



Welsh Affairs Committee

Oral evidence: [The Future of Nuclear Power in Wales](#), HC 699

Monday 7 March 2016

Ordered by the House of Commons to be published on 7 March 2016.

Written evidence from witnesses:

- [Greenpeace](#)
- [Nuclear Industry Association](#)
- [Nuclear Institute](#)
- [Supporters of Nuclear Energy](#)
- [Professor Gordon MacKerron and Doctor Philip Johnstone](#)

[Watch the meeting](#)

Members present: David T.C. Davies (Chair); Byron Davies; Chris Davies; Gerald Jones; Liz Saville Roberts; Craig Williams

Questions 59-108

Examination of Witnesses

Witnesses: **Dr Doug Parr**, Chief Scientist, Greenpeace UK, gave evidence

Q59 Chair: Good afternoon, Dr Parr. I will give you a few minutes to get anything out there. I can rattle on while I see you pulling out paperwork.

Dr Parr: Yes, sorry.

Chair: I do want to apologise for the fact we are starting like this. There seem to be other things going on in the Chamber today and around the place, I have no idea what, but I gather people are doing statements and things. Thank you very much indeed for coming along this afternoon. Obviously, Greenpeace is opposed to nuclear power. Are there any circumstances in which you can imagine that you might support it for environmental reasons?

Dr Parr: Well, our concern has always been based on the issues of radioactive waste, proliferation, accident risk, to which I might add terrorism risk, as well as discharges from accident and routine operation. Solving those problems collectively would be a necessity

before we would see nuclear power playing any role, and it has to be said we do not foresee that happening.

Q60 Chair: What do you think overall poses the biggest risk to human life? Would you say it is climate change caused by man-made carbon emissions or the possibility of an accident involving a nuclear power station?

Dr Parr: I would say that is not a simple and straightforward thing to compare one with the other because with nuclear power we are talking about energy choices, whereas with climate change we are talking about long-term issues that would impact over a course of time. The way in which I would frame it is that climate change is clearly something that needs to be tackled and that is why nuclear power is back on the agenda again, because its supporters say it is a low-carbon form of power, which I generally think it is. The challenge to the environmental community is to say, “What is the alternative? Can we manage without nuclear power?” and we think we can.

Q61 Chris Davies: Thank you very much, Dr Parr. If I could say in the politest possible terms that many other organisations who were opposed to nuclear power seem to be on board now, would I be correct in saying Greenpeace is behind the curve and would I also assume from your answer as to why you oppose nuclear power that there may come a time when Greenpeace would be inclined to support nuclear power? You did not give a definitive “no”, shall we say?

Dr Parr: I would not give a definitive “no” because the future is uncertain. There are concerns about nuclear power and our opposition is based on those criteria that I outlined. We foresee no realistic possibility that that will change, and, therefore, our opposition to nuclear power remains.

Now, in terms of are we behind the times, I think there has been a phase where nuclear power has seemed to be more acceptable. I think that is particularly true in the UK, in fact, whereas if I look around the world, I do not see any other major developed nation or, indeed, developing nation that keen on nuclear power compared to other forms of generation—clean generation, like renewables—with the possible exception of some eastern European countries and those who have reactors to sell.

Q62 Chris Davies: You acknowledge that there seems to be a change in Britain, in the UK. What do you put that down to?

Dr Parr: I think there is a long-standing culture of acceptance in nuclear weapon states that is not necessarily present in others. Now, why that is—

Chris Davies: But we are not talking about nuclear weapons here; we are talking about nuclear power.

Dr Parr: Yes, exactly. Nonetheless, if I look around the world that seems to be how it is. I am not for a moment suggesting that the civil nuclear programme is necessarily connected with the nuclear weapons programme. I am just trying to unpick the cultural backdrop to where there are different attitudes pertaining to civil nuclear.

Q63 Liz Saville Roberts: You have explained that as things stand new nuclear build in your opinion is not necessary for the UK. Would you think that renewables could be used to meet

the UK's entire energy needs, and, alongside that, if nuclear new build were to be abandoned, would you think that it would be more likely to be replaced solely by renewables or renewables and coal and gas?

Dr Parr: No, I do not think it is a simple swap of one for the other because renewables, particularly wind and solar, do not generate all the time. It has to be a different kind of system, the sort of system that the National Infrastructure Committee were so keen to emphasise in their report of a couple of weeks ago. It would be an interconnected, demand-responsive, smart system, probably with elements of storage that greatly enhance the flexibility of the system and the interconnection with overseas markets, together with a removal of some of the barriers to the smarter technologies and storage at a local distribution and even household level.

Accepting that, under those circumstances, the costs of integration of renewable energy are much lower, then it seems to us that the best option for the UK is a system that is based on a portfolio of renewables that frequently generate at different times—solar and wind are often generating at different times, for example—that would deliver an overall lower risk but nonetheless still reliable system. Our own analysis, which was done taking 11 years of real weather data from 2003 to 2014, showed that an 85% renewable electricity system could deliver full system security to a better standard than the one laid down by the Secretary of State. There are other components to that, including combined heat and power, which becomes important because, as you get to higher and higher levels of power decarbonisation, it is important to think about heat at the same time.

My overarching point would be that it is a different kind of system from simply substituting renewables for nuclear or for coal, but it is the sort of system that is starting to emerge anyway because many of the utilities, recognising that that is where things are going, are starting to reconfigure around those smarter, more interconnected systems anyway.

Q64 Liz Saville Roberts: Is the technology in place to enable this within a reasonable timeframe?

Dr Parr: Yes. Actually, it is probably available certainly within a timescale of deployment similar to that of, say, Hinkley Point. We already understand how to build large cables to our European colleagues. Again, the Treasury in the recent Budget suggested another nine gigawatts of interconnection. I would say out to 2030 we could do rather more than that, but 9 GW is decent on top of the four we already have. Demand responsiveness, demand shifting and, indeed, demand reduction have already started to play a role. They could play a much bigger role. Organisations like KiWi Power and Tempus Energy, using smart building systems, using the ability to reduce power and then upscale it again at different times, are already starting to operate within the market. They could be assisted by further deregulation, if you like, at the lowest level.

Storage has a dynamic all of its own. Grid-scale storage makes a certain amount of sense at times. I think the biggest dynamic over the next five years in the UK is going to be the evolution of storage associated with solar, and that, frankly, is going to happen whether the policy and political system wants it or not.

Q65 Chair: In your evidence, Dr Parr, you mentioned—actually, it may not have been in your evidence; it might have been in somebody else’s. I may be mixing it up, but we heard about the number of jobs that will be created, for example, in Anglesey as and when the project goes ahead. Do you think we should take account of the potential number of jobs that can be created when we look at whether or not a nuclear power project should go ahead?

Dr Parr: I think what I would argue for is consistency across Government policy. Obviously, Greenpeace has a view about nuclear power, but I am saying how Government should approach this. For example, in the recent feed-in tariff cut for solar, the jobs were not taken into account in terms of the overall impact assessment for whether the feed-in tariff cuts should go ahead. It seems to me either you do or you do not take into account these things and if you do not take it into account for solar, then do not take it into account for nuclear. On the other hand, if you want to do it the other way round, then okay.

Q66 Chair: In a funny sort of way, I can totally see your point, but I think what I would suggest then is perhaps not only should the Government have a clear policy but maybe the NGOs should as well. If the NGOs want to use the number of jobs created in renewables as an argument for renewables, then they perhaps also ought to look at the number of jobs created in nuclear. Is that a fair comment to make?

Dr Parr: I have never dismissed the idea, mostly in relation to the argument around Hinkley Point, that if there was a major building project in Somerset around the Hinkley site that jobs would be created. It goes without saying.

Q67 Chair: Obviously, from what you were saying earlier on, you talk about a perfect world, perhaps, where 85% of our energy needs could be supplied from renewables, but we do not necessarily live in a perfect world. If you had to make a choice between nuclear power to generate electricity or coal or gas—probably gas, actually, that is realistic—what would you go for?

Dr Parr: Again, I still do not see that we necessarily need to construct that in those terms.

Chair: I appreciate that, but in the less than perfect world in which we live, sometimes these decisions have to be made. What would you do if you were the Energy Minister and you had to choose between gas and nuclear?

Dr Parr: Okay. Let me give you an example of our scenario that was 85% renewable by 2030. We did have gas in there, but we did not have CCGT. What we had was heat-led, combined heat and power based on gas, because there becomes a premium of flexibility in the world to which we are moving with the smart innovations that I talked about earlier. What I would call routine standard gas is not something that fits necessarily very well with the sort of future that I am talking about, but some form of gas generation to cover flexibility gaps, which may not have a particularly high load factor, would be an important component of that.

Chair: A role for gas in the energy mix—that is interesting.

Dr Parr: Yes. It is quite clear if it is a 2030 scenario, 85% renewables, the other few per cent—10%, 15%—is made up of gas. It is worth saying that nuclear could not fill that gap in anything like the same way of the current set of models that are on the table.

Q68 Chris Davies: Before I ask the next question, following on from your answer there, does your answer say you are looking at gas from the North Sea or gas from fracking?

Dr Parr: We did not take a view about where the gas was coming from in that. We do have a view on fracking, which is that it should not go ahead, and that is because of the amount of fossil fuel that needs to be left in the ground in order to meet climate targets that have now internationally been agreed under the Paris agreement. If you look through the lens of climate targets, then the University College London assessment of what that means is that even at two degrees—and remember Paris was saying well below two degrees—gas that is in reserves in Europe would still have to stay in the ground. We do not see the value and we see significant political risks associated with exploitation of further unconventional sources of gas.

In terms of the remaining gas in the system, I think under our scenario we would certainly be significantly reducing our imports because associated with renewables, associated with smart grid and associated with the use of gas in heat, there is also significant demand reduction in the power sector, and that would also spill over into buildings more generally where there is significant gas use.

Q69 Chris Davies: Forgive me, I am trying to pick my way through your answer there. Do I assume that the extraction of fossil fuels from the North Sea is acceptable to you, but the extraction via fracking on the mainland is not?

Dr Parr: Existing reserves, yes, clearly. We are going to be using gas for a couple of decades and we are going to be using it more in heat than we are in power.

Q70 Chris Davies: Is not a fossil fuel a fossil fuel wherever it may come from?

Dr Parr: Yes, it is. Are you asking me about the fracking point?

Chris Davies: I am, yes. I am comparing the two. You mentioned that you are prepared to see gas within the mix.

Dr Parr: Yes.

Chris Davies: We may, as the forecasters tell us, run out of gas in the North Sea at a certain point.

Dr Parr: Yes.

Chris Davies: Therefore, the gas would have to come via fracking, and that is what I am asking you. A fossil fuel is a fossil fuel as far as I can see; but evidently, North Sea gas is more acceptable to you than fracking gas.

Dr Parr: Yes, North Sea gas is more acceptable because it is an existing reserve. As I say, I am looking at this through the lens of meeting climate targets and how much gas is already going to have to stay in the ground. If fracked gas were to appear in the UK, then some gas somewhere else that is already established and already being exploited would need to be left in the ground and the political conditions to deliver that do not seem to us to be anywhere near fulfilment. Therefore, we are creating a new climate risk—and this would be true anywhere in Europe but certainly in the UK—of creating a new lobby for exploitation of an existing reserve, because those lobbies exist in every country

everywhere in the world. By creating new ones, you make the political achievement of those climate targets that much more difficult.

Chris Davies: I see.

Chair: I think we had better move on because I know some people have Delegated Legislation Committee shortly.

Chris Davies: Okay, I will stop there, sorry.

Chair: Can we just move on to costs?

Q71 Chris Davies: Can I ask regarding the advanced boiling water reactor, Chairman, if I may? Why do you think that reactor will not be reliable?

Dr Parr: I do not have a technical assessment of why those reactors were not as reliable as others when they were built in Japan. All I can do is quote the IAEA load factors that they seemed to be achieving in the years before the Fukushima disaster. Obviously, they had a very low load factor after Fukushima. Those load factors were, from memory, around 50% or lower. That is the established performance of these reactors where they have been completed.

Q72 Chris Davies: A few weeks ago we had representatives from Horizon sitting where you are and they gave us technical detail. They said that they were indeed reliable, but you are telling me you do not have the technical detail but you are saying they are not reliable. As a Committee we are gathering evidence in these sorts of sessions. How should we reach a conclusion?

Dr Parr: As far as I can say, the best thing to do would be to look at the actual existing performance of those reactors, and the actual existing performance of those reactors is that they do not approach a 90% or even 80% load factor. I think one over its entire period of operation has got into the 70s. That is where I would look for evidence because saying it is going to deliver 90% load factor is an assertion. The actual evidence of existing performance says it is rather less than that.

Q73 Chair: Presumably, if it does not deliver or if it is more expensive to build than we are being told, which is also part of your evidence, it will be Horizon that loses out?

Dr Parr: Yes, it would in the sense that the way—

Chair: Not the taxpayer?

Dr Parr: Sorry?

Chair: It would not be the taxpayer that lost out?

Dr Parr: No, it would not, so long as the UK Government were able to stick to their guns. What I mean by—

Q74 Chair: May I just gently suggest to you that it might stretch some people's credulity that you are worried about the profit line of a nuclear power company?

Dr Parr: No, I am not. What I am worried about is a commitment of political and economic capital that then reaches a point where it becomes very difficult to back out. We can already see that around Hinkley Point where EDF has spent, some people say, as much as £2 billion and the Government have invested very considerable amounts of political capital in getting a deal. It is now going to be extremely embarrassing if they have to pull out. Nonetheless, those people who are looking at it, like *The Economist*, like *The Financial Times*, like *The Times*—

Chair: More embarrassing for the directors of EDF, I would have thought, when they have to talk to their shareholders.

Dr Parr: Which is why they do not want to pull out either, but it seems to me that what we have is a set of Governments and a company who are now very heavily invested in getting it done even if it is not necessarily in the interests of either the UK consumer or the French taxpayer.

Q75 Chair: Obviously, you think that cost is a very important factor because in your evidence you have said that the costs of the contract for difference could add £900 million a year to UK energy bills—over £11.50 per year to average household bills. You feel that these costs are a relevant factor that should be taken account of?

Dr Parr: When one looks at the overall system that one wants in the future, then yes. Again, I would point to the fact that the amount of cost that appears to be problematic in terms of delivering subsidy-free solar is considered germane, taking that form of power to a source where it should not need any more support. If that is a germane consideration, then it is difficult to see why my estimate of £11.50 should not be considered germane.

Q76 Chair: Your view is that in deciding the energy mix of the future the Government should take account of the likely impact on household bills?

Dr Parr: Yes. That is fair enough, yes.

Chair: Yes, I agree with you, actually. I agree strongly, but I would certainly apply that consistently across all energy sources. Would you like to come in at all, Liz?

Q77 Liz Saville Roberts: There was something you mentioned earlier on—and I agree with you on this—in terms of jobs created or lost in relation to support for, say, solar energy, as opposed to nuclear energy, that we should be comparing the situation across different sorts of generation and different industries. Could you explain also what you mean when you say that Government should apply cost criteria consistently, the same concept, across different technologies?

Dr Parr: Yes. I think this was also in relation to the way in which the capacity market is seen to be working. In other words, this is an element of the power market, which is paying existing fossil plants to stay online. What we have is a series of cost criteria or costs that are being added to the bill in one form or another, and what it feels like at the moment is that certain forms of generation, particularly gas and nuclear, are getting preferential treatment across all those cost criteria, including what the levelised cost is and the bid cost in the auctions that are being made for power, in terms of carbon cost, in terms of support for being available, as well as the additional system costs that would be incurred by, say, the use of renewables. It was a plea for being consistent in approach

across all those different criteria that the different energy technologies have rather than picking on, say, nuclear and saying that we need baseload power and not going beneath that.

To use that example, high flexibility systems, as I say, as endorsed by the Treasury on the back of the National Infrastructure Commission report, would suggest that the additional system cost of wind is in a high flexibility scenario about £1.30 per megawatt hour. That would make it comfortably cheaper by a long way than nuclear, even allowing for the fact that there are additional costs in integrating wind into the network. The transparency of how this is being done and the choices that are being made are not clear.

Q78 Chair: May I just come in on that point? You have made this point that you think that wind—did you say offshore or onshore? I did not quite catch that.

Dr Parr: It is the additional system cost of integrating wind on a per megawatt hour basis into the electricity system.

Chair: Okay, but in general, and it is elsewhere in your evidence, you make the point that wind and solar are cheaper than nuclear?

Dr Parr: Yes.

Q79 Chair: In that case, would it be a fair recommendation for the Government that they should not pay more than the nuclear strike price or more than they do for nuclear to anyone who produces wind or solar energy? Surely, if it is cheaper to produce than nuclear, why should they be paying more for it under any circumstances?

Dr Parr: I think onshore wind and solar already meet that criterion because the auction prices that are being met beat certainly the Hinkley strike price by some way. Offshore wind is in a different category because it is less mature and is still developing. That said, the cap prices for offshore wind into the future that have been set by Treasury in the last Budget would make offshore wind cheaper than nuclear by the time or around about the time Hinkley opened.

Q80 Chair: Basically, by the time Hinkley opens, which is in the 2020s, 2022?

Dr Parr: 2025, 2026.

Chair: 2025, okay, we should ensure that the Government are paying less for offshore wind than they are for Hinkley?

Dr Parr: That appears to be de facto the existing policy, and it has to be said the offshore wind companies seem comfortable with that.

Chair: All right. Thank you very much. I am speeding slightly through this for logistical reasons that I will not bore you with, but I really do appreciate you coming in, sir, and giving us your evidence. Thank you very much, Dr Parr.

Dr Parr: Good, thank you.

Examination of Witnesses

Witnesses: **Tom Greatrex**, Chief Executive Officer, Nuclear Industry Association, **John Warden**, Chief Executive Officer, Nuclear Institute, **Sir William McAlpine**, President, Supporters of Nuclear Energy, and **Neville Chamberlain CBE**, Member, Supporters of Nuclear Energy, gave evidence.

Q81 Chair: Gentlemen, thank you all very much indeed for coming along this afternoon. We are having to rush slightly through this because of things that are taking place in the Chamber at the moment, which involves some of my colleagues here. In fact, the Welsh Affairs Select Committee is one to watch because people who sit on it often end up remarkably high up in Government, except for the Chairman, sadly. Can I welcome back Mr Greatrex and everyone else, and I will start with Gerald Jones?

Gerald Jones: Can I ask all members of the panel if you could give some insight as to why you support the use of nuclear power? It is a pretty general question, but I am sure you can give some details.

Sir William McAlpine: I chair Supporters of Nuclear Energy, who are 230 people, most of whom have been in the industry all their lives, some of them right back to the beginning of civil nuclear power. We believe and have believed that it is the cheapest, safest, least disruptive form of producing electricity. We started building nuclear power stations quite successfully; but unfortunately, we did diversify rather a lot and then nuclear power seemed to have gone out of fashion. We still believe that it is, will be, should be the cheapest form of electricity. I think that Hinkley Point has rather changed things in that the Government are, in a word, subsidising the supply of electricity. Of course, we do not have our own industry to produce nuclear power, but basically nuclear power is home produced. Obviously, the ideal would be 40% nuclear power baseload, 40% gas or coal or other forms and 20% renewables. Of course, we may not get to that for some time, if ever, but nuclear is a viable, safe and excellent way of producing things and has been very successful. Wherever we have had a nuclear power station and taken it down, people have missed it and been very upset that it has gone away. Very quickly, that is why we believe in nuclear power.

Q82 Liz Saville Roberts: Sir William, you mentioned the significance of home-produced energy. Can you tell us some more about that, please?

Sir William McAlpine: Yes, absolutely. It uses uranium, which is available all over the world, and once you put it into the reactor it stays there and hums away. One of the problems with nuclear is that in order to build a nuclear power station you have to spend a lot of money. After that, the thing will hum away and produce electricity very cheaply, but one of the problems is getting people to invest in it, obviously, because the front end is very heavy. But it does not rely on gas from abroad, it does not rely on coal from abroad, and once it is there you become almost self-supplying.

Q83 Chair: May I respectfully challenge you on something, Sir William, that you said? In terms of the cost, surely you would accept it is more expensive to generate electricity per megawatt hour with nuclear than using coal or gas.

Sir William McAlpine: When we looked at it, until recently nuclear always came out cheaper on Government figures.

Q84 Chair: Therefore, should I suggest to the Government that they just pay commercial rates and that there be no CfD or strike price or anything else because you could produce this for a commercial rate and compete with gas and coal producers?

Sir William McAlpine: I would like to think it could be done without subsidy, but I think it depends entirely on things that are under the Government's control. The strike price and the deal they do with the—

Q85 Chair: Sir William, if it could be produced as cheaply as you suggest, there would be no need for a strike price or a CfD. You could just go ahead, build it and sell the electricity and compete with other producers.

Sir William McAlpine: I am saying it was true. As to whether it is true now because of the cost of nuclear, the current costs—and I have no control over that—it certainly was. Things were built to time and to budget.

Q86 Chris Davies: Sir William, you are heavily involved in nuclear in Great Britain. Do you think what you have just stated as a fair mix is a fair mix—that we should have 40% nuclear, 20% renewable, etc.? Renewable to me, living and representing a glorious part of mid-Wales that was under the threat of being blighted by wind turbines, is not the choice of power that we would look to in my part of the world. Hearing just a few weeks ago people giving evidence, Members representing the people of Anglesey and North Wales were very acceptant to a nuclear power station there. In fact, as you quite rightly said, they very much accepted that they miss it when it is gone and they want it to continue for jobs and every other reason. Should we be seeing, in your eyes, more dependency on nuclear in this country rather than less?

Sir William McAlpine: I think we should. I think we should be up to 40%. Nuclear is baseload, it does not go up and down like other forms of generation, and 40% would be very sensible. Unfortunately, we do not have—

Q87 Chris Davies: Is there anything—while we are on this particular topic, Chairman—you could do not from a nuclear basis but for our Swansea Bay tidal lagoon to try to get the costs down on that?

Sir William McAlpine: You like pouring concrete?

Chris Davies: No, I will not push you on that. Don't worry, I will not push you.

Q88 Chair: We do not want to pick on Sir William all the time. I am happy to hear from others as well, or not as the case may be. Gentlemen, you will have heard our previous witness suggest that the costs of Wylfa Newydd may go up. Is that something that you would go along with and, if so, is it likely that the Government will end up picking up the bill in some way?

Tom Greatrex: I am sorry, Chairman, I am not sure whether he said the cost of Wylfa will go up.

Chair: Well, that the costs will go up. All right, let me not put words into the previous witness's mouth; he is not here to defend himself. It was suggested, I think, that the costs of building nuclear can end up being much higher and can end up increasing and that, if that happens, the Government might end up having to pick up the tab. Is that a fair suggestion, do you think?

Tom Greatrex: Not under the policy that the Government have adopted because of the structure of the contract for difference and the strike price.

Q89 Chair: But you will have heard the suggestion, perhaps, that even with that agreement in place, there is so much political capital invested that Governments will have to, one way or another, pick up the difference?

Tom Greatrex: I would say that the Government, including the current Government and the coalition Government and Governments before that, have invested a lot in support for a range of different energy technologies because we have a pressing issue in this country to replace a significant amount of generation capacity that has come or is coming towards the end of its life. That is true of almost whatever form of generation you want. Mr Davies' suggestion or comments in relation to his constituency indicate that there will be some energy sources that are applicable and appropriate for some places that are not suitable for others. It is about how you best construct the optimum mix rather than trying to justify a prejudice for or against a particular form of energy.

Q90 Liz Saville Roberts: What would you describe as being the economic benefits of new nuclear build in general and in relation to Wylfa Newydd?

Tom Greatrex: In relation to Wylfa, I know you had evidence from Horizon earlier on in your inquiry and they will have, I think, outlined in terms of the amount of investment going in the amount of jobs that that will create, both in the construction phase and then later and for a significant extended period in terms of the operation of the station and eventually, when it gets to that point, decommissioning. Those jobs will have an enduring value. People in Anglesey will know the economic impact that has been made in relation to Wylfa generation, which finished at the end of last year after 44 years of generation, the extent that that has helped to provide well-paid, high-skilled, permanent jobs in an economy in a part of the world where it is more remote than perhaps some other parts of the country. There is an enduring economic impact, but it also has a particularly important energy impact in that part of the world. As you know, the Energy Island concept is about a range of different energy sources, but the new build Wylfa will be a significant part of that.

Q91 Liz Saville Roberts: Is it possible to quantify the potential economic benefits of small modular reactors?

Tom Greatrex: Small modular reactors are at a very early stage and you will have seen the Government's publication just last week in terms of the opening stages of a competition towards SMR technology. I think it is an important technology. It is the right thing for the Government to be doing to be setting out a roadmap for the adoption of that technology, but it should not be seen as an alternative to the new build programme but as something that can be complementary in certain sites where it might not be appropriate for a larger new build facility to take place.

Q92 Chris Davies: Can you explain—and perhaps Mr Chamberlain may wish to explain—the nature of the UK nuclear skills gap and what skills are needed? Or perhaps, in fact, you may want to continue with the question: what skills are needed in the nuclear industry and how are we fulfilling those skills?

Neville Chamberlain: The first thing is it is not all bad news. I think North Wales can epitomise the good news because in North Wales we have a great track record of excellent nuclear operational skills, and they are still there, of course. It is now decommissioning in Trawsfynydd, but it is still up to operations, as it were, in Wylfa. That is an important reason why I think new nuclear is important in North Wales.

If I can declare a personal interest here, I am chairman of a group called the Cheshire Business Leaders. The economies of Cheshire and North Wales are very interlinked and that is why we in Cheshire would support new nuclear in North Wales because we think it is important for the North Wales economy. In North Wales, you have the operational skills, as I say, nuclear skills, but you also have a tradition of supplies and services to—I call it—the nuclear standard to power stations in North Wales. I think, quite frankly, it would be a really beneficial boost to their economy and, indeed, ours in Cheshire if we saw some new nuclear build there. Where we have a gap is building new nuclear power stations because we have not built any in this country for a very long time. There we have allowed the skills to fade away. We have to regenerate them.

Q93 Chair: Does Mr Warden have a view on that because I believe, sir, you used to build and operate nuclear submarines?

John Warden: My background is as a submariner, so I have spent 18 months of my life within 50 feet of an operating power plant, which is why I think they are fairly safe. My recent background has partly been analysing the skills requirement across the UK to support the nuclear industry, both in new build and current operations and decommissioning. As part of the written evidence, I alluded to the recent labour market intelligence study that some of the skills bodies have done, where it looks like there will be about 9,000 new entrants needed a year for the next five years to keep both the current workforce and to meet the rise in demand from new build projects.

Q94 Chair: May I just come back on the safety issue? We were going to ask it later on, but as Mr Warden has mentioned it, you obviously have first-hand experience of this. How safe do you think nuclear is? A lot of people do have a concern about it, don't they? There have been the incidents around the world: Chernobyl, Fukushima.

John Warden: They do, and understandably. If you look at straight industrial safety, nuclear power plants and the nuclear industry have the safest record of any. That is in terms of, say, injuries and accidents and deaths in the industry itself compared to, for example, coal mining. Of course, the issue with nuclear is not just the industrial accidents; it is the perception of radiation around that and the potential risk to health that comes from that. From my own background, I well understand that. I am well aware that even on a submarine when you are within 15 feet of the operating reactor you are going to get a bigger radiation dose when you go across the Atlantic in a jet. I am very comfortable with the risks and I understand it. However, I do realise that most of the public do not, and that is one aspect that the Nuclear Institute has a remit to try to educate the public.

I am very comfortable. You can look at the four biggest accidents in nuclear history. You have Windscale, Three Mile Island, Chernobyl and Fukushima. The only positive risk to health that came from any of those was from Chernobyl. They were each very different reactor designs, each with different mechanisms for why that accident happened, and there have been an awful lot of lessons learnt from those. I am very comfortable knowing what happened in each of those incidents and what the consequences were. I understand that reactors are safe. You can drive past Torness on the A1. It is a very lovely building. It sits there very quietly, does not push out any kind of fumes, and produces very high density electricity, which is required for a western industrialised country like the UK.

Q95 Chris Davies: Can I briefly come back, touching on two points: the safety and, indeed, the skills gap that we touched on? There seems to be a skills gap because we have not been building nuclear plants. Is the skills gap in the construction of a building, or is the skills gap in operation thereafter? One expects highly skilled personnel to manage and to build these plants, otherwise we will have problems as far as safety is concerned. First, is there a massive skills gap? Is it in the construction? Is it in the operation? Secondly, how will the nuclear industry deal with this and train more skilled people into this business?

John Warden: There is a skills gap. However, there are several years in order to close that gap, but looking at the demand ramping up from now, it needs to be dealt with immediately. I know Matthew Hancock last year said, yes, it takes a long time to build the skills but we have a long time to do that because of the length of time it takes. Well, we don't because it takes three to four years to grow an apprentice, so we need to start that now.

There are gaps both in construction and in operations. The utilities very strongly understand the operations requirement, and I know they are all putting in place training programmes for operators and maintainers as part of the operations team. One of the issues I think is the construction workforce required because in each of the new build sites it is quite a large amount, up to 9,000 people. Looking at the timing of the new build programmes, particularly as Hinkley has moved right, they are all coming along at the same time. If you ally that with some of the other major construction projects in the UK, there is a potential issue with the engineering and construction workforce.

Q96 Chris Davies: Can I just go on briefly if I may, because I have to go in five minutes, to Mr Chamberlain? You said that you run a business in Cheshire and that is the area you represent. How do you see a new nuclear plant in North Wales on the tip of Anglesey benefiting the economic community of Cheshire?

Neville Chamberlain: What I said was I am chairman of Cheshire Business Leaders, which is a group of businessmen in Cheshire who look at ways of improving the economy of Cheshire. Chester and West Cheshire to a large extent are service centres for the whole of North Wales. You only have to go into Chester on a Thursday and you will hear more Welsh spoken than English. Our economies are very closely interlinked, we know that. There are a lot of people who live in North Wales and work in Cheshire and vice versa. I live just over the border in Cheshire. I live, by the way, 40 miles downwind of Trawsfynydd and 60 miles downwind of Wylfa and—

Chris Davies: That does not bother you at all?

Neville Chamberlain: I have no worries about them. Both sites have excellent safety records, if I may say so. By the way, I started my life in the nuclear industry as a health physicist, so I, too, understand some of the safety issues and the difficulty we have had in explaining to the general public the hazard of something they cannot see.

We do see more economic activity in North Wales as beneficial to our patch, Cheshire, and we are very happy to work with the North Wales officials, local authorities and businesses to help develop that, just as we are happy to work with North Wales on the electrification of the Crewe to Holyhead line. That is something again that benefits us both. We would like to see that pursued, so we are very happy to give our vocal support if necessary to new nuclear build in North Wales.

Chair: I had better speed things along a bit because we could end up non-quorate otherwise. Did you have a quick question?

Q97 Gerald Jones: Building on the issue around the skills gap, I wonder if you could comment on what you think the Welsh and UK Governments could be doing to help to redress the skills gap, and also perhaps aligned to that in terms of decommissioning, how you feel decommissioning could be planned to retain skills?

Tom Greatrex: On the first point in terms of the Welsh Government and the UK Government, obviously this cuts across devolved and reserved areas in relation to skills and education. My understanding is that the Welsh Government have been very active in trying to ensure they are getting prepared for this potential development and ensuring you have enough people with the right skills coming through education and aware of the opportunities. It also starts a lot younger than that in encouraging people to take the right subjects and to be able to see that there is an economic future and job opportunities.

On the point about decommissioning as well, I think it is important to think about the workforce that are currently decommissioning and the timescales of that, and then leading into when you get into operation, I think there is a good basis of work to be done there to ensure that some of those people are able to move between. People who have been operating at Wylfa up until relatively recently now may be involved in the early stages of decommissioning and may be able to go back into operation again once Wylfa Newydd is up and running.

Gerald Jones: It is timing?

Tom Greatrex: Yes.

Q98 Liz Saville Roberts: The decommissioning process in Trawsfynydd, of course, is ongoing and has been undertaken for many years. It is very well-paid employment in what is presently the area that has the lowest average wage in the United Kingdom. How do you think decommissioning should be best planned to preserve both skills, as we mentioned, and also to retain jobs? Are there issues in relation to workforce planning, particularly in relation, say, to Magnox sites? I have the exit payment cap in mind in relation to workforce planning during decommissioning.

Neville Chamberlain: I think you have to plan decommissioning well ahead. The industry sadly, and I do not want to make a party political point here, is often accused of not preparing for decommissioning and not making financial provision for decommissioning.

It is just not true. The industry made a lot of provisions for decommissioning, but when the industry was restructured and CEGB disappeared and my old company, BNFL, disappeared, I am afraid all those provisions were simply snaffled by the Treasury and we have to start again. Financial planning, therefore, is very important and the industry has to have confidence that if they set aside funds for decommissioning, it will not be raided between now and the ultimate day when the decommissioning kicks in.

In this country, the UK generally, I would claim we are world leaders in decommissioning nuclear facilities. We have a lot of people involved in it, people who are now making careers out of it. The expertise is there, and I think it is about recognising it and indicating to young people that simply because a nuclear power station has come to the end of its life that is not the end of the career prospects of people who want to work in the industry. It is an honourable, if you like, thing to be doing, working in decommissioning. I think it is a little bit a question of status of the role.

Tom Greatrex: We do have, I think, one of the most advanced decommissioning workforces, and you can see in other parts of the world now that people who have decommissioned in the UK have been going to Japan, for example, recently to be able to share that expertise and export some of that expertise, which has its own economic benefit value as well.

Q99 Chair: I am going to have to draw it very quickly to a close. Can I just ask you, Mr Greatrex or Sir William, very briefly whether you think the small to medium-scale reactors are a realistic option for the UK's energy mix?

Tom Greatrex: They are potentially a good further option, but they should not be seen as an alternative to the larger-scale new build.

Sir William McAlpine: I think they could be a wonderful export thing. If we develop it right, we could lead the world. There are 300 or 400 nuclear power stations all over the world and increasing, and this could be a tremendous extra, I think, a great export.

Neville Chamberlain: If I may, Chairman, I just want to add I think Trawsfynydd is an ideal site for perhaps the UK's first SMR and that will add to, if you like, the international reputation of Trawsfynydd. It will become a visitor attraction for the nuclear industry worldwide to come and see the first commercial SMR. That is what I would like to see.

Chair: Excellent. Gentlemen, thank you very much indeed. We will call our next witnesses.

Examination of Witnesses

Witnesses: **Professor Gordon MacKerron**, University of Sussex, and **Dr Philip Johnstone**, University of Sussex, gave evidence.

Q100 Chair: Professor MacKerron and Dr Johnstone, thank you both very much for coming along. We may in about 15 or 20 minutes have to change the way the meeting is being conducted, but I will explain why if it happens. In the meantime, could I ask Chris Davies to ask the first question, please?

Chris Davies: Good afternoon, gentlemen. Can you explain why you think the proposed schedule for Wylfa Newydd is optimistic?

Professor MacKerron: Yes. There are a number of reasons why that may be so. The proposed schedule is that construction may start in 2019, which is a possibility, to be completed in what Horizon says is the early 2020s. The reason why I think that may well be optimistic is, first of all, we do not have experience in the UK of building reactors quite at that speed even if everything else goes well. There are still licensing issues yet to be resolved. There are financing issues yet to be resolved. Horizon has said publicly they still need to find extra finance. That has been difficult for EDF at Hinkley Point; it may be difficult at Wylfa. Of course, thirdly, the strike price is still to be negotiated. That might happen quickly—it took a long time at Hinkley Point—but if you add those things together it seems to me the balance of probability is that the early 2020s is quite an optimistic assessment. It could be a couple of years later than that—one does not know—but I think they will be doing jolly well if they did it by the early 2020s.

Q101 Chris Davies: You mentioned the strike price at Hinkley. Do you think the Government and the nuclear industry have learnt from that so, therefore, we should get a better deal and a quicker deal?

Professor MacKerron: I do not know whether it will be quicker. I think it will be better in the sense that, politically, it will be very hard to go for a higher price than at Hinkley, and Horizon, possibly for very good reasons, is optimistic that an ABWR will be a cheaper proposition than the kind of reactor that is being built at Hinkley. I would be very surprised if the strike price was higher than 92.5. Beyond that, it is almost impossible to say because this will almost certainly take place in a private negotiation. Smoke will then appear and we shall hear what the number is, but it is very difficult to tell in advance how it will work out.

Q102 Chris Davies: The smoke may be there but there will be no mirrors, I am sure. Can you enlighten me? You say the construction time. Taking out the planning process, etc. for a plant of that size, how long in your estimate would it take to build from digging the first sod of earth to switching on the reactor?

Professor MacKerron: It might be worth asking Dr Johnstone, who knows about the construction experience of ABWRs elsewhere, to give a view on that.

Dr Johnstone: Yes. As Doug mentioned, there is not much experience of the construction of ABWRs in the world. There are three in Japan, and there were two attempted to be built in Taiwan, but they have been abandoned for various complex reasons. The construction times in Japan have been pretty good. They have been five to six years for the three reactors. As has already been mentioned, we have not had experience of building these reactors in the UK. If we look at the current new build in the UK, as we all know, it is a different reactor, but still things are not looking good. Nuclear construction times are often notoriously difficult to forecast, but I would follow Gordon's opinion. To suggest it could be completed by 2025 if we start in 2019, I think that would be very ambitious because if we—

Q103 Chris Davies: Sorry, ambitious and impossible are two very different words. Are you saying ambitious rather than impossible?

Dr Johnstone: Highly ambitious.

Chris Davies: We are the politicians.

Chair: Excellent. Moving around, I appreciate some members may just have walked straight into this. Perhaps, Gerald, would you like to go next?

Q104 Gerald Jones: Yes, I will go, Chair. I understand with the construction of Wylfa Newydd and Hinkley C that there may be an issue at some point over the next few years with labour and labour shortage. What view do you have on that? What can be done to mitigate that in terms of the pinch points?

Professor MacKerron: I think you have heard from previous witnesses that there are potentially some serious difficulties if there is an almost exact overlap—likely—between the construction of Hinkley Point and the construction of Wylfa Newydd. It is difficult to know exactly how that may be mitigated. It may be possible to bring into the UK people from elsewhere who have relevant experience. I am not sure how likely that is. I think the most likely outcome is a possibility of some slight delay or because the prices of labour will be bid up for people with the right skills for the companies involved to have to pay somewhat more than they would currently expect to get the right people. Short-term mitigation is difficult; it takes a while to train people up.

Q105 Gerald Jones: In terms of timing of the two, would that be something that could potentially help?

Professor MacKerron: I am sorry, I do not quite understand.

Gerald Jones: The timing of both projects.

Professor MacKerron: If it were possible to schedule things, if there can be that degree of co-operation, that could help. It is not something that I think has been frequently done before. It is a possibility.

Dr Johnstone: Can I just add a point that another aspect of the skills issue, which is not just to do with Hinkley and Wylfa, is that there is also going to be the construction of reactors for nuclear propulsion and the maintenance of UK submarine infrastructure, so that is another potential pinch point, as it were, in that there could be competition potentially between the defence and civil sectors in terms of allocation of resources there for jobs.

Chair: Thank you very much indeed. Liz Saville Roberts.

Liz Saville Roberts: Could we move on to decommissioning?

Chair: Yes, we will carry on, yes.

Q106 Liz Saville Roberts: I am interested in what you are saying about the concept of continuous decommissioning, and I understand that this is an alternative decommissioning strategy mentioned by the NDA. Could you explain to us more about what this would involve?

Professor MacKerron: I think the easier thing to explain is what is currently intended, which is that at places like Trawsfynydd probably earlier and the old reactors at Wylfa a little bit later they will be put into a state that the NDA now calls quiescence. Essentially, the sites would be abandoned for anything up to 30 years before final site clearance began. Clearly, that is a difficult issue in terms of the maintenance of skills and the possibility of employment. What the NDA has been saying in their draft strategy is that they are going to do a radical reconsideration of this notion of quiescence and see whether it may be possible to move towards a system whereby decommissioning is continuous. I think Trawsfynydd is one of those sites where this is most likely.

Coming back to a point I think I heard you make earlier, it is at least a possibility that there could be something closer to a continuity of employment at a site like Trawsfynydd. I am not yet party in any way to the exact sorts of proposals that NDA will make because they are not yet public, but the argument that is being made in their draft strategy is quite a strong one for not losing the knowledge, not losing the skills, possibly having further export opportunities, if the process of decommissioning is continuous rather than interrupted by a period of 30 years or more of, effectively, inactivity. It is the NDA; if you can ask them, they will probably tell you a lot more.

Q107 Byron Davies: My question is based around your scepticism of the proposed viability of the costs of small modular reactors. I just wondered whether you could tell us whether you think that SMRs are a viable option for the UK's energy mix.

Professor MacKerron: I think it is too early to say whether they are viable at all. The risks are very substantial. They include quite a large economic risk. The industry has argued fairly convincingly for a long time that an individual unit that is big is going to be quite a lot cheaper than individual units that are small. The only way those could be overcome would be by factory construction, which could allow greater control. That is one possibility and that might make a significant difference.

Some evidence I have just recently come across that came from Princeton University's Andlinger Centre for Energy and the Environment makes some calculations about how much factory construction would have to have an advantage over the existing largely on-site construction methods for small modular reactors to become cheaper. Their answer is it might take many hundreds of units before it is likely that the small reactors will become cheaper than the larger ones on a per megawatt or per kilowatt basis. Because we have so little experience internationally in constructing small modular reactors, other than slightly eccentric designs in places like Russia, we simply do not know. The economic obstacles are pretty considerable because the argument that bigger is cheaper is, on the whole, convincing. Of course, it could turn out better than we think, but it is going to take time. We do not have a head start in the UK. Other countries like South Korea, United States, China and Russia have done a lot more work in this area than we have done.

Byron Davies: Anything to add to that?

Dr Johnstone: I suppose just to emphasise that, in the USA, various SMR projects have been abandoned in the last few years and that is perhaps the best comparison to the UK context. Another point is that there are potentially many different designs of SMRs. The most likely one is going to be a PWR, but there is a potential for sodium-cooled reactors, waste-reducing reactors, the pebble-bed reactor and so on, which historically have not

performed too well. There is a lot of uncertainty regarding the economics surrounding them as well. I think it is just to emphasise it is very difficult at this stage to know the viability of SMRs.

Professor MacKerron: It is maybe worth adding briefly one point, which is that the Energy Technologies Institute has recently produced a report on SMRs, which says that their viability is probably going to depend, if it works at all, on using the heat that reactors produce directly, probably for industrial purposes. In that context, a place like Trawsfynydd is not well positioned because there is not a very large local heat load. I think if there were to be development of SMRs at Trawsfynydd it would almost certainly involve a larger premium or subsidy to the developers than if it were true that SMRs were to be built somewhere else.

Byron Davies: Next to a large city you mean?

Professor MacKerron: Well, the promoters of SMRs are very keen because it would allow the heat load to be used and make the economics better. They are hoping that what they think is the greater inherent safety will allow much shorter emergency planning zones, as the Americans express it, around the reactor and allow much closer siting to urban areas.

Q108 Byron Davies: Can I just ask you then lastly, would developing them provide any research benefits, do you think, or wider scientific benefits?

Professor MacKerron: If the Government spends, as it plans, a substantial sum of money on the development of SMRs, there will be some spin off, of course. That may be the basis for starting some kind of industrial activity in the UK, but I think we should not underestimate how long it is going to take. When the chief inspector was asked by the Energy and Climate Change Committee how long it would take to license SMRs, he said about as long as conventional reactors—about six years—and there has not been a start on that process yet. The ETI, when it made this recent report, said it would take up to 17 years for conventional designs to reach the point we could start deploying them, and for the more radical designs up to 26 years. It is unlikely these things are going to happen any time soon, so the benefits are going to take time to develop and defuse.

Chair: Professor MacKerron, you have rather cleverly in that answer foreseen the next couple of questions, I think. Looking quickly around for inspiration, particularly on the last one as it is about Trawsfynydd, I wonder if anyone else wishes to add any supplementaries. If not, then I will call this to a close. I do apologise to everyone for the fact that we did rush through it a little bit because there are quite a lot of other things going on today, which other Committee members have to be present for, but I am very, very grateful to all the witnesses for coming in. All of the witnesses are still here and have given evidence that in some instances has—conflicted is a strong word—certainly been different, so feel free to continue the discussion in the corridor and I shall referee it happily from a distance. Thank you all very much indeed.