



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON THE ENVIRONMENT AND ENERGY

Prerequisites for nuclear energy in Australia

WEDNESDAY, 16 OCTOBER 2019

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STANDING COMMITTEE ON THE ENVIRONMENT AND ENERGY

Wednesday, 16 October 2019

Members in attendance: Mr Burns, Dr Gillespie, Mr Ted O'Brien, Ms Steggall, 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.

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COSTELLOE, Mrs Marina, Acting Branch Head, Mineral Systems, Geoscience Australia

CROSS, Dr Andrew, Senior Commodity Specialist, Geoscience Australia

FEITZ, Mr Andrew, Section Leader, Geoscience Australia

HAYWARD, Dr Jennifer, Senior Research Scientist, Commonwealth Scientific and Industrial Research Organisation

MALLANTS, Dr Dirk, Senior Principal Research Scientist, Commonwealth Scientific and Industrial Research Organisation

PHALEN, Mr John, Chief Research Consultant, Science Strategy, Commonwealth Scientific and Industrial Research Organisation

Committee met at 10:39

CHAIR (Mr Ted O'Brien): I declare opening this public hearing of the House of Representatives Standing Committee on the Environment and Energy for the inquiry into prerequisites for nuclear energy in Australia. The inquiry's terms of reference ask the committee to examine circumstances of 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's website, and the proof and official transcripts of proceedings will be published on the website. Those present here today are advised that filming and recording are permitted during the hearing. I remind members of the media who may be present or listening online of the need to fairly and accurately report on the proceedings of the committee.

I welcome representatives of Geoscience Australia and the CSIRO to give evidence. 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 and attracts parliamentary privilege. Do you have any comments to make on the capacity in which you appear?

Dr Cross: I'm a uranium commodity specialist

Mrs Costelloe: I'm a geophysicist.

Mr Feitz: I'm an environmental engineer, and I lead the low-carbon geoscience and advice section

Mr Phalen: I'm a project director for the nuclear fuel cycle research in CSIRO.

CHAIR: I invite you to make a brief opening statement before we start a discussion. Of course, each of you is welcome, otherwise, one representative from each of Geoscience and CSIRO. Who would like to begin?

Mrs Costelloe: I'll go first. Geoscience Australia's mission is to be the trusted source of information on Australia's geology and geography for government, industry and community for decision-making to contribute to a safer, more prosperous and well-informed Australia. Geoscience Australia sits within the Department of Industry, Innovation and Science; I understand they will be here on Friday.

As part of our ongoing resources program, Geoscience Australia provides geological information and advice on Australia's uranium resources, including the status and production of operating lines and new developments related to uranium exploration. Geoscience Australia reports Australia's uranium resources in two annual publications—*Australia's Identified Mineral Resources* and *Australian Energy Resources Assessment*. They are available on our website. Geoscience Australia is also a member of the joint Organisation for Economic Co-operation and Development Nuclear Energy Agency, the International Atomic Energy Agency and the uranium group, which coordinates the biannual assessment of the world's supply of uranium in order to assess supply capabilities for future demand. This group produces the biannual publication *Uranium Resources Production and Demand*, also known as the red book. Geoscience Australia's uranium expertise is also regularly called on to provide information and advice for Environment Protection and Biodiversity Conservation Act referrals. This advice particularly involves the geological aspects of mining, tailings, storage facilities and mine site rehabilitation.

Geoscience Australia is the custodian of valuable geoscientific data and information. Our minerals program aligns with the priorities of the National Minerals Exploration Strategy, which aims to generate new exploration opportunities and assist in ensuring the continuity and longevity of Australia's mineral resources industry,

particularly in undercover greenfields areas. The current Exploring for the Future program is also designed to boost investment and resource exploration in Australia. Our precompetitive data program makes data publicly available to support and de-risk decision-making and investment opportunities in Australia's resources.

In 2011, our Onshore Energy Security Program also provided precompetitive data and knowledge supporting uranium exploration in Australia and reported on fundamental geological controls and on minerals systems that contain uranium and also reported on Australia's prospectivity for uranium resources. Geoscience Australia has supported the Department of Industry Innovation and Science with geological advice on the establishment of a national radioactive waste management facility recently. Thank you.

CHAIR: Thank you very much. CSIRO?

Jane Coram: Good morning and thank you for the opportunity to attend today's hearing of the inquiry into the prerequisites for nuclear energy in Australia. As you know, I'm representing CSIRO, the nation's science and innovation organisation. We have a range of capabilities and expertise relevant to the nuclear energy cycle. We provide science to inform decision-making, in collaboration with other agencies and specialists. That includes waste management, disposal and fuel processing; social licence to operate; site feasibility assessment; and exploration, minerals processing and environmental monitoring.

Accompanying me today are Dr Dirk Mallants, who can speak to our role in the South Australian nuclear fuel cycle; Mr John Phalen, who has expertise in disposal and storage of nuclear fuel cycle waste; and Dr Jenny Hayward, who has expertise in energy modelling, including the role of nuclear in Australia's energy mix, and she is one of the authors of the GenCost report. We welcome your questions.

CHAIR: Why don't I start. Much evidence has been given to this inquiry which has been anchored by or has relied on that 2018 GenCost report and the cost assumption of \$16,000 a kilowatt for nuclear for small modular reactors. I understand that a new report is currently being done.

Dr Hayward: That's right, yes.

CHAIR: Where does CSIRO sit now on that assumption? Is it likely to change, and, if so, to what number?

Dr Hayward: We are sticking with the original, initial cost estimate from GHD, but, based on stakeholder feedback, we're revising the scenarios that actually go into the modelling and the modelling assumptions, and we're also modifying our methodologies. What we're expecting to see is a bit more variety in terms of the outcomes for SMR. So, instead of having a flat cost trajectory going out to 2050, we think that, given the changes that we're making because of the stakeholder feedback when we've had our meetings, that will actually see some cost reductions. But, yes, we are sticking with that number, because it is a first-of-a-kind plant. That's the assumption that we're sticking with.

CHAIR: And where did GHD source that information?

Dr Hayward: They're saying that it's from the World Nuclear Association website. We've done a bit of an investigation into that and, if you go through some of the pages in there, there are a wide range of values; \$16,000 is just one number. I couldn't find \$16,000 stated specifically, but it's within the range of numbers that they give on that website and other websites and in other documents.

CHAIR: So the source of the number did not state \$16,000?

Dr Hayward: Well, the source was in Canadian dollars, but it's a bit unclear at this stage because we didn't actually come up with the number.

CHAIR: There will be different scenarios. So \$16,000 will be only one of several scenarios provided in the next report; is that right?

Dr Hayward: Yes. We're going to look at several scenarios, so we're revising all the different assumptions.

CHAIR: In looking at the GenCost analysis, obviously, when we're looking at the topic of this inquiry, there is a need to compare it across other sources of energy. I see that even the life span for a black coal plant is listed as 25 years, with large-scale solar and solar thermal also 25 years. That's from the same page that lists the assumption of \$16,000.

Dr Hayward: I'll have to look into that for the black coal plant, because normally they are 50 years, I think. I'll have a look at that. Certainly in the modelling we assume it's 50 years.

CHAIR: Okay. This is on page 54. I'm happy to provide it, but it's on the same page as the \$16,000 one. We've had very different views put on it, and to date nobody has actually been able to put their finger on the \$16,000 figure. But, okay, thanks for your response on that.

Mr ZIMMERMAN: Can you unpack that a little bit more? It sounds remarkably vague, in the sense that GHD has relied on a website, and, when you've sought to fact check that website, you can't find the \$16,000 yourself, but then you talk about a range. It doesn't sound like a massively thorough process, if I can put it that way. I'm interested in your response to that. It sounds highly vague. Basically, you're relying on a third party, who's relying on a website, and you haven't been able to fact check that information yourself. It doesn't seem to provide the certainty—I know it's speculative, but you'd certainly be relying on it if you're making decisions about a significant investment in a new form of energy.

Dr Hayward: It is a tough one because it is so speculative. We have these stakeholder workshops where we put the numbers to them. We actually invite about 100 stakeholders, and we get about 20 to 30 to 40 coming along. We've interrogated those numbers with the stakeholders, and they seem to think that it's a perfectly reasonable number given the range of uncertainties out there.

Ms STEGGALL: Who are the stakeholders?

Dr Hayward: We could probably provide you with the list, I think.

Mr ZIMMERMAN: That would be helpful.

Mr JOSH WILSON: Can we have a broad indication? Do these people have expertise in small modular reactors?

Dr Hayward: It's a diverse range of people across the energy space. I believe some experts in nuclear were invited. I'm not 100 per cent sure—I don't think they came along to the workshops.

CHAIR: So they didn't include experts in nuclear?

Dr Hayward: They were invited.

CHAIR: But they didn't attend?

Dr Hayward: No.

CHAIR: So you're relying on validation from stakeholders who do not have expertise in nuclear energy?

Dr Hayward: They're experts across the energy sector. I'm not 100 per cent sure of all their expertise.

CHAIR: Sticking on this topic, are there any follow-ups?

Mr BURNS: To follow up on Mr Zimmerman's question, is that an accurate statement? CSIRO has relied on GHD, who's got a number from a website. Is that correct?

Dr Hayward: It's the World Nuclear Association—

Mr BURNS: I'm aware of the association.

Dr Hayward: so it's a reputable source.

Mr BURNS: But in terms of a thorough analysis and reliability—we are looking to make recommendations, decisions based on some of this information. It just doesn't sound terribly thorough.

Jane Coram: If I may, the difficulty in any modelling is that usually you're trying to predict something that you don't understand particularly well, so we're frequently forced into using ranges and picking a number within a range. At CSIRO we do source our figures in as much detail as we possibly can, but frequently when we're exploring new scenarios we don't necessarily have a definitive source of information. We can certainly provide the justification for the figures that have been used. But they have not been plucked out of the air. They've been justified as comprehensively as we can.

Mr HOGAN: Just to come back to that statement, why wouldn't CSIRO utilise someone who did know what they were doing?

CHAIR: Is that a question or a statement?

Mr HOGAN: It's a question.

Jane Coram: Could we possibly get back to you with the basis for the figures—the comprehensive basis—because it has been done as comprehensively as we can within the time frames. There is limited information to draw upon.

Mr BURNS: I certainly have sympathy in modelling a technology that isn't actively available right now. It is a complex task, and I'm glad you're working on it not me. On technologies that are available now where we can have perhaps a more accurate look at some of their prices: I'd be interested in your comments in relation to the *GenCost 2018* report, especially around firm renewables—the trend of firm renewables and the cost around firm renewables, as well as the long-term trend around large-scale nuclear reactors. Is it true that large-scale reactors have never gotten cheaper? And what is the long-term trend around firm renewables?

Dr Hayward: For the large-scale reactors we include a learning rate of three per cent for those in modelling. That's where for every doubling of cumulative capacity of that technology the cost comes down by three per cent on a unit basis, such as dollars per kilowatt. That's based on a value from the International Energy Agency. So we do see some cost reductions in large-scale nuclear—

Mr BURNS: What does that mean—how much are we actually talking about in terms of making it bigger?

Dr Hayward: This isn't making them bigger as much as just increasing the cumulative capacity—increasing the number of builds. It could include making them bigger, but it's also just a number that get built. We actually have a lot of data on plants that are going to be built as well. All that's given well in advance. So they do come down slightly in cost. The trouble for them is that because there's so much capacity out there it's quite hard to double it, so it takes a long time to double it. Then the cost comes down by only three per cent once they double it. So it is hard to see cost reductions in something like that.

Mr BURNS: And long-term firm renewables?

Dr Hayward: Variable renewables—batteries, back-up—

Mr BURNS: Basically the cost of renewable energy but as well as having a dispatchable energy component to them. I think you used the term 'firm renewables' in the report—what the trends are—

Dr Hayward: We see those coming down in cost—solar PV in particular has quite a high learning rate, as do batteries. And wind is less so—it's a more mature technology—and pumped hydro is coming down in cost as well. I can't remember the exact figures, but we do have them. I think battery's getting down to \$50 a kilowatt-hour, but I'm not sure, I'm sorry.

Mr BURNS: But overall it would be fair to say that it is still significantly cheaper, and the trends are indicating that it will remain significantly cheaper to have firm renewable energy versus large-scale nuclear reactors and also the modelling for small modular reactors?

Dr Hayward: It depends on the assumptions and scenarios that we're looking at. I think in the majority of scenarios that's what we've shown in the *GenCost 2018* report. But we'll have to see in the 2019 report as well.

Dr GILLESPIE: I haven't read every paragraph, I must admit—I get report overload—but I can't see you benchmark it against recently built. You've got the figures—the GALLM ones and assumptions—but have you benchmarked it against ones that have been built? Also, has GHD ever been involved in nuclear energy?

Dr Hayward: The GHD numbers are the benchmarks. They go out and do a survey of the plants that have been built, so they've got quite an extensive cost database. That's where we're getting the benchmark figures from, from GHD. And I'm not really sure of the expertise—they were contracted by AEMO.

CHAIR: Sorry, Dr Gillespie: on your first question, maybe I didn't hear it properly, but does the *GenCost* report model existing plants?

Dr Hayward: Yes.

Dr GILLESPIE: And the other thing is the overnight costs of nuclear reactors versus this assumed completed cost is often influenced greatly by the finance behind it. Do you account for that, given that some of the models that have been presented assume discount rates of nine or 10 per cent?—which is just price-gouging by the people providing the energy, as opposed to what realistic discount rates would be in the current world interest rate cycle. You could halve the cost of a project just by changing the financial assumptions—not the engineering cost bill, but just the costs of your borrowing.

Dr Hayward: Sorry; I'd have to check how it was done for the levelised costs, but in the modelling we assume a discount rate of seven per cent in the GALLME model, for everything.

Dr GILLESPIE: It's very expensive. And that's the last question: everyone talks about the levelised cost of energy, but, unless you're right next to Bayswater Power Station with your own 240-volt coming out of it, you get everything through a system—transmission costs and all that sort of stuff. You don't appear to have levelised system costs of energy, particularly if a lot of the alternatives that you're comparing it against would require whole new transmission systems from remote areas of the country, which in itself is another financial nightmare. So why don't you make the system it a system levelised cost in your next report?

Dr Hayward: Well, it's nice you should say that because we're actually doing that for the next GenCost report.

Dr GILLESPIE: That's much more realistic. All the bean counters talk about levelised cost of something, but energy generation is only one piece of the energy puzzle.

Ms STEGGALL: You mentioned the CSIRO and the social licence to operate, and the waste management aspects. Part of our terms of reference for this inquiry is: what are the prerequisites for considering lifting the moratorium? We're not going down the step of recommending a source of energy. But part of considering those prerequisites is looking at what the factors are that would influence it. Clearly, cost is a big one, and we have been poring over the report. It's a big issue. I'd like to hear from both groups in terms of the social licence to operate: how do you factor that aspect, the social licence, in to your consideration?

Jane Coram: I'll call on John Phalen, who has been working extensively on this issue

Mr Phalen: Thanks for the question. What I would say is that the nuclear power plants are not really a technical challenge to overcome. It's really mostly a social challenge. It's one that would require a number of years of community consultation. This is not something that you could do in a six- to 12-month process. You would need extensive Indigenous consultation. You would need to develop community consent processes, and, if you have a look at success around the world trying to get either waste disposal systems in place or new power plants in place, it's not a very good track record—

CHAIR: My apologies, the division bells are ringing. We are going to have to go. I'll suspend the hearing for now, but we should have time to come back.

Proceedings suspended from 11:03 to 11:15

CHAIR: I declare the public hearing resumed. I think you were in the midst of an answer, Mr Phalen. Why don't you finish that and then we'll go to Ms Steggall.

Mr Phalen: Sure. Given the time, I will summarise based on the South Australian experience, which is the largest consultation process in Australia on this particular topic. There were three reasons why the community said that they weren't participating in that process. The first was that they said they didn't know enough about the topic to comment. The second was they didn't have the time to participate, so that spoke to it being too quick. And the third was that they didn't trust the government would listen to them. So there is an element of transparency that would be very critical to any process that we would conduct in regard to establishing a nuclear industry in Australia.

Ms STEGGALL: Essentially, we have to assess the upsides and downsides of recommending lifting the moratorium; it will be the government's call. What do you see are the benefits and the negatives of lifting the moratorium at this point? We really haven't had that public consultation.

Mr Phalen: The first benefit would be being able to provide better information to committees like this because we would be able to conduct research and have more definitive answers to the types of questions you ask. It does free organisations like ours to explore these topics in a bit more detail.

Ms STEGGALL: I don't quite understand: the moratorium stops you from investigating? We've had a number of inquiries, so I don't understand how the moratorium stops you from properly investigating.

Mr Phalen: It's just that you can't spend public money on, for example, high-level nuclear waste facilities. That's one of the reasons. Those sorts of bans would need to be lifted in order to conduct public money research on that type of activity. What are the benefits and the downsides? There are always two sides to every story. Obviously, this type of topic is very sensitive to many Australians. Therefore, it would need to be conducted in a very inclusive and respectful manner. CSIRO is independent, obviously; we're not for or against these types of things. We focus on the science and on the facts, and those are what we would be focusing on presenting to anyone making advice to anyone making decisions on this type of matter.

Mr JOSH WILSON: I have a question for Geoscience Australia. We had a submission from Dr Gavin Mudd. He presented a little snapshot of uranium mining operations and where their site management and rehabilitation, if appropriate, were up to. It was a bit of a bleak picture. In almost every case there were instances of contamination, ongoing rehabilitation and so on. Does Geoscience Australia maintain a watching brief on those instances as part of its assessment of what managing uranium mining operations really amounts to?

Mrs Costelloe: It's not immediately in our mandate, but we do provide advice to our department and the state and territory geological surveys which that falls under. We don't have the funds to maintain or regularly assess those over time, but we definitely have the expertise to help in the local measures put forward. We also advise on the EPBCs.

Mr JOSH WILSON: So you do it when requested rather than on kind of a watching basis?

Mrs Costelloe: That's correct.

Mr JOSH WILSON: But you have the resources? If you were asked at some point to provide an across-the-board snapshot, you could?

Mrs Costelloe: Absolutely.

Mr JOSH WILSON: It's just that it's not actually part of what you do?

Mrs Costelloe: No. That's right.

Mr JOSH WILSON: Are you aware of Dr Mudd's work? Do you look at work like that and take a view on it?

Mrs Costelloe: We work with Dr Mudd in critical minerals, for example. So we are aware of him and we find him to be reputable. Does his opinion reflect the Commonwealth government's? I don't think so, but we are definitely aware of his work. I'm not exactly sure what he has submitted.

Mr JOSH WILSON: I guess this is to the CSIRO: you made the point that CSIRO doesn't spend a lot of time and resources, obviously, in looking at nuclear energy in Australia because, at this stage, there are legislative prohibitions against that. Some have said to us, 'Look, just take the legislative provisions out; that's all you need to do and then just let things kind of develop in the natural way'. If they were taken out, would you expect the CSIRO would need to be resourced quite considerably to ensure that we did have the scientific assessment capability and all the other planning around that kind of technology?

Jane Coram: We already do undertake a lot of associated research around nuclear mining and energy, although we're not actively involved in nuclear energy production per se. We don't undertake research on nuclear physics or nuclear electricity, but for a lot of the associated considerations—energy flow modelling, environmental impacts, site rehabilitation and water management—we already have the skills to undertake that work, and in fact we're working in associated areas already.

Mr JOSH WILSON: Do you provide any advice to government in relation to the assessment between civilian and military nuclear systems and the integrity of those systems from a non-proliferation point of view? I ask that because of course the Australian government enters into agreements with countries like India and the Ukraine, and the premise of those agreements is that there is no mixing. To some degree, there are technical and scientific aspects of that—does the CSIRO provide advice to government on those matters?

Mr Phalen: In relation to any activity that might be related, as Jane referred to we work closely with DFAT—for example, Rob Floyd's office—with regard to making sure that any agreements or partnerships we might enter into with other countries to help with our research aren't contravening any of those agreements that are in place at that level.

Mr JOSH WILSON: Have there been any issues of that kind that have been matters of concern?

Mr Phalen: No.

CHAIR: One last question from me: when is the next GenCost report due?

Dr Hayward: There will be draft results presented at the end of October or the beginning of November. That will be out for comment, and then the final report will be out in February.

CHAIR: Okay. Thanks very much to all of you, and sorry for the interruption with the division. If you've been asked to provide any additional information could you please forward it to the secretariat. The committee may have additional questions for your response on notice which we sent to you from the secretariat. You'll be sent a copy of the transcript of your evidence and you'll have an opportunity to request corrections to transcription errors. I declare this public hearing closed and the committee is now adjourned. Thanks very much for your time.

Committee adjourned at 11:22