

Business, Energy and Industrial Strategy Committee

Oral evidence: Decarbonising heat in homes, HC 851

Tuesday 16 March 2021

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[Watch the meeting](#)

Members present: Darren Jones (Chair); Alan Brown; Judith Cummins; Richard Fuller; Ms Nusrat Ghani; Paul Howell; Charlotte Nichols; Mark Pawsey; Alexander Stafford.

Questions 76 - 98

Witnesses

I: Steve Keeton, Director of External Affairs, Vaillant; Dr Angie Needle, Director of Strategy, Cadent Gas; Michael Lewis, CEO, E.ON UK; and Greg Jackson, CEO and Founder, Octopus Energy.

II: George Day, Head of Markets, Policy and Regulation, Energy Systems Catapult; Councillor David Renard, Chair of the Environment, Economy, Housing and Transport Board, Local Government Association; Patrick Chauvin, Executive Director of Assets, Stonewater; and Randolph Brazier, Director of Innovation and Electricity Systems, Energy Networks Association.

Written evidence from witnesses:

– [Vaillant Group UK LTD ([DHH0112](#)); E.ON UK ([DHH0043](#)); Cadent Gas ([DHH0012](#)); Octopus Energy Group ([DHH0129](#)); Energy Systems Catapult ([DHH0063](#)); Local Government Association ([DHH0019](#)); Energy Networks Association ([DHH0021](#))]

Examination of Witnesses

Witnesses: Steve Keeton, Dr Angie Needle, Michael Lewis and Greg Jackson.

Q76 Chair: Welcome to this morning's session of the Business, Energy and Industrial Strategy Committee, the latest hearing in our inquiry on decarbonising heat in homes. Before we begin today, I should declare my interest: my wife works for the Association for Decentralised Energy.

We have two panels today. On the first panel, we welcome a number of businesses to give evidence to the Committee. I am delighted to welcome Steve Keeton, who is the director of external affairs at Vaillant; Dr Angie Needle, who is the director of strategy at Cadent Gas; Michael Lewis, who is the CEO of E.ON UK; and Greg Jackson, who is the CEO of Octopus Energy. Good morning to all of you.

The first question today is from me. Could you explain to the Committee what your businesses are doing at the moment in terms of low-carbon heating and what the particular barriers are to your being able to extend low-carbon heating?

Steve Keeton: Good morning. Vaillant is a company that currently makes the vast majority of its sales from gas boilers, but we are accelerating our development of heat pumps in the UK. As other manufacturers are doing, we are upskilling through internal training and preparing to upskill our installer base as well. That is our particular way forward.

In terms of decarbonisation, we see two main areas. As you have discussed before, one is hydrogen and hydrogen boilers; the other one is heat pumps. We can get greater penetration of heat pumps, particularly in the retrofit market. We can come on to some further discussion in detail later, but to do that we will need certain different policy measures to enable us to start to speed up the implementation and installation of heat pumps in the market.

It comes across four main pillars. The fabric of housing stock needs improving to enable us to do it. We have some systemic challenges in systems that are currently out there that we need to address. We have to upskill the installer base. Currently, we sit with around 1,000 MCS installers; we need to get that up to 10 or 20 times that, easily, to hit the numbers that are projected. A massive thing is to upskill the knowledge of consumers, so that they know what to expect and the behavioural change that is required for these new technologies.

Chair: We will be coming back to a number of those issues in the course of the session today.

Dr Needle: Cadent delivers natural gas to 11 million homes in the UK. We believe that net-zero heating will involve both hydrogen and green gases and heat pumps. Both are equally important. From a gas distribution network perspective, what Cadent has been focusing on is



how we can repurpose the existing gas network to transport hydrogen. How can we do that? How can we do that using blends of hydrogen and at 100% hydrogen? We want to ensure we can do that safely and cost-effectively. I am sure we will talk about some of the trials and pilots and things that are going on a little later.

In terms of barriers to getting decarbonisation of heat—I will talk particularly about hydrogen, of course, and I am sure the others will talk about electrification, too—big progress can be made with little spend, particularly to unlock private investment. If you can blend hydrogen in the gas grid today at 20%, you can immediately decarbonise heat in people's homes. We know that existing gas appliances can take that. That would be brilliant. You could do that immediately. We know that is possible, because we have been doing pilots to demonstrate it.

The other thing that is important is around how you make this easy for customers. The real difficulty about heating people's homes is that it is their castle; it is really important that we understand this is going to affect people's lives. Mandating hydrogen-ready appliances—boilers and cookers—is a “no regrets” move when it comes to replacing them at their natural end of life. We think that would immediately allow people to invest in net zero for their homes and be ready for when hydrogen does come.

Lastly, the most important thing is that we need to make some hydrogen. We need to do that at scale. It needs to be a significant amount, not just for heating in people's homes, which would be a small part of the hydrogen we need, but also for industrial processes, power generation and transport. It is really important to have a big focus on production and the things we need to do to attract investment in production.

Lastly, this is about a regional focus. Not every place is the same. There are differences that make places more or less aligned to different technologies for homes. We must try to avoid broad-brush “pick a winner” solutions. It is not going to be that way, and we have been doing lots of work planning with our electricity counterparts on how you can decarbonise whole places, which I am sure I will talk to you about later.

Greg Jackson: You asked what companies are doing. Octopus's mission is to make decarbonisation faster and cheaper for consumers. In the last four and a half years, we have attracted 2 million households through our understanding of consumers. Our mission now is to help them decarbonise their entire home.

As a company, we are focused on driving down the cost of decarbonisation in a consumer-oriented way. Right now we are putting a lot of investment into finding ways to dramatically drive down the cost of heat pumps. Today they cost £8,000 to £12,000 to install, typically. We think that is largely because it is currently a cottage industry. If heat pumps become a scale industry with much more standardised approaches



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to manufacturing and installation, we have the opportunity to bring them down to cost equivalence or thereabouts with gas boilers.

When we achieve that, we can get the capital cost for a household down to something close to what they expect today. If at the same time we start addressing some of the bonkers approaches to electricity pricing, we will be able to fuel them with cheap green electricity as well. Very briefly, when I talk about the bonkers approaches to electricity pricing, it is increasingly obvious that green electricity should not carry 10 times the climate levy of gas. We need to address that.

Once you have lower-cost heat pumps with lower-cost installation running on largely lower-cost electricity, we arrive at a point where for consumers the choice is much more naturally to be taking decarbonised heating. If we look at what has happened in electric vehicles and the cost reduction of electricity generation, this does not sound so crazy. What we have seen in things like renewables and electric vehicles is that costs have dropped precipitously once we have kickstarted mass-market investment. That is what we need to do in electrified heating.

Today, Octopus sells more than £1 billion of gas a year. The biggest thing at the moment for us is to get that down to zero as quickly as we can, by moving to clean electric heating.

Chair: I do not think we have been joined by Michael Lewis from E.ON yet, as he was having some technology challenges. We will come back to him later.

Q77 Mark Pawsey: I want to pick up on a point that Steve made and ask a question about the energy efficiency of the buildings that we are trying to heat. Whether we go to hydrogen or heat pumps, it seems to me that, if we have old, draughty and poorly insulated homes we are not going to have a massive impact. Steve, you spoke about the fabric of our buildings. How important is it to improve the thermal efficiency of our buildings? What can we do about it?

What can we do to make it a greater priority for people when they are choosing to buy a house, whether they are moving into a new building or whether they are looking to buy a second-hand home? At the moment, the thermal efficiency of the building is very low down the list of priorities. Schools, local green space and good internet provision are much more important as far as house buyers are concerned. How do we get this up the priority list for people when they are choosing a home?

Steve Keeton: If I can just address your first point, in terms of the efficiency of homes that are out there, from the studies that have been done—we are drawing on some of the English housing surveys, et cetera, but also on what we see out there—a fair amount has been done in terms of the insulation of cavities and loft insulation, et cetera. The figures I saw were that something like 85% had actually had double-glazing.



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Compared to the original build of some of these ageing houses, we have made some improvements.

According to our calculations, if we could get to the latest spec of insulation in walls and lofts, we could get to a position where the majority of housing could be suitable for your average heat pump, a 10 kW heat pump. When you compare that with the discussions we have just had about the viability of heat pumps, et cetera, there is a first step. The first step is always to wrap before you think about heating. That is important.

In terms of your second point on how we get insulation up the agenda, it is not the most bright thing to talk about, but it is certainly fundamental to what we need to do. I know there are ongoing discussions as to how we perhaps wrap that into consideration for mortgage provision, as an example. You might have to achieve a certain EPC level. For example, it could be C. It could be even higher, but C is the benchmark. We could wrap that into some kind of mortgage consideration to encourage people to do that upgrade as they go through the process of the mortgage. We could wrap it into the mortgage cost.

Certainly, the level of improvement in costs would be around a couple of thousand pounds for the average house. Therefore, it is not significant in terms of a mortgage scale. Certainly, when you are improving a property to fit a different heating system, another £2,000 would not be make or break, I would suggest.

Q78 Mark Pawsey: Dr Needle, Steve says we have made some progress. Have we made enough?

Dr Needle: I have a simple view here, which is that it is essential for us to put some effort into improving energy efficiency and retrofits of people's homes. Every kilowatt-hour, whether it be of hydrogen or electricity, is precious. We have put some effort into making that up the supply chain. Wasting it through inefficient heating is not brilliant.

We have a historical building stock, and retrofitting is expensive. We need to make sure we get on with and promote the easy wins and the low-cost retrofits. Things like the green homes grant could be used for those kinds of things. ECO has been very successful in the past at making homes more energy-efficient. Those kinds of things need to happen. We need to make sure that building regulations reflect, as they will do, better insulated properties going forward. I agree, yes.

Q79 Mark Pawsey: Greg, Octopus often looks at these things with a slightly different eye. How can you get your customers to be more aware of the efficiency of their homes?

Greg Jackson: There is one interesting thing here, which is that every home is different. We now have a fleet of hundreds of infrared cameras that you attach to a phone. You hold it up to your house and you can see where your house is leaking. The biggest learning we have got from that



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is that there is no one-size-fits-all solution for the UK's very diverse housing stock.

Thank you for suggesting that we do things differently. At the moment, there is roughly a 15-year replacement cycle for gas heating systems. Every 15 years or so, pretty much all boilers are replaced. If we are going to start moving towards, for example, electric heat pumps, over a 15-year period we are going to have an expert in every single home in the UK whose job it is to bring in a low-carbon heating system. While they are there, that expert is able to provide the advice and, indeed, the service to insulate the home.

In a way, for 20 or 30 years we have been asking people to improve their home's energy efficiency, and there have been lots of great moves. Perhaps now what we do is say that we will bring them—forgive me for this—a sexy new heating system. While we are doing that, there is an opportunity to bring the home up to the standard that will make that heating system efficient for the household. When you are making a big purchase like a heating system, it is the ideal time for home efficiency to be the add-on with an expert.

Q80 Mark Pawsey: Mr Lewis, what are your thoughts on improving the thermal efficiency of our homes?

Michael Lewis: Apologies for the delay; I have had some IT problems this end. I would totally agree with what I have just heard. Improving the energy efficiency of homes is the absolutely fundamental foundation stone of zero carbon. It is something that we at E.ON have spent the last 10 years doing a huge amount of work on, with around 1.5 million measures over the last 10 years.

It has to be part of the whole zero-carbon transition. That includes cavity-wall insulation, solid-wall insulation and loft insulation as the first step, but only the first step. What we really need is Government to start to drive the supply chain, because at the moment our problem is that we have had lots of schemes that aim to do broadly the same thing, but they have been bitty. They encourage investment and then they discourage it. What we need is a trajectory to get to a consistent installation rate that is consistent with zero carbon. That means a huge expansion of all these technologies.

The first thing is that it has to be done through public money to drive the supply chain, to drive the installation and to drive all the jobs and training that will be required, but then we have to activate the able-to-pay market. That is the key challenge, because that is where the real investment will come from. We are looking at fully upgrading all homes across the UK. It is roughly £10,000 to £15,000 per home, which, over a 30-year period, is £200 billion to £300 billion. That means we cannot do it with public money. The able-to-pay market and the mortgage market in particular is critical. That is where the Government



need to focus: how we incentivise mortgage lenders to lend into this market.

- Q81 **Paul Howell:** To move the conversation on in the same space, I really want to talk about the green homes grant, why it is not working and what we think we should be doing. I will direct my questions first to Mr Keeton, and then I will come on to Mr Jackson, and then I will invite comments from there in terms of where we go. It really starts with how the decision to cut the grant has affected installers. Is the sector going to be able to deliver energy efficiency and low-carbon heating without this fiscal and policy support? Do you want to start from there, Mr Keeton? I will then develop the questions.

Steve Keeton: We need something like the green homes grant or the clean heat grant, as it will become in a year or so's time, because we need to get over this big difference in installed cost between a heat pump and a boiler. The green homes grant has been beset by a lot of admin problems. I could supply you with quite a long list of issues we have been fed back by installers and homeowners. Homeowners have not been able to access information on how things have been progressing or not, and installers have not been paid. They have just not had the confidence in the system. In fact, I have some examples of them taking on people to try to meet the initial wave of demand that they had, but eventually they had to lay people off again, because they could not get the actual installs going.

- Q82 **Paul Howell:** Can I ask you to build specifically in that space, just before you move on? I know that one of the comments back from Government has been that people are reluctant to have tradespeople in their home because of Covid and those sorts of questions. Can you cover that at the same time, please, Mr Keeton?

Steve Keeton: We have not had a lot of negative kickback from engineers going into people's homes; you do get some, of course. A lot of manufacturers have now come up with schemes, and they have supplied all the information and the kit for their installers to be able to go into homes in the most safe and Covid-secure way.

I can investigate further, but I have not really had a lot of negativity in that respect. There are always some people, but it has not been a massive contributor to why the green homes grant has not kicked off. It is mainly the admin and all that side of it.

Greg Jackson: First, there is a segue from the last discussion about efficiency into this. We need to find ways to work with householders and industry, rather than push stuff on to them. A lot of the time when we talk about efficiency and decarbonisation, we forget that there is a human being making decisions about their home and their life. Similarly, when we are talking about things like Government schemes like the green homes grant, there are a bunch of companies making decisions based on what they see.



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Steve is right about admin. With GHG, the delay between choosing that you would quite like a heat pump and the point at which you get that desire met is far too long and too uncertain, and there is too much paperwork. You are applying for a voucher, finding out whether you have got it and so on. What we need to do is step back a little bit and work on ideas that will take people with us. That is particularly important because we cannot decarbonise our society by having schemes that sit around forever subsidising things that are not economically efficient. What we have to do is learn from what we did with renewables: we have to kickstart things that will get to scale, and then costs will drop and they can operate without subsidy. Otherwise, it will be too expensive and we will lose public goodwill.

The opportunity here is to start thinking about what schemes we can iterate in market so that Government, industry and households learn together, and we then start to see costs falling when we get to scale.

Q83 Paul Howell: Would you like to propose any particular schemes that are working in that space? There is another thought that comes with what we have been talking about. We have heard already that we should not be talking about one scheme fitting all in terms of whatever we are looking at in this space. I am an MP in the north-east of England. If you want to spend £3,000, £6,000 or £10,000 up here, that is a very significant part of the purchase price. If you are trying to get a landlord, a private landlord in particular, to invest in that space, why would they? If you are talking about a £500,000 house in London compared with a £50,000 house up here, there is a massive difference in terms of economics.

Greg Jackson: You are entirely right. I am from Teesside, so I completely understand the picture you are painting. One thing we need to do is understand that there are some homes that are going to be much easier to decarbonise than others. Think about the iPhone. A bunch of Apple-loving geeks queued up outside the Apple store to pay £425 plus £45 a month for a gadget. If we had been looking at that, we would say, "That does not help my gran," but it kickstarted a market that means that my gran today, in her house in Saltburn, is getting through Covid, using a £60 Android to stay in touch with the world.

We need to do the easy stuff first. For example, we could look at helping the homes that can easily take a heat pump, that are already pretty efficient and not too big. If the scheme merely makes a heat pump roughly cost-equivalent with a boiler, that will kickstart a market, because there are enough of those homes in the UK for us to get to scale manufacturing and to train installers and get efficient installation. That will bring the cost down. Bit by bit, we can then start getting into the harder homes and the bigger homes, but we will have grown a business here with thousands of jobs in manufacturing, tens of thousands of jobs in installation and we will be heading to the point where we do not need subsidy any longer.

Q84 Paul Howell: We talk about trying to encourage people to use heat



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pumps or whatever, but is the situation not that the vast majority of people change their boiler because the old one has just broken? It is not a planned expense. It is not something that is going to happen with you thinking, "In six months' time, I am going to replace my boiler." It goes off; "I need to do something". How does the green homes grant or another sort of scheme fit into that space when you have a reactionary process?

Greg Jackson: You are so right. That is why voucher-based schemes have a problem. If you need a heating system now, you cannot wait for that process to go on. What we need to do is get to a point where, for homes where it is appropriate, someone can turn up and show you this. It is a shame that the policy ended up having the wrong effect, but there was a point when we essentially made diesel cheaper through taxation. When you went on a forecourt, the salesperson could show you the diesel car and the petrol car, and you would choose the diesel one. Imagine the point when we can get the salesperson or the surveyor in the home and they could show you the gas boiler and the electric heat pump. They are broadly the same price. People can then start choosing the electric one at the point of purchase. To do that, all we need is a really simple scheme that brings the cost of heat pumps for appropriate homes down to rough cost equivalence.

Michael Lewis: Just coming back to the point about why the green homes grant was not successful, from our perspective, it was not to do with people not wanting people to come into their homes. We have been installing smart meters throughout this process. We are probably installing a million this year, along with solar PV, batteries and other things. The issue has been the complexity of it, and it is just not consumer-friendly. It was done very quickly, and people did not understand it. That was the voucher scheme.

However, there is another scheme called the local authority delivery scheme, the LAD scheme. That has been very successful. In fact, it is oversubscribed. We are working with a number of local authorities, and some of them were not able to do schemes because there was not enough funding available. There was only £200 million available in contrast to the £1.5 billion for the voucher scheme. In our view, some of that funding from the voucher scheme should be redirected to the local authority delivery scheme. That will enable some of the untapped demand to be picked up.

If we change some of the rules around the local authority delivery scheme—for instance, if we lifted the cap of £10,000 per home to £15,000—we could do more work. It is a question of getting the thing moving quickly. If it is a question of getting the thing moving quickly, which we think it is, we should build on successful policies—LAD is successful—and move away from those that are less successful, which is the green homes grant. Ultimately, we should morph this into the home upgrade grant system.



The lesson we can learn from the green homes grant is that a co-ordinated delivery body, a national delivery body, can deliver this much more effectively than a voucher scheme for individual consumers, simply because consumers do not understand it; it is complex and difficult. They need some help and guidance from experts.

Q85 Paul Howell: You are basically saying it is supply-pushed rather than demand-pulled in terms of getting the motivation behind the systems.

Michael Lewis: Initially, yes, but this is primarily for the customers who are not able to pay and need some kind of help. When we move to the able-to-pay market, it has to be demand-driven through incentives from Government, for instance through the taxation system—it could be through stamp duty, council tax or VAT—to incentivise this kind of investment, or through building standards, where mortgage providers can only lend for houses that meet certain standards or where there is a commitment to upgrade to a certain standard.

It is a combination of incentives, building standards and mortgage lenders being required to do certain checks that will activate the able-to-pay market, because that is where the real money will come from. These schemes are absolutely critical to drive investment for vulnerable customers and social housing, and to get the supply chain moving in the short time.

Q86 Alan Brown: Steve, at the moment, I have a combi gas boiler and central heating system. If I decide that I want to do the right thing next week and start changing to low-carbon technology, what would the reality be for the changes that are needed in my house in terms of boiler replacement and possibly radiator replacement? What would the total system cost be, not just of, say, a heat pump? What would the level of destruction be? How many tradespeople would I likely have to engage with?

Steve Keeton: That is an excellent question, and it is linked to what Greg was saying earlier about looking in a rollout for heat pumps, at least initially, at those properties that are more attuned for heat pump delivery. I would say that combi boilers—we think there are about 15 million out there in the stock—pose more challenges. They have been out there since the 1980s, when they took off. They went into lots of new-build properties at the same time as microbore systems, which may have been mentioned. Those are very small bore systems, which pose problems for heat pumps. With combi boilers, you lose the cylinder. All these things add up and need fixing when you put in a heat pump.

However, the counterbalance is that, if you look at the other products that are out there, like system boilers and open vent, of which we think there are 9 million, so not insignificant, they have the cylinder in there. They are probably not on microbore. They are probably slightly ageing properties, but some upgrades have probably been done, looking at the



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figures from the housing surveys. There is an opportunity there to start moving forward with installation of heat pumps in the right places.

For combis, I would say we are missing a trick here. If you want to fit a heat pump, the ideal way of moving forward with a combi-type system, with the challenges I have just outlined, would be to move to a hybrid system. Assuming that your current product does not need changing, if you put a hybrid heat pump with it that has 50% of the output required for peak season, you can cover around 80% of the overall heat demand for the year. You have 80% of the benefit, which is a massive step forward.

The other conversation we have not got into yet is on hydrogen. If that comes along, you will eventually decarbonise your boiler as well. There is a massive opportunity here to have different solutions for the different systemic problems that I mentioned at the start.

Q87 Alan Brown: What would the system cost be if I went for the hybrid pump?

Steve Keeton: Greg mentioned the number earlier. It is £9,000 to £11,000 or £12,000 for a typical heat pump system. With hybrid, at the moment you are probably talking about £7,000 or something like that. It is definitely less. The trick with the hybrid is making sure you have the right control and that you can prioritise the right heat source at the right time. The heat pump delivers for the majority of the year, and the boiler delivers when it really needs to in January and February, when the temperatures are really low.

Q88 Alan Brown: Greg, do you have any views on how the costs of these changes required in homes should be distributed between homeowners and the electricity and gas network owners? That links to what you said about the bonkers policies, as you see it, in terms of taxes and levies on gas and electricity. How could they also be changed to encourage low-carbon heating?

Greg Jackson: First, taking that bit about electricity costs, today electricity goes into the network at about 4.5p per kWh, coming out of a wind farm, a solar farm or indeed anywhere else. By the time it gets to a consumer's home, it costs more than three times that. By contrast, by the way, milk leaves the factory gate at about 65p for two litres. By the time it is in the supermarket, it is just over £1. Milk is going up by less than 50%, and that has to be transported in trucks on roads, refrigerated the whole time.

Essentially, the way in which we pay to distribute electricity today is totally outmoded. That is the biggest barrier, first of all, to the running costs of decarbonised heating. There are two things we need to do. First, we need to allow green electricity to access the electricity network at marginal cost. When we have abundant wind today, we are turning it off because we have nowhere to put it. We should be supplying it cheap or



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even free to households to use in decarbonised heating, for example. We need to get rid of the taxes that mean every electron carries a very high fixed cost, and we need to get rid of the levies, which mean that electricity carries 10 times more carbon cost than gas does. If we do that, essentially we can reach the point today where running a heat pump is cost-equivalent or better versus a gas boiler. We could do that today.

Secondly, in terms of bearing the costs, if you look at the components of a heat pump, there is no reason why they are so expensive. If you look at the fitting, for a straightforward home it is no harder than a gas boiler. There may be need for some insulation, and we cannot do every home like this yet, but at scale we should be able to get heat pumps into homes at not much more cost than for gas boilers. That is where we need to get, because at that point we can truly break the mass market without subsidy.

If you look at what happened with electric cars, the first Tesla cost over £100,000 to do just 100 miles with two seats. You are now at the point where Teslas are available for under £30,000 with five seats doing 250 miles, 10 years later. That is the cost journey we are going to be going on, if we can kickstart heat pumps and get them to volume.

What that might mean, though, is that, if it is going to be hard to fit a heat pump in your home, you will get a hybrid solution or even your last gas boiler this time, but next time it will be a heat pump. Meanwhile, we will find homes that are going to be easier, and that is going to be the best place to put the effort to get this market working the way that so many other markets have done.

Steve Keeton: I just want to pick up on what Greg said about bringing the price of heat pumps down to be similar to the price of a boiler. We would contest that. Certainly, there would be some economies of scale, but it will not be on parity with a gas boiler. In terms of the technology that goes into a lot of these heat pumps, a lot of the sourced parts are from the air-con world, which has scale in other parts of the world. Some of that cost reduction has already been implemented to come into the heat pumps of today.

No doubt there is more reduction that can come, but we are looking at lower global warming potential refrigerants, et cetera, at the moment. There is additional development that needs to go in that will also mean that the price is kept higher than that of a typical boiler. As an engineer, if you also look at the weight of the product as a guide to cost in terms of material, a typical boiler is around 40 kg or 45 kg and a heat pump is about 120 kg or 130 kg. That gives you an idea of the amount of material in these products. Our argument would be that, yes, it will come down, but it will not come right down to parity.

Q89 Alan Brown: Greg, in terms of decarbonising the gas network, if we are not doing environmental levies, how is the massive transition cost going to be paid for?



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Greg Jackson: A couple of things. First of all, on the cost of heat pumps, we heard exactly the same from the traditional car industry 10 years ago, and in fact until very recently, about electric cars. The reality is that, as soon as we start backing a new technology at scale, costs come down dramatically and the fundamentals of every component change.

In terms of the cost question here, today we spend a fortune maintaining a gas network. How exciting will it be when we no longer need to do that. There are enormous cost savings there. Secondly, we have seen the cost of renewable generation dropping precipitously. There is a great stat, is there not? In 2016, we forecasted that wind would hit a certain price by 2030, and it hit it in 2018. We have the opportunity to grasp these collapsing costs in fundamentals for the benefit of consumers, decarbonising more cheaply than our existing society.

That question about who bears the cost almost starts to disappear. That is the huge and exciting opportunity: the transition to renewables is a cost-saving transition. Take the levies on electricity today, for example. They are paying for historical costs. The problem is that, if we keep laying them on the new stuff, people will not get the benefits of the new stuff. Imagine if we did not have off-peak pricing on the train network. Everyone would be cramming on to trains at peak times. If we ran it like the electricity system, you would have 200 lines going out of King's Cross that would be packed at peak time and the rest of the time there would be nothing running. That is the way we run our electricity system today.

Instead, we could start to have dynamic pricing. When the wind is blowing or the sun is shining, those zero-marginal-cost, zero-guilt and zero-carbon electrons could go to households much more cheaply than they are today. Households can be using their heat pumps and charging their cars off-peak. There are only three peak hours in the UK anyway. It is all automated, and you do not need to think about it. That is the future we have the opportunity to grasp, if we stop worrying about having to fund, for example, the industries that are, unfortunately, going to be in decline.

Q90 **Chair:** I am conscious that we are getting to the nub of the commercial competition here between gas and power. For a sense of balance, Dr Needle, if you want a minute to respond to anything that has been said, you are welcome to do so.

Dr Needle: Thank you. Well spotted. What do I say here? There is quite a lot of work being done on the total cost of getting to net zero and whether you should have a fully electric system or a system with a balance in it.

Assessments done by the ENA and Imperial College London—there are lots of others—show that a balanced system that has gas and electricity in it is ultimately cheaper for the consumer. That is because, if you electrify everything, when it is not sunny or windy, when it is calm and snowy outside, you have to have massive resilience in your network to be



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able to provide all the electricity that you need when you need it. That is why you need gas in the system, and the best alternative we have is hydrogen. Hydrogen is just a way of storing energy. When you have surplus electricity, which we often do—we had surplus nuclear power this last summer, and we have surplus wind quite a lot of the time—you can use those electrons to make hydrogen, which you can store for when you need it.

Do not forget that this country has a massive seasonal demand for energy. That is driven largely by heating. Again, a lot of people might not realise that the gas grid today delivers 900 terawatt-hours of gas and the electricity network delivers 300 terawatt-hours of electricity. While we shift to electric for vehicles and we shift some heating to electricity, it is a big ask of the electricity network. We have also talked about how not all homes are fit to have a heat pump. You are going to need options.

If you think that we are going to need a gas network anyway, because we need it to provide that resilience so you have a place to store energy, then customers have options to have gas in their homes in the future. That could be either biomethane—we have not talked about it much, but that is still being made—or hydrogen. When your boiler breaks, you then have that big dilemma as to what you replace it with.

There was a great question from a member who said it was a distress purchase. Being able to buy a boiler that can burn both methane and hydrogen—they have been developed already by Baxi, Worcester Bosch and many others—means that you have taken that issue away from that customer. They have a boiler that can burn hydrogen when it comes. The next question is about when hydrogen is coming. How do we scale it? Is it the right thing for that particular consumer? How much does it cost? That is the important bit.

Greg's point about levies is fair. In the electricity network 20% of your bill is environmental levies. That has been delivered to great success in the electricity space. You can imagine all of the wind turbines and other things that the levy has achieved. There is not the same levy on gas. If we add a levy on to gas, we have to be really careful, because we are potentially putting people into more extreme fuel poverty. Do not forget that those who heat their homes with natural gas today have already had lots of insulation programmes in their homes. Adding to their gas bill is something we need to try to avoid and/or protect those people from as best we can. Although I appreciate that we need to raise some revenue to pay for this energy transition, we should do it in a fair and just way.

The last thing I want to say is about converting the gas network or getting rid of it, and whether we need it or not. The cost to convert the gas network to hydrogen is not a significant cost in the grand scheme of all the costs to get to net-zero heating. It is actually quite small, because we can reuse the assets that people have already paid for. You will have seen all those yellow pipes that have been rolled out. We have been



converting the gas network to plastic network for the last 10 years. We have a little more to go. That means the gas network is hydrogen-ready. There is a global market developing for hydrogen. It is everywhere. We will get hydrogen one way or the other. The answer is whether we want it or not.

Chair: Thank you for that. We are struggling for time, so I cannot have another round between all of you on that point, but we will no doubt come back to some of those issues.

Q91 Charlotte Nichols: I have a brief declaration of interest, as a member of the GMB trade union and an officer of the all-party parliamentary group on hydrogen. I also have a constituency interest in hydrogen, as I have around 4,500 people who work in civil nuclear in my constituency, and obviously there are synergies there with hydrogen.

Dr Needle, what initial results have you found from your hydrogen home trial? What is the expected timeframe by which you will be able to deliver hydrogen for heating in homes commercially?

Dr Needle: There are lots of trials going on across the different gas distribution networks. We are doing two things. First, is it safe in the home at 100%? Secondly, is it safe in the network at 100%? How do we make sure it is safe for all?

In the home, BEIS has been carrying out a programme called Hy4Heat—Cadent has not been involved in this project, although we have been on the steering group for it—which has looked at all aspects of hydrogen in the home. Once it is in the home, is it safe? Do the materials work? What happens if there is a leak? Can your boiler work in the same way?

What is really great about the findings so far is that it is going to be at least as safe as methane. In fact, there is a high chance that it could be safer. In terms of some of the things in that programme, does it smell? Can we add the same odorant to it as we do to methane? Can you see the flame? It burns with quite a clear flame, and you can change your appliances so you can see the flame. What happens to it if it leaks? The good thing about hydrogen is it is very light, so it dissipates very quickly if there is a leak. What safety measures do we need to put in place in the home?

The output of that programme is currently with the HSE, and the HSE will assess whether we can go ahead and do occupied pilots in people's home. We are waiting on them. They have all the information. Soon, a verdict from the HSE will unlock a lot of future research potential for us. A nudge to the HSE would be really helpful. There are no carbon monoxide emissions with hydrogen as well, so there is a benefit there in homes.

The next bit of your question was, "When is it going to happen?" A series of trials are happening. We have tested all aspects of the network itself and in people's homes. There are a number of projects ongoing jointly with some of the other gas networks. There is one called H21, which is



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Northern Gas Networks and ourselves. That will blend hydrogen into the gas network in a village near Gateshead. It will then move to 100%. There is a project in Fife with SGN and ourselves, who are delivering hydrogen to a selected number of properties there. We will have enough information to make sure we have tested all those aspects. We have done the safety bit now. This is about making sure it is acceptable to customers and how we go about the conversion.

The next phase is, "When is it going to be commercially available?" If you think about the town gas transition, which happened in the 1960s and the 1970s, you would have to convert places in chunks, and you would have to do that over a period of time. The industrial clusters that exist in the UK today are the places that are likely to make hydrogen first at scale. That is HyNet, which is the Merseyside cluster; we have Teesside and Humberside, and up near Aberdeen as well. They are going to make hydrogen at scale. The first thing they will do is start blending it into the gas grid, so we can all benefit from a small amount of hydrogen in our existing appliances, which will decarbonise heating by a small but useful amount, and then the next stage is to plan a zone-by-zone transition in the same way as happened for town gas.

We have done this before. It was slightly easier last time around, because the whole supply chain was driven by one organisation, but our plan now is to work out what that would be. We expect town conversion to happen from the 2030s onwards.

Q92 Charlotte Nichols: How much does it cost today to heat an average home per kilowatt-hour with hydrogen, and how does this compare to current gas prices? How do you expect costs to change over the next 10 years or so, and what assumptions have you made to get to this estimate? Public consent for any hydrogen conversion is very much rooted in its affordability and its impact on fuel poverty, which, as we know, is a big issue in this country.

Dr Needle: I completely understand that question. Hydrogen is not produced at scale in the UK, so it is expensive. In the same way that Greg talked about how focusing on heat pumps would bring prices down, that is the kind of thing that you need to happen in the hydrogen space. It is expensive today. It currently costs between £70 and £90 per megawatt-hour. We do not heat any homes with hydrogen today. Converting that into pence per kilowatt-hour for the home is a little tricky, because you would have to put in the network conversion costs and things. Some estimates have been put in place as to what that might be once it is at scale, which I will tell you about in a moment.

Costs are expected to come down to between £30 to £50 per megawatt-hour. Do not forget that natural gas today is around £20 to £25 per megawatt-hour. Whichever way you look at it, it is going to be more expensive than natural gas. Natural gas is not really the thing you should be comparing it to, although customers will in their own minds. The alternative to having hydrogen in their home is an electric solution. We



look at this in terms of, "If I have a hydrogen boiler, a heat pump or some kind of hybrid scheme, how does it stack up for me?" The good thing about hydrogen boilers is that, from the point of view of disruption to customers, the producers and the networks like us have the pain of converting it, but for the customer the boiler looks the same and the central heating system is the same. It is quite minimal from a disruption point of view.

Let us have a look at the costs. We think a hydrogen boiler is going to cost roughly the same as a gas boiler today. That is helpful. We think the cost of hydrogen will be about 9p a kilowatt-hour, which includes all the network charges and the cost of conversion, storage and things like that, which we would need to think about. That is still quite a lot higher than the cost of natural gas, but, if you look at it like for like, for an average home the total cost over a 15-year period—this is over the life of those assets, whether they are heat pumps or hydrogen—is broadly the same.

Any effort into bringing down the capital costs of heat pumps, the capital costs of hydrogen boilers, the costs of renewable electricity or the costs of hydrogen makes quite a big difference. We have to keep track of that over time. People's bills will go up in either scenario, if you switch to low carbon today. That is why we need subsidy to enable it to happen. In the long term, they will be quite similar. The hydrogen system and the electric system drive each other. They are inextricably linked, because renewable power will make hydrogen, and hydrogen will make renewable power when there is not enough. The systems are very much connected in the future.

Chair: Greg, I could see that you were looking a bit uncomfortable there. We are really struggling for time, but you are more than welcome to write to us off the back of today's session with any further contributions you want to make. We will make sure that gets fed in alongside the oral hearing today.

Q93 Alexander Stafford: The Government have announced that they will hold a consultation on the appropriateness of ending gas connections to new homes by 2025. The CCC has recommended that from 2023 no new gas boilers should be installed in new or existing homes. Are both these targets deliverable? I am just speaking from personal experience, but my father-in-law is very sceptical about all this. I am keen to hear from Michael first. Can we do this? If not, why not?

Michael Lewis: Yes, we can. For new-builds, the situation is very different. It is much easier to build a house that is all electric and robust to any development in the energy system. For new-builds, not being connected to the gas network is not a problem.

In terms of phasing out installing gas boilers in existing homes, there is a caveat on that. The question is about what role hydrogen plays. In the scenarios E.ON has done, we believe that 60% of homes will be fully electric; 20% will require hydrogen; and 20% will require some kind of



zero-carbon district heating. That means that boilers that are installed should be hydrogen-ready; they should not be not installed at all. The question is about the point at which we make it mandatory for all boilers to be hydrogen-ready and which houses we mandate that for. That is rather a tricky judgment that you have to make, but we have time to do that.

There is one other macro point to make here. Whatever end scenario we have—it might be the one I have just painted, but there are many others; there is fully electric, as Angie said—the key point is that we do not have to make all those decisions today. There are many “no regrets” options, of which home insulation is the absolute fundamental and robust foundation stone in every investment scenario. That is where the short-term focus should be through Government policy and grants, while creating the optionality for whatever future scenarios develop as costs fall and as the cost competition between electricity, gas and hydrogen changes.

Dr Needle: I hate the phrase about banning gas boilers. It is not the boilers’ fault; it is the fuel. When we start talking about heating systems and what we are banning, let us talk about the natural gas and the fossil gas that we want to remove, rather than the boiler itself. Lots of people have a gas boiler that works perfectly fine for them.

The good thing about gas boilers is that people like them. They provide instant heat and hot water. We just ought to consider the hydrogen-readiness of boilers and make sure that, in the language we are using, we enable hydrogen-ready as part of some of these conversations. If you are close to a gas grid, why would you not want to connect to it so that you can have that optionality in the future?

Steve Keeton: I have a quick point related to being hydrogen-ready. A week or two ago, the HHIC announced that all the gas-boiler manufacturers had agreed that going forward, past 2025, all new product launches would be hydrogen-ready, provided that we see some commitment and a clear roadmap going forward. We want to plan to set up supply chains, et cetera, to feed hydrogen-ready appliances, because there is a lot to do to get hydrogen-ready. There is time to do it, but there is a lot to do. That will be in place as we go past 2025, progressively.

Greg Jackson: The really important bit is that a heat pump generates 2.5 kWh to 3.5 kWh of heat for every kilowatt-hour of electricity. If you really care about bringing cost down for consumers, the end-to-end efficiency of heat pumps is unbeatable. Going into new homes, which are going to be built to the right standards for them, is a fantastic way of getting that market started.

Q94 **Mark Pawsey:** We have heard a very interesting debate about the relative merits of hydrogen versus heat pumps versus a hybrid system. We have concentrated on the capital cost and the fuel cost, but I just



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want to ask about the day-to-day maintenance costs. I have an engineer come to look at my gas boiler every year. I also have an immersion heater. Nobody comes to service that. Is there an annual maintenance requirement for heat pumps?

Greg Jackson: Yes, there is, but it is very straightforward. Typically, it is to stop the fans making noise and to check the fluids.

Mark Pawsey: Okay, but I will still need an engineer to come out every year in the way I would need for my gas boiler.

Greg Jackson: Maybe not every year, but, yes, from time to time.

Q95 **Mark Pawsey:** We are talking about all electric on new-builds, but the gas industry has been very effective at marketing gas as a preferred choice for cooking. Do we envisage new houses being built and connected to the gas grid exclusively for people to be able to do their cooking?

Dr Needle: If you are going to build a new-build and it is all electric, you would not need any gas for cooking. It would not make sense. For new-builds, if they are near a gas grid and they could have hydrogen-ready appliances, that is great. They could have hydrogen-ready cookers. If it is not near a gas grid and it can be all electric, there should not be any gas at all.

Q96 **Chair:** I am conscious that we have been talking a lot about hydrogen and heat pumps today. We have not said anything about heat networks. As I understand it, a heat network can have various sources of heat going into it for distribution purposes. Steve, do you want to say something about that briefly? Why have we not talked so much about heat networks today?

Steve Keeton: In terms of heat networks, I have to be honest: it is not my core knowledge base. We touch on heat networks in terms of some of the end-use equipment, but it is not a big part of what we do. I would have to defer to some of the other guys around the table for that.

Michael Lewis: We are a large operator of heat networks. We have 60 district heating schemes and about 35,000 customers. As I said earlier, about 20% of dense urban housing will require a zero-carbon heat network as part of the transition to zero carbon. The issue at the moment is that most of those schemes are run on natural gas, so we have to find a solution, as much for district heating as we do for domestic boilers, as to which fuel we use to heat those homes. At the moment, you could see hydrogen being a possible fuel, or maybe biogas or other biofuels.

We are also looking at installing heat pumps. We have a flagship scheme in central London. We have a district heating and cooling system that does the area in the City of London around Smithfield. We are installing what we think is the largest heat pump in the UK right now to take away some of the heat load that we currently use from our gas boiler. We think that is one option for certain types of district heating system. Again, you



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could speak for another hour about networks, but they are a fundamental part of the transition and one of the areas where there is probably less of a clear solution than in some of the others.

Chair: Thank you. We will come back to heat networks in a later session, because you are right that we need to dig into the detail there.

Q76 Alan Brown: Can I ask Michael about off-grid homes? I think 15% of homes are off the gas grid, but they account for well over 20% of emissions due to the type of fuel they use. Are there particular challenges in getting off-grid homes to change to low-carbon technology? Also, do any targeted incentives need to be considered for this type of properties?

Michael Lewis: You are absolutely correct. There is a particular challenge for those homes, but, in one sense, it is straightforward. The answer is a heat pump. We know what we have to do. Therefore, it is just a question of how you incentivise people to switch quickly to a heat pump. We have done to death the relative economics of heat pumps. We have to change the revenue balance between gas and electricity over time. We have to change the capital cost of heat pumps, which will come through scale. In the early phases, we need some capital grants to help those off-grid people move to heat pumps. Again, it will stimulate the market, start to build demand and start to drive down the cost that we need for the mass-market roll out. I do not see any contradiction. It is simply about making those off-grid homes a priority, because we know the solution right now today and we need to move to it quickly.

Something like a capital grant through a green homes grant scheme or a home upgrade scheme would be the right way to do it in the short term. Also, I mentioned the able-to-pay market. Mortgage lenders need to really focus on what houses they are lending to and what conditions they put on that lending. Government can help here as well, through changing stamp duty and council tax, to incentivise people and make it normal for people to upgrade to a heat pump when a house transaction takes place. That is when the trigger point should be. It is when there is capital available to invest. It is when people are disrupted anyway. That is exactly the right time to put the heat pump in.

Q77 Alan Brown: In that scenario, would it be a combination of a loan and a capital grant, so the loan would be through the mortgage and paid over a long period of time?

Michael Lewis: Yes. If you look at the German system, when you buy a house, an auditor comes in, says what levels of energy efficiency you need to move to and gives a report to the bank. The bank will lend on the back of those upgrades but will back that loan off to the German investment bank that lies behind it, which is their equivalent of the national infrastructure bank and which will give a very cheap loan. You can do it through a cheap loan or a capital grant. You just have to make sure that the economics are right.

Q78 Alan Brown: If I was Energy Minister, I should be starting with off-grid



homes for heat pumps.

Michael Lewis: Yes. It is a no-brainer. They should do it now.

Chair: Thank you to all our witnesses. As an open invitation to all of you, if there are points that you have not had the chance to respond to today and you would like to submit that to us, you are welcome to write to us after today's session and it will get fed in formally as part of your evidence. Thank you to Steve Keeton from Vaillant, Dr Angie Needle from Cadent Gas, Michael Lewis from E.ON and Greg Jackson from Octopus Energy for your contributions this morning.

Examination of Witnesses

Witnesses: George Day, Councillor David Renard, Patrick Chauvin and Randolph Brazier.

Q79 **Chair:** We are now moving on to our second panel. I am delighted to welcome George Day, who is the head of markets, policy and regulation at the Energy Systems Catapult; Councillor David Renard, who is the chair of the environment, economy, housing and transport board at the Local Government Association; Patrick Chauvin, who is the executive director of assets at Stonewater; and Randolph Brazier, who is the director of innovation and electricity systems at the Energy Networks Association. Good morning to all of you. Sorry that we are running a bit behind.

You will have heard in the first session today the clear commercial competition, which, in my view, is always a good thing, between heat pumps and power, hydrogen and the gas industry, with this question about heat networks in the middle. I would be interested to hear, from your perspective, about how that competition plays out in different areas. We have heard that some technologies are better for different parts of the countries, different types of housing stock and new-build versus retrofit. From your perspectives working on systems and on delivery, what is your response to that issue about this competition between the different types of technology?

George Day: Good morning. It is very important to remember that we have a great variety of building stock and communities across this country, so there will be local variation in the heat decarbonisation solutions, so local area energy planning has a really important role to play in creating the understanding of what the menu of options is likely to be in different local areas. We also need competition and markets to play a role. We live in a mixed economy. We are going to need some collective investment, where we need some local planning around the infrastructure that gets put in place and identifying areas where hydrogen or heat networks may be the solution. Many other areas will be mainly electricity.

We need markets with good market signals and competition between different technologies, whether they are heat pumps, hydrogen, heat



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networks or whatever it might be. We also need the upgrades that need to be put into buildings so people have the incentives to upgrade and improve their buildings.

Finally, we need to put the consumer at the centre. It is people's homes we are talking about. They will have very strong views about what they want in their homes, what they want it to look like and how they want it to feel. The consumer has to be at the centre here, supported by good market signals that give them the incentives to move to low-carbon technologies, whichever one suits them best within the context of good local plans around the infrastructure that needs to support and enable those options.

Q80 Chair: Councillor Renard, local authorities are already used to doing their local plans and designating areas for different use classes. Do councils have the power at the moment to do this zoning for heat technologies?

Councillor Renard: I do not think we do. We need Government to give local authorities more flexibilities to work on this particular agenda. It is really important that local authorities are at the centre of this, in terms of not only planning but also helping to deliver on the agenda. There are, we estimate, 28 million homes in the UK that will need retrofitting. Many of those are in local authority ownership. As was said by one of the first panel members, every home is different. I agree with George. Homeowners will have a particular view, but it is really important that there is not a governmental top-down solution to this and that local authorities are at the core of ensuring this is delivered.

Of course, funding is a key part of it and we welcome the Government's £3.8 billion announcement to start to address this, but we really need to start getting that money to local authorities so that we can work with the private sector and other partners to deliver on the agenda.

Q81 Chair: Patrick, from Stonewater's perspective, you manage a significant number of properties. From your perspective, what do these different types of technology options in different parts of the country look like?

Patrick Chauvin: We really need to know what the heat strategy is going to say and define in terms of this, because it is crucial for our planning and investment. Without that as the cornerstone, we cannot do it. Where we have our off-grid properties, we can and are installing heat pumps because, as a previous panel said, that is a no-brainer for us and we have done that at some small scale. We are choosing the easy wins first, which, again, is what the previous panel looked at. In urban areas, we have the technology to move to heat pumps, but, again, we need to understand what the heat strategy is going to say in terms of that, so that is really important.

The other factor, which I think other people have mentioned, is fuel poverty and how it really impacts our residents. We have a situation now where electricity is overpriced and gas is cheaper, so there is a barrier for



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residents in terms of wanting to have that technology. Going back to Councillor Renard, the local authority and those local networks are really important in co-ordinating and defining how we move forward and plan. That is really key.

- Q82 **Chair:** Can I ask what may be a simple question? In my head, off-grid properties sound like older rural properties that are probably not very well insulated. Is that a consideration when you are installing heat pumps, or have I completely misunderstood?

Patrick Chauvin: No, that is the easy win. They can be properties that were electrically heated before, so they were never on the grid. They could be in semi-urban areas. They do not need to be in rural areas particularly.

- Q83 **Chair:** Randolph, from an energy networks perspective, we have heard about the challenge around resilience and capacity of the power grid versus the resilience and capacity of the gas network and its ability to store surplus power. There was a bit of a conversation on heat networks. What does all this mean in terms of technology choices in different parts of the country?

Randolph Brazier: I agree with George. We are going to need a combination of green gas and electrification of heat. It is going to be horses for courses. Different technologies work best in different areas of the country. Housing is a key aspect, but there are other factors that affect which technology might go in which area, such as synergy with local industrial clusters and things like that, the capacity and type of grid that is occurring in that location, and what is being generated in that area, whether it is renewable energy and/or hydrogen. It is going to be horses for courses.

The other thing on which I agree with George is that, ultimately, customers should have a choice on how they decarbonise their heat, so I agree with you that competition is a good thing. The key thing is that there is a level playing field, so there is a technology-agnostic approach regardless of whether it is gas, electricity or heat networks.

- Q84 **Chair:** Very briefly, when you say "level playing field," I understand what that looks like when we are looking at taxes and levies between gas and electricity. Is there a level playing field issue when it comes to investment in the infrastructure? We have heard that the gas networks are changing to plastic pipes and presumably have had quite a lot of capital to do that. Has the power network had equivalent money for there to be a level playing field on the infrastructure side?

Randolph Brazier: Today, probably, the answer is no. The electricity networks have not been designed and invested in assuming electrification of heat, so that is something we require from Ofgem in the next regulatory period. Obviously, we do not just factor in heat. We need to factor in electrification of transport, population growth, renewable growth



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et cetera, but, yes, that has to be available in the investment regime that Ofgem sets up for electricity networks going forward.

Q85 **Chair:** Have we not just gone through the RIIO-2 determination on that?

Randolph Brazier: We have gone through it for gas networks and electricity transmission, but we have not gone through it for electricity distribution. That does not start until 2023. We think a lot of the issues when it comes to electrification of heat are at the distribution level, so we need to get it ready for those DNOs, ready for 2023.

Chair: That is useful, thank you.

Q86 **Paul Howell:** I would like to address a couple of questions to Councillor Renard and Mr Day, particularly; others can come in if they wish. I am looking at the opportunities for delivering low-carbon domestic heat on a local-area basis. What do you think the best opportunities are? To some extent, I would like to raise a question about what Mr Brazier has just said in terms of giving people choice. Is choice really feasible when, in reality, there is going to be a situation where certain types of solution are going to be specific to certain demographic situations?

Councillor Renard: That is a really interesting question. You are right to say that different solutions will be more appropriate in different circumstances. We need to make sure that whatever is implemented is equitable. Patrick talked about fuel poverty, and this is a real concern for the LGA. We have to make sure that any measures are available to everyone. We know we have roughly 10% of households in fuel poverty. We have to make sure that any of these measures are not just available to those who can afford them and that everyone can take advantage of them. It may well be that some measures are more affordable and easier to deliver, which, again, is why local authorities have a really key role to play here. They will know their housing stock. They will know what is possible in their own areas. They will have those partnerships set up with the energy companies and so forth.

George Day: I agree with Councillor Renard that there will likely be different solutions in different local areas. That is where local energy planning, with local authorities in a lead role supported by the energy networks providing their technical expertise and understanding, has a crucial role to play. As Randolph pointed out, there will be different resources available in different areas. If you are in a city that is close to an industrial cluster, there may be waste heat and hydrogen. Those are resources that may not be available in other areas.

That local energy planning process has an important role to play, but it does not eliminate the role of the consumer and consumer choice. Consumers may have a different menu of choices in different local areas, but there will still be quite a lot of choice and a big role for consumers to play in choosing what, specifically, they want to be installed in their homes. Similarly, local authorities and social housing providers will be



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choosing solutions that fit their housing stock and clients. That will be important, so they may get connected to a heat network, but there are still other aspects of the choices that need to be designed and made people-friendly. That is why the consumer still has an important role to play alongside this better planning process, which is where local authorities have quite a leading role.

Q87 Paul Howell: I will give Mr Brazier a chance to come back on that in one second. We always localise things when we talk about them. I am in the north-east of England. There is a lot of talk about the opportunities for the development of hydrogen up here, which is therefore a local thing that could enable choice. Clearly, there is a lot of choice potential from heat pumps through district heating into geothermal mine workings and things like this. I can see that the choice is there, and I am very much in favour of the choice. I am just trying to understand how it works in terms of the economics that would sit round it.

Randolph Brazier: I totally agree with David and George on the local authority and local area planning engagement. The other thing to note is that we should not underestimate the role of community energy groups. The engagement with the people involved in these groups on energy and decarbonisation is much higher than in the general population. When we are talking about the local planning, we need to involve the community energy groups, and that is a key focus of ours at the ENA. We have a range of different community energy forums that we run because their engagement and enthusiasm is quite infectious, to be honest.

Q88 Mark Pawsey: Mr Brazier, you said that different technologies will work best in different areas. Which technologies are most suitable for different housing tenures, whether they are owner-occupiers, privately rented or socially rented? What are the implications of that?

Randolph Brazier: It is a good question. I am not a housing expert; we represent energy networks. Broadly speaking, I would agree with the previous panel members who said that the off-gas grid is best for electrification. That seems to make sense. Newer-builds probably make more sense for electrification. When it comes to social housing and things like that, we really need to focus on costs, so it would be what is driving the lowest-cost solutions in that area. That is where we would have to get really close to local authorities and the like to understand what works best from a cost perspective in those sorts of areas and in those types of buildings. There is, within social housing alone, a really wide range of different types of buildings. Some are really leaky. Some are quite new and well rated. The technologies will depend highly on the type of building.

The other thing to note, when we are talking about different types of buildings in different areas, is that the network is also very different. Energy networks are also highly locational. In some areas, the network can be over 50 years old and quite small in terms of capacity. In other areas, it can be really new and have more spare capacity. In some areas,



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you have an updated gas network with the plastic pipes that can enable hydrogen. In other areas, we have not yet got to that, so it is also quite locational from a networks perspective.

Q89 Mark Pawsey: Turning to Patrick, as a large social housing provider. Mr Day said that social housing providers would fit their housing stock with what is best for that stock and their customers. What is your assessment of what is going to be best for your stock?

Patrick Chauvin: Our stock is mainly semi-urban and rural, so it is largely going to go down the route of heat pumps, we think. With the tenures that we were talking about and the choice given to residents, it is more difficult for particularly social landlords who are funding the up-front investment costs. It is important that they look at the most cost-effective solution. We have projects where we have done this, where we have to take the residents through the journey of what we think the best solution is. When we do that, we need to do it because we want to get our supply chains going and be clear on our investment routes.

We probably need to take our residents on a journey, where we say, "We think this is the best technology," and do it that way, through engagement, essentially. They are focused on what it costs them to run, because they are paying the running costs. In the private sector, it is more the opposite. If you are talking about different tenure types, the private sector has to pay the up-front capital cost and that is much more difficult to engage with. Those are the differences, and they are the challenges for the social housing sector.

Q90 Mark Pawsey: If your tenants were willing to accept a more efficient solution that kept their energy costs lower, do you think there is a case for encouraging you, as a social landlord, to make that investment, by permitting you to charge a slightly higher rent because the tenant would be paying less on their fuel bills?

Patrick Chauvin: It is not currently a very popular theme in terms of charging additional rent. We would see, probably, that money coming through taxation and being provided, in terms of the capital cost, through grant. The problem is that, when we go to heat pump technology, electrification is more expensive at the moment because the tariffs are more expensive, as the previous panel looked at. That is the issue. The issue for us is how we get the running costs down for our residents, and we can do that, probably, by tariff-switching at the moment. Octopus Energy, which was on before, does variable tariffs. We will find ways of making it as cheap to run, if we can, for our residents. We cannot win the discussion with them otherwise, because it will just be more expensive for them to use.

Q91 Alan Brown: George, we have heard a lot that there will be different solutions for different properties in different areas. Should somebody take responsibility for providing consumers with advice and information on what would be the most appropriate solution for their home? If so, who



would have that responsibility? Also, looking ahead, there have been discussions about capital grants. What protections would need to be put in place to ensure it is still the most appropriate solutions that are applied, rather than with the previous green deal, when unscrupulous salesmen installed inadequate solutions for people. How do we put these protections in place?

George Day: Yes, you are absolutely right. We need those kinds of protections, and we need major investment in upskilling the industry so it is able to provide really good-quality, balanced advice to householders to make informed choices. We are going to have to build that up over time because we do not have that much experience with low-carbon technologies in many households. It is a very small part of the market so far, so we need to have experimental trial environments and so on, so that we get good evidence and that then flows through into the advice that people are given.

We need all the people who currently advise people about their choices—plumbers, installers and providers of equipment—to be giving good, balanced advice to consumers so that they can make informed choices. At the moment, for a consumer to convert to low carbon, you have to go on a grand design journey. It becomes a major project for a consumer to manage, and there is so much information and so many different choices about the combinations of insulation and choices of equipment. It is really difficult for consumers to navigate, so we need to make that a lot easier.

One way we can do it is partly through reforming the market so that there are incentives for companies to come in and provide really good-quality advice to consumers, as well as companies that provide heat as a service, potentially, so that they have an interest not only in selling a piece of equipment to a consumer but providing a good-quality service to the customer, so a solution that works over time. That could be a really important new business model that comes into the home energy environment.

Similarly, you could imagine social housing providers contracting with a company that takes responsibility for delivering low-carbon energy to their housing stock and taking responsibility for making sure the service is good quality over time, so they have an interest in installing solutions that are going to work for that housing stock. There is a whole combination of things, including a lot of investment in skills. There will need to be some standard-setting as well, but it is vital that we make this as easy as possible for consumers over time, so that they can make informed choices and the changes that they need to make in their homes.

Q92 **Alan Brown:** Who should lead and stimulate that change in terms of upskilling and those reforms and incentives? Would that be the regulator, the Government or a combination of that and industry working together?

George Day: It is the latter. At the moment, we have quite fragmented industry structures. We have a divide between gas and electricity,



because they are two different industries that have grown up separately. Increasingly, we need to look at it from the point of view of the consumer and the home. Those industry bodies should be coming together and maybe developing a low-carbon heat qualification or the idea of a home energy assessor. This is somebody who can come to your house and give you balanced advice across all the options that are available to you, not just advise you on gas boilers, heat pumps or whatever it might be. We need a bit more cross-industry thinking. The Government need to play a role in driving the different industry bodies to collaborate and deliver something that is integrated for consumers.

Randolph Brazier: I agree with George on heat as a service or energy as a service. A few suppliers are starting to do this. They are not just giving customers choice; they are reducing complexity. Customers do not want complexity; they do not understand energy; it is too difficult. The suppliers and big tech companies that are coming in with these new models can play a role in reducing complexity.

Q93 **Alan Brown:** We will change tack and look at fuel poverty. Patrick, as we know, all domestic heating will need to be decarbonised. We talked about high up-front costs. How do people who are already fuel-poor get supported in this? Also, as we look ahead, does there need to be change? Octopus was quite clear about issues with levies on electricity bills. Does that need to be addressed as well, if we are trying to prevent fuel poverty?

Patrick Chauvin: Answering that first point, the disparity between the two is so great; it does need to be levelled up. I totally agree with what Octopus Energy was saying on that. It is far too great. As I said before, we have found, when we are putting in heat pumps, that we are having to try to convince our tenants to find ways to not spend more money by using electricity. What we can and are doing is linking with external agencies, working through local authorities and using that network.

The other thing is, for social housing, we need to understand our residents, so we need to know who is in fuel poverty, who is behind with their rent, who has a cold property, who experiences damp issues and things like that. We can then put in a network of advice for residents to advise them on the costs of their homes. We already do that. We have a green doctor scheme where, essentially, we have people who target those we perceive to be on low incomes. We could also, through policy, set a minimum EPC target. That is about running costs for homes, so it is quite important. Minimum EPC banding would be appropriate for that.

A lot of the things that have come out recently such as the sustainable warmth strategy are very good. There are measures now, through the energy company obligation, the green homes grant and the warm homes discount, that will target that funding towards those on low incomes.



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Just going back to your first point, the market requires a level playing field. Energy policy is currently loaded on the electricity bill in terms of decarbonisation, so that clearly is an issue.

Q94 Alan Brown: David, you touched on fuel poverty as well. Are there particular changes that you would like to see, from a local government perspective?

Councillor Renard: Yes. This is an issue of real concern to the LGA. I want to build on what Patrick was saying. The LGA has done some research and had a look at which types of tenures have the biggest issues around energy efficiency. Around 97.5% of socially rented properties are non-fuel-poor properties, so they have an EPC rating of band D or above. If you look at privately rented properties, it is only 87.7%. Owner-occupiers are the ones most likely to be living in properties with fuel poverty; they are down at 83.4%. We should not necessarily make the assumption that all those in fuel poverty are living in social rented properties.

I take Patrick's point. My authority still owns its housing stock. It is the amount of money that the tenants are paying each month that is of most concern to them. That is a good example of how we need to focus our attention on all properties of all types of tenure, and not just assume it is the social housing sector.

Q95 Paul Howell: I would like to move on to the subject of the energy infrastructure at a local level. The CBI has called for a national body to oversee this approach. I am interested in whether you would all agree with that. If not, who should do it? If they should, what should they do? What would be the different aspects of it?

Randolph Brazier: Some sort of national framework for consolidating a view and agreeing an infrastructure strategy is really useful, because we want to avoid postcode lotteries and things like that, so a national strategy is required. Whether you need a national planning body is still open for debate. The thing about local infrastructure, especially when we are talking about heat, is that it is highly local and highly personal. A national body would have to understand what is happening on every single street in every single town and village. Is that feasible? Is that likely? I would tend to think not.

That means local bodies—local authorities, local area planning groups, community energy groups, housing authorities, transport authorities, et cetera—play a key role. Some sort of national framework to work under, to avoid postcode lotteries, is also required. You need the top-down approach and a bottom-up approach.

George Day: I broadly agree with Randolph. Getting this local planning right is key. A body that supports and enables that, and makes sure that, if we roll out local energy planning across the country, it adds up into a coherent national strategy, could be very useful.



The interesting thing now is that we are looking at the potential for an independent system operator. That could potentially cover all the energy networks, not just electricity. It could also be an important player in making sure that we have a technology-neutral level playing field across the different technology options. There is a little bit of rivalry, shall we say, between the gas and hydrogen interests on one side and the electricity interests on the other. We need a neutral choice between those. There will be right and different solutions, so a body that helps that environment to emerge could play a very useful role, but very much building on the insights and evidence from the local level, led through local authorities and local network companies doing local energy planning.

Q96 Paul Howell: The first session showed us clearly that there is a little bit of competition between the two approaches as to where it goes. Councillor, would you like to give a position on that? At the same time, I would also like you to elaborate on the role that the local authority should play in delivery and whether there are other powers or fiscal measures that would help to support local government in that space at the same time.

Councillor Renard: On the first point, the LGA does not have a specific view about whether there should be a national delivery body, but we are very clear that the Government need to lead this with a national long-term strategic commitment to decarbonising homes. Over the years we have seen a number of initiatives, but we really need a strategy. We are also aware that a lot of the work takes place in different Government Departments, so we really need to see a joined-up approach across the whole of Government and work with partners, both locally and nationally. It is really about co-ordination for us. If a national body is set up, obviously we will seek to work with them, but we do not have a particular strong view one way or the other on whether that is the way forward.

In terms of the role of local authorities to deliver low-carbon heating, I am sure the Committee is aware that a large number of councils have declared a climate emergency. Two thirds of councils have declared their aim to become carbon-neutral within the next 20 years, so there is a clear leadership position that local authorities have taken on this; they are very keen to deliver on it. We talked earlier about needing greater skills, information and advice that we can give to people. Some minimum standards around that and a clear national approach would be really useful.

We have seen that some local authorities have been successful and instrumental in delivering district heating in their areas and play a critical role in that. We would certainly encourage local authorities to do that as and where appropriate, and to promote energy efficiency programmes.

Of course, we have COP 26 coming up. The LGA is very keen to promote all the good work that local authorities are doing at that event and outside that event.



We need to see some methods for accelerating and promoting councils' decarbonisation ambitions. The LGA, for example, has the housing advisers programme, which supports local authorities to deliver projects to meet housing needs in their particular local area. We would encourage local authorities to engage more with that particular programme. Of course, the LGA works very closely with local partnerships, and that is a useful agenda that everybody could get behind.

Paul Howell: It also goes back a little bit to some of the other subjects we have covered. Whatever the subject is, it seems to be that not all things fit the same agenda; you almost need a menu to choose from. In terms of supporting the different local authorities, for example, up here in Durham, there is likely to be some energy, as I mentioned earlier, going into geothermal. In other parts of the country, local councillors will not be interested in that because there are no real practicalities for them. If you did have a national body, it has to be able to ebb and flow depending on how it is dealing with the different parts of the country.

Q97 **Alan Brown:** If we are looking at the delivery of low-carbon heating, what area do you think the Government should focus on first? Is there a deadline they should be applying, and what fiscal or policy measures would be needed to support that?

Councillor Renard: In responding to that one, I will come back to some of the comments I made earlier. The focus has to be on minimum standards. We talked about insulation earlier. We have to make sure that all the existing properties, as far as they are able to be, are well insulated. That has to be the starting point.

Randolph Brazier: Ultimately, net zero means net zero, so you have to focus everywhere. In terms of the least-regrets first steps, I agree with David on building standards. The off-gas grid and electrification of heat is a fairly big no-brainer. As we heard from Dr Angie Needle in the previous panel, blending of hydrogen up to 20% is fairly least-regrets. There are probably a few other least-regrets things that we should focus on, such as replacing oil in rural grids, new-builds and electrification, et cetera. Just going back to my earlier point, it also needs to be, as much as possible, technology-agnostic, so that we are not picking winners across the country.

George Day: I have a shopping list of three things in terms of immediate priorities. First, we have to build skills and scale some of these things. I would like to push the idea of a net-zero pathfinder, which is where we have some really big city-scale or region-scale investments concentrated in a smaller number of localities that push ahead as demonstration and learning environments, where you can really start to try out some of these city-scale investments and strategies to deliver heat decarbonisation. We have a competition and pick two or three cities or towns to push on and become leaders and demonstrators. A net-zero pathfinder could be very powerful and help us to understand how we build the local skills base and do this at scale.



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Secondly, we need to roll out local area energy planning across the country. We need local areas energy plans everywhere, so that people have a sense of direction and we have the evidence base to make some of the choices that we are going to need to make.

Q98 Alan Brown: What would the timescale be to get these rolled out?

George Day: With the local area energy plans, there is no reason why, with will and investment, we cannot do it within the next three, four or five years across the UK. These plans would then be updated every five years or so.

The third thing on my shopping list is market reforms. We have heard a lot about the imbalance between gas and electricity. We need to get some of these price signals right, because that is vital for bringing the innovators into the market. The innovators include some really exciting companies like Octopus Energy and PassivSystems. These companies are going to produce some of the consumer-friendly solutions that are going to be really important, so we need to get them going and start creating the rewards and incentives for them.

Patrick Chauvin: I have three things. Long-term funding is the main thing for us, so that we can plan. Planning is the biggest thing in terms of the investment for us. We know there is going to have to be a blended solution there. We would also like direct access to that funding, rather than having to go through local authorities or grant applications.

The other thing is the standards that people have mentioned. Be clear about what the standards are. Those will drive behaviours. If you bring forward a standard from 2035 to 2030, it will drive where we need to go.

The last thing is about the technology pathway, which I have been going on about. We need clarity on that, about what we expect where and when. That needs to have some indication in it. If it is too open, we will still be thinking about what we need to do in terms of the technology pathway, whether it is hydrogen or heat pumps. Real clarity on that will really help.

Chair: That poses lots of great questions for us to take forward in our future sessions; we have a couple more of these to go on heat. As you will have heard from the first session, there is a similar invitation to colleagues on this panel: if there are further contributions you have not had the chance to make and would like to follow up on in writing, you are more than welcome to do so, and that will get incorporated into our evidence base.

For the purposes of today, we will bring this session to an end. Thank you to George Day from the Energy Systems Catapult, Councillor Renard from the LGA, Patrick Chauvin from Stonewater and Randolph Brazier from the Energy Networks Association. Thank you to all of you for your contributions. Thank you, as always, to colleagues on the Committee and to the Clerks for putting together the session today.