the cost of demolition and new build.

Chair: Thank you very much. We are going to move on now to Matthew Offord.

Q98 **Dr Matthew Offord:** Is retrofit only possible for building in urban settings? I want to put that to Ms Brandmayr and Dr Owen.

Caterina Brandmayr: From the point of view of retrofitting and maximising building reuse, I don't think there is anything that, in principle, would prevent that happening outside urban settings.

Dr Owen: I agree. Retrofit in rural settings may offer additional opportunities if it is lower density and there is the opportunity to have private wire energy arrangements or some degree of self-sufficiency in terms of energy supply and demand.

What you do find is that the design considerations associated with the types of buildings that are more frequently found in rural situations require different skills from the small firms that undertake retrofit work. There is a real interest here and an argument for developing cohorts, cadres or place-based networks of skills and tradespeople who can work on peer learning and deliver rural and appropriate retrofit. There might be building types that need a different approach. You might get more frequent solid-wall properties, but I suspect in proportional terms it is not hugely different. Place-specific retrofit skills and renovation plans are quite important.

Q99 **Dr Matthew Offord:** In one of our earlier sessions, we heard that building sustainable homes has to include sustainable transport. What are the requirements that would need to be established to ensure retrofitted or new buildings have access to sustainable transport links? Can I bring Mr Lambe in on that as well?

Robert Lambe: Thank you. Picking up a bit on the previous question, I have been involved in work with the Welsh Government, through the Welsh Government programme, Arbed. It was a retrofit programme and it is still ongoing; it has been going for many years now. Many of the properties that we dealt with were very rural, very exposed and in remote locations. As Alice quite rightly said, accepting the fact that those properties in many cases demand different skills and different approaches, because of the nature of the existing properties, it is absolutely appropriate to bring those up to a standard that we are looking for now.

Picking up on the next question, the properties I am talking about in Wales—probably to an extreme—are very remote and they are small communities. Linking back to a point that was made earlier, they are existing communities and one of the benefits and one of the values of retrofit is retaining that community and that cohesiveness in existing communities.

We are doing work with Nottingham City Council, and one of the major objectives that was put forward for a retrofit programme on some hard-to-treat properties and non-traditionally built properties, was keeping the tenants in situ and not having to relocate them or even decant them during the work. The benefit of that, which we have seen as we have completed the programme of work, is huge. There has been a change in the attitudes of the individuals and the cohesiveness of that neighbourhood has increased, so there is a benefit to be recognised in terms of bringing existing rural and more remote properties up to a standard without considering impacting on that established community.

In my mind, the question about sustainable transport and infrastructure is much more challenging when you are talking about rural retrofit works. Arguably, it could only be addressed if you are looking at community-led, regional-led plans of retrofit, which is an important aspect of stimulating the market. Local authority or social landlord-led programmes of work can deal with retrofit on a street-by-street community basis, rather than individually.

On the whole-house retrofit projects that we are dealing with, we are faced with doing substantial work on social landlord properties and we have pepper-potting of right-to-buy privately owned properties. We are doing terrace blocks of seven or eight properties and in the middle is one we are not doing because the funding does not allow us to do that. In terms of community-led programmes of retrofit, whether they are rural or urban, it allows you to consider the place-making and the infrastructure, but clearly there is a bigger challenge—a huge challenge—if retrofit is dealt with on an individual property-level basis.

Dr Owen: I want to add to what Robert said there. In a rural situation, the way of achieving sustainable outcomes may be different but it is equally important. We should not confuse public transport out of a rural location with a low-carbon system of transport and access. It might be that shared access to individual low-carbon transport is viable for a particular dispersed community, and it might be important for that rural location to have services come to it and reduce the number of journeys that individuals have to make to somewhere else.

I am sure that members of the Committee have experience of mobile libraries, mobile banking services and so on and so forth, which have been in decline, but there is an opportunity here to rethink how we provide access to the services, including transport and mobility, that enable the rural built environments to be entirely sustainable.

Caterina Brandmayr: Can I come in on a comment that more generally touches on the role of sustainable transport related to retrofit? A starting point should be that, based on the Climate Change Committee recommendations in its sixth carbon budget, we know that already by 2035 total car miles will have to fall by 9% and by nearly a third by 2050. There is a new analysis of this, which will be published in the next week, which shows that we will have to go even further in terms of traffic reduction if the Government's efforts to drive EV uptake do not meet the

level of uptake that the CCC recommends. Therefore, we clearly have to move away from car use, where possible, and make sure that we promote and prioritise public transport, walking and cycling. At the moment, there is a significant shortfall in the planning system.

For example, there is extensive research by the organisation Transport for New Homes that has found that a lot of the new housing developments across England are car-dependent and lack access to sustainable transport systems. That goes directly against the CCC's recommendations and the Government's effort to make public transport, walking and cycling the natural choices. That needs to be much more strongly prioritised as part of the planning system and it means that location does play a role in where we decide to promote new developments.

Obviously, there might be exceptions when we look at certain rural areas but even there—as Alice was saying—we do need to think about what might be local solutions that still allow for some form of public transport within the community.

Q100 **Dr Matthew Offord:** Do you believe that the new build development that you mentioned, which is dependent on cars, should have gone ahead or not, given that it could not be accessed by sustainable transport?

Caterina Brandmayr: It should be a priority for the planning system to ensure that new developments are located and designed to facilitate zero-emission transport. They must be located in areas where this can be supported. Either the access to zero-emission transport should already be available, or the developer should address that issue when it provides the development and make sure that that low-carbon transport is available from day one of residency so that the residents are not forced to take up car use. There can be interim solutions, but the aim should be that from day one of residency there are already low-carbon transport options available.

Q101 **Dr Matthew Offord:** Finally, are there some buildings that are simply unfit for repurposing from commercial use to residential? In my constituency, there has been some problem with that on the basis of sustainability of high streets, for example. In regard to this issue, are there any areas or any locations where you believe it is not viable, and how would that be decided?

Robert Lambe: It comes back to some of the points that have already been made in terms of the risks around the permitted development rights and the standards of living spaces that are being created. It is about making sure that any building that is repurposed is fit for that new purpose. Equally, on the point that you have made about the impact on that community or the high street, is it in the right location? Even if the building itself is fit for repurposing or living accommodation, is it in the right place? All those considerations have to be made, and the system has to ensure that those decisions are considered properly and that there

are mechanisms in place to avoid the wrong buildings being used for the wrong purpose in the wrong location.

Dr Matthew Offord: Are there any further comments? That is certainly a view that I agree with. Thank you very much.

Q102 **Mr Robert Goodwill:** We have already heard a long list of reasons why it is harder to retrofit an existing property than to build a new property: the fact that VAT is not levied on new build, the cost of bespoke work as opposed to mass production or offsite production, or even the disruption of working on a property that you are already living in. Which of those barriers could we remove and are there any other things that we need to address before we can deliver that? Dr Owen is smiling, so can I start with her?

Dr Owen: This is such an important question. I am going to start by reminding everyone that the list of barriers is indeed very long. Demolishing barriers does not automatically mean that people will move forward to do the right thing. In the evidence that we submitted to the inquiry, we tried to set out that to get a shift in behaviours you need an aligned set of capabilities, opportunities and motivation. That will get through a remarkable number of barriers.

However, what we uncovered is that there are some demotivating factors, and these are worse than barriers in some ways because they are actively discouraging the building firms from undertaking the kind of work that would lead to more sustainable buildings. Foremost among those demotivating factors was the perception of cost. I say "perception of cost" rather than actual cost. It is the perception of cost of energy efficiency and of whole-house retrofits.

In the previous panel, Peter referred to contractors being wary of the costs of undertaking assessments, because they have not done it before and they had to invest their time and effort in getting their understanding before they could move. The same applies to the building firms that are contemplating changing their very tried and tested ways of working.

There are two aspects of the perception of high costs that need to be tackled separately. The first is that the ticket price on the materials and equipment may seem high in comparison with the tried and tested things that they know how to do. Some of that is because they are unfamiliar. That is what the heat and buildings strategy that was issued yesterday says: "It's okay. If we get enough out there the cost will come down." But that does not help with the labour and supply chain issues to get the experience in installation so that cost comes down. The capital grant element can reduce the barrier of ticket costs but it is not enough to deal with the demotivating factor about the total cost package.

The other aspect is that the cost of the entire job is bigger than the ticket price of the capital equipment or the things that are bought down the yard. In particular, it is the risk that doing new work might sacrifice customer satisfaction. Small building firms and people working in this space are absolutely dependent on maintaining an excellent reputation

and, therefore, it is vital for them that they have happy customers. Introducing something that the customer does not particularly want, and that may not be installed brilliantly and so needs extra time for commissioning, is a high risk for small firms.

The practical things that you might do to reduce those risks include ensuring that there is the financial support to help small firms move up the learning curve. Maybe on the first five whole-house retrofits you do that involve some kind of novel heating technology, the grant aid is not just to the customer for the capital equipment, but you get four days of your time paid for so that you can go back without risking your business. Your business is still viable, but you will do the learning and the commissioning.

We need to think about the financial risks not only being with the house owner or the property owner; they also sit with the installer. We need to couple support to move them up the learning curve with something that acts as a backstop to prevent everybody rolling back down when it all gets a bit too difficult.

I can return to it in a moment, but the area of technical standards that are consistent, credible, buildable and useable by the industry and how those standards are measured and enforced is vital. I have given you a flavour of how we might try to reverse the direction of the demotivational arrow of perceived high cost.

Q103 **Mr Robert Goodwill:** Of course, we could use the stick rather than the carrot. We could, for example, set energy performance levels for houses at a letter. We could have differential rates of stamp duty on differently performing properties. That would not be popular but it might be effective.

Dr Owen: I agree. The key thing there, though, is that you talked about building performance. That is different to how we measure things at the moment, which is about the technology that is deployed or the thickness of insulation or whatever. Moving towards measuring building performance—real building performance—which is not an insignificant shift but which also requires a complete reinvigoration of building control as an advisory function rather than a checklist function at a local level, would be vital.

I would say, however, that there will be limited appeal of regulation in this space. Where the industry is interested in regulation is where it creates a level playing field. Those who are minded to do the right thing cannot do so because they risk being undercut by the people who will keep on doing the tried and tested for as long as they can. If there is any space for regulation, I would argue that it might be in creating a level playing field, from which all work on existing buildings would be costed on the same basis, rather than the people who try to innovate being penalised.

Q104 **Mr Robert Goodwill:** Thank you. Caterina, do you have a comment on

what we can do to remove barriers to retrofit?

Caterina Brandmayr: Yes, I will comment on retrofit and reuse, and also address the embedded carbon aspect. As I highlighted, here are some of the areas where we think policy is falling short. The planning system, building regulations and reforming VAT are the key areas. The planning system should set a requirement on developers to provide an assessment of the whole life carbon of a building; show why a building might need to be demolished as opposed to simply being reused; and make sure that, even in an instance where a building needs to be demolished and built anew, there is maximum material reuse from the building. For that, we should revise the national planning policy framework and provide guidance to local authorities to make sure that they can implement this effectively.

The planning system—and this links back to the previous section—should also be a key driver of sustainable transport delivery as part of new developments. There needs to be much more join-up between the Department for Transport and the Department for Levelling Up, Housing and Communities and local government to make sure that planning is integrated and compatible transport is integrated at the heart of the planning system.

Particularly on that, I was going to say in the previous section that there is an opportunity to make effective use of the infrastructure levy that has been proposed by Government as part of the proposed planning reforms. Obviously, there is a lot of uncertainty around what the future of the proposed planning framework looks like. The proposal to introduce an infrastructure levy could provide some funding that should be, in our opinion, ring-fenced to support the delivery of sustainable transport associated with development.

Moving on to building regulations, that is another area where we think a requirement for a whole life carbon assessment needs to be introduced as part of the Future Homes Standard to make sure that the developers are incentivised to first of all measure and report on embedded carbon but also, over time, set the emission target so that they need to tackle and reduce that embedded carbon through low-carbon materials in buildings. Finally, we should reform the VAT system to bring VAT on building upgrades in line with new builds to avoid providing a disincentive for that.

Moving on to building retrofit, as I mentioned in my comments on the heat and buildings strategy, we think one of the key missing programmes is a comprehensive plan to deliver energy efficiency. That needs to use a number of tools. It needs to have regulation, it needs to have financial incentives and it needs to have public investment if you really want to scale up that supply chain. It has to be a multi-year public investment programme to give visibility to the sector and investment in the skills and supply chains.

That is also the case for heating. It is very welcome that there is some funding available for promoting the uptake of heat pumps. In the near

term, we expect heat pumps to come down significantly in cost as they are scaled up. However, much more funding is needed in the longer-term funding plan for the supply chain to be developed and for heat pumps to become the norm. We only have limited funding for heat pumps at the moment and by 2026 the Government are due to make a decision around the roll-out of hydrogen in heating. I think there is a risk that it might undermine the uptake of heat pumps, when the Climate Change Committee points to heat pumps as the preferred choice for decarbonising heating. Therefore, having a much more upfront and ambitious plan for promoting uptake of heat pumps should be a priority.

Q105 **Mr Robert Goodwill:** Thank you. Finally, to Mr Lambe. Dr Owen talked about people giving builders bad reviews because the work either costs a bit more or did not work as well. Is that something that you recognise?

Robert Lambe: Certainly, there is an element of managing the risks associated with using new approaches and new technologies. Inevitably, using new approaches is less tried and tested and, therefore, you are more likely to be learning as you go. It depends how far on that leading edge you are in terms of application.

A lot of the stuff that we are talking about at the moment—heat pumps and the insulation products and methods of retrofit—are quite well known. There are some very innovative products also coming to market and being developed, but there are a lot that are well understood. Having said that, there are still a lot of challenges with the knowledge and the skills in application, in implementing those technologies. There is a huge challenge that has already been touched on by the earlier panel around skills and knowledge and around the capacity of the industry to scale up and deal with these types of works.

If I can go back to your earlier question on cost, I was personally a little lost in terms of the thread of discussion. In terms of the cost of new build versus retrofit, the cost of new build is absolutely more expensive in capital cost. There is no retrofit that will typically cost more than a new build in pound notes. If you are talking about developers, they are looking at return on investment—how much they get the land for, what they can build it out for and what they get. It is a very different financial assessment. However, if somebody owns a property and they were considering retrofit or knocking it down and rebuilding, there would be no question that it would be much more expensive to knock it down and rebuild—two or three times more expensive.

There is the question then, if you are talking about the cost comparison between building to the current standards and what we should be building to, the Future Homes Standard, there is an uplift. There is a cost difference between the current standards in new build and what we should be building to already—probably 15% or thereabouts of capital cost.

Equally, picking up on the retrofit, if you are retrofitting at the moment and you are just replacing gas boilers with gas boilers without any

consideration of future-proofing, or you are doing other measures of retrofitting in a property without considering the impacts on energy efficiency, that is very short-sighted. Equally, changing a boiler for a boiler is less expensive than changing it for a heat pump.

Mr Robert Goodwill: There will be a boiler that will use hydrogen in the future.

Robert Lambe: It could be hydrogen-ready, absolutely. It could be a hybrid boiler. There are various options, absolutely.

Some of the work we are doing with local authorities is very much about that recognition that the alternative is demolition and rebuild, and it would cost X versus retrofit, which keeps the community in situ and intact. You still have to invest a substantial amount of money to do a whole-house retrofit with people in occupation and there need to be encouragement, incentives and drivers for that. There needs to be much more in the way of R&D to drive costs and scaling-up and industrialisation.

There is huge opportunity, for sure, and there are huge challenges. The challenge of cost of a whole-house retrofit at the moment is one about getting that scale; it is about bringing products to market. The ambition in the heat and buildings strategy is that the cost of a heat pump will reduce substantially in the next five or 10 years. We expect that to happen, the same as we did with the feed-in tariff impact on solar PV.

Mr Robert Goodwill: I will wait 10 years before I get mine, then.

Robert Lambe: Absolutely, and that is the problem if there is not enough incentive, either carrot or stick, because otherwise people will sit and wait and we cannot afford that. We simply do not have time anymore. If we had received the heat and buildings strategy 10 years ago, we would all be jumping up and down with excitement. Receiving it yesterday, it sets out the priorities and the challenges, but it is not sufficient in terms of what we need to do and the urgency of what we now face. The scary thing is how long it is going to take to grasp what we have ahead of us as a challenge around the existing building stock and the time that we have left to deal with it.

Chair: Thank you very much, Robert. I am afraid that the Committee has a bit of urgency about it, so we are going to move on to our last set of questions from Jerome Mayhew.

Q106 **Jerome Mayhew:** Thank you very much. I am going to go off piste right from the start, because I want to pick you up on one of those points. It is repeated again and again that the cost of heat pumps is going to come down as we ramp up scale, but last year France installed over 400,000 heat pumps and it is the primary mechanism—if that is right word—in mainland Europe. We have scale globally, so why do we think that the UK ramping up its installation programme of heat pumps is going to lead inevitably to a very substantial reduction in cost? I do not understand that.

Robert Lambe: I am not in the manufacturing element. We manufacture timber frame houses but not these types of elements. I can only say there is not much difference between manufacturing a heat pump than a boiler, and boilers are £500, £600 or £700 to buy versus £4,000 or £5,000 for a heat pump. There has to be huge opportunity to drive those costs down through manufacturing at a different scale than we are doing at the moment, be it local manufacture or otherwise.

Q107 **Jerome Mayhew:** I am going to have to track down a manufacturer to answer that question.

Okay, back on track. We have talked about the barriers to moving in the right direction, but now let's talk about some of the incentives. Dr Owen, what else can the Government do to incentivise more repairs, maintenance and retrofit of existing buildings?

Dr Owen: The idea we should keep in mind is: what can we do to ensure that energy retrofit is something that people want done in their homes because it gives them a nicer home—whatever that means to them—rather than being told that it is something they need to do because we are all doomed? The latter may be true, but the former seems to me to be a more productive way of thinking about how to engage people in the process. At the same time, we need to think about why a busy, profitable building firm would change what they do when they have a year's worth of work in front of them. They are not interested in growing, particularly, if they have the flexibility to do other things in their lives. What is going to make them switch?

At the core of this is the issue of standards and performance and, linked to that, supply chain capability, part of which is knowledge and skills, but part of which is about ensuring customer satisfaction, understanding the customer, understanding a whole house and communicating with other team members. One thing we do know about retrofit is that individual, narrow trades do not deliver a whole-house retrofit terribly well, because the electrician who punches a hole in the beautifully airtight insulation because he needs to get his cable down to somewhere is not the most popular person in the team. What we need to do is have those outcomes in mind and then put the interventions in place that enable them.

What are the benefits of retrofit beyond feeling good because you are cutting carbon, if you are a householder? Actually, it may not cut your energy bills massively in the long term because the chances are that the cost of energy will continue to rise. That means that where cost is an argument, it is the running costs, so reducing energy demands rather than switching your energy supply is of most appeal to the customer. Also, people want homes that are comfortable. Our rapid cycling up, cycling down in quite draughty houses does not deliver great comfort. We need to think about how we can position low-carbon space heating as a comfort thing.

How do we make sure that our homes are aesthetically pleasing? Aesthetics are used as a proxy for quality by most customers. Even with

the most brilliantly technically performing bit of kit, if it is ugly and it is going to take away your airing cupboard or half your utility room and turn it into a plant room, the average customer's enthusiasm will wane at that point. Therefore, we need to think about how retrofit can deliver on what people want, and merrily entrain carbon in its wake.

Similarly for construction firms, how can retrofit deliver them a steady income, good customer satisfaction and so on? Probably moving towards certification and licensing of trades, both individually and across different trades, is part of that picture. Certainly, making sure that technical standards are consistent among the different trades, but then are also field tested with practitioners and are viable and so forth—

Q108 **Jerome Mayhew:** If I could cut you off there, a vote is imminent. I have just seen a text, so I am going to be very quick. Ms Brandmayr, we have talked about the psychology of retrofit. Could you deal with the policy interventions that Governments could make? If you could be brief I would be grateful.

Caterina Brandmayr: I would reiterate my point that, particularly on energy efficiency and clean heat, there is a need for a comprehensive plan. It needs to have regulation and fiscal incentives but also public investment to make sure that we are driving the market in the near term, because that will leverage private investment into energy efficiency upgrades.

As Alice was saying, it needs to be a well-designed programme that also tailors to people's needs and desires. That needs to be well communicated to be taken up at scale. There is definitely a lot of interest already in energy efficiency; it is just that then there was a U-turn that led to some of the schemes floundering.

There is also an opportunity and a need to empower local authorities to go further. Obviously we need to strengthen the planning system and we need to strengthen building regulations, but we also need to give the opportunity to local authorities to go further and set more ambitious standards on environment and climate. For that, they need to have the resources and the powers to deliver on those aspects. That is relevant for buildings but also on delivering local transport options, including by joining-up across local authorities.

Q109 **Jerome Mayhew:** Thank you very much. Finally, Robert, we have talked about some of the policy things. I was interested that you said that it is not a fair comparison between retrofit and new build, because retrofit is always cheaper by a factor of two or three. VAT is charged on retrofit and renovations but it is zero on new build. It seems grossly unfair and counterintuitive to what we are trying to achieve. However, having started this session thinking that that must be wrong, if there is no real financial comparison between retrofit and new build, it does not make much difference, does it?

Robert Lambe: No, I would argue that it is still significant, even from a perception point of view. Tax is very emotive, including VAT, and there

have been lots of proposals put forward around using fiscal measures. It is very odd that we are charging VAT on retrofit and not on new build, and we are involved as a business in both. I think it would have an influence directly on decisions that are made.

Q110 **Jerome Mayhew:** It is the most visible encouragement for people like me to take the plunge and make a financial investment, which, as the doctor said, may not be financially defensible in its own right but is the right thing to do.

Robert Lambe: The main point also is that there is not always an option between new build and retrofit. We have lots of existing homes that will absolutely have to be retrofitted. They are not going to be knocked down. They are not going to be rebuilt. To address VAT and the other fiscal opportunities to make them more affordable and more attractive to do and quicker is important.

Jerome Mayhew: That is wonderful. Thank you all very much. That is the first time I have ever been part of this Committee where we have ended on time.

Chair: Thank you for the admonition, I will try to do better, or build on this example. I thank our second panel, Robert Lambe, Dr Alice Owen and Caterina Brandmayr for joining us today. Thank you for your evidence. Thank you, members of the Committee, for joining us and staying with us during a slightly fraught day, and Medha Bhasin from the Clerks for writing our brief.