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The Select Committee on Science and Technology

Inquiry on

THE RESILIENCE OF ELECTRICITY INFRASTRUCTURE

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Witnesses: Rt Hon Ed Davey MP and Jonathan Mills

USE OF THE TRANSCRIPT

This is a corrected transcript of evidence taken in public and webcast on
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Members present

Earl of Selborne (Chairman)
 Lord Broers (co-opted)
 Lord Dixon-Smith
 Baroness Hilton of Eggardon
 Lord Patel
 Lord Peston
 Lord Rees of Ludlow
 Viscount Ridley
 Baroness Sharp of Guildford
 Lord Wade of Chorlton
 Lord Willis of Knaresborough
 Lord Winston

Examination of Witnesses

Rt Hon Ed Davey MP, Secretary of State for Energy and Climate Change, DECC, and **Jonathan Mills**, Director, Electricity Market Reform, DECC.

Q186 The Chairman: Welcome, Secretary of State. We are delighted that you have been able to join us for this, our last session on the inquiry that we have been involved in now for some weeks on resilience of our electricity generation and supply. I should alert you to the fact that we are being broadcast, so I will ask you just for the record to introduce yourself. If you want to make an opening statement in any shape or form, we would be very happy to hear that. Otherwise, we will go straight into the questions.

Rt Hon Ed Davey MP: Thank you very much Chairman. I very much welcome the Committee's inquiry. This issue is obviously vital to electricity security of supply, and I welcome proper scrutiny of what we are doing. I am delighted to have Jonathan Mills, who is director of electricity market reform at DECC, here with me today. I do not think I need to say much more than that, and I look forward to your questions.

The Chairman: Thank you very much. During the course of our inquiry we have recognised that there are a number of conflicting objectives in delivering resilience to UK electricity. There is the question of affordability, of security and of decarbonisation. Ultimately, how reliable you want the system to be must eventually be a political decision, balancing costs overall with the ability of bill payers, and for that matter of taxpayers, to match the implied costs. So my first question of a general kind is: who do you recognise as ultimately responsible for maintaining resilience in the electricity system—keeping the lights on—and do you feel that the electricity market reform introduced by this Administration has brought back unduly large-scale government intervention, or do you feel that the balance is about right?

Rt Hon Ed Davey MP: First of all, inevitably Ministers are responsible for the overall policy design and, as the Secretary of State for Energy and Climate Change, clearly I am responsible

to Parliament for the design of policy on energy security and resilience in the electricity system. But we obviously work with industry, and industry delivers on an operational basis, whether it is the long-term planning for investment or the day-to-day managing of the system. Clearly the lead on that is with National Grid, which we work closely with. National Grid is, of course, regulated by Ofgem, which, on behalf of consumers, has to ensure that the balance is right between the costs and ensuring that consumers get the supplies they need, because that is obviously fundamental to what consumers want. National Grid and Ofgem are the key people we deal with in designing policy. We have worked very closely with them and continue to do so as we estimate what needs to be done and design policy. Then, of course, you have the wider industry, whether it is the generators or the distribution and network operators that own and operate the regional electricity networks. I am fundamentally responsible, of course, but we work very closely with industry and the regulators to deliver a secure system.

Your other question was whether or not electricity market reform has seen more intervention. Clearly it has. The first reason for intervening in the market that lies behind EMR, and indeed behind policies before it that were similar but not as well designed, is in my view the need to tackle the challenge of climate change. The market does not cost in the effects, the costs, of climate change, and while you might want to do this in another way, for example through a carbon price or carbon tax—we know the difficulty of designing those both internationally and with a credible level over time—we think that the contracts for difference, which is our intervention on the carbon challenge in the EMR, are a good way of dealing with that problem. They are a targeted intervention.

The other major intervention by the electricity market reform is, indeed, on the security of supply through the capacity market. It has been clear for some time that, left to its own devices, the free market was not bringing forward low-carbon capacity or sufficient capacity, so the capacity market within EMR is designed to do that. But it is quite common in the academic literature to find two good reasons for intervening, which have emerged both over history and in different countries, and they are the two I mentioned: the need to deal with the fact that the markets do not price in carbon by themselves and do not have a solution for that—they will just bring in fossil fuels and not low-carbon—and the need to make sure that we have security of supply.

Q187 The Chairman: You referred to the contracts of difference, which offer different levels of support for different types of renewable technology. As I understand it, they are to offer greater levels of support for technologies that are at earlier stages of development. But in practice it seems that they fix the price of electricity for a certain technology, and it does not seem to disappear once this technology has matured. Clearly you are not going to have a free market. In any way, the free market does not seem to have been able to deliver the capacity that we now seem to recognise we need. After all, the capacity market is subsidising the restoration of what would otherwise be redundant capacity. Why did the market not signal the need for new generation?

Rt Hon Ed Davey MP: There are two questions there, and if I may I will unpack them. First, on the contracts for difference, you are right that as we deploy the budget in the levy control framework, we support less mature technologies in a greater way by the very fact that they are less mature and need extra support. If we did not, you could end up with a suboptimal outcome for the country, and indeed the world as a whole, given that those technologies

could turn out to help us dramatically in a more cost-effective way. An example at the moment might be carbon capture and storage, which is not happening to the extent that people had hoped, and the need for government intervention to bring that technology on is clear. But I have to disagree with you about the design of electricity market reform and how it is affecting prices on the supply side. Legislative market reform is in several phases. The first phase is having strike prices at an administered level, in the way in which renewables obligation certificates worked. Phase 1 is very much about administered prices. Phase 2, which we are going to more rapidly than we expected, is technology-specific auctions—we have various pots: pots for more technology and pots for less mature technology—and we are bringing market forces into the selling of those contracts for difference far faster than people had expected and than we had expected. So you will see the support costs—the subsidies, if you like—for these new technologies falling as market forces help to deliver that.

Ultimately we want a free low-carbon electricity market where the subsidies are no longer. It is possible—we have seen the trajectory of the costs of some of these technologies—to envisage that in the next decade, and I hope we will move from a technology-specific approach with these different pots to a technology-neutral approach.

Q188 Lord Broers: Are the Government confident that sufficient action is being taken to keep the lights on, especially over the next two years? We have heard evidence that today's tight capacity margin was entirely predictable. How has the UK ended up in this position? Is this simply a case of policy failure?

Rt Hon Ed Davey MP: When the coalition came to power, it was very clear that we were going to have to run as fast as we could to ensure that the lights stayed on, not just in the short term but in the medium and long term. We were left with a legacy of underinvestment in our electricity system and we have had to take short-term, medium-term and long-term measures. The long-term measures are about bringing on all the extra capacity, whether that is low-carbon or gas capacity. We have seen in the first three years of this Parliament—I do not have the latest figures; we hope to publish them later this year—more than £45 billion of investment in electricity generation and networks, which is a dramatic increase in the level of investment. We published a report in July last year setting out energy investment across the piece, which can detail for the Committee how that big surge in electricity investment has occurred. That is really for the long term. In the long term we are looking at about eight of our nine nuclear reactors probably coming off line by 2023. We are looking at almost all our coal generation going by the middle of the next decade. So we must have a long-term strategy.

We need a medium-term strategy for the end of this decade, when we will face particular challenges. The capacity market, which I am sure we will come to, is very much focused on that. Your question focused on the short term and the next two winters. To take the measures that we agreed, and which we have been planning for several years now, given the legacy we had—it is not a new thing or a sudden realisation that there is a problem—we have used the powers in the Electricity Act 1989 and consulted on them with National Grid and Ofgem to bring in supplemental balancing reserves on the supply side and demand-side balancing reserves on the demand side. We have pushed ahead with that, so for this winter, 2014-15, National Grid has purchased 1.1 gigawatts of balancing reserve to support the system. It has not had to use that at all, because we have got nowhere near a problem, but it

is there; it sits outside the market and National Grid can use it if we have a problem at peaks. We do not anticipate that, but it is there as a sort of insurance policy. We are expecting there to be about 1.8 gigawatts of supplemental balancing reserves for 2015-16. On the basis that that goes ahead, I am sure that the lights will stay on not only this winter but next winter as well. That action—which, as I say, has been planned with all the different stakeholders for a period of time—can give this Committee and the public the reassurance they need that the lights will stay on.

Lord Broers: That has all been a little last minute, has it not? And it has not been cheap; I calculate that it is going to cost £1.26 billion.

Rt Hon Ed Davey MP: First of all, it has not been last minute, as I have sought to set out for you already. These plans have been developed since the coalition came to power. I do regret that there has been a poor legacy, but we have been working on it. If you look through the history of our consultation and our announcements, they have not been just in the last week, month or year, but over a period of years. So I do not call that the last minute. Of course they come at a cost—absolutely. My job has been to make sure that we minimise that cost. Jonathan may be able to remind me of the cost of the supplemental balancing reserves for this winter and next, if he has them to hand. We will come to the capacity market in a second, and that is expected, over the lifetime of those contracts, to add about £11 gross to anyone's bill—but when you take into account the fact that wholesale prices will not peak at such high rates as they otherwise would have done, the net cost of that intervention is just £2 on the bill. So, having been given a problem to tackle by previous Governments, we have gone about it in a systematic way, over time, and done it in a way to minimise the cost to the bill payer.

Jonathan Mills: The figure for the supplementary balancing reserve is less than £1 on the average household bill.

Lord Broers: But the situation is getting more and more difficult, is it not, given the way we have tackled it? It is inevitable now that our electricity is very expensive. We have been slow in realising the real supply that will decarbonise electricity because nuclear has slipped and slipped. I am surprised that you seem confident that we will have—did you say eight new nuclear plants?

Rt Hon Ed Davey MP: No, I said that eight are closing by 2023. I cannot tell the Committee that we will have eight new nuclear power stations by 2023. Eight are closing, and we need to fill that gap.

Lord Broers: That is quite aggressive, considering that we have made almost no progress on any of them.

Rt Hon Ed Davey MP: I have to say that I completely disagree. We have spent a huge amount of time on this. The last Government put some of the framework in place. We are months, possibly weeks, away from signing the final contract for Hinkley Point C with EDF. That will be the first new nuclear power station in a generation. It has gone through a whole range of processes, such as the regulatory process to generate generic design assessment, the planning process and so on, and we have two other consortia that have either gone through the regulatory process approval—the GDA process—or are a long way through it. They are, of course, Hitachi with potential nuclear reactors on Anglesey and at Oldbury, and Toshiba and GDF Suez with a nuclear reactor in the north-west. So if you talk to people around the

world, and certainly around Europe, we are seen as a country that has grasped this nettle and has been moving far more quickly than others. We have a very detailed policy that looks at decommissioning and waste management in a way that previous generations—I underline this—failed to do. We are not repeating the mistakes of previous generations.

Lord Broers: So you are confident that we can meet our three requirements of security of supply, cost and competitiveness, and decarbonisation?

Rt Hon Ed Davey MP: Our three objectives are the ones that you have said, and I believe that we are managing them. I will take them in turn. On decarbonisation, we are seeing a reduction, in electricity in particular, of our fossil-fuel sector. We are seeing a big increase in renewables. If we add that to nuclear, we are seeing record amounts of low-carbon electricity as that rolls out. We need to do a lot more, but there is real progress there. We could talk about heating and transport, which is not going quite as fast as electricity, but your report covers electricity and we have made a lot of progress there.

On security, I believe that we now have a very systematic approach in place for the short, medium and long term to give people that reassurance. While the report covers not just electricity security of supply but other aspects of energy security of supply, I would recommend to the Committee the report by the US Chamber of Commerce, which looks at energy security across the world for its member companies to invest in. It places the UK as the most energy-secure country in the European Union—Norway is slightly higher than us, but in the European Union we are the most secure. We are the fourth most secure country in the world. The three countries ahead of us are Norway, as I mentioned, New Zealand and Mexico. I do not know why Mexico is more energy secure than we are; I have not looked at it. But it means that we are more energy secure than the rest of the European Union, the United States of America, Australia, Canada, Japan—I will not go on to list all the other countries in the world—and so are not doing quite as badly as some of the headlines you might read. So that is decarbonisation and energy security. By the way, I do not want to come across as complacent—we are watching this all the time—but the idea that we have not made progress here is something that I contest very strongly.

The final point is about affordability. This is something that I worry about all the time, but you have to look at it for both domestic and business, because the pictures are slightly different. On the domestic side, our gas prices in the UK for households are the lowest among the EU 15 comparator countries. Our electricity prices for domestic households are among the lowest. So if you have those international comparisons, our prices are among the lowest. I focused on making sure that electricity markets are among the most competitive, and I am sure you will be as delighted as I am to see that yet another big six company has reduced its prices.

One of the challenges, though, is for industry. While industry has relatively low gas prices, it has relatively high electricity prices compared to other European countries. We need to work on those, as indeed we are doing. I am working with my right honourable friend the Secretary of State for Business, Innovation and Skills, and the Chancellor, on a whole range of policies to support energy-intensives that otherwise would have competitive issues, given the relatively higher price of electricity for industry in this country. I could go on at length about the ways in which we have tackled affordability for both domestic and business customers, but I think I have made my point today—although you may wish to come back on this.

Lord Broers: In terms of competitiveness with America we are not very well off, are we?

Rt Hon Ed Davey MP: You are right to say that. The shale gas revolution has absolutely changed the energy price comparator with the United States, but if you compare us with the rest of Europe, and indeed with the rest of the world, it is not quite as severe, as they have not enjoyed the benefits of the shale gas revolution in the way that has happened in the United States. When one looks at the impacts and how you address them, they are more on energy-intensive industries, because, on average, energy costs are about 3% for the average manufacturing firms; the petrochemical and steel types of industries are particularly exposed. I have argued at the European Council, as well as within the Government, that we need to have a strategic response to the competitive challenge that shale gas applies to the UK vis-à-vis North America. That strategic response has a number of elements to it. The first is securing and completing the single energy market in Europe, which will put much greater downward pressure on prices. One thing I have championed as Secretary of State has been interconnections with our European neighbours, because that will produce lower prices and greater security in the long term.

We also, across the European Union, need to look at R&D and innovation. I particularly wanted to bring that to the Committee's attention. It seems to me that there is a case for greater European effort on R&D to help energy-intensive industries. I hope, whether it is in Horizon 2020 or other budgets, that we can do more as the European Union—indeed, more as a country—to work with energy-intensive industries to make not just marginal changes in their efficiency and efficient use of energy but step changes. In the European Union ministers' group I set up something called the green growth group, which now has a corporate platform for businesses to talk to European Ministers about all these issues. At some of those meetings we have heard from energy-intensive industries across Europe about how they are beginning to think in this way. The example that I was particularly impressed with was the European federation for paper and pulp, which is a big, energy-intensive industry. It has run a competition to look at the different technologies that could be transformative over the next 15 years. It believes that some of those technologies, with some support from the European Union and member states, could be taken so that they could reduce their use of energy by 50%.

The point I am making to the Committee, with respect to your question on competitiveness with America, is that we have to have a strategic response to that. We cannot just wring our hands. That strategic response is, first, the single energy market and, secondly, R&D.

Q189 Viscount Ridley: Can I press you a little further on the affordability leg of the trilemma? You took comfort a moment ago from the fact that energy prices in this country will not peak as high as you thought they would. This is largely because of the downward pressure on fossil-fuel prices from the fall in the oil price, the shale gas revolution and so on. But at the same time you have said that we are about to sign a contract for Hinkley C, which many people, even in the nuclear industry, regard as an extraordinarily highly priced nuclear facility. We are pressing ahead with offshore wind, which is three times the price of gas electricity. Is there a danger that the falling price of gas and oil is exposing a real gap in affordability behind the agenda of decarbonisation and security? Your predecessor had, I think, three scenarios for what would happen to fossil-fuel prices and they all went upwards. They varied just in how much they went up.

Rt Hon Ed Davey MP: Let me first for the record say that I am not complacent about prices; it is something that we focus on, laser-beam like, all the time. Let me take issue with your points and start by commenting on what is happening to oil and gas prices. Oil prices have more than halved in a very short time. This will impact particularly the transport sector. It will have almost no impact on the electricity sector and almost no impact on heating, because, in the main, oil and gas are not substitutes; they may be at the margin, but generally it is very rare to find oil-powered electricity stations—I am not sure that we have any more. We might have them in the reserve. Oil is not seen as a way to produce electricity any more. On heating, it is mainly people who are off the gas grid who use oil for heating. The dramatic decline in oil prices is not affecting gas and electricity prices.

Viscount Ridley: No, but we talked a moment ago about the fall in the gas price as a result of the shale gas revolution.

Rt Hon Ed Davey MP: I am coming to that, but there is quite a lot of misinformation. The dramatic collapse in the oil price will not impact oil, gas, heating and electricity so much. Of course, the fall in wholesale gas prices is affecting those prices and is welcome. Let us look at what has happened. In the last year, the average wholesale price—depending on which price and which date you take—has fallen by between 20% and 30%. It fell quite dramatically in the first half of last year and then crept up significantly. So it has been volatile, but over time it has been on a downward trend, which I welcome. It will actually help the decarbonisation agenda because it will help us to remove coal from the system much more quickly. If there is one part of the decarbonisation agenda that we have to pursue relentlessly it is to remove unabated coal from the system. Rather than hindering the decarbonisation agenda, I argue that it helps it in the short and medium term.

You then brought in whether the costs of the contracts for difference are at one with Hinkley Point C—the first new nuclear power station—or offshore wind. Taking Hinkley Point C first, given our policy we have been pretty rigorous and robust in calculating the price that we propose to close the deal on with other comparators, whether that is gas plus the cost of carbon—that is important if you are going to compare apples with apples and not apples with pears—and other comparators such as onshore wind, taking into account the system costs that they might have, which is not the case for nuclear. I think we published our analysis when we did the heads of terms of agreement and we will certainly publish it when we conclude the deal. I think you will find that rather than it being expensive in the way you suggested, it is good value for money when compared with alternatives. Would I like a lower price? Of course. Are we pushing hard for lower prices? All the time. Some people look at the wholesale price of electricity and compare it with Hinkley Point C and conveniently forget that oil and gas are not paying the price of their pollution. That means that you are not doing the right comparison.

I could make the same comparison for onshore wind, but it is slightly different. Hinkley Point C would represent a third generation of nuclear reactors—very mature technologies that have been around for many decades. Offshore wind is a new technology. What we are trying to do, through our system of intervening through electricity market reform, is drive down the costs of offshore wind. Our target is to get it down to £100 per megawatt hour by 2020. We have worked with the Offshore Wind Cost Reduction Task Force; it is pretty clear that we are going to do that. If you talk to some of the investors and developers, such as DONG, they are even more aggressive than that. So for a pretty new technology, in which Britain is leading the world and has huge potential, we are driving those costs down far faster than

many people have recognised. Inevitably, you can pay higher prices when you are rolling out new technology, but I would have thought that this Committee, more than any other, would have recognised that you do not take snapshots when you deal with technology; you look at technology development and deployment over time.

Q190 Lord Winston: Obviously we are very pleased to hear about security, but can we turn to major events? What are the emergency plans for worst-case scenarios? How are they developed, tested and co-ordinated in case of a major event? How much are exercises on the emergency procedures for serious or catastrophic failures of the grid carried out?

Rt Hon Ed Davey MP: Electricity, gas and transport fuel are a major part of wider government planning for dealing with emergencies. The Government, with their cross-sector national risk assessment, are looking at hopefully every conceivable type of risk to the UK, and I pay tribute to my right honourable friend the Minister for the Cabinet Office, Oliver Letwin, who has held the ring for a lot of work that this Government have done. I do not think it is appreciated by many, because looking at all this resilience planning is not terribly sexy, but he has done it more thoroughly than it has ever been done before. My responsibilities are quite a big subset of that. We deploy our planning under the national risk assessment mainly through the Energy Emergencies Executive, the so-called E3, which brings together government, industry and regulators, first to identify the risks, then to try to prevent them and mitigate them—obviously prevention is better than cure—and planning for what happens if our prevention and mitigation strategies do not work. We will look at everything from severe weather events to terror attacks, cyberattacks, technical failure and industrial action to plan how we would manage in those circumstances. We will then produce documents, strategies and policies, which might be directly linked to our investment strategies so that our networks in the UK are some of the most resilient and effective in the world. Our reliability rates for our networks are 99.99%¹¹—we will give you the exact figures later. They are incredibly reliable, but we are absolutely not complacent; we still need major investment. I published a major report recently on that investment, which is all about prevention. We also plan ahead in case something happens that we could not have invested for. We have a national emergency plan for downstream gas and electricity and a national emergency plan for fuel, which set out what would happen in an emergency.

Lord Winston: Are periodic rehearsals conducted?

Rt Hon Ed Davey MP: Yes.

Lord Winston: How many have you personally been involved with?

Rt Hon Ed Davey MP: I personally, in terms of my time, have been involved only with one. I do not have a figure for the Committee today for how many there have been. I know there have been more than the one that I was personally involved in, but Ministers tend to be involved at different levels, with junior or Cabinet Ministers in some of these exercises.

Lord Winston: We have heard quite a lot of evidence on the risks of cyberattack. What are you doing about that scenario?

Rt Hon Ed Davey MP: From the Cabinet Office to No. 10, across government, there is a major effort to look at cyber issues. We have seen investment in the key transmission and

¹¹ This figure is for transmission, rather than networks as a whole (i.e. including distribution).

distribution mechanisms, but because it is an evolving threat and one that we take very seriously, we do not think that we reached a final solution for dealing with cyber and we keep it under constant review. Jonathan, did you want to add anything?

Jonathan Mills: I was just going to say something about the number of exercises involving electricity that have been conducted. A large number of scenarios that might be primarily about testing some element include lots of electricity suppliers as a dimension. Without giving confidential details, electricity is considered a dimension in a large range of scenarios that are tested.

Q191 Baroness Sharp of Guildford: Can I bring us back to the capacity market? Are you satisfied that the Government are now meeting the trilemma of a secure, low-carbon and affordable electricity system? How do you decide how much capacity to procure? Are current security standards fit for purpose, and what are the risks of basing policy on current standards rather than looking ahead rather further? Is there a risk that the capacity market will report too much capacity and cost consumers more than it should?

Rt Hon Ed Davey MP: First of all, the process of determining how much we want to purchase in the capacity market involved a huge amount of consultation—indeed, we had recommendations from National Grid, after it had worked with the department, with Ofgem and with industry. That was related to loss of load expectation, which is a new way of measuring it—it is a bit like old margins, but we think it a more informative and helpful way of measuring what you are trying to achieve—and that was after that had been debated and consulted upon. We spent some time working out how much we felt we needed to contract for. Our analysis suggested that we needed about 48.6 gigawatts—that was our target. We ended up buying slightly more than that, just because it made sense and was good value for money. We ended up buying 49.26 gigawatts in the first capacity market auction, which was the clearing price of £19.40 per kilowatt hour. Interestingly, that was significantly less than the figure in our impact assessment. When we did our analysis, we thought that we would end up having to pay about £42 per kilowatt hour, but I am delighted to say that the capacity market produced a much better price, from the consumer's point of view, at less than £20. That is why the cost to the consumer is less than we had expected.

There are a number of parts of the capacity market auction that are worth bringing to the Committee's attention, because they were pretty successful. Not only will some plant be maintained on the system and its life extended, which is economically and environmentally a good outcome, but it has unlocked new investment; we have seen a large independent gas plant at Trafford win a contract in the capacity market. So in terms of security, the capacity market auction was a success. Clearly we will do a review of how it went and learn lessons that we will take on board for next year's capacity market auction. At a high level, it looks as though it has done the job and at a more competitive price than we had expected.

That links into your other question, Baroness Sharp, about low-carbon. The capacity market itself is not an intervention to deliver low-carbon; the contracts for difference are. We had the first round of contracts for difference with what was called the final investment decision enabling contracts for difference—we do not make it easy for ourselves with these words. We issued eight of those contracts to five offshore wind and three biomass projects, which will stimulate £12 billion of private sector investment in low-carbon. We now have the first enduring CfD round with that auction under way. That should complete in the coming weeks, and we expect to allocate up to £4.5 billion of support to another wave—

Baroness Sharp of Guildford: Has that first auction not given a disproportionate amount to old and rather polluting plant?

Rt Hon Ed Davey MP: First, that was the intention: to keep old plant on the system. It is quite economically sensible to sustain the life of a gas plant and prevent it from closing too early. That is one of the aims of the capacity market.

With regard to polluting plant, I have seen some of the commentary on this, but the commentators do not seem to understand how long these contracts are for. The vast majority of the contracts are one-year contracts, for 2018-19, so to the extent that they are keeping on coal plant they are keeping it on for a year.

Q192 Baroness Sharp of Guildford: What about the demand side? Is there enough emphasis on the demand-side response?

Rt Hon Ed Davey MP: We certainly have demand-side balancing reserves and we are working up demand-side response. We still have some way to go on that side. We have had some success, but we want to do more. Jonathan might want to comment on that. It has not been the major part of this work, but I am very keen to look at it.

Baroness Sharp of Guildford: Clearly the more we can smooth out the peaks, the greater the advantage.

Jonathan Mills: We modelled the approach that we have taken here quite closely on international evidence, including from the United States, where we have seen demand-side response play a very large role in markets such as the PJM market. We allowed demand-side response to participate both in the auction that we have just conducted, on the four-year ahead market, and in the one-year ahead market, which we will conduct, to top up, if necessary, any gap between what we have procured and what we need. We got about a gigawatt's worth of interest in the T-4 auction, which I think was positive. We would really expect more of the demand-side response to seek to participate nearer the time, because the evidence suggests that the economics of attempting to sell demand-side agreements on a shorter time horizon tend to be better.

We had some success in T-4, but we look to T-1 as our real opportunity for that technology. With that in mind, we have put special transitional arrangements in place to enable demand-side response providers to prepare for future auctions. Those are open only to demand-side response providers. We hope that we can mirror the sort of patterns that we have seen in the PJM market, a market that is about three times the size of ours. It went from about two gigawatts in its first demand-side auction to 20 gigawatts now. There is potential for that sort of growth.

The Chairman: There is an imbalance here. You are concentrating on the one-year contracts for demand-side management and longer contract times for the capacity margin. Do you not need to think on a longer timescale for demand-side management?

Rt Hon Ed Davey MP: With respect, I think we are doing both. We have both T-4 and T-1, where the demand side can play in.

Jonathan Mills: On the length of contract available, we are trying to strike the trade-off between flexibility, getting the best cost for the consumer and ensuring that there are as many people able to participate and as much competition available as possible. The evidence that we had through the consultation was that while people in the demand-side

sector understandably wanted the most favourable terms available, a one-year agreement was supportable and a realistic proposition that would enable people to come in. That is the basis that we have worked on. As the Secretary of State said, we will keep all aspects of the operation of the capacity market under review.

Baroness Sharp of Guildford: How do you write the possibility of price volatility, such as we have seen today, into your forward planning?

Rt Hon Ed Davey MP: The contracts for difference are stable prices over 15 years. The consumer is protected, because if prices go above the strike price they have to get back. We built that into the CfDs. We are trying to get the market to respond to the capacity market. Clearly, they are making commercial decisions. The good news for the consumer is that the price cleared much lower than we had expected.

Can I bring two distinct parts of the demand side to the Committee's attention? There is the demand-side response, which is part of the capacity market. We are trying to get people to change their behaviour at peak demand to help with the smoothing out. But we also have pilot schemes, which we call electricity demand reduction pilots and are about permanent reductions, not directly related to this security challenge. We are trying to get demand-side responses in the market in peak management, but also more broadly in terms of long-term decarbonisation.

Q193 Lord Rees of Ludlow: To go back to the question of the adequacy of the 4% safety margin, we had different views from various witnesses on whether that was large enough to be comfortable. It is clear that it is enough to deal with the worst crises that we have had in the last decade. Do you agree that, in this context, the past may not be a good guide to the future, in the sense that there are new types of threats—cyberattacks and terrorism—and that we are getting more and more vulnerable to cuts in electricity, especially with prolonged outages? Do you really feel that you can reassure those people who feel that 4% is not enough?

Rt Hon Ed Davey MP: First, the margin for this winter is more than 6%. It was 4% before the balancing reserve measures kicked in, but that has given us additional margin. That is significantly above the standard that we set. In setting the standard, we took into account a whole range of different scenarios. When you do this sort of planning you look at what would happen if a nuclear power station did not function, or if there was some flooding that meant that a particular power station could not operate. We create scenarios that would be quite frightening, were they to happen. We try to ensure that the system is robust in a lot of those scenarios. No one can ever say that we can plan for the most extreme scenarios and I do not think that you expect me to, but on all reasonable planning, given that we have a cost issue here—we manage reliability and costs—we absolutely err on the side of caution, as you would expect us to.

Lord Broers: This is a very naive question: how on earth does this auction work? You receive bids from different sorts of suppliers at presumably all sorts of different prices. I am very ignorant of these things. Does one price emerge from all this?

Rt Hon Ed Davey MP: When we were designing it there were different types of bidding strategies that we could go for. We decided to go for the clearing price strategy. There are various rounds of the auction. First, the price is set and you see how much capacity you get at that price. If you get more than you need, you lower the price.

Lord Broers: I see. So you gradually set the price and look at the volume coming in?

Rt Hon Ed Davey MP: The auction took place over a period of days. It was not a one-off.

Lord Broers: Do you apply some sort of risk assessment to the people supplying it?

Rt Hon Ed Davey MP: They are entering a commercial contract. They have to prequalify and to do so they have to meet certain criteria.

Lord Broers: So you assess their credibility.

Rt Hon Ed Davey MP: Jonathan may want to say a bit more about the prequalification process.

Jonathan Mills: There is prequalification to ensure that people have deposits where they need them, that they have planning permission and all those sorts of pass/fail tests. The individual technologies are then subjected to a process of de-rating. They are adjusted for the average reliability of the technologies involved.

Q194 Lord Peston: My question is the counterpart to Lady Sharp's set of questions. It is on the distribution networks. My understanding is that, both for households and firms, their experiences of disruptions or failure to supply arise mostly from what happens to the distribution networks. Most of them were as ignorant as I am; they just assumed that there is a switch, you get electricity, and that is your sole contact with the system, especially if you pay by direct debit, so you do not even have any contact with your supplier. What puzzles me is how the system works. We had the people from Ofgem here last week. They were very interesting, but I still could not make head or tail of what they were telling us because they used different words. At one point they said that the investment in distribution is supervised by Ofgem. Another thing we got was that it is regulated by Ofgem, which is not the same at all. A third was that Ofgem ensures that the distribution network has enough investment. It is the word "ensures" the puzzles me considerably. That relates to the question of where you come in. Do you just stay out and let Ofgem do it, or do you get involved?

Rt Hon Ed Davey MP: Ofgem is an independent regulator.

Lord Peston: Yes, I know.

Rt Hon Ed Davey MP: Under the third EU energy package, it needs to be independent. That helps to promote competition. With respect to distribution and network operators, its job is to do all the three things that you said. I would use all those words: regulate, supervise and assure. It does this through price control periods. It looks at what needs to be done. There is a whole range of different DNOs in different parts of the country, because they are effectively local monopolies. It discusses with them what investments they need in their distribution networks over that price control period. These tend to be quite long periods. The current one is from 2015 to 2023. That is seen as a real strength. I can say this, because I was not involved in setting it up—I am not bragging or anything—but the UK's system of regulatory controls of DNOs is seen worldwide as a leader, because it gives great stability for investment. Therefore, we can get it at a lower cost. People from around the world have come to look at how we regulate our distribution network system.

Lord Peston: They also told us about something called RIIO.

Rt Hon Ed Davey MP: That is the price control system.

Lord Peston: But it is an incentive system.

Rt Hon Ed Davey MP: Yes it is.

Lord Peston: It is not a system that can ensure anything. Incentive systems give you the incentive, but that does not mean that you deliver. They can be adjusted then, so that they improve. Most people think they have a right to electricity when they want it, but they added, "If you pay for it". So when I raised what was happening in Scotland at the very time we were talking, they said, "If you choose to live on the Isle of Skye and you don't want your power supply interrupted, you have to pay for that". Do the Government agree with that as well?

Rt Hon Ed Davey MP: We are not advocating a policy of free electricity.

Lord Peston: No, no, but people would not regard having a proper delivery system as free electricity. They regard electricity as paying their bill. They do not regard the capital cost as free electricity.

Rt Hon Ed Davey MP: Your bill has the wholesale costs in it: the costs of producing the electricity or buying the gas. It then has the cost for networks, which is the cost of investing, maintaining and repairing the gas pipelines, the electricity cables and so on. It also has elements for the administrative costs of the company involved and its profits. It has a small amount for helping us to deal with fuel poverty and a small amount to help us support low-carbon electricity. People are paying for the costs of the networks in the average bill.

Lord Peston: Yes. Wearing my economics hat I know that someone has to pay, but ever since I have been on this Committee doing this inquiry I have talked to people who of course know that they have to pay but who also think that they have a right to an assured supply; notice that they used the word "right". That is what the people I talk to think about electricity. Those of us in public life have difficulty with people claiming that they have a right to this and a right to that. I just want to know your judgment. Do you have a judgment?

Rt Hon Ed Davey MP: Of course there is a very interesting philosophical position about political rights—

Lord Peston: Yes, exactly.

Rt Hon Ed Davey MP: —to a fair trial, free speech and so on, and to economic rights. I would simply say that in a modern developed country, people expect the electricity system to work. Let me give you some figures, which I hope will reassure you. Whether they get quite to your point about rights, I do not know, but in 2012-13 Great Britain's national electricity transmission system operated with a reliability figure of 99.99975%. In 2013-14, that improved slightly to 99.99991%. I do not know whether that gets to a right, but it certainly suggests a very reliable system.

Lord Peston: I am not denying that. Speaking again wearing my economics hat, I would always round up and say 100%.

Rt Hon Ed Davey MP: I am happy for you to do that.

Lord Peston: You have covered the ground that I wanted you to clarify.

The Chairman: We will call that 100% and move on.

Q195 Lord Patel: The central theme of my question is on the resilience of the electricity supply. Various policies and measures that have been put in may well have an adverse effect on that. If it does, who will be held responsible for making sure that that does not happen?

Let me give you an example. The electricity system is expected to change radically over the coming decade. What effect will that have? Will that adversely affect resilience, and who will make sure that it will cope? What additional policies and measures are required to meet carbon budgets beyond the mid-2020s? How might that affect resilience? What effect might reducing the diversity of the electrification of the whole energy system have? Might that decrease resilience? Lastly, although not directly connected, how much contribution can or should flexible generation, interconnection, electricity storage and demand-side response make to the integration of intermittent renewables? A whole set of different questions maybe.

Rt Hon Ed Davey MP: I think that what lies behind those questions is an acute observation that technologies are changing and that the ways in which we are going to produce electricity are going to change over time. As we move to low-carbon technologies, they will all have different features. Coal and gas are broadly seen as relatively flexible. Other types of system will have different features. Nuclear is seen as having a base load. Carbon capture and storage will enable us to have some of the features of gas and coal today. Renewables tend to have different types of features—some are intermittent; some, like tidal, operate in different ways. So as we plan the system and we have more low-carbon and different forms of electricity generation, we need to ensure that the system maintains the resilience and security that it has always had. That is one of the reasons why the objectives of energy policy remain the three that keep recurring. We place weight on all of them, and as we decarbonise we will have to ensure, and we are ensuring, that we focus on resilience and security of supply.

You asked me then to speculate on carbon budgets in the 2020s and 2030s. In a way, it is very difficult for me to do that, because one of our approaches to electricity market reform is to reduce intervention over time. At this stage, as we are dealing with developing technologies, it is quite interventionist, for reasons that we discussed right at the beginning. But the objective is to remove intervention gradually over time as costs come down and as low-carbon technologies compete. To give you a bird's-eye view as I see it, I do not know which of the low-carbon technologies in the 2020s will be the most competitive. People might think it is a bit odd that the Secretary of State is not certain, but the thing I am certain of is uncertainty. I am absolutely clear that we do not know how these different technologies and cost profiles are going to change. We have created a very flexible approach to electricity market reform, which will in effect be a market in low-carbon, to enable the most competitive low-carbon technologies to develop. We could end up with nuclear being championed in the 2020s and more nuclear being built than other low-carbon technologies, or we could find breakthroughs in carbon capture and storage and see a massive expansion of that, or we may see offshore wind costs come down dramatically and be ultra competitive compared with the others, and we will see them taking a bigger share.

Whatever that market response is, we have to think about the impact on the security of supply in the system. It is not that we just have a completely hands-off approach; we will need to think through how having different shares of different low-carbon electricity will mean that the system behind it has to evolve. Clearly that is ongoing work. You show how dramatic this change is going to be. Many people do not really recognise that. We are not just talking about low-carbon in the electricity sector. The electrification point that you make in your question points to the fact that electricity may well be the low-carbon approach to decarbonising transport and heating, and if electricity is behind the low-carbon technologies

for heating and transport you can imagine how much low-carbon electricity we are going to need in the future. We are going to need huge amounts. Imagine that we had no fossil-fuel cars, we all had electric vehicles, and we had to produce the low-carbon electricity to run 30 million vehicles in the country. That is a lot of power, in addition to the electricity needs of today. Clearly these are big, strategic changes, and it is quite difficult to be precise about them now, but we are going to have to think them through.

Your final point was about how we manage that, whether it is on the demand side or using new storing technologies and so on. For me, the alchemy for energy policy is storage. If we could find cheap ways to store electricity in particular but other forms of energy as well, that would be a massive breakthrough. Huge amounts of work are being done on that. Sir David King, the climate change adviser to the Foreign Secretary, is talking about his Apollo project: his idea that globally we put more money in together to sort out energy storage, because if we could store solar and wind power in very efficient, cheap ways, that would also be transformative.

I hope that in that bird's-eye view I have given you a sense of the excitement and the sheer scale of what is happening, but also of the uncertainties and how policy has to try to manage those. I cannot give you a full answer about what the system will look like in 2030, because no one can.

Lord Patel: While I agree that all that is quite exciting as we move towards it, the key issue while we do that will be the resilience of the supply side. That was the key question: who will be responsible and how will they tackle the issue of ensuring resilience is always there?

Rt Hon Ed Davey MP: That almost goes back to the first question from the Chairman. Ultimately, whoever is doing my job has to think about the policy design to ensure that it can deliver that resilience, while working with industry, headed up by the system operator, which is National Grid. There is quite a lot of work and future scenarios that I am sure National Grid will have talked to you about, if it gave evidence to the Committee. People are thinking about these issues; we need to plan for them in our future scenarios. If you have too hard-and-fast plans for what the system needs to look like in 2030, you will almost certainly get it wrong, because the changes are quite profound and have quite large degrees of uncertainty.

Viscount Ridley: Following up on that, you are quite right that we will need a lot of R&D to work out what the position will look like in a date such as 2030. You said earlier that the falling wholesale gas price is helping decarbonisation because it is displacing coal. That goes to the evidence that we had from Professor Dieter Helm, who said that he would have preferred to see a policy of dashing for gas now, as that gets a quick, cheap decarbonisation of the electricity system—not full, but partial decarbonisation—and a lot of money into R&D for energy storage, CCS, nuclear and all these other things to see whether we can come up with longer-term solutions.

We have also heard evidence that the decline in the cost of wind energy has plateaued—we heard that from Robert Gross last week—and that wind requires a lot of system back-up, which means that wind is not delivering anything like decarbonisation. What would it take for you to give up on a technology such as wind and to say instead that we should be using gas now, with more in R&D for future technologies?

Rt Hon Ed Davey MP: The problem with a gas and R&D approach now is that you could be really behind the curve in some of the fast developing technologies. You are almost putting off the challenge, which is so great for the globe. It seems to me that we need to experiment not just in the laboratories but in deployment. A lot of lessons can come only through deployment. If you look at the cost savings in offshore wind—I do not believe that they have plateaued; I do not see that in the figures I see—they are all about industrialisation. They are not about something you do in a test tube, but about working out how you manage to put things out in the North Sea: securing them to the seabed, having bigger ships, improving the installation and so on and so forth. You cannot just wait and hope that R&D will sort that problem out; you have to do it.

Interestingly, in solar you need to do both. In solar you can look at and try to reduce installation costs, but some of the evidence from some of the labs in California shows that the costs of solar panels are falling even faster than we have seen. That is very exciting. I think that solar will be a very big player in the future. Many people think that the costs of solar will be lower than gas and coal in the relatively near future.

That is why I think that a boom for gas and R&D would be a wrong approach. The danger, particularly if you put all your eggs in one basket—that is a very bad idea; I am into diversity, not betting the planet on one particular technology—is that gas would become locked in. If CCS turns out not to work, you would end up having too much fossil fuel locked into the system, with all the dangers, risks and costs that that would entail for future generations.

The Chairman: Very briefly, Lord Ridley, then we must move on to Lord Rees.

Viscount Ridley: In which case, I will pass over.

Q196 Lord Rees of Ludlow: You mentioned in the context of decarbonising that nuclear may be the best bet in the long run. I would like to ask a bit more about nuclear. We all know very well that the level of expertise in this country has plummeted over the last 20 years, to the extent that any new nuclear power stations will be built by the French or the Chinese and not by us. This is very sad to many of us. The more realistic issue is the extent of our involvement in R&D. A couple of years ago this Committee had studied the level of nuclear R&D. It was dismayed that it seemed unclear whether we could even train the next generation of nuclear inspectors, so low was the level. The issue was taken up by the Government. I would like to ask how you see UK involvement, at least in R&D for fourth-generation and small-scale modular reactors, which is important.

I would also like to ask about an issue that has just been brought to the attention of the Committee in a letter we had from Dame Sue Ion, the chair of the Nuclear Innovation Research Advisory Board, which was set up two years ago—it was good news when it was set up. She is now disappointed that in the recent spending review no money was allocated for the ongoing cost of nuclear in the Autumn Statement. Can you comment, maybe not on a particular issue but on the general issue of how much we can be involved in nuclear R&D and next-generation nuclear?

Rt Hon Ed Davey MP: Let me preface my remarks by saying that I have in the past been very sceptical about nuclear power, mainly because of its costs. Over many decades the costs did not really come down enough. I changed my mind and decided that the country needs to embrace all forms of low-carbon generation because of the threats of climate change and the costs that that will impose, and is imposing, on the world, now and in the future. I

believe, given the sheer scale of the threat from climate change, that to discard any low-carbon technology, whether it is offshore wind or nuclear, is frankly deeply irresponsible. That is not a policy that we can have at this stage as we tackle climate change. I have embraced the prospects of nuclear power. I hope that we can get the costs down and learn from the frankly disastrous lessons of the past. Two-thirds of my budget is spent on decommissioning and nuclear waste management. That is its legacy. We cannot allow that to happen again.

We need to build up expertise as we go into new nuclear generation. I agree with you: it is regrettable, given that we were one of the leading nations in this industry in the past, that we no longer are. Again working with my right honourable friend the Secretary of State for Business, Innovation and Skills, we published, I think in 2013, an industry strategy for nuclear—for the supply chain, the skills and so on—to ensure that we build up our skill base, knowledge and, hopefully, intellectual property rights over new technologies. I agree with your overall proposition.

You mentioned that people felt that we did not spend enough in the recent Autumn Statement—it was not the spending review, it was the Autumn Statement. I have heard that. It would be inappropriate for me to tell you how the bidding process went in that Autumn Statement. However, I believe that the forthcoming spending review, which no doubt the next Government will have to undertake, will need to look at R&D for all low-carbon technologies and make it a priority, whether it is nuclear or others. On taking nuclear forward, whether it is small, modular reactors, which has a lot of press, or fourth-generation technologies as you call them—thorium or molten sodium—all of them need to be in the mix. Again, I am not going to sit here and tell you that I know which are the right ones, because I am not a nuclear scientist. A huge amount of uncertainty surrounds all of them. But given the huge challenge of low-carbon electricity for Britain and the world in the decades ahead, we definitely need to invest in this type of R&D.

Lord Rees of Ludlow: On this issue of Sue Ion's committee and the anomalies that they have—£80 million capital allocation already, but not the running cost to make use of it—that does seem to be a serious weakness.

Rt Hon Ed Davey MP: I do not recognise the figure. I am sure that we can write to the Committee with some of the investments that we have made. The Secretary of State can certainly make decisions about spending. Quite a lot tends to be locked up already before you get a chance to look at the budgets, but at the end of the year you get an underspend and you think about how that can be allocated. Recently—I do not think it was last year; it may have been the year before—the chief scientist recommended that we spend money on a share in a nuclear test reactor that helps to test materials. He persuaded me that this was a very important part of future research, and we allocated some of our scarce resources to that. I have certainly been open to that, but, as I say, the next spending review will be critical for this and other decisions on energy R&D.

Q197 Lord Broers: I would like to follow up on R&D for nuclear. In this report, which was published in November 2011, the Government committed to going ahead with the various recommendations. One was that there should be a long-term strategy until 2050, another that a road map should be drawn up, and another that R&D should be funded at a higher level. Here we are, three years later. The problem with this is that there are several time-sensitive things. First, there is a lot going on overseas and there are a lot of opportunities to

collaborate on those projects. Overseas, people were optimistic back then because they thought, “Good, Britain is backing this game”. We are not backing it, and now we are embarrassingly being left out of all this.

There is also the issue of skills. There was a resurgence for a while, but again that is lapsing. The population that knows about the nuclear situation is getting very old. This is a serious and time-sensitive situation.

There was also the anomaly, as Sue Ion points out, that £80 million of capital was provided for facilities and equipment but no money was provided for people to use it. We see this as an urgent and frustrating situation, because we felt that our report had had some impact and that things were going ahead.

Rt Hon Ed Davey MP: All I can say is that we keep this under review. We have put forward some money. We recently announced £67 million of investment in nuclear R&D infrastructure both through the Autumn Statement and through the separate grant exercise by DECC, so it is not that money is not being made available; £67 million is a sizeable sum. We have funded a feasibility study on SMRs, for example, and we have secured additional funding to investigate the further potential to the UK of deploying SMRs in the UK.

You mentioned international projects. In my previous answer I talked about a decision I made for capital investment in a state-of-the-art material test reactor, which is based in France. That was a £12 million investment, and it helped to provide the UK with access rights and R&D support. We have been doing quite a lot. Should we do more? Yes. Could we do more? Absolutely. But I am afraid that I come back to my point: in difficult financial times you will have noticed that we as a Government have had to make quite a lot of difficult financial choices. It will be the next spending review that sets the longer-term frame for this type of R&D.

Lord Winston: Secretary of State, I do not want to extend this for too long as I know your time is precious, but one of the things that we found very clearly—I have seen this myself as an academic at Imperial College—is much reduction in the number of people wanting to do PhDs or post docs in nuclear physics. It is also clear that the Engineering and Physical Sciences Research Council, which I sat on at one time, is unable to fund research in the way that it should do, with the reduction in research spending. I do hope that that can be looked at and that the commitment that was given is reinstated. It is very, very important if we are to invest in nuclear in the future. Would you just comment on that very briefly?

Rt Hon Ed Davey MP: I want to reiterate my point that we recently announced £67 million of investment in nuclear R&D in the Autumn Statement and in our grant exercise. That has not necessarily had the attention that it deserves. I do hope that students choosing different engineering and scientific courses are clearly seeing the Government’s push on new nuclear; it is difficult to miss it. Whether it is the supply chain industrial strategy that we launched in 2013, or the work that a lot of the nuclear developers are doing with colleges, such as the college down in Somerset, which EDF has helped to support, there is quite a lot of activity here. When I go to the Nuclear Industry Council, which I co-chair with Lord Hutton—I cannot remember how many times I have been but I have been quite a few—one of the main items on the agenda is always skills and supply of labour. A huge amount of detailed work has been done to look at the number of people we will need at different skill levels. We are engaging not just with industry but with universities and colleges to work out how we deliver

on that. I am sure that we can provide you with more material, but this is something that we are very alive to, and we are working actively and in close partnership with industry on it.

Q198 Lord Willis of Knaresborough: Secretary of State, the two things that I have learnt throughout this inquiry is that in the move to a low-carbon electricity system there is a great deal of uncertainty, which you mentioned this morning, and that it is a hugely complex field. There are many players in it, some with complementary demands but many with competing demands—of course, once you put the market in, there are competing demands. We were urged very early on by the Institution of Engineering and Technology that a systems architect was required to look at the whole system who could advise not only government but all the various players on a very, very clear road map. Do you think that that would be a good idea? If it is, do you think that the lead player as systems architect should be the Government, the National Grid or Ofgem? If it is not, what is the alternative?

Rt Hon Ed Davey MP: First, you are absolutely right on the uncertainty, competing interests and complexity. Ultimately the department is rising to that challenge, and my officials do a huge amount of work with academics and institutes that is all about thinking about the future. I certainly welcome the work that the Institution of Engineering and Technology and its energy panel have done in looking at this concept of the systems architect. That needs further exploration. I am not saying that we are yet convinced that it is the right solution, but I think they are asking the right questions, and we would like to see that work in that area and the governance of the system continue.

The Committee will be aware that we have an energy systems catapult as part of the Secretary of State for Business, Innovation and Skills' programme for helping new technology and new challenges to be taken forward and dealt with more speedily. The new systems catapult can definitely explore the thinking behind the systems architect and work with the IET and others on a structured programme of work to explore the potential.

But as you hinted towards the end of your question, there are quite a number of players already, whether it is National Grid as the systems operator, Ofgem as the regulator, or DECC as the sponsoring department, so I am not yet convinced that we need a new body to come in. There may well be responsibilities and duties that need to be given to an existing body with an overall shape and role within the government system, but I am not in the market for a whole new set of quangos—I am not sure that that is needed. Some people have suggested that we need an energy security board. That looks like a totally unnecessary quango. The analysis behind the concept of a systems architect is where we need to go. What would it do? Could it be grafted on to one of the existing players? We are certainly not rejecting that. We want to see it explored, but it is relatively early days in working out what that will actually look like.

Lord Willis of Knaresborough: Just as a final comment, it is the first time that the energy systems catapult has been mentioned today. In other fields, there is huge excitement about the catapults. They have really taken off and are leading innovation in the way the Germans did with their Fraunhofers and what have you. I might be wrong, but no one has come to this Committee and said that the energy systems catapult is playing a key role here. Why do think that is? What do you think it is doing?

Rt Hon Ed Davey MP: It is very early to say. It is only just starting up, so if anybody had mentioned it I would be surprised. I cannot remember exactly when it was announced. We might have to write to you about it, but it was relatively recently.

Lord Willis of Knaresborough: It would be useful to have its terms of reference anyhow, so that at least we know what its core functions are going to be.

Rt Hon Ed Davey MP: Of course.

The Chairman: I think we can provide that and will circulate that for the next meeting.

On that note, we have reached the time when we assured you that we would let you go. Thank you for a very interesting morning's session. I think we have agreed on one thing throughout: that there is uncertainty and complexity whichever way you look. Equally, we recognise that somebody, whether a new organisation or the existing players, has to help in trying to chart a road map through this complexity, which is driven by new technology, legislative programmes, affordability and much else besides. Whether our report, once it sees the light of day, helps to elucidate who should do that, only time will tell. Thank you very much indeed for helping us in our deliberations.

Rt Hon Ed Davey MP: Thank you very much for inviting me. I look forward to your Lordships' report.

The Chairman: Thank you very much.