



Economic Affairs Committee

Corrected oral evidence: UK energy supply and investment

Tuesday 26 April 2022

4.20 pm

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Members present: Lord Bridges of Headley (The Chair); Viscount Chandos; Lord Fox; Lord Griffiths of Fforestfach; Lord King of Lothbury; Lord Monks; Baroness Noakes; Lord Rooker; Lord Skidelsky.

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Questions 193 - 208

Witnesses

I: Martin Pibworth, Chief Commercial Officer, SSE plc; Zoisa North-Bond, Chief Executive, Octopus Energy Generation.

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Examination of witnesses

Martin Pibworth and Zoisa North-Bond.

Q193 **The Chair:** Thank you very much for joining us this afternoon. Would you like to introduce yourselves?

Zoisa North-Bond: I am the CEO of Octopus Energy Generation. The Octopus Group also contains the retail business Octopus Energy. We supply 3 million customers. I also look after the generation division. We represent around £4 billion of investment from institutions in wind and solar farms in the UK, with about 50% of that being invested in solar and wind here in the UK itself. Europe is £4 billion, and it is £2 billion here in the UK. I have about 15 years of experience in the renewable energy field. Previous to my role at Octopus, I was the CEO of Eneco, which is a Dutch utility. I managed their UK investment in wind and solar on their behalf.

Martin Pibworth: Good afternoon. I am the chief commercial officer of SSE. SSE is a FTSE 30 company based in the UK, headquartered in Perth. We are invested right across the energy space, with networks, distribution and transmission all the way to the technologies and business areas that I am responsible for. The best way to describe my role is that, for any assets that we have that point towards the market, whether that is renewable generation, thermal generation, gas storage, customers or distributed energy, those businesses effectively report into me. I perform that task on the plc board for the company. I have about 24 years' experience in SSE, mostly in traded markets. My background is trading, but I have been on the board for about five years now.

Q194 **The Chair:** You have lots of experience. Thank you both very much for coming. Let me start with a scene-setting question. We have been talking a lot with Mark Carney just now about the Government's energy security strategy. From where you sit, what do you see are the main strengths and weaknesses of the strategy?

Zoisa North-Bond: We were really excited by it. It was the first time we had seen such a comprehensive strategy that was really focused on net zero. It really was delightful to read. In terms of the strengths, there were certain areas where we felt it got it absolutely right. These are things such as heat pumps in homes and the fact that it had focused on not just encouraging investment from investors on the one side, through this £50 million grant into innovation, but on the other it also is incentivising consumers to want to put this technology in their homes. There is a grant at the moment that means that it will bring it down to the same cost as fitting a gas boiler. Heat pumps are so important because, once fitted, they can be run four times more efficiently than gas boilers. Of course, gas boilers contribute to the main emissions in homes and about 16% of carbon emissions here in the UK. We felt that was really excellent.

There are lots of technologies that certainly our investors are very keen on that were outlined in there. We were also particularly pleased to see

that onshore wind is featured in a very subtle way. It got that absolutely right, because that was one example in the last decade or two where we perhaps over-incentivised investments, but we did not focus enough on why people would want it and certainly want to live close by to it. This very measured plan for it, which is about pilots where we can deliver cheaper electricity as a result, was great.

The Chair: What were the weaknesses?

Zoisa North-Bond: Some of our investors maybe saw it as a smorgasbord of too many treats and just did not know which one to go after first. In two or three years' time it may need to really zone down on what the priorities are so that investors can make that choice.

The Chair: What would those priorities be?

Zoisa North-Bond: It is the things that can be built cheaply, without subsidy, that will give more prices to consumers. On heat pumps, it is perhaps more for that. Things like onshore wind can be built without subsidies at this stage. Offshore wind can actually be built really cheaply, too.

Martin Pibworth: The first point to make is that it is incredible when you take a step back and compare for a committee like this. You think about the progress that successive government policies have produced over a relatively short space of time. I mentioned that I joined my company in 1998. If I think back to 2012 and what has happened in that 10 years, it is quite incredible some of the things that the UK has achieved. Some of the policy platforms that have been set up have genuinely initiated very good innovation, very good technological progress and very good engineering progress, which has been exported to the world. We see this as a continuation of that theme.

We were very involved in COP back in Glasgow in November. If it is helpful to the committee, we published a report about the pathway to net zero which LCP, a consultant, did for us. We outlined various things in that, and it is interesting to compare those things to the strategy. We had five main points that we pushed on. First, we said that it is really important to go big—and we mean big—on offshore wind. Of course, the strategy does exactly that. We are very pleased to see that.

We also said that we thought it was important that there was low-carbon thermal deployment to provide flexibility to that big deployment of offshore wind. There are mentions of hydrogen production in the report. There are also mentions of CCUS and perhaps a recognition of the role of that. Again, we see that as a positive.

We also said that we need to invest in other forms of flexibility. We as a company are very interested in pumped storage. We are also interested in hydrogen and in battery technology. Of course, there are markers in the report for those things, too. We see that as a positive. There will need to be market reform. These are very complicated configurations that

policymakers are trying to put together. There will be a requirement for that. Of course, there are operations under way for that as well.

Finally, to balance that, the area that needs the most attention is transmission, which is fundamental to a successful achievement of net zero. It is complicated in itself and perhaps requires some heavy thought processes. That was mentioned in the report. There are also perhaps some progressive things in there. Those five things are probably big policy objectives, difficult in their own right to achieve, but we are pleased the strategy, as my colleague mentioned, was pretty exciting and ambitious.

Q195 The Chair: That is great, and we will come on to transmission in a moment. A number of commentators who looked at the strategy have noted how a number of the measures that the Government have put forward will only really bear fruit many years out, five years potentially at minimum, and maybe a lot more with regard to nuclear. What should the Government be doing here and now for this winter, next winter and the winter after that? Given that the impact of the terrible events in Ukraine are still likely to be felt certainly this winter and maybe well into next year and beyond, what should the Government be doing here and now to address the issue of energy demand in the eyes of consumers and businesses?

Martin Pibworth: That is a really difficult question. It is very difficult to provide infrastructure that will mitigate the requirements that have emerged from the pretty horrible situation going on in Ukraine right now. It is worth noting that investments that have been made on the back of government policy in the past are providing mitigation right now. We have a number of offshore and onshore wind assets that are clearly providing very low marginal cost energy to the system, which is mitigating some of the balances and perhaps leaves the UK in a slightly better balanced position.

Perhaps some of the things we have missed as a country in thinking about this, which are perhaps a little more obvious now, are investments in gas storage and some of the other flexible technologies that would have enabled perhaps a little more mitigation. It is difficult to be critical of the policy that has landed us here, because it has been so ambitious, so expansive and perhaps world-leading. It is worth noting that as a result we are perhaps in a slightly more robust position than other nations in dealing with this.

In terms of the here and now, markets have been extremely volatile. That is obviously well recorded. Markets at the moment are falling back a little. The UK seems pretty well supplied in terms of gas. It is actually exporting a lot of the LNG that is landing into the UK and it is exporting it to Europe. Perhaps some of the panic in the market has subsided a little. That is perhaps to do with some of the policy interactions that are happening, but also seasonal and storage levels have filled up to a degree. Perhaps that gives a bit of cover and mitigation as we go forward.

As the situation persists, we will all have to think very hard about how to best protect markets from the volatility and the wild risk premiums that have been placed as a result of the tragic events that are going on.

Zoisa North-Bond: We need to focus on building forms of generation that are cheap and quick. Looking historically at things in this country, it currently takes probably four years to build small wind farms and three years to build solar farms. We really need to take it upon ourselves and have the same mindset that we did during the pandemic with sorting vaccines out. In reality, it only takes months to put turbines in the ground, particularly at small scale. In some of our trials we can see that we can supply customers with half-price electrons very swiftly in that model. We should be concentrating on building the things first that are the cheapest and the quickest to build out.

The Chair: Just to be clear, what would be stopping us from doing that? Is it mainly planning and those things? It is not investment.

Zoisa North-Bond: No.

The Chair: We will come on to planning, but now we are talking about it, is there anything specific that you would like to see happen? I am thinking once again for the immediate term, this coming winter and the winter after. Are there things that, if they were addressed right now, could unleash that investment and that planning?

Zoisa North-Bond: One would be if we had zones in the UK where it showed that we need generation and where we could add it to the grid without it causing further constraints and further cost to the customer. This identification of renewable energy zones could be quite helpful.

Lord Fox: You said that you could put things in the ground in two or three months. We have heard about supply chain disruption and a lot of stuff is coming from China. Is that realistic, given the current level of the supply chain, which is severely hampered at the moment?

Zoisa North-Bond: It depends. If you are looking at doing small, distributed turbines, which is certainly the Fan Club model, as we call it, there is an ability to put turbines very close to the sources of consumption. The energy generated is travelling shorter distances, so we can provide it at half-price cost. We could procure those pretty quickly. If we were talking about it being scaled into the thousands of turbines, yes, we would certainly need to—

Lord Fox: In reality, how big a quantum of energy would your Fan Clubs actually meet?

Zoisa North-Bond: It is an interesting question. At the moment, about 5,000 communities have come forward asking for us to at least explore hosting turbines. If we were to create all those fans, about 15 gigawatts of energy demand could be created. Looking up to 2035, an opportunity for onshore wind had been outlined of about 35 gigawatts, but in certain circumstances we could accelerate that.

The Chair: Are those small turbines or large turbines?

Zoisa North-Bond: These are smaller turbines.

The Chair: They cost most, do they not, per kilowatt hour?

Zoisa North-Bond: In certain circumstance they can, but if we were doing this at scale where we were not just procuring them one at a time but were buying 1,000 of them, it might look quite different.

Lord Griffiths of Fforestfach: Are you considering these like enterprise zones? They are energy zones. Consent is, in a way, taken away from the general public to some extent. There may even be a tax advantage in that particular entity.

Zoisa North-Bond: At the moment, we are looking at where there is community support. We have also launched a campaign specifically for landowners, which is called Plots for Kilowatts, where they can also register their data, showing us exactly where you can build them. We match-make them like a dating agency. We can then put in things like environmental information. We are also working very closely with local authorities just to understand where things sit within local planning and with National Grid to see where there may be capacity for smaller projects like this to come on to the grid. From there, we certainly hope that we could help to guide where zones like this could be created.

Q196 **Lord Rooker:** Coming back to the structure, could you talk to us a bit about the barriers to unlocking the investment that we need to get to net zero? I have a particular question for Martin, because in the written evidence from SSE on clean electricity generation, you tell us that getting consent is seven years for onshore and 10 years for offshore. Last year, on a short visit to Shetland—it was the first time I had ever been there—I saw these massive construction sites, purely as a tourist. Is the position on planning time different in Scotland, because that seems quite specific, given what we have just heard? These are huge gaps: seven years for onshore and 10 for offshore. I thought it was easier offshore than onshore, but that is not your experience.

Martin Pibworth: Can I take that and perhaps also respond to Lord Fox's question? I should have said in my answer that, as we look over the next year to three years, we are building things now that will contribute to the energy balance in the UK.

Right now, we are building Seagreen, which is the deepest offshore wind farm in Europe. We are building Dogger Bank, which is the world's biggest offshore wind farm in construction. These will come through over the next few years. These were first thought of and first conceived—to your point, Lord Rooker—many years ago. Seagreen took 10 years to plan, to go through consent and then to win a contract in a government auction. From there, it takes three and a half to four years to achieve first power and then, ultimately, the full handover to contribute to the market balance. That is a function of the planning, the environmental conditions

and some of the other things you have to overcome in doing a project of that size.

It is worth thinking about the dimensions of these projects. These are massive capital infrastructure programmes. Seagreen is a really interesting case, because it is in the deepest waters that probably anyone has ever tried to put an offshore wind farm in as a fixed-bottom offshore wind farm. That creates its own environmental challenges. Perhaps 10 years through planning and four years to build gives you an idea of how that plays through.

You mentioned Shetland, and I assume that you are thinking about our Viking onshore wind farm, which again is a significant onshore wind farm. There are similar challenges in environment and planning, but also that required a very long cable to connect it to the mainland, which also takes years of planning to think about.

I agree with Lord Fox that for these bigger projects the current situation in terms of supply chain has become a little bit more difficult for all investors. This is probably the point I was trying to make to Lord Bridges in my opening remarks. Because of the early start the UK had on this in thinking about how to deploy offshore wind, you have some very specialist people, very specialist developers and some very good partnerships with OEMs and the supply chain, which perhaps mitigate that more than might be the case for other investors.

Q197 Lord Fox: Are you seeing a change in your investment model, because not only is the supply chain disrupted, but it is substantially more expensive?

Martin Pibworth: We actually take a very long-term view of the market. I mentioned gas storage in my opening remarks. There was a time when people did not want to invest in gas, whereas we chose to because we saw the need for flexibility. That is obviously important right now given the gas market. We take a very long view. We understand that things happen in supply chains that may be slightly temporary, but we will look to the long-term strategic objective the Government are trying to achieve, how that fits to what society is looking for and then how we think markets develop through all those permutations. The simple answer is that of course we are cognisant of the fact that the world is in a slightly more volatile place right now, but we would still take the long view of our investment cycle over many decades.

Lord Fox: Also you are fighting with a lot of other countries now for that supply. There was a time when you might have been the only business or one of the few businesses competing for that capacity. Now, everybody wants that capacity, so the price is surely going to substantially increase. Indeed, the lead time for delivery will increase.

Martin Pibworth: I do not know about the second part of that statement when it comes to lead times. I agree that, without any response from the supply chain, there is a possible delay in supply chains compared to

where they were. This is the important point about the UK's first-mover or front-runner advantage when thinking about these technologies. The experience that companies like mine and other companies have had in deploying some of these big investments, the partnerships that have been formed and the engineering and the technological work that has been done may mitigate that a little more than you imagine.

What is really important here is that, if the policy is firm, robust and believable from the investor space and from an OEM space, the investment still flows and the risk you are rightly pointing to may be mitigated a little more than you expect.

Lord Fox: Would you agree that OEM confidence is probably even more important than the investor confidence, in that you need something to invest in before you can invest?

Martin Pibworth: There is absolutely no doubt in my mind, if we think about 14 or 15 megawatt offshore turbines, the energy yield and the efficiency of the energy yield they provide, that that is a function in particular of UK policy 10 years ago, backing, with confidence and maturity, an offshore wind policy. When I think about the technology that we will have to deploy as an organisation and as a country going forward, including carbon capture and hydrogen, that same basis is really important. We have to provide that confidence to the OEMs.

Lord Fox: Where does that confidence come from? Does it come from the revenue model, the contract in the first place, or what?

Martin Pibworth: It comes from robust government policy backed by business models that investors like us say are investable to the OEMs: "Can we work together with you to produce the technology to deliver that?"

Q198 **The Chair:** There is a very interesting story in the *Financial Times* that has literally just popped up about a study in rare earth minerals showing that Europe will not have the metal for its climate programme. It points out that Europe will require 35 times more lithium and seven to 26 times the amount of rare earth metals in 2050 compared with today. I am just trying to get into my head what that means for cost and price, putting aside the geopolitics that we were talking about in the previous session. How confident are you that we will not see what this report is implying—a big crunch coming pretty fast in the cost of these rare earth minerals, unless something happens pretty soon?

Martin Pibworth: I have not seen the report. To be very clear to the committee, I am not ruling out a short-term crunch in supply chain costs. If you think about the large offshore wind turbines that we are deploying at Dogger Bank right now and compare them to the offshore machines we deployed at Greater Gabbard 10 years earlier, which are roughly a quarter of the size, the cost of those machines at Dogger Bank is significantly lower despite them, by definition, being more expensive in terms of metal, tonnage, et cetera.

If there is a very robust policy that OEMs and investors like us could get behind and believe in, and we take a long-term view, which is very important, we can see progress in all these technologies. To be honest, to deliver the net zero programme, we will have to invest in technologies that we are not invested in at the moment. We will need to provide that confidence.

Q199 Viscount Chandos: Ms North-Bond, you have talked already quite a lot about planning issues. You would like to see zones, whether they are like enterprise zones. There is Plots for Kilowatts. You talked about greasing the palm of the landowner. The history of planning reform in other respects, most of all residential housing, is one of the “too difficult” box. Can it be different in respect of renewable energy? If so, what needs to be done to make it different? The supply chain may have challenges, but you feel it is something that should be capable of being addressed. Local people’s concerns for their community and how that may affect their voting in elections is even more difficult to manage.

Zoisa North-Bond: No, absolutely. Our research at the moment is implying that nine in 10 households would welcome a wind turbine like this in their postcode area if it means that they get cheaper electricity as a result. That is the really important point. It is not just about putting wind everywhere. It is about putting it where people want it because they receive this benefit, because the financial crisis has really brought into stark reality that certain costs of generation could cost less. We have to have the ability to pass that on to the end consumer as well.

Viscount Chandos: Why do you think the Government have taken the position they have on onshore wind?

Zoisa North-Bond: Because, frankly, a decade ago we got this absolutely wrong. We were building wind turbines where they simply did not belong. They were a problem from the perspective of the people who lived close by to them, because they never received a benefit from it, or if they did it would be a community benefit pot to support a Brownies or a Scouts hut and almost caused more problems with benefits going into the community than it solved. This is being built with people in mind, and investment follows. It is people pulling this into communities this time, which is very different from where we saw it 10 years ago.

Viscount Chandos: If the Government have responded to the mistakes made in the past, we cannot get away from the fact that that is how they have responded. In the strategy that you have been generally very positive about, you could say that that is the gaping hole. What needs to be done to reconcile the support that your survey suggests there is for properly priced and compensated local onshore wind and the Government adopting it as part of a strategy for the next five or 10 years? We have repeatedly heard, absent planning and possibly supply chain on a more temporary basis, that the speed with which new onshore wind in theory could be brought on stream really is relevant to the gap of the next five to seven years.

Zoisa North-Bond: There is a very specific point in the national planning framework, which means that currently onshore wind is almost at a disadvantage over being able to build solar or anything else. It is footnote 53 and it will basically say that one person can object. If you had a community of 400 people who really needed something like this for the sake of driving down energy costs but one objected, it would mean that a scheme could not go ahead. We would ask to be able to map where there is community support, where people want those turbines, and in those circumstances to be able to relax it where people want it, though not everywhere, certainly.

Secondly, at the moment, when we look at the wholesale energy pricing system, it is a single energy price that is set by the gas price, which is also really high. We need two things. The first is the ability to do time of use pricing. This, at the moment, is what we can pass on to customers, so that when the turbine is turning and they can see that out of their window, they can do their energy-intensive chores. That means that we can pass on the cheapest possible cost.

The second thing that we really need to make this happen could also be helpful for investment and is geographic pricing, because of course in the UK not everywhere we need energy at the same time in exactly the same ways. If you could bring in geographic pricing as well, we would have the ability to send energy and energy price signals to the right places when they are needed. That is helpful for investment, because it helps us look at where generation is needed, not continue to put it in the wrong places. There is no point in continuing to build wind turbines in already constrained areas of the grid, but we can help to identify through geographic pricing areas where generation is needed. It is a combination of those two things.

Q200 **Baroness Noakes:** Can I just explore what, in practical terms, could be achieved this way? Most people live in large urban areas and they will certainly not be capable of being impacted by what you are talking about. What impact on the energy supply in the UK, in practical terms, are you talking about?

Zoisa North-Bond: It is the ability to build some renewables more quickly by identifying areas where you can do that.

Baroness Noakes: Can you calibrate that in terms of the proportion of the UK's energy supply needs?

Zoisa North-Bond: At the moment we are looking at the security and supply strategy. If we were looking at things like reducing our dependence on Russian gas imports, we need something like 3,000 to 4,000 more turbines, for instance, to replace that need and that requirement.

The Chair: Those are small turbines.

Zoisa North-Bond: Those would be the small turbines, yes. It would be fewer if we were looking at big wind turbines in certain places, but I am

quantifying it that way. I do not know if that is helpful. I can certainly come back to the committee with some other quantifying factors if that is helpful.

Baroness Noakes: Does this shift the dial on the UK's energy supply, or is this a nice thing that happens at the margins for a few villages?

Zoisa North-Bond: It could shift the dial, particularly if you added the impact of onshore solar on top of that, with things like geographic pricing and the ability almost to charge for electrons dependent on the distance that is travelling. Time of use and geographic pricing are the two things that will give us the ability to drive the costs of the system down for the consumer to use the energy.

Baroness Noakes: Geographic pricing does not sound like a vote winner in urban areas.

The Chair: It would be very useful just to get a bit more detail on that, if you can. I am interested in geographic spread.

Q201 **Lord Griffiths of Fforestfach:** Lord Rooker has told us on a number of occasions about his visit to the Shetlands. Do you see the Shetlands as a dedicated island filled with nothing but turbines?

Lord Rooker: The distinction is Scotland to England with the planning rules. I just happened to see these whacking great wind farms.

Lord Griffiths of Fforestfach: What if I am interested in Anglesey? Are you thinking of areas like that? If I was to put on a bird-watching hat, where would I not want you to be, and so on? You have a vision and there is something important in it. I love the idea of consent coming from the population in that area. Can you tell us where you would send television cameras for tonight's "BBC News At Ten" and say, "This is the ideal area we want to go to"?

Lord Rooker: Lord Chandos has just whispered "Rwanda" in my ear.

Zoisa North-Bond: We are seeing lots of demand in the north-east, in particular, followed by Yorkshire and the midlands. Those are areas that already have many single turbines, but people want more of them. They are some of the windiest areas of the UK, so there is a really good yield from that perspective. Also, the fact that there are turbines there already suggests that things like bird surveys and the environmental information are also good. These are all things that we would want to overlay along with where we have landowners who want to host turbines, community support, environmental support and working with local authorities, where hopefully we could outline those zones and be really clear about it.

Martin Pibworth: With apologies to my colleague, I slightly disagree with that. We have sites in Scotland where the local community really wants us to build a wind farm. We have potentially one of the best-yielding wind sites in GB. During various planning meetings the local community actually campaigned for the wind farm to be built. The reason

is exactly as Zoisa says: because of the share of the economic benefit of that.

Lord Griffiths of Fforestfach: Where was that?

Martin Pibworth: That was Strathy, up in the Highlands. It is right at the top, in Tongue and Melness. There are examples of communities that really do want large-scale onshore wind farms to be built.

Where we possibly slightly disagree, perhaps to pick up on Baroness Noakes' point, is that it does not have to be in an urban area where you deploy big renewables. You can deploy big renewables. The slight issue has been transmitting or transporting that power to the demand centres. That is why I said in my introductory remarks that transmission is incredibly important here, because you can deploy lots of renewables, probably in the north, and you need the transmission lines to move it.

I would be against the geographic pricing that was mentioned, because I would see that as a barrier to investors. It is a complication when investors are trying to deploy lots of technology. It is actually quite a complicated thing to do for the market. Localised flexibility to lift some of the constraints is also a potential positive solution to that.

I am not sure that this was the point, so I apologise if I take us down a cul-de-sac here. You can correct me. In thinking about the planning and some of the barriers there, it is not just the timescales for the environmental, local regulatory bodies and statutory consultees. There is also an enormous amount of work coming to those bodies. If you think about the recent ScotWind auction for offshore in Scotland, 25 gigawatts of Scottish offshore wind is to be built. That will create its own planning requirements. The AR4, the next offshore round, is 8 gigawatts, and that will also create a lot of planning requirements.

We need to think as a country about how we will fund and resource these bodies to be able to do that. It is a big piece of work. Sometimes we may not think about it enough from that side of the fence.

The Chair: What I am hearing so far is that clearly the investment is there. I want to remind everyone of the questions that we are trying to answer here. They are about investment. It is the planning and process that is the real problem on wind, as far as I am hearing. If you could follow up in written evidence, I am very interested in the specifics that you would like to see changed that enable the acceleration of the build-out of wind in the very near term. It is those specifics that we are most interested in.

Q202 **Lord Griffiths of Fforestfach:** I will ask a question about the integration of different parts of this system. We have storage, we have interconnectors and we have the grid. Do you feel that there is sufficient investment at present, in either the pipeline or the design stage, which makes it feasible that we will have a stable and affordable power supply?

Martin Pibworth: That is a very big question. I will do my best to answer it. I keep referring us back to 10 years ago, just to remind us of how much the market has changed and has had to reconfigure. In 2012, coal was utterly dominant, providing a lot of load to the system but also, importantly, flexibility to look after demand variability. Now the market still has to look after demand variability—I would definitely defer to Zoisa on that—but it also has to look after wind intermittency, solar intermittency, et cetera, as well as the role of interconnectors and how they are playing through in the market. Coal does not exist anymore, or it barely exists; it is not a huge part of the merit order, and we have to find other solutions.

Then you roll forward into what we are trying to achieve on net zero and the significant addition of intermittent renewables and of other new technologies. You see a requirement very quickly for big investment into large flexibility assets. I said in my introduction that I was a trader. I like to see this in terms of the end scene and then work back. The end scene is net zero with a lot of renewable deployment. To get there, we will have to invest in these flexible technologies.

There are no regrets as a country from us investing in big pumped storage, carbon capture and hydrogen technologies to provide that flexibility. In fact, I would strongly argue that a delay in that slightly reduces the economic benefit to society, because these assets are very long-term. We need them deployed as soon as possible.

I have hinted at this at least twice, so I apologise if I start sounding repetitive. I would also very strongly advocate for transmission investment. There has been a history in our markets, because the regulatory codes are set up like this, of requirements for needs cases before transmission investment is triggered. We need to have a bit more forethought about strategic requirements and have no regrets, anticipating the strategic investments. If we know that there are 25 gigawatts of potential offshore wind in Scotland, we should be thinking now about how we build the wires to transport and then transmit that to the demand centres.

It would feel a great shame to me if the money was there to build the renewables. Zoisa makes the good point about weaning us off international gas flows with their own volatility and their own price shock potential. It would be a disappointment to me and the country as a whole if we ended up constraining some of that offshore wind because we just had not built the wires quick enough to move it.

Lord Griffiths of Fforestfach: Would you consider what the Government want to do with the National Grid, hiving off the systemic role of integration from other parts of the grid? Do you think that is a good thing and a step in this direction?

Martin Pibworth: To be honest, the system operator role is critical and we are interested in how that consultation follows through, but we do not have a particularly strong position on that.

Q203 The Chair: Can I just pick you up on the point of investment? Many thanks for your written evidence. I was struck by the fact that it refers to the importance of long-duration storage in the smart systems and flexibility plan. You talked about financing challenges. I am just trying to get some specifics again. What are the specific financing challenges here? How can government or others try to remove them?

Martin Pibworth: I could draw a picture to put some colour on. Tell me if this is helpful, please. We are talking specifically about Coire Glas. That is a 1.5 gigawatt pumped storage opportunity that we have as a chance to build in Scotland, which will offer benefits to the market not just in removing system imbalances and mitigating the peak but in removing surplus wind and in effect creating a demand centre for that while relieving localised constraints. There are a lot of very good benefits for that project.

On today's energy price, that looks like a very easy investment to make, except that it is probably eight years to build; that might be being slightly conservative. If I look at the energy price eight years ago and the prospects for the fundamental economic drivers of that asset, I would have had a completely different imagination to what has actually occurred. This is an asset that would serve markets for decades. We have hydro stations that are coming up to their century anniversaries. These are very long-term assets.

When you are investing in an asset like that, you do take a long-term view, but you are taking a long-term view against a market that is reconfiguring. It is resetting the merit order, as we have already discussed with Lord Griffiths. You are projecting that decades in the future and trying to work out what the distributions of possibilities are. That becomes extremely difficult to model and extremely difficult to invest in on a completely merchant basis. We have argued for a cap and floor mechanism where, essentially, if the asset overearns in any given year, the money goes back to the consumer. It also gets a floor in terms of the returns if there is a bad year, in order to look after the capital requirements. Triggering that investment would be a way to unlock that and get that moving.

If that asset was on today, I am sure you would be seeing less onshore wind constraint on the grid and less importation of expensive international gas flows as a consequence into the UK market.

Q204 Lord Fox: Coming back to investments in the grid, to give you another chance to say the same thing again, from memory National Grid's settlement is £5 billion to invest over the next five years. Is that in no way sufficient? What scale of investment are you projecting should be needed?

Martin Pibworth: There is quite a lot on this and I am on the other side of the business. I am an energy person rather than a transmission person, but I will give you my best attempt at an answer. There are various consultations going on about the network investments that are

required. We see these as positive consultations. Some of them are set up with an idea of 40 gigawatts of offshore wind by early 2030s in mind. We now know the target to be higher than that. By definition, the world has changed. On top of that, you have the ScotWind result, where most people were expecting perhaps 10 gigawatts of pipeline development prospects in Scotland. It is two and a half times the size of that. That also has implications.

You then have what is going on in the energy markets right now, the pressure for that and the realisation that maybe there is a slightly different way to configure the market and risk-manage it. All those elements and all those changes have been introduced into these consultations, but by definition I would argue for increasing the requirement for more transmission investment going forward. We are assured by the fact that the right consultation processes are happening. That is a positive thing.

Lastly, I would really like to reiterate the need for the regulator to be able in effect to create a strategic rationale for a no-regrets investments. That is really important. It is not necessary to wait for the needs case. A strategic view of this element of the energy industry is very important.

Lord Fox: In just the same way that it takes 10 years to build a wind farm, it takes at least 10 years to update a transmission system. Are we behind the game in upgrading the transmissions?

Martin Pibworth: The very simple answer to that is we slightly must be, because wind is being constrained off right now. By definition, there is not enough transmission to move it. I am not a pessimist on this. As we discussed, it is probably 10 years or more to get ScotWind fully built, so we have time to put these transmission lines in if we start now. That is my point about how I see things as an ex-trader. If you know where the end picture is, if you know what we have to get to, there are a series of very credible, very good rational economic debates about investment to be had. There are also some big no-regret investment decisions that we should be taking.

Q205 **Lord King of Lothbury:** I want to pursue this issue of investment, because this is the focus of our inquiry. Many of our witnesses, as you have done today, have said there are some wonderfully exciting technological possibilities. The big question is, if they are so exciting, why the private sector does not invest in them. Will they invest in them? If not, why not?

Can I also add one example here, which is hydrogen? In much of these discussions, the word "hydrogen" eventually comes up. That is a technology where, in order to see the costs fall, it needs to be produced at sufficient scale. Do you think that Government intervention is needed in order to make this technology viable for the UK and profitable? If you do, what kinds of interventions would be appropriate? I do not know whether you both want to comment on this. You have mentioned hydrogen twice already.

Martin Pibworth: First, we do invest in some technologies if we see a business case that does not require support. If I go back to the previous answer I gave to Lord Bridges, technologies that are expected to have longevity of many decades, given market uncertainties and market possibilities, probably do need some support.

For example, we are building the most efficient combined cycle gas turbine (CCGT) gas power station in Europe at the moment. That is good, given its efficiency. It delivers power for less gas usage, which has to be a good thing right now. We started that without any support. We started that on a merchant basis. It now has a capacity market contract, but we believed in the policy and just got moving on something that we thought there was a need for in the market.

We have Coire Glas. Pumped storage and carbon capture are definitely in different boxes because of the long-term nature of the technology and the fact that, in carbon capture's case, it is the first of a kind and therefore will require some government support to get off the ground. I would argue very strongly that, should that occur—the Government are clearly interested in deploying that technology—ultimately costs will come down and we will get the benefit of that, because I suspect that we will need to deploy more than the at least one that is in the current strategy.

In terms of hydrogen, this is one of the more complex areas, because there is absolutely no doubt in my mind that hydrogen will have a significant role to play in any net zero programme. If you had asked me about it a year ago, I would probably have said, "This will really matter in the early 2030s". You are asking me today and I would bring that forward. I suspect that if you ask me next year, if you invite me back to the committee, I might bring it forward again. There is an urgent requirement for hydrogen.

To achieve a hydrogen economy, you need to tackle four things simultaneously. This is the thing that we are all struggling to completely resolve. You need to provide the incentive for production. You then need to provide a demand source. You then need to provide the transportation. You then need to provide the storage. Those things are difficult to do in concert. We are pretty pleased with the government progress on the production side of things. We were encouraged by what was written in the strategy recently. Those other elements will come.

To your point about why we do not just get on with it and invest as an investor, the truth is that we are. We are looking at green hydrogen possibilities from wind farms. That is something the renewables team is doing. In the thermal team, we have a hydrogen power station in the very early stages of planning at Keadby in Lincolnshire. We are also involved in projects in Cavendish that are also looking at whether you could use hydrogen as a major fuel source. We have been in discussions with partners for a while about this, which is why I confidently say that it is coming towards us a little more quickly.

There is investor risk capital at stake there. We have some money invested in it. The stronger government policy gets and the clearer some of those strands become, we will clearly be stepping up our investment in response.

Lord King of Lothbury: Here the focus is on the need for a clear strategy, not for financial support.

Martin Pibworth: Yes. Again, I go back to the metaphor I gave earlier. Do I see hydrogen as an important part of the eventual energy mix? Yes, strategically it will be critical. I am not quite sure how we will navigate that in terms of policy over the next couple of years. I am not quite sure, depending on where the OEMs get to, what type of supports are required. I am encouraged that, on all four of the elements I listed, there is very good consultation.

Lord Fox: What do you need to know to be more sure on that navigation process?

Martin Pibworth: In terms of production, there are discussions about what the market mechanism will be. That is coming relatively close to being defined. In terms of demand, again, once you get the production side sorted, some kind of CfD for a hydrogen generation plant might be a credible instrument. It is an instrument that clearly government and industry are very familiar with.

Once you get those two elements in place, in terms of the transportation and storage side, I see people looking to invest. Again, being very open with you, we have a gas storage facility at Aldbrough in east Yorkshire. It would be very possible to convert some of those caverns to hydrogen storage. As soon as we see the policy signal, I am sure we would be interested in having a discussion about that. Other people will be in a similar position.

Q206 **Lord Monks:** We have noticed on the National Grid website that it is arguing that, in future, electricity systems will have to adjust to consumer choice and the pattern of demand. I take it that by that they mean giving out appropriate price signals about usage during peak hours and so on. Do you agree that this will be that important in an area where we have been talking a lot about supply and not so much about demand? What role can consumer choice and demand play in the transition to net zero?

Zoisa North-Bond: We see that it could make a really significant impact. National Grid on its website actually predicts that by 2050 we could be making £68 billion of savings across the grid. If we look at flexibility as a whole, at least £5 billion of it could be created by consumers themselves.

We have been working quite closely in this area for the last couple of years through various trials. For instance, there is the Powerloop project, where we have been working with customers who have electric vehicles, specifically Nissan LEAFs. We incentivised them to be able to store energy in their vehicles in the middle of the night, when it is cheap. Then, when

National Grid needs it, they return it back to the grid. Something like that could have significant impact, because we would need something like 10 million cars to be able to power the whole of the UK's peak demand. Now, up to 2030, we are predicting that there will be 11 million cars on the road.

As Octopus Energy, we are obviously looking at really trying to accelerate the rollout of electric vehicle usage. Structures like the benefit-in-kind tax for drivers are hugely helpful in that. With those kinds of tools, we really see that they will be able to play a part.

If people do not have electric vehicles, we also have tariffs like Agile Octopus, which taps into the cheapest energy prices, where we text customers price signals for the day ahead, so that they can plan when to do their most energy-intensive chores. Two or three years ago those kinds of things may not have been as high in take-up, but when we start to look at time of use, certainly in the backdrop of what is now happening with consumers' energy bills, we are seeing people's reaction to those types of products increase.

For instance, with our Fan Club tariff, which has a time of use element to it, speaking to people through an independent survey, 80% of UK consumers have said, "If it meant that we could get reduced energy bills, we would respond to price signals so that we could get cheaper things at different times of the day". Of course, it is using the grid and helping to relieve it at times when there is an abundance of capacity on the grid. We have a number of things like that.

We are also working to make the experience a little easier. We have things like Intelligent Octopus, where basically the consumer hands over their permissions to us to use vehicles to store at various different times. It is not like they have to take time out of their lives to manage that. It is almost automated through an app. Into the future, we make consumers' place in flexibility much more powerful by gamifying it in that way or by digitising it or making it as simple as possible for them. We see it as something that is really valuable and could be harnessed.

Lord Monks: I was pleased with what you just said about helping the consumer, because these are not easy areas to be a consumer in. Things are complicated, and it is very difficult to grasp how consumer choice will really be possible for many people. For some people it will be fine, but other people will find it difficult. Making a big effort so that people understand it will be very important.

Zoisa North-Bond: Yes, absolutely.

Q207 **Baroness Noakes:** I will focus on investment, because that is the focus of our inquiry. We have talked about investment in generation, transmission and storage, but one of the aspects we need to consider is the investment in energy efficiency and what the Government should do on that. I am conscious that you are not investors in energy efficiency per se, so if you do not have anything significant to say there is no need

to say it. But if you do have any observations, I am sure we would be pleased to hear them.

Martin Pibworth: I am not sure that any evidence I gave would be very good. I agree that energy efficiency is particularly important, and of course I would support that, but I do not have anything to offer, I am afraid.

Zoisa North-Bond: It is not particularly my expert area either. One of the things that we see with energy efficiency measures, being at the consumer end at Octopus as well, is that things like insulation in homes and when to do it are such a personal choice. It is not a one size fits all, so it is very difficult to get a financing solution, because at the other end of it you have our style of investors who may see energy efficiency as an investment opportunity. They will look to deploy hundreds of millions as quickly as they can in the easiest ways they can, and energy efficiency structures are so varied and at the moment could be few and far between, so it is extremely difficult. Although I am definitely not an expert, I would say that four or five solutions may be needed from a financing perspective that meet most of the requirements of the UK. Maybe that is something that investors could really get behind.

Q208 **The Chair:** Just on the demand side, is there a coherent, clear enough and credible government strategy? It comes back to my point about the very near term.

Secondly, I totally understand that you do not want to talk about energy efficiency, but just to build on Baroness Noakes' question, what are the impediments here apart from government? I take it that you both would agree that government should really be stepping up its role here. We are talking here about investment. What more can and should the private sector be doing to encourage consumers to make these choices, be it to install a heat pump or to buy an electric vehicle? What are the impediments to the private sector in doing that?

Zoisa North-Bond: In the heat pump example, we are getting it right from the perspective that we are doing things that will drive down the cost of the technology itself. Heat pumps have been a cottage industry until now, but it needs investment and to look into the model to be able to dissect it and put it together more cheaply. We as Octopus Energy have made some investments in that space over the past week in a company called Renewable Energy Devices to do precisely that. At the one end, you need people investing. The Government have also pledged to invest in innovation for heat pumps, which is really helpful.

The Chair: Is that sufficient, though?

Zoisa North-Bond: I would imagine that into the future it may need to be more sufficient. At Octopus Energy we are seeing, with the grants, and at the consumer end, some of our work already being able to drive down the efficiencies. We have the ability to install these at the same costs as gas boilers. With the removal of the grant, we are working very quickly to be able to create a heat pump very cheaply. That would still be

the case without the grant. That is a blend of private and government investment, but it feels like something that has certainly been set off on the right foot.

The Chair: Just sticking with heat pumps, it still feels niche to me. Correct me if I am wrong, but that is, first, partly because of customer confusion and lack of understanding. Secondly, it is because of planning issues, especially in urban areas. Thirdly, it is because of skills. Is that correct?

Zoisa North-Bond: Yes. To really speed the deployment of heat pumps along at the moment, we need focus in each one of those areas. As a private company we have also taken on an investment in a heat pump centre in Slough, where we are retraining 1,000 engineers to fit heat pumps in people's homes. We are able to do that at the same time as fitting insulation, as an energy efficiency measure, as well as smart meters and other things that will be needed for electrification in homes. That ability to look across a number of technologies will be really important.

Martin Pibworth: I totally agree with you, Lord Bridges, on skills. It does not matter if it is at the demand end, with heat pumps and energy efficiency, or at the end that we are dealing with. When markets are going through these wild transitions with the demand and supply curves, investment in skills is clearly critical. Every industry member will talk about the fact that they are investing heavily in apprenticeships and in upskilling their workforce. That will be incredibly important. Policy direction and strength of policy direction provides the signal to companies to allow them to do it. They are building out abilities and capabilities for the long term, which will serve the country very well.

The Chair: We keep coming back to this phrase, "the long term". It strikes me that we may have a strategy from the Government that will deliver in 10 or 15 years, but I am still concerned. Do you really feel that we have a strategy, from now to 2030, to increase investment sufficiently to deliver energy security and supply that is renewable, affordable and reliable?

Martin Pibworth: Because of a decade-long investment in renewables, particularly offshore wind, yes, that is there. We need to focus on the newer technologies. Carbon capture, hydrogen and pumped storage would be the three that I call out. I have mentioned transmission a lot. After 10 years of energy transition, the country is in quite a good space when it comes to capability, investor understanding, being in partnerships and relationships. We are also right at the front of the technology curve. We stand in good stead. I am basically an optimist, so I am optimistic about that, as long as the Government keep going on their policy trajectory.

Zoisa North-Bond: I am also optimistic. I would go back to my opening comment that, to get there quickly so that we have the biggest impact on consumers and the way they are struggling to pay bills right now, we

have to prioritise things. We should be prioritising the things that are the cheapest and the quickest to create.

The Chair: Thank you both very much indeed.