HOUSE OF LORDS

Industry and Regulators Committee

Corrected oral evidence: Ofgem and net zero

Tuesday 26 October 2021

11.50 am

Watch the meeting

Members present: Lord Hollick (The Chair); Lord Allen of Kensington; Lord Blackwell; Baroness Bowles of Berkhamsted; Lord Burns; Lord Curry of Kirkharle; Lord Eatwell; Lord Grade of Yarmouth; Baroness Noakes; Lord Reay; Lord Sharkey.

Evidence Session No. 11 Heard in Public Questions 114 - 119

Witnesses

I: Juliet Davenport, Founder and Director, Good Energy; Greg Jackson, Founder and CEO, Octopus Energy.

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Examination of witnesses

Juliet Davenport and Greg Jackson.

Q114 **The Chair:** I welcome our second panel today for our 14th meeting. We have heard quite a lot of evidence—I guess that you are familiar with some of it. We are very pleased that two founders have joined us today: Juliet Davenport, founder and director of Good Energy, and Greg Jackson, founder and CEO of Octopus Energy. Thank you for coming to see us today.

Did you feel that the many pages that were published last week offered clarity, a clear way forward and a clear framework for the journey to net zero? Did you feel that there were sufficient financial incentives to encourage the very substantial investment that is needed?

Juliet Davenport: Thank you for that. May I answer the question by framing it slightly first as regards how I think about the challenge and where the bits are missing?

From the point of view of net zero, you cannot just look at one aspect or one policy, because it is multiple policies that come together and multiple layers of regulation that fit together to make it work.

I see it as five pillars that you need to deliver: R&D and innovation; infrastructure; policy and investment; customer; and skills and capability to deliver. You need to be able to deliver on all five of those pillars to be able to deliver net zero, at speed.

What I have never quite seen is a pulling together. That is the way I frame it, so that is the way I look at it. It does not mean that everybody else has to look at it in the same way. I have never seen a pulling together of strategy across the board to ensure that it all adds up, consistently and coherently.

I think that we are beginning to see innovation in R&D move in the right direction because those will be the technologies, the processes and the systems that we will need in the next 10 years to deliver. It is not about today; it is about tomorrow. R&D and innovation spend in the UK has been focused on healthcare, aerospace and automotive over the last 10 years, if you add up the numbers. Very little has been spent in the energy space.

That has to shift, and the recent publishing by BEIS on the net-zero innovation strategy is an important shift. It is the first time that we have seen that. For me, it is not enough in the heat space. We are not investing enough in systems and ideas in heat, particularly. We also need to look at where the UK has a natural advantage over other countries where there is already investment in R&D going on and look at how we compare to that.

We do not really have our heads around infrastructure. We built the infrastructure in this country for a high-carbon infrastructure, so we built

it around a high-carbon energy system, and we need to have a systematic rethink about what we are going to do with the gas grid if we electrify heat. Just talking about hydrogen is not enough. We need to think about the hydrogen ladder and understand what the priorities for that technology will be, and whether it really will be heat, and, if it is, what will happen to the gas grid. I do not think that is addressed at all at the moment.

On the policy side, to be honest, most of the policies and regulations that get in the way of good investment, from my point of view, are hidden. It is things such as the balancing and settlement code and DCUSA. It is all the nuts and bolts that the everyday policymaker cannot necessarily see that are hidden by the processes within this industry.

In fact, we were reviewing the gas code recently. The gas code has more reference to the environmental impact of gas than the electricity code.

I think that there are some reviews as to how it all stacks up, because as soon as you start moving forward in investing in net zero, if you have a backwards step that undermines it—it comes out of left field and is not a headline policy grabber—you undermine the investment strategy for that.

On consumer, the Climate Change Committee report says that 60% of the next measures will need consumer engagement. The IEA report on climate change and net zero says something very similar. I do not think that we are really thinking about what the consumer's role is and how that is going to be protected. It is not just about buying the cheapest electricity tariff. It will be about investing in their own homes and how they are going to be protected around these new propositions.

Finally, on the skills, I think it is recognised across the industry that we do not necessarily have the right skill sets. We do not have a diverse set of skill sets in the industry. It is a big challenge. We need to be talking to the education sector about what we need our graduates to be coming out with to be able to really deliver net zero. My personal view is that it has bits of that but it does not have it all.

Greg Jackson: I think that the reams of paper are fine. They provide a reasonably good start point in the current system. We need to recognise that times of great technological change are not about a like-for-like replacement or tinkering at the edges. They are about understanding that when you have fundamentally different technologies you need a fundamentally different market, and fundamentally different solutions.

The reality of the energy industry today is that many extremely well-meaning, talented and capable people across the public and private sector think of energy in rectangles. You turn a power station on, you get a rectangle of power, you turn it off; it is dead easy. You do not have that many rectangles. At one time we had about 130 in the UK.

It was a system designed around the ability to just turn it on and off to meet what at the time was a static demand curve. Pretty much every day

in the UK the national grid could wake up and the demand curve would look a bit like a wavy line. There might be the odd peak for a football game and people turning on their kettles.

That is not the world of net zero, and the more that we try to shoehorn an entirely different market of generation and consumption into rectangles, the dramatically more it will cost citizens to achieve net zero. The reality with renewable generation is that it is a zigzag. There are times of great plenty; there are times when we do not have very much available.

Consumption is changing as well. The average electric car holds enough electricity to power a house for five days. The average commute in the UK is nine miles, with a typical electric car battery of 200 to 250 miles, and is increasing all the time. We have an enormous shiftable load. That is just electric cars, never mind the critical requirement now to decarbonise heating. It cannot shift it several days, but there is plenty of opportunity to feather heating during the day to handle the peaks and troughs of the rest of the system.

We have an emerging world in which the reality is that renewable generation is cheaper than electricity generated from fossil fuels, but the system we are creating is failing to expose those low prices to consumers at times when they are available. It is not giving consumers—and that may mean businesses, electric cars, heating systems—the opportunity to grab green electrons when they are abundant, in doing so driving down cost and reducing the problem of when they are less abundant, thus making it easier and cheaper to store a lower amount of energy, a lower amount of cheap electrons for when we need them.

The great frustration, for example, for our company is that we have invested £30 million, £40 million, £50 million of our shareholders' money in proving that these innovations work, at scale, but there are no routes to market. The gateholders, the monopoly and the monopsony that is National Grid and the distribution networks, prevent us deploying billions of pounds in new generation to bring consumers billions of pounds of cheaper electricity.

We really need wholesale market reform—the ability for companies that believe that they can generate cheaper green electrons, and that they can find consumers who want them and that they can find ways in which those consumers will enjoy the benefits. We need to allow routes to market for that kind of innovation.

I think it is instructive that during the pandemic—with no notice and no planning; we did not know it was coming—within months we reformed the way in which we create, regulate and distribute vaccines to tackle a global emergency, yet years and years down the line we continually wait for any form of reform to how we change the way the energy market works. We cannot afford, financially and in terms of climate, to keep on having drawn-out bureaucratic processes to decide how it is all going to work.

For us, the signals in the heat and buildings strategy are great, and we can talk about the right solutions, but the most important thing is that we now need routes to market that escape from this central planning, escape from the waste that we are already seeing, and enable us to make net zero an opportunity for citizens to enjoy cheaper energy, not more expensive energy.

Q115 **Baroness Bowles of Berkhamsted:** We have strayed into the questions that I was going to ask, but if I interpret what both of you have just said, the policy framework from the Government may be of some assistance, but there is not enough within the infrastructure—what is available, what needs to change and the markets—to steer to net zero. Is that more or less true for both of you?

Juliet Davenport: Picking up from what Greg is talking about, what we are not allowing for at the moment is any new business models to accelerate and to come through. It is restricted by the current policy areas.

One thing that we have to admit is that we need a systematic shift, and what we are trying to do at the moment is tinker at the edges. There are something like 11,000 pages of regulation related to the electricity market. Innovating in that is pretty tricky, as Greg said. Trying to figure out the future income streams for a customer who might decide to employ demand-side response, or put a battery in their home, or use their car to integrate with the grid are just not possible.

The system was built around 30 large, centralised power stations that used to dispatch to a fixed curve from customers. We now have a system that generates power from over a million small power stations that are connected to the distribution grid, and we fundamentally have not shifted the mode by which we are going to deliver it. We absolutely know that households will not just be a meter on the end of a grid; they will be integrated into the system, and we do not have any regulation that takes that into account.

Baroness Bowles of Berkhamsted: How easily could that be put in place?

Juliet Davenport: There are some fundamentals that you could look at. I hate to go back to the codes, but the codes fundamentally underpin how this market works. One way it has remained relatively static is about being able to get into the detail of those codes, because having enough people in an organisation to sit on all those codes committees is quite tricky and very expensive.

A lot of changes to the codes are quite subtle but can undermine any movement towards decentralisation. There was something called TCR last year, which basically took away the benefit of generating power in your own home. The question is: why did we do that? When we went to see the regulator, the comments were, "That is because that is how the costs should be delivered."

If you are thinking about it through the lens of zero carbon, it makes no sense at all. A problem is that there are a lot of these small shifts that take us in a backwards step that look through the wrong lens.

Baroness Bowles of Berkhamsted: Greg, are you happy with that—can I move on?

Greg Jackson: I completely agree with what Juliet has said. I have a couple of examples of the way in which we might think about things differently.

Today, 25% of an electricity bill is transmission distribution costs. If you have ever worked in retail you may call that haulage and distribution. It sounds quite high. Haulage and distribution in the typical FMCG sector is 3% to 5%, and you have to pay diesel truckers to schlep up and down motorways.

I think that the way in which it is charged is critical. Much of our system is empty much of the time. If it were airlines, you would be looking at planes flying less than half full most of the time. If that was happening, enterprising travel agents would fill those seats, offering us bargain holidays, bringing down the costs for everyone, because those people who are paying marginal costs to access the plane reduce the cost of flying for everyone.

Our energy system does not work like that. It is an average price basis. When we want, for example, to put some renewables on the grid, there are times when the wind is blowing and literally the electrons are zero marginal cost, but we have to pay heavy fixed charges to access the network, and that means that we cannot offer consumers the ability to grab those electrons when they are abundant. This is serious. Today, 45% of our electricity is renewable. Electricity makes up perhaps 15% to 20% of a typical household's energy use, just to put this in perspective, yet in quarter 1 of last year we spent £300 million throwing away green electrons because we did not give anyone the ability to use them.

In the old days that Juliet and I were describing, consumption was homogenous. If you turn on a power station, there is no variation in marginal cost, and of course at the time we had 100-watt light bulbs, and we did not have a growing market for electric cars, smart meters and the ability to shift consumption around. Today, I think if you said to a lot of people, "You know, yesterday we were throwing away green zero carbon marginal cost electrons", they would say, "I wish you'd told me. I could have used them". Getting our heads around this different system is the critical part. What we need is marginal cost access to the distribution and transmission networks for green generation and green consumption.

Baroness Bowles of Berkhamsted: If you gave Ofgem a priority to pursue net-zero policies, would that force them more in that direction to change the codes, and so forth? Are they tied to the type of codes they have at the moment because they have to manage everything—the security of supply, the customer, and net zero thrown in now as well?

Would giving them a proper priority of net zero force it?

Greg Jackson: I am worried that it could be a distraction or it could even be counterproductive. The challenge is that the centralised thinking that we have today is trying to solve these problems based on an outdated mindset of the energy system.

I recognise that football is polarising so I will not state which manager, but a great football manager said that the most important talent of a player is knowing where the ball is going to be. I think that the challenge in energy today is knowing where the system is going to be. The great opportunity is private sector innovation that enables different companies to place bets on where we think the ball will be, and those of us who are right will win, and those who are not will lose.

The challenge when we ask our centralised planners to give their best guess of where the ball is going to be is that they have proven consistently to be wrong, even on very short-term decisions. For example, the estimates made in 2015 about what the cost of renewable generation would be by 2025 were beaten by 2018. Something that they thought would take 10 years happened in three. If we have a planning framework based around mistakes such as that—I do not blame them, because it is difficult—we need heterogeneity. We need different companies placing different bets on different outcomes, and consumers benefiting as they compete to provide the right solution.

Baroness Bowles of Berkhamsted: How do you solve the problem that we have at the moment that some of the suppliers made the wrong bets on price and went bust, with the consumer being left without a supply? If you deregulate to enable more things—I can see a basis for that—the other side is you will get failures. Who picks that up?

Greg Jackson: There are two things. First, as I walk down the high street I see as many closed shops as I see dead energy retailers online. The reality is that periods of disruption lead to dislocation.

I think that we could have minimised the damage done by those exiting retailers by some simple prudence. It is great for innovative companies to enter a market if they have something new to offer. It is the only way we will be able to experiment with new ideas, but, of course, there should have been measures in place that meant that before they got to scale they could not cause systemic risk. That is where the issue was. I think that a couple of relatively simple measures would have prevented the costs that have been socialised.

But we should not forget the benefits that competition has brought. I can only quote from us, but when we launched into the market, I remember going to see some of the regulators and explaining that our view was that we could drive down the costs of energy through technology. The regulator said no, the incumbents are already efficient and at scale, and then Boston Consulting Group, three years later, analysed our costs and said that we were operating at 75% lower cost than a typical incumbent

and 50% lower than the most efficient. That innovation has driven down dramatically the cost of serving energy, passing hundreds of millions, billions of pounds of benefit per year to households through a genuinely more competitive, more efficient market.

We have licensed our technology to Npower and Eon. I am not using that as just about us but to say that these opportunities exist. Unfortunately, retail is just the last 10% or 15% of the stack. The middle of the stack now needs to be open to innovation and competition to drive costs down for everyone.

Juliet Davenport: On your original question about whether Ofgem should have a wider remit, I slightly disagree with Greg: I think it should. Although I agree that we need to look at bringing more companies into the sector and allowing more deregulated activity, one of the areas where I have a problem, where Ofgem could play a bigger role, is in the codes. The codes have to come to Ofgem with an economic case for any change that they make. If Ofgem had this remit, it would also have to do an analysis of the impact on zero carbon. You would automatically build in a system that any changes to the existing codes would ensure that it was zero carbon proof. That is the bit for me that is the great unseen.

On the wider regulation and getting more pieces in, asking a centralised organisation to second-guess a market is always tricky, but if you have a set of principles, you can allow those to evolve within that.

Coming to the failure of the energy companies, since I set up Good Energy about 22 years ago I have seen three of these types of failures. It is a cycle. It always tends to happen at this time of the year, to be honest, when a lot of the power stations are out for refurb. September/October is a classic time in the energy market for these spikes.

One of the things that we have seen that has exacerbated it this time is that very few of these suppliers are fit for a volatile market. None of them had real trading or hedging expertise. Part of that is due to a systematic change in the energy system itself. When we introduced the capacity market, it took a lot of volatility out of the wholesale market, and we had a very smooth, very benign wholesale market. Nobody thought that hedging was necessary because it was pretty flat, and all the cost of balancing that market went into the capacity market, which you paid as a fixed charge.

Again, from my point of view there are two benefits of rethinking the way the capacity market works because the time of day of use or the benefits of the decentralised system, whether it is customers or batteries, are being isolated in a separate marketplace. If we saw those reflected more in the wholesale market, we would get two things coming through: better pricing for consumers in their behaviour; and energy companies would not just think that it was really easy to come into the energy market and carry on trading with no experience whatever just because we have had this very benign period where prices have been super flat.

Baroness Bowles of Berkhamsted: How do you square the more beneficial effects of having the volatility that you might have if you have more open markets and do not have the capacity market against security of supply?

Juliet Davenport: There is no difference in what you can call on from that. It is just whether you charge the capacity market through into the wholesale market in a different way—whether you add the two. Right now it is a fixed charge, so it is of no benefit to anybody else in behaving and responding to a shortage in the marketplace. It is like a nanny state, where somebody else takes over and says, "Okay, we're going to fix it all", and there is no leverage coming through in the marketplace to have any innovative products or thoughts to come through and do that. I think that there is a balance that needs to be spread between that, and the question is whether the capacity market is the best place to do all this activity.

Baroness Bowles of Berkhamsted: That is an interesting thought.

The Chair: Lord Curry is joining us on Zoom.

Q116 **Lord Curry of Kirkharle:** Apologies for coming in ahead of Baroness Donaghy, but, as I mentioned last week, I have an unavoidable commitment and I need to leave in a few minutes.

While there is a lot of uncertainty around how we are going to achieve net zero, one thing that is very clear is that it is going to be very costly moving from where we are now to net zero. There is a lot of debate about where the investment should come from and who should bear the cost— investment in new science, investment in capacity for green energy generation, distribution, infrastructure and heat pumps. There is uncertainty about how this is going to happen and who is going to pay. I just wondered what your view of this was. Is it entirely down to the market, as many would suggest, or a huge burden on the taxpayer? Your views on that would be really helpful.

Greg Jackson: First, we should ask ourselves whether it does have to cost more. I mentioned earlier that even before the current hike in global gas prices, we are increasingly in a world where electricity from renewable sources is cheaper than electricity generated from fossil fuel sources. In fact, we are getting into a world where it would be cheaper to build new renewables and close down the fossil fuel plants. Of course, you mentioned security of supply and we need to ensure that this is not a process that makes the lights go out.

Our start point should be saying, "Let us build a system that capitalises on abundant green electricity when it is available". To put that in perspective, a large electric car with a 300-mile range can charge its battery with an average price of about £4.50-worth of green electrons—and, by the way, that would be subsidy free, just to give you an idea. That price is coming down year on year on year. There is a cost of net zero. What does it cost to fill a petrol tank? Of course, petrol carries

enormous taxes, but the commodity cost exceeds the commodity cost that I have just described.

Not only do we look at that in the world of cars. Buying an electric car is seen as a luxury for wealthy people, except that it is rapidly becoming not that. Ten years ago, a Tesla with a 100-mile range and two seats cost £100,000. Today, a Tesla costs £30,000, has a 230-mile range and five seats. That is an eightfold reduction in cost per passenger mile. If you look on Alibaba, you will find five-seat electric cars with a 250-mile range for $12,500. It is a lot more in the UK and Europe, but it tells us the way things are going. This is the new normal.

If we were to say that our transport system can be made dramatically cheaper for consumers through renewables—and not only is the car cheaper but of course its battery acts as a source of security of supply because you can soak up several days' worth of generation into a car fleet—that reduces the cost of us meeting the basic needs of society. Once we are monetising our green electrons and using them when they are available rather than throwing them away, as is increasingly happening today, we are able to start filling batteries with cheaper green electrons. The cost of batteries is falling roughly 10% year on year on year grid scale.

Once the UK builds enough renewable generation to meet its winter needs, we have a colossal export market. Germany has very little in the way of renewable generation compared to us, as an example.

I think that we need to challenge the assumption that net zero will cost more. It only costs more if we keep trying to fit a zigzag into a rectangle and assume that consumption is static.

Before we make that assumption, let us start by asking how we make it cheaper. This will be one of those classic cases where we look back in 15 or 20 years and say, "Why did we hold off?"

Juliet Davenport: I would agree with Greg. I think that we have to challenge this idea that this will be more expensive. There was a really interesting piece of work published yesterday or the day before, highlighted in the *Telegraph,* by a bunch of mathematicians from Oxford who have looked at the future probabilistic cost of zero carbon and seen that going down a net-zero approach could potentially be cheaper than where we are today.

I think that we need to review our attitude to this market. When we are going to change something it always feels that it will be more expensive, but, in reality, it is likely to be cheaper. It is just about how we ensure we transition that. Transition will be tricky. Technologies will not be ready at the same time and there will be security of supply issues, and it is about how we manage through those. From my point of view, we have to work through the cost of this and work out, as Greg said, how we ensure that we do not add costs to a system when we do not need to.

Greg Jackson: I will give a couple of examples. The physics of heating make it very hard to believe, if you look at the fundamental physics, that in the long run electric heat pumps will not be the majority source of heating in the UK if we are going to go zero carbon, if we have abundant renewable electricity. We risk today spending tens of billions of pounds subsidising the continued existence of a gas network, kidding ourselves that we might transform it into hydrogen for heating, at colossal expense. That is the sort of thing that makes the transition expensive. Hard decisions based on tough analysis may enable us not to make some of those very costly mistakes that will put bills up during this transition.

We can buy ourselves time. If we spend a few years assuming that we will get to a 100% electricity system or a vast majority electricity system, if it we prove to be wrong, at that point we will still have something that we could resort to, but I suspect we will be right.

A lot of the time people raise an objection with me and say, "This is all well and good for rich electric vehicle owners who can fill up their cars at 5p per kilowatt hour, but my gran is paying 17p, or in today's prices 25p or more per kilowatt hour". That is a genuine and fair concern. The secret to a just transition is to separate the orthogonal axes of efficiency and equity. If we have an expensive transition, everybody will be paying more. What we need to do is have a cheap transition and then deal with equity separately, whether that be through transfer payments, a social welfare system or something else. Let us first focus on the most efficient transition that we can achieve through making bold decisions, analysing the physics, and absolutely ensuring that we deal with equity, but do so separately.

Q117 **Lord Reay:** Recent energy price rises have raised questions on the resilience of the network and robustness of supply chains. As we transition towards a more renewable energy system, how will the security of the UK energy supply be affected? Moving on from that, what role should there be for nuclear fossil fuels during the transition in a net-zero environment alongside solutions such as storage and flexibility?

Juliet Davenport: On robustness of supply, we need to take a quick look at what is causing the current energy crisis. The current energy crisis is caused by a combination of issues. First, there is a grid connection issue from the UK to Europe, and, secondly, a gas connection from the UK to Europe. There is also a shortage coming out of Russia, which looks like it is a geopolitical play, so we have geopolitics mixing with reality at this point.

Going forward, on transition, there are various things that we can do to transition in a much cheaper way. The first thing that we should be looking at is how much we can improve our building stock and reduce demand, particularly winter demand in gas. That is the first step that you will want to take. Whether you are going for electric or not, we should be reducing our demand by improving building stock. That is energy efficiency investment and it has to be ramped up. We have to find

innovative ways of deploying energy efficiency, new technologies to do that, or innovative ways of financing that.

That for me has to be the base state for any transition because, first, it delivers zero carbon, but, secondly, it delivers on reducing our dependency on some of the European geopolitics around gas.

That would be the first thing you absolutely have to do. Going forward, the more you rely on a resource that is based here in the UK—based on our weather and not on politics—the less you will be at the whims of a European energy system.

The final piece that you have to do is to connect our system to Europe, and to Iceland and to Norway, and potentially to north Africa as well. We have to look at that interconnectivity because, taking Greg's point about when we are in excess, we have an opportunity to export; also, when we are not, we can import, and we need that connectivity to make a zero-carbon system work.

Greg Jackson: First, I fully endorse what Juliet said. I think that it is really important. If we go back to that problem of rectangular thinking, one of the rectangles often talked about is nuclear. I have no problem with nuclear. It is fine. It might be expensive, it always takes a lot longer than expected and is perhaps a bit late for net zero, but it is okay.

If we rely on rectangular thinking, we should remember that one of the biggest causes is that we had five nuclear reactors offline causing roughly 5 million households-worth of electricity not to be generated. The very basis of saying that we need to have a firm power base over the rectangles causes these problems. We need resilience through heterogeneity, including the ability to handle flexibility.

I shall give a couple of examples. Juliet has talked extensively, and rightly, about the capacity market. The capacity market was designed so that, when all else fails, we will switch on some power stations. By the way, everyone knows in technology that the back-up is the most likely part of the system to fail because it is not used very often, but we will put that aside for a second.

The other thing is that that is a rectangular thinking basis. In a world where we have heterogeneous consumers and smart meters, this could be a great opportunity for some households and businesses. I reckon that we could find a few 100,000 households who would say, "I'll tell you what, give me half price electricity all year round and when the UK is going to be in short supply, send me a text message and I will keep my consumption below 500 watts or 1,000 watts, or whatever it be, for a few hours". They could opt out any time they wanted so they could carry on using electricity if they needed to. We do not even look at solutions such as that, yet those are the kinds of solutions that exist in retail markets, and everywhere else.

The challenge when we stick with our existing thinking is that we are trying to solve problems such as security of supply as though, for example, demand is a given, and without the benefit of flexibility. Apart from that, I completely agree with everything Juliet said about interconnectivity.

The key thing to ask is: why is the internet resilient? It is resilient because it is heterogeneous—there are loads of routes to market, and there is not a big central server doing all the work.

Lord Reay: Thank you. I want to ask a question on the retail energy market. Obviously, conditions are very tough for the retail providers, given the dramatic price rises, and we have seen a number go insolvent. What risk is there that one of the larger companies outside the top six or seven goes bust and there is not a large enough provider willing to take on the acquisition of that company, given the enormous costs involved and the fact you will have 1 million-plus people immediately calling your call centre?

Greg Jackson: First, I think that the largest one that went bust was Avro Energy, with 508,000 households. Octopus took that on and I hope that we are doing a good job of looking after the customers who have transitioned.

The most important thing for us to remember is that what happened here is a roughly fivefold increase in the price of gas globally as it is available to the UK. As that passes through the system—and the price cap has slowed down the impact on consumers—consumers will face much higher bills, and we need to find ways to help them.

In looking at what happens in the case of company failure, Ofgem has a special administration regime and can step in to run a company at a time of failure. For a whole bunch of reasons, that is probably the right thing to do for larger companies, and perhaps even some smaller ones. The economic cost of sorting out the mess at a time of a high pricing crisis can be far greater than if we buy ourselves some time by stepping in, running those companies under special administration and then selling them off, breaking them up or reprivatising them once the market restores to some degree of normality. I think that is probably the right approach to minimise the total socialisable cost of failure.

Juliet Davenport: There are some other aspects that the regulator can look at at the same time. The biggest failure in this market was many years ago, about 15 years ago, when TXU went bust. I think that it was one of the big 12 at the time and it had over 1 million customers. The process worked at that point and those customers were distributed.

One of the biggest problems that we have at the moment is ensuring that we are not seeing excessive profits going to fossil fuel companies, particularly with the behaviours of certain generators who bid in and then remove their bids into the balancing market. We are seeing some play in there. We think that the regulator needs to take a very tough stance in

that case because we are seeing price spikes that make it very hard for those companies, once they are being split up, to maintain that. They look for opportunistic moments to spike the energy price.

Ofgem also needs to look at the credit requirements within the balancing and settlement code and imbalance market at this particular time, because it becomes a self-fulfilling prophecy when companies are struggling and you put extra credit requirements on them. I think there needs to be a rethink, and Ofgem, particularly right now, potentially needs to take special powers to look at keeping this market as benign as possible within the external market situation, and not create more of a problem by the current mechanisms and regulation already in place.

Q118 **Lord Grade of Yarmouth:** It has been fascinating. I am trying to reduce the rectangle to something within my grasp. Am I right in saying that it is your belief, Greg, that from a consumer point of view net zero will be, if you do it the right way with 100% renewable—there is a question mark over whether it is reasonable to assume that—a better deal and we will be self-sufficient, et cetera? To get to that point, if you are right, there have to be massive capital costs to transform homes, to insulate homes. We cannot rely on new builds. We are not great at new builds in this country and most homes are hopeless as regards insulation. Boilers have to be changed and we have to wean ourselves off gas, and so on. There is a massive capital cost to get to that nirvana of cheaper self-sufficient electricity. How will that be paid for, and what is the bill for that?

Greg Jackson: I think that is critical. To date, for those of us who raise money from investors, I think that it is fair to say there is a wall of investment globally from pension funds, insurance companies and others who wish to invest in the transition but do not have enough routes to market. They wish to invest in everything from generation, to upgrading homes, to providing clean solutions in heating and electric transport, and so forth.

Earlier, I talked about the lack of routes to market. If we can open up more routes to market for cheap green energy and cheap low-cost consumption that balances it, we can access—

Lord Grade of Yarmouth: What is stopping that happening now?

Greg Jackson: Forgive me for the poetic licence, but for simplicity—and I cannot remember in which decade it happened—Stalin decided that grain would be grown in Kazakhstan. It was not a good idea as it turned out not to be the best land for growing grain. We have an energy system that is a bit like that. It is the same in most countries. Quite rightly, Governments have worked hard to drive down the cost of renewables by subsidy and incentive schemes, but we have got to the stage now, thanks to that investment, that without subsidy, increasingly, renewable generation is cheaper than other forms, and subsidy has almost become a barrier to the market. If you are an investor, are you going to take a risk on deploying into subsidy-free generation when you can join the queue and get some subsidy? It is becoming a barrier.

At the same time we all know that last year 23% of the average electricity bill in the UK was made up of taxes and levies and social and environmental costs. We are simultaneously subsidising generation and taxing consumption and green energy. Bringing both of those down and opening up the distribution and transmission grids to marginal cost pricing would enable us to deploy multifold more renewable generation than we have today.

Lord Grade of Yarmouth: Your concern is that philosophically and emotionally, and probably intellectually as well, the Ofgem and government mindset is backward-looking and trying to recreate the existing structures in a way that is greener rather than saying that there is a whole other way of looking at this.

Greg Jackson: I think that is right.

Lord Grade of Yarmouth: That is very general but—

Greg Jackson: I think that is right and I do not blame them for it, of course. The two bits that really change this are understanding that when electricity was a rectangle everybody's consumption choice was the same. It always cost the same to generate, so it did not matter when or where you used it. That has changed in the world of renewables. There are different consumption choices between different people, different households and different users and they will have different preferences, and we need to open up the ability to use that to drive down the cost of the transition.

Roughly a decade ago, even three or four years ago, the entire global automotive industry was laughing at Tesla. Today, they are fawning to get Elon Musk on their board calls to have a handshake with him, and Governments around the world are trying hard to get the investment from Tesla. I just use Tesla as an example because we all know it. In the short space of half a decade the entire global automotive industry, and every expert, and, by the way, quite a lot of City analysts, have flipped, and that will happen in energy. The question is just whether we are going to leave it too long and force consumers to pay too much.

Lord Eatwell: May I ask you about your marginal cost pricing? If you have marginal cost pricing when prices are falling, everybody makes a loss because average cost is higher than marginal.

Greg Jackson: When you say everybody makes a loss, you mean generators.

Lord Eatwell: The point is that, if marginal costs are below average costs, the marginal cost is falling.

Greg Jackson: Yes.

Lord Eatwell: If you price at marginal cost, the industry is losing money on a large scale.

Greg Jackson: First, the industry is losing money on a large scale. In all seriousness, today we have an entirely average costs-based system. If somebody comes along and says, "I can create some really cheap electrons and, by the way, I've got a user who will use them", they still have to pay a very high average cost to access literally empty capacity on the network. It may not be pure marginal cost, but we need a transition process that says that if you are using largely empty capacity, you should be paying very little. By the way, the flip of this is if you are using capacity that is—

Lord Eatwell: You will have really unstable pricing in those circumstances.

Greg Jackson: First, in generation we have a price that goes to negative and we have a price that goes to colossal levels. We already have very unstable pricing in generation. We all worry about the spikes in price and what we forget is that there are tremendous times when the price is incredibly low, near zero or negative. At the moment we have no way of enabling people to benefit from that. In Tesco, we see yellow labels on products that are about to go out of date so we do not have food waste. We need the equivalent of that in energy. We can talk about the purity of marginal cost pricing, but, essentially, if you are a hotel and you have empty rooms, you sell them at, broadly speaking, marginal cost, having already sold some of your rooms at the price that people will pay. That is where our energy system needs to move to.

Lord Eatwell: You need a Ryanair algorithm. Is that what you are talking about?

Greg Jackson: It should all be algorithmic.

Juliet Davenport: I will answer the question and then I will add marginal cost pricing on the end because there is an interesting piece there.

Coming to whether we can do the UK in 100% renewable, recently we did a study called *Renewable Nation*, which turned renewables up as hard as we could. You can get to 98% because we have abundant renewable resources in the UK. The key thing on heating particularly, if we look at district heating systems, particularly in cities such as London, with heat pumps, is that on the whole piece about heating we need some innovation funding to drive down cost and to drive usability. I have a heat pump. I have had one for four years. It works perfectly well. It is quite ugly. That sounds ridiculous, but an important part of a consumer brand is that you need something that is attractive and easy to use.

Lord Eatwell: The same for Dyson.

Juliet Davenport: You can take different views on whether you like Dyson products or not, but, yes, it is the same for Dyson. You need a product design piece, and that is one of the things that we have not invested in in this market.

In terms of where the funding is going to come from, I agree with Greg that the ESG market is waiting to go, and, in fact, yesterday I was very pleased to announce that I am sitting on a new investment trust that is investing in rooftop solar, with an ambition to raise £150 million to start that process of investing. We are beginning to see a lot of IPOs stacked up at the moment, looking to try to take advantage of this non-subsidised market.

I think that Greg is right. I always remember the renewables industry coming to talk to me when some of the subsidies got removed and they asked, "What shall we do?" I said that the first thing that you have to do is go and look at what the customer wants, because for quite a long time we isolated technologies from customer through the subsidy market. I think that is what Greg was talking about—that sometimes these mechanisms get in the way of delivering the actual product that you want. Would we have built most wind farms in the UK with some kind of storage on site if we had thought about customer rather than subsidy? That is the mindset that we need to change.

Marginal pricing is always an issue when you do not see it most of the time. What we are seeing at the moment is that in transition, if you get negative pricing, suddenly you will get a response to that. You will get flexibility markets coming through and you will get flexibility coming into the marketplace, and those are then benign.

It is about the transition to that marketplace. Marginal cost pricing will exist, but most of the deals—90% to 95%—are done directly with the consumer, effectively, so marginal cost pricing is what the balancing mechanism is dealing with, not necessarily what the market is dealing with. I think that is the piece that we need to shift and move.

Q119 **Lord Allen of Kensington:** Greg, I would like to go back to talking about consumer and customer behaviours. I am trying to get behind how things will change for the consumer in the move to net zero. We have 28 million homes and lots of people have very different views on how things will happen. We do not seem to have communicated well the benefits of moving; therefore, there is the fear of increased costs, and complete uncertainty about what this may mean, particularly now when many companies you have been working with or have been supplied by have gone bust. I think that there is a fear there.

We have been hearing limited support for smart meters. People are not taking them up, and they have been available for some time.

There are also concerns about collective switching and whether we should move to that—big brother moving things around for me, with me losing control as a consumer or as a customer, and companies external to properties controlling devices. Citizens Advice talked about a trusted adviser.

What I am keen to understand is what role have government, Ofcom and suppliers played in this fairly major communications programme, which from my perspective we have not got right to date, and that is why we

have a number of the concerns that we currently have.

Greg Jackson: Thank you for raising that topic because I think that it is critical. Forgive me when I use my company as an example, but it is just because I am sitting on the data and, perhaps as a challenge, I have some different experiences. You talked about smart meter take-up. This is a great example of the change that we need to see in the way the energy sector understands consumers.

We were forcing smart meters on people. We were not talking about how they could benefit them in a meaningful way—in a way that meant something to people. It was the same, by the way, with the switching market. I heard a senior regulator say, "For 20 years we've been telling people they are wrong. Maybe we should listen to them".

A quick bit of data. On average, Octopus Energy takes six pieces of communication to persuade a customer to get a smart meter. That is emails, phone calls and text messages. The industry norm is 30. The conversation that we had with the regulator was, "Dear Octopus, perhaps you should be sending more communications", and my response was, "No, perhaps people should learn to communicate in a way that consumers respond to and listen to".

With an energy sector that was built by generators and engineers and that built the transmission distribution networks, when you had rectangles and consumption was just a given curve, consumers were off-takers; they were the lucky recipients of the product. In fact, when I started Octopus I thought that the phrase "behind the meter" meant the grid. If you are in the consumer's shoes, behind the meter is the grid. It turns out that energy companies think "behind the meter" is the home, because for them it starts with generation. We need dramatically to create a market in which the companies are run by people who understand consumers.

Just two weeks ago I was speaking at a major energy conference, and one of the industry-wise people said afterwards, "That's a fascinating idea that the energy market is actually for consumers".

I think that we could get away with not thinking about it like that in the days before the quest for net zero, before renewables. However, because renewables offer this very different generation curve and opportunities for people to grab bargains, we have to invert the way the energy system behaves and start with the consumer.

You ask about people allowing control of their devices and so forth. You go home and plug in an electric car. The typical time that you get home is around 5 pm or 6 pm. That is the very worst time, because it is when the grid is already stressed. By doing so, you push up the price of electrons because there is more competition for them, and you require more network infrastructure—yet more gold-plated infrastructure that will be empty most of the time. Almost every electric car or charger—in fact, all of them—have the ability to read a schedule from the internet, and that

schedule can be dynamic or a fixed time every day and you can just set a clock. You get home and plug your car in and you do not need to think about, but it will automatically charge at the very cheapest time, which, by the way, is also typically the very greenest time. That kind of behaviour is already normal.

I think that the electric car is the gateway drug for this new energy system. No one in Britain knows what a kilowatt hour costs, except perhaps some people in energy companies and every single person who has an electric car, because they have taken that knowledge of a litre or a gallon and they have moved it into the world of an electric car. If we capitalise on this, over the next decade we will almost automatically end up with a dramatically more informed and dynamic consumer base.

We supply roughly 20% to 25% of electric car owners in the UK with dynamic tariffs as I have just described—time-of-use tariffs—and, almost invariably, once they have got used to the idea that an electric car is going to charge when it is cheap, they think about other things such as the washing machine, or leaving the dishwasher until just after peak and doing it at 8 pm rather than 7 pm, because they have suddenly realised that these opportunities exist. I think we are on the cusp of this change, but we could do dramatically more to drive it.

Juliet Davenport: I think that it is really interesting to look at it from the consumer point of view. I would agree with Greg: when I came into this marketplace customers were meters, and what happened on the other side you did not really care about. Personally, I think that we got to a place where we ended up having to have a price cap because of that attitude—we did not treat consumers like consumers in this marketplace.

From my point of view, we have to start to change the language, both on a political level and a regulatory level. We have never talked about energy efficiency as something that we should ask customers to do to save their energy costs. We have always told them to switch. It has been this mantra. Switching is fine—do not get me wrong; it is part of the process—but we should also have come up with more comprehensive smart meters. There is no point in having a smart meter unless you know what to do with it. It is about having that energy conversation with customers. There is a role for the Government and the regulator as well as innovative companies. Everybody has a role in this because you need the trusted adviser piece.

I have to declare an interest. I have just been appointed to the Energy Ombudsman and will start that role from next April. I think that there is an increasing role for organisations such as the ombudsman to protect consumers. Particularly in this new marketplace where they will be selling new propositions, new products and new ideas, the consumer has to be at the heart of it, and we have to ensure that they are looked after.

Going forward, the ideal will be when we get the overall system working for the customer. Greg talks about the gold-plated distribution network and national network. The load factor on that system is about 60%, so

we could deliver cheaper power if we could get more going through it, at better times of the day. The way to do that is to engage the customer and to think about the customer as a different segment. You have the enthusiasts. They are already out there. Probably a lot of them are on Greg's tariffs. They will have the spreadsheets and they will be calculating every half an hour that they are producing power and what they are doing.

In fact, as well as electric vehicles, the other gateway is having a solar panel on your roof because you start to think about when you use that power and whether you can use the power rather than export it to the grid because it is more cost effective.

A heat pump tends to run 24/7. You have it at a low-grade heat so switching it off is really easy. It does not have a big impact on the heat capability of the home so you can use it for demand-side response as well.

While it is not quite happening yet, and we do not have the final product where it all adds up well enough together, that system is coming towards us already. For me, it puts the customer more in control than ever before in reducing their costs. That is what is so wonderful about it. The answer is not just switching. The answer is investing in different pieces in your home, or having somebody else invest in your home, but then being able to use that as a system that can pay you money. Through vehicle-to-grid charging, we estimate that you can earn £300 a year from having an electric vehicle. Suddenly these technologies become an income generator rather than just a cost.

Lord Allen of Kensington: On supply, I think you have been very clear on whether they are really fit for purpose. Today somebody referred to the sector as a regulatory-subsidised sector rather than a consumer-focused sector. I think you are basically underscoring that. Are we really ready for new models such as energy-as-a-service?

Juliet Davenport: The sector or the customer?

Lord Allen of Kensington: The sector. I am talking about the suppliers. Are they really able to innovate? People in these businesses are pretty used to being in a subsidised business that looks at being regulated to do things.

Juliet Davenport: The role of people at Octopus and Good Energy is to come in and take that space. That is what Tesla did. Tesla basically occupied a space that none of the rest of the automotive industry wanted to go into. It is really interesting if you talk to the innovation sector of BMW. I asked it how it does its innovation and it said, "We do it all internally". That is why it is where it is and it is behind Tesla as an organisation.

The same goes for energy companies. Octopus has taken huge strides and I hope Good Energy has as well, but there are lots of other

organisations looking at this space to challenge that. I think you will get better innovation from external challenge than internal.

Lord Blackwell: Greg, I have a question on your model of dynamic pricing. To get to what you describe of being able to use the distribution network to sell cheap green electrons when you have them at spot price and suck electrons back out of car batteries when the price is higher, does that require significant engineering investment to make the network intelligent to deliver it, or is it primarily a regulatory and pricing issue?

Greg Jackson: It is almost entirely a regulatory and pricing issue. Thank you for the opportunity to address that. When we get to full scale there may be engineering issues, but what a great opportunity it will be to get to that scale first.

At the moment the system is often paralysed by the bureaucracy. Juliet talked about the codes. There are game-changers through the codes. I do not know whether you know, but there are bodies create enormous piles of legalistic tracts on how the energy industry works, dominated by the incumbents, who, by the way, typically will not want change, or by the rectangle thinkers, who do not understand it.

Then you have the fixation that, if we are going to change the way something is charged, it needs entire piles of new technology. The reality is that, if we were doing this in a company or organisation for ourselves, we would run it in parallel. We would do some reconciliation. Once a quarter we would work out what it cost the old way and what it cost the new way, we would reconcile it, and do some transfer payments. You could be doing these kinds of things within months—in fact, probably less. What is holding it back is simply the decision-making and the incumbent thinking throughout the sector.

One of the challenges is that people think that this stuff is tinkering around the edges, when Juliet talks about vehicle to grid or I talk about electric cars, or we talk about people with dynamic response or heat pumps, but all innovation starts like this. There is the famous quote from Thomas Watson that there would be a worldwide market for five computers, and here we are—we all have several in front of us. I think we have to take it very seriously and we have to use the same thinking that got us through the vaccine programme in the pandemic, to move fast.

I have to say that over the last three or four years we have invested tens of millions of pounds of our shareholder money in driving this innovation with no route to market, just to prove that it works. It is increasingly frustrating to sit with global investors saying that the UK is the home of the energy transition, yet the way we are doing it is by paying for it out of our own pockets and not by creating the market that makes it work.

Lord Blackwell: Would it be within the remit of Ofgem to make those changes?

Greg Jackson: Between Ofgem and BEIS. When I say between them, I think either. We are talking about changes that are literally cheap and will save the system money.

Lord Burns: A quick observation. I was interested in your role, Juliet, when you talked about the ombudsman side of things. Is the first port of call the regulator, and that when the ombudsman gets involved it is normally because the regulator is having problems in doing its job, or are they two separate jobs? Some of the things that you said you would be doing in the ombudsman service sounded to me as if they were regulatory tasks.

Juliet Davenport: I was not trying to claim any role for the ombudsman that is outside its remit already. The ombudsman has a specific remit on what it is allowed to go and investigate and look after. It is the consumer side. It is paid for by the energy companies to look after consumers, but the issue at the moment is that it is within a specific remit. The regulatory shift is whether it can cover a wider remit that could cover net zero on a bigger basis.

The Chair: Thank you very much, both of you. You have painted a compelling picture, and you have had a musical accompaniment as well. May I trouble both of you, please, to send us a note setting out the measures that you think either Ofgem or BEIS, or both, needs to take to usher in the world that you have described? I think that it is an exciting opportunity, which capitalises on the very low cost of renewable energy, but it will need organisations such as yours to hold the consumer's hand. We are very interested in looking at it from the consumer point of view, and understanding it, because it provides a pretty compelling case for politicians to make to consumers. Thank you very much for joining us today.