HOUSE OF COMMONS

Science and Technology Committee

Oral evidence: Delivering nuclear power, HC 626

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Watch the meeting

Members present: Greg Clark (Chair); Aaron Bell; Chris Clarkson; Tracey Crouch.

Questions 259 - 285

Witnesses

I: Josh Buckland, Partner, Flint Global; and Dr Fiona Rayment OBE, Chief Scientific Officer, National Nuclear Laboratory.

Examination of witnesses

Witnesses: Josh Buckland and Dr Rayment.

Q259 **Chair:** I am very pleased to welcome back to the Committee Dr Fiona Rayment, the chief scientific officer at the National Nuclear Laboratory, who is joining us virtually. So useful and compelling was Dr Rayment's evidence to the Committee previously that we wanted her back to talk about another subject of her expertise: the UK green taxonomy that is under development. Dr Rayment is a member of the Energy Working Group—a set of technical experts who advise the Government on the development of the technical screening criteria in the energy sector for the UK green taxonomy. Thank you very much indeed for joining us today.

I am very pleased to welcome Josh Buckland, who is in the room with us. He is a partner at the Flint Global consultancy and has been an adviser on energy issues in the Business Department, the Prime Minister's policy unit and His Majesty's Treasury. Thank you both very much indeed for joining us.

Mr Buckland, you might have seen evidence this Committee heard from James Richardson from the National Infrastructure Commission, who, in talking about the regulated asset base financing model for new nuclear, was very keen to make the point that the RAB model did not reduce the financial risk of nuclear projects but shifted the cost from Government to consumers. Would you describe what is meant by that and how we should think about risk between the two models—the RAB model and the previous contract for difference approach?

Josh Buckland: Absolutely, and thanks for the invitation to the Committee this morning. Effectively, the financing model for nuclear relies on the allocation of risk, and risks in the nuclear space are considerable, both the overall cost, with nuclear power stations costing £20 billion-plus, and the scale of potential overruns. Nuclear power stations since the 1970s have overrun by around 200% on average, so the scale of the cost and the potential financial—

Q260 **Chair:** Is it 200% since the 1990s?

Josh Buckland: Since the 1970s, on average, internationally.

Q261 **Chair:** What is the sample size in that term?

Josh Buckland: It is significant because it is global. It is a material number; it is obviously not just UK-centric.

The key challenge is how you allocate the risks in the most efficient way to ensure that you can deliver projects. Ultimately, that is the real challenge. It is not necessarily about efficiency; it is also about the practical delivery of such a scale project. When James was talking about it, I think he was articulating the fact that in a regulated asset base model the risk allocation is very different from under the CfD model.

Under the CfD model, in a very simplistic way—we can dive into a bit more detail if useful—the developer or the investors in the project take the development, the construction and the operational risk. Some extreme risks are still taken by Government. Changes in Government policy are potentially quite fundamental risks that we have seen elsewhere in the nuclear sector, but the developer is taking the risk and therefore prices it at an effective market rate. Typically, it is usually private, and that number is material, given the scale of the potential cost overrun.

The alternative, on the regulated asset base model, is that risk is shared. It is not necessarily all in the Government's court or all in the developer's court; it is shared. Typically, that means that the equity holders share the development risk, but at the point when you enter construction, the construction risk, which is in effect the cost overrun risk associated with the delivery, is shared between the investors, the consumers, who could pay a higher charge through the regulated charge they pay on their bills, and, in extreme cases, the taxpayer, if cost overruns or delays hit a certain point.

If you are an investor, that allows you to know that your risk is effectively capped at a certain level, meaning that you can demand a lower level of return. However, the point James was making is that that does not mean that the cost goes away. The financial risk still sits there and, effectively, it is now split between a different set of parties. You can argue, and I would say, that that is fair, because in reality the scale of the cost overrun and the scale of the potential risk is probably too big for a private sector entity to bear. We have seen companies internationally struggle to cope with the scale of potential cost overrun, but that financial risk still sits there.

The challenge for politicians as they think about the right financing model for Government is what their risk appetite is, between placing the financial risk with the private sector and paying more for it, or, alternatively, placing it on the taxpayer or the consumer but accepting that the state may have to pick up the bill for that risk if it materialises down the line.

Q262 **Chair:** You quoted a figure of 200% as the average overrun cost. Taking the Hinkley Point C nuclear power station and translating the construction risk, which under that contract sits entirely with EDF, and if that were to be shared with consumers in the way that is proposed for Sizewell, is it possible to estimate what the equivalent price per megawatt hour would be in the strike price?

Josh Buckland: Unfortunately, there has not been a huge amount of detail published on the exact deal that is being developed with EDF, but in an overarching way the model is that the development risk and the construction risk is shared between the investors and the equity holders, who take a lower return as a result of cost overruns, and consumers.

It is a bit difficult to do a comparison in terms of the strike price because in reality—you made the point about the financial risk being shared now with Government—the levelised cost of energy, which in energy parlance is the cost of actually producing the unit of power, is unchanged, irrespective of the financing model. In some ways, under a RAB model it may be slightly higher because of the soft costs such as the advisers, the transaction fees and all the associated complexity around the RAB model, but the underlying LCOE is the same. In reality, the strike price under a Hinkley model—£92.50—reflects the financial cost associated with the developer taking the risk.

Exactly what proportion of that £92.50 is made up of the financing cost has not really been articulated, but people have put it at around 50%, which seems like a reasonable estimate. If you then assume that the financing cost is around 10% for a fully CfD model, and you halve that on the basis that you moved to a regulated asset base model because that is broadly in line with other regulated asset bases, in effect you potentially halve that element, so you are looking at a strike price of say, £60 to £70 per megawatt hour.

EDF made the point that that number could come down further if there is return also due in a construction period, because, critically, it allows you to pay back investors earlier than, say, a seven to 10-year time horizon at the point that you start construction. That widens the pool for investors and, critically, reduces risk. You are looking at that sort of number but, critically, it is not a fair comparison. A fair comparison is the LCOE figure, which is broadly unchanged. The Government need to compare that LCOE figure with other potential technologies that can combine to consider what the right cost-effective energy mix is.

Q263 **Chair:** Is that the right approach to allow public policy to be made and properly scrutinised? What is the right way to do that between different models of financing big nuclear projects?

Josh Buckland: I would separate the question of what the most cost-effective energy mix is, and I think the Government are going down that route. It would be looking at the mixture of technologies—the proportion of the vast majority of renewables, and capacity, potentially nuclear, CCS and other capacities around that—and maximising what a cost-efficient system looks like, probably using relatively generic financing assumptions that you can compare and contrast against different technologies to ensure that it is a fair comparison. Then there is the separate question of what is the most cost-effective means of delivering nuclear.

We have had a slightly different conversation recently, given that high energy prices have suddenly made Hinkley look like a slightly different deal than it was at the time. The RAB model being proposed for Sizewell looks as if it will deliver a competitive financing cost and a lower headline strike price, but critically it is a question of how you maximise and make the financing the most efficient solution, versus what the right technology mix is for the energy system. I would differentiate the two.

Q264 **Chair:** Okay. I have a couple of points before I turn to Aaron Bell. Obviously, if the constructor is bearing all the risk—in the case of Hinkley, it is EDF—they have a strong incentive to minimise overruns. Presumably, those incentives lessen if the consequences for the constructor are spread. Should it be of concern to policymakers that there will be even less adherence to getting things done on time and on budget?

Josh Buckland: It is a fair question. The way I think about financing models is not necessarily that there is a regulated asset base model and a CfD. Effectively, they are on a spectrum of how much risk the Government want to place with the private market and the public market; in the case of nuclear, either consumers or taxpayers. What you will find is that different models and different iterations of the CfD or the RAB framework shift that balance in different ways.

The Hinkley CfD is not a pure CfD: there are additional protections built in for investors in certain extreme circumstances that are not necessarily in place for, say, offshore wind CfDs, because the level of risk is different. The key thing is that it is on a spectrum. The question for politicians is: what is their risk appetite, and where do they think the most efficient route within that market framework is? That trades off in the incentives on the private investor to maximise efficiency and delivery of the construction and minimise the risk of cost overruns.

On the RAB model currently envisaged for Sizewell C, there is still an incentive to maximise, and to minimise cost overruns. The equity investors share that risk most directly. That now includes the Government, who have a potential incentive to improve efficiency, and to an extent that is shared with consumers, Clearly, however, the direct incentive on a CfD-only model such as that used under Hinkley is more acute. The question for the Government is whether the additional financing cost that consumers have to pay for a higher strike price outweighs the cost that is ultimately passed on to taxpayers or consumers through that risk-sharing approach. That is a complex question. To an extent, it is ultimately one of judgment as well as analytical robustness.

Q265 **Chair:** On the basis of models that have been applied elsewhere in the world, is there anything that we can have as a kind of quantification of that behavioural response to shared exposure to cost overruns?

Josh Buckland: Not off the top of my head, but the thing to think through is that there should be a different risk tolerance for Hinkley and Sizewell C, taking the UK example. Hinkley was the first nuclear power station in a generation. Sizewell C is using the same model and technology, with some nuances, and, ideally, is using the same supply chain, as well as some of the same experiences in technology developments utilised. The risk tolerance should be different and, therefore, the framework and the justification for the financing model is also different.

Elsewhere, the regulated asset base model has not been used well. For example, it has been used in the US at the Vogtle project, where costs have overrun significantly. That was driven largely by a lack of engineering design up front and less certainty on the cost entering into the project, so that costs have overrun and ultimately the state has had to pick them up through consumers, through funding it without the private sector.

It is less about the financing model being applied elsewhere; it is about the status of the project and the nature of the entity that is being put into that financing model which then dictates your cost profile. There are other options that have been utilised abroad. The public private partnership is used quite often, where a Government will compete out a technology and then agree to part-fund it. That model was considered for the Horizon nuclear project with the Japanese Government in the 2010s. Other, more limited options have been considered, such as a guaranteed offtake, where effectively a Government will back up the idea that you will buy, and guarantee to buy the electricity from a nuclear power station. They are less utilised in the western world, where it is typically a more private sector-led development, or alternatively a fully publicly owned model.

Q266 **Aaron Bell:** With apologies to Dr Rayment, I have a couple of follow-up questions for Mr Buckland. On what you just said about the differences between Sizewell and Hinkley, it always strikes me that they have the models the wrong way round. The riskier one was the first, and once the company already had the knowledge, surely it was in a better position to take the risk itself on the second. Am I getting that right, or have I misunderstood?

Josh Buckland: You have absolutely not. I was specifically referring to the technology risk of the European pressurised water reactor that they have utilised, and the experience that they have developed through the supply chain. The thing that is probably different, if anything, is the external context. Since the Hinkley deal was originally envisaged, we have had Fukushima and the challenges that created around additional safety requirements and concerns about the potential impacts of extreme events. Connected to that, we have had a series of significant cost overruns in nuclear projects in both the US and France, including EDF-led projects, which has led to greater financial concern about putting investment at risk and finding that it is lost.

Lastly, we clearly have greater levels of policy risk. Perhaps we will get to that in the discussion. With the design of reorienting the electricity system to be net zero by 2035 in the UK, and the extension and expansion of renewables, the policy and regulatory risk for a nuclear developer looking at an asset over a 60 or 80-year time horizon has changed quite fundamentally since the Hinkley deal was originally envisaged.

You are right that, on a technology basis, you could see a pathway start with a regulated asset base model and potentially look to create more of a private sector incentive over time, as the technology develops. You could look at that in the world of, say, small modular reactors, which I am sure we will talk about. But the external environment has changed, and it is worth bearing that in mind. To an extent, it justifies the change.

Q267 **Aaron Bell:** I think my colleagues will come in later on the future financing of SMRs and AMRs. It strikes me that, regardless of what happens, there will always be a huge amount of risk falling on the Government/the consumer. You can see that even with Hinkley, because EDF is now trying to renegotiate with the Government. Whether it is a question of Ofgem setting a RAB or the regulator assessing whether force majeure has occurred, the regulator is tasked with making billion-pound decisions, and, essentially, those will come down to negotiations. We cannot get away from the problem of it ultimately falling on the taxpayer if things start to go wrong, can we?

Josh Buckland: I don't think so, personally. To the Chair's point about international experience, most international projects have relied to an extent on either a state-run company, which obviously has a different risk tolerance, or some kind of state guarantee. You are definitely starting to see that dynamic playing out in the UK as we start to develop a nuclear fleet.

My personal view is that each financing model will be relatively bespoke. These projects are significant and they cost a vast amount. Their technology will differ depending on the scale and timing. What that will mean to an extent, going back to the point about the sliding scale of risk, is that Government will have a choice on each individual project about where they situate themselves in the risk allocation between the private market and ultimately the state. There is a set of risks that a state should take. If Government decide to change policy overnight in relation to nuclear, that is not in the gift of developers. Clearly, they should be protected from that risk.

On the other hand, if a technology does not work, the equity holders and developers should surely be put at risk on that basis. The state should not have to take that risk. The issue is the grey area in between. For example, we have talked about construction cost overruns. In a world where you place all of them with the developer, given the scale of potential cost increases, do you require a higher financing cost which could be inefficient? There are others—for example, wholesale price risk. As we have seen over the course of the past year, wholesale prices have changed significantly. Again, should a developer be asked to take on that risk, or should it be a risk shared with the consumer, which is the case under both the CfD model and the RAB model? You can see some synergies, but that is a debate for Government. I completely agree with you that to a certain extent it all comes down to the risk tolerance and appetite of a Government to put those risks on to the state.

Q268 **Aaron Bell:** The Government's own estimate, which obviously comes from the consultation, is that using RAB rather than a contract for difference model could save consumers, who are the same as taxpayers one way or the other—you can see the RAB as just a tax that goes on to bills—between £30 billion and £80 billion for a large-scale project. Is that a number you recognise?

Josh Buckland: It is not a number that I have backsold for. To be perfectly frank, there is not a huge amount of substantive publication of analytics that have driven that number. Personally, I would love to see it and I am sure the Committee would be keen to see it as well.

The argument is relatively sound. You have a lower headline financing cost, so it is half what it was for a fully CfD project. That will amortise over a long period of time, given the timeframe in place for these subsidy models, meaning that the material cost to the consumer should be significantly lower. The issue, and the equation they have to do, is whether that offsets the additional financial risk that is now being put on to the taxpayer in the event of extreme cost overruns. What is unclear is exactly the equation and trade-off that is being made between those two things.

Q269 **Aaron Bell:** Does it not make cost and time overruns more likely when you go to that model, whereas the company is not on the hook for it quite as much as it was in the CfD model?

Josh Buckland: It is unarguable that the incentive is slightly less sharp under the RAB model than it is under the CfD model, but it is critical to remember that the developer and the investors are not completely immune to risk. They take a lower risk in the event of significant cost overruns, and they will be well aware that there will be public scrutiny in the event of significant cost overruns. It is right to say that the risk is to an extent potentially higher, but equally the risk and incentive on the developer is still there.

Q270 **Chair:** Dr Rayment, we have some questions for you about the green taxonomy. You are very experienced in the nuclear sector. Is there anything you have heard so far that you disagree with, or do you wish to give a different perspective on the financing of large nuclear through RAB?

Dr Rayment: Thank you for inviting me back to the Science and Technology Committee and letting me join online. I agree with what has been said so far. I just note that I am an engineer and a scientist, not an economist; I do not pretend to be an economist.

First, the nuclear industry has an ask about being able to access affordable finance. That is where we are at this moment in time, recognising that any plant that is built will last for at least 60 years; it could be as many as 80 years, depending on the technology. It is pretty different in comparison with some other energy providers that we are

talking about, which have plants that may not last as long as that. That is the first ask.

The second thing, which Josh has already brought out, is about fair comparisons. Whether we are talking about taxonomy or financing, the ask is to treat it on a level playing field. One of the things that has come out very much about nuclear, when we start to think about the overall cost, is recognition of the fact that a lot of that cost is not about the nuclear element of the project. About 70%, if not more, of the cost of a nuclear project is absolutely around all of the infrastructure that is required outside that nuclear island. It is just a really large infrastructure project. The challenges we have in nuclear build are applicable to other large infrastructure projects too. I want to make that point.

Chair: Thank you very much indeed. That is very clear and helpful.

Q271 **Chris Clarkson:** Mr Buckland, what lessons could the UK learn from largely privately financed models in other countries? We have heard that certain countries struggled when they tried to do it on a purely private basis. We have heard about public private partnerships. What lessons can the UK learn from other countries in how they have approached this?

Josh Buckland: There may be a couple of less financial things we can learn and apply to the financing piece. Other countries have largely tried to take, at least in part, a fleet-based approach. They have tried to show that the way to reduce risk over time—the investment in South Korea is the best example—is to reduce the level of risk on the construction side, the timing side and the broader infrastructure time, as has been mentioned, and that flows through into lower potential financing risks over time. The opportunity to think about how you create a clear pathway and fleet-oriented mentality makes a huge amount of sense and allows you to think carefully about how you reduce financial risk over time. That is a critical part of thinking about the right approach.

The more general financing point is absolutely about the allocation of the risks that the state should take. There are certain risks that effectively should not fall to the private sector because it cannot effectively price them. Decommissioning is a good example. Government will have a role in ensuring that the plants themselves are fully decommissioned through some kind of financing solution, but the Government stand ready to supply the right decommissioning process for spent uranium and other hazardous materials to ensure that they have a pathway to be dealt with. Again, the financing sector cannot deal with that, and obviously the public sector and the state have a role to play there. Identifying what those risks are and being clear that Government will stand behind them allows the financing sector and the investment community to focus on the risk they can tolerate and price them in the right way.

The other quite interesting point is about the level of commitment from Government. In some countries, you hear a lot about some Governments, especially in the Gulf and elsewhere, making big

commitments to overall pipelines, and obviously that has allowed some sense of development cost to be shared across multiple projects. It has also potentially allowed bigger-scale investment or development up front to reduce operational risk when it comes through, and potentially construction risk as well. That is a potential challenge. We have talked about the changing energy market and making big, bold commitments to a whole pipeline of projects. An order of multiple projects at any one time is a challenge. There is potentially a question around, say, new reactors or modular reactors, which may be smaller. Can that learning be bought and applied?

It is not necessarily that the financing model is directly replicable, because there are different challenges. We do not have a UK-oriented developer; we have a state-owned company which, for all sorts of reasons, means that potentially it is difficult to make an exact read-across from an international perspective, but there are general rules that can play into a more efficient financing solution.

Q272 **Chris Clarkson:** Picking up on SMR and AMR and first-of-a-kind reactors, what would you say is the ideal financing model in that scenario, or will it be bespoke, as you alluded to?

Josh Buckland: I thought about it in advance of the Committee session. I do not think there is any reason to think that any of the available financing models could not be applied to SMRs and AMRs. SMRs and AMRs are on a spectrum. I know that the Committee has thought about that and looked at it. In reality, it comes back to the risk allocation. You might need to have slightly more risk placed on the state in the event that it is a first-of-a-kind model, but there should not be any reason that the model could not be applied.

The challenge is to look at a pure CfD-type model, which is the model being looked at for, say, offshore wind. New SMR projects that have a high level of technology risk and are relatively untested will clearly have a high risk premium. A regulated asset-base model in the near term for early stage projects might be sensible but, on the point already made by another Committee member, over time as the market becomes more aware of the risk, and you start to deploy and test the technology risk, there is no reason to think you could not shift the burden back to the private market, especially with smaller-scale projects that do not necessarily have the significant cost tags of large-scale projects. It is probably on a timeline where you may end up in the same sort of debate up front, but over time you might be able to shift back to the private market.

There are two other things in relation to SMRs and AMRs that I think are different. There is probably a greater role for the state in development funding for those technologies, because to an extent it is an R&D as well as a commercialisation challenge. That is not the case for large-scale projects, which are not necessarily at that stage. The other critical thing is the balance that could be struck around more innovative models in the

future. It goes back to the point where you can make the private market take on more risk. If they are smaller-scale projects that potentially have either a single customer or a group of customers, say a big industrial area, could there be an agreement where Government stand behind the offtake agreement for the electricity that is produced? Over time, the private market can invest in the asset and sell it back on the basis that they have a guaranteed offtake of power. That is where we are going in the renewable space. We are increasingly starting to see merchant-oriented deals done. I do not think that is for now; it is further down the line, but the smaller projects potentially are slightly more interesting in that sort of space simply because the size and capital requirement is lower.

Q273 **Chris Clarkson:** Staying with uptake, we have seen that both the RAB and CfD models encourage operators to keep generating baseload energy, which obviously discourages the use of renewables. Do you think there is anything that can be built into the financing model that would encourage more flexible generation of nuclear power?

Josh Buckland: It is a difficult question, because the more flexibility you build in, the more investors will say there is an element of financial risk that they will price and, therefore, the financing risk goes up. You get to the point where you have to think about the overall trade-off between those two elements.

That said, given the point made about these assets having a 60-year lifespan, it is important to think about flexibility being built into the contract and to explore whether that flexibility could be provided. Potentially, one option is hydrogen. I know that has been talked about before. In areas where there is low pricing, could you see the ability of a nuclear power station directly to produce green hydrogen, which effectively gives it the opportunity then to be able to turn off from pumping into the grid, and lower prices further? Some of those innovations are interesting. The challenge is how you build in that flexibility, because in all honesty we are probably not at the stage where we can design the perfect financing model for a future energy system with hydrogen networks, for example, because they are simply not there. We do not quite know yet whether the scale and size will reflect that, but if you can at least build in a bit of flexibility to reopen, or at least review, the financing arrangement, it allows more optionality in the future, because we will start to think about the need to create more flexibility.

The one overall caveat is that I am still a strong believer in the fact that we probably need to double or triple the size of the electricity system by 2050 if we are to electrify a large proportion of the economy. A significant proportion of that power will still be stable, and there will be a high level of demand. The idea that we will move to a completely flexible system where baseload, or at least firm capacity, is not required is a big gamble at this stage. It comes back to the necessity for nuclear and potentially the need for CCS as well in that context.

Q274 **Tracey Crouch:** Dr Rayment, I heard what you said about not being an economist. Neither am I, but I find green finance interesting. How do you feel the nuclear sector would benefit from being included in the green taxonomy?

Dr Rayment: It is a really interesting question. I have spent quite a bit of time on this, working it through. If we have any taxonomy in the UK, the first thing to think about is what criteria we set for any of the energy companies to come forward and engage with that. In the EU, there are six criteria that technologies need to meet. Of those criteria, at least one has to be something you can tick the box on. For the other five, you have to satisfy the requirement not to do significant harm. To take the criteria that the EU has set up, they are that there is to be no impact on climate change and that the technology mitigates climate change; there is no impact on adaptation to climate; there is sustainable use of water and other resources; it is transitioning to a circular economy; it prevents pollution in terms of the whole system going forward; and it protects biodiversity and the overall ecosystem. That is a good set of criteria to use.

What I propose is that, based on those criteria, you decide whether or not any technology can be part of them. If the technology meets the criteria, or the technology is being legislated against those criteria, or the technology is doing anything it can to get to a stage where it mitigates itself against those criteria in the future, I think it ticks the boxes. Having looked at that for nuclear, we believe that for all the criteria highlighted nuclear meets them directly—for example, net zero with no CO_2 being produced at source of generation. If it does not meet the criteria, it should be regulated against to meet those criteria—for example, the regulatory requirements to be met for discharge to sea or discharge to the air. In addition, in many cases we have to design in technology to meet the criteria before we even get the permit to operate.

That is why I think nuclear meets the criteria and it should be included. It comes unstuck when you set up a set of criteria, try to put a technology through it and then say, "It does pass, but there are extenuating circumstances why it shouldn't be included." Choose the criteria, have a level playing field and decide whether nuclear is in or out. That is where I would be.

Q275 **Tracey Crouch:** From that answer, I guess that you do not think that the EU taxonomy, or the Canadian equivalent, categorise nuclear correctly.

Dr Rayment: When the EU initially carried out that review, it excluded nuclear. That was at a time when we did not have the issues with energy security that we have now. Since then, the EU has looked at the taxonomy again and decided that nuclear is in. It has also included gas. Basically, it said that nuclear and gas are transition technologies. I understand why the EU has done that. Personally, I do not see nuclear as a transition technology; I see it as a sustainable technology for the future. The only thing I disagree with is the fact that when the review

was carried out originally it looked at the criteria, ticked the boxes for nuclear and yet decided that there were extenuating circumstances where nuclear should be excluded. Now it has decided that there are some extenuating circumstances that mean nuclear should be included. My point is: let's get the right criteria and carry out a review on a level playing field for nuclear energy to be in or out.

Q276 **Tracey Crouch:** Parking the issue around the EU thinking that nuclear is a transitional project, you have obviously looked in great detail at the EU green taxonomy. Do you think that it could be deterring investment in transitional projects—for example, coal phase-out?

Dr Rayment: The reason for a taxonomy is to enable investor confidence in what is going to be a green sustainable technology in the future. If you are talking about being able to access pension funds and other kinds of large-scale investments, the question about whether or not it is sustainable will come in again and again. If you think about where it might go further down the line and what an investor will invest in, as an investor are you going to invest in something sustainable, and recognised as sustainable for many years to come? Are you going to invest in a transition technology? It depends on how long your journey is. If you are on the journey in the short term, maybe it is okay to be involved in transition technologies, but if you are on the journey for the long haul, you probably want to go more towards sustainable technologies. I think the word "transition" could stop some investors wanting to invest in certain technologies going forward. That would be my view just because of the terminology "transitional".

Q277 **Tracey Crouch:** Presumably, you would not agree with the decision to exclude nuclear power from the 2021 UK Government green financing framework. Do you think that was a mistake?

Dr Rayment: I go back to the level playing field. We should set the criteria and analyse all of the potential energy solutions against those criteria and not make separate decisions for specific technologies. If nuclear meets the criteria, my view is that it should be included, and should be treated like anything else, on a level playing field. That is basically my ask. As to whether or not it should be excluded, look at the criteria and make decisions based on whether nuclear is in or out. I know that nuclear continues to face certain challenges—for example, dealing with the waste. Nuclear is currently regulated very heavily against any waste that is created. There are legal penalties for any company operating nuclear power plants that is not able to manage its overall operation against the requirements in place.

The other point about the EU criteria is very much about the fact that, if you can show you are moving towards being able to mitigate completely the challenge in a particular area, you should be included in the criteria. Why exclude nuclear now when we are working through the overall way forward in being able to deal with that waste, and there is a plan in place

for interim storage at this moment in time? What I am saying is that you should just treat this on a level playing field.

Q278 **Tracey Crouch:** Josh, you spent a long time in the Treasury. Do you have any thoughts and comments on that?

Josh Buckland: I obviously cede to greater experience than mine on the taxonomy piece. My general view is that the taxonomy framework is less important than ensuring that investors have the right information. Ultimately, the financial community is very good at assessing risk—if anything too good—and therefore will not invest. Equally, it is very good at looking at a set of risks and thinking about how they will be borne, both over time and critically, in the case of nuclear, over a 60-year time horizon, or at least a 30-year financing time horizon.

The critical challenge when it comes to climate is about disclosing what those risks are, effectively ensuring that projects as well as investors are required to set up explicitly the level of climate risk, emission exposure, technology risk and all the sorts of things that external investors can consider and think about whether they want to abide by that project. If you get that framework right, which is why the disclosure stuff being done by Government both on climate and on the broader biodiversity side is so critical, an investor should be able to say, "I think the climate-related risks are too high for that investment," whether nuclear, coal, gas or whatever it may be, and they decide. Alternatively, it is priced at a level which means that it is priced out of the market and lower-cost greener investment comes through. That, I think, is the critical thing.

The taxonomy is difficult—it was picked up in the point about the level playing field—because to an extent it is subject to politics and regulatory risk. Effectively, that means that you are considering not just financial aspects but political views within individual member states in the case of the EU, or individual technology priorities for other countries. That is the case in Canada as well as in the UK to an extent.

The other key challenge is how a taxonomy flexes over time. You will remember that 10 years ago we were talking about the need for clean coal. No one talks about that any more. We are now in a world where we want to invest in renewables, nuclear and other areas, so the critical challenge for me on taxonomy is: how is it meant to evolve? Does it mean having a brown transitional sector now? That in some ways creates challenges to the point that has been made around the fact that even those assets potentially have a short time horizon. What is the review process for individual technology assessments and the guidance that sits around it? It is highly complex and potentially exposed to political and regulatory risk. From an investor's perspective, I come back to the point that disclosure of information and the ability to understand and price, and get the private sector to incentivise and think about risk, is probably the right solution more generally.

Q279 **Tracey Crouch:** Would you recommend a binary system, such as the

green taxonomy, over a proposed scoring system, perhaps like traffic lights or a brown taxonomy?

Josh Buckland: You can probably make either work, subject to ensuring that there is a level playing field, as has been said, as well as a level of flexibility within it. There is also a question around mandation versus voluntary approaches. Is there a question, at least in the early stages, about seeing this as some sort of voluntary process that people can think about assessing against, and then it can strengthen and become more mandatory over time as the delineations between classes of investment become clearer? That is one option. The other option is a slightly more graduated approach, but I still think it comes back to the idea that an investor will decide and will want to have the right information to make their own investments. There will be funds that want to invest purely in very highly green areas, and there will be those that will invest in the transitional space. The critical thing is that they understand the investments they are making. I think there will be less of a dynamic where if a taxonomy framework is set up, whatever it looks like, investors will immediately respond completely to that framework, because there is a whole heap of other things they consider when they make those investments including, critically the rate of return.

Dr Rayment: If I may jump in, I totally agree with that. Whether you go with a taxonomy, green bonds or whatever it may be, or whether you look at green or brown financing, for nuclear it is about whether we can access affordable finance. Can we do that such that we have a fair and consistent approach being applied against other technologies as well? Whether it is green bonds or taxonomy, both have a place, but it is about being able to access affordable finance.

Q280 **Tracey Crouch:** I am glad you mentioned green bonds. I was going to raise a specific question around individual investor awareness, not major investment finance. For reasons I never quite understood, I temporarily had responsibility as a Minister for ethical investment. One thing that is clear is that individual and small investors do not necessarily have awareness of green investment or green bonds. Even I was not aware of green premium bonds until I read the briefing for this meeting today. Do you think there is enough individual awareness around these very important issues of finance?

Dr Rayment: I do not think at this moment in time that there is awareness at an individual taxpayer level, but there is increasing individual awareness of what people want to do. People are getting more and more interested in climate change and green financing and what that means for them. They want to make their own choices in terms of what that will mean in the future. At the moment, we have an issue with energy security and we have an issue with affordable energy, so that takes priority, but at some point, hopefully in the not too distant future, we will resolve that and start to ask questions about where we want to invest. Where do I want my pension funds to be invested? Where do I want to invest my savings? I honestly think that, as people start to hear

more and more about what is happening in the green space, they will want to make sure that their money is flowing through routes that enable them to think that they are being green.

Josh Buckland: It is a really interesting angle; in some ways, it is even more interesting than the Government deciding what investors can and cannot invest in. There is a real issue around lack of public awareness and public trust. In the retail energy market, at the moment you can market a green electricity tariff, for example, when in reality the electricity coming into your home on an hourly or half-hourly basis is not green; it is a mixture. Effectively, the system allows you to market something that is not necessarily what is being delivered. We have seen challenges around banks making claims that are not necessarily true, and the Advertising Standards Authority has tried to resolve that.

I agree. I think there needs to be a policy and regulatory programme to ensure that the claims being made and therefore sold to consumers are robust and fair. In some ways, that gets you into a conversation around what is green, but in reality the key thing is that the public are aware and can make informed choices. That will ensure that they are then able to trade off what they prioritise, whether it is cost or greenness, and different consumers will have different choices. That is a policy and regulatory challenge, as well as an advertising standards question. In some ways, it is critical to get that right; otherwise, we risk undermining public trust. We have talked today about the regulated asset base model. We will be asking consumers to pay for a lot of the energy transition through their energy bills, their transport bills and even their mortgage costs, so it is vital that we get it right now.

Q281 **Tracey Crouch:** I was going to ask whether you feel it is reasonable to ask the energy bill payer and taxpayer to fund a multibillion-pound project that is not yet operating anywhere else.

Josh Buckland: It is fair to say that an enormous amount of electricity generation needs to be built. The electricity bill payer benefits from that new capacity and, hopefully, over time from lower costs as well. Critically, lower-carbon technologies could come through that are not exposed to fuel cost premiums and gas price spikes. There is potentially huge value in that and there is no reason to think that energy bill payers should not necessarily fund that cost. That has always been the case. Even if you look back at the publicly oriented owned market, the cost of that was passed through to bill payers through a standard charge, so it is a similar sort of model.

There are a couple of idiosyncrasies in that. On the RAB model, clearly there is a question about the fact that consumers will be paying during the construction period. There is a good rationale for that. Effectively, it brings in much more available finance; it means that as an investor you are not necessarily waiting 10 years for a payback, so you are willing to price the financing risk lower. Equally, it is a new concept where we are asking consumers to pay before they actually receive the benefit. It

comes back to the political risk appetite. Maybe we have not had enough of a conversation at a political level about whether that is the right model.

The other thing for me is that when you look at the amount that needs to be spent on net zero transition, especially energy bills, there is a question around distribution. A lot of that is a fixed cost, so you can decide whether you want to use the energy bill system to try to have a more progressive approach to paying for that. One of the conversations happening at the moment is around social tariffs as a result of the energy crisis. Should we look to rebalance some of those costs and make the energy pricing system a bit more progressive? That gets you into a question of the role of social policy versus the welfare state, but it is an interesting conversation to have. To be honest, if we are to maintain public trust, ensuring that there is a fair transition is probably something we need to start thinking about now. It is not just a question of individual projects; it is a question of the overall approach to energy.

Q282 **Tracey Crouch:** Dr Rayment, when do we expect the UK green taxonomy to be published? Do you have any insight?

Dr Rayment: I don't have an answer on that. Dialogue is happening at the moment between BEIS and Treasury. The decision is firmly with Government as to when that taxonomy is published. I welcome the taxonomy coming forward when it is published. I hope it arrives in the not too distant future, in line with all the other things we are trying to do in the energy space. I am sorry I do not have an answer on that.

Q283 **Tracey Crouch:** Josh, do you have any insight?

Josh Buckland: I am hopeful that it will be in the first quarter of next year. I think that is reasonable. They said that broadly that is what they are aiming for. It is vital. The key thing is clarity. The longer you leave it, the more uncertainty you create, so getting on with it is the better option.

Q284 **Chair:** To go back to gigawatt-scale nuclear, two prospectively commercially financed reactors, Hitachi at Wylfa and Toshiba in west Cumbria, failed. Was the essential problem cost overruns from construction? Was that the risk that proved indigestible?

Josh Buckland: There was a specific set of challenges on the Horizon side; and a particular challenge around the political issues on nuclear in Japan, given the ownership of Hitachi. On the NuGen side there were some challenges around the site. It is not necessarily the first site you would choose, given the connection issues. I think those were largely technical issues that could have been resolved.

I agree with you; the major issue was financing. The model put on the table by Government at the time was relatively significant: 50% of the equity; a significant chunk of the debt; guarantees around supply; and obviously the pricing of the power that came out at the end. It was more

a public private partnership sort of model, but critically the risks that fell to the equity providers, which equally would have been private investors in these circumstances, on the other side of the Government equation, were exposed to those potential cost overruns.

Unlike a world with a regulated asset base model, they were directly exposed, and were exposed at a level that would have been greater than would have been the case under a regulated model. That was the bit that could not be overcome. It was driven largely by experience around cost overruns recently and the additional safety requirements post some of the issues the nuclear sector has had, and to an extent by the changing nature of the energy market that sits behind that. Those were the insurmountable risks. It comes back to the idea that one of the fundamental challenges when it comes to nuclear is getting the financing model right, because, as we have seen at Hinkley, the supply chain is there and the technology is there. It is more about trying to facilitate the amount of investment that is required at a reasonable cost.

Q285 **Chair:** I come to my last question on financing models. You spent time in the Treasury working on these things. In my experience, the Treasury has always been sceptical, to the point of hostility, about the regulatory asset base model. Why is that? Do you think that view has genuinely changed, or has it been compelled by other voices in the Government, or other Departments of Government?

Josh Buckland: They have probably been on a bit of a journey. Interestingly, if you go back five to seven years, the Treasury was not necessarily opposed to the regulated asset base model because they saw the opportunity potentially to have it as an off-balance sheet model. We have not talked about the Government ownership piece, but one of the benefits of the contract for difference model is that it is effectively off the Government balance sheet and does not count in the capital investment budget. Therefore, you are able to deploy multiple projects at a similar sort of scale and time.

The regulated asset model was originally envisaged as that; it was envisaged as a kind of shared-risk model, with investors, consumers and taxpayers taking risks. If you could design it as was the case with the Thames Tideway model, it could potentially be off the Government balance sheet. What has changed? I do not think the Government have said this specifically, but in the documentation around the Sizewell deal that seems to be the case. The model itself is now on the balance sheet. Effectively, you have a regulated model where risk is shared, but the budgeting cost on the capital side now sits with the Treasury, and that will come through in the construction period.

To an extent, the Treasury welcomed and explored the model early on, and now the key driver around its being an off-balance sheet solution no longer appears to be the case. Personally, I think that is largely a technicality. In reality, the fact that you still have private investment there that is creating the right incentive and you have reduced the overall

financing cost, which means consumers over time should be paying less, is a value and a critical aspect of the RAB model. The fact that it scores on the Government's balance sheet should, hopefully, just be a technicality. Critically, once the project is built, there is an opportunity to think about the risk-sharing mechanism changing. It could come off. I think that is one of the key changes in the Treasury, but it has consistently on the capital side looked for ways to try to get investment off the Government's books for the fiscal position that creates. To an extent that is justified, but obviously it has created some challenges historically around things like PPI.

Chair: I thank our witnesses for a deep dive into some of the questions on nuclear financing. Josh Buckland and Dr Fiona Rayment, thank you very much indeed for your evidence today. That concludes this meeting of the Committee.