

TRANSCRIPT

LEGISLATIVE COUNCIL ENVIRONMENT AND PLANNING COMMITTEE

Inquiry into Nuclear Energy Prohibition

Melbourne—Thursday, 25 June 2020

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Mr Clifford Hayes—Deputy Chair

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Mrs Beverley McArthur

Mr Tim Quilty

WITNESSES

Dr Jo Lackenby, President, and

Ms Jasmin Diab, Vice-President, Women in Nuclear Australia (*both via videoconference*).

The CHAIR: I declare open the Environment and Planning Committee public hearing for the Inquiry into Nuclear Prohibition. Again, I ask that mobile phones be switched off or turned to silent and that background noise is minimised. That is in relation to participants via Zoom to make sure your mute button is pressed.

I would like to welcome the witnesses for this session, Dr Lackenby and Ms Diab. Thank you very much for making yourselves available today. All evidence taken at this hearing is protected by parliamentary privilege as provided by the *Constitution Act 1975* and further subject to the provisions of the Legislative Council standing orders. Therefore the information you give today will be protected, but any comments you make outside this hearing will not be protected. Any deliberately false evidence or misleading of the committee may be considered a contempt of Parliament.

All evidence is being recorded. You will be provided with a proof version of the transcript following the hearing, and ultimately the transcript will be made public. The process will be that I will ask you to give us about 5 to 10 minutes of opening statement and members will then ask questions. Over to you. Who would like to go first? Ms Diab or Dr Lackenby? Who is going first?

Ms DIAB: Good morning. I am Jasmin Diab, the Vice-President of Women in Nuclear Australia, and I will start with our opening statement. My colleague Jo and I are from Women in Nuclear Australia Incorporated, which is the Australian chapter of Women in Nuclear Global, also known as WiN. Thank you for having us speak at this very important hearing. WiN Global is a not-for-profit association of women and individuals of other genders who work professionally in the various fields of nuclear technology and radiological applications. WiN has over 35 000 members from 110 countries. One of the aims of WiN is to promote the understanding and public awareness of the benefits of peaceful nuclear and radiological applications, including nuclear energy.

WiN Australia values our position as a professional organisation, and we seek to inform this debate through expertise and neutrality rather than lobbying. The peaceful application of nuclear and radiological technology, including nuclear energy, provides many benefits to people, society and the environment. The global WiN community sees nuclear energy technology as a key part of the solution in the fight against climate change. Noting that Australia has signed up to the UN sustainable development goals and the UN acknowledges that women and children are more gravely affected by poverty, natural disasters, climate change and inequality. WiN Australia supports the move away from fossil fuel energy generation towards sources of energy that will improve the lives of the world's poorest and those that will be most impacted by climate change.

The energy needs to not only be sustainable but also reliable. With around 1 billion people worldwide still without access to electricity, there is much work to be done. We would like the committee to note that nuclear energy is a proven, reliable low-emissions technology with advanced safety management. The types of nuclear reactors under construction in the world today align with Australia's high standards and expectations for health and safety. Due to nuclear energy's low mining-resource and land-use requirements, high energy density, long plant lifetime and extremely low greenhouse gas emissions, it is a feasible and suitable technology for not just Australia but Victoria as well in terms of its low environmental impact.

We recommend, firstly, that the committee recommends that the Victorian ban on nuclear energy be overturned. This will allow an educated community engagement and public debate and the consideration of nuclear power as part of the energy mix for reducing carbon emissions and firming electricity supply in Victoria. We secondly recommend that the Victorian ban on uranium mining be overturned to allow Victoria to contribute to the global effort to reduce carbon emissions. WiN Australia thanks the committee for considering this submission and inviting us for further questions here today.

Ms TERPSTRA: Thanks very much, Jasmin, for your submission on behalf of Women in Nuclear. I just have two very quick questions. I would like to know: why does nuclear power have to form part of any future

energy mix? So that is the first one. And how might we overcome some the long-term challenges associated with long-term storage of nuclear waste?

Dr LACKENBY: I will take this question first, and I will let my colleague Jas answer if she has anything else to add. The first question was why does nuclear have to be part of the long-term mix, and how do we deal with waste long term? I guess nuclear does not have to be part of the long-term energy mix in the world, however what we have seen from nuclear to date is that it actually works. If our aim is to reduce carbon emissions down to a very, very low level, we have got plenty of evidence that suggests that there are two technologies that have done that so far worldwide, and they are hydropower and nuclear power. If you want to go and have a look for yourself at some of this evidence there is a fantastic publicly available website called electricitymap.org, and this will show you that the places in the world with the lowest carbon emissions from their electricity generation; they either have a lot of hydro generation or have a lot of nuclear generation or have a lot of both of them. The countries that have a lot of renewables installed absolutely have less carbon emissions than the countries that mostly have fossil fuel generation. However, what you will see on this site is that you can get massive swings in the carbon intensity from those sources depending on whether the wind is blowing or the sun is shining. So you can have very low emissions from those places with renewable generation or very high emissions if they are relying on fossil fuel backups to coincide with their renewable generation. So we do not have to have nuclear in Australia or anywhere in the world but we do have lots of evidence that if the goal is very low carbon emissions nuclear can and has and is achieving that across many parts of the world.

Ms TERPSTRA: And I guess that goes to my next question about the long-term storage, because it seems to me that we are replacing one problem with another. If you are saying nuclear is good about reducing carbon emissions but then we are creating lots of storage of waste that potentially can last many, many, many, many years, how can we deal with the challenge of waste? My understanding is no-one has actually come up with a good solution to that yet. Is that your understanding?

Dr LACKENBY: It is a fabulous question but actually that is not my understanding. The nuclear industry knows exactly what it can do with this waste. It has two solutions. One is long-term deep geological disposal and the other is reprocessing, so recycling of the components that can be reused in reactors. These solutions have been around for decades. Technologically they are very possible but politically they are much, much more difficult to pull off. We are all aware of the acronym ‘nimby’—not in my backyard—and there is another one, ‘banana’: build absolutely nothing anywhere near anyone. These are philosophies that people have, right?

I will just go back to the technological part. There are solutions. Politically they are much harder to implement than they are technically. I often see people say, ‘What about the waste?’, as being their major concern with nuclear energy, and you often see pictures of drums of waste from nuclear power plants just sitting there. I am sure you have all seen those pictures. For me, I see these drums as a big opportunity because once you dispose of these used fuel assemblies you cannot get any more energy out of them. So the next generation of advanced reactors—I do not know how far away these are, I would say probably still decades—what they are planning on doing is getting this used nuclear fuel from the currently operating reactors and using it in future reactors. According to the World Nuclear Association you can actually get 60 times more energy out of used fuel from nuclear power reactors today than if you just use that fuel once. So for me, the fact that we have not really disposed of any waste into a deep repository, I see that as actually a good thing because the amount of energy contained within that spent fuel is not really spent. It is used, but there is a huge opportunity there.

Ms TERPSTRA: Who would work in reprocessing, then?

The CHAIR: Ms Terpstra, we need to move on. If you have got a question, please write it down.

Ms TERPSTRA: Okay, sorry. I might put that in writing then.

The CHAIR: That would be excellent. I do apologise for that.

Dr BACH: Thank you both, Dr Lackenby and Ms Diab, for your submission and also for what you have had to say already today and for being with us. Can you please clear this up for me: I do not fully understand what exactly we would be able to do here in Victoria if we lifted the nuclear prohibition because of course, for now at least, national bans remain in place. So would you mind talking me through that? What meaningfully could we do?

Dr LACKENBY: It is a fantastic question because even investigating the laws in Australia myself I find them quite convoluted and slightly difficult to understand. My understanding is that the energy responsibility in Australia falls with the states, not the federal government, so the states have the right to determine themselves how they generate their energy. When it comes to nuclear though we do have a section of the EPBC Act, which is a federal Act, which talks about prohibitions on certain nuclear activities.

So if Victoria did remove its bans and wanted to pursue nuclear, it would also need to put in an application under the EPBC Act, which may or may not be approved, depending on what changes may or may not be made to the EPBC Act, which is currently under review as well. Does that make sense? The other Act that prohibits nuclear energy in Australia is the ARPANSA Act, the *Australian Radiation Protection and Nuclear Safety Act*, but this applies specifically to commonwealth agencies and not to state agencies, so the hurdle would be the EPBC Act.

Ms DIAB: I might add in as well that whilst removing the Victorian ban might not change anything in the short term about nuclear energy in Victoria, what it does do is it is opening up the possibility to investigate and engage in public debate about nuclear energy, because we see at the moment a lot of people as soon as you mention nuclear go, 'It's illegal in Australia; let's not waste energy talking about it', which I think is an important part when we are talking about climate change. It is missing from the current discussion. So lifting the ban in Victoria allows for free and open debate, without worrying about the legalities, to make sure that we are coming up with energy mixes that are suitable for each state and that are suitable for each area, because some remote locations will have a higher reliance on certain energy types than others. Being able to lift these bans is supporting that discussion to occur openly, professionally and with the right people at the table rather than emotional lobby groups, I guess, taking over discussion.

Ms BATH: How refreshing it is to see, if I can be so bold as to say, two fabulous women leading the charge in science and being at the forefront of very interesting science and technology. Congratulations to WiN as a whole. In your submission I am interested in page 12. You talked about the IPCC working group, and you talked about climate change and I guess it is the outputs and the CO₂ emissions per kilowatt hour. Now, this could be a question on notice; I am fine if you want to get back to me. But it is interesting there is often the discussion—and I am really doing this from a scientific point; I am neutral in this discussion—that solar rooftop and certainly solar is far more high-emitting than nuclear. I guess, to that point, the long-term grandfathering and storing of that by-product still has to be factored in to the CO₂ emissions and the overall, I guess, nature of it. Could you work through that discussion a little more?

Dr LACKENBY: Our submission has a table from the IPCC, who analysed hundreds of different scientific papers to come up with a lifetime-emissions median value for many different sources of energy generation. In this table it has nuclear down at 12 grams of carbon dioxide equivalent per kilowatt hour and solar up at between 40 and 50 grams. As you rightly pointed out, these are life cycle emissions. It does take into account the front-end mining and also disposal at the end. I will also point out, though, that for solar and wind these are unfirmed. So these are just the solar panel and other infrastructure technology and the wind turbine and other infrastructure technology and not the technology needed to work alongside that to ensure that they are actually operating 24/7. To tell you the truth, I have not done too much investigation into all these hundreds of scientific papers that went into making up these values. Maybe my colleague, Jas, will have something else to say about this.

Ms DIAB: I guess the key point here is the life cycle emissions. When we talk about energy production, what I have noticed is that when we talk about nuclear energy people seem to focus on the energy-producing end plus the waste management at the end of the nuclear fuel cycle. When we talk a lot about solar and wind technologies, people talk about the electricity-generation portion, where the greenhouse gas emissions are zero, but they fail to mention the front and tail ends of these life cycles, which actually involve significant amounts of energy production to produce solar panels and wind turbines and then at the back end significant energy and space to dispose of the solar panels and wind turbines at the end of their energy production.

So this table has taken into account the entire life cycle, including front-end production, tail-end disposal and recycling, which is why nuclear tends to balance out. The energy production bit in the middle actually does not produce much CO₂, if any. Its CO₂ portions are at the front and back ends, in the mining and the waste disposal, which is why it is considered significantly lower than solar and wind generation there. I hope that makes it clear, and if you would like further information on that, we can take it on notice and gather more data.

The CHAIR: That would be excellent.

Mr LIMBRICK: Thank you, Dr Lackenby and Ms Diab for coming today. I am really excited that you spoke about electricitymap.org. It is one of my favourite websites, and very easy to see where the decarbonisation has already happened—and I totally agree with your summation of it. As one of the few people that work in the small nuclear industry that we have in Australia, could you describe what it is like to work in an industry, and as you are women in nuclear, what it is like to work in as a woman? What do you think of this industry and how it is as a worker, from a worker's point of view?

Dr LACKENBY: Okay, so I will just be clear that I am here today representing my own views and the views of Women in Nuclear Australia and not those of my employer, but I find my place of employment very exciting. I have been working in the nuclear industry for 12 years, and in this time I have had the opportunity to travel right around the world for WiN and for my employer, to go to all kinds of nuclear facilities. It is exciting. There is so much potential for our industry, and that is why I am so passionate about nuclear—plus its benefits outside of energy, of course; all of its benefits. It is funny, because people often ask me, 'Well, aren't you afraid of radiation at work?'. And I say that is the lowest concern that I have going to work. I am much more concerned about travelling to work in my car, because I know the risk of car accidents is much more significant than the risk I am going to get from actually working at a nuclear facility. I just see so much potential here, and that is why I am so passionate about the whole area.

Mr LIMBRICK: And with regard to worker safety, what is your view on that for workers in the nuclear industry compared to other industries, I suppose? Do you feel that it is a safe industry? Why do you feel that it is safe, if that is the case?

Dr LACKENBY: I think my colleague Jasmin will agree with me that nuclear is one of the most heavily regulated industries worldwide, probably right up there with the airline industry. It is really important that we get safety right, because one accident in one country affects the whole nuclear regime in another country. It is extremely safe; I mean, the workers get exposed to such low levels of radiation. The major hazards are not from radiation. I feel sorry for the electrical workers. In every job that they do, if something goes wrong, there is a risk of electrocution. So most of the hazards and risks at nuclear plants are more likely to be—what do you call it? Conventional work health and safety hazards pose a bigger risk—slips, trips and falls, which every other industry has to deal with. And also lunchtime sport—that can also be quite hazardous to the health of the workers, especially in Australia.

Ms TAYLOR: Thank you for your presentations. One thing I just would say is that just because one opposes nuclear, that does not mean you can put the argument that it is emotional to oppose nuclear. I often have had that argument thrown at me as a woman. I do not particularly appreciate it. Often it is quite patronising, so I think we have to be careful. You are allowed to oppose nuclear but not be dismissed as being emotional because you oppose it. I think you have to be careful in that space.

I understand that, and please correct me if I am wrong, because scientists can create an atomic bomb but they can also cure cancers. You can do magical things either way, and you have incredible power and intellect to be able to do these things for the planet. One thing I was just going to say: I understand with the storage of nuclear, the particular storage units—and maybe there are many variables—have to be repackaged every 100 years or so, and so that is a consequent monitoring element. So I would proffer: there is a safety element in that, but why do we have to have any waste? Having to bury this waste for hundreds and hundreds of years—it just does not make any sense to me that we would think this is a really good idea on the premise that hopefully one day, because we know that generation IV nuclear concepts were considered and rejected at the 2015–16 South Australian Nuclear Fuel Cycle Royal Commission, maybe in the future, we can re-use that waste that we are putting into the planet for future generations. Can you see why that is not tangible and is not tenable for the average person?

Dr LACKENBY: I am happy to admit that nuclear is not perfect, but neither is any other source of energy generation that we currently have. Everybody has future hopes for nuclear fusion, which will be about as close to perfect as we can ever get. But that could be still decades away, if it ever arrives at all. I guess what we need to do is have a good think about: what is important to us as a state, as a country, as a civilisation? Do we think that putting nuclear waste safely underground for long-term storage is a bigger risk than the risk that we are facing from climate change? That is the question we need to ask ourselves, and for me it is quite clear that

climate change is a much more imminent and much, much bigger risk to civilisation, to the environment, to animals, to everything on earth than safely disposing of nuclear waste underground, even if it is for thousands of years. We have the technology to do this, and Sweden and Finland are currently building their waste disposal facilities. It comes down to risk—what you think is a bigger risk, and what you are willing to accept. Because, for me, I would much rather accept disposing of waste underground than I would accept a world that is 3 degrees or 4 degrees warmer than what we currently have.

Ms TAYLOR: That is a perspective, and I respect that perspective. I would not conflate the two, where you have to have one or the other. I think that we are far more capable as human beings than having to rely on nuclear to solve climate change. We are just probably coming from different perspectives with that. I respect your perspective, but I would not conflate those two, and I think wedging those two in that way is very limiting. That is just my perspective. I did have one more question, but if you have not got time, I will send them to you.

The CHAIR: No, go with your question.

Ms TAYLOR: The other thing on that note: when I was in Copenhagen, they were deeply resentful of the nuclear energy facility that was put right on the edge in Malmo in Sweden. So saying, ‘Oh, well, Sweden—they’re going ahead with the nuclear and they love it and they’re going to find spots to bury it’, noting that they are running out of space in France and then there are propositions that we should have to take it here. I do not want more waste, and we are going to chuck it in the outback? Why does the outback have to be burdened with this waste? Can I put it to you: if you are so keen on having this waste, should it not be taken by those who want this energy source in the cities, in their backyards? Would you be prepared to take it?

Dr LACKENBY: I personally would, but the fact of the matter is that in Australia, if we ever decide we want to pursue nuclear energy or a waste facility, it is up to the will of the government and the will of the people to decide where it goes. Yes, we absolutely should not be forcing anything on anybody. That is where we come back to NIMBY and BANANA, because I know in Australia there are lots of local communities who are opposing wind farms and they are opposing solar farms. They are opposing everything, right, and it is the people’s right to do so. So any nuclear in Australia should definitely be invited by the community—that is my opinion, and it is WiN’s opinion—and forcing it on anyone is not going to achieve anything.

Mrs McARTHUR: Congratulations on your terrific submission and presentation. Like Melina, I think it is fantastic to have women of your capacity presenting to us today and representing the nuclear industry around the world. So, well done. I would just like to take up your point that what you are first asking for is that we open up for a discussion. Now, what is not to like about a discussion? Are we trying to restrict free speech and the opportunities of exploring better ways that we can provide energy? I am particularly interested in the fact that those countries that do have nuclear power produce the cheapest form of electricity. That is of huge benefit to people in low socio-economic areas but also to women and children, who are often the most disadvantaged when it comes to costs of living.

I would just like you to explore the idea that what we are saying here first of all here is to lift this kind of moratorium on free speech so we can actually have a discussion about all forms of energy and how they can best work, maybe in a mix together—not eliminating any particular form because of some emotive argument necessarily—and that we look at expanding the educational discussion of moving forward.

Dr LACKENBY: Yes, definitely—absolutely. Women in Nuclear cannot really see any technical or safety or other legitimate reason as to why nuclear should be banned. Whether we actually want to go down a nuclear path, again, is a decision for the governments and for the people of this country, but having the ban tells people that nuclear is banned for some legitimate reason, whether it is safety, technical, environmental or other. So unless there is a legitimate reason to ban something, why should it be banned?

Overtaking a ban does not mean you are going to go and build it; and if you do decide you want to build it, it will probably take at least 10 years to get them up and running, as a minimum. People see that it is banned and think it is banned for a particular reason, like it must be no good. But we cannot see any link there and therefore we think removing the ban will show people that it is now an option, but it is up to the people to decide whether they want to pursue this option.

Mr LIMBRICK: One last question on attitudes: how do you feel that people’s attitudes have changed on the issue of nuclear over the last couple of decades, say? I know that when I was a kid everything nuclear was

bad, and I grew up believing that. I was a Cold War child, and everything nuclear was bad. I feel like attitudes have changed. Do you have any comments on that? How do you think that has changed over recent times?

Ms DIAB: I might take this, if you like, Jo. I think attitudes have changed because that Cold War era was centralised on nuclear weapons, I guess. That is what everybody was seeing. You would think nuclear and you would automatically think atomic bomb, death, destruction, and they are not peaceful uses for nuclear and we do not advocate for that. The emergency of climate change has brought about the nuclear conversation again, as we look to see other forms of energy that do not produce high levels of carbon into the atmosphere—and nuclear is one of those technologies that has raised its head. So a lot of the young generations, when they look at it objectively, see that renewables is a great form to decarbonise, but there are also other elements to energy generation, including nuclear, that can be used to support reducing the effects of climate change.

So I think we are seeing that discussion around nuclear energy rise again as people start doing their own investigation into that, as the rest of the world starts looking at how it is producing its energy. I think attitudes are slowly changing, but again, like we said in our submission and like Jo just said, while we still see a ban on nuclear energy generation in Australia, people will always have in the back of their mind that there is something wrong with nuclear energy generation, where there is nothing technically wrong with that technology. We need to be able to look at it all objectively and see what is the best solution for Australia, for Victoria, for all the small remote towns we have in Australia that require energy generation and find the best solution, because there is not one nice fix that will solve everybody's energy requirements.

Dr LACKENBY: To add to that too, I think there is a lot of innovation going on in nuclear at the moment, which we probably have not seen in decades in the past. We are seeing a lot of innovation around advanced reactors but also small modular reactors. So nuclear energy is starting to become very topical in countries like the US and in the UK as they are looking to change some of their designs up a bit and look to introduce some small modular reactors and some newer technologies into their mix as well.

The CHAIR: Melina, is it a quick one or are you able to put it in writing?

Ms BATH: It is a very quick one, but it can go in writing. I just want it to go on record: in your submission you talk about costs, and in any discussion the cost has to be a factor—the cost per kilowatt hour or the cost for output. Can you provide the most up-to-date, comprehensive cost analysis of nuclear in comparison to other electricity sources, energy sources?

The CHAIR: Have you got a quick answer or are you happy to take it on notice?

Dr LACKENBY: We might take that one on notice, I think, because you can see a full range of different costs, depending on assumptions and who is doing the building. Countries like Russia, China and South Korea are building nuclear plants quite cheaply at the moment, and the West is struggling a little bit more because they have not built anything for the last few decades. But we will try to find you that answer, because I know there is a lot of information out there with all sorts of varying results. So I can understand why you want some information on this.

The CHAIR: Thank you very much. On that note, I would like to thank both of you for providing us with valuable information today and thank you for your submission. We appreciate your time. A number of questions may be sent to you via the secretariat from the committee members, and your response will be much appreciated again. So thank you very much.

Witnesses withdrew.