COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON THE ENVIRONMENT AND ENERGY

Prerequisites for nuclear energy in Australia

TUESDAY, 22 OCTOBER 2019

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STANDING COMMITTEE ON THE ENVIRONMENT AND ENERGY

Tuesday, 22 October 2019

Members in attendance: Mr Burns, Dr Gillespie, Mr Ted O'Brien, Mr Pitt, Mr Josh Wilson, Mr Zimmerman.

Terms of Reference for the Inquiry:

To inquire into and report on:

The Committee specifically inquire into and report on the circumstances and prerequisites necessary for any future government's consideration of nuclear energy generation including small modular reactor technologies in Australia, including:

a. waste management, transport and storage,
b. health and safety,
c. environmental impacts,
d. energy affordability and reliability,
e. economic feasibility,
f. community engagement,
g. workforce capability,
h. security implications,
i. national consensus, and
j. any other relevant matter.

The inquiry will have regard to previous inquiries into the nuclear fuel cycle including the South Australian Nuclear Fuel Cycle Royal Commission 2016 commissioned by the Labor Government in South Australia and the 2006 Switkowski nuclear energy review.

WITNESSES

COBB, Dr Jonathan, Senior Communication Manager, World Nuclear Association

COSTES, Mr Philippe, Senior Adviser, Staff Director of the Economics and Law Working Groups, World Nuclear Association

HESS, Mr David, Policy Analyst, World Nuclear Association

SANDERS, Ms Charlotta, Staff Director, Waste Management and Decommissioning, Sustainable Used Fuel Management, and Radiological Protection Working Groups, World Nuclear Association

Evidence was taken via teleconference—

Committee met at 19:01

CHAIR (Mr Ted O'Brien): I declare open this public hearing of the House of Representatives Standing Committee on the Environment and Energy for the inquiry into the prerequisites for nuclear energy in Australia. The inquiry terms of reference ask the committee to examine circumstances and prerequisites necessary for any future government's consideration of nuclear energy generation. In accordance with the committee's resolution of 24 July 2019, this hearing will be broadcast on the parliament website and the proof and official transcripts of proceedings will be published on the website. I remind members of the media who may be present or listening online of the need to fairly and accurately report the proceedings of the committee.

I welcome representatives of the World Nuclear Association.

Although the committee does not require you to give evidence under oath, I should advise you that this hearing is a legal proceeding of the parliament and therefore has the same standing as a proceeding of the House. The giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. The evidence given today will be recorded by Hansard. Please note that, while Australian law provides parliamentary privilege to witnesses appearing before committee inquiries, that privilege does not extend beyond Australia. I now invite you to make a brief opening statement before we proceed to discussion.

Mr Hess: Thank you very much for approaching us to give this evidence. We believe it is only natural that an advanced country like Australia should seek to make use of nuclear energy as it attempts to address its energy, environmental and economic challenges. The country has a long and proud nuclear tradition and is well placed from a technical, regulatory and social standpoint to start a nuclear power program. There has never been a better time to make such a start. The growing urgency of the climate challenge is driving momentum for a global transition to a deeply decarbonised energy future. Any advanced economy which is serious about addressing climate change should be developing nuclear energy if it wishes to increase the speed and reduce the costs and uncertainty of this transition. Nuclear energy is a complementary partner to variable renewables and helps to ensure a reliable and resilient electricity supply which is the backbone of any modern society.

Innovation is currently transforming the global nuclear sector. This year should see the world's first small modular reactor start up. The IAEA notes that currently there are more than 50 SMR designs under development and that these are suitable for a range of applications, including bulk electricity, heat and hydrogen production as well as potentially being cited near industrial facilities and/or off-grid facilities. Many SMR designs are expected to become available throughout the 2020s and 2030s. Innovation is also improving currently available gigawatt-scale nuclear power plants, making them cheaper and easier to construct as well as improving their operational performance. We encourage Australia to keep an open mind with respect to nuclear technology selection at this stage.

We understand that the committee has encountered significant confusion with respect to nuclear capital costs, including in relation to our own information resources. It is indeed a confusing subject, as these costs vary significantly by location and are influenced by a range of factors. For the gigawatt-scale reactors, the projected costs range globally between about A$2,900 and A$9,000 per kilowatt. However, as with all major infrastructure projects, the realised cost can be significantly higher if issues are encountered during construction. For SMRs there is currently less comprehensive data available, but we take issue with the A$16,000 per kilowatt figure that is mentioned in the GenCost report and which is attributed to us. Judging from the authoritative reports in our submission, we believe that a more reasonable mean value would be around A$7,000 per kilowatt as part of a range of optimistic and conservative values. We do not recall that the figure of A$16,000 was ever presented in our information resources, but if it was then it was surely an upper limit. Using this figure solely as a basis for a cost estimate in Australia seems overly negative.

If the Australian government really wants a reliable estimate for nuclear project costs in the country then it should enter into discussions with nuclear vendors and developers. However, we suspect they will be unwilling to allocate significant resources to this activity while nuclear power remains illegal in the country. Nothing, in our opinion, should be illegal just because of cost uncertainty. The prohibition against nuclear energy is outdated and simply has no place in a modern, data-driven society striving for a sustainable future. We hope this committee comes to recommend that the ban is removed. Thank you.

CHAIR: Thank you very much. Let me start with some questions. I was interested to hear you make some comments there about the A$16,000 per kilowatt assumption. There have been many submitters to this inquiry that have argued that nuclear energy is not feasible economically and they have based their evidence on that $16,000 data figure. When this committee asked AEMO, one of the two author bodies of that report, where that data came from they said it came from the CSIRO—the second body. This committee heard from CSIRO last week. They explained that that data figure came from a company here in Australia—GHD—and that they received the data off the World Nuclear Association website. They also conceded that they themselves, looking at that website, couldn't find where that figure was stated specifically. So, just to be very crystal clear on this, if the ultimate apparent source of that data is the World Nuclear Association, do I hear you correctly that you are saying that you do not believe that is an accurate figure?

Mr Hess: The World Nuclear Association gets its cost data from other people who develop the projects—the vendors and the developers—so any data that we collect would be coming from there. But we can't be the ultimate authority for these kinds of projections. On our website we have an online information resource that is kept up to date as regularly as it can be with new information as it comes in. There is a possibility that the information used to be present as a data point in our extensive information collection, but it would have only been one value and, by the sound of things, it would have been an extreme value, because it's a very high capital cost estimate for nuclear projects. So I'm not sure if that addresses the question, but—

CHAIR: It does, thank you. Your submission also provides a table, I note, on page 6, with capital cost kilowatt hours in US dollars.

Mr Hess: That's for large reactor projects, yes.

CHAIR: Thank you. Our interest as a committee is less in trying to find out why a figure might have been incorrect from a former report and more in what are the accurate figures as they are today, and you've certainly clarified that. Let me now pass to the deputy chair.

Mr JOSH WILSON: In the opening parts of your submission you talk about how nuclear should be part of a process of deep and urgent decarbonisation. Can you put some details around that? What kind of rapid decarbonisation do you have in mind when you suggest that nuclear needs to be part of it?

Mr Hess: I'll pass to my colleague Dr Cobb on this.

Dr Cobb: We have taken note of the evidence that has been presented through the IPCC and other excellent sources that there is an urgent need to decarbonise the global economy in order to combat climate change. Now we feel that nuclear has a role to play in achieving that goal, and, most of all, I think it's the case that nuclear has been shown historically to be able to decarbonise rapidly. In countries such as France and then Sweden, they were able to make very large reductions in their emissions from their electricity generation—specifically, emissions per kilowatt hour per capita for that country. So nuclear has proven itself historically to be able to make rapid decarbonisation of the electricity generation mix. Therefore, if that is the policy aim of governments around the world and it's the wish of people around the world to achieve that aim then nuclear is an excellent way of achieving that goal.

Mr JOSH WILSON: But, if you want rapid decarbonisation in Australia, the evidence that we've had put to us is that, if we were for some reason to go down the nuclear path, we wouldn't get any nuclear generation for 10 to 12 years at best. As a country—unlike France, which has had nuclear for some considerable time and the capital costs of those reactors have been amortised well and truly by now—the evidence that we have is that new carbon-free forms of generation that are in the form of firmed renewables are much cheaper than nuclear in terms of speed and cost. There doesn't seem to be any case for us going down the nuclear path.

Dr Cobb: On that point, I think you have to look at your ultimate goal. I think the ultimate goal is decarbonisation of the electricity generation mix by those who wish to achieve that aim, essentially going to zero. Governments—certainly I think in Europe it's the case. The UK, for example, has set a goal of achieving that by 2050. So, in the very short term, if you want to start the process of decarbonisation then using renewables in a mix which at the moment has a high level of carbon and also high levels of flexible generation that can cope with the variable output of renewables is the right step to take initially. However, if you're looking at the overall goal of complete decarbonisation then you might have to look at the most effective way of producing the overall electricity generation mix. If you look to a recent study by the OECD NEA, the study showed that the most cost-effective way of doing that was with a combination of nuclear generation and with a variety of renewable forms of generation. Also, if you look to a recent report by the International Energy Agency, that report was looking at the role of nuclear in a clean electricity mix. They too came to the conclusion that it would be more costly and less likely that you would be able to achieve a zero carbon generation mix or a very low carbon generation mix if you excluded nuclear from that overall mix of generation technologies that you are using to achieve that aim. With bringing in the first reactor, it may be that the 10 or 12 years that you mentioned is a figure that could be reasonable, but from that point you would then be able to achieve further decarbonisation of the generation mix more rapidly by using nuclear energy.

Mr JOSH WILSON: You talk about the GenCost CSIRO estimate in relation to capital costs and you make the point at that part of your submission that SMRs haven't been delivered yet, so any assembly of a capital cost estimate is just a guess. But at the same time you turn to the vendor estimates by NuScale as a basis for a cost. Isn't it right to say that at the moment, as far as SMRs, you can write whatever number you want on paper—we just don't know?

Mr Hess: I don't really think that's a fair assessment of the vendors themselves in developing their products and coming to understand their own costs. Certainly, as vendors progress down the process of developing their reactors, they get to a better understanding of how much they expect it to cost. Certainly, if you read some of the literature, they talk about an optimism bias, which some of the developers and vendors may have. But really that's just code for more pessimistic people having a pessimism bias. So I think that, as the SMRs have developed, as we've gotten more data in and as they've gotten closer to having licensed designs, the quality of the information about the eventual costs is improving. However, that doesn't change the fact that the nuclear project economics do apply. When you're setting up a nuclear industry in a country for the first time, some of the costs may be higher, to become lower as you build more units or further down the track. But these are all points that need to be taken into consideration. I'd like to just hand over to Mr Costes for some further comments.

Mr Costes: I think you are fully right that at the moment there is a lot of demonstration to be done. As Mr Hess said in the opening statement, many SMR designs should be expected between the 2020s and 2030s. And it's fully right that the costs and the price are still unknown, even though we have some studies—for instance, MIT earlier this year produced a study with a target price for those SMRs. In addition, what I just wanted to add is that today we have existing technology—off-the-shelf technology—with large-scale. If you look at the data base also, as Mr Hess mentioned, by NEA or IEA, you'll find out that large-scale, with proven and available technologies, are fully affordable and much lower than the A$16,000 you mentioned before. By taking those costs into account, you derive a COE which, in the mix, is compatible with other renewables or other technologies.

Dr Cobb: I'd make one final point. We should recognise that SMRs encompass a wide range of designs, from those that are based on very novel technology to those that are fundamentally scaled-down versions of existing large-scale reactors. So, regarding the comment that you can write any number you like, I think you would recognise that there would be a wider range in an estimate on an SMR than on an existing design which you've shown and demonstrated to be able to construct. But that range would be smaller and there would be greater certainty for those reactor designs that are made based more fundamentally on existing reactor technology, then there would be a wider range for those which would be using much more novel technology. Those would be reactor designs that we would be expecting to come forward later in the process.

Dr GILLESPIE: I was very fascinated by your economic analysis. I notice that you put down that a nuclear power plant has about a 90 per cent capacity—that is, it's available 90 per cent of the time, 24/7. Have you got comparative figures for solar and wind? I've heard variations between 10 per cent and 30 per cent for both of those modalities. That's my first question. Then I have some follow-up ones.

Mr Hess: Yes, there are published values for solar and wind capacity factors. It's something else which varies very significantly by location, and obviously where you site that resource makes a big difference. Also, the technology that you choose to use in those instances can make a big difference—so the size of a wind turbine and whether it's located onshore or offshore. I think in the UK a typical figure for—I would have to provide more information, but I suspect that wind would be about 20 per cent, but once you shift it offshore the capacity factors could be around 40 per cent or even higher. For nuclear the 90 per cent is certainly close to a best performer level. Best performers can get up to towards 95 per cent. Average plants are over 80 per cent. So that's a typical value.

Dr GILLESPIE: You mentioned the life span of the new reactors—the engineering life span—is up to 80 years. You said usually 60, but the new ones are designed to last 80 years.

Dr Cobb: In terms of lifetime, it's actually the case that, in the US, many of the existing reactors—those reactors built in the seventies and eighties—many of those have already been authorised to operate to 60 years and some are now looking at the potential to operate towards 80 years. So the potential of having additional lifetime from existing reactors is great. On that basis, new reactor designs typically now state a lifetime of 60 years. But, again, there would be the potential for those to operate for longer than that. That's an initial figure that is given for those designs.

Dr GILLESPIE: I note with interest that you look at China. It's a fascinating report and I'd like to thank you. You've made things seem a pretty stark difference to me. But you mentioned that even in China they've got more solar and wind and are putting more in than anyone. They seem to be putting in more nuclear than anyone. But you figured that renewables for solar and wind onshore are 16 per cent more expensive and 50 per cent more expensive and if you go offshore they are 140 per cent more expensive than a nuclear power plant. That's in China—comparing like with like. So I'm thinking that, if you've got to replace your solar panels every 20 years or so or your wind turbines every 20 years, you'd be doing that four times, so it'd be 660 per cent more expensive for offshore wind in China over that time frame. It's just astounding. Is that the same everywhere else?

Mr Costes: No, I think that at any time, we or the NEA or whoever are trying to compare an apple and an apple. So, when they say that, for instance, in theory wind offshore electricity is 100 per cent more expensive, this is comparing over the period of time of 40 or 60 years. That includes the fact that you have to replace your wind turbine 20 years from now. So this is the first point. The other thing I just wanted to point out, to add to what Mr Cobb and Mr Hess said, is that it's very difficult and you cannot compare directly the output of a wind farm or solar farm with nuclear. One is maybe predictable but variable, while the other one is 24/7 and is flexible. So it's on command. This is a very big difference. It's the basis for any analysis we have behind the system cost. So it's nice to look at LCOE, which is considering mainly the capital cost of an investment, but afterwards, when it's embedded in the system, you have to look at all the system costs. Basically it's the viability or the lower predictability of wind and solar that is a major system cost when there is a high penetration of wind and solar in a system.

Mr BURNS: Apologies, everyone—I walked in late. I was stuck in the House of Representatives. I think it was Mr Costes who gave evidence, along the lines of your submission. That some SMRs will be available in the 2020s and then a wide range of SMRs will be available in the 2030s. Given all of your experience and understanding of how long it takes for a country to be able to adequately skill themselves, regulate and fund a nuclear industry and given our current capabilities, which are only really for a small research reactor, we're looking at possibly 10 to 15 years, including the build of any nuclear reactor. So, if some are available in the 2020s and most are available in the 2030s, the reality of the time line that we'd be talking about for a nuclear energy reactor in Australia, whether that be a large-scale reactor or a small modular reactor, would be somewhere in the 2040s. I'm interested in how you can say that that's a good fit for Australia, given we share the goal of wanting to rapidly decarbonise our energy market.

Mr Hess: I think one of the more toxic elements of the climate debate recently is this idea that decarbonisation needs to be achieved within 10 years. The truth is that, even five, 10, 15 or 20 years from now, there's still going to be energy investment and there's still going to be a need to decarbonise. The option to introduce nuclear energy is still going to be a good one. There's an old saying that the best time to develop nuclear energy was 20 years ago. The second best time is today. Certainly, when we look internationally, the UAE came to a final decision to build its reactor and 10 years later—about 12 years later now—it's very close to starting up its first reactor and three or four years down the track nuclear electricity is set to be providing 25 per cent of its electricity supply. If Australia chooses to go down the pathway of developing nuclear energy and the government commits to it and goes down the established pathways that are supported by the IAEA and others, it should be able to do it within, indeed, about 10 to 15 years and have nuclear providing a sizeable contribution to energy.

Dr Cobb: Just to add, if I may, taking that point, I think the 2040 figure is stretching. If Australia wanted to start using nuclear energy as soon as possible to make a large-scale contribution to its electricity mix and have the aim of reducing greenhouse gas emissions then we would recommend, I think, that it should consider the option for existing designs of reactors, because it would get over some of the issues that you were posing in your question. Evidently, if a reactor design was not available until 2035 than that's going to delay deployment. However, there are SMR designs that are closer to market, so it's certainly something that could be used in Australia. I think the point would be to identify the time scales at which Australia would wish to be deploying nuclear reactors as part of its generation mix and then make a judgement on the right technology to use on that basis.

Mr BURNS: So basically the options that Australia would have if considering nuclear energy would be, for a large-scale reactor, today to 15 years down the track, we're talking 2019 to mid-2030s and, even at the earliest, from the mid-2020s to early 2040s—if we go hell for leather maybe just before the 2040 mark—if we're going down the small modular reactor path. Are they the rough time lines in which you think we'd have nuclear energy available in Australia?

Mr Costes: I think you are not far away. For large scale you're talking about 10 to 20 years. It might be a little bit earlier than the 2035, which you were referring to, and definitely for a commercial deployment of an SMR of proven technology it would be between the 2030s and 2040s. The other thing I wanted to add is that looking at the large scale would make sense regarding the existing system we have in Australia because of large coal plants which are going to be phased out at some time. Also, all the grid is existing. So large scale would really fit into the scheme.

Mr ZIMMERMAN: I had a number of questions, but unfortunately time has escaped us. I just wanted to put a proposition to you, because we'll be hearing evidence following yours which includes a submission from a group called Nuclear Consulting Group. They made two propositions that I just wanted to get your feedback on. They're talking about large-scale reactors rather than small. They make the comment that in the UK alone in 2018 the Sellafield, Moorside and Wylfa B projects were effectively abandoned as Japanese reactor vendors pulled out because they were unable to attract the scale of finance required. Then they talked about the Finnish project and they make the comment that effectively that reactor was promised in 2009 and is likely to come on-stream next year, and the costs have tripled in the process from $3 billion to presumably close to $10 billion. How do you react to those types of claims?

Mr Hess: To be honest, they're true. There is a serious challenge with getting nuclear financing. It's one of the most difficult aspects for any nuclear project. It often involves agreements between different countries, so there's a lot of politics which has to go into those. In the case of the Japanese projects in the UK, they decided that, with the state the deal was in, they were not certain enough to proceed with making an investment. At least one of those projects was not entirely cancelled. It may continue, but it's contingent upon a new financing package being worked out by the government in the country at this stage. If you look at the project in Finland that's discussed, they've certainly experienced many difficulties which have seen the capital cost of that project increase. But, importantly, those were costs which have been associated with the fact that this was one of the first times that this reactor was constructed. A lot of the knowledge and experience that has been gained from that process, again from the construction in France and also from the process of constructing those units in China has now been internalised as much as possible and has been brought across to, for example, the Hinkley Point C project in the UK. So it is possible to learn from doing. It is possible not to repeat the mistakes on nuclear construction projects which have been made. A first of a kind project is a challenge, but we don't take that as a basis for all nuclear costs and certainly, when we look abroad and we look more generally, we see a range of nuclear cost estimates. Where there is a lot of expertise and experience, these costs are significantly lower.

Dr Cobb: I think the important thing when being presented with those individual cases is to note that they are not typical for the global nuclear industry. For example, in 2018 and 2017 the median build for reactors was very much less than that. In fact, in China, construction has been achieved, from first concrete to grid connection, in around five years. So that's very much shorter than the experience in Finland and in France. Therefore, those examples can be given, but they are outliers compared to the very many more reactors that have been built and coming online in recent years, which have much shorter construction times. So I think those can be presented and in isolation, as Mr Hess said, they are happening, but they are not typical for construction neither in countries that have existing nuclear build nor, indeed, in those countries that are going forward with new build, such as the UAE, as David suggested as an example, and also looking at other new build constructions in new countries that are taking place around the world.

CHAIR: Thank you very much. We will have to draw this session to a close. You've been very generous in making yourselves available and aligning the time zones. Also, thank you for your substantive contribution by way of a submission. I don't believe you've been asked to provide any additional information, but, if the committee does have additional questions for you to respond to on notice, we'll send that to you from the secretariat, with whom you've already been liaising. You'll be sent a copy of the transcript of your evidence and you'll have an opportunity to request corrections to any transcription errors. With that, on behalf of the committee, thank you very much.