

# Energy and Climate Change Committee

Oral evidence: [UK new nuclear: status update](#), HC 922

Wednesday 23 March 2016

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Members present: Angus Brendan MacNeil (Chair); Tom Blenkinsop; Mr Alistair Carmichael; Glyn Davies; James Heapey; Matthew Pennycook; Mr Jamie Reed

Questions [1-135]

Witness[es]: **Peter Atherton**, Managing Director and head of European utility Sector research, Jefferies, **Dr Simon Taylor**, Judge Business School, University of Cambridge, and **Dr Douglas Parr**, Chief Scientist and Policy Director at Greenpeace UK, gave evidence.

**Q1 Chair:** Can I thank the first panel for coming this morning? Your attendance is appreciated indeed. Can I ask you first to state your names and organisations, not just for the record but for the sizeable crowd you have behind you as well.

**Dr Parr:** My name is Dr Douglas Parr. I am the Policy Director at Greenpeace UK.

**Dr Taylor:** I am Dr Simon Taylor. I am an academic at the University of Cambridge, Judge Business School.

**Peter Atherton:** I am Peter Atherton. I am an equity analyst at Jefferies, which is a US investment bank. Chairman, may I just say at the start, as an equity analyst, I need to make clear that any views I express today are my own and do not necessarily reflect Jefferies.

**Q2 Chair:** Thank you for that. That is understood. Can I ask the panel first, could you begin by telling us, just for the record really, what role you see for nuclear as part of the UK's future energy mix? I will go to Dr Douglas Parr on my left first for that.

**Dr Parr:** We do not see new nuclear as playing a useful or important role in the UK's energy future. We see that there are better, cheaper alternatives that can be deployed more quickly, and that the Government has effectively made a strategic choice to back nuclear ahead of other technologies and that that choice is wrong. There are a number of reasons for this, including the rapid evolution of costs in the renewables sector, the rapid evolution of technology in the flexibility smart grid systems, and so with the issue of nuclear waste not properly dealt with at all, and serious doubts about the applicability of nuclear

technology globally, I would say the UK has much more interest in furthering a different kind of agenda, which is smart, efficient and clean renewable energy.

**Dr Taylor:** In the context of the country's carbon emission targets, and in light of all the information I have seen on both the practicalities and the economics, I think it is difficult to see how those targets can be met without some new nuclear construction.

**Peter Atherton:** From my perspective, obviously I am an equity analyst. I am really looking at the investment opportunities, good or bad in this, so I am not an advocate of one technology over another. I certainly agree with Simon that, if you look at the pathway to 2030 in particular, it was extremely hard to see how you could hit those numbers without a sizeable nuclear fleet on the system, whether that was the existing fleet or new nuclear. I certainly understand why the Labour Party in the White Paper in 2008 decided that part of the solution to try to hit 2030, and through that 2050, was going to have to be a sizeable new nuclear programme.

**Q3 Chair:** As we know, there has been a lot of focus in the press—and one of the reasons we are here—on Hinkley Point C in recent weeks in particular. Can you tell us first whether you think Hinkley C should be built and, secondly, the crucial question, do you think it will be built? I will start with Peter on that one.

**Peter Atherton:** It is a simple question but an extremely difficult one to answer.

**Chair:** Let's take the first part of it: do you think Hinkley Point C should be built?

**Peter Atherton:** My view is that it offers extremely poor value for money, in terms of the contract that we have, and very high risk for the UK consumer and taxpayer. The question for policy-makers is of course: are there benefits that you get from this particular project and other nuclear projects to outweigh that? The three Governments—Labour, the coalition and this Government—have set out a series of public goods that they think that nuclear provides: zero carbon electricity, baseload power, security of supply and geopolitics, relationships with China and so on. It should be a relatively straightforward process to value those public goods, keep the value of those public goods under watch, because they will change over time, and compare that to the price we are paying for particular projects and assets. Somewhere in Government somebody should be doing those calculations. I have never seen them unfortunately. When I try to do those calculations myself—imperfectly for sure—it looks pretty unfeasible that the cost of Hinkley, the value being created in those public goods, outweighs the cost. It seems pretty unfeasible.

**Q4 Chair:** Simon Taylor, do you think Hinkley Point C should be built?

**Dr Taylor:** I agree that it looks very poor value for money. I think the case for continuing would be that not to continue jeopardises the rest of the new nuclear programme; and that is a difficult judgment, at least for me. There is some value in keeping the momentum going with the wider policy but if it could be cancelled or renegotiated, without jeopardising the rest of the nuclear programme, in my view that would be in the public interest.

**Q5 Chair:** As a general supporter of nuclear power, you feel that there are big questions with Hinkley C. Is that fair to say?

**Dr Taylor:** I think it has turned out to be much more expensive—we cannot say for sure—than probably the other new nuclear options. The cost of proceeding with it seems to outweigh the benefit, so long as we can keep those other nuclear options open.

**Q6 Chair:** Dr Parr, as part of Greenpeace—

**Dr Parr:** As my foregoing remarks will have suggested, no, we do not think it should be built for the reasons I outlined. If it is built, it will be because of an active political will by the UK and the French Government beyond any commercial logic for the immediate project. The case that it should be built because it might help the remaining nuclear programme is obviously not one that I am particularly sympathetic with. Remember that this year, in May, marks 10 years since Tony Blair said that nuclear was back on the agenda with a vengeance. Since then there has been no investment decision. Since 2010 we have saved enough energy through efficiency measures to match Hinkley—that is just in the power sector—and we have also deployed enough wind energy to the equivalent of what Hinkley Point C would cover. Frankly, we have had 10 years of not a lot happening while other things have been powering ahead.

**Q7 Chair:** If it does get built—let's assume it did—do you think it will cost the £18 billion or will there be cost overruns in that? How secure is that £18 billion as a figure?

**Dr Taylor:** I don't think anyone can say with great confidence, but to date the evidence of the other stations of the same type that are being built does not give great optimism. The latest EPRs to be built, namely in China, appear to be running less behind schedule and less over budget than the others, but I am not sure that that experience in China would transfer given China's rather unique expertise in construction. Whether you could transfer that knowledge and learning—if indeed it is learning—to the UK, so I think you are left with a great deal of uncertainty about what the construction would actually cost and how long it would take.

**Chair:** Thank you. I will turn to my colleague, James Heappey here, who happens to be a Somerset MP as well.

**Q8 James Heappey:** EDF have maintained that they have proceeded with the ground works. I have seen that with my own eyes. There is a £2 billion hole in the ground in Somerset. They maintain that, providing an investment decision is taken within the next few months, that they can hit their timeline of switching it on in 2025. Are you disagreeing with that?

**Dr Taylor:** I am just saying that, bearing in mind all the other statements EDF has made over recent years, and bearing in mind the projected construction costs were £16 billion only a year before, while I have no reason to doubt their sincerity I don't think anyone in EDF, or anywhere else, is in a position to be greatly confident about those forecasts.

**Peter Atherton:** If you slightly lift your eyes up from thinking of it on time and on budget, EDF have learnt lessons from TVO and Flamanville. The lesson they have mainly learnt

from those projects is to have a much, much, much bigger budget and to give themselves nine to 10 years to build it. We are talking about power stations here. We are not talking about a Mars mission. A power station should not cost you £20 billion and it should not take you nine to 10 years to build it. Nuclear power stations are no different. They are big pieces of kit that take a long time to build, five, six, seven years, but the debate is around: can they do it within the budget and the timeframe? They have given themselves the mother of all budgets and they have given themselves a decade to build it, so frankly yes they should be able to build it within that budget and in that timeframe.

Also the issue on the cost, because the European Commission said this is going to cost £24.5 billion. EDF now say it is going to cost £18 billion. I have never personally seen a good reconciliation between those two numbers and, if the Committee could ascertain why, I would be very interested to see the detail of it.

**Q9 James Heappey:** We are going to push on now to talk about the economics of the project. Clearly, over the last few weeks we have seen cries for help from EDF, I think primarily aimed at the French Government. Indeed the French Government has come in and recapitalised EDF. In your analysis, is that EDF sorted financially to proceed with the build?

**Peter Atherton:** There have been some public statements recently by the Finance Minister that they will consider refinancing EDF. No decisions have been made yet. EDF is a very, very big company and although its market value has fallen very substantially in the last seven or eight years—it used to be up to €150 billion, today it is only €20 billion—it is still a very, very big company. It produces a lot of revenue a lot of cash flow. The problem they are facing at the moment is that they produce around about 17 billion, 16 billion of EBITDA, but they also spend 17 billion a year in terms of investment requirements. They are running into a period, in the next decade or so, when the investment requirements in the French nuclear fleet will start to ramp up. There is a €50 billion programme to invest over a decade or so. They also want to do new investment as well, Hinkley Point C and other stuff.

**Q10 James Heappey:** It seems to me from EDF that is the key challenge here. In theory, they do not have the capital to proceed but of course if they don't then they are demonstrating an inability to deliver, which will cost them in terms of contracts that they are pursuing elsewhere around the world. I wonder what your analysis is of where EDF are at. It has struck me that they must proceed in order to maintain investor confidence and in order to win contracts elsewhere, but I am keen for your views on that.

**Dr Taylor:** I agree that from a broader French perspective of going ahead—not just EDF but perhaps the Government and the rest of the nuclear industry—it is to keep alive the EPR as a potential competitor in what could be quite a large global market for new reactors. Again it is a judgment whether that option is already not closed because, even if Hinkley Point C is built on time and budget and works out extremely well, it is difficult to see many potential customers around the world wanting to buy an EPR over alternative reactors that have better demonstrated records for construction and operation. I can see the logic for France not wanting to give up on it but if Hinkley Point C does not go ahead then that probably will kill the EPR.

**Q11 James Heappey:** Can we be clear in your view—and I accept, Dr Parr, that your predisposition is that it should not be built full stop, but for those who believe there is a role for nuclear—what needs to be done to make the project viable? I presume the recapitalisation by the French Government is a starting point but is there anything else that needs to be done?

**Chair:** That is an £18 question I think.

**Peter Atherton:** The UK Government has given a very, very substantial supporting economic package and that was certainly deemed to be sufficient to get this over the line. That EDF and its partners would be able to raise the capital. I think the problem EDF have found in these final few months, the process, is that their financial outlook—not their current position today but their financial outlook—has deteriorated substantially over this period of the last few months. They were originally looking to find partners to take 49%. They only found partners to take 33%. So they have to finance more of the project than they originally wanted to, plus their own financial outlook has deteriorated substantially in just the last few months. That is an outlook, which is why of course the French Government are talking about potentially stepping in and providing some support, both through support mechanisms in France, so like a capacity payment mechanism in France that would give EDF more revenue in France and/or giving them some cash or forgoing the state's cash dividend from their shareholding for many years. All those options are on the table. They have not been decided yet.

**James Heappey:** Thank you. Dr Parr, you caught my eye.

**Dr Parr:** Yes. I wanted to make the observation that clearly this project is intimately bound up with the French Government's willingness to recapitalise EDF in some way. Indeed, it seems like the new pronouncements on whether or when this goes ahead is now in the hands of the French Ministry for the Economy.

I do want to raise the point about state aid. Remember that state aid has been introduced, often at the behest of the UK Government, in order to avoid Governments picking their favourites and providing unfair competitive advantage to particular companies or particular projects. If the UK wants to play in the single market—which I think is true, irrespective of the outcome on 23 June—then state aid is a consideration and fairness to other players is a consideration. I think that many of the proposed mechanisms that are being touted as potential ways of ensuring that Hinkley Point C goes ahead with a big slab of public money, would potentially fall foul of that because even the existing state aid clearance from October 2014 is already subject to challenge from Austria and others and there is a company case as well. The idea that this can simply be allowed to proceed because the French or British Government decide that it should do so, if we want to continue to be part of a single market, is not well founded.

**Q12 James Heappey:** Thank you. My final question is—and we have spoken about the role that the French Government must play to make the project viable—has the British Government done all that it must by going for the Contract for Difference and also the infrastructure guarantee scheme, or do you suspect that the British Government may yet have more to do?

**Dr Taylor:** I certainly hope the Government does not feel that they should do more because I think the current package of support, from a UK electricity customer point of view, is already quite generous and to go further, in my view, would put the cost benefit ratio further in the wrong direction. Also presumably it would reopen the question of state aid. I think the approval of the original package by the European Commission was a little surprising, to be honest, and I think some of the logic is not very robust and to go further into its actual support would raise considerable risks there.

**Peter Atherton:** I think the only thing left in the quiver would be direct investment, presumably equity rather than debt. That would immediately run into state aid issues. The UK Government package is already very, very large. The CfD takes the entire power price risk from this project and puts it onto the UK consumer for 45 years. It takes inflation off the table for the developer and gives it to the UK consumer. The £10 billion of guarantees takes a great deal of the debt risk, and the financing risk and the construction risk and puts it on to the UK taxpayer. I cannot see how they can go any further without putting up their equity, which maybe they should have done in the first place. That is obviously a whole different question but at this stage it would be extraordinarily difficult to do.

**James Heappey:** Thank you.

**Q13 Chair:** Before I come to other colleagues, with the recapitalisation of EDF by the French Government there are voices saying that that would cause state aid issues. Do you think that EDF can make a defensible final investment decision on Hinkley if they have a substantive EU state aid inquiry hanging over them?

**Peter Atherton:** Sorry, I am no expert on the state aid rules so I am not sure I can answer that.

**Dr Taylor:** My impression is that the state aid rules are about whether interventions are discriminatory and whether they are proportionate. A recapitalisation of the whole of the company, or some form of general support that was not specifically linked to Hinkley Point C might well not be regarded as state aid. Any financial support that was in effect subsidising one project I think would be far more likely to

**Q14 Chair:** If the refinancing with the aim of helping one project that puts it into the territory of state aid?

**Dr Taylor:** It would depend on how it was framed and worded. If it was merely a promise to recapitalise EDF in the event that it needed the capital in future, where even if the proximate cause was the cost of construction of Hinkley Point C, it could equally be argued it would be the cost of the capital spending in France. In other words, there are multiple calls on their cash flows and if they run the risk of running out of cash the state, as its biggest shareholder, would be entitled to put more money in if it chose to. That may be less likely to be challenged as state aid.

**Q15 Mr Carmichael:** It does look like state aid to me I have to say. I am hearing this was in EDF's strategic interest quite clearly. I am hearing, to a lesser degree but still significantly,

why there is a French national strategic interest in this project going ahead. Dr Parr mentioned in fact that the driver for this is now the French finance ministry. God knows it is bad enough having any policy driven from the Treasury in Whitehall. The only thing I think that could be worse than that is having it driven by the French finance ministry. Where is the UK strategic interest in this project continuing?

**Dr Parr:** I don't see one. I don't see one. It does not come over very well but I just don't see one. I just don't see one because, if you look internationally at technology trends, the UK is relatively isolated in prioritising nuclear ahead of renewables. That is right across the OECD now and certainly in most developing country markets. If you look at the new five-year plan from China, for example, they are expecting to be spending as much per head—and given the population of China that is a lot—on clean energy as Europe is. There is an international technology race going on around the new technologies of renewable, storage flexibility and smart grid, which at the moment the UK is not participating in because its policy has been drawn into a new nuclear programme that predisposes it against thinking of a different kind of system operation. I would say it is antithetical to the UK's long-term interest.

**Q16 Mr Carmichael:** Mr Atherton is talking about the possibility of Government equity being taken in order to make it work, but that is a 180 degree reversal in policy. The policy was that it would only be done if it could be done with private finance. You are saying that, fundamentally, if it cannot be done with private finance then—

**Peter Atherton:** It is not private finance. There has been state finance from France, state finance from China and lots and lots and lots of state finance, either implicitly or explicitly, from the UK. Apart from probably a very fleeting moment back in 2008 and 2009, when people thought it might be able to be done privately, this has been a state project, just somewhat hidden. The problem the Government has—if you sit back and say, “Why did Labour go pro-nuclear in 2008 and why did the coalition under two Lib Dem Energy Ministers go pro-nuclear? Why is the current Government pro-nuclear?”—is we have set ourselves on this pathway and we have set ourselves legally binding targets in 2030 and 2050. All the scenarios that come out of National Grid, and all the scenarios that come out of the Committee on Climate Change, assume that you have a large nuclear fleet. The reason all those scenarios assume you have a large nuclear fleet is that the alternatives are even more expensive.

The thing about Hinkley Point C is, Hinkley Point C produces a lot of power—26 terawatt hours—and to replace that with renewables would require even more expenditure and even more cost. I know that Doug would come back and say, “No, that is not quite right because renewable are coming down to this or that”. At the moment the advice that the Government gets from National Grid, and presumably the advice they get from the Committee on Climate Change, is that it would be even more expensive. I think that is why three Governments now have pursued this. The problem they have, though, is that the reason we fast tracked Hinkley Point C—a three-year process and we did not go to a competitive bidding process among nuclear suppliers—was the idea that Hinkley Point C could get done fast and kick start the rest of the programme. The problem is it has been delayed and delayed and delayed.

**Mr Carmichael:** It is difficult for us as parliamentarians, if we don't know the actual figures, if we don't know the genuine costs, how do we assess what is actually more expensive, never mind the other implications of Hinkley Point C?

**Q17 Matthew Pennycook:** Picking up on that, given what you said about the economic logic or the logic in terms of baseload and our carbon targets was the speed with which we could get up and running. Is the project being pushed ahead? Is the imperative now purely a political one rather than in terms of the benefits to UK consumers or our energy security?

**Peter Atherton:** Yes, I think it is political but also in the sense of trying to meet the targets that are obviously established in legislation, so there is the type of question: How else are we going to do it if we don't go down a large nuclear fleet? Because don't forget the assumption is that, except for Sizewell, all the existing nuclear fleet will be shut down by 2030. Looking at all the scenarios that National Grid comes up with, say the "gone green" scenario, they have about 12 to 15 gigawatts of nuclear in there. But that is not the existing fleet plus a couple. It is the existing fleet closed, except for Sizewell, and then go back up again, so you need 10, 12, 14 gigawatts to be built. If you are going to replace that power—and that is a lot of terawatt hours—with something else then those something elses at the moment are even more expensive; offshore wind, which is the only realistic way of doing it.

**Dr Taylor:** I think there will come a point, probably at some point in the future, when renewables plus storage will make nuclear unnecessary. It is hard to say when that will be but until then, given the uncertainties and given the Government's own targets and the urgency of cutting carbon emissions more generally, my view is that to wait for that day when renewable plus storage offers the full solution is too risky. In the interim we need more nuclear to make sure we are on that path and maybe, by 2030 or 2040, we will decide never to build any more nuclear again. That would be a good thing but I think until then it is not proven. Storage is absolutely crucial but we are simply not there yet.

**Dr Parr:** I want to throw in some points on this. First of all, the point about the rationale for prioritising nuclear for state favours, above and beyond all the others, might once have been the need for baseload but the Government could at least be upfront about what it is doing. Why do we have to take them to court, along with the Information Commissioner, to get the justification for the state aid clearance that was given about 18 months ago? Those documents, which include modelling of the electricity sector and why Hinkley Point C and a nuclear programme would be a good idea, I do not see any reason why those should not be public.

The second is to throw some numbers into the debate. After the last Budget offshore wind is capped in 2026—which I think is probably when Hinkley Point C is going to be opened—at £85 per megawatt hour. It is a number the wind industry is quite comfortable with. That is about £7 per megawatt hour cheaper than Hinkley Point C, and that is less than the system integration costs according to Imperial's work for the Committee on Climate Change. The direction of travel for offshore wind, which is the big prize in terms of producing lots of power, is coming down at 20% to 25% per decade and, as Steve Thomas at the University of Greenwich points out, the real cost of nuclear has not come down in 50 years and we see no sign of them doing so. As I say, the rationale for

prioritising nuclear, as being the essential component of energy policy, I think is falling away, practically, by the day.

**Q18 Matthew Pennycook:** What I was trying to get at was—and perhaps you can pick it up in future comments—if we do need nuclear, if that is part of the assumption for all the reasons you have laid out, why this particular technology and why this particular way of funding it, given all the problems that seem to be plaguing the project?

I have a specific question on decommissioning if I can. If I am right in thinking that £2 of the strike price is allocated to decommissioning, do you think that is enough given that the Cour des Comptes did raise concerns that EDF's decommissioning programme is underfunded and, if it is underfunded and if there are potential problems about the £2 being able to cover the future costs of decommissioning, is there any UK taxpayer liability question here?

**Dr Parr:** Yes, I can comment on that. I think the expected £2 to £3 per megawatt hour is to cover up to the fixed unit price that is going to be calculated by Government for when in about 30 years' time, after Hinkley Point C opens, the Government takes responsibility for nuclear waste. The final numbers have not been absolutely decided, so under that scenario £2 to £3 could be enough but the risk of cost escalation of nuclear waste management and decommissioning, of which we have seen a great deal, does sit with the taxpayer.

**Chair:** Do you think the French Government would be as keen to recapitalise if the point about the decommissioning money was short, as they might be at the moment for construction in 20 or 30 years' time?

**Dr Parr:** It is hard to say I think, isn't it?

**Chair:** It is a rhetorical point really.

**Dr Parr:** Yes, okay.

**Q19 Chair:** The energy experts and academic Professor Dieter Helm have suggested it would make more sense for the Government to take a direct stake in the Hinkley Point C project, as opposed to the current support that is through Contracts for Difference and the infrastructure guarantee scheme. What is your view on that? Peter Atherton, I see some movement there, which I take—

**Peter Atherton:** I think it is going to be very difficult from where we are. It is one of the classic questions. If you could have planned this properly you said we would not be where we are in this new nuclear programme. I cannot—

**Q20 Chair:** If you had planned it properly then what would you have done?

**Peter Atherton:** I cannot think of a worse way of doing it than the way we have done it. What we should have done is what the UAE did, which was to identify the fact we needed a certain size of nuclear and got the various providers of nuclear technologies around the world to go through a competitive bidding process against each other. We could have set a

cap. We could have said, “The maximum we are willing to pay is £70 a megawatt hour so you are going to have to come in under that”; go through a competitive competition and the winner then builds a series of the same. In the UAE they are building four nuclear reactors simultaneously. They are all running roughly on time and on budget. There has been the odd problem but nothing too dramatic. The contract went to the Koreans, by the way. The French were an over-bidder very, very substantially.

The genesis of our problems date back to when the decision was made that we needed nuclear in the fleet to meet environmental goals. We never really started from this to say: how are we going to build a new fleet of nuclear power stations at the best economic terms for the nation? We started from the premise: we need nuclear power by 2030 otherwise we cannot meet 2030. That was a really, really, bad public policy decision and all the consequences of a really bad process and an incredibly expensive process stem from that.

**Dr Taylor:** I broadly agree. I think energy policy has been for a very long time essentially about leaving everything to the market, which worked tolerably well when we did not have a great deal of new capacity needed and when we did not have the carbon emissions targets. The intention of keeping as much of the market in there as possible, while sensible up to a point, meant that there could not be the kind of decision that Peter is talking about where the Government decided: there will be this much capacity that is nuclear and then we can auction it off. Theoretically, it has been left always to private companies to come along and offer low carbon or zero carbon options and, in principle, nuclear was competing with renewables. Even without hindsight, one can say that was a little bit optimistic the idea there could be some market process. Even the wording of the original White Paper that brought nuclear back in is worded along the lines of, “We will allow the private sector the option of building nuclear”, as if it is all just allowing the market to go to work. No new nuclear gets built anywhere without some degree of Government support in the background. It cannot be funded without actual or implicit state support.

**Q21 Chair:** Is that because nuclear is a very costly form of power to the consumer?

**Dr Taylor:** It is the risk rather than the cost. You can have a high cost option if the cost is not too uncertain. What the private sector cannot take or will not take is the huge uncertainty over the construction cost, which is entirely reasonable given the history of nuclear in almost every country. All infrastructure is tricky but nuclear is almost at the extreme end of all the things that make infrastructure difficult to finance in the private sector. I think it would have been better to have acknowledged that upfront and come up with a different mechanism, possibly an auction.

**Dr Parr:** As someone who has been engaged in this for quite some time, let’s remember what was going on at the time when the policy changes to support nuclear were taking place. I don’t think there was any prospect that the Government at the time, or the coalition Government, would have been able to change policy in the way that it did had it not said, “These things are going to be built without public subsidy”. That was the basis of the 2006 and then the 2008 White Paper. It was in fact the basis of the coalition agreement, so the coalition could then agree on carrying on. Yet, looking back, that looks like something close to deception because, clearly, as I said at the beginning, this is only going to be built by a huge slab of public money and by an act of political will. The case again for prioritising nuclear as something where a public stake should be much more

engaged, resides on its specialness and its uniqueness in something that has to be a component part of the mix. Again, I emphasise that you could certainly make that argument in 2008. I think it is very difficult to make that argument in 2016. Just last week I was at a conference about the energy futures and a senior player at Ofgem was talking about what they are going to do when the collapse of the price of solar and the collapse of the price of storage means that that combination is delivering power, the question is: not £100 per megawatt hour but at £10 per megawatt hour, and what does the network look like under those circumstances and how do we manage the situation that emerges? I emphasise, this is the UK regulator. It is not some post-modern Germany think tank. The UK regulator is having those conversations about what happens in the late 2020s and 2030s when the cost of storage and the cost of solar have come down in the way that they have started to do and are going to continue to do.

**Chair:** Thank you. James Heappey, you want to come in.

**Q22 James Heappey:** I want to come quickly back to Mr Atherton and Dr Taylor's point about the competitiveness of the marketplace. Presumably you would agree that the longer the DDF prevaricates, and the more that they call into question the technology and the confidence of their investors over the progress in Brittany and in the UK, the better that the other consortia look, which makes their prevarication particularly foolish.

**Peter Atherton:** Yes. I am not sure they are prevaricating. They are trying to overcome challenges of getting this over the line in terms of FID. Unfortunately, there is not a lot of visibility in the other processes and we don't have a huge amount of visibility in the Hinkley Point C process, frankly, but there is even less in the other processes. But if I was the negotiator on behalf of NuGen and Horizon, my starting point is £92.50. It is £92.50. I might work back from that a little bit and be pushed out, but that is a very, very different competitive pressure from me bidding for the right to build eight reactors in the UK. Bear in mind, the civil nuclear industry globally is bereft of orders outside China; absolutely bereft. Therefore, there is a gigantic industry here desperate for orders. We have seen the lengths that the French Government are apparently going through to try to get the EPR over the line as far as Hinkley Point C is concerned. This would be the perfect time, the best time in decades, to have launched a competitive auction against various technologies for a new nuclear fleet in the UK. It could be designed and delivered at a very, very, very, very effective price but to go from where we are today back to that, where we should have gone in the first place, is probably impossible.

**Chair:** Does anybody wish to comment before I move on?

**Dr Taylor:** The UK's position, indeed apart from Finland, the only advanced economy that is planning to build any new nuclear power at a time when there are several reactor vendors desperate to build new nuclear, I think it is fair to say, does give the UK quite a strong negotiating position. The opposite side of the negotiation is if the UK says it is desperate to build the nuclear come what may, then of course it gives away that power. So in a curious way, if the Government can free itself temporarily from that it can speak to these vendors. The Japanese especially have no home market for the time being. France has no home market, possibly ever again, and the Chinese are very, very keen to get a reactor built in an advanced economy, so there is a lot of competition to build in our country and we ought to be able to exploit that rather better from a cost point of view.

**Q23 Chair:** If you are ever playing poker don't ask the UK Government for help and advice into the—

**Dr Parr:** I agree with that. I think it speaks volumes that the reactor vendors' countries are not terribly interested in building in their home markets.

**Q24 Matthew Pennycook:** To pick up on that point, and to get some additional clarification, are you saying we could go out and find new technology now that potentially gives us a better deal but the political costs, for the French and the British Governments, of pulling out of this deal are too high? That is the thing that is standing in the way. You are saying it is too late to go back. Could we do that now if we wanted to? Is it politics that is standing in the way of pulling out of this deal?

**Dr Parr:** Absolutely.

**Dr Taylor:** Instead of having, as Peter suggested, an auction where all the potential vendors were allowed to give their best offer, we have theoretically had an open market where anyone who wants to put a consortium together with their particular reactor has come along. They have their different sites and they are at different stages in the race. It does take a very long time to approve a brand new reactor and there are at least two new reactors that are in the pipeline. Until they are approved those companies could not possibly make any kind of binding offer. In that sense, the process makes a big one-off auction very, very difficult. That said, the Government have no commitment to any of those projects individually and they are proceeding on the basis that their sponsors are taking the risk. They do not know what the electricity price contract will be at the end of it. I am sure they would love £92.50 but that does not mean they should get it.

**Q25 Mr Reed:** The people who helped write the 2008 White Paper, the critical element within that wasn't public subsidy but the fact that Vladimir Putin turned off the gas. That was the critical element in that paper and I think remains at the heart of so much policy. I think that question and the issue of nuclear crowding out renewables, France demonstrates, with more renewables than us and more nuclear than us, that that is not the case. I would say, too, that waste is always a political and never a technical issue in this industry. We are talking about a project here that is long-term, hugely capital intensive and, by necessity, backed by the state. Since the 2008 White Paper and since the beginning of construction at Hinkley Point C, we have had two relatively significant events in the world, particularly with regard to nuclear, in the shape of Fukushima and an unprecedented global downturn. How have those events affected this project in your view?

**Dr Taylor:** Of course Fukushima affected policy very briefly in the sense of Governments in many countries wanting to check what, if anything, they could learn from Fukushima. I think the EPR, and indeed all the other proposed reactors in the UK, are all advanced, highly safe, reactors, so-called Generation III. Therefore, nothing from Fukushima in principle affects that. They are all designed to cope with the kind of problems that Fukushima had. In that sense, apart from a brief delay, it had no real impact. The financial crisis had a very big impact because I think it continues to be an overhang in terms of the financial capacity available, particularly for very long-term projects. That is going to remain the case for some time to come. In that sense, it worsened the prospect—if it was

ever there—of Hinkley Point C and other projects being done without Government support.

**Peter Atherton:** I think Fukushima had some ripple effects around Europe, particularly in Germany and their nuclear programme. It has had some impact on French public thinking probably as well, and around the future of nuclear, so it changed some of the dynamics around the accessibility of nuclear across Europe and also the sale prospects for the EPR. It has also changed the dynamics profoundly, obviously, in Japan itself and is one of the reasons why the Japanese nuclear industry now has no orders and why we should be able to buy very cheaply from them, if we can get the process properly right, is that they have no home orders.

Of course, the event that has profoundly changed the outlook is the arrival of shale in the US and the fact that now gas is coming out of the US. LNG will be leaving the US shores very shortly, priced at around \$5 to \$6 per million of Btu. A few years ago, Ministers were absolutely certain that the oil and gas prices were going to be very high, very volatile in this decade and the 2020s. Just to put it in perspective, when Hinkley Point C comes on stream in 2025 if we inflate the strike price with, say, 2% inflation then the power price we will be charging is about £120 per megawatt hour. The equivalent gas price, to give you an electricity price of £120 per megawatt hour, is about \$25 per million of Btu, \$25, and the current price of getting gas from America into the UK is \$6. The relative economics of nuclear and Hinkley Point C and other technologies, frankly, have been profoundly changed by the fact that we now look like we have, at least for as far as the eye can see—and nobody can look too far into the future—an abundant world gas supply that looks like it is going to be pretty cheap for quite a while.

**Dr Parr:** Yes, I concur with a lot of what has been said. Fukushima had significant impacts elsewhere in the world but the impacts here were relatively small in terms of public opinion. There is a long discourse as to why the UK was different, but it seems to me that the thing that is true is that gas has affected the commercial logic for investment in a number of spaces but, credit where it is due, successive Governments in the UK have been very strong on the need to tackle climate change. That has continued under this Government, although clearly we have some disagreements with them about specifically how. That challenge is going to continue to grow in the wake of the Paris Agreement in December. Commitments to climate change don't look just like the domestic Climate Change Act. They look more and more like an international obligation than they do enlightened leadership.

**Q26 Mr Reed:** The consequences for the sector for other projects in the pipeline, if Hinkley Point C does not go ahead, are what in your view?

**Peter Atherton:** I guess it is who pulls the plug. If it is the French Government that pulls the plug there should not be any particular knock on effect. Clearly, if the UK Government suddenly pulls the plug, because it is too expensive, then that will have a knock on effect on to the other projects.

**Dr Taylor:** I agree. I think that is why we have to have the French pull the plug.

**Q27 Chair:** So the French Government could do a favour for the UK Government is what you are saying?

*Dr Taylor:* I think they would do a favour for the French taxpayer as well, but that is clearly up to them.

**Q28 Chair:** You think that the pivot for getting everybody out of the bind, which some feel they have found themselves in with Hinkley Point C, is for the French Government to pull the plug? Am I correct?

*Dr Taylor:* That would be the best for most people concerned. I think it would preserve the rest of the nuclear options in the UK because it would not cast any doubt on the UK's underlying commitment, whereas if the UK cancelled the project it could jeopardise all the other nuclear projects in the pipeline. It may raise their required return just to compensate for the heightened political risk.

**Q29 Chair:** In fairness, could that not be seen by the rest of the sector as a Hinkley Point C issue rather than a nuclear issue?

*Dr Taylor:* I think that is the point. Assuming the Government's policy remains that nuclear is an unavoidable part of the transition to a low carbon future, then it is just a matter of whether Hinkley Point C—no matter how it started out—has regrettably become simply a project that should not be continued.

**Q30 Mr Reed:** In your view, how likely is it that other new nuclear projects—particularly those slated for the UK that I personally want to see succeed—will face similar problems to those experienced by EDF at Hinkley Point C now?

*Dr Taylor:* There are two major reactors in reasonably short-term contention, one of which is proven. The advanced boiling water reactor has been built and it definitely works. It has been built successfully in Japan, so we know it works and we know it can be built. The AP1000 is suffering some difficulties. It has not yet been fully proven. There are difficulties in China where it is under construction. They are not on the scale of the EPR but we have to say that until it is completed somewhere, and preferably a couple have been completed, it has the same qualitative risk of being the first of a new type of reactor. That suggests that the advanced boiling water reactor, which is proven—which of course has not been built in the UK before and, therefore, requires perhaps an extra level of regulatory scrutiny, but nonetheless operates successfully in the US and Japan—is perhaps the least risky thing to go for.

**Q31 Mr Reed:** What lessons should be drawn then by other developers in the UK? To date, from the Hinkley Point C experience, what are the lessons? What advice would you give them? What mistakes would you tend to avoid?

*Peter Atherton:* My advice to them would be to ask for everything that the EDF got because it is a great deal.

**Mr Reed:** That is some professional advice.

**Peter Atherton:** Get £92.50, get a £10 billion guarantee and get a 35-year inflation linked contract. That is brilliant. That is a great, great deal if you can built it on time and on budget. There are two phases in issue: the building of it is very complicated, difficult and things but, once it is operational, that power station is going to be gold, absolute gold. It is going to be cash flow—

**Q32 Chair:** It is a licence to make money, yes.

**Peter Atherton:** Very simply, guys, if you spent £20 billion on something and you aim for a 10% return then you are going to earn £2 billion a year profit. The thing about nuclear power stations is that, not only are you going to produce a lot of profit, you are going to produce a lot of cash, a huge amount of cash flow because your costs are low. You have a 35-year revenue line that is going to increase by inflation. You have a cost line that is about one-third of your revenue line that isn't going to increase by inflation. It is like compound interest. It is like having a mortgage and a house price that was already twice that level and the house price going up each year and your mortgage not going up each year. It will generate a staggering amount of cash. That is needed because it is so expensive.

**Q33 Chair:** Who is paying this floating cost? Dr Parr wants to come in.

**Dr Parr:** I want to make two observations on that. There was a blog last week by a well known nuclear sceptic saying that the anti-nuclear group should now start campaigning in favour of Hinkley Point C being built, because it is going to be so damaging to the nuclear industry as a whole, in terms of how it is seen internationally, that it is going to be a millstone round their neck. I don't subscribe to that theory but it is, nonetheless, an interesting perspective that somebody would like to blog about it.

Secondly, as I have alluded to, the change in energy systems, opportunities and technologies, is going on at tremendous speed. It is starting to be recognised, if I might say, out there. We launched a petition only two weeks ago, not an explicitly anti-nuclear petition but saying that we want the Chancellor to put money into renewables instead. We have has 100,000 people sign up in a couple of weeks, which my webby colleagues tell me is very good. I think there is a considerable public policy difficulty, and public support difficulty, in trying to maintain this direction of travel over a project that is widely seen by independent commentators, the *Financial Times*, *The Economist* and so on, as being a bit of a basket case.

**Q34 Mr Reed:** What I have tried to touch upon is that energy policy is not just about energy supplies. In this country it is about rebalancing the economy. If you look at the south-west and the kind of industrial development that it needs, if you look at energy security, if you look at our climate change objectives as well, as we have touched upon, in your view, what would the implications for energy security and climate change policy be if Hinkley Point C did not go ahead

**Peter Atherton:** That is very much the point. The economics of nuclear power can often look very complicated but actually it is very simple. It is not economic and probably never will be, certainly in the west. Therefore, the state has to effectively pay for it. It has to

compensate for the lack of commerciality and the state gets public goods in return. We have had various public goods mentioned: security of supply, low carbon and baseload. We have the geopolitics with the relationship with French and China. We have had protection against high and volatile fossil fuel prices, although that one has sort of slipped away. It should be a relatively straightforward process of saying, “What is the value of those public goods relative to the cost of this particular project or this particular asset?” The fact that none of us knows what that calculation is—that is, the Government have never published one and do not keep it up to date—is the fundamental flaw in this whole process.

**Q35 Mr Reed:** The impact on energy security and climate change targets if Hinkley Point C does not happen?

**Dr Taylor:** It will leave a gap. It is difficult to see how the 4th or even 5th climate budgets are going to be hit without Hinkley Point C, because the various scenarios that have consistently been put forward by the Committee on Climate Change have envisaged quite a lot of new nuclear and carbon capture and storage. At best, both of those are behind schedule—in the case of carbon capture and storage—and I think in some deep question. That means the budgets going out to the end of the next decade may well not be hit. However, the question is how serious that is relative to the longer term path. We may deviate from the path but still get there. More nuclear could be built later, so if it is a matter of a timing issue then, arguably, that is not so problematic. If the alternative is to miss the target temporarily or to spend a great deal of consumers’ money just to hit the target, it is not clear that that is a favourable outcome.

**Dr Parr:** The question of the impact if Hinkley Point C does not go ahead depends on what you are going to instead. If you did nothing then clearly there would be impacts on all sorts of things, including jobs investment and so on. The assumption is that the Government have been prepared to make a certain amount of public money available, or in this case bill payers’ money available, to finance that and other hidden subsidies, like loan guarantees and so on, rather than deploying state resources to support other things, and I would highlight energy efficiency and the poor state of our poor housing stock ahead of electricity supply security. Nonetheless, there are options out there and there are more options out there than there were even two or three years ago to compensate for the failure of a nuclear programme.

**Q36 Chair:** Two final short questions to the panel. Peter Atherton may have given the game away when he said it was not economic but it was a printing press for developers, effectively. But the Government and Ministers at the Department of Energy & Climate Change are often telling us that their policies are designed with a view to keeping costs down for the bill payers. Can you give us an indication or flavour of what Hinkley Point C means to the bill payers?

**Peter Atherton:** It all depends on the wholesale factor. The strike price of £2.50 is in 2012 money. Therefore, we have already had three years of inflation, so today if it was operating it would be charging around £99, a wholesale price of £35. Therefore, the subsidy would be £65 effectively, which is times 25 terawatt hours. That would be about £1.8 billion. If Hinkley Point C was operating today the consumers would be subsidising it

to the tune of about £1.8 billion. We obviously have a very low wholesale power price at the moment. For all sorts of reasons that could change dramatically, but if we go to 2025 and it comes on stream at £120 per megawatt hour, for the power price to be anywhere near there, unless we have a very, very high carbon price imposed but if we assume the carbon prices are round about £20 then the all equivalent is about £230 to £250 royal, giving you \$25 gas, giving you £120 per megawatt hour electricity. We would need a very, very, very high fossil fuel environment to give us anything like that power price that we are guaranteeing Hinkley Point C, not for just one year but for 35 years, so it will be pretty expensive.

**Dr Parr:** At 2012 prices the calculations I did would suggest Hinkley Point C would add about £14 to the consumer bill; assuming appropriate load factors a power price of about £14 and 90% load factor. That is just above the existing power price. That would be the official cost.

**Chair:** £14 a year to the average consumer is the cost of Hinkley Point C?

**Dr Parr:** That is the average household bill because, of course, it is about one-third of power supply that actually goes on to households. That is the household bill. There would be costs distributed elsewhere for commercial and industrial users.

**Q37 Chair:** Thank you. My final point is: what advice would you give the Government in terms of contingency planning around Hinkley Point C? What else? What is plan B?

**Peter Atherton:** I don't think they need any contingency planning for security of supply because this is not due on for 10 years anyway. You can do a great deal of things in 10 years. I don't think there needs to be any contingency planning for baseload, because again you have plenty of time to plan for it. The problem will be hitting 2030. That is the problem, hitting the 2030 target.

**Q38 Chair:** Would carbon capture and storage have helped, there?

**Peter Atherton:** No. It is even less likely to be available by 2025.

**Q39 Chair:** Would carbon capture and storage have helped, though?

**Peter Atherton:** No. It is even less likely to be available by 2025 than new nuclear.

**Chair:** Fair enough.

**Dr Parr:** My plan B would be to look around and see what is going on elsewhere in the world and how fast things are developing. I have given you some numbers on speed of cost reductions of offshore wind, of speed of reductions of the flexibility measures endorsed by the National Infrastructure Commission. If we are moving to that world, having a contract that will lock in today's school-leavers to continuing to pay even when they are approaching pension age, in a fast-moving field like this, just seems to be a very strange way to proceed. I absolutely concur about the importance of decarbonisation and

that nuclear is seen by many people as a way of delivering it, but if you look at that long term, it does not look such a great option.

**Q40 Chair:** Thank you. Simon Taylor, would you like to comment?

**Dr Taylor:** I work for a university so I am bound to say more research. The UK has no nuclear industry other than Rolls-Royce and submarine reactors. Even if all these reactors go ahead, it is not going to benefit the UK industrially or strategically because we have no major player. There are other areas, and storage is the key. Storage is a fantastic market potential if we can crack it. A lot of people are working on it. The US Government has been putting funding into it. That is an area where there is not necessarily a single unique solution. Where the UK could build a major new business opportunity, which would be both valuable for the country and also good for the world as a whole, would be to invest in research and development in storage.

**Chair:** Panel, can I thank you for your time and your frank answers to the questions? It is always appreciated.

### **Examination of Witnesses**

*Witnesses:* **Zhu Minhong**, General Manager of International Nuclear Business Development Department, General Director of UK Nuclear Projects, China General Nuclear (CGN), **Vincent de Rivaz**, Chief Executive Officer, EDF Energy, **Humphrey Cadoux-Hudson**, Managing Director, Nuclear New Build, EDF Energy, **Tom Samson**, Chief Executive Officer, NuGeneration, and **Alan Raymant**, Chief Operating Officer, Horizon Nuclear Power, gave evidence.

**Q41 Chair:** Again, can I thank our second panel this morning for coming before the Energy and Climate Change Select Committee? It is appreciated. For the record, can I ask those on the panel to state their names and organisations for the record, and I will start on my left?

**Alan Raymant:** My name is Alan Raymant. I am Chief Operating Officer, Horizon Nuclear Power.

**Tom Samson:** Good morning, panel. My name is Tom Samson. I am the Chief Executive Officer of NuGeneration, a company current owned by Toshiba Corporation and ENGIE.

**Vincent de Rivaz:** Good morning. I am Vincent de Rivaz, Chief Executive of EDF Energy.

**Humphrey Cadoux-Hudson:** Humphrey Cadoux-Hudson, Managing Director for New Build for EDF Energy.

**Zhu Minhong:** I am Zhu Minhong. You can call me Minhong. I am General Manager of International Business Department of CGN. I am pleased to be here today. Thank you.

**Q42 Chair:** Thank you very much. I understand that Vincent de Rivaz would like to give an opening couple of minutes' statement, so I will be tight on the time, and two minutes would be appreciated. Thank you, Vincent.

**Vincent de Rivaz:** Thank you. Thank you for the opportunity to be here today and to update you on our project and answer your questions. I would start by saying, clearly and categorically, that Hinkley Point C will go ahead. That is good news for the UK. It has been a long road. The project has successfully passed a huge number of regulatory, political, commercial and operational milestones, and I will say briefly why it will go ahead. It will go ahead because we have the expertise, the supply chain ready and the team ready, including our longstanding partners, CGN, to build HPC on time and on budget. It will go ahead and it will deliver 60% of the project's cost for the UK suppliers. We are confident in this project. We are confident in the EPR technology and evolution to achieve higher standards of safety, of the well-established and reliable PWR technology. EPR is a modern design, which has already been approved by the UK safety regulator. It will go ahead because we have the strong support of the UK Government and of the French Government. It will go ahead because we are confident regarding the financing of this project.

Chair, we are confident and proud to be able to deliver this project because it meets the UK need for reliable, affordable, low carbon electricity. It is a fair deal that is at the heart of this project: fair for the customers and fair for the investors. The customers will not bear any risks during the construction of this project. We will bear those risks. Because we are confident in our ability to deliver, we are ready to take those risks. At the end, you will probably see that we are here with the team, with the same passion, the same vision, the same stamina, and behind us there are hundreds and thousands of people ready to go ahead for this vital project. Thank you very much.

**Q43 Chair:** Thank you. Thank you, indeed. I am sure the panel will have plenty of questions following that statement, but for fairness I will ask the other two companies present as well, Mr Samson and Mr Raymant, to tell us what their interest is in UK new nuclear. Mr Samson first.

**Tom Samson:** Thank you. We believe that NuGen is an essential part of the UK's nuclear new build industry. We think that industry is larger than just Hinkley Point C. We understand the need to bring on 18 gigawatts of new capacity in the mid-2020s, and NuGen wants to play its part in delivering that new, clean, green, baseload power on time in the mid-2020s. We believe that is consistent with the Government objectives for climate change. We believe that it is necessary to replace the existing ageing fleet of nuclear assets and to overcome the impacts of the shutdown of the coal assets by 2025, and we think it is essential for security of supply to have a domestic source of baseload power here in the UK that we can depend upon for the following 60 years. We are prepared and are working within the defined UK policy framework with the CfD and the IUK regime, and we are confident that we can continue to develop our programme and attract debt and equity to fund our regime over the coming years. We have a deliverable technology, a fleet of AP1000s currently being built around the world today in China and the US. In fact, NuGen will be the 17th, 18th and 19th AP1000s being delivered. We have a single-

consortium approach to deliver the project in Cumbria, and we believe we have the right technology and the right team, in the right location, to bring this online.

**Q44 Chair:** Thank you. Mr Raymant.

**Alan Raymant:** Thank you, Mr Chairman. Horizon is the developer and future operator of Wylfa Newydd in Anglesey and at Oldbury, with the potential of others to follow. We are bringing forward the advanced boiling water reactor technology, which is proven both through construction and operation. We are making steady progress through developing all aspects of the project, focusing initially on the Wylfa Newydd project, to deliver commercial operation in the first half of the 2020s. Like Tom, we see nuclear as an essential part of the future energy mix going forward in order to deliver affordable, secure and low carbon electricity, and we are pleased to be able to give evidence to you this morning.

**Q45 Chair:** Thank you. Can I also ask Mr Zhu Minhong? Aside from your interest in Hinkley Point C, perhaps you could also tell us briefly about other CGN interests in the UK.

**Zhu Minhong:** Thank you for your question. I am happy to give you some information related to CGN. CGN is an energy company in China, and we have many—four—sectors of business. They are nuclear, renewable, finance and the mines. I have worked for the nuclear sector for about 30 years. Regarding our business in the UK, I like to say, as you know, we have been in partnership with our colleague, EDF, for 30 years, and we are working together today jointly to build two EPR units in China. First, it is natural to extend our partnership to the UK. That is why we are here, of course. Our partnership will cover HPC, Sizewell C, and Bradwell, and at Bradwell we plan to deploy so-called HPR1000 Chinese technology, provided we can go through GDA assessment. That is our plan. Thank you.

**Q46 Chair:** Thank you very much. Mr de Rivaz, you started with a quite flamboyant, perhaps, opening statement there. You said you were confident in the project itself, and then you said you were confident in EPR, and my heart sank somewhat and then I thought about Flamanville in France, which was due to be opened in 2020. Was EDF also confident in that at this stage of its development?

**Vincent de Rivaz:** EDF is confident in EPR. It is a technology that has been developed in order to meet the highest standard of technology and the highest standard of safety. It is an evolution compared to the PWR technology but it is the same family fundamentally. In terms of it being the technology for our times, meeting the highest standard of safety, absolutely. In terms of our ability to deliver Hinkley Point C on time and on budget, absolutely. Maybe I will let Humphrey to explain how we have, in our project, organised ourselves to learn all the lessons we have learnt from previous projects, Flamanville in France, as well as the Taishan project in China.

**Q47 Chair:** Can we move to that maybe later as the morning moves on? Can I ask you just a secondary follow-up point? You said this will be fair to customers. We heard earlier that it

would only be economically fair to customers if oil was around \$230 a barrel. When you say, “Fair to customers”, on what criteria do you mean fair to customers? Do you mean economically fair to customers?

**Vincent de Rivaz:** The question you are asking is absolutely at the heart of why we are meeting today. Is the Contract for Difference that we have negotiated in 2013 with the UK Government, and this is now in its final form, ready to go ahead? A fair deal. I tend to say that when I see on the other side of the channel that it is too risky for the investors, and when I come back here on this side of the channel that it is too generous for investors. That sends me a strong signal that it is a fair and balanced deal. Consumers will pay nothing, absolutely nothing, until the electricity is produced in 2025. The real question is: how have we determined this price, and by which process? Secondly, is this price going to be competitive with the lifetime costs of other generation from 2025 until 2060?

**Q48 Chair:** Is your answer that it is economically fair to consumers in the UK?

**Vincent de Rivaz:** Yes. It is. Maybe I—

**Q49 Chair:** Do you agree it needs \$230 a barrel of oil for equivalence?

**Vincent de Rivaz:** No. I have listened to what Peter said, and fundamentally I agree with much of what he has said, but you cannot take one isolated element of the whole energy equation. What is true is he said that prices of electricity are very low today and they can be much higher tomorrow, as they have been very high in the past. In 2008, for instance, it was £80 per megawatt in Britain. What is true is that we have to compare the price between 2025 and 2060 to what will be the prices of alternative low carbon energies, in a world where, clearly, the push for decarbonising will be even stronger than it is today, in a world where, very probably, the carbon price worldwide will be higher. At the heart of this price there is a long process that has been scrutinised and challenged here in Britain and then in Brussels, and both processes have concluded it is a balanced deal because it reflects the costs to build this plant, the costs to operate it for 60 years, and it reflects the fair return for the investors, a return which is commensurate with the risks they are going to take during the construction, and they have to take all the risks of the construction and commensurate with the need to attract investors in a world where the UK Government has decided a long time ago that the taxpayers will not pay for the construction cost and will not invest directly in the project.

**Chair:** Thank you very much.

**Vincent de Rivaz:** That is the fair deal we have achieved: fair for the customers, fair for the investors.

**Chair:** You have indicated there are nerves on both sides of the English Channel. I will bring in James Heappey on this.

**Q50 James Heappey:** Mr de Rivaz, I am going to invite you to give some very short answers. It is my understanding you have spent £2 billion on the groundworks and project-specific research on Hinkley. Is that correct?

**Vincent de Rivaz:** It is a very good question. Thank you for making this point.

**James Heappey:** Roughly, I believe.

**Vincent de Rivaz:** This project has never stopped. This project has never stopped.

**Q51 James Heappey:** You have spent about £2 billion.

**Vincent de Rivaz:** We have already invested for this project £2.4 billion.

**Q52 James Heappey:** You continue to spend, I think, about £55 million per month on the site.

**Vincent de Rivaz:** Correct, which means that we have never stopped this project.

**Q53 James Heappey:** Given that is the case, why do you not tell us when you are going to take a final investment decision?

**Vincent de Rivaz:** I have said categorically that this project will go ahead.

**Q54 James Heappey:** No, I know that. We have heard that for quite a few months now. When will you take a final investment?

**Vincent de Rivaz:** I am pleased to confirm it, and I am pleased to confirm that a final investment decision will be taken very soon. The French—

**Q55 James Heappey:** By when? By when, please? By when?

**Vincent de Rivaz:** The French Minister of Economy and Finance, Mr Macron, said yesterday it will be by early May.

**Q56 James Heappey:** It will be by early May. The first week of May?

**Vincent de Rivaz:** He said it. I can confirm that for me it is a confirmation of what I have said that it will be very soon.

**Q57 James Heappey:** You have confirmed to the Committee this morning that you will take a final investment decision by early May. If, by 15 May, no final investment decision is taken, would you agree with us that the UK Government and UK public should be very concerned about your commitment to the project?

**Vincent de Rivaz:** Nobody should doubt our commitment to the project in which we have invested £2.4 billion.

**Q58 James Heappey:** It would be helpful if you committed that that is what you are saying to the Committee this morning.

*Vincent de Rivaz:* Yes. I understand, and I am very pleased that people are so eager to see this final decision happening, which is a good sign of the appetite for the project. I have the same appetite for a decision very soon. I cannot give you today, this morning, the precise date.

**Q59 James Heappey:** You can tell us by when.

*Vincent de Rivaz:* I will not give you a precise date. I have just told you that the French Minister of Economy has given this horizon, early May, and it confirms that the decision will be taken very, very soon.

**Q60 James Heappey:** Thank you for that. That is very reassuring, and I suspect that Twitter has just lit up, but I want to understand what remaining barriers there are in front of you. Are you now on the home straight towards taking the final investment decision by early May, or are there other things that you need to work out before then?

*Vincent de Rivaz:* Thank you for the question, because I think it is very important that I explain the context in which this decision will be taken. As the chairman of the group said it, he is working as the chairman of the EDF Group, with his main shareholder, the French Government, to secure the financial situation of the group as a whole for the next decade. What is the challenge that we are facing as a group? Huge investments: investment in existing nuclear plant in France, in networks, in energy services, and all sorts of activities that we have in France and in other countries. Hinkley Point C is 15% of this amount of investment. 15%, so it is a large chunk of investment that the company has to deliver. At the same time, it is a point that also Peter said very well. The power prices in the wholesale market have dropped dramatically in six months since October, 35%, so there is an issue coming from that. It is more strain on the finance of the group. We are discussing actively with our shareholder, the French Government—EDF is doing so—to find a solution to this financial equation. What is the good news? I can confirm to you these discussions are now in the final stage, which has allowed the French Minister of Economy to say what he said, and we are going to find a solution, which is not going to be one solution only. It is a combination of solutions that any company facing these challenges must deliver, with the support of its shareholders.

**Q61 James Heappey:** This morning you have told us that you will take a final investment decision by early May. Yesterday we heard Monsieur Macron in the French Parliament confirm that this is very firmly in the French Government's interests, but from your reply to my question about the remaining barriers you did suggest that there is still some decision-taking to be done, and while your commitment and the French Government's commitment remains clear, you accept that your answer then does not quite tally with you being convinced that you can take a final investment decision in the next six to eight weeks.

*Vincent de Rivaz:* No, no. You have heard what I said, which is that we are working on the solutions. They are well defined. It is a complex issue. As Peter said earlier, we talk

about £15 billion to £17 billion a year for EDF in this investment, so it is a big, big number. The power price and the revenues are going down, so how do we fix this problem? It is now very clear that everybody is working in the final stage to make it happen, as the French Minister said it yesterday, and he said it in a context where also he said what our chairman said, that this project, Hinkley Point C, is absolutely critical and it has the full support of the French Government, as it has the full support of the British Government. Everything is aligning at the moment very positively. That is why I said in my opening statement categorically it will go ahead, and a decision is very soon.

**Q62 James Heappey:** Do you accept that, given your commitment today to take a final investment decision by early May and Monsieur Macron's statement to the French Parliament yesterday, were you to now miss that deadline—and I accept that that is the first time that EDF have actually said when you will take a decision by, and previously it has been the UK press that has imposed a deadline on you—of early May, which you have said this morning, that would cause us all to question the credibility of the project?

*Vincent de Rivaz:* First of all, I have not given you a precise date.

**Q63 James Heappey:** You said by when you would take the decision.

*Vincent de Rivaz:* I have said the French Minister of the Economy has said it, and he has a very important role in the decisions that are taking place. I take every confidence from what he said that the decision will be taken very soon.

**Q64 James Heappey:** Mr de Rivaz, I am not sure that we can let this move on. We thought that you had said by early May, and now you are rowing back from that a little. You are here this morning—

*Vincent de Rivaz:* I am not rowing back. I am just saying the French Government has said it very clearly, so I take it as very positive.

**Q65 James Heappey:** Give yourself some wriggle room, but I want you to be clear with us by when you will have taken a final investment decision. We know you are committed to it. We have seen the press releases over the course of the last six months, telling us again and again and again your commitment to the project. By when will you have taken a final investment decision?

**Chair:** I distinctly heard “early May”. Early May would be before 15 May, as Mr Heappey said earlier. Early May is before 15 May. Will it be done by then?

*Vincent de Rivaz:* You can understand that I do not want to give precise date.

**Chair:** That is fine.

**James Heappey:** By when?

**Chair:** I mean if it is a—

**Vincent de Rivaz:** You refer to a very important declaration that I can only take as a very positive one.

**Q66 James Heappey:** Then you have not actually advanced what we know about your commitment to Hinkley this morning. All you have done is come here and told us what we know already, which is you are committed to it.

**Vincent de Rivaz:** That is absolutely fine. You are convinced that we are committed. We cannot be more committed and more confident than we are.

**Q67 Chair:** I have taken some advance from it because, if Mr de Rivaz is correct and he said early May, early May will be before 15 May. The precise date is immaterial, but before 15 May will be the time this Committee will look for the final investment decision for Hinkley Point.

**Vincent de Rivaz:** I am very happy to come back to confirm that when it is taken.

**Q68 Mr Carmichael:** We have all heard commitments, Mr Chairman, in this House, to do things by spring, which tend to happen when the leaves are falling off the trees. We will take early May as being in May. I am just interested to explore with you some of the reasons behind your apparent great confidence here and just look for a second at the relationship between yourselves and the French Government, who are 85% owner. There has been some speculation that in order for the project to go ahead, they would be looking in the future at taking the dividends in shares rather than cash, such is the nature of the financing of the project here. Is that correct?

**Vincent de Rivaz:** I do not want to enter into details of the discussions taking place.

**Q69 Mr Carmichael:** I am not looking for details. I am just looking for—

**Vincent de Rivaz:** No, no. It is one of the points that the French Minister has said yesterday, with your colleagues in Paris at the French Parliament, as one of the avenues that are contemplated. There is a whole suite of solutions we are now working on, and at the end there would be a good solution, good for the shareholder, the French Government—which has to defend French taxpayers—and good for the company, which has the ambition to make massive investments despite the difficult market conditions that we are all facing. The good news is that this work is going on happily, and we will deliver the good news of EDF being involved to take very soon the much-expected decision on Hinkley Point C.

**Q70 Mr Carmichael:** Your colleague, Jean-Bernard Lévy—

**Vincent de Rivaz:** My chairman.

**Mr Carmichael:** —spoke to your employees, saying that the project would only go ahead if it had more support from the French Government. Is that correct?

**Vincent de Rivaz:** It is exactly the same point, yes.

**Q71 Mr Carmichael:** The suite thing is that it is not to be taking shares instead of cash dividends. What else is it?

**Vincent de Rivaz:** What has been said publicly is that there is a combination of solutions. One is from the shareholder something that increases the capital of EDF in another form. That is a technical detail, which will be discussed, and a solution will be found. The second avenue that is contemplated as a normal decision for a normal company facing choices, investing in a priority project, is to divest in the non-strategic assets. That is a natural thing to do. The third thing is obviously to continue, as any company should do, to reduce its costs, to increase its operational performance, and those are the types of avenues that we are working on with, I have to say, 100% confidence that the solution will be found shortly, as the French Minister said it.

**Chair:** I am sorry, Mr Carmichael, can I interrupt, please, for a moment? I need to interrupt because at 11.00 am, in approximately a minute or so, we will be observing a minute's silence for the victims of the attacks in Brussels yesterday, and I hope that all in the room will join us to mark this moment of respect. I expect the bells to ring, and if they do not ring—because they are often muted during a Committee—I will just call us to order and we will begin a minute at the point we left off. Mr Carmichael.

**Q72 Mr Carmichael:** To an extent, to some of what you are saying, in addition to the question of taking equity instead of cash, you would divest yourself of other assets, so you would look at making other cuts within your business. Is this not in danger of becoming something of a cuckoo in the nest for you?

**Vincent de Rivaz:** No. EDF is 70 years old. It is a great company. It is a world leader. It is the most successful power company in Europe. All the power companies, energy companies and electricity companies in Europe are suffering because the market conditions are dire.

**Chair:** Order, order.

*The Committee observed a minute's silence.*

*On resuming-*

**Vincent de Rivaz:** I repeat what I was just saying: this company is a great company facing huge challenges, absolutely determined to face them, and taking action, as any normal company should do, to make choices, priorities, disposing of non-strategic assets, hedging costs, and having the support of its main shareholder.

**Q73 Mr Carmichael:** I completely understand that, and I think, as Chief Executive, it is absolutely proper that your first priority should be the protection of your company. As a Committee of the House of Commons, though, obviously we have wider interests to scrutinise and protect. What I am interested to know is the point at which the different options that you have outlined to the Committee this morning will be confirmed and put into the public domain.

*Vincent de Rivaz:* Yes.

**Q74 Mr Carmichael:** You will do that?

*Vincent de Rivaz:* Of course. The decision will be based on the evidence that EDF has found the solutions to sustain the investment, and I think it should be good news to see this company behaving in such a responsible way before the final investment decision before kicking off the massive additional investment in Hinkley Point C to be sure that we will deliver, and it is going to be the case.

**Q75 Mr Carmichael:** It must be controversial internally. You lost your chief finance officer recently, Thomas Piquemal. That was over the Hinkley Point decision, was it not?

*Vincent de Rivaz:* I will not comment on the decision of any individual in this company. As I have said, it is 70 years old.

**Q76 Mr Carmichael:** Let me put it this—

*Vincent de Rivaz:* What is important is that the chairman has made a very clear choice that we should all be pleased with to categorically support this project, to make sure that it will go ahead. The finance director of the group is a supporter of this project. We move on, and we move on with this very clear choice of the chairman and the French Government that Hinkley Point C will go ahead.

**Q77 Mr Carmichael:** The departure of your CFO saw a loss of 6.5% in your share price overnight. This 70 year-old company has a share price standing at €10, down from €22, at the moment. If you do not meet that early May deadline for a final investment decision, it will be dreadful for EDF, will it not?

*Vincent de Rivaz:* Hinkley Point C will go head, categorically, very soon. I have already answered the question of the deadline. We are in these days where an historical decision will be taken, and everybody is working in the same direction: the UK Government, the French Government, my parent company, and the team are here to make it possible.

**Q78 Mr Carmichael:** It is all confidence, is it not? You cannot not be confident in your situation.

*Vincent de Rivaz:* It is a great project. It is a good project. Yes, I am passionate about it, the team is passionate about it, and we are eager to start it.

**Chair:** We understand that. Thank you.

**Q79 Tom Blenkinsop:** Thank you, Chair. Good morning, gentlemen. I want to ask a few questions of Mr Raymant and Mr Samson. Do you think the delays experienced in the Hinkley Point C project are unusual, and what lessons have you learnt from the EDF experience?

**Tom Samson:** I am happy to answer first. We are optimistic that EDF will achieve FID soon, and we wish them well. We were keen for that to happen. We do not believe that that necessarily is currently a barrier to us progressing. We have made tremendous progress over the recent years towards our own FID, which is scheduled for the end of 2018. We will continue on that path, and we are optimistic as well that that is a realistic path for us. As I mentioned in my opening remarks, we have some differences in our approach. We have a fleet of AP1000s being built in China and the US, which have also, as was mentioned earlier this morning, suffered some challenges. Those challenges have been overcome. We hope to load fuel in the first reactor in the coming 12 months. That gives us the input and the knowledge to benefit from those lessons learnt when it comes to delivering the project at Moorside. We are delivering a single EPC consortium solution to build the project and we are looking to attract debt. There are a number of distinct differences in how we are approaching it, still within the CfD and IUK regime in the UK, but we remain confident and our shareholders remain committed to our progress towards FID.

**Q80 Tom Blenkinsop:** Mr Raymant.

**Alan Raymant:** Very similar. Clearly, we wish EDF all the success with Hinkley Point, but we are not dependent on that project. We, likewise, have made huge progress over the past few years in developing particularly the Wylfa Newydd project, and our focus is very much on getting to FID as soon as we can on that project to be able to bring the plant into operation in the first half of the 2020s.

We have the opportunity to learn from a number of opportunities, from previous experience. First of all, we are bringing, as I mentioned earlier, tried-and-trusted technology from Japan. It has been constructed to time and cost in Japan and it has been in operation, so we are using a tried-and-tested technology that is currently going through the generic design assessment process on schedule.

Also, we are seeking to benefit, particularly from the experience and the lessons learned from the Hinkley Point project, in terms of the process that it has gone through and some of the outcomes to make sure we have a project at Wylfa Newydd that attracts the widest pool of investors possible. We are owned by Hitachi. Hitachi has made a huge investment in the project already, but it will be looking for additional external finance to support the project, and we have to make sure, through discussions with Government, that we can attract the widest pool of investors to support that.

**Q81 Tom Blenkinsop:** Mr Raymant, could you tell us about what stage you are at in the development process for Wylfa and Oldbury, for example?

**Alan Raymant:** Our target is to get to financial investment decision in early 2019. To do that, we have to conclude the generic design assessment process. We have to secure the development consent order and the various licences and permits to achieve that, and, in addition, finalise an agreement with Government on the Contract for Difference and put the financing in place. There are a huge range of activities we have to conclude during that time. At the moment, as I mentioned, generic design assessment is on schedule. That is due to complete at the end of 2017, as we said when we started that process, and we will be looking to have the key permits in place by mid-2018 to enable us to move into the financing phase.

**Q82 Tom Blenkinsop:** Mr Samson, could you tell us likewise about Moorside?

**Tom Samson:** Yes. We are targeting an FID towards then, the 2018. That is really driven by a critical path in the DCO planning progress. We have completed our DCO stage 1. We are about to start DCO stage 2 in May, so our DCO progress is on target. We are in the midst of our GDA process with Westinghouse, our technology provider, and expect to have secured our DAC and SoDA from the GDA from the ONR in Q1 2017. We are already preparing in Q1 2017 to develop our nuclear site licence submission to the regulator. In the meantime, we are building our organisation. We have moved to Manchester over a year ago. We are now 130 people in Manchester. We are continuing to grow and we are preparing ourselves, by the middle of next year, to have those key development milestones in place, and by that stage as well to have validated our financing strategy. I mentioned the introduction of debt, and we are engaged with a number of entities to try to attract debt to our programme, and that needs to be validated by mid-2017.

**Tom Blenkinsop:** Thanks, Chair.

**Q83 Matthew Pennycook:** Thank you, Chair. I am going to take us back to the economics of Hinkley Point C, I am afraid. Can you tell us how much the project is going to cost? EDF's figure is £18 billion, and the EU state aid investigation said £24.5 billion, I believe. We know that £2.5 billion of that has already been committed. How do you reconcile the difference between those very large figures, and is it still your position that the cost is £18 billion?

**Vincent de Rivaz:** First of all, I would like to also say that I wish my two colleagues well for their respective projects, and thank you for your good wishes. Yes, the construction cost is £18 billion. The number that you also referred to was mentioned by the European Union in 2014 in a certain assumption regarding the way the project would be financed. We have moved the way we are going to finance this project from project financing to corporate financing. This number is no longer relevant. The contribution costs of Hinkley Point C are, and remain, and will remain, £18 billion.

**Q84 Matthew Pennycook:** Thank you very much. My second question is around the support the French Government are going to be delivering. I have to say that I share the frustrations of other Committee members that—while you are categorically certain that this project is going ahead—you cannot tell us about the suite of solutions that you are negotiating with the French Government or anything beyond the timeline. I will not labour

that point; I don't think we are going to—in the short time that we have—make much progress on that. Can you give this Committee a guarantee from EDF that the support the French Government look likely to offer will not be passed on to the UK taxpayer in the form of infrastructure guarantees, shifting liabilities, or direct investment? A short answer, if you can.

**Vincent de Rivaz:** Okay. Thank you for the question. Sorry for the frustration, but you can understand that these discussions between the chairman and the CFO of EDF and the French shareholder are technically complex and I cannot enter into the details. The key point is that they are discussing with the common will to achieve an agreement, shortly allowing Hinkley Point C to go ahead. The solutions that they have mentioned are clearly between the French Government and EDF, in the case of capital, for instance, possibilities regarding the dividends that the French debt would like to accept to be paid in shares, rather than cash, for example. Point number two, disposal of non-strategic assets. Point number three, efforts to continue to be the cost-efficient counterpart in the whole group. None of these solutions have any impact on the British taxpayers in any shape or form. All those solutions are there to secure the finance of the EDF Group, the shareholder of EDF Energy, allowing us to go ahead with Hinkley Point C. It is all positive.

**Q85 Matthew Pennycook:** So, no. Thank you very much. Just moving us on to the UK loan, can you confirm whether or not you intend to make use of the £2 billion UK loan that has been confirmed, and do you expect to go beyond that and use any more, or to approach the UK Government for any more, of the up to £10 billion that has been discussed?

**Humphrey Cadoux-Hudson:** The agreement we have is to put in place a loan of a further £2 billion, to be repaid relatively early by 2020. We will assess, based on the financing available to us after FID, whether we need to go through a process to extend the loan to a further amount, but we are setting up FID on the basis that we will not have to.

**Q86 Matthew Pennycook:** My final question, Chair. I think we have established that in your financial position you have problems with cash flow and profitability. The support the French Government are, therefore, going to offer: we are going to add a categorical “no” that that will not impact on the UK taxpayer.

My last question is about decommissioning, which could potentially impact on the UK taxpayer. How confident are you that the £2 to £3 in the strike price will be enough to cover decommissioning, given that the Cour des Comptes have raised concerns that EDF's decommissioning programme is underfunded?

**Humphrey Cadoux-Hudson:** I do not think they have had a comment on Hinkley Point decommissioning. The decommissioning fund that we are setting up is a bit like a pension scheme. We are going to set money aside through every year of operation to go and build the fund up to pay for decommissioning and treatment of waste, but we take full responsibility for it. The number you quote is an estimate inside total estimated costs, but it is the risk of the project to pay for the decommissioning. As we go through time, regularly there will be reviews of the estimated cost of decommissioning, and we will need to put aside the amount of money necessary to enable that decommissioning to actually

happen. It is a scheme in which the project remains all through its life fully responsible and will have to adjust according to updated views of forecast costs.

**Q87 Matthew Pennycook:** On that basis and as things stand, you are confident that there will be no future liability for the UK taxpayer from the decommissioning of Hinkley Point C?

**Humphrey Cadoux-Hudson:** Yes.

**Vincent de Rivaz:** I have to say that it is the first time that such a nuclear project is going to be launched with the funding of the decommissioning already included in the financial model and a specific contract has been negotiated and approved by the European Union for the funding decommissioning plan. It is the first time. It is very positive. It is an example of us and the UK Government behaving in a responsible way and not transferring the problem for the next generations.

**Q88 Chair:** We heard last weekend at the Department of Energy and Climate Change that decommissioning is very expensive. 44% of DECC's budget is spent on wind scale in Cumbria, still paying for past energy.

**Vincent de Rivaz:** We are in the new world pricing. What has been badly done in the past will not happen again.

**Q89 Tom Blenkinsop:** Thank you, Chair. Mr Samson, we have heard from EDF. Are you likely to run at the same constraints that EDF is currently facing regarding the Moorside project?

**Tom Samson:** As I mentioned to you earlier, our plan is to develop a financing strategy that we can build on in the coming 12 to 15 months. It gives us confidence we can reach FID in advance of FID. We have a different view on the timing of building that confidence on the financing, yet to be proven. We are engaged in discussions with a number of players. The reality is developing nuclear projects is difficult, it is challenging, but it is essential.

**Q90 Tom Blenkinsop:** Will you seek additional partners?

**Tom Samson:** Absolutely. The current shareholders we have are committed to take us through to FID. We need to attract debt and we need to make the deal attractive for equity investors. We will need additional equity investors to come in at FID to commit to the funding required, along with debt and equity, to achieve the commercial operation.

**Q91 Tom Blenkinsop:** How is the financial health of Toshiba?

**Tom Samson:** Toshiba's commitment to nuclear remains, Toshiba's commitment to Westinghouse remains, and Toshiba's investment in NuGen is still a top priority. We are working very closely with Toshiba, and the recent challenges they have faced have not changed their commitment to nuclear in either Westinghouse or the UK as a result of those

challenges. They are on the course to recovery and we are confident they will make good progress in that recovery.

**Q92 Tom Blenkinsop:** Is this the same situation for Wylfa and Oldbury?

*Alan Raymant:* Absolutely. As I mentioned earlier, Hitachi is our shareholder and is funding our project through to financial investment decision. Clearly, we are pushing the project forward as fast as we can, but also we have to get it right. We have to make sure the project is developed in the right way and also we can then secure the investment support we will need. As I mentioned earlier, we have been very clear that we will need to bring in additional investors, external finance to support the project, and we are working on that at the moment.

**Q93 Tom Blenkinsop:** How is Hitachi's financial situation?

*Alan Raymant:* Hitachi's financial situation is fine, and it is continuing to fully support the plans that the development had.

**Q94 Tom Blenkinsop:** You do not see it running into any constraints, as EDF have?

*Alan Raymant:* Clearly, we have to go through the same process that EDF has been through in terms of getting all the consents and permits, and that is a complex process. We then have to negotiate a very complex deal with Government in the same way that EDF has. As I mentioned, we would expect that process, having gone through that once, to be smoother. We have learned from that experience, and ultimately we have to create the right project structure and investment case to attract the external finance that is required, not just for our project but for the whole new nuclear programme, and we have to think of it in terms of a programme as well as individual projects.

**Chair:** Thank you very much.

**Q95 James Heapey:** Mr de Rivaz, our earlier exchange has surprised commentators a little because your unwillingness to commit to early May stands at odds with what Monsieur Macron said in the French Parliament yesterday. I think I know why, and I just want to question you a bit on that. The leaked letter from your boss in France the other week said very clearly that they need to obtain commitments from the state to help secure our financial position. Without that commitment, you cannot proceed with the project. Is that right?

*Vincent de Rivaz:* Yes, and this coming month we—

**Q96 James Heapey:** What Mr Macron said yesterday in the French Parliament is that the French Government will take a decision on that recapitalisation in early May. The reason you cannot commit to a date this morning is that if the French Government do not agree to that recapitalisation, no matter what your commitment is in your statement front-up, actually you will not be able to build us a power station because the French Government will not have given you the cash to do so.

**Vincent de Rivaz:** May I repeat, if I may, what I have said categorically? This project will go ahead. It is difficult to imagine stronger support than that which the French Government has given for this project. Recently, early March, the French President, François Hollande, and the British President, David Cameron, in the Franco-British summit, expressed very clearly there is strong support for the project. Secondly, the French Minister of Economy and Finance was in charge of precisely the discussions with EDF on this subject. As I said, every day in the last 10 days, he has supported, and he has said yesterday at the French Parliament that—

**Q97 James Heappey:** This is exactly what I hoped you would say. I put it to you that the reason that you cannot commit to a decision is because you are in the French Government's hands, but you have just replied categorically that it will happen.

**Vincent de Rivaz:** Yes.

**Q98 James Heappey:** That means that you are 100% confident that the French Government will give you the cash by early May. It is extraordinary that if you are that confident of that and you are that confident of the timeline, you are unwilling to say that the very next day you will make a final investment decision, and, therefore, you can do it by early May. It does not make sense to us and it does not make sense to anybody who is commentating on this session from afar. Why the disconnection?

**Vincent de Rivaz:** No, there is no disconnection. I have just told you that I do not want to give a specific date.

**Q99 James Heappey:** We are not asking for that. We are asking you to set a backstop. We are asking you to tell us the latest possible date by which you will have taken a final investment decision. Not the date. The latest possible date by which you will have taken one. I know it is dependent on the French Government.

**Vincent de Rivaz:** You have said earlier that, listening to the French Minister, you think these latest dates should be mid-May. I think it is a very assumption you are making.

**Q100 James Heappey:** Once the French Government has taken its decision, which you are confident will be as you need it to be, and you are confident it will be in early May, it is very reasonable for us to assume that in that same timeline you will take a final investment decision?

**Vincent de Rivaz:** It is.

**Q101 James Heappey:** Why is it reasonable for us to assume it, but not reasonable for you to just say it?

**Vincent de Rivaz:** I am very pleased to give you the privilege to make this assumption, and to draw—

**James Heappey:** We are here to take evidence from you.

**Vincent de Rivaz:** —the right conclusion, as you have done.

**Q102 Chair:** Basically, the future of Hinkley Point C in the United Kingdom is in the hands of the French Government as we speak?

**Vincent de Rivaz:** The future of Hinkley Point C, the future of nuclear, is the result of joint efforts, which have been there for years and years.

**Q103 Chair:** The French Government is absolutely pivotal here.

**Vincent de Rivaz:** Absolutely, as the British Government is, and I think it is no surprise that for such a massive project, the shareholder of EDF, which is the French Government, is as supportive as it is. It makes a lot of sense that after all these years, where the French Government and the British Government have been supporting us developing this project, bringing it to the stage it is today, going through all the hurdles, and our colleagues have said that there are many hurdles, just to—

**Q104 Chair:** I understand that. Hinkley is in the hands of France. It is in the hands of France.

**Vincent de Rivaz:** No, no. No, no, no, no. Hinkley is in the hands—

**Q105 James Heappey:** It is not in your hands.

**Vincent de Rivaz:** Hinkley is in good hands, first of all. The hands of a great team, which—

**Q106 Chair:** I am not sure that was meant to bring a laugh, but it certainly did bring a laugh.

**Vincent de Rivaz:** It is in good hands, in the hands of a great team, which has achieved a lot, which has been through many hurdles—2012—to get the GDA that we have since 2012, to get the nuclear site licence that we have since 2012, to get the planning consent that we have since March 2013, to get the CfD that we have since the end of 2013—

**Chair:** Yes, I think we have established that. Time is pressing, I am sorry—

**Vincent de Rivaz:** —to have the support of the European Union that we have had in 2014—

**Chair:** Yes, we understand this.

**Vincent de Rivaz:** —to have the partnership of the Chinese, French, and partners that we have got in October 2015.

**Chair:** I am sorry, Mr de Rivaz, I have to cut you off.

**Vincent de Rivaz:** No, but it means that it is a very long and good process.

**Chair:** That is fine. We understand this. We are pushing for a date and you cannot give us a date. You have background information, which we know. Mr Pennycook, you want to take it further.

**Q107 Matthew Pennycook:** I will take the pressure off for a few minutes.

**Vincent de Rivaz:** Thank you.

**Q108 Matthew Pennycook:** Mr Zhu, could I put it to you? You are looking at a European company, EDF, whose balance sheet is stretched, whose CFO has resigned over concerns. How firm is the Chinese end of this deal, given the problems that you are viewing from where you are?

**Zhu Minhong:** I understand you are asking me for a commitment from the Chinese party. I am happy to answer your question. We keep our full commitment to UK projects. As I told you, we have been in partnership with our colleague, EDF, for 30 years, and the story in our mind is we are partnered with EDF. We think we can commit not only investment but also we think we can bring our expertise and experience that we have of 20 years' nuclear development and operation to this country, to this HPC project. That is on one hand.

On the other hand, we hope through our participation in the HPC project we can learn how to direct nuclear power sites in the UK because the context is totally different. We hope that we can learn from our colleague, EDF. To be clear, our commitment remains. We will be helping EDF to make this project a success. Thank you.

**Q109 Matthew Pennycook:** No legal documents have been signed and no agreements finalised. Perhaps we can get the question we have been asking from the point of view of China General Nuclear. When do you expect an agreement to be finalised, to be signed off? If an agreement was not signed off by mid-May, would you be concerned, as an investor in the project?

**Zhu Minhong:** It is a super question, and I am happy to share with you some evidence in terms of progress we have made. It is huge progress. Last year in October, SIA has been signed between two chairmen of two groups, CGN and EDF. It marks a very important milestone. That means what? It means we have agreed the package deal in terms of heads of terms, and then we spend our time transferring heads of terms into a long form. Today what I can say is our discussion is practically completed.

**Q110 Matthew Pennycook:** When do you expect that final form agreement to be signed off?

**Zhu Minhong:** As Mr Vincent de Rivaz responded to your questions, and from CGN's side, we are confident to say this project will go ahead.

**Q111 Matthew Pennycook:** If this power station were fuelled on confidence and passion, it would be up and running, but it is not.

**Vincent de Rivaz:** I concur totally with what Mr Zhu Minhong just said. We have made huge progress since October to finalise, I think, 2,500 pages of contracts related to three sites, Hinkley, Sizewell and Bradwell, and to two technologies. It is practically completed and when it will be signed, at the same time and—

**Q112 Chair:** Nobody disputes that at all, but the Committee have been trying with various degrees of success to get the date in May. We think now it is the first half of May, at least.

What I want to do is take you on now to the experience of building EPRs in other countries. We have talked about a lot of the economics but of course a lot depends on the technology. If the finances have problems, if the dates have problems, if the form-signing has problems and if the final investment decision has problems, it would appear too that the EPR itself has problems. The one in Finland is nine years behind schedule and €5.2 billion over budget. The project in Flamanville in France is six years late and €7.2 billion over budget. Is Hinkley C going to go the same way, over time and over budget? We already know that the filling-in of the paper is taking time. How is the building or the construction going to be? Will that be over time and over budget?

**Humphrey Cadoux-Hudson:** I would not describe what we have been doing as filling in the paper. We have spent the last years, through the Generic Design Assessment process, doing an enormous amount of work on the design to ensure that we have that design stable and ready, which I have to say has not been the case for the Olkiluoto and Flamanville start. Part of this is to go and look in huge detail at all the lessons we can learn out of the experience of the other projects, and on top of that we have engaged the supply chain to be part of the preparations for the project. We have had an enormous amount of engagement from Areva, Alstom, with Laing O’Rourke and the other big supply chain companies. I would say that none of the other projects have been anything like as well-prepared as we are today.

**Q113 Chair:** You say that but on 9 March, the *Times* reported the Office for Nuclear Regulation had yet to give final approval for Hinkley Point C because of “increasing worries about the reactor’s steel dome”. If the planning was there, why are they concerned?

**Humphrey Cadoux-Hudson:** The UK regulator has looked into all of the issues. We have, as I said, passed the GDA. We keep them informed of any issues that are arising and they have clear visibility of how we are intending to solve the issues. There have been issues around the dome raised for the Flamanville reactor. We are very confident that we have—

**Q114 Chair:** These are issues in the UK.

**Humphrey Cadoux-Hudson:** We have a clear solution to ensure that the reactor pressure vessel for the UK will be built using slightly different manufacturing methods, which will

eliminate the problem that has arisen on other forgings. It is a good example of how we are taking fast feedback out of all issues that are arising out of the other projects, taking them into account and ensuring that we have good, reliable solutions that will enable us to deliver on time, on budget, safely.

**Q115** [Click here to enter text.](#) **Chair:** You are still in the position where your technology and your construction are dependent on what is happening in Flamanville in France. The French nuclear regulator, ASN, warned of “very serious anomalies” and weak spots, again in the steel reactor, and it seems that the ONR here in the UK is following that very closely. You cannot have finalised what you are going to be doing at Hinkley given the ongoing “very serious anomalies”, as the French regulator put it in, in Flamanville.

**Humphrey Cadoux-Hudson:** The regulator has not classified them in terms of the seriousness. It is an anomaly to an engineering standard and the task for the EDF engineers now, EDF and Areva, is to study the dome that they have and demonstrate that it is safe beyond any possible doubt. They are going through that process at the moment.

That is for the Flamanville reactor. Ours is not made yet. The reactor pressure vessel is not made yet. We have started the process of getting forgings. We have done that well in time, so that if there are problems on the forgings we have time to correct them, and we are using a different manufacturing method, which we are absolutely sure will lead to a different result. That is a discussion that has been had explicitly with our regulator and they are comfortable to monitor us in our progress of ensuring a safe, reliable nuclear power plant.

Flamanville itself has nearly completed its civil works. It is over 60% through the erection phase and if you look at the Taishan EPR, Unit 1 has already, over Christmas, entered into the first, very important stage of commissioning the testing on the primary circuit, the reactor pressure vessel and all the associated pipework. We have a very advanced stage reached for the EPR in Taishan and again, together with our partner, CGN, we are getting the feedback out of that experience and will do over the next year as that commissioning runs through to its completion.

**Q116 Chair:** Where in the world is an EPR operational at the moment?

**Humphrey Cadoux-Hudson:** The closest we have at the moment is Taishan.

**Q117 Chair:** There are none at the moment operational?

**Humphrey Cadoux-Hudson:** No, but this is a function of the fact that we are building the latest generation of nuclear power plant. It is a third-generation plant. It is intended by design to be significantly safer than anything that has gone before. It takes into account all the lessons out of Fukushima and all the other things that you would wish.

**Q118 Chair:** Is there one planned to be built—

**Humphrey Cadoux-Hudson:** It is not surprising that there is not one operating because we are at the forefront at the next generation of plants.

**Q119 Chair:** Given this track record of EPR that I have laid out, is there one planned to be built after Hinkley? Are there any further plants or is Hinkley the last?

**Humphrey Cadoux-Hudson:** No, we are planning to build the same plant at Sizewell and also there is a possibility at the Taishan site. For sure, this is not the last. Through Hinkley Point we are going to demonstrate a plant built on time and on budget and allow that track record to create projects that will deliver cheaper, even more economical energy for subsequent projects.

**Q120 Chair:** Can I ask the other two nuclear developers on the panel? The delays to the Hinkley project have undoubtedly affected confidence in the building of new nuclear in the UK. Do you think your technologies could have offered a better solution to that that has been proposed by EDF? Mr Samson?

**Tom Samson:** We believe that our technology offers a deliverable solution for the UK. That is why we are progressing forward with the AP1000 through GDA, and to build it in Cumbria. Westinghouse, our technology provider, is the originator of the PWR and has a rich legacy and history in developing the PWR technology, both in the commercial fleet and in the nuclear navy in the US and elsewhere. Westinghouse's ability to build the PWR over time has been demonstrated. The AP1000s are part of a fleet that is currently under construction in China and the US and, as I mentioned earlier, we are learning those lessons, building in the deliverability, the price and delivery certainty, into our programme to ensure that we can also deliver our programme on time and on budget, to be part of the UK's nuclear new build programme.

**Q121 Chair:** Thank you. Mr Raymant?

**Alan Raymant:** Thank you. The Advanced Boiling Water Reactor that we are building, the Wylfa Newydd, will be the ninth and the tenth unit. Four other units have been built and been in operation in Japan and another four are in the advanced stage of construction. The opportunity for us is to transfer that expertise and know-how from successfully building those reactors to time and cost and to bring that to the UK, working with the UK supply chain to achieve that.

**Q122 Chair:** Thank you. Mr Zhu, you must feel almost a spectator looking at the tête-à-tête going across each side of the English Channel at the moment. What confidence do you have towards the nuclear build in the UK or to other nuclear build in the UK? What do you feel is the climate for welcoming nuclear technology and construction in the UK?

**Zhu Minhong:** Personally I have confidence in EPR technology because we are now building our two units in China. It is clear.

**Vincent de Rivaz:** Saying our Chinese partners are spectators is very economical to the truth. They are building two EPRs in China successfully. As Humphrey said, the first ever

third-generation technology, which is meeting the highest safety standards and has been successfully through these tests, what we call the tests, is in Taishan. EPR is a technology that has the Generic Design Assessment certificate here in the UK. It is the only third-generation technology that has been through this.

**Q123 Chair:** China General Nuclear are building at Bradwell, I understand, as well. You are involved in construction at Bradwell and Sizewell, yes?

**Zhu Minhong:** Yes. As I shared with you, our partnership covers HPC, Sizewell C and Bradwell B. Bradwell, where we plan to deploy HPR1000 technology, even later we can—

**Q124 Chair:** If Hinkley does not happen, will that affect your confidence? If Hinkley Point C is not built, how will that affect your view of building nuclear in the United Kingdom?

**Zhu Minhong:** It is a simple question and I am happy to share my thoughts on this. I believe our investment will benefit the UK. Why? Because our investment means, from my understanding, thousands of jobs we can create.

**Q125 Chair:** If Hinkley does not happen, how do you view the UK? Hinkley might not happen. Do you have any particular feeling towards the UK in the event of Hinkley not happening?

**Zhu Minhong:** As I said, we have confidence to say HPC will go ahead. We can only look at the deal on the table. We do not have thinking on this kind of hypothetical scenario. Thank you.

**Chair:** I am sorry, time is pressing. Confidence and enthusiasm again, as Matthew Pennycook said.

**Q126 Matthew Pennycook:** To Mr Zhu, given how confident you are in EPR why has CGN not ordered another EPR at Taishan, as Paris has been pressing you for quite some time to do?

**Zhu Minhong:** It is a good question. We are progressing well the construction of two EPRs in Taishan. That is a fact. We hope that the first unit of EPR will come into production in the year 2017, next year. That will be the first unit of EPR. Alongside this progress, alongside this success, we will have plans to construct more EPR in China.

**Q127 James Heappey:** This morning has been a great advert for NuGen and Horizon, as we have the confidence of knowing that you are intending to build much later in the class. Was it the thirteenth and fourteenth reactors and the fourteenth and fifteenth reactors? The question for EDF, and for China General Nuclear, is how far out of the ground Hinkley can get before Taishan and Flamanville are up and running. Moreover, what can be done on Sizewell and Bradwell until construction at Hinkley is in full swing?

**Humphrey Cadoux-Hudson:** You have heard Minhong say that Taishan Unit 1 should be operating next year.

**Zhu Minhong:** Yes.

**Q128 James Heappey:** You are totally confident of that? With Flamanville there has been—

**Humphrey Cadoux-Hudson:** Sorry, you should not direct—

**James Heappey:** You are totally confident that Taishan will operate next year?

**Zhu Minhong:** Yes.

**Q129 James Heappey:** Why is the Taishan technology working and you are confident you can switch it on next year, whereas in Flamanville there have been delays and need for redesign?

**Humphrey Cadoux-Hudson:** I will just say that we have an open learning process between the projects. Taishan has been able to benefit from learning out of the experience on Flamanville. That learning has been put in practice by a very strong team at Taishan. As Minhong said, it is a partnership between CGN and EDF, so there is a very clear route for those lessons over time.

**Q130 James Heappey:** Taishan will overtake Flamanville, effectively. The question still stands: how far out of the ground can Hinkley get and how much work can be done on Sizewell and Bradwell?

**Humphrey Cadoux-Hudson:** In a year and a half you will see us moving an enormous amount of material and starting to create galleries around the bottom of the plant. That is what can be done in that period of time. It is not very far away before we can see Taishan operating.

**Q131 Mr Reed:** How many reactors does China intend to build at the moment? Fifty springs to mind.

**Zhu Minhong:** It is a very good question. The fact is China has the biggest number of units under construction. For example, for my group, CGN, we have 12 units under construction, two units per year. We have not stopped our construction for a decade. That is why I told you that I hope we can bring our expertise to this country. Construction of a nuclear power station is something really complicated and, as nuclear people, we have this concept. We need to share our experience. As Humphrey said, my units in Taishan are advanced and we are happy to share our experience for HPC. That is our life.

**Mr Reed:** Thank you.

**Zhu Minhong:** Xiè xie.

**Q132 Mr Reed:** Xiè xie. Turning to NuGen very briefly, what is the experience elsewhere in the world with regard to the AP1000? What have the project developments been like in terms of running to time and budget? How can those lessons be assimilated at Moorside? Have there been, at any point, any safety concerns with the AP1000?

**Tom Samson:** I will talk about the other projects first. The other projects in China and the US have also had schedule challenges and cost challenges. We have dissected those and done a forensic analysis to understand which were related to engineering impacts, to supply chain decisions or to construction progress and which were related to regulatory changes, government intervention or other political activities in those countries.

All those experiences and lessons are being factored into our programme. What is important to recognise is that as there are eight units under construction, there is a physical progression. The delays that were experienced on the first units were then much less as the subsequent units came on line. Similarly, in Abu Dhabi—I spent four years in the UAE—with four units being constructed side by side, you could visibly see the lesson-learning transferring to the subsequent units because that knowledge builds up. We benefit from that knowledge base on the AP1000. That is built into our programme to ensure we can rely on price and delivery certainty in our structure.

On safety features, the AP1000 has been through a regulatory review already in the US and in China and is going through the GDA process. There are no technology barriers preventing us from getting to the end of that process. There are a number of issues to be concluded with the regulator. Most of them are converging issues. The features on the AP1000 do have some unique safety features, being part of, as Vincent mentioned, the generation three-plus designs, with the passive safety features that provide the AP1000 with some unique safety elements particular to that design.

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**Q133 Mr Reed:** Alan, with Horizon, what is your experience elsewhere?

**Alan Raymant:** The projects in Japan have been built to time and cost. The benefit there that we are able to bring to the UK is that in Japan they have had a continual programme of nuclear power station development. They have not had the stop-start that we have experience in the UK and, therefore, they have been able to maintain that expertise and experience and bring that through into subsequent projects. That is the opportunity that we have, to transfer that expertise and know-how to the UK projects, which is what we are heavily focusing on at the moment to make sure our projects are delivered successfully to time and cost here.

**Q134 Mr Reed:** Any particular learning points for Wylfa and Oldbury? Clearly, you are all working in different regulatory and political environments with these projects. Any particular learning points for your projects here in the UK?

**Alan Raymant:** Yes, it is true to say the key challenge for us at the moment is going through the regulatory process. It is very different in Japan to the UK, the whole approach to regulatory assessment, and that is a key focus. The other key lesson that Hitachi has learned is the need to do detailed planning up front before getting too far into construction.

That is a key feature of our programme here as well, to make sure we have the plans fully established before we proceed with committing to construction.

**Q135 Mr Reed:** This is a very unfair question. This is a question I have for the entire panel. Is the Office for Nuclear Regulation and the Office for Nuclear Development in this country sufficiently staffed and powered in order to help you all expedite your projects?

**Alan Raymant:** At the moment, clearly, it is something we keep an eye on because there are two projects going through GDA and obviously the Hinkley project now in the licensing phase. We will be moving into the licensing phase over the next 12 to 18 months as well. It is a key issue that we have to bear in mind because, at the end of the day, the regulatory regime is hugely important. It is a key part of maintaining and building public trust in what we are doing, so it is vital that they are staffed accordingly to be able to scrutinise and assess what we are doing closely.

**Mr Reed:** My view is it is a bit of a bottleneck, but I see I am not going to get any joy from the panel. Thank you, Chair.

**Chair:** Thank you very much indeed, Mr Reed. That brings our questioning to an end for this morning. I would be quite interested also to know—and maybe it will transpire in the future—but I am not sure I would get an answer, of what EDF would look for from the UK Government if it pulled the plug. I am sure the cost would be expensive.

Can I thank you, panel, for your time this morning? We have heard of your confidence and, indeed, your super enthusiasm loud and clear. We will be awaiting EDF's announcement in early May. Indeed it may be in the Queen's Speech on 18 May, which will be marking the new parliamentary session. Of course if it is not there we will reserve the right to call EDF back to the panel. We will also be following the developments of NuGen and Horizon with great interest as well. Thank you all for your time.