



# Select Committee on Risk Assessment and Risk Planning

## Corrected oral evidence: Risk assessment and risk planning

Wednesday 10 March 2021

11.15 am

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Members present: Lord Arbuthnot of Edrom (The Chair); Lord Browne of Ladyton; Lord Clement-Jones; Lord Mair; Baroness McGregor-Smith; Lord O'Shaughnessy; Lord Rees of Ludlow; Lord Robertson of Port Ellen; Baroness Symons of Vernham Dean; Viscount Thurso; Lord Triesman; Lord Willetts.

Evidence Session No. 13

Virtual Proceeding

Questions 140 - 146

### Witnesses

**I:** Dr Tim Stone, Chairman, Nuclear Industry Association; Will Webster, Energy Policy Manager, Oil and Gas UK.

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## Examination of witnesses

Dr Tim Stone and Will Webster.

Q140 **The Chair:** Welcome to the second panel of this morning's session. The second panel is Dr Tim Stone, chairman of the Nuclear Industry Association, and Will Webster, energy policy manager at Oil and Gas UK. Welcome to both of you and thank you very much indeed for giving evidence to us this morning. You do not both have to answer every question, although you may have a view. The first question, as with the first panel, is: what is the greatest risk faced by the nuclear, oil and gas industries is, and how resilient are these sectors?

**Dr Tim Stone:** The biggest risk is wider. I will take the comments from both of the previous witnesses around systems. For some time, I and many others have been complaining about the lack of systems thinking in energy policy in general. To take what Dame Sue said further, we do not have a glimmer of a plan as to how to get to 2050 and net zero. There are lots of modelling and theories, but nothing about how to do it. Frankly, we are running out of time. There is probably almost no low-carbon energy operating today that will still be operating in 2050. We have to replace the whole system. The word "system" keeps coming up.

With some academic friends and colleagues, I did a paper a year ago for the Prime Minister's senior adviser on the need for systems thinking. We have been speaking about it in public. Unless we approach the reconstruction of our energy system as a system in the way that engineers understand it, there is a very high risk that we will end up with something that is not in the best interests of the UK economy and its citizens. That is the starting point. Until we get a grip on that, we are wasting our time. The whole thing has been abrogated to markets, which is fine when the pace and scale of change are slow and markets work very well, but we are now at a point where the pace and scale of change are colossal. The only way we are going to get there, a bit like the way we have dealt with the vaccines, is by doing it in a very disciplined and organised way. As Dame Sue said, you can do things in weeks that would otherwise takes months and years, provided adults who know how to run things get on and do it.

To hit net zero, we do not need any more technology. If anything comes along that is even better, that is great, but we know how to do it. Although I have "nuclear" in two of my job titles, I am not exclusively a nuclear guy. If it is low-carbon, safe and cheap, I am very happy. Things such as hydrogen from steam-methane reforming, which I am sure Mr Webster will talk about, nuclear and renewables are all part of the answer, but they have to be put together in a systemic way that is in the best interests of the national economy and national economic competitiveness. We are so far away from that. That is the first threat.

On resilience, the nuclear sector is pretty lucky by comparison, because everything about the way that it works is around safety and resilience, even down to the level of pretty much every meeting in the nuclear

business starting with a safety moment. At the Nuclear Industry Council a few weeks ago, the very first thing that we had delivered, in this case by a member of the Young Generation Network, was a safety moment. It is not about nuclear; it is just about thinking about safety, so that, in everything you do, it is there in the background, your eyes are open and you are thinking about safety and resilience.

From an industry point of view, I am far less concerned than I am about the rest of the system, such as, "Do the distribution and transmission work effectively? What happens with frequency instability? Why are we patching the system with frequency stability contracts and, frankly, what, in other contexts, I would call Rube Goldberg bodgers? Why are we not dealing with this as a system?" Frankly, it is because it has become fractured, the energy industry becomes scattered to the four winds and there is no guiding mind.

This is something that we see in the nuclear industry as well, which is that a site, by law, has to have a guiding mind. There has to be clear evidence of a very small group, led by a person in charge of the whole thing. The site operators are referred to in legislation and by the regulator as duty-holders. Unlikely some other regulators, when a site starts work, just about the last thing the regulator says is, "Just to be clear, I am not giving you permission to do anything. You are the duty-holder. You have to make sure that the way you operate the site is safe. I am satisfied, as the regulator, that you know how to do it, but it is still down to you". That, as a fundamental contrast with a rules-based approach, is so much safer. I would go so far as to say that we have the gold standard on nuclear regulators in the UK, both in the ONR and the Environment Agency.

I do not want to make light of it, but, from that point of view, the UK industry itself is in a relatively very good place. We can always learn more, but, fundamentally, it is about that systems thinking and the approach to risk from the very moment you get out of bed in the morning.

**Will Webster:** I would not disagree with anything that Tim has just said. I will build on that around the risks. It is essentially about investment and people. As well as transitioning the energy system to the net-zero future by 2050, the other thing that is sometimes a little neglected is maintaining the system that we have while we are doing it. Not only do we have to construct a new net-zero system, we have to, in parallel, maintain all the assets, keep all the connections to end-users, and make sure that the transition can happen without adding risk to consumers and businesses across the UK.

I will not go into a lot of figures, but, for example, oil and gas still provide about 70% of the UK's primary energy. That will gradually get a bit smaller, but the challenge is how to maintain an element of the energy system while it is getting smaller. The risk is that that feeds through into investment decisions that companies make and into getting qualified

employees to maintain those assets, as well as moving into the new areas. That is proving to be something of a challenge.

Sometimes regulators or the Government also have to give a clear description, as Tim said, about how that process will work. Plenty of modelling is being done about, "Let us transport ourselves into 2050 and have a look at what the system will look like then", but we also have to look a lot more carefully at how we get from where we are today to where we are going to be in 2050, while also delivering secure energy supplies to consumers and businesses across the country.

One of the risks we see is that, without it necessarily being written down, there is a bit of ambivalence being brought into the old sectors, which filters through into the culture about how decisions are made and the choices people make, and then presents risks: either the economic risks of having a less resilient system or of investment decisions being made about the assets and so on.

To wrap up, that is being brought into quite a sharp focus in the licensing review, for example, that BEIS is conducting at the moment. One of the worries that we have is that the Government will feel under pressure to say, "We are not going to do a certain activity any more in the oil and gas sector", but the problem that we see with that is that, as soon as there is a mindset of there being an end date for a certain activity, that sends a signal back to investors of, "That is not something that we are going to do in the future, so we do not have to do it today".

A bit of a vicious circle is then set up in terms of investment and recruitment, which then feeds through into day-to-day experience. That is one of the real worries that we have around the interface between the economics, investment and employment on the ground, and policy itself.

**Q141 Lord Robertson of Port Ellen:** First, I must say that I have been an adviser to the CEO of BP for the last 11 years. I just want to declare that interest, because it resonates with what Mr Webster has been saying. This transition to net zero has to be accompanied by keeping the rest of the industry going in order to support the activities that will lead us to net zero, so I strongly approve. The campaign just now of disinvestment in the oil and gas and fossil fuel industries is completely counterproductive.

I was going to ask whether we are too preoccupied in the national risk register with the big items such as Piper Alpha, Deepwater Horizon or Fukushima, rather than these longer-term issues that you and the previous panel have been talking about. How do we manage to change the culture of national risk assessment from examining the catastrophes to looking at these longer-term lifetime issues that are much more relevant to the risks for the future?

**Will Webster:** Both are really important. That is an immediate reaction. On learning the lessons from past incidents, a great deal of that has gone on. On Piper Alpha, Lord Cullen's report had 106 recommendations and changed the fate of offshore operations in terms of safety, and not just in the UK; those principles have gone around the world—things such as

emergency shutoffs of valves to deal with the sorts of interconnection issues that Stephen Richardson raised, and separate locations for high-risk and non-high-risk activities, et cetera.

That experience has absolutely transformed the way that safety is dealt with offshore since 1988, and the number of process safety incidents and hydrocarbons releases continue to go down. There is a good story to tell there. We are not complacent, and the regulatory structure, which is built around goal-setting and responsibility, has really contributed to that and made it a cultural thing in how the safety regime is overseen.

Returning to your point, there is a need to think about the transition that we are all going to experience and how that will raise new risks in terms of discontinuities that we do not want to see. There is a sequencing aspect to this, and a choreography around what can and should be done, and when.

The other point that I would underline is that, although there is certainly the systems thinking about new interfaces between gas and electricity and those needing to work, some thinking needs to be given to how you build resilience into the system and the different energy vectors being used. Electricity is going to play a bigger role in our energy supply, which everybody understands and recognises, but you need the other vectors. You need a gaseous fuels vector, because certain things will still need gas, even in the long term. You need a liquids vector. The more of those you have, the more resilience you have in how the energy system as a whole works.

In addition, you have to think not just about the efficiency of the system as it is but where redundancy is in the system. We have done this quite successfully in the UK, but we have to continue to do it. It is a bit more three-dimensional now than it previously was, because the policy objectives are more complicated.

**Dr Tim Stone:** You make some extremely good points and it is fascinating that it is a House of Lords Committee raising these, rather than a House of Commons Committee. That might be a little clue to some of the issues here, which are to do with the long-range nature of many of these risks. As we rebuild the energy system, we are making decisions day by day that create obligations and consequences that last for two, three or four generations, and yet so much of the thinking that goes on day to day is still driven by immediate market-type responses. That, frankly, does not work. There is an inevitable and inescapable role for government to ensure that nationally significant infrastructure is planned, commissioned, maintained, decommissioned and operated all the way through, and we do not do that. We have abrogated too much of this to markets historically, so there is an issue there.

If I come back to long-range issues and risks, the oil and gas sector underpins our pensions. We have to provide them a just transition. Thinking through how to get to 2050 is not just about wiring up bits and pieces to deliver energy to our homes and our industries; it is about how

the industries themselves transition. When I first went to work in government in 2007, we had six big energy companies. Where are they now? They have disappeared. We have very few big balance sheets to drive this any more. I would put this down, to a degree, to government policies around the world, which have damaged those balance sheets and those industries.

There are some big risks here that we do not focus on, because we just assume it is market issues, but it is not. Ultimately, in big national infrastructure, failure always comes back to government. If the water or the lights do not work, it is a government issue, no matter who is doing it, and we are missing a complete level of governance and accountability of big risks in the UK, not just in energy but in big infrastructure.

I would add one more point, which is that one of my other hats is that I chair an organisation called Nuclear Risk Insurers, which is one of the world's largest insurers of nuclear power stations and nuclear facilities. We do over 320 sites around the world. The way we assess the risk for underwriting purposes is exactly like the regulators'. We cannot do it based on data, because there is not very much data, so we have engineers, as do pools in other countries, who go to the sites, walk around and do a risk assessment. They talk to the operators and engineers, and that risk assessment informs the pricing of the insurance and feedback to the operators, to make sure that they are aware, on a day-to-day level, that we need to make sure that, right up at the top, there is visibility and that we have proper risk managers within government.

To an earlier point, it might be the National Infrastructure Commission or a new body. It might even be—a blast from the past—a department of energy. We have to grip some of these things much more thoroughly and not just assume that there are no limits to markets; I am afraid that there are. The "I" in plc causes some problems. There are things that Governments have to own, take responsibility for and deal with.

**Lord Robertson of Port Ellen:** You make a good point about the fact that it is the House of Lords looking at this, because none of us has to be elected; some of us used to be elected. Electoral cycles are the important thing. How do you get over that when you are talking about these long-term risks, not just to life and limb but to earning a living and keeping the lights on? Do you have any ideas on that?

**Dr Tim Stone:** A couple, if I may. First, the accountability of an organisation that is looking at long-term risks cannot be just to a House of Commons Select Committee. The one thing about appearing in front of a committee such as this is that it is much more like a PhD viva. You have to prepare for it rather more carefully, and the odds are that there is going to be somebody on the other side of the table who knows more about bits of it than you do. It is really important that your role in this is increased.

Secondly, that body that looks after long-term systemic risks to the national economy, a bit like the NHS, is way beyond electoral cycles. Frankly, the consequences of them ever going wrong are so profound that we are looking at the future of the UK as an economic country. If you look at the way that other countries deal with some of these things, we are starting to see a recognition of this. I will not name any particular country, but there are some that are better at thinking about the long term, because of the culture of the people.

Once upon a time, the UK was rather better at this. It might be that, a generation ago, many of the people sitting where you sit now had served in the war and were automatically trained to think in a systemic way and to think about long-run consequences, because that was just what you did. We have too much segmentation and day-to-day focus on individual bits and pieces, which, as Professor Richardson said, is where problems start. It is the big thinkers who are missing. It is about how we make sure that we have a group, properly accountable and independent from electoral cycles, to manage this and to provide real wisdom and public transparency.

Where can I find a two-page summary of the remaining useful life of nationally significant assets, which is updated every year and which shows me how they are declining or not? Without visibility of measurement, you will not get management.

**Lord Robertson of Port Ellen:** There is a plug for continuing the unelected House of Lords.

**Will Webster:** One of the things we are discussing with the Government at the moment and are quite hopeful of concluding over the coming months is what we call the North Sea transition deal, which is about how we manage the reduced size of the oil and gas sector in future decades and make a transition into the new technologies and, particularly where our expertise is concerned, into things such as carbon-capture and hydrogen, where the expertise of our employees and our 300 supply chain companies can be fairly seamlessly moved into these new sectors.

That is one way in which we are trying to get a longer-term perspective on the formulation of policy and how it deals with our particular sector, and we are hopeful that that has at least a 10-year lifespan. That is definitely one way in which we are approaching the issue. We are doing that in conjunction with government, so that is a good thing.

Another point that I would highlight from my experience is that our economic regulators are well respected and are probably at the leading edge around the world of managing and overseeing the sectors on a long-term basis, and delivering investment. Our regulator, the Oil and Gas Authority, has just had its overarching strategy document changed as a result of a parliamentary process. That will help us govern this transition from the offshore energy system of today into the future. The OGA has estimated that up to 60% of the total emission reduction that

we need to achieve to get to net zero will be something to do with offshore, whether it is offshore wind, CCS or hydrogen.

The OGA did a report with the other regulators to highlight some of the changes that need to be made, but the interfaces between the different regulators are starting to creak a bit. If you think about offshore with hydrogen, you have the environment regulator offshore, you have Ofgem, because it will be part of the gas market, you have the OGA and you have the planning issues around all that. There are different interfaces that need to be thought about.

One of the potential problems is that you deal with these things sequentially, so you go through one hoop, then you have to go through the next one and then a third one. By the time you have reached the third one, you have to start again on the first one. We are seeing that a little bit in quite a number of the big decisions, such as thinking about how an offshore electricity network will be constructed. That was set up in one particular way under Ofgem's remit but it needs to go a bit wider than that now.

Those are the sorts of practical issues that we are bumping into from the way that the existing structure of regulation was designed around how it was done before. It was pretty successful before, but it might not be quite fit for purpose for some of the things we now need to do.

**Dr Tim Stone:** I completely agree with what Will just said. The interface between regulators is where there is real risk, but even the regulators themselves have properly independently set-up duties that, frankly, are anachronistic. Ofgem has a duty to reduce the cost to consumers over a five-year control period, but we are about to make decisions that might have 50- to 100-year consequences, and what matters is the effectiveness of the national economy and national competitiveness. It is a real conflict. How do we make sure that regulators' duties are kept up to date in a way that protects their independence but then provides them with the right incentive to ensure that the right decisions are taken and these interface risks are brought under control somewhere?

**Lord Robertson of Port Ellen:** That is a very good point.

**The Chair:** That is very interesting and will be helpful for our session with the regulators next week, so many thanks. Dr Stone, you said that you did not want to identify the countries that do things better than we do, but we might find it helpful if you did, so that we could ask them for advice and follow their example.

**Dr Tim Stone:** That is really interesting. One of the delicate ones, of course, is China, where there is a much greater focus on a transition at a systems level. We may find it hard to have the conversation in quite the open way that would be helpful.

It is interesting now watching Japan suddenly waking up to the fact of, as I would say here, "No nuclear, no net zero". The Japanese probably need

29 of their reactors back online again pretty quickly if they are going to have any hope of getting there. There are the beginnings of some thinking there.

It has been interesting to watch the way that the US is slowly starting to think about this too, and the way, for example, that the US Government are empowering national labs to take a much more active role in making things happen and thinking more systemically. There is an interesting contrast between the two approaches to national labs. In the US, the Government put money into the national labs to get at science and engineering. We seem to do it almost the other way round: to put the science and engineering in and to try to extract money from them by selling services. We do not treat the national labs here, good though they are, with anything like the respect and support that they really need.

Fundamentally, most countries are going through this now for the first time. There has been a big shift from the 1970s and 1980s to open markets, which worked extremely well but from a base of a pretty well-constructed set of assets and where the rate of change was relatively slow. The change in technologies, in optimisation and in objective function was pretty small, so you could see a Darwinian evolution and markets that allowed you to work out what the best thing was by seeing who won auctions. It is too slow. You cannot do that.

You have to take a view at this point that we know everything we need to know to deliver net zero. If something magical turns up, if fusion turns out to be an astonishing fix in a few years' time, that is wonderful, but right now we have to take what we have and drive that forward. I encourage the Committee to have a look, where it is politically appropriate, at what other countries are doing and to look at the systems thinking in those other countries. It is going to keep coming back to systems thinking, because we are, like it or not, designing systems.

As Mr Webster just said, we have to have gas and liquids as vectors for energy. If we cannot shift pretty much as much energy down the gas pipes in the future as we do today, and it has to go to electricity, we could face a world where we have to rebuild the electricity distribution system to shift the amount of energy that we need. That is the sort of issue that we have to take much more seriously than we do now and where that guiding mind has to be created.

Nuclear, renewables, hydrogen from methane and high-temperature nuclear are all part of it. There is no silver bullet in this. We have to learn from everybody we can. This is not a single UK issue but a global issue. We need that high-level guiding mind with eyes wide open, looking at what others are doing and, frankly, sharing with them and learning.

**Q142 Lord Clement-Jones:** I have a rather more specific question to you both about how the sectors are managing cyberthreats. We have heard little mention of that today. The reason for concern is derived from things such as the Atkins *Cyber Resilient Infrastructure Report*, which says that six in 10 critical national infrastructure companies have low confidence in maintaining supply chains that are secure against cyberattacks.

You contrast that with the NIA website's "myth-busting" statement that, "At present, it is impossible for a cyber attack to defeat any reactor protection system in the UK because they are not digital and have no embedded software". Then you come on to the fact that the NIA has published a cybersecurity guide, but it is not clear whether all the issues that Atkins raises in terms of disclosure, culture challenges and so on have been addressed.

**Dr Tim Stone:** I have to start by saying that, clearly, I cannot be as entirely transparent in this open conversation as I might otherwise like to be. First of all, I would say that the Office for Nuclear Regulation has a specific team focused on this. It is very clear that the risk of cyber in the nuclear sector is extremely low and it is very diligent in working with the Security Service to ensure it remains that way. There are a number of issues that play to that.

First, anything to do with nuclear control is air-gapped. It is not connected to anything in the outside world. The movement of things such as USB keys into and out of those facilities is strictly forbidden and very tightly controlled. In the way that operations happen today, there is still a fair degree of manual involvement, even down to the way that communication happens within the control room between different members of the control team to ensure that there is just no doubt as to what is going on.

The other issue, of course, is that, unlike our mobile phones, such software as currently exists in nuclear power stations is not updated over the air; it is updated as part of formal, very carefully planned and thought-through outages, with the precautionary principle that, if it is not necessary to change, it is necessary not to change.

There are some very well-understood techniques for checking whether anything has been interfered with. There are techniques called hash functions, where you can check whether embedded software in the system is, in fact, what you thought it was or if it has been tampered with. The defence in depth that we have is very robust indeed. We are fortunate that the operation of the sites is air-gapped.

I also come back to my insurance perspective. We have spent the last three years looking at potential insurance products for cyber. Frankly, it is pretty hard to find the markets, because of the level of control and the resilience that is built in there, but we have, in the slang term, had the drains up on it. We have worked very closely with the regulators and the security services; internationally, we have worked together pretty well too.

Nothing is impossible. It is an exceptionally high barrier to imagine how it might work. Indeed, the regulatory teams in the ONR spend a lot of time trying to work out, with a red team sort of approach, how you might get into these things. It is very difficult.

**Lord Clement-Jones:** That sounds quite reassuring. You do not think

you are guilty of the charge, which Atkins made as a general statement, of "a false sense of security stifling appropriate security investment".

**Dr Tim Stone:** On the false sense of security, no, absolutely not, in the sense that there is a robust degree of challenge, with regulators testing each other. There is also a close link between the cyber people in the regulator and the wider security services. Very open and regular inspections and challenges go on.

Could it be improved? It can always be improved. Is it a risk that keeps me awake at night? It absolutely is not, compared with many of the other risks. The biggest risk, frankly, is rogue individuals and how we check that people who are licensed as operators are, in fact, completely robust and remain robust. We need to ensure that there are always several pairs of eyes on a problem.

I will give you one little example, which is not quite cyber but gives a sense. In some control rooms in another country, armed guards were placed around the building. One guard was in the control room, until somebody realised that the risk of that armed guard was far exceeding the risk of anything going wrong with the operators; the armed guard could go rogue and cause trouble with the operators.

Thinking through even that type of behaviour is part of the process, but the challenge has to be continuous because, as we have seen with Hafnium recently and the Exchange servers on many Microsoft sites, there are some really quite offensive processes going on. The hacking in the US is also quite profound. It is a much bigger issue for other parts of the energy sector than it is within the nuclear sites, but you should check with the regulator behind closed doors.

**Lord Clement-Jones:** That is a very good link to Mr Webster because, of course, the oil and gas industry has massively increased its use of data in recent years and yet there is very little about cybersecurity on the OGUK website. People such as PwC talk about how the geopolitics surrounding the oil and gas sector continue to serve as a motivation for cyberattacks. They talk about the significant growth in ransomware operations. How is the oil and gas industry approaching these things? Are you giving it enough attention?

**Will Webster:** I will give quite a short answer as it is not my specific area of expertise. I can draw attention to a couple of things that are going on. There is perhaps a distinction to be drawn between risk to the company and risk to the asset and then the systemic national risks of this kind of thing. One thing about our oil and gas production and supply is that the ownership of it is quite diverse. We have around 20 or 30 companies involved in producing oil and gas offshore and then, likewise, the assets themselves are physically separated, so physical threats are in a specific location.

We have a long-established oil and gas industry group, so quite a bit of collaboration and sharing of best practice goes on as part of that. You are

right to say that is getting more important with a greater level of digitalisation. We conducted a survey on digitalisation; that is probably the latest thing that we have, which we did in conjunction with the Oil and Gas Technology Centre in Aberdeen, and Deloitte. That is a review of companies' digitalisation strategies. That is on our website, so we can let you have that.

On the systemic risks, to some degree they are a bit more concentrated at the terminals and the onshore networks. We were part of the stakeholder user group for National Grid's price control. Part of that was having a review of the expenditure that is being proposed there for dealing with cyber and physical security. A lot of the details of that are confidential, but, clearly, it is a growing issue and a growing level of attention is being given to how that is managed. Ofgem is the competent authority under the NSI regulations. That kind of interface between the infrastructure and the terminals—the point at which the gas has landed—will be part of a more ongoing discussion between the companies and the regulator about the expenditure that is needed and the actions that need to be taken. They have built a reopener into the price control for any additional expenditure that is needed at certain points in the next five-year price-control cycle.

**Lord Clement-Jones:** In summary, your members would not be part of that six in 10 national infrastructure companies that have low confidence in maintaining supply chains that are secure against cyberattacks. Can you state that with confidence?

**Will Webster:** Yes, I could, but they will each have their own strategies for how this is being dealt with, so I would not like to say I know all of those on an individual basis. There is certainly a process within the companies for dealing with this as an issue. If their assets are affected and they lose production, that will affect their bottom line, at the end of the day. There is quite a strong commercial motivation for companies dealing with this issue effectively as well.

**The Chair:** We have reached the point in the meeting when we are running short of time. I ask for short, snappy questions, please—and short, snappy answers.

Q143 **Viscount Thurso:** Dr Stone, I will ask this just of you in the interests of time. My question was about how effective our nuclear, oil and gas sectors are in embedding safety processes and what we might have learned from the Fukushima or Piper Alpha disasters, but you largely answered it in your opening remarks when you talked about the safety and resilience, the duty-holder and the safety moment. So I think I can take it that you think it is very good.

You will have heard my questions to Dame Sue in the earlier panel. I pointed out the various things that have happened at Dounreay, this morning's report on bullying, racism and so forth at Sellafield, and the Holliday report. They all have in common that the institutions regard themselves as world-class decommissioning experts with robust systems.

Is the biggest danger in this that there is too much self-belief and that people do not do what they are meant to?

**Dr Tim Stone:** That is a really good question. You are absolutely right that the critical issue is that people—everybody—ask questions and are self-critical, and that that is encouraged. I will give you a really silly example of the extent to which this percolates down in every nuclear installation I have ever seen, and pretty much every one, I expect. If I walk downstairs in the offices and my left hand is not on the handrail, somebody says, “Why are you doing that?” Woe betide me if I am carrying a cup of coffee because it is not safe and I am not thinking about it. We need to encourage that in the way that both the two previous witnesses were talking about, in embedding this into the education of engineers and pretty much everybody who works in any industry, not just high-hazard. It should be part of what you do. We need to reward people for saying, “Are you sure about that?” and being curious. It is the curiosity and taking time to think, not to rush.

Rushing is probably the biggest issue in this, even when you have all those safety trainings in place. Make sure that people have adequate time to reflect on what they are doing and, to quote my grandfather in doing some woodwork, “Measure twice. Cut once”. Think about it, be careful and encourage everybody else to do it. Do not let people be pressured into making snap decisions. In our entire working lives, there are very few things where time is of the essence. We are not neurosurgeons. We are not in the operating theatre. Taking a few moments just to think, look around and test is critical. People will always be the weakest link, other than rogue software. Giving people the confidence to be robust is critical; we have to support that.

Very quickly on your point, the industry does not condone, in any way, bullying, harassment or anything else like that. It is simply unacceptable. With the challenges we have in making 30% of the workforce in nuclear women, with the Women in Nuclear organisation, we drive it pretty hard. We have zero tolerance.

**Viscount Thurso:** What you have said absolutely rings true. I am sure nobody would disagree with it. How do we then take that and apply it to the way in which we produce the national risk register, so that we get that same methodical approach, but with pizzazz?

**Dr Tim Stone:** I would compare the way the regulators in the UK and US work. The US’s is a rules-based regulator. Ours is an outcomes-based regulator. All the way through this, whatever you are doing, however you are approaching risk at whatever level, it has to be about outcomes. You cannot do it by writing rules because, if you write rules, I guarantee you that there will be little lacunae that things slip through. All the way through, it is, “Why am I doing this? What is the outcome I am trying to achieve?” Stick to that at every single level in this process, right up to the top.

Q144 **Lord Triesman:** Looking at what has been happening in Texas, what are

the nuclear, oil and gas sectors doing here to ensure the resilience of the UK energy supply system? How likely is it that we could face any similar event in the UK to what has been faced in Texas? What would be the impact of such a sustained blackout on the sectors? Since I have the great luck of having Tim Stone here, I wanted to ask quickly whether the creation of the nuclear police force, which caused me great difficulty as a legislator at one time, has had any impact on any of the issues that you have raised.

**Dr Tim Stone:** To answer your second question first, yes, it has had an impact. It has helped weld together more of the supervision. There is always more we can do. We should perhaps have a conversation offline about your own experiences, because I would love to hear it from the other side.

On the big resilience point, first of all, the nuclear industry in the UK works on one-in-1,000-year and one-in-10,000-year probabilities in planning for weather, seismic events and so on. When we looked at the lessons from Fukushima, it was clear that what we had here in the UK was already more than good enough to deal with those sorts of extremes. We were at that level of extreme in our thinking. We still learned more and still did things to help, but nuclear reactors are, in almost any country in the world, extremely resilient. They are resilient by virtue of their safety processes anyway. They operate in extremely cold countries, such as the extremes of Russia; indeed, there are icebreakers that go to the North Pole that are nuclear-powered. They operate in astonishingly low temperatures, simply because they have been designed as systems.

On the resilience of our energy system to weather, you will have the nuclear stuff sitting there, bubbling away on the bottom, staying completely solid because it is not in itself dependent on those sorts of temperatures. The inverse is true. Working in Abu Dhabi, one of the issues there was the temperature of the seawater in the summer, which meant that the reactor design had to be turned down. It could not run flat out because the cooling water was not cool enough. Texas-type extremes are very carefully planned for in any event.

The regulator challenges to make sure that all the systems around a power station, including multiple energy supplies, a second grid connection, backup power supplies and the ability to operate in what is called islanding mode, are all carefully thought through. They always need challenging, but the risks to the UK energy system do not come from the risk of intermittency of the nuclear sector other than being turned off earlier than it ought to be.

**Lord Triesman:** Can I quickly ask Mr Webster whether he has had any observations from Texas in his part of the energy world?

**Will Webster:** Yes, there are a couple of things that we would take from it. There is definitely one around the licensing regime for generators and what they are required to do to be connected to the system. Our

requirements are high, and rightly so. I am not an expert on how that works in Texas, but there may be an issue there.

The other thing that we would inevitably point to is the point I made earlier: a resilient system is one that has electricity, gas and liquid vectors. I understand that the heating load from the 1.5 million homes that have been connected in Texas in the last 10 years is pretty substantial. That is a policy choice, to some degree, as to how you do that, but you need to understand what you are doing when you make that kind of commitment and what extreme events that system then has to deal with.

**The Chair:** Dr Stone, are you saying that a prolonged outage of electricity caused by something other than weather—for example, a cyberattack or a solar flare—would still leave the nuclear sector in a good place?

**Dr Tim Stone:** Yes, I am, in the sense that the reactors are designed to withstand shocks such as the loss of grid feed, so there is a second grid feed there; there are backup power supplies. They are designed to work and to sit there in an islanded mode if they have to, because you cannot rely on the external systems to ensure that your own plant is running properly. There is a very careful process right in the very early design and licensing stages to make sure that the single reactor can withstand those sorts of external interruptions. Whether you or I can is a different issue, but, yes, the reactors themselves, given their design, licensing and regulation, are designed specifically to make sure that they are robust.

Q145 **The Chair:** I would like to pursue that with you offline. What is your view of the current regulatory environment surrounding the nuclear and offshore oil and gas industries? You have touched on that, in a sense, already, Dr Stone, by saying that there is not sufficient connection between the regulators, but what about internationally? How does that work internationally?

**Dr Tim Stone:** That is very interesting. The nuclear safety regulators, globally, inspect each other. They visit each other on a regular periodic basis. It is an astonishing thing to watch. I was privileged to watch it happening with the NII before we moved to the ONR. The Americans came over to inspect, and the regulator here wanted the other inspector to find things it could do better. It was not a case of hoping that the inspector did not catch you out. It was exactly the opposite. It wanted the guys to find things that we could do better. That is a general feat around the world.

In the week after Fukushima—I was the adviser to the Secretary of State at that point, dealing with the immediate response—I was in the Far East giving a series of speeches about energy policy in the UK in nuclear. I went to China and the very first question they asked me was, “How do we make absolutely sure that we learn all the lessons as a safety regulator in China from what has happened in Japan?” This is not something where we have balkanised regulators at all. It is quite the

opposite. There is a European group of regulators. There are regulators more broadly. They talk to each other a lot and there is huge degree of interaction and mutual learning.

The issue for me is not about the regulation of the nuclear industry as between the Environment Agency and the ONR. It is the interrelationship between those regulators and economic regulators and the wider system point that I keep banging on about, because that is fundamentally where we now have to focus. Regulation in the nuclear industry itself has benefited from a massive focus on, as Sue Ion was saying, an unreasonable terror of low-level radiation. As a consequence of that, the principles of "as low as reasonably practicable" and "as low as reasonably achievable" are built in. With an outcomes-based regulator, you have about the best theological approach to this that you could get.

Q146 **Baroness McGregor-Smith:** Could you please suggest one policy recommendation that this Committee could make to the Government?

**Dr Tim Stone:** It is very simple and straightforward: we have to have a guiding mind in government that is independent and works out how, in physical and practical terms, we are going to get to 2050 and net zero in a way that is to the best benefit of the UK economy and national economic competitiveness. That is the end of it. That is the critical issue today. It is as important, in my judgment, as dealing with the pandemic, the approach to that and the vaccines industry. It is actually bigger, because the consequences in the long run of not sorting out net zero are truly profound.

I am addressing here a Committee that includes Lord Rees, but, if you look at the history of Venus and what happened there, we potentially face runaway problems. We have to deal with this. We have a duty, in our behaviour today, to support our children, grandchildren and way beyond. We are not doing it. That independent systems thinking and guiding mind to drive the delivery of practical energy systems for the best interests of the country is at the centre of everything that I am doing at the moment. I would heartily recommend that the Committee picks this one up.

**Will Webster:** I have one positive one and one negative one. The positive one, as I mentioned at the start, is the North Sea transition deal that we are currently discussing with government, BEIS officials and Ministers. From that, we hope to get a process and a framework for dealing with some of these cross-regulator issues around how the North Sea will be used in the future for a wide range of energy solutions and to provide a route to the future net-zero-carbon economy. That is the positive one, and we are having pretty positive discussions with BEIS on that topic, so I will not dwell too much on that.

The one that worries us a bit is the licensing review. We need something that recognises the contribution that the oil and gas sector makes. It has to recognise the volumes of oil and gas that we are still going to need as an economy during the transition. We really need to avoid arbitrary restrictions, whether that is dates on exploration licences or restrictions

in acreages. Such restrictions give the impression that we can just run down the clock on the sector and forget about maintaining the assets and attracting new recruits to the sector. We need to avoid that policy of ambivalence. That is a real worry we have about the current licensing review. We are really keen to make sure we have something that works in conjunction with the North Sea transition deal and that tells a rational story about the process of getting from today's situation to the future situation, without just arbitrarily saying, "By X, we will not be doing a certain activity any more".

**The Chair:** That brings us to the end of this morning's session. The evidence we have had is fascinating. We are going to find it very difficult to write a report that is short enough to be readable in view of the importance of your evidence. Thank you very much indeed to both of you. Thank you to the Committee and the committee staff.