

# PARLIAMENTARY DEBATES

HOUSE OF COMMONS  
OFFICIAL REPORT  
GENERAL COMMITTEES

Public Bill Committee

## NUCLEAR ENERGY (FINANCING) BILL

*Second Sitting*

*Tuesday 16 November 2021*

*(Afternoon)*

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Examination of witnesses.

Adjourned till Thursday 18 November at half-past Eleven o'clock.

Written evidence reported to the House.

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**Saturday 20 November 2021**

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**The Committee consisted of the following Members:**

*Chairs:* †YVONNE FOVARGUE, JAMES GRAY

Baker, Duncan ( <i>North Norfolk</i> ) (Con)	Owen, Sarah ( <i>Luton North</i> ) (Lab)
† Blackman, Kirsty ( <i>Aberdeen North</i> ) (SNP)	† Pennycook, Matthew ( <i>Greenwich and Woolwich</i> ) (Lab)
† Brown, Alan ( <i>Kilmarnock and Loudoun</i> ) (SNP)	Wallis, Dr Jamie ( <i>Bridgend</i> ) (Con)
† Browne, Anthony ( <i>South Cambridgeshire</i> ) (Con)	† Whitehead, Dr Alan ( <i>Southampton, Test</i> ) (Lab)
† Cairns, Alun ( <i>Vale of Glamorgan</i> ) (Con)	Whitley, Mick ( <i>Birkenhead</i> ) (Lab)
† Crosbie, Virginia ( <i>Ynys Môn</i> ) (Con)	† Whittaker, Craig ( <i>Lord Commissioner of Her Majesty's Treasury</i> )
Doyle-Price, Jackie ( <i>Thurrock</i> ) (Con)	
† Duffield, Rosie ( <i>Canterbury</i> ) (Lab)	
† Fletcher, Mark ( <i>Bolsover</i> ) (Con)	
† Hands, Greg ( <i>Minister of State, Department for Business, Energy and Industrial Strategy</i> )	Sarah Ioannou, Rob Page, <i>Committee Clerks</i>
† Jenkinson, Mark ( <i>Workington</i> ) (Con)	† <b>attended the Committee</b>

**Witnesses**

Richard Hall, Chief Energy Economist, Citizens Advice

Chris Ball, Managing Director EMEA Nuclear, SNC Lavalin

Dawn James, Vice President Nuclear, Jacobs

Cameron Gilmour, Vice President Nuclear, Doosan Babcock

Alan Woods, Director for Strategy and Business Development, Rolls Royce

Tom Thackeray, Director for Decarbonisation, Confederation of British Industry

Tom Greatrex, CEO, Nuclear Industry Association

Rebecca Groundwater, Director of External Relations, Energy Industries Council

Mycele Schneider, World Nuclear Industry Status Report

Professor Stephen Thomas, Emeritus Professor of Energy Policy, Greenwich University

Doug Parr, Policy Director and Chief Scientist, Greenpeace UK

## Public Bill Committee

Tuesday 16 November 2021

(Afternoon)

[YVONNE FOVARGUE *in the Chair*]

### Nuclear Energy (Financing) Bill

2.1 pm

**The Chair:** Can I ask if there are any declarations of interest?

**Mark Jenkinson** (Workington) (Con): Chair, I would like to bring to the Committee's attention my entry in the Register of Members' Financial Interests. It is a matter of public record that I worked in the nuclear industry prior to my election.

**The Chair:** Thank you.

#### Examination of witness

*Richard Hall gave evidence.*

2.2 pm

**The Chair:** We will now hear from Richard Hall, chief energy economist, Citizens Advice, who is appearing via video link. We have until 2.30 pm for this session. Welcome, Mr Hall. Would you like to introduce yourself?

**Richard Hall:** Good afternoon. My name is Richard Hall. I am the chief energy economist at Citizens Advice. Citizens Advice has a statutory role to act as a consumer representative in the electricity and gas sectors. That comprises a research and advocacy function in terms of trying to understand the issues consumers face and propose better solutions for them; an advice function in terms of helping consumers to understand their rights and options that is provided through our bureaux, our website and a telephone consumer advice service; and providing advanced support to consumers with difficult complaints or issues through an extra help unit that is shared between ourselves and Citizens Advice Scotland based in Glasgow.

**The Chair:** Thank you very much. Dr Alan Whitehead would like to ask a question.

**Q60 Dr Alan Whitehead** (Southampton, Test) (Lab): Good afternoon, Richard. I will start the questioning by asking you to reflect on your consumer protection role at Citizens Advice and how you feel that the regulated asset base arrangement protects, or otherwise, consumers and their bills. For example, I know that you made a submission to the RAB consultation when it was under way, which made a number of points about how the customer might be best protected in a RAB situation of the size of Sizewell C and about the risks that might be run as a result of dealing with a project that has so many uncertainties in cost and timing. Could you expand on that for us?

**Richard Hall:** Yes, certainly, Alan. There are good reasons to think that a RAB model could reduce the cost of capital associated with bringing forward new nuclear projects, but it is important to be mindful that consumers are not simply exposed to the cost of capital; they are also exposed to the volume of capital. That is relevant in the case of nuclear because nuclear projects have a track record of coming in over budget and behind schedule.

If you look at the impact assessment that the Department for Business, Energy and Industrial Strategy published alongside the Bill, it highlights that, on average, new nuclear projects of the nth of a kind—not the first reactor of a particular model to be built, but an iteration of it—have come in 20% over budget within Europe and 100% over budget worldwide since 1990. It also highlights that nuclear projects within Europe have suffered construction time overruns averaging 40% following the final investment decision. The average is 90% on a worldwide basis since 1990. This matters to consumers because, under a RAB model, unlike a contracts for difference model, they are exposed to the cost overruns and to the time overruns if they occur in a different way.

Perhaps to unpack what we mean by that, I should point out that under the CfD model that was adopted for Hinkley Point C a price is guaranteed to the developer for every megawatt-hour of output it produces, and that is inflation-linked, but consumers do not become liable to start paying those costs until the plant is operational. Those costs are pay on delivery. Consumers are not expected to pay in advance of the plant being there. Under a RAB model, consumers would start paying towards the cost of the plant from the time the construction commenced. Indeed, the Bill as it is drafted allows for that. If there are construction cost overruns, consumers will essentially be paying for a benefit in terms of a production facility that is not actually being delivered yet. That is the point about construction time issues.

On cost overrun issues, while the strike price that was agreed for Hinkley Point C appears to some commentators to be quite high, it has the advantage to consumers of being, in effect, an all-in price. If the cost of the build project escalates over time, those escalating costs will have to be met, but they would be met by the developers; they would not be met by consumers. Essentially that risks sits with investors. Under the RAB model, however, it is likely that any cost escalations would be shared between the consumers and investors. At this stage, we do not know exactly how. The BEIS consultation from the autumn of 2019 suggested that it might look at putting in place mechanical sharing factors between the developer and consumer. That means if the construction were to run under or over budget, a proportion of the benefits or additional costs would be borne by the investors and the developers, but a proportion would also be borne by consumers. On that, it is important to be aware that although the developers have some control over construction because they are in control of the overall project, consumers do not have any control over the risk. Essentially, they are the passive recipient of the risks.

In a nutshell, the concern that we have is that if a project were to come in on budget, RAB looks like a very good model potentially, but there is a strong historical track record that suggests that projects may not come in on budget. Under the RAB model, consumers may be exposed to significant cost overruns as a consequence.

**Q61 Dr Whitehead:** Thanks very much for that. I am sure you understand, having looked at the Bill, that the mechanism that is in place at the moment for the sort of overruns you mentioned is a revision of the allowable costs. That would be at the Secretary of State's discretion to reformulate as far as RAB was concerned. That would then follow on into additional calculated costs for consumers as the RAB was re-costed according to the overruns. Do you have any thoughts about whether that is a good enough system for the protection of overall consumer interests, or are there ways that you might want to modify that to make sure that the allowable costs ceiling that was initially set out was, indeed, either shared by developers and consumers in future or might be considered for different methods of financing should it be breached?

**Richard Hall:** There is a lot in that question. I will try to unpack it if I can—there was something about methods of financing, and something about cost caps too. Regarding cost caps, the Bill envisages that there would be a funding cap essentially—a point at which, if costs escalated significantly above the expected spend, the Secretary of State would be prompted to take a decision on what should happen with those additional costs. I do not believe that the face of the Bill actually stipulates what that materiality would be, and I think it also leaves that decision very much at the Secretary of State's discretion, so there is the potential that they could simply acknowledge that there was a problem, but continue to put those costs on to consumer bills. That seems to be fairly vague: it leaves room for ambiguity on what a Secretary of State might do in that type of scenario in future.

A couple of things could be done to try to mitigate consumer costs. The first is that the sharing factors that are set out—they are not set out in the Bill; they are to be agreed between the Department and the developer, as to who bears the costs if there are significant cost overruns—should be slanted towards the developer facing most of those costs. Again, that is because consumers have no ability to control those costs whatsoever, whereas the developer does have the ability to control some of those costs. Effectively, that risk needs to be borne as much as possible by the developer. It should be borne in mind that, obviously, that creates some interactions with the cost of capital: effectively, the more you de-risk the developer, the more you reduce the cost of capital, but given that you are only doing that by pushing those risks on to consumers, we think it is probably better to ensure that the developers are subject to as sharp incentives as possible to build it on time.

Turning to the other areas that I think would be of assistance, the Bill envisages that the developer would have a right to appeal any decisions that Ofgem made on the price control that had been agreed for the developer. Intuitively, those appeals are only going to go in one direction—that is, if the developer feels that a settlement is not generous enough to it. It is hardly going to appeal if it feels a settlement is too generous. I notice that elsewhere, in terms of many aspects of energy governance, where appeals processes exist, they are bidirectional: they allow for someone to appeal that a settlement is too tough, but they also allow for people to appeal that a settlement is too weak. We think that type of approach should be followed here: if the developer has the right of appeal to basically ask for more money, other interested

parties should have the right of appeal to argue that there should be less money, so there is bidirectional scrutiny and tension there.

A second area in which I think we could help to bear down on costs is that it is quite important that some form of independent third-party impact assessment is made of the key terms of any deal that is agreed under this Bill, and published before that agreement becomes legally binding. I would also like parliamentarians such as yourselves to have an opportunity to see the headline terms of any agreement and that independent third-party impact assessment, and to be able to scrutinise those costs before the agreement becomes legally binding. If that seems like it might be quite an unusual thing to do, because obviously Parliament does not micromanage individual infrastructure purchases, we would argue that it is justified in this case, because we are talking about building assets that will—even at the most conservative estimate—cost consumers tens of billions of pounds, and those costs will be recovered from consumers for potentially 50 or 60 years.

**Dr Whitehead:** Thank you.

**Q62 Matthew Pennycook (Greenwich and Woolwich) (Lab):** Richard, you have spoken with great insight about the balance between the advantages of the RAB model and the risks that come with it for consumers, and also about how those consumers might be better protected. Will you give the Committee your take on what we have learned from those infrastructure projects that have benefited from a RAB funding model, such as Thames Tideway or Heathrow terminal 5? Was the peak of costs on consumers within the estimated range at the start of the project, leaving aside cost and time overruns? How accurately can you predict the peak cost for consumers and ensure that it comes within a set range, if—as may be the case—amendments to protect consumers are not ultimately adopted? How accurate is the forecasting of the total impact on consumer bills?

**Richard Hall:** On those two specific projects, Heathrow and Thames Tideway, I cannot give any insight. I am not particularly close to those individual cases. It is fair to note that in both cases the cost of capital brought forward by the model seems to have been low, in particular in the case of Thames Tideway. On nuclear, I simply go back to the point that there is a large base of literature looking at historical cost overruns and the extent to which things come in on budget. That tends to display fairly consistently that these types of projects are very likely to be subject to optimism bias at the time that they are procured—a belief that they will be cheaper than they actually will be.

In addition to the costs and dates I mentioned from the BEIS impact assessment suggesting the average levels of cost overruns, look at a couple of other examples from academia: Sovacool et al. looked at a global example of 180 new nuclear plants and found that 97% of them came in over budget and that the average cost overrun was 117%; and Flyvbjerg et al. found that in a sample of 194 nuclear plants, the median cost overrun was 68% and the median schedule or construction-time overrun was 40%. That is a fairly large sample set of projects, and the analysis tends to suggest considerable optimism bias for new nuclear—it tends to come in late and over budget.

**Q63 Matthew Pennycook:** I have one follow-up question. Leaving aside the particular problem historically in nuclear projects with overruns, will you elaborate on how the order of magnitude with this particular RAB—or a RAB that the Bill would facilitate for something like Sizewell—increases the amount of risk for consumers vis-à-vis those RABs that have been used on other infrastructure problems, which are smaller? Does the order of magnitude of the potential RAB we are talking about—independent of the dynamics around nuclear—inherently increase the risk significantly, just because it is so much bigger?

**Richard Hall:** I think potentially it could, simply because of the scale of the project. The cheapest cost estimate in the impact assessment is that, for a Hinkley Point C-sized plant put forward on the RAB model, it would cost about £24 billion. That is the cheapest estimate, so we are talking about extremely chunky consumer spend.

**Matthew Pennycook:** Thank you.

**Q64 Alan Brown (Kilmarnock and Loudoun) (SNP):** Richard, following on about costs, you said that Hinkley Point C was estimated at £24 billion. Even if we say that Sizewell is £20 billion, we heard that Rolls-Royce is hoping to build five small modular reactors, which will be about £10 billion. If we look at consumer protection, value for money and achieving net zero—particularly heat decarbonisation—if I gave you £30 billion, would you spend it on nuclear, or would you do something different with such levels of capital?

**Richard Hall:** It is hard to see a case for this being the most cost-effective way to spend money on generation. A lot of the argument for whether we need new nuclear or not comes down to whether it is perceived as being useful to provide a balanced generation mix, so that it is available when other forms of low-carbon generation are not available. On that point, I note that the Government are more confident on the need for new nuclear than some of their advisers are. The Committee on Climate Change's sixth carbon budget work from last December shows a range of pathways to net zero by 2050, some of which involve new nuclear. It talks about it being "possibly" needed, not definitely needed.

The National Infrastructure Commission's 2018 national infrastructure assessment recommended that the Government consider bringing forward one new large-scale nuclear plant in the 2020s—but only one, suggesting that in general terms the cost reductions in renewables were so sharp and likely to continue that a pivot to renewables appeared a better bet than backing nuclear more forcefully.

The case for whether new nuclear is needed is ambiguous at this stage. Could you get better value for money from investing in other things? I think the challenges of making our homes energy-efficient so that we stop spending so much on energy and reduce emissions should be tackled as a priority.

**Q65 Alan Brown:** We heard this morning from the Sizewell C company that it is looking for a 60-year contract under the regulated asset base model. Do you have concerns about consumers getting locked into a 60-year payback period? Given that the longest operational lifespan of a UK nuclear power station has been 40 years,

60 years is 20 years beyond that maximum. Does the Bill need to address the risk of consumers paying for a nuclear power station that has reached the end of its life and is not generating?

**Richard Hall:** I certainly think that the risk of it being brought out of service earlier than expected has to be borne by the developers rather than by consumers. There is no way in which consumers can forecast or manage that risk.

On affordability over 60 years, we are talking about a 60-year lifespan, but there may be another 10 years in addition for construction, so we are talking about a payback period that, if we had the decision now, might continue until 2091 or towards the end of the century. It is extremely hard to know what options will be available to consumers 10 or 20 years out, let alone 70 years. It is hard to forecast whether it will offer consumers good value for money over that period.

One can only note that the cost of alternatives—renewables, storage and so on—has fallen rapidly over time. There is some risk of buyer's regret: an option that looks cost-competitive today might look quite cost-uncompetitive quite rapidly.

**Q66 Alan Brown:** We also heard this morning that disposal of radioactive waste is built into the up-front cost and becomes part of the 60-year payback. Is there any way of ensuring that the risk stays with the developer? Might the risk transfer to the consumer? If a company became insolvent, who would be responsible for decommissioning and disposal of the waste?

**Richard Hall:** That is a good question. If the special administration regime were to be used, I understand that effectively it would mean that the special administrator would be taking on that risk. That may mean that it became a public liability. I do not know how a special administrator would sell on that risk to others.

In terms of where it would be borne if the special administration regime were never used, I think that would come down to the terms of the contract agreed between the Government and the developer. In its current form, the Bill basically enables the Government to enter into negotiations with a developer to agree a contract based around the RAB model, but the details of that contract are not contained in the Bill. Earlier, I said that I thought it very important that an independent third-party impact assessment be laid before Parliament after a deal is struck but before it becomes contractually binding. That would provide the opportunity to understand where the liabilities would sit in that type of situation.

**Q67 Mark Jenkinson:** Obviously, I have heard what you just said about nuclear. Since Hinkley, we have taken an annualised payment from operators to deal with waste and decommissioning. It is not something that we have to deal with later in the special administration regime. I gather you have an anti-nuclear stance. Does the CAB have a preferred route to providing consumers with electricity? You have spoken a lot about renewables and the cost of renewables, but when we factor in constraint payments and various other issues, such as back-up, it becomes a very expensive way of delivering energy to the most vulnerable in society. Does the CAB have a view on a preferred electricity generation route, and if we are to build nuclear, do you have an alternative preferred model to RAB?

**Richard Hall:** We do not have an anti-nuclear stance; we are technology neutral. In terms of the options between bringing forward new nuclear or leaving catastrophic climate change unchecked, there is no question that nuclear is an option that can help us to reduce our emissions and tackle the climate change crisis. We do not have concerns on the technology itself, and whether it can be done safely and so on. Our concerns are simply around cost. It looks like a costly option compared with others.

On whether we have a preferred approach, because we are technology neutral we do not have a preference for any particular technology over others. I would simply highlight such things as the analysis of the Committee on Climate Change, which showed a range of possible pathways to 2050 that it considered to be affordable. Some of them involved nuclear and some of them did not. It appears that there is a choice to be made.

**The Chair:** I think this will be the last question to the witness.

**Q68 Dr Whitehead:** Richard, you said earlier that under a CfD model, consumers do not pay anything regardless of overruns other than what they committed to pay through the CfD strike price, whereas in a RAB model, as we have discussed, they are committed to paying throughout the process and may well incur additional costs under a cost ceiling increase. In the impact assessment, it appears that the difference in the cost under a CfD model and under a RAB model was calculated on the basis of consumers paying in full for overruns through a CfD model. Do you agree that that is perhaps not an accurate way of putting it? If so, what sort of difference will that make to the suggestions of the savings between the two models put forward in the impact assessment?

**Richard Hall:** Yes, certainly. Paragraph 4.2 of the impact assessment sets out a range of tables showing what the estimated construction and financing costs would be for a Hinkley Point C-sized power station in a range of scenarios: under a CfD with 20% cost overruns, or with 100% overruns, or under the RAB model at various different costs of capital—

**The Chair:** Order. I am afraid that that brings us to the end of the time allotted for the Committee to ask questions. On behalf of the Committee, I thank you very much, Mr Hall.

### Examination of Witnesses

*Chris Ball, Dawn James, Cameron Gilmour and Alan Woods gave evidence.*

2.30 pm

**The Chair:** We will now hear from Chris Ball, managing director of EMEA nuclear at SNC-Lavalin, and Alan Woods, director for strategy and business development at Rolls-Royce, both of whom are giving evidence in person. We will also hear from Dawn James, vice-president of nuclear at Jacobs Engineering Group, and Cameron Gilmour, vice-president of nuclear at Doosan Babcock, who are both giving evidence via video link.

We have until 3.30 pm for this session. Could the witnesses please introduce themselves for the record?

**Chris Ball:** I am Chris Ball, managing director of the Europe-middle east business at Atkins SNC-Lavalin.

**Alan Woods:** I am Alan Woods, director of strategy and business development for Rolls-Royce SMR.

**Cameron Gilmour:** Good afternoon. I am Cameron Gilmour, and I run the nuclear business at Doosan Babcock.

**Dawn James:** Good afternoon. I am Dawn James, the vice-president responsible for the nuclear power business at Jacobs.

**The Chair:** Thank you very much. Are there any questions for these witnesses? I call Virginia Crosbie.

**Q69 Virginia Crosbie (Ynys Môn) (Con):** I welcome our witnesses. There has been a lot of talk about the impact on consumers of CfD versus the RAB financing model, particularly with respect to large nuclear projects, which often face construction delays and overruns. What is the difference between the impacts of RAB financing and of CfD on consumers?

**Chris Ball:** We talk about the RAB model, from the numbers that I have heard, probably putting about £1 on to consumer bills on a monthly pay-in. To put that into the context of some of the price increases that we have seen through the energy sector over recent weeks, we are probably talking about an 80% increase from some of the figures that I have seen. I have been looking at this with elderly relatives as well.

When you look at the RAB model in terms of the impact on consumers, there is a cost associated with that—of course there is. It is very limited compared with many other models, and we have to take the long-term view in the energy sector. That is something that the energy sector has been sadly lacking for many, many years. We have to take that 2050 view. It represents very good value for money in the big scheme of things.

**Alan Woods:** We welcome any model that helps the deployment of new nuclear. From a Rolls-Royce SMR perspective, if we were to deliver our power plant under a RAB, we estimate that it would be capable of getting in the order of £35 a megawatt-hour, whereas a CfD mechanism would be in the order of £60 a megawatt-hour. That is the different that we would forecast.

In terms of one against the other, it comes down to a question of risk. Our whole programme is designed to eliminate risk, particularly construction and build risk, and to move away from what we would call a one-off infrastructure project to a factory-repeatable product that means we can build certainty into the design. We believe that we can use the CfD mechanism for our plants. We believe that we can raise the private capital to fund that, and that is something that we will be exploring in the coming weeks and months.

**Dawn James:** The way that I look at this, large gigawatt-scale nuclear power stations require a huge up-front investment. Under the CfD model, looking fundamentally at the costs over time, there are a huge number of hidden costs associated with financing these projects, and those costs over time will essentially all be passed on to the consumer.

Under the RAB model, by driving down the uncertainties associated with financing costs because of risk, we are able to actually—

**The Chair:** Ms James, I am afraid your evidence is not very clear. Could you move nearer the microphone?

**Dawn James:** I do apologise. I will do that. Is that clearer?

**The Chair:** Thank you.

**Dawn James:** The costs associated with the CfD model are passed on to the consumer over a much longer period of time. Because the capital investment is so much greater due to financing, ultimately the cost to the consumer is much greater than it would be under the RAB model.

**Cameron Gilmour:** I largely echo the points made by all three of my colleagues. When we look at the Hinkley Point C case, the financing cost within the CfD is the largest amount within the rating—over £82.50. The cost of construction at Hinkley is actually a small element—£11—of that CfD price. The more we can introduce a more economical financing model, that is obviously of benefit to the consumer down the line, so we welcome that.

**The Chair:** Thank you. Anthony Browne or Virginia, did either of you have a follow-up question?

**Q70 Anthony Browne** (South Cambridgeshire) (Con): Yes, thank you, Chair. I just want to clarify something. Mr Woods, did I hear you correctly when you said you could finance your smaller reactors from contracts for difference as well as a RAB model?

**Alan Woods:** We believe we can, yes. It is worth noting that our plant is an order of magnitude different to the larger ones in terms of the capital. It is also different in terms of the time it takes to build and in the fact that we have completely changed the risk profile. As I say, this is a factory-built product and it is something we are used to.

**Q71 Anthony Browne:** Do you not have the construction risk that others have?

**Alan Woods:** We have removed a lot of the construction risk. We have what is called our fourth factory, so we actually assemble our modules on site in a controlled factory environment. This allows us to remove and reduce that risk profile. It is a completely different ball game.

In that regard, we believe that we can attract private capital. We spent some time at COP26 last week and there is an appetite in the financial markets for investment in projects that can demonstrate an acceptable risk profile, which we believe we can. It is up to us to demonstrate that and to attract that private finance, but we think that is doable.

**Q72 Anthony Browne:** Is that irrespective of whether you have the CfD model or the RAB model?

**Alan Woods:** I am referring there to the CfD model. If we have the CfD, which is essentially providing some certainty of returns, then that certainty of returns, coupled with the fact that the risk profile of our product is completely different, represents an attractive financial investment.

**Q73 Anthony Browne:** From what you are saying, if you had the option between CfD and RAB, it sounds as if you would choose CfD?

**Alan Woods:** Well, look, if RAB is available then RAB is great. If you have got that high-risk profile, it will provide even better value to the consumer. From our perspective, the pace is also important and RAB is not legislated for yet. CfD is an available mechanism that is tried and tested, and we believe we can make it work. Therefore, to operate at pace, our preferred route at the moment would be to move forward with the CfD approach.

**Q74 Anthony Browne:** If you moved ahead with the CfD approach, would you be able to switch to the other approach when it is legislated for?

**Alan Woods:** Yes, sure. There is nothing stopping you.

**Anthony Browne:** Change horses.

**Alan Woods:** Yes, it is no secret that SMRs work by building a fleet. How you finance each SMR does not mean they all have to be financed the same way. We are also looking at models for the future, looking at the net zero challenge. The scale of energy or electricity generation that we will need to decarbonise things like heat and transport, or for synthetic aviation fuel, hydrogen and so on—it will take an enormous amount of electricity to make those new fuels. We see a world where you might need to do that on energy campuses that operate in an off-grid manner to maximise that value. In that kind of a regime in the future, we may be able to build these under a separate, more simplified PPA model.

**Q75 Anthony Browne:** I am interested in similar questions to the others. Chris, do you think the RAB model will be sufficient to encourage enough private capital to build a new generation of nuclear power stations, separate from the Rolls-Royce plant?

**Chris Ball:** Yes. I would take it back a step, actually, because we cannot let this conversation become either/or; it has to be both. I say that because, if you look at the future net zero world, the general view is that we should electrify as much as possible and then decarbonise the electricity supply industry. The electrification will probably double our demand on the grid and will probably lead to a tripling of our capacity on the grid, because a large amount of it is intermittent renewables.

There are various studies out there and everyone has a different view, but broadly speaking a quarter of the grid should be—will have to be—firm power, for a host of reasons, not least the storage costs escalating almost exponentially with increased of renewables penetration. We are talking around 50 GW of firm power, or 50 large plants; Hinkley is 3.2 GW. You have two main sources for that. The first is gas with carbon capture and sequestration. By the way, that energy sector has risks; there is no large-scale carbon capture and sequestration plant in the UK, but some of the modelling suggests that we would have to capture and sequester in the UK alone four times the current world capacity of carbon capture and sequestration. The other source is nuclear. This should not become an either/or conversation. This should be a conversation about how we make sure that the CCS market starts moving, the SMR market starts moving, and the large-scale nuclear market starts moving.

For context, we need to build something like 9 GW a year across all technologies—firm power and renewable power—between now and 2050. If you go back over the

last 60 years, our peak output is of the order of the construction of 6 GW a year, averaging at 3 GW, so we have to treble the average output every year for the next 30 years, working to the 2050 timescale. This has to be a conversation about all. There is no doubt that, to push large-scale nuclear forward, the RAB model seems to be the most appropriate method.

**Q76 Anthony Browne:** That is very interesting context. To come back to my question, will the RAB model be enough to attract sufficient capital, particularly from UK investors, to fund the building of the capacity you say is needed?

**Chris Ball:** This is not really my area of expertise; I suggest you are better off asking other people about that. The big piece for me is the risk allocation within that model—where risk sits. There is a balance there. From listening to some of the earlier evidence, clearly the more risk that is transferred to the developer, the more attractive that might become to some investors. The flipside of that is that you are starting to move to a scenario where risk is priced in through the delivery vehicle. That is a trade-off that I would be very careful of. I will limit my comments to that area.

**Q77 Anthony Browne:** Dawn, do you think the RAB model is sufficient to encourage the investment into the nuclear industry that we need to build the capacity to get to net zero?

**Dawn James:** I hope you can hear me okay now. I am not an expert in the field of investors, but building on what Chris said, it would certainly bring more developers into the UK. As I think you are all aware, a number of programmes have started then stopped, including at Wylfa and Moorside, and that is largely down to issues around financing. So yes, I believe that the RAB model will definitely attract more investors and developers, which, as you just said, is critical to our meeting our net zero target.

**Q78 Anthony Browne:** Cameron, the same question. Do you think the RAB model will be sufficient to attract enough capital to build the nuclear power stations we need?

**Cameron Gilmour:** Looking at some of the detail and how the Bill has been written, it seems to be designed to encourage that investment. Again, I am not a financial expert, but it is encouraging to see that nuclear is recognised as playing a key part in our journey towards net zero. From an investment perspective, it becomes something that the Government want to invest in and commit to, so you would say that has to be an encouraging sign for any potential investors.

**Q79 Anthony Browne:** Do you have any particular view about the role of Ofgem as set out in this Bill? Does Ofgem have the capability to regulate a RAB model in nuclear power? Obviously it is whole new area of interest and expertise for it.

**Alan Woods:** I notice I keep getting questions first, so I have less time to think of the answer, but—

**Anthony Browne:** I can ask Chris first if you want.

**Chris Ball:** No, that's fine. [*Laughter.*]

**Alan Woods:** Look, clearly there needs to be a regulator, and a regulator is needed to regulate the way RAB is deployed and managed. From our perspective, Ofgem is as good a point to start as anywhere.

**Chris Ball:** Clearly this creates a new demand, and there is a need for additional capacity somewhere to oversee the management of the RAB model. I think the question is whether Ofgem is best placed to do that, and the answer is: possibly.

The other piece that I would look at is, ultimately, where our country's energy system architect is now. Who is defining the way in which our energy system should look and operate in 2050? Is there benefit in establishing a new energy system architect who takes decisions on the future power mix, and actually putting into that system architect the capability to oversee investments in all sectors? I think that is one of the reflections that I would have about the controlling mind in how we reach that 2050 net zero energy system.

**Q80 Anthony Browne:** Would that not be the role of Government—of BEIS?

**Chris Ball:** It may well be within Government and BEIS, absolutely. But I think we do need that capability firmly established in one place. I am not suggesting it should necessarily sit outside of Government or BEIS, but we should have a clear collection of people under that title as the controlling mind.

**Anthony Browne:** Okay. That is all my questions, thank you.

**Q81 Alun Cairns (Vale of Glamorgan) (Con):** This is a question just for Mr Woods—sorry—because of the small modular reactor interest. The benefits of RAB for the industry and for traditional build are quite obvious, but there are still risks. There is a risk in construction, and therefore costing that risk and building it into the RAB financing is a challenge. We were given evidence this morning by those who believe that a fleet will mean that things de-risk as we go along. There is, at least, a concept, and there is a proven record of design that works, but that is not necessarily the case with SMR. I am playing devil's advocate. I can see that RAB would be extremely attractive to SMR going forward, but we are still at the concept stage, rather than having proof that it works in the way that we all hope it will.

**Alan Woods:** Let me break that down in terms of the proven part. Our design and our plant use proven technology. At the base of the reactor island, there is a pressurised water reactor. It is the same as what Rolls-Royce has designed, built and operated for the past 60 years in the submarine programme. We do not have the same set of requirements as the submarine programme, but it is the same core technology. Is it proven? Yes, it is absolutely proven. We know it works and that we can build it. We are building them today.

The rest of the turbine island plant is designed to use products that are already available in the market today. We are not designing a power plant that requires us to invent a specialist product here or a specialist product there and that has never been made before. It is designed to use products that exist in the market. Even though it is a steam turbine, it is a commodity product we can buy. All the constituent parts at our plant are proven technology. Our civil module approach has been proven

by our partner, Laing O'Rourke, which is making modules of this nature today at Worksop. We will expand that facility to replicate and grow that module manufacturing capacity. The constituent parts are all proven. There is no technology innovation at the plant that is questionable as to whether it will reach the right technology-readiness level.

Then we come to our ability to manufacture and join the modules together. Again, this is not a technology challenge. It becomes more of a logistical challenge and there is plenty of evidence in other industries—in fact, inside Rolls-Royce—where we manage those logistics from the supply chain to the module facilities to the delivery to site and to the installation and commissioning of them.

I do not accept that we are not proven technology; we absolutely are. As I said, we have built into the design, intentionally from the outset, technologies and features that remove the risks associated with traditional construction. It is no longer a very large construction project; it is a factory of products. For example, when we build the power plant, we assemble the modules on site where an average of 500 people are assembling the parts. We do that to move those jobs into the module facilities and the supply chain and into the factory environment where we are manufacturing the same products over and over again in a production line environment.

**Alun Cairns:** Thank you.

**The Chair:** Do any of the other witnesses want to answer the question?

**Chris Ball:** There are two aspects to the question. First is the one about proven technology, which Alan has covered. Secondly, there is taking the lessons learned and leveraging the skills and capability within the UK nuclear industry. If we look at Hinkley Point C from unit 1 to unit 2, we see broadly in the order of a 20% reduction in time scales and costs as we take the lessons from unit 1 on to unit 2. Clearly, if we carry on with that same trajectory at Sizewell C, it will be 40%. I am not suggesting that it would necessarily get to 40% but one would assume it would be in excess of 20%. That is a benefit. Going back to the RAB model, leveraging the experience of Hinkley Point C affords good protection against the risks of cost and schedule overrun. Equally, leveraging those lessons into the SMR programme and from the skills and capability that have been built up on existing nuclear programmes is the benefit from all programmes.

My big fear for us as an organisation, which has several thousand engineers in the UK, is that disruption to workflow means that we lose the lessons learned from the industry. That is not to the benefit of the UK, job creation and the cost of our energy.

**The Chair:** Dawn, do you wish to comment?

**Dawn James:** I merely wish to echo Chris's point that intelligence replication will drive down risks and costs significantly. I really wish to impress on everyone the need for pace in getting the Bill through. A huge number of jobs are at risk across the whole UK.

Can you not hear me very well?

**The Chair:** Not very well at all, I'm afraid. If you'd like to speak up.

**Dawn James:** I have never been accused of this before. I was echoing Chris's point about the benefit of intelligence replication and how it will reduce risks and therefore drive down costs. I was also pressing the need for pace in moving the Bill through so that we retain the skills and the knowledge as we move from Hinkley to Sizewell. That is where a huge amount of value can be realised.

**The Chair:** Cameron, do you have anything to add?

**Cameron Gilmour:** I will be brief. The thing to remember is that the Sizewell C project is global European pressurised reactor Nos. 7 and 8, so the core technologies are proven and operational in a civil nuclear power plant right now. The important thing for the industry is that we generated the continuity and recreated our nuclear expertise in the UK when we started on Hinkley Point C. We have learned a huge number of lessons and we have created a lot of energy in the industry and on the programme. I echo the points made about pace and moving forward. If we give people continuity of employment and the long-term horizon, we will retain the skills and the knowledge. Those skills will be there not just for the gigawatt plants that we can build but for SMRs. For me, this is a crossroads not just for the engineering and construction industry but for the nuclear industry. The skills have been hard earned, and the lessons have been hard learned, so we have to capitalise on that and move forward quickly.

**Q82 Alan Brown:** Mr Woods, earlier you spoke about possibly delivering SMRs with a contract for difference mechanism. What sort of contractual period would you be looking for? Hinkley, at the moment, is a 35-year CfD.

**Alan Woods:** That would depend on a number of factors, including the expected rate of return that the investors were looking for and the value of the CfD itself. In the previous session you were talking about having a requirement for 60 years to pay back on. It would not be that long for an SMR because the capital cost is that much lower and the speed we can build them that much quicker, particularly once we have reached that nth unit and we are rolling them off the production line. The payback period will therefore be a lot quicker, and that will reflect what is available on the CfD. It becomes a balancing act.

**Q83 Alan Brown:** Okay. If I understand the concept of SMRs, it is factory modular production, but the theory seems to be that repetitiveness drives efficiencies as well, so the costs come down. That effectively relies on a multiple order. Would you be looking to get a multiple order or would each contract be negotiated individually, be it RAB or CfD?

**Alan Woods:** There are two things to say on that. First, it is not just about repetition to get down the costs of SMR; there is a core reduction in the capital cost per megawatt purely driven by that factory approach. Taking jobs off an external site environment and moving them to a factory delivers immediate portable efficiencies anyway in terms of the efficiencies that we get out of the people and the product. The method of manufacture and build reduces the capital cost to start with. What was the second part of the question?

**Q84 Alan Brown:** I was asking whether you need a multiple order, and would the contracts be individual or part of a multiple order?

**Alan Woods:** We need to have a pipeline of orders, mainly for us to underpin the investment in the factories, and for the supply chain to underpin the investment that it is looking for in its own facilities and capability capacity. They do not all have to be in the UK. Certainly, we are equally looking at export markets to deliver that order book and line of sight to orders.

The other critical point is that to take advantage of the reduced capital of an SMR, it is beneficial to look, in certain circumstances, at an SMR as a single product. If we start grouping them together in chains of four, five or six as a single project, all of a sudden the capital goes higher and you have a similar position, in some respects, to raising large amounts of capital for single projects. There is a benefit to be had from treating SMRs in smaller multiples, but we need line of sight to orders off the back of the first order or two for us to get the confidence to build the factories, and for the supply chain to invest behind us.

**Q85 Alan Brown:** On what timescale do you think you could have the first SMR constructed and operating?

**Alan Woods:** We have a very detailed schedule to get us to the first of the fleet, as we call it, operating by 2031. The first one has a number of activities that are unique to the first unit. For example, we have to go for generic design assessment, which we entered last week. We have to build those factories and the supply chain. That puts more time into building the first unit. Coupled with that, we know that the first unit will take as long, because it is that first one, and that is in our plan.

**Q86 The Chair:** Do any of the other panel members have a comment? Dawn, do you have a comment?

**Dawn James:** The only thing that I would add is that, as I think Chris said before, we have an ever-increasing demand for electricity in the UK. Our current suite of nuclear power stations bar Sizewell B will all be off the bars by 2030, so we really need to be investing in those big gigawatts and in SMRs, using whichever models are appropriate.

**Q87 The Chair:** Cameron, I see you nodding. Is there anything you want to add?

**Cameron Gilmour:** I am largely in agreement. I will reinforce Alan's point about the need for certainty, where any developer or investor needs a programme. When we create a programme, whether it is gigawatt-sized or SMRs, we create that confidence, the continuity of resources, and then we start to see the efficiencies flow through in the programme as we deliver them, whether it is factory or site construction.

**Q88 Dr Whitehead:** Mr Woods, you mentioned your timescale for the delivery of the first of their kind of SMRs, which I presume will be the 470 MW Rolls-Royce SMR. That, as a matter of interest, is well above the International Atomic Energy Agency definition of an SMR. Why did you choose that particular size to develop?

**Alan Woods:** We actually challenged the IAEA on its definition. The response we got was that, at the time it defined an SMR, that was halfway between what it classed as a medium reactor and a small reactor. There

was no set rationale for why it classified, and it was many years ago, that 300 MW. The simple reason that ours is 470 MW is that we set a requirement on the design to be road transportable. Each module has to be transportable to site by road. That gives us maximum site flexibility. It also removes the need for expensive additional infrastructure, such as new port facilities or new roads, to get the parts in.

Having set the size for the biggest module to be road transportable, the biggest limitation across Europe is about a diameter of 4.5 metres for the biggest module. If we set that as the maximum size for our reactor pressure vessel, that gives us an internal diameter and an internal volume for that pressure vessel. Using conventional available fuel that is made today in the UK and elsewhere, that sets the power that we can get out of that pressure vessel, so we need to design around that power.

The objective that we had, which was set by the utility partners we have worked and continue to work with, was that they want the maximum power for the least capital cost. We are therefore delivering that within the constraint of road transportability.

**Q89 Dr Whitehead:** Does the new reactor that that would involve have to go through the generic testing and approval process?

**Alan Woods:** Yes; all new plants that come to the UK have to go through the generic design assessment process. We put in our application to enter that process last week.

**Q90 Dr Whitehead:** How long do you estimate that process will take?

**Alan Woods:** Our next phase of the programme is for the next three and a half to four years, which will get us to the end of GDA step 2. That is the point at which we have completely de-risked it—not that we see any risk to going through the regulation, because as I said, this is proven technology power plant. We have already been working with the regulator for some time. At that point, we move to the final step, which is step 3, and that will take about another 18 months.

**Q91 Dr Whitehead:** That means your actual construction period at the end of that will be about four years.

**Alan Woods:** We would actually start building ahead of that, because the GDA process allows us to prioritise the longer-lead items, the critical items, up front. We validate those with the Office for Nuclear Regulation early, on the basis that we can then get a release to order to accelerate the manufacturing process. We can do some of that activity in parallel by the way that we sequence the assessment through the GDA activity.

**Q92 Dr Whitehead:** So it is just about possible by the early 2030s if all these things work together.

**Alan Woods:** No, it is eminently possible by the 2030s; it is very doable.

**Q93 Dr Whitehead:** Mr Ball, you mentioned the availability of engineers and the possibility of transferring skills and expertise between sites to save costs and time. What timetable is likely to be best for that transition to

take place in the best way between Hinkley C and Sizewell C? We have heard talk already about a window in which that needs to be done, so that you have the maximum engineering skills and capacity coming in at certain stages in the Sizewell C plant, and coming off the Hinkley C plant as it develops its own stages. What risk does that entail along the way if there is a delay in getting the latter stages of Hinkley C together? What overall window would that represent?

**Chris Ball:** If we work on the basis that Hinkley C is on line in let's call it five years from now, we would have an issue if we held back over that time and thought that we then just move across. Naturally, within any project there is a phasing—there is a phasing of skills which means that we need to maintain a continuity almost at a lower level in terms of the breakdown of those skills. In my own organisation we currently have of the order of 600 people mobilised on Hinkley Point C. At this point in time, that is largely connected with civil engineering, civil design, design of structures, and that positions us quite clearly in a good position for future export markets. Those skills start to demobilise 12 months from now. Naturally in any major project such as this, civil engineering design is one of the earlier phases of the project. We will start to demobilise those skills 12 months from now, if not sooner, and you would probably say that we would demobilise three quarters of that skills base over the course of the subsequent 18 months. We are talking of a one year to two and a half year period over which we would be demobilising three quarters of our workforce, and taking skills out of the industry.

We would look at other neighbouring industries that have a demand on common skills bases to ensure that we maintain employment where possible, but it still represents a loss of capability from the industry that we may or may not be able to bring back in at some future point. That 12-month period from now is what is high on our mind.

**Dr Whitehead:** So that is the window, essentially?

**Chris Ball:** Yes.

**Q94 Virginia Crosbie:** If there was no RAB nuclear financing model, what would that mean for our energy security, delivering net zero by 2050 and our dependence on overseas investment?

**Alan Woods:** Chris made the point earlier that net zero is such an enormous challenge. We often think about decarbonisation in the context of the grid, but the grid in the UK in particular represents about 20% of the total energy we use. The rest of it is heat and transport. As we look to decarbonise heat and transport, there are not that many routes available, certainly in some of them. Hydrogen is one, synthetic fuels is one and of course more electrification, but the common denominator among all of those is that you need more clean electricity. The scale is enormous. We therefore welcome any financing mechanism that will help any industry, not just the nuclear industry, bring forward those clean technologies, because the reality is that we have to have them if we are going to meet net zero.

The implications if we are not innovative with how we approach financing both in nuclear but also in other industries mean that we become dependent on other sources of technologies—imported technologies financed from overseas, which bring with them the whole dependency

on other nations for our critical energy infrastructure. Increasing that dependency puts our ability to meet net zero at more and more risk.

**Chris Ball:** I will take a step back here. Earlier, I mentioned that there is a need for about 9 GW a year of construction to take place each year for the next 30 years. We need to find a way of building everything we possibly can in a way that is most cost-effective for the consumer. In every single area, there will be challenges for us to overcome.

People talk about offshore wind at £40 per megawatt-hour strike price. Actually, when it comes to the last two offshore wind farms—one up in East Anglia and one in Hornsea—one was at about £120 and one at £140 a megawatt-hour initial strike price. I recognise that offshore wind prices have been coming down; that is because of consistent underpinning Government policy. We have to replicate that in each and every one of these areas.

Just because offshore wind prices have come down, does not mean that they will continue to do that; they will reach a plateau and companies will start to go to deeper waters and floating offshore wind prices will pick up. We are also judging things on an old-fashioned measure of the levelised cost of electricity, but for renewables we need to start building in the cost of energy storage as well. That does not come cheap. There is a lot of talk about hydrogen, but that requires a lot of power. For every electron that goes into generating hydrogen, we might get 0.3 electrons back out again; it is not a one for one. That is quite often lost in the debate. Actually, I am a supporter of all these technologies; what I am saying is that we need to look at how we manage those risks.

Net zero will not be achieved without nuclear. From an engineering perspective, the system requires firm power on the grid. The RAB model is a good way of driving forward large-scale nuclear for the benefit of the consumer. Look at the levelised cost of electricity at, let us say, £40 per megawatt-hour for wind, noting my earlier comment, and add the storage costs; if you compare that with nuclear and the RAB model, the prices are very similar. Obviously, Alan also knows the SMR nuclear market very well and would say that, yes, it is similar there.

It worries me that if we do not find a way of pushing all these technologies forward, including carbon capture and sequestration and the technical challenges around that, the risk of failure for the 2050 net zero system is very high.

**Q95 The Chair:** Dawn, did you want to answer next?

**Dawn James:** Yes, please. There is a risk of not having financing models for UK electricity prices. We have seen some evidence of it this year. Earlier this summer, the wind was not blowing—I know it is a trite phrase, but it is so true—and the sun was not shining very much. We were having to fire up gas plants and to bring coal plants back on to meet the needs that we had then and to use our current fleet of nuclear power stations that, as I said before, had come offline.

Not having the financing model so that we have control of our energy supply here in the UK would mean that we would be held hostage by other nations. We have seen what has happened with gas prices. I am sure that you have heard all these arguments from other

people; maybe it has even been quite emotional. It is a huge risk to every type of taxpayer in this country if we do not take control of our electricity generation, and not just from a net zero point of view. But actually, we will not achieve what we need to from a net zero point of view without nuclear.

**Cameron Gilmour:** I can reinforce that. Our baseload generation comes to the end of its life in this decade; if we do not replace that and add to it, we will not continue our net zero ambitions with the current technologies on the table.

Dawn made a really good point about security of supply. We have seen what has happened to gas prices over the last few months. Baseload nuclear gives us confidence around pricing and supply. It is very complementary with renewables as well, with a mixed system of gigawatts, SMRs and future technologies being very complementary with all the renewables that we have on the grid and planned.

**Q96 Virginia Crosbie:** In the 1950s and '60s, the UK used to lead the nuclear sector on the global stage. When people across the world look at us they say that we have all the pieces of the jigsaw: we have the fuel; we have the large reactors; we have decommissioning; we have the supply chain. They are looking at us to put all those pieces of the jigsaw together to make that jigsaw puzzle. Is the RAB nuclear financing model the one piece of the puzzle that is missing so that we in the UK can once again compete on the global nuclear stage?

**Chris Ball:** I would observe that it is about making sure that companies come together as one, and that there is leadership in the industry. If a RAB model supports and encourages that, fantastic. Looking at nuclear nations around the world, those that have been successful in the decades since—the 2000s and '90s onwards—we tend to find a clear industry lead. Sometimes that is the operator, and sometimes it is a reactor vendor, behind which everyone else is corralled. It is probably that leadership that we used to have in the UK in decades gone by, and behind which everyone corrals, that has aided a successful industry, particularly in overseas exports. That is the piece that is missing at the moment, but that does not mean that industry should not come together and do something about it itself. It probably should, and I include myself in that comment. If RAB encourages that, all the better, but that is an observation that I would make.

**Alan Woods:** I would say that for us to be seen as a global leader in nuclear again we need to own the technology as a nation. We need to own the intellectual property; we need to export it; we need to be the country that other countries come to when they are thinking about wanting to deploy and exploit nuclear solutions in their home markets. I think that we will get there. With SMR, we will definitely get there. I think that that is what differentiates us.

You only need to read the news—there is an awful lot of noise around SMRs. There are a lot of vendors out there, and there is a lot of confusion about what is near-term and what are future technologies. I can speak at first hand, as I was in the Czech Republic yesterday, and they said that there is one thing that differentiates us. They believe that we can and will do it—and that is not true for everyone they look at. Having our own technology, coupled with the heritage that we have as a

nation, we can and will grow back our position of being seen as a global leader in nuclear technologies around the world, without a doubt.

**Dawn James:** I think your question, Virginia, is about the magic key to unlocking or getting back to that fabulous heritage that we have in the nuclear industry. At this moment in time, yes, it is, and we really welcome the legislation that is moving forward. I cannot begin to tell you how excited I am finally to see my industry moving forward at pace. I started in the nuclear industry when Sizewell B was commissioned—at the back end of the construction of the last power station in the UK—yet we still have a really thriving nuclear industry. This is the key to unlocking and creating an industry that will thrive for many years to come.

**Cameron Gilmour:** A couple of points. I think that it is probably a question for the developers about gigawatt plants—could they raise the capital required without RAB? Probably the answer is no. There is a bigger issue at stake, which is sustaining the advantages in the '60s and '70s that Virginia talked about, and being able to have a new build programme that is both gigawatt and SMRs—EMRs in due course. That helps us to sustain expertise and knowledge, and help people with the careers that Dawn and I have had, for apprentices and for graduates in modern history. Without that funding we do not have a programme, and without a programme we do not have an industry with a future.

**Q97 Anthony Browne:** Chris, I want to pick up on something that you said earlier. You talked about needing—my words, not yours—every tool in the tool box, or every weapon in the armoury, to get to net zero. You have mentioned carbon capture and storage a couple of times. That is not within the scope of the Bill, but I wondered whether you thought that the RAB model would be suitable for carbon capture and storage, and whether the Bill could possibly be widened so that it applied to things other than nuclear.

**Chris Ball:** Again, that is probably not my area of expertise. The way I have looked at this is to look at every technology, and where the challenge is around enabling mass deployment of that technology. With CCS at this point in time, the key issue is not necessarily about the financing but about how the market is going to be structured and the quality of demonstrator projects.

There are different models, of course, but if you believe some of the modelling out there, we would need to capture and sequester within the UK four times the current world capacity. That is not without its challenges. So in answer to your question, I would suspect that, of course, it can be applied to that, but I actually think there are other key focus areas that need some attention to start that market moving—not least the deployment of demonstrator projects in the near term hopefully as well.

**Q98 Virginia Crosbie:** There has rightly been a lot of talk today about the cost to consumers and the nuclear fleet mentality. Is the reality not that RAB will facilitate a fleet of nuclear, which will in turn be good news for the consumer?

**Chris Ball:** I think that is absolutely right, if you look at the RAB modelling. You have got to look at this from the concept of managing risk. How do we manage risk

in the best possible way? You manage that risk through commonality and through ensuring that capability remains within the industry. We might deploy that commonality as pressurised water reactors. It might be a fleet of a couple of different designs, for instance, instead of one. From a risk perspective, it starts to consolidate down to a smaller number of different designs, with a level of commonality, where we can really drive risk and take the lessons from more projects to the next as well.

**Alan Woods:** A fleet clearly drives cost benefits. That is absolutely true of SMRs, despite the fact that they are factory produced anyway. We need that throughput in the factories. I would go back to the point I raised at the start. We welcome RAB. It is a mechanism that helps reduce cost of capital, but from our perspective we see there are alternative mechanisms, such as leaning on the CfD mechanism, and pace is important for us. We need to start thinking about delivering this fleet now, and that is what we are doing. Therefore, we have to look at mechanisms that are available for us now. We believe we can do this from a CfD to start with.

**Dawn James:** A fleet approach, without a shadow of doubt, drives down costs to the consumer by driving up our ability to replicate and driving in lessons learned from one station to the next. That security of work allows us to develop our workforce and to bring more people in. The more people you bring in at the bottom end, the more you drive down your costs, because you can spread the workforce across a number of different projects. It drives down costs in so many ways that, ultimately, that does get passed on to the consumer.

**Cameron Gilmour:** Yes, I agree with that. I will just bring a people angle to this as well. When I talk to some of the amazing, talented young apprentices and people in our business and we talk about this exciting future, there is no question that, without RAB, we will not have that opportunity to create that future for them, which would be a huge waste of talent. RAB is the enabler to getting that certainty and continuity for that next generation.

**The Chair:** Thank you. If there are no further questions from Members, I thank the witnesses for their evidence. I am sorry about some of the technical issues that we have had—that happens. We can move on to the next panel.

#### Examination of witnesses

*Tom Thackeray, Tom Greatrex and Rebecca Groundwater gave evidence.*

3.25 pm

**The Chair:** We will now hear from Tom Thackeray, director for decarbonisation, Confederation of British Industry; Tom Greatrex, chief executive officer, Nuclear Industry Association; and Rebecca Groundwater, director of external relations, Energy Industries Council, all of whom are giving evidence by video link. We have until 4.15 pm for this session. Could the witnesses please introduce themselves for the record?

**Tom Thackeray:** I am Tom Thackeray, the programme director for decarbonisation at the Confederation of British Industry. We are the UK's largest business representative organisation, representing small, medium and large businesses right across the country. My role is aiding businesses' decarbonisation efforts and pursuit of sustainability. Part of that is influencing Government

policy to enable them to invest, and part of it is working with businesses directly to drive down their own carbon footprints.

**Tom Greatrex:** Good afternoon. I am Tom Greatrex, chief executive of the Nuclear Industry Association, which is the trade association for the UK civil nuclear industry, representing companies throughout the supply chain.

**Rebecca Groundwater:** I am Rebecca Groundwater, and I am responsible for external affairs at the Energy Industries Council. We are a supply chain energy trade association. We represent all the energy sectors, not only in the UK but internationally, and we have five other offices in Houston, Kuala Lumpur, Dubai, London and one other that always escapes me—apologies.

**The Chair:** Thank you very much for attending, all of you. Could Members please indicate to me whether they have any questions to the panel? Dr Alan Whitehead.

**Q99 Dr Whitehead:** Good afternoon, ladies and gentlemen. Good afternoon, Tom—I ought to explain that I have known Tom Greatrex for a very long time, and we go back a long way on a number of these issues. What was your reaction to the proposals that came forward about Chinese involvement in the nuclear programme, particularly in Sizewell C, and what views does the Nuclear Industry Association have about their continued involvement and its effect on Sizewell C funding overall?

**Tom Greatrex:** Apologies, but I missed part of the question; it cut off partway through, but I think I got the gist in relation to Chinese investment in UK nuclear. I think that is what you were asking about—is that correct?

**Dr Whitehead:** Yes, basically.

**Tom Greatrex:** You will recall, I am sure, the original arrangements that were made to facilitate Chinese investment in UK nuclear. China General Nuclear, who are currently the minority financial shareholder in Sizewell C, are also a member of the Nuclear Industry Association and have a potential project at Bradwell. In terms of technology, it is very clear that any reactor technology has to go through the same process to be approved, and that is done independently by the Office for Nuclear Regulation. I do not think there is any difference in the thoroughness of that approach, wherever the technology comes from.

However, making decisions on the larger geopolitical issues is, I am afraid, way above my current—or ever anticipated—pay grade. As far as I am concerned and as far as the industry is concerned, Chinese companies have significant expertise in nuclear capacity and have built quite a lot of nuclear capacity, working with different reactor designs in China. Whether, and to what extent, they should be involved in the UK is not really for me to express a view on.

**Q100 Dr Whitehead:** I presume the Nuclear Industry Association has been informed of the decisions that were reached in the recent Budget about funding that has been put aside in the Red Book—£1.7 billion for works leading to a financial closure of the Sizewell C plant. Did you have any input into the procurement of that £1.7 billion and what is your understanding of its purpose?

**Tom Greatrex:** In terms of that funding being available, for a number of years, the Nuclear Industry Association and companies that we represent have made representations to Government about the costs associated with large-scale projects prior to getting to final investment decision. Significant amounts of money were spent on projects that have not happened during that process, and that pre-development funding is something that needed to be considered.

As to what that announcement covers, we have asked Government for further information on that. At the moment the information we have is that that is funding that could be available to a range of different projects and opportunities, but nothing specific. In relation to what I think was your implied question, on whether this is instead of buying out the CGN stake in Sizewell, it has not been made clear to us that that is what it is for.

**Q101 Dr Whitehead:** Forgive me for being a little surprised, but the Nuclear Industry Association does not know any more than the rest of us about what this funding is supposed to be for. Is that right?

**Tom Greatrex:** Yes, we have had the announcements and spoken to officials about the announcements, but we do not have any more detail than is currently available.

**Q102 Dr Whitehead:** Not a happy state of affairs, is it?

**Tom Greatrex:** Well, I hope that there will be clarity on that and other aspects of what has been announced by the Government in recent announcements as we proceed.

**Q103 Anthony Browne:** I have a simple, open question for all three of you. You all run trade associations, effectively, and you will have gone through the Bill in detail and looked at what you like and do not like. Are there any gaps in it? Are there any things you think should be in there that are not in there? We heard earlier, for example, about how, if there are overruns, you allocate the risk between consumers and investors and construction companies. That is obviously not covered in this Bill, but what gaps do you think there are?

**Tom Greatrex:** The Bill sets out a framework for a mechanism that we as the industry welcome. We think it is very important to be able to facilitate development of new projects. There are levels of detail that are not covered in the primary legislation, and I think you have touched on some of those in relation to exactly how aspects of risk sharing will be undertaken and the role of the regulator, which will be Ofgem—the expertise available to that body, and the fact that transitioning into being able to undertake what is effectively a new role is going to be significantly important. I am not sure those would necessarily be in the primary legislation, but there are aspects of this where there will need to be further information and development before a regulated desktop-based model can be used for nuclear development.

**Q104 Anthony Browne:** Tom Thackeray, are there any gaps or things you would want changed?

**Tom Thackeray:** From the CBI's perspective, we do not have any significant concerns around what is included in the Bill, but as has been noted previously, there is a framework for the establishment of a regulated asset

base model, and the details around designation and the risk-sharing profile are things that will be worked out on an individual project basis further down the line, which should be the case when legislating in this way.

**Q105 Anthony Browne:** You do not think it needs to be in primary legislation. It is better to be secondary legislation.

**Tom Thackeray:** Yes, from our members' perspectives, they are comfortable with that way of operating.

**Q106 Anthony Browne:** Rebecca, does the Energy Industries Council have any particular concerns? Are there any gaps in the legislation? Are there any things that are not there that you would like to see included?

**Rebecca Groundwater:** I would echo what previous panellists have said. We have engaged with our members on this and, although the Bill is a framework and there will be more detail going forward, they are happy with how things are at the moment. There are no big gaps for them as the Bill currently stands.

**Q107 Anthony Browne:** That is reassuring to hear from the three trade associations. I have one other question. This is obviously about the nuclear industry, but there are other forms of energy out there. Wind power famously gets contracts for difference, but things like tidal power are also coming on. Carbon capture and storage is not a form of energy, but it is part of the battle to net zero that we were talking about earlier. Are you concerned that having this regime just for nuclear will favour one form of energy versus another and disadvantage other sectors, and that we will end up without the optimum different types of energy supply? Do you think that we might choose something different if we had a controlling mind of the energy supply, as it were? Are you concerned that this will end up distorting the sources of energy that we have? It is difficult for Tom Greatrex to answer that because he represents just one sector, but the others represent all the different sectors.

**Tom Thackeray:** I think that the Bill recognises the particularities of the nuclear sector and the state that we are in, in terms of having built the first of a kind at Hinkley and the next stage of that process, with the RAB being the apt model for this technology at this time. The RAB has potential in other parts of the energy mix. Carbon capture and storage is one of those areas where we might look to expand it, although we are probably not at that stage of development just at the moment. Across the energy mix, others have tried-and-tested routes to market through the contracts for difference regime. So this adds another piece to the puzzle in providing the diverse energy mix that businesses want to see. The Bill provides a useful framework that could be replicated if we wanted to use the RAB model in other forms of energy generation in the future.

**Rebecca Groundwater:** I think the funding model here works for nuclear because of the investment required. At the moment, the other energy sectors are working in their own areas and they have the strategies, the legislation and the sector deals that are working for them and helping them to get to the point where they need to be. The Bill is very sector-specific, and it works for nuclear. I agree with Tom that, if and when it gets to that stage,

it can be rolled out further. If you look at this in terms of the nuclear energy system, it works, and it is okay to look at each one in silo while having a holistic view of how all energy systems work together to get us to net zero.

**Q108 Anthony Browne:** My last question is one that we touched on in a previous evidence session, which you probably did not hear. In the 1950s and 1960s the UK led the world on nuclear power. Then we hesitated, shall we say, and we have ended up with an industry in which most of our power stations are on their way out. The Government is now pro nuclear power, as I am, and I assume you all are. Do you think the RAB model is enough to get us back on the front foot with nuclear power and build the capacity and industry that we need, or is something else also needed?

**Tom Greatrex:** This is a really important part of it. We have had policy under successive Governments for a while now for new nuclear capacity. It should not be a surprise to anyone that our current fleet is coming towards the end of its generating life, even after life extensions. The barrier that has existed to a number of different projects that were cited in the Second Reading debate, for example, has been about the financing regime, given the long lead time to develop an asset that then lasts for a very long time. So this is the biggest single thing.

I think that what needs to go alongside it—to be fair to the Government, we have seen this in recent times—is a commitment in words of the need for nuclear to be part of that future mix. All those things help to give investors, potential investors and developers confidence that this decision will not be changed on a whim. That clarity of purpose is important. The financing framework has been the thing that has scuppered various projects, and I think it will be vital in getting our capacity levels back up again.

**Q109 Anthony Browne:** Rebecca, do you think this is enough to get the UK back on the front foot in nuclear power, or do you think other things are needed?

**Rebecca Groundwater:** This model provides certainty, and I know that the supply chain needs that certainty. We have been speaking to our members, and we engage with them. We know that they are diversifying out of energy. They are just not sure, despite what is needed, where the actual pipeline of projects coming down is from. They are not entirely sure what to go into. A lot of work has been done around the nuclear sector and with the supply chain. It is there and it is viable, and this commitment towards investment, and showcasing that it is seen as part of reaching net zero and part of that commitment to getting there, provides the stability for the industry to commit properly to it and to drive not just the local capability but the export capability, which UK businesses are very good at doing. I think this is a very welcome piece that we can move forward with.

**Q110 Anthony Browne:** Tom Thackeray, from the CBI's point of view, is this what is needed to get the nuclear industry going again, or are there other parts of the jigsaw that we need to put in place?

**Tom Thackeray:** I think this is a really important step for the nuclear industry and could establish our credentials as world leaders once again. From the business customer

side of this, obviously, the bulk of the CBI's membership are people who are concerned about energy from an energy bill perspective, and they are all setting net zero targets for their own operations. That is not going to be achieved unless we decarbonise the energy supply, and that cannot be achieved unless we have the roll-out of nuclear over the years ahead, and in quick time. From the point of view of UK credibility towards net zero and business leading the way generally, outside and inside the nuclear industry, it is a really important step.

**Anthony Browne:** Those are all my questions. Thank you.

**The Chair:** Are there any other questions from Members?

**Q111 Matthew Pennycook:** I have two open questions for the panel. The first is on clause 1 of the Bill, which I hope you have had a chance to look at, on designating a nuclear company. In previous evidence sessions, some of the witnesses who attended suggested there might be a lack of detail. What are your thoughts on whether there is sufficient detail in the Bill, both on who designates a company and how you designate an appropriate company?

**Tom Greatrex:** I am sorry, but you cut out slightly. I think you were referring to clause 1 and designated companies, but I missed the question.

**Matthew Pennycook:** Sorry, Tom. From what you have seen, is there enough detail and clarity in the Bill about who designates a nuclear company and whether that is appropriate, and is there enough in there to be clear about whether we are designating the appropriate type of company?

**Tom Greatrex:** Thank you; I understand the question now. The detail of the designation process is set out in subsection (3) of clause 1, on procedure. I am not absolutely sure that it necessarily gives the full, detailed approach to the designation and who the designation will be of. As this is a framework Bill, we work on the assumption that the detail of that will be set out in regulations subsequently. We are quite comfortable with that being the approach. The broad principle is set out in the Bill, and I think that gives us enough to go on for now.

**Rebecca Groundwater:** The transparency piece and the openness of the process was mentioned by our members, but the assumption is that the detail will follow.

**Tom Thackeray:** I don't think we have picked up strong views from our membership worrying about the level of detail in the Bill at present. I note from the previous comments that political statements and backing are really important in this industry, and making sure there is no ambiguity around the backing that the Government provide. Perhaps that leads us to a decision on who should do the designating, with Secretary of State-level backing for it. We can take further soundings from members on that.

**Q112 Matthew Pennycook:** My second question is on the total amount of nuclear capacity we require going forward. I am quite clear in my own mind that the Bill is primarily about Sizewell C, but we have had talk of nuclear fleets, SMRs and what might come forward in

years and decades to come. Do any of you challenge the Climate Change Committee's central scenario of its balance pathway, which is that we need 10 GW total nuclear capacity by 2035, and 8 GW of new build. If you take Sizewell B and C and Hinkley, we are talking about a remaining gap of 1.6 GW to 2.5 GW. Do you work on that assumption? Do you think it should be higher or lower? I am trying to get the sense, beyond Sizewell C, of what this funding model might be used for.

**Tom Thackeray:** I think we are comfortable that the Climate Change Committee's analysis in the balance pathway is a reasonable assumption. We think nuclear will be a strong part of the energy mix in the years ahead. Obviously, we will need a much bigger electricity capacity up to 2050. As we learn more about the process and the cost of technology starts to drop, there might be slight adjusting of those assumptions in years ahead, but at the moment we do not diverge markedly from what the CCC has said.

**Rebecca Groundwater:** We are aligned with the CCC report. I have nothing further to add.

**Tom Greatrex:** It is important to underline that the CCC scenario is for 2035 and towards the sixth carbon budget. I think it is broadly in the right area. The 2050 net zero modelling that was published alongside the energy White Paper has a broader range to 2050. We have to bear in mind, looking beyond 2035 towards 2050 and net zero overall, that the overall proportion of our energy that will come from electricity will be high. It is reasonable to assume that we will be beyond 10 GW by 2050, although 10 GW by 2035 is probably the right ballpark figure.

**Q113 Virginia Crosbie:** What more do you need to see from the UK Government to get us back into leading in this critical sector on the global stage? We have had the energy White Paper, the Prime Minister's 10-point plan and the net zero strategy announced by the energy Secretary a few years ago. We have the RAB nuclear financing model and we had a good presence from nuclear at COP26 in Glasgow. What more do we need?

**Rebecca Groundwater:** I would go back to that stability and the pipeline of opportunities that are viable. The supply chain is ready and equipped with the people, skills and capability. It is world class. We have a brilliant energy sector here in the UK. In the market forces piece, it is unclear which one will take the lead out of all the technologies. It has caused uncertainty, and that is not what the supply chain needs. When we talk about the supply chain, we are talking about the breadth of it. Each organisation has different needs, but they need that investment piece; they need to know where to upskill and when; they need to know the timescales.

That is why this legislation going through quite quickly is helpful, because it showcases that decisions can be made now to drive forward investment in what is needed. That ongoing dialogue and conversation—the message, “This is serious, and we're taking it forward,”—will give that stability and the ability to the financial markets to come in. We know they are talking about the sustainability goals and we know that parts of the supply chain are struggling with how to implement them and what that will mean for them, depending on their size. That wider conversation now needs to start to break down a little,

so that we are looking at how that impacts each of the different sectors. That way, we can drive it forward and bring it all together.

**Tom Greatrex:** All the things you mentioned have been important, significant and welcome for the sector over the last period. This legislation is key, as I mentioned previously. As for what else we need, we know that development of the taxonomy is ongoing—the Treasury has an expert group leading on that. It is important that the taxonomy is objective and avoids some of the mess the Europe-level taxonomy has managed to get into, in terms of setting a framework for investment in infrastructure that will contribute to a low-carbon future and to net zero. The requirement will be to pace delivery of agreements, to enable projects to go forward—for example, negotiations are ongoing between EDF and Government on Sizewell C, although that goes beyond the scope of the Bill, and with others on the SMR programme; last week's announcement was very welcome. A number of things are in the purview of Government to deliver—siting, for example. We need all those things to happen. If I were to characterise what is needed in one phrase, it would be: an appropriate sense of urgency, given the urgent situation of our current and future power mix requirements.

**Tom Thackeray:** I would echo many of the points the others made: detailing objective, sustainable finance taxonomy for the UK including nuclear will be really important over the next few years. More holistically, there is the extent to which the Government can build out their export and skills strategy, taking advantage of the technology developments we are making in a lot of the clean areas. I have a slight concern, not in the nuclear sector but potentially in other green economy areas, that there will be a squeeze on the labour market, with multiple industries going after the same labour pools, which will probably put a brake on our capacity. We need to think really strategically about some of that stuff.

You invited general comments about the 10-point plan. In some areas, there is a need to detail the routes to market for things like the hydrogen economy. That goes back the points the other Tom made about pace of delivery and urgency. However, having just come back from Glasgow, I think it really hit home how far advanced the UK is in some of these plans compared with others. We can always ask for more, but I think we are genuinely world leading in a lot of these areas.

**Q114 Virginia Crosbie:** There has been a lot of talk today about our domestic energy market, but Tom Thackeray and Rebecca both mentioned export. What does the RAB model mean for our ability to export our technology? What would that mean for the steel sector in the UK, for example?

**Tom Thackeray:** I think it will be a huge opportunity, particularly if we generate those fleet opportunities in the year ahead. One of the great risks of not moving ahead with the RAB model straightaway is that you lose supply chain capacity, you lose innovation, and you lose the skills you have in the supply chain. There is a fantastic opportunity to build out an industrial strategy approach around the supply chain that we built up through Hinkley and will continue through Sizewell C, and to look at how we can use that in international markets as well. In addition to that, we have the exciting

developments around small modular reactors, where UK-developed technology is exciting clients around the world. That will obviously be a huge part of the UK's potential in the years ahead.

**Rebecca Groundwater:** I agree. I think this helps to anchor the UK as a model on which the expert piece really comes into play. We have been mapping where the proposed capacity is coming from, looking at new build projects from 2021 to 2080. With the RAB model, if this goes ahead and everything falls into place, we will be one of the top investors in nuclear. That allows us to then export that to the other countries that are coming up behind us. If you want, I can pass on the data that we have from our members on the international market piece.

**Tom Greatrex:** I underline the point that this mechanism will enable projects to happen. When projects happen, you have a supply chain that is engaged. Just think about some of the announcements made in the run-up to and in Glasgow over the last couple of weeks from other places—France, Canada, the USA and Japan—in terms of restarting. There is a whole load of potential opportunities there. If the UK is ahead on developing and delivering through its supply chain, those export opportunities become real. I echo the point that the other Tom made: if we leave it and do not do it, the danger is that those opportunities will be lost.

**Q115 Virginia Crosbie:** May I ask one more question? In terms of the RAB model, what does this mean for our dependence on overseas investment? We are dependent on EDF and the French, and on CGN and China. What does RAB mean in terms of us being much more financially independent here in the UK?

**Tom Greatrex:** There is a distinction to be made between the technology. Sizewell C is obviously effectively a Franco-German technology by origin, and the amount of UK content in the supply chain at Hinkley is about 65%. That is likely to increase if Sizewell goes ahead. One of the opportunities that a RAB model opens up is interest from a greater pool of investors because of the way in which the returns will accrue. People will have mentioned, I am sure, long-term infrastructure investors, pension funds and various others, who use and have used RAB models in other infrastructure that they have been investors in, and have made it clear that they are interested in potentially doing that with nuclear. It broadens the scope of investment, which may then have some impact in terms of where some of the other financial stakeholders that you alluded to in your question are.

**Rebecca Groundwater:** Some of our members feel that the RAB model provides more opportunity for the UK supply chain content to increase. With investment coming in, there may be greater options for the supply chain.

**Tom Thackeray:** I echo the points already made, and note that we have a great history of private investment in infrastructure. Deployment of the RAB in other infrastructure assets has been hugely successful, and the examples are well known. That means that we have a mature investor base here in the UK, who are looking at other opportunities to spend their money. The opportunity to invest in environmental, social and governance is growing. Providing that opportunity in nuclear through the RAB model is a welcome next step.

**The Chair:** If there are no further questions from Members, I thank the witnesses for their evidence.

### Examination of Witnesses

*Mycle Schneider, Professor Stephen Thomas and Doug Parr gave evidence.*

3.59 pm

**Q116 The Chair:** We will now hear from Mycle Schneider from the World Nuclear Industry Status Report; Professor Stephen Thomas, emeritus professor of energy policy at Greenwich University; and Doug Parr, policy director and chief scientist, Greenpeace UK. They will all give evidence via the video link. We have until 5 o'clock for this session. Can the witnesses who are available introduce themselves for the record, please?

**Mycle Schneider:** Hi there. This is Mycle Schneider. I am an independent analyst and consultant on energy and nuclear policy based in Paris. I am the co-ordinator and publisher of the annual World Nuclear Industry Status Report, and it is in that capacity that Members have invited me. Thank you very much for the opportunity.

For people who are not familiar with the World Nuclear Industry Status Report, it is a multi-indicator analysis that is elaborated annually by an international team of interdisciplinary experts that I have co-ordinated since 2007. The 2021 edition had a dozen researchers from a number of quite outstanding think-tanks and research institutions, including the Harvard Kennedy School of Government, Chatham House, the Technical University of Berlin, the University of British Columbia, Nagasaki University and so on—just to give a quick overview.

**The Chair:** Thank you very much. We can also hear from Professor Stephen Thomas. Doug Parr will join us when he can. Professor Thomas, would you like to introduce yourself?

**Professor Thomas:** My name is Stephen Thomas. I am emeritus professor of energy policy at the University of Greenwich in London. For the past 40-plus years, I have been an independent energy policy analyst, first at Sussex University and more recently at Greenwich University.

**Q117 Alan Brown:** We have heard arguments for new nuclear, including that nuclear power is required to provide baseload; that the UK cannot possibly meet net zero without further new nuclear; and that new nuclear will provide certainty and value for money for consumers. Are there any contrary opinions to such agreed views? I will start with Mycle.

**Mycle Schneider:** Thank you for the question. I believe that if we are talking about the climate change emergency, it implies two things: to be able to reduce greenhouse gas emissions as quickly as possible and at the largest rate—that is the combination of effectiveness in terms of quantity and time. If we spend, whether it is a pound, a euro or a dollar, we have to see which options give us results that are large and fast.

If we are looking to nuclear power as an option for reducing greenhouse gas emissions, it is pretty much clear today that the options that are available, whether it is efficiency or non-hydro renewables, are more climate

efficient than nuclear. That is not only because, if you look at the cost estimates from institutions such as Lazard bank, about a quarter of the cost is needed to generate electricity by solar and wind, for example, compared with nuclear. It is also about five times slower to implement than other options. Again, I am referring essentially to efficiency and newer renewables. Actually, what we hear about possible investment over the longer term will, if ever, provide these services only in the longer term. That means beyond 2030, and far beyond that for some of the options we are talking about. In my opinion, that is much too slow.

**The Chair:** Stephen, do you have any comments on that?

**Professor Thomas:** Yes, I would like to pick up on the point about the need for reliable baseload plant. I can see the intuitive logic of that, but the National Grid's scenarios—I trust the National Grid more than others on what it takes to run a reliable grid—say nothing about reliable baseload plant being needed. It has three scenarios to reach net zero by 2050, and in only one is Sizewell C required; the others do not require it. It seems entirely comfortable with the availability and cost of batteries. If National Grid does not see the need, I am not sure why I would. It is a non-sequitur that you need baseload plants.

Clearly, there is a baseload—in other words, a level of demand that we never go below—but I do not see the reason why we would need a dedicated set of plants to meet that baseload. It is like saying, if you have a factory that operates 24 hours a day, seven days a week, you need a set of workers that will work seven days a week, 24 hours a day. It is simply a non-sequitur.

**Q118 Alan Brown:** You say that the baseload argument does not stack up, but another argument is that nuclear is needed to compensate for the intermittency of renewables. How robust is that argument? Is there an argument that nuclear is not the right technology to complement the intermittency of renewables?

**Professor Thomas:** It is not the right technology. Both renewables and nuclear power are not flexible options. Nuclear power only makes any sense—if it makes any sense at all—if it is operated round the clock, with baseload at the maximum level it can work at. If the wind is not blowing, there is nothing you can do with a nuclear power plant to fill in the gap. Clearly, whichever way you go, nuclear or renewables, you will need flexible plants, which will probably be batteries and perhaps some demand-side response, to fill in those gaps. The worst thing of all would be to mix two inflexible sources, because you will get a time when nuclear is not available and renewables are not available, and then you will be in much worse trouble.

**Mycle Schneider:** There is this myth about nuclear power providing electricity 24/7. We have done a very detailed analysis of the French nuclear fleet for 2019—the year before covid—and it turned out that, basically, when the operator, EDF, starts an outage for maintenance and refuelling, it entirely loses control over the date and time it restarts. There are cases where there are 40 versions for the restart date and time. That does not really indicate that this is a 24/7 electricity-generating source. On the contrary, it means that even if we stick to the

example of 40 revised dates and times, five of those were in the last 24 hours of that period. So not even 24 hours ahead was it possible for EDF to predict when 1,300 MW would be available to the grid or not. On the other hand, I think the whole concept of baseload is flying out of the window. As Stephen has said, what we need is flexibility. If we build up solar and wind massively, it means that a lot of that so-called baseload is already covered by those sources. It therefore becomes a competitive environment for certain times during the year and for certain times during the day. We need to fill in the gaps.

As the court of accounts has shown in its sensitivity analysis of the costs of nuclear power, the highest sensitivity is the productivity of the nuclear power plants. If the production levels go down, you increase costs significantly. We have seen over the past few years in France, but also obviously in the UK, lower production rates and therefore increased costs. That means that these reactors have become much less reliable. We have calculated that the average increase in 2019 over the expected outage time was 44%. It can be a planned outage of a week, and it turns out to be six months. That is not an exaggeration, we have cases like that.

**Chair:** We have been joined now by Doug Parr. Please introduce yourself.

**Doug Parr:** My name Dr Douglas Parr, and I am the policy director for Greenpeace UK. Apologies, I did not see the email that said that this session was starting early.

**Q119 Alan Brown:** In terms of alternate technologies, the Royal Society prepared a report that suggests that 11 GW of electricity generation could be provided by tidal stream technologies by 2050. We know that those streams already generate and connect into the grid up in Orkney. How realistic do we think that is, and is that the type of alternate technologies that the Government should be pursuing? I will start with Mycle, followed by Doug Parr and then Professor Thomas, please.

**Mycle Schneider:** I think I will pass that one on to my English-based colleagues who are better suited to answer.

**Doug Parr:** There are certainly opportunities in tidal energy, and, at a minimum, I would hope that the Government would seek to pursue them in the next renewable auction round. I think there are a variety of technologies, certainly including tidal and geothermal. In terms of the subject of the Bill, nuclear energy is seen to be always on, but the overall competition for the grid is going to be between dispatchable and available power, which ideally should be flexible as well, and the provision of storage from cheap renewable power. In that sense, we are talking about green hydrogen, alongside these other renewable sources; but in terms of my personal preference, yes, I would certainly want to see tidal as part of the mix.

**Professor Thomas:** We cannot prejudge whether tidal would be a useful technology until we have tried it out. We can look at nuclear and see that costs have gone up rather than down, and on the other hand we can look at offshore wind, and see that five years ago the cost was £140 a megawatt-hour and now we are down to £40 a megawatt-hour. I think it is an option that we need to test. Whether it will be a success, I do not know; we cannot judge that in advance. If it was a guaranteed certainty, I guess we would have done it, but we must try out all these options.

**Q120 Dr Whitehead:** Mr Schneider, are you able to tell us anything about the experience in the United States of using RAB arrangements for nuclear plant development? I am thinking in particular of the two plants in South Carolina that were abandoned a little while ago but which I understand were funded partly through the RAB process, by consumers in South Carolina. Would you advocate measures to ensure that nuclear plants actually get finished and do not dump on the customer, who has already put in their money, a load of the cost that is never realised because there is no output?

**Mycele Schneider:** Yes, I can briefly comment. I think you are referring to the V.C. Summer plant in South Carolina. It had a similar scheme to RAB, which basically allowed it to pass on cost overruns to electricity customers. Construction started in 2013. Westinghouse was the technology provider. The plants were supposed to come online in 2017. By 2017, the cost estimate had increased by 75%, and I believe that there were nine rate increases for ratepayers up to that point. Finally, in July 2017 the construction was abandoned. Obviously, this was one of the consequences of the fact that Westinghouse filed for bankruptcy, and one of the main reasons for that was the V.C. Summer AP1000 project.

It might be interesting for the Committee to spend some time studying this case because it also involved some very problematic criminal activity. The federal grand jury has charged the former senior vice-president of Westinghouse Electric Company, Jeffrey A. Benjamin, for his role in failing to report accurately the status of the construction of these nuclear sites. It is worth noting that he served as senior vice-president for new plans and major projects, and was therefore directly responsible for all new projects worldwide for Westinghouse during the period of the V.C. Summer project. He has been charged in a federal indictment with 16 felony counts,

“including conspiracy, wire fraud, securities fraud, and causing a publicly-traded company to keep a false record.”

That is a quote from the Justice Department. He is only one of four top managers who had criminal charges filed against them in this affair. The former chief executive officer of SCANA, the utility that was building the plant, pleaded guilty to federal felony charges and was sentenced to two years in jail, which will start in December. The case had major implications.

Obviously, the ratepayer is left with the ruins of concrete and steel, and with no kilowatt-hours. Apparently, reportedly this affair is not over. It has cost the ratepayers billions, and reportedly it will cost more over the 20 years to come.

**The Chair:** A number of Members want to ask questions, so could we keep them as short as possible?

**Professor Thomas:** I wanted to add that what marked out the Summer project and a similar project in Georgia from those in all other states of the United States was that they were allowed to recover money from consumers before completion of the plant. That is a central feature of the RAB proposal. The Summer experience shows clearly the folly of making consumers pay for a plant before it is complete.

We have to be careful with the idea that we need to take measures to prevent unfinished plants from being abandoned. We have a very good example in Britain in

the Dungeness B plant: it took 24 years to get from start of construction to commercial operation, and over its 32 years of operating life, its availability was well below 50%. It is very clear that the plant should have been abandoned before it was completed.

**The Chair:** Doug, do you have any comments?

**Doug Parr:** I am not sure that I have much to add. I read that the Summer plant added 18% to bill payers' bills in South Carolina at one point, which is obviously a very considerable amount. I am not saying that those numbers are translatable to the UK context. It chose to expose the consumer to those considerable risks.

The Government really need some kind of independent evidence base for their judgments if they are going to enter bilateral negotiations with a plant builder who, on the basis of the plant builder's word, can expose consumers to very considerable risks; Dr Schneider alluded to that. We see that with the RAB mechanism, the Government have a bilateral negotiation mechanism, and those do not have a happy history in almost any sector, including for the various networks. I am not quite sure how you establish that.

One thing that has been missing from nuclear policy as it applies to renewables and other mechanisms, such as the capacity mechanism, is the element of competition. The information asymmetry is potentially very strong. It gives a lot of cards to the nuclear seller—the nuclear provider—without giving the Government any backstop with regard to understanding what is going on. When there is competition via a reverse auction of the kind that we find in renewables, you factor those risks out, but consistently over the years—decades, in fact—this kind of discipline has not been applied to nuclear policy. With the RAB-type mechanism, those risks potentially land on the bill payer, not the provider of nuclear stations.

**Q121 Dr Whitehead:** This question is for Stephen and Doug. In the Bill, there is a mechanism to put a special administration regime in place if the constructor of the project defaults or is unable to complete it at any stage. Is that mechanism sufficient to enable us to overcome the sort of issues that we have heard about with the American nuclear plants, or are there other things that need to be done, particularly in the light of what Doug said about the lack of independent assessment, at particular stages, of what ought to be done next, and how progress ought to be made?

**Doug Parr:** I am not sure that I am across the detail enough to give a good answer to that one, I'm afraid. I would need to come back to the Committee on that, if that is all right.

**Q122 Dr Whitehead:** Stephen, do you have any views on that?

**Professor Thomas:** I think the problem is not the need for a special administrative regime to rescue things if it all goes badly wrong in the construction phase. I think the problem is the RAB mechanism that is putting consumers' money at risk, and if we look at the impact assessment, we are looking at a plant that will not be completed until something like 2037 to 2041, so I will be paying into this plant for quite a long time and I probably will not live long enough to see any power

from it. The special administrative regime is a way to try to solve a problem that is better solved by simply not using this RAB mechanism.

**Q123 Anthony Browne:** If we are in an existential crisis of climate change—if it is the biggest threat that we face as a species—should we not use every tool in the toolbox to combat it? Why would you rule one of them out? That is a question for Doug Parr first, and then Mycle Schneider.

**Doug Parr:** I do not think I have ever made any secret of the fact that there are attendant risks that come with nuclear that do not apply to other forms of zero-carbon and low-carbon generation. What I would ask, in the light of the climate crisis—it is not an insignificant challenge that you have put there—is why UK Governments of all colours have continued to emphasise nuclear policy over and above other ways of cutting emissions. For example, the last time I saw figures on Department for Business, Energy and Industrial Strategy civil servants and where they were working, there were more people working on nuclear than on renewables and clean building heat put together, so when it came to two of the big-ticket items that are going to be absolutely essential—lots of renewable power and lots of clean heat for buildings—there were fewer civil servants working on those than on nuclear.

Nuclear is a bit-part player in this. All sensible, cost-effective models show that nuclear will not be a big piece of the pie, in terms of delivering what we need to deliver, and there are considerable problems with delivering heat, as members of the Committee will know. There are some substantial issues with delivering the amount of renewable power that we need, yet what we have is a Bill for delivering nuclear, and more civil servants working on it than on other things. I emphasise that this is a distortion that has been in place over years, and it is becoming quite problematic, because every time people are working on nuclear and not working on these other things—not putting energy and money into other things—we lose our ability to deliver what we need to deliver.

**Q124 Anthony Browne:** The Government are obviously doing a lot of other things; most obviously, there is wind power, which has increased dramatically and now produces far more electricity than nuclear. Mycle, if we are in a climate crisis, why rule out one of the tools in the toolbox, which could be one of the most effective or most scalable?

**Mycle Schneider:** The question has to be: if I spend money today, what is the most climate-effective option that is available? There is absolutely no doubt, wherever it is, that it is impossible today to build a new nuclear plant as quickly as many other options, and at a cost that is competitive. Every dollar, euro or pound put into new nuclear is making the climate crisis worse. There is no doubt about that; it is very clear. It is straightforward. Existing nuclear power plants are a bit of another story, because they are there.

**Q125 Anthony Browne:** When wind power was in its early days—I used to be environment editor of *The Observer*, 20 years ago—obviously, the environment movement was very pro-wind power. It never worried about the cost of it, which was incredibly great then; it

was an incredibly cost-ineffective form of energy, but because we invested in it, the prices came down. As Professor Thomas said, it has become a far more cost-effective form of power, so why are you so worried about the cost of nuclear now when people were not worried about the cost of wind power 20 years ago?

**Mycle Schneider:** That is their problem. We have a very precise view about what nuclear power has actually delivered. Nuclear power is not a new technology. It was 70 years ago that construction started on the first nuclear power reactor. We have long experience, but the strange thing is that the nuclear industry always claims a “first of its kind” situation. It is surprising because whether it is Olkiluoto—an EPR in Finland—Flamanville in France or Hinkley Point C, every time the industry claims it is the first of a kind. How many times can it do that? We see that each time, costs skyrocket and the nuclear industry does not deliver.

By the way, the nuclear industry is not delivering on existing reactors, either. It is not a coincidence that Standard and Poor’s downrated EDF Energy to junk last year. For me, as an outside observer, that is a strange situation. Basically, the business as it is run by EDF Energy is judged by the credit rating agencies as not investment grade. In fact, the EDF Group has been downgraded as well. It is still investment grade, but only because they get additional notches from extraordinary state support. The RAB scheme suggests bringing down financing costs—making borrowed money cheaper—but the way EDF runs its business is judged to be so bad by credit rating agencies that it is rated non-investment grade.

All of those things have to be taken into account, and the question for me—having listened to much of the industry’s presentations today—is about how incredibly confident it is about what it will deliver in the future, when what it has delivered in the past is way off its own targets.

**Anthony Browne:** You are based in Paris and 70% of France’s electricity comes from nuclear. France has consistently lower carbon dioxide emissions per capita than the UK. Presumably you agree that that is because of the size of its nuclear sector.

**Mycle Schneider:** Of course that is a substantial part of it, at this point. The problem is that in 2020 the production of nuclear power was the lowest it had been in 17 years, and the share of nuclear power in the French system was at its lowest since 1985. That does not sound like a very reliable source of electricity. Basically, the French reactors were down to zero production for 115 days in 2020. That means that for every two reactors you need one in reserve, because they do not generate power for a big part of the year.

Do not forget that France has created a very distorted energy system. The peak load in the winter is historically more than 100 GW, while the lowest load day is about 30 GW. To give you an idea, Germany is about 80 GW at the peak, but it has 20 million more people. France has distorted the system with electric space heating.

The nuclear sector provides just over 60 GW, and those 60 GW are never all available. So what happens in the winter is that France often imports power from Germany. As we know, quite a bit of that peak power from Germany is coal, so one has to look at the carbon footprint and not only the grand gigawatt-hour.

**The Chair:** Order. We are drifting a little from the scope of the Bill. Can we get back to questions that relate to the Bill, please?

**Q126 Mark Jenkinson:** This question is particularly for Stephen. I want to go back to comments on baseload. The Climate Change Committee says that we need 37% firm power—we can call that what we like; we can change its name from baseload to firm power—which most of our renewables do not provide. You talked about CfDs being better for consumers than RAB. At the time, I thought we were mad to strike at £92.50 at Hinkley, which is probably 800% of construction costs, because of the cost of capital being all back-loaded, which RAB will obviously do away with. What is an acceptable level to force on the poorest in our society for energy per megawatt-hour? We have heard today that we can probably produce energy at £60 per megawatt-hour, possibly a bit less. The update in levelised cost of energy for 2020 for one of the UK's biggest wind farms, which continues to be extended in Walney, was £136 per megawatt-hour. That is before we take into account constraint payments and all the other inefficiencies in wind power. You talked about tidal and how it is not on the radar, but is far off in the future, and of course into three figures per megawatt-hour. What is acceptable? What is the answer for that 37% firm power?

**Professor Thomas:** As I said, I do not think there is a case for the need for firm baseload power. If the National Grid Company does not think there is a need for it, who are we to tell it that it does not know how to operate a system reliably?

**Q127 Mark Jenkinson:** That is the Climate Change Committee's sixth carbon budget. Are we saying that the Climate Change Committee is wrong?

**Professor Thomas:** I would trust the National Grid Company over the Climate Change Committee on matters of reliability of the grid.

**Q128 Mark Jenkinson:** That was not the question. Are we saying that the Climate Change Committee is wrong to say that we need 37% firm power?

**Professor Thomas:** Yes, I am saying that it is wrong. If the National Grid Company does not say that there is a need for firm baseload power, I will trust it. If that means that the Climate Change Committee is wrong, so be it.

**Q129 Mark Jenkinson:** Reliability not being baseload, but—Doug wants to come in. Go on, Doug.

**Doug Parr:** There is a difference between firm and baseload. We absolutely need firm power because there will be spells when we do not have much wind and solar. That is where there is a need for firm power, and I do not believe that anybody who thinks about it for a moment would dispute that. The question is what forms that. As I hinted earlier, on the question about where nuclear fits in the overall system to deliver a cost-effective and secure system, it is now a race between cost-effective storage of renewable power on the one hand and something like nuclear on the other. We can see that the existing deployment of green hydrogen and the money that is flowing into it will bring that cost down sharply. The Climate Change Committee has already assumed that

there will be cost reductions. How fast they will go is still not certain, but we know that those costs will come down pretty quickly.

**Q130 Mark Jenkinson:** Back to the definition of firm power, we have energy requirements of up to 50-something gigawatt-hours. Thirty of that is a constant. The figure does not drop much below 30 or the late 20s. We can dress it up however we like, but that is a firm requirement that is likely only to increase. The Climate Change Committee defined firm power very specifically as nuclear or gas with carbon capture and storage. Are we saying that we should ignore its proposals in favour of intermittent renewables?

**Doug Parr:** No, we are not. We are saying that there needs to be a storable medium for energy, and that is the gas that I would be talking about. There needs to be a firm dispatchable form of power, and that is what it is, because there will be times when there will be an excess of renewable power, which will be convertible. In the first instance, it will be exportable. Then it becomes importable, and usable in the form of stored energy. I take the point about what the committee says is necessary for system security, but as Steve said, the National Grid does not see that as being baseload; it is about something that can be flexible to accommodate the other aspects of the system, and it needs to be looked at as a system.

**Mark Jenkinson:** It is semantics—baseload or firm power.

**The Chair:** Order. I am going to move on. Two more people want to ask questions.

**Mark Jenkinson:** I just want to pick up on hydrogen specifically, because we heard that it is incredibly inefficient.

**The Chair:** Order. Mark, I am going to move on. There are two more people, and you have had a long time. I call Kirsty Blackman.

**Q131 Kirsty Blackman (Aberdeen North) (SNP):** Thank you very much, Ms Fovargue. Specifically on what Mycle said earlier in relation to the ways that we can tackle the climate emergency, given that the climate emergency is now are there better uses of money and time than supporting new nuclear?

**Doug Parr:** I think we need to really get a shift on with deploying renewables as fast as possible. I know it is said that we are already deploying them. Sure, but are we deploying them at the speed we need to? I think the answer is no. We need to get a move on with that. That in itself will not take up a lot of money but, as the previous conversation alluded to, there need to be alterations to the electrical system that allow that to be best accommodated. That is where some of the money goes.

We also need much greater interconnection with the continent, because that allows the flows to be balanced much more easily, and we definitely need a shedload of money going into making our buildings and appliances more efficient, because the best and most secure energy is the stuff that you do not need. Those can all be done at scale in the 2020s, so well before Sizewell will ever get going.

**Professor Thomas:** I do not think that you can possibly argue that nuclear is the best option to pursue. As Doug said, energy efficiency can be implemented very quickly, and it has the double pay-off that, whereas expensive new power sources will increase bills, energy efficiency measures will reduce both emissions and bills. It will have a welfare pay-off for low-income consumers as well as reducing our carbon emissions.

**Mykle Schneider:** Most of it has been said. We need to schedule priorities by availability and cost. The combination of time and cost together makes climate effectiveness.

**Q132 Kirsty Blackman:** A brief question that Stephen touched on, but specifically to Doug. Would you be happy to pay more money on your energy bill in order to fund new nuclear?

**Doug Parr:** I would not be, no.

**Q133 Kirsty Blackman:** Would you be happy to pay more money on your energy bill in order to fund new renewables, for example?

**Doug Parr:** Yes. I have always been very clear that there are particular hazards around new nuclear developments, whether it is waste, the terrorist threat, what to do with them or security issues. That is why I think, as a society, it is worth avoiding those hazards and, if necessary, paying a bit more. In practice, there are models out there by, for example, Imperial College that say that no more new nuclear is on the cost-effective pathway, given the cost of renewables. Theoretically, I can say that. In practice, I am not sure that is the situation we are facing.

**Q134 Matthew Pennycook:** I have a two-part question for the panel, but in particular for Professor Thomas. The Bill is clearly designed to facilitate primarily Sizewell C. I still think there is a lack of clarity about Chinese investment in that project and how that interacts with the Bill's intentions. What is the panel's understanding—and specifically Professor Thomas—about what is in the October 2016 strategic investment agreement and what provisions are there in that agreement that would allow the Government to remove CGN from the project? Related to that, we had a number of questions earlier about the £1.7 billion allocated to nuclear in the Budget. The Budget line says that that funding is there:

“to enable a final investment decision for a large-scale nuclear project in this Parliament, and the government remains in active negotiations with EDF over the Sizewell C project.”

What is your understanding of what that means and can you comment on potentially the use of that £1.7 billion as it relates to the RAB funding mechanism? It is a very different two sets of scenarios, if we are talking about whether that £1.7 billion is for a buy-out of the CGN minority stake or potentially put in as part of a pot of money alongside the funds generated from RAB.

**Professor Thomas:** If we go back to the 2016 agreement, CGN agreed to take a third of the Hinkley Point C project: the construction and the operation of the plant. It agreed to take 20% of the Sizewell B/C project up to final investment decision. It has an option to take 20% of the construction and operation of the plant if it goes ahead and for Bradwell, there is the 66% of CGN and 33% of EDF. EDF and CGN have spent about

£0.5 billion developing the plans to the point they have reached so far. Let us say it is going to take another £0.5 billion to get to final investment decision—that is at the most. So £1.7 billion seems a bit too much for that. The wording of the £1.7 billion is very vague. Some people have assumed it will be an 8.5% stake, or whatever £1.7 billion works out as.

In terms of how you would get CGN out of Sizewell C, I think it is really dependent on what happens to Bradwell B. It is clear that CGN's presence in the UK is for only two reasons. First, to build the Bradwell B plant, and the price for that is its involvement in Sizewell C and Hinkley Point C. The other is to get the British safety regulator's endorsement of its technology. If it is not going to be allowed to build Bradwell B, I cannot see why on earth it would be interested in putting money into Sizewell C. It is not CGN's technology, it would provide nothing and it would not be particularly profitable. So if Bradwell B is abandoned, the Sizewell C CGN problem will solve itself. Can you briefly repeat me the gist of the second part of your question?

**Q135 Matthew Pennycook:** I think you have answered it in part, but it is about your understanding of how that £1.7 billion might potentially be used in a Sizewell C project and how that, in a sense, relates to the RAB funding mechanism set out in the Bill.

**Professor Thomas:** The CGN EDF consortium have spent about £0.5 billion so far, and they have some more money to spend to get to the final investment decision. They would then expect to sell that work to the company that actually builds and operates the plants, so they would get their money back. If Sizewell C goes ahead, it is sort of alone. It seems to make more sense to see it as a stake in the plant, which might encourage institutional investors to go in. If they saw Government involvement, they might think that it will probably not be allowed to collapse, but it is up to the Government to provide a bit more clarity about what they expect the £1.7 billion to do.

**Q136 Alan Brown:** I have a question for Stephen Thomas. We heard this morning that the Sizewell C company is looking for a 60-year contract under the RAB funding. Does that mean that, effectively, bill payers will be paying for the asset before it comes into use and can generate electricity, and that they will continue to pay for it once it has reached its end of life? Are there any protections in the Bill? If Sizewell goes ahead and then goes offline early in the way that Dungeness went offline and had to be shut down seven years early, would the bill payer still be stuck paying for that under the RAB model, or is it possible to have recovery mechanisms in order to counteract that?

**Professor Thomas:** I think there is a lot of missing detail in the RAB proposal, and one of the biggest elements of missing detail is how much the surcharge for consumers will be during the construction phase. The Government have said that it will be a maximum of about £10 per year per consumer. That makes no sense, because it would yield about £6 billion. In the context of a project that the Government said would cost between £24 billion and £40 billion, plus financing costs, £6 billion is a nice little present, but it will not be much of a game-changer. We need to see much more clarity about what that cost will be, because if it is to make a big

change to the cost of power from Sizewell C, it has to be quite a significant surcharge. We also need to include that in the price of power. At the moment, we are talking about £60 per megawatt-hour and completely forgetting the £6 billion, or however much it will be, that consumers will put in during the construction phase.

In terms of what happens if the plant has to close early, there is a big problem with decommissioning. Decommissioning funds work on the basis of discounted cash flow—in other words, a liability that falls due in 50 years. You have to have enough money in place now, plus the interest it would earn for 50 years, to pay off the debt. If the plant closes early, you do not earn all that income and you have to bring forward the process of decommissioning, so there will be a big hole in the decommissioning funds.

I remind members of the Committee that the decommissioning funds that we have in the UK have continually failed. Consumers have paid three or four times over, only for the money to disappear and not be available for decommissioning. Decommissioning is a very serious issue. It appears to disappear because of the belief that you can invest a sum of money at 2.5% or 3%, in real terms, for 100 years. That is not the case, I am afraid—not on the historical evidence.

**Q137 Alan Brown:** Under this current proposal, in effect, the decommissioning risk—some funding is built in, but the actual risk if costs increase or the liabilities kick in early—currently sits with the consumers.

**Professor Thomas:** The only people who can pay are taxpayers. If the company goes bust, unless you have powers to pursue the companies back to their parents, and the parents are still there to pay off, you will be left with the taxpayers. We are talking about a process that happens something like 100 or 120 years after the plant starts up. The chances of an entity that owns the plant at the start still being around in 120 years' time seems to

be very slight, so I do not think that you will be able to pursue companies and you will end up with taxpayers having to foot the bill, as is the case with the Magnox plants now—that is being funded entirely by taxpayers.

**Q138 Alan Brown:** Does a 60-year funding model under RAB make sense given that the maximum lifespan of a nuclear power station to date has been 40 years? Why therefore is it a 60-year funding model?

**Professor Thomas:** That is a fairly rash decision, to go for 60 years. There are plants that are just about reaching their 50th birthday, but a lot of plants have retired well before that, so 35 years—as for Hinkley Point—is the very maximum I would want to go to.

**The Chair:** Doug, did you want to come in on that?

**Doug Parr:** Only as a rejoinder to what Stephen said about the risk of underperformance, if not early closure. Remember that the EPR that was constructed in Taishan is offline at the moment, because of a fuel issue. It has been offline for about three months, I think, and that is only three years into its operation. Underperformance, if not early closure, is a tangible issue even with that model of reactor.

**The Chair:** If there are no further questions from Members, I thank the witnesses for their evidence. Thank you very much for attending. That brings us to the end of our oral evidence session today. The Committee will meet again on Thursday to begin line-by-line scrutiny of the Bill, meeting at 11.30 am in Committee Room 11.

*Ordered,* That further consideration be now adjourned.  
—(Craig Whittaker.)

4.57 pm

*Adjourned till Thursday 18 November at half-past Eleven o'clock.*

**Written evidence reported to the House**

NEFB01 Derek Wyatt (former MP 1997-2010)

NEFB02 Maïke Windhorst

NEFB03 Urenco Limited

NEFB04 Together Against Sizewell C (TASC)





