



LEGISLATIVE ASSEMBLY FOR THE AUSTRALIAN CAPITAL TERRITORY

**STANDING COMMITTEE ON ENVIRONMENT, CLIMATE CHANGE
AND BIODIVERSITY**

(Reference: [Inquiry into Renewable Energy Innovation in the ACT](#))

Members:

DR M PATERSON (Chair)
MR A BRADDOCK (Deputy Chair)
MS L CASTLEY

TRANSCRIPT OF EVIDENCE

CANBERRA

TUESDAY, 8 JUNE 2021

Acting secretary to the committee:
Dr F Scott (Ph: 620 75498)

By authority of the Legislative Assembly for the Australian Capital Territory

Submissions, answers to questions on notice and other documents, including requests for clarification of the transcript of evidence, relevant to this inquiry that have been authorised for publication by the committee may be obtained from the Legislative Assembly website.

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Privilege statement

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Amended 20 May 2013

The committee met at 9.32 am.

BLAKERS, PROFESSOR ANDREW, Professor of Engineering, Australian National University

THE CHAIR: On behalf of the committee, thank you very much for appearing before us today and for your submission to the inquiry. I remind witnesses of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement, the pink one on the table. Can you confirm, for the record, that you understand the privilege implications of the statement?

Prof Blakers: I confirm.

THE CHAIR: Thank you. Before we move to questions, would you like to make an opening statement?

Prof Blakers: Thank you. I appear in my capacity as an academic and not representing the views of ANU, which might or might not accord with mine, but generally they probably do accord. One of the key points I make in my submission is that the ACT is doing a better job than other states in moving quickly to reduce greenhouse gas emissions; but it needs to go much faster. The offset of electricity emissions through the contracting of electricity from solar and wind farms—some in the ACT, some in other states—means that electricity emissions in the ACT are effectively neutralised.

Offsetting the remaining big emission sources, of course, are electric vehicles, space and water heating and waste. We need to move very quickly in respect of all three because there are long lag times. If someone buys a conventional car today, it will still be driving on the road perhaps in 15 years time. If we are looking to do most of the heavy lifting to get rid of greenhouse gas emissions by the mid-2030s, then we have to move quickly on electric vehicles. There are several ways in which we can do that. I suggest a few in the document, but there are many other ways as well. Looking to exemplars overseas, Norway being the classic example, is useful.

I would like to draw the committee's attention to the possibility that the ACT could go far beyond net zero emissions in electricity by going to net negative, large net negative. In fact, the most effective way in which people can contribute to removing greenhouse emissions right at this moment is just to carry on with the offset program for electricity and go to 200 per cent electricity by contracting more solar and wind farms. The reason is that it undermines the intransigence at the federal level in terms of supporting renewables and, because of the low cost of wind and solar, it contributes to the continuation and expansion of the industry at very low locked in prices for electricity in the ACT.

THE CHAIR: Thank you. We might take it in turns to ask substantive questions. My first one is in reference to a couple of things in your submission—that is, one of the characteristics is a strong renewable energy R&D community, particularly at ANU, and the recommendation about the ACT government collaborating with linkage grants and that type of thing. How could the ACT government do this better? Given the lag times in ARC grants, I am interested to know how you think we could improve the

research and development environment in the ACT.

Prof Blakers: With the electricity program, the companies that won the various contracts for wind farms and solar farms were required to create co-benefits for Canberra, not just to have a low price and strong technical capacity but also to do things like headquarter in the ACT or provide some other benefit. A potential benefit that would help ANU and UC and the other institutions is if a company promises to spend \$1 million, for example, on R&D in the ACT. This would not be prescribed initially; the company would have to support the research institutes by providing co-funding for ARC linkage and ARENA grants. So the money does not flow through the ACT; it is company-flavoured money. The ARC linkage grants, for example, are primarily determined by whether or not you have strong cash contributions from a company.

Roughly speaking, if a company puts up \$100, you have a 50 to 80 per cent chance of getting funding for a \$300 grant from the ARC, so you leverage your money one to four. That has all sorts of benefits for ANU and also side benefits for the ACT, through the payroll tax system, for example. Where companies agree to support activities in Canberra, it can be done much better than it has been done in the past to assist ANU.

You would be quite careful that the money remained company money. If it goes through the ACT, then it is not eligible co-funding for these ARENA and linkage grants. A simple discussion with the research office or an experienced academic at ANU will very quickly elucidate the best way to do this. We are very aware of the difficulty of getting private cash into a grant and the way in which it can be managed so that it looks to the ARC and ARENA like genuine private money.

MR BRADDOCK: And that would be accepted under those schemes, if it was a condition of an ACT government auction to put the amount towards funding—

Prof Blakers: That is right. There are a number of traps and pitfalls, but we can work around those.

MR BRADDOCK: My question goes to page 3, where you talk about air and water heating. You talk about organising “a series of large-scale auction programs to replace existing gas air and water heaters in privately-owned houses.” Can you elaborate on what that would look like, particularly from the consumer perspective, in terms of the ACT government, presumably, holding the reverse auction? How does that work after that point?

Prof Blakers: Heat pumps for air and water heating are capital intensive. If you have gas air and water heating and you rip it up and throw it away, which is a very good thing to do, it might cost you \$12,000 to \$14,000. You might want to put a solar panel on the roof as well and you might get up to \$20,000 with all three. Because it is in a house that is privately owned, you have excellent security on government or some other funding that goes to pay for the capital. For example, you could have a lien on the title of the house to ensure that, when the house is sold, that is the very first item that has to be repaid out of the settlement of the house sale and also that it is repaid through an increase in rates levy.

The City of Melbourne has such a scheme for energy efficiency. Basically, anything energy flavoured could be included. There are two components. One is the repayment, which is through the rates and with the class A security, because it is on a house; and the second is a reverse auction where companies agree to provide standardised systems for the water heater, the installation, the solar collector et cetera at a competitive price, with appropriate technical capability. The government would say, “We’re doing an auction for 10,000 houses,” and then the company, if it wins the auction, has an obligation to do 10,000 houses.

MR BRADDOCK: The consumer then enters an arrangement with the ACT government. They pick X system that suits their house, which will be at the agreed rate under the reverse auction, and then they will pay that back via the rates. Is my understanding correct?

Prof Blakers: Yes. That could also be used to get around the landlord-tenant problem where the tenant benefits from the more comfortable house and lower energy costs and the landlord has to put up the capital and so does not want to do it. The system can be designed to get around that problem.

MR BRADDOCK: How would it get around that problem? I am just trying to understand that.

Prof Blakers: It would be a formal sharing of benefits between the landlord and the tenant.

MR BRADDOCK: So the landlord would benefit from the capital upgrade to their house—

Prof Blakers: Which means they can essentially put the rent up.

MR BRADDOCK: Yes.

Prof Blakers: The tenant benefits from much reduced energy bills.

MR BRADDOCK: Okay.

Prof Blakers: Because you are not doing it one by one but 10,000 by 10,000, you can have a fairly robust legal and economic framework.

MR BRADDOCK: And you can have a number of providers and competition—well, not competition, because that comes from the auction process, but a variety across industry. Thank you.

Prof Blakers: There are many ways it can be done; I do not want to say this is the best or that is the best. The general principle is that you have fantastic security on the house and you can radically upgrade energy performance, which improves comfort and reduces energy bills on a mass scale.

MR BRADDOCK: Yes.

MS CASTLEY: What do you mean by having better energy in the house? How is ripping up the gas and changing the whole heating system and putting in a solar panel going to make the house warmer or cheaper?

Prof Blakers: It could well make the house warmer if you have electric bar heaters, for example, or electric fan heaters, or if you have an old gas system that needs replacing or you have a non-heat pump water heater perhaps boosted by gas. All of this is old technology that does not benefit from the three to five leveraging of a heat pump. With a heat pump, for every unit of electricity, you get three to five units of heat. Many houses do not have heat pumps for water and many do not have heat pumps for heating and cooling. So you could have a warmer house or a cooler house and lower energy bills. If you couple it with a solar system on the roof, which produces electricity at a third or a quarter of the price of tariff electricity, then that is also a good thing.

MS CASTLEY: Just to confirm: you are saying that if you have an investment property and you make the upgrade, the initial financial outlay can be finished up at settlement if you sell. Is that what you are saying?

Prof Blakers: For any of these systems, where the debt is against the house, if the house is sold, the very first thing to be paid out of the settlement is the residual debt. The contract between the organisation that is running it and the owner of the house does not then propagate to the next owner of the house.

MS CASTLEY: Okay. So if it does not get sold for 30 years, the government does not recoup its money for 30 years?

Prof Blakers: That is right.

MS CASTLEY: Earlier you said something about electricity prices being cheap. Can you go back to that? I believe that we are quite expensive—

Prof Blakers: The wholesale price of electricity has halved in the last year compared with the average of the previous four years because of the flood of new solar and wind. Prices have gone up again just in the last two weeks because of the explosion and fire at the Callide Power Station in Queensland, but that just illustrates that solar and wind are cheap and that the problems all arise from the fossil fuel side of things. If the ACT government contracts a solar and wind farm today, it can probably contract at around \$40 per megawatt hour and this is cheap electricity.

MR BRADDOCK: Sorry, did you say 40?

Prof Blakers: \$40 a megawatt hour at the wholesale level.

MR BRADDOCK: That is cheap.

Prof Blakers: Prices just keep coming down and down, but they are going to come down more slowly now than in previous years because we now have a big industry, we have got the fat out of it, and there will just be a steady decrease in prices over the

next 10 to 20 years as you learn from doing better and better.

MS CASTLEY: How is it then that in the paper this morning it said our electricity is going up by, on average, 100 to 200 per household, if it is cheaper?

Prof Blakers: That is a very small increase compared with the total electricity bill, which is going to be thousands of dollars. Canberra remains the lowest priced jurisdiction in Australia. There are a number of reasons for that. One is simply that there is a small amount of inflation in the price of things and that is at the retail level, not at the wholesale level.

MS CASTLEY: Right.

Prof Blakers: The wholesale price of electricity over the last year has been averaging around \$40 and the retail price in Canberra is \$200 or so. There is a big difference between 40 and 200, wholesale and retail. Retail includes distribution and all sorts of things.

MS CASTLEY: Thank you.

THE CHAIR: One of our terms of reference is around strategies to address limitations to collaboration and innovation between renewable energy stakeholders. What are your thoughts on limitations in the ACT, what the key limitations would be and how we—

Prof Blakers: Money.

THE CHAIR: Money.

Prof Blakers: Any offset money that can be leveraged with a company is gold, as we discussed.

THE CHAIR: Yes.

Prof Blakers: And if it is federal government money that is leveraged, it is good for the ACT.

THE CHAIR: In terms of other stakeholders, relationships between ANU and CIT and so on, is that something that could be improved? Are there ways that different entities in the ACT could work better together?

Prof Blakers: Possibly. Collaboration is always a good thing, but it has to be between people who want to collaborate for a good reason. Shotgun collaborations generally stop as soon as the shotgun is taken away. There are always improvements that are desirable in educational programs, for example. They range from vocational through to degree through to research. That can always be improved. We are talking about a really big change in energy systems. That is going to require substantial work in training at all levels, so there is an opportunity, I suppose, for facilitation of high-level contacts between the various education institutions.

MR BRADDOCK: You seem to be very down in your submission about hydrogen. I just want to explore that with you, particularly in terms of the natural gas network we have at the moment. Some submissions have said that we need to investigate that further in terms of hydrogen, but you seem to have a counter view. I would like to hear more about that.

Prof Blakers: The chemical symbol for hydrogen is H. It also stands for “hype”. I have seen the hydrogen hype come about three or four times in my career. There is so much garbage being written. There are fundamental thermodynamic, physical and chemical reasons why hydrogen is great if you need a hydrogen atom to make plastic which has hydrogen in it, but it is absolutely hopeless if you want hydrogen as an energy carrier. This includes hydrogen as an energy store and hydrogen as a way of transporting energy from here to Japan, for example.

I will just go through it briefly. The round-trip efficiency to go from solar and wind electricity through an electrolyser to make hydrogen, then back to electricity through a fuel cell, is around 25 per cent or 30 per cent tops. If you put the same electricity through a pumped hydro system or a battery, the efficiency is 80 to 90 per cent. So why on earth would you use hydrogen as an energy store? It makes zero sense. Then there is the extraordinarily disingenuous hype about Australia becoming a vast hydrogen exporter to Japan, South Korea, Taiwan: you name it. Those countries have fantastic offshore wind, far more than they need, and they are going to exploit it. There is going to be a very small market for international hydrogen. Singapore will need it, because it's just too small and it has five million people. This is tiny. Exporting hydrogen is like saying, “We're going to export clean Australian water. Okay; we will export a few bottles.”

Hydrogen hype is a dangerous and destructive myth. You cannot put hydrogen through a natural gas network at more than—I do not know what the number is—five or 10 per cent. That means that you still have 90 per cent of the destructive capacity of methane. Methane greenhouse warming is not just the CO₂ when you burn it. Possibly up to half of it is future dif emissions because methane is anywhere between 28 and 70 times worse than CO₂ when you look over a 100-year or 25-year time frame.

We should be looking over a 25-year time frame, which means that methane is arguably worse than brown coal. We need to shut off our gas. The sooner we do it the better. Methane is a very nasty greenhouse gas, much worse than CO₂. I think we are better off sticking with coal. Natural gas is now five per cent of generation in the electricity market; it is a bit player. Most of the load following it is done by coal, batteries and pump hydro. It is not done by gas. The ACT does not have a chemical industry which needs hydrogen atoms to make a chemical.

THE CHAIR: Sorry; can you say that again?

Prof Blakers: If you want to make ammonia, which is nitrogen with three hydrogens, you need hydrogen atoms. You just have to get the hydrogen from somewhere. We do not have that chemical industry, so we do not have that hydrogen market. We have an energy market requirement. We make renewable electricity and keep it as electricity or put it in pumped hydro batteries, including electric vehicle batteries. Just remember: “H” stands for “hype”.

THE CHAIR: Can you speak about batteries? In some of the other submissions there was a lot of talk about batteries and community ownership, co-op-type relationships around batteries. Do you have any thoughts on this?

Prof Blakers: Yes. Again, it is hype but on a much smaller scale than hydrogen. The reason is that by far the biggest batteries in Canberra would be in electric vehicles. A typical home battery is maybe 10 to 15 kilowatt hours. An electric car battery is 50 to 70 kilowatt hours. Once you have an electric car, your home battery is a very small amount extra. It is all about electric vehicle batteries.

There are two ways in which those batteries can contribute. The first is simply charging during the day, rather than during the night, so you can soak up solar power that is generated during the day. The next stage is that you might even allow batteries to feed back into the grid. This can be done either a few times a year when there is a stress period in the grid, like a hot summer afternoon, or it can be done every day. The car manufacturers are extremely reluctant to do it every day because that degrades the battery, but they might well do it a few times a year when we really need the extra power. Community-owned batteries are a furphy. We need to move very quickly to electric vehicles and the batteries are vastly larger.

THE CHAIR: Why are we not able to use the same technology in electric vehicles batteries for house batteries?

Prof Blakers: We can. The batteries are rigidised versions of house batteries. They are much bigger. The electric vehicle manufacturers guarantee the performance of those batteries in an automotive arrangement and they might not have any control over people who flatten the battery every night. That kills the battery in five years, instead of 15. That is why Tesla, for example, does not let you do it. There will be a lot of pressure on Tesla to allow it and it might allow it for X number of times per year, for example; I do not know.

MR BRADDOCK: Can I just backtrack, because I am not quite sure if I have the argument clear in my head. When you say community-run batteries were a furphy—

Prof Blakers: Simply because the electric vehicles and batteries would be vastly larger, and everyone would have them.

MR BRADDOCK: Okay.

Prof Blakers: So what is the point of a community-run battery?

MR BRADDOCK: Well, stabilisation of the grid and other services.

Prof Blakers: But electric vehicles will do that as well.

MR BRADDOCK: If they are plugged in during the day.

Prof Blakers: Simply having a charge controller which says, “Charge now, because the price is low and there is plenty of solar and wind,” does 80 or 90 per cent of the

work of a fully interactive battery. Simply not charging between five and 10 o'clock on winter and summer evenings does 90 per cent of the benefit of a fully interactive battery.

MS CASTLEY: But how can we do that if we are not at home with our battery to charge our car? For instance, if I have an electric vehicle and I want to charge it today because the solar and wind and everything is perfect, I cannot do it here at work.

Prof Blakers: There are two obvious ways. One is that a typical electric vehicle has a range of 400 to 500 kilometres, so charging it once a week is fine or once every two weeks. So you just charge it on the weekend.

MS CASTLEY: Right.

Prof Blakers: You get home and you plug it in. The way in which you charge at home is that you go home and you plug it in. There's a controller which says, "Don't charge, don't charge; now charge," on demand. If it is windy overnight, you would charge overnight. If it is a wet, windless week in winter with no sun and no wind, then you just grit your teeth; you just have to charge it.

The second way is to do it in multistorey car parks. That is where most people park their cars. You go in there and you see little red and green lights which say that there is a spare parking spot there, or not. There is a cable tracer there. If you run a 240-volt cable along each of those cable trays, you have a trickle charge. It does not have to be a high-speed charger; it is just a trickle charger. You plug your car in and, over the course of an eight-hour day, it will give you about 100 kilometres of range. This is easy to do because all of the infrastructure is already there.

MS CASTLEY: That is a good thought, actually, to have the electric extension cords—

Prof Blakers: Yes, low power. These are not fast chargers; this is low power.

MS CASTLEY: Is there not an impact if everyone is charging their cars only on the weekend when they are at home during the day?

Prof Blakers: No, because at the moment the number of electric cars is so small you would not notice it.

MS CASTLEY: Yes, but we do not want that to be the case.

Prof Blakers: I know, but all you have to do is expand the charging infrastructure to keep pace with the electric vehicles. So if you do 10 per cent of all the parking spaces this year, another 10 per cent next year and 10 per cent the next year, then the whole job is done in a decade, which keeps pace with the replacement of ordinary cars.

I have one other suggestion. Vehicles have the biggest residual greenhouse emissions in the ACT. I think the ACT needs to bite the bullet and provide substantial subsidies for electric vehicles. The obvious way to do this is to add \$30 to everybody's registration fee. All of that money would raise \$9 million or \$10 million per year, and

that is simply divided by electric vehicle sales in the ACT. Suppose it is \$10 million and there are 1,000 electric vehicle sales this year, each gets a subsidy of \$10,000. When the sales get up to 10,000, each gets a subsidy of \$1,000. That is an automatically scaling subsidy for electric vehicles that winds down as the sales go up. This is a way of bridging the gap between the capital cost of electric vehicles and the capital cost of an equivalent ordinary vehicle.

MS CASTLEY: Impacting on people who will never be able to afford an electric vehicle—\$50,000 or \$60,000 for a car. There are so many people in Canberra that cannot afford that. Because they are not going to be able to afford that, they also get penalised in their rego by an extra \$30 so that people who can afford an electric vehicle get an extra discount.

Prof Blakers: It would be easy to arrange, for example, that the average \$30 depends on the value of your car. So if you are driving a cheap car, it is not \$30, it is \$5, and if you are driving a Lamborghini, it is \$100. That sort of thing would be quite easy to arrange. You just declare the value of your car. If it is a 10-year-old combi van or something like that, it is valued at \$3,000 and your extra fee is \$5.

THE CHAIR: We will need to end it there. Thank you very much, Professor. It has been very informative. We really appreciate your time and your submission.

Prof Blakers: Thank you.

Short suspension.

COX, DR KEVIN, Director, Prepower Co-op One Ltd
FOSTER, MR SCOTT, Lead Organiser, Co-operatives, Commons and Communities
Canberra
KEIGHTLEY, MR DAVID EDWARD, Founder-Director, Ecospectral Pty Ltd

THE CHAIR: On behalf of the committee, thank you very much for appearing today. I remind witnesses of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement on the table. Can I confirm, for the record, that you have read and understand the implications of this statement?

Dr Cox: Yes.

Mr Keightley: Yes.

THE CHAIR: Thank you. Before we begin, would any of you like to make an opening statement?

Dr Cox: Yes.

THE CHAIR: Thank you.

Dr Cox: Maybe two of us could make an opening statement?

THE CHAIR: Wonderful.

Dr Cox: Scotty and I are with Prepower and David is with an organisation called Ecospectral. First of all, we would like to thank you for the inquiry. This was a great innovation in itself. Our submission is all about funding; it is all about money. It outlines another way that we call Prepower funding to finance any innovation and bring it to market. The innovation takes an old idea of a mutual benefit society and scales it with modern technology. What we have done is take an old idea and bring it up to date, if you like, with what is possible now. Investors fund innovations to make a profit. Prepower funding makes a profit and it keeps the profits generated from Canberra consumers inside Canberra.

The benefits of this form of funding are many. The profits that come from the innovations stay within Canberra to benefit not just the people who consume but the whole community. The profits go first to the people who need it the most. Normally in these things, the money goes to the people who need it the least. With this approach, people who need it the most get the money first but everyone benefits. Also, the profits can actually help reduce government costs, taxes and support for the underprivileged. Finally, it provides local communities with an alternative capital market. We have difficulty participating in capital markets, so this provides an alternative to the stuff that happens on Pitt Street and Wall Street.

Over the past 50 years I have watched investors buy innovations and then resell them back to the Canberra community. For the first 25 years I worked in academia, where I helped deploy innovations with students and staff, much like Andrew is doing there. Then outside investors commercialised the innovations and sold them back to the

Canberra community. It continues today. The same thing is happening today with many of our institutions here. CSIRO, the universities and government departments all have great innovations.

In 1998, I left academia and I invested in TransACT. TransACT was a great innovation success. However, it required further funds to fully commercialise it that were unavailable in Canberra, or it was not possible to get them in Canberra due to the way in which the capital markets worked, and ownership moved to entities outside Canberra.

I became a member of one of the first Epicorp incubator companies, which was one of the first ones doing innovation in Canberra. The company was called Pay by Snap. Our innovation in the early 2000s on payments predated PayPal, Afterpay and Tap and Pay. We were unable to find the commercialisation capital in Canberra, or actually in Australia, for that matter.

I then started an identity company at Epicorp that now has 50 per cent of the Australia-New Zealand identity market. The capital to fully commercialise it came from a multinational, and it is now owned by an English company. These stories are really common. If you wander around Canberra, you will find them all over the place. David is another person who has a very interesting story. There are very many successful Canberra innovations where the commercialisation capital comes from outside our community.

Ten years ago I started work—I thought it would take less than 10 years—on innovations to bring non-traditional capital markets to Canberra. Prepower One, a mutual benefit cooperative, which was supported by the ACT government, is a working prototype of a solution. It is a prototype; this just shows it can be done. It is a scalable way to raise capital from the community where the returns come as lower priced electricity. I could take it to a venture capital and I believe I could get funds for it, but I do not want to do that.

Prepower funds solar panels to any cooperative member, prioritising the lowest income members of society. It reduces the cost of renewable electricity by 30 per cent for those consumers, for no cost to them. It gives investors and members double the return of superannuation and allocated pensions and makes a profit for the local consumer members. It all sounds a bit magical, but it is not.

The approach can apply to any innovation requiring capital. For example, eBRIM and large community battery innovations shift demand and sell low priced power when the price is high. Consumers would pay 50 per cent of the savings generated by eBRIM and community battery systems, and investors would receive higher return annuities.

Another is Andrew Blakers's system that we heard about. There is no reason why we in Canberra cannot fund pumped hydro. Others are energy efficiency businesses such as Harvest Hot Water, which you will hear about a bit later on, that supply heat pump hot water systems. These sorts of capital markets can work really well with other greenhouse gas reduction innovations requiring community involvement. It is a community way of raising money, such as Josie Grenfell and Annabel Schweiger's

Food2Soil and Brook Clinton's Capital Scraps.

The mutual benefit organisations may or may not own the innovations, but they own the output. Seed money to start them can come from Australian banks who are sitting on \$200 billion worth of zero interest money with the Reserve Bank. They are trying to find things to do with it; they put up the price of houses and the stock markets go up because they have to do something with the money and that is what they tend to do. Canberra mutual benefit cooperatives could set up local non-traditional capital markets.

The approach addresses the equity issues that are raised in the ACTCOSS submission. Much government support, like zero-interest loans, at the moment benefits those who have assets, whereas Prepower funding will leave no-one behind. The community cooperatives can extend the government's good work with low income households. Extending the government assistance can reduce government taxes and charges while increasing benefits to low income residents.

In summary, funding renewable energy innovations using mutual benefit cooperative capital markets reduces electricity consumption and cost, increases investor returns, strengthens the ACT government budget and strengthens civil society.

Mr Keightley: As a brief introduction, I moved to Canberra in 1984 from Albuquerque, New Mexico in the United States, hence my accent, which never went away; I go back frequently. I worked there in medical imaging and aerospace. My background is in electrical engineering, physics and mathematics. I have worked in R&D labs here in Canberra, in commercial areas, so prime R&D. I led teams and systems in a quasi-government organisation, CSIRO, where I worked for 10 years. I led a group and then spun off a company called Mediaware.

I started two leading technology companies here in Canberra: Mediaware Solutions, my first company, which is now owned by General Dynamics—we were bought out by General Dynamics—and Ecospectral, my current company. I am working on a new product called Ibrahim with Polygon Energy. Ecospectral built leading-edge sensing and control capabilities for energy efficiency and occupancy analysis.

The cooperative model is what I am really here to talk about briefly. The cooperative model for energy supply is not something new but is a proven model for delivering services, particularly energy to communities. The model has been used throughout the United States as a solid way to provide energy to community, with the community's wellbeing top and foremost. If you look up cooperatives in the United States, you will see a list of well over 100 of them. I am talking to them now and they are highly successful organisations on the whole.

The model works very well as a funding model and strongly supports power and energy innovation; buying and using that technology are critical to a cooperative's success. I am an entrepreneur; I like to build things and sell them. I would not be here if I did not think that, one, I had something that benefited the community and, two, there was a vehicle here that made a hell of a lot of sense to me. The well-known power and energy disasters of Texas recently and California, by privatising energy, are prime examples of the risks inherent to making profit a major driving force in

energy delivery. Have a look at what has happened in Texas recently with their energy over winter and how that developed.

Ecospectral's Ibrahim capability is key to helping our society move off fossil fuels and onto renewable energy quickly and with minimal risk. It is energy source agnostic but lends itself perfectly to both solar and battery solutions. We believe that combining leading local and global technology with a cooperative model will accelerate de-carbonisation, with a solid fiscal model and community interest preserved. I am happy to go into any details that you would like on that and any details on how we believe that can be achieved.

THE CHAIR: I think all of us are not from the renewable energy field, so it would be really helpful if you could explain exactly what you mean by a cooperative model in the ACT. What do you mean by "community"? Is that a suburb or is that the whole ACT community?

Dr Cox: Yes. The model that we think will work best for the community is one where we have many local cooperatives. It could be a suburb. It could be a street. You could have multiple cooperatives within a street. It does not have to be all together in one. The reason for that is cooperatives mean that people have to trust each other and they work together. We can handle that sort of thing because we have great communications and computing stuff around the place now. We are no longer limited, as we once were, in the way in which we scale things. We can use our computers to do a lot of scaling but still keep things local. The money can come from outside but, once it comes into a community, it comes in in the form of assets; it buys assets.

Effectively, the cooperative does not allow the value of those assets to leak out of the community. The way in which normal finance works is that people put money in and they want more money to come out. Here what happens is that you put money in and you get electricity. You do not extract money from the system; the money stays there. Electricity is the way in which you get it. You get a return on investment for those people within the community who invest. They get a return on investment by cheaper power or by selling cheaper power for the regular price to one of their neighbours.

THE CHAIR: If you had 10 neighbours, for example, you would all have to invest in solar and battery technology?

Dr Cox: No. The cooperative owns the batteries. It turns out that it does not actually matter who owns it; it is who has the rights to the output that is important. It is more like a custody model. If you have the right to the power that comes from the panels on your roof, it does not matter whether you own them or not. Scotty can probably explain it a bit better.

Mr Foster: The question basically was: what is a co-op and which community are we looking after? A cooperative is another form of business structure which is available to us. Like a limited company, a private company or a partnership, a cooperative is another one of those. However, it is based on the International Cooperative Alliance's principles, which are tailored to working for a community purpose. Built into this business model is actually a community purpose. It is a membership organisation. When you become a member, you become an owner of the cooperative, and then the

cooperative can do the business stuff, whatever it might be.

It is like an empty bucket; you get out of it what you put in. If a bunch of billionaires decided they wanted to be trillionaires, they could put into a cooperative and make that happen; that is their purpose. You set your purpose and then your cooperative tries to do that. We have a very specific model which we have worked out. We have taken into account making sure that everybody gets benefits out of the situation.

When you join the Prepower Cooperative, you get the right to do two things. You can put your hand up and, in the first case, it will be solar panels installed on your roof, but once you have proven the model, it might be batteries of electric vehicles or what have you. As Kevin said, it is technology agnostic. So you can put your hand up and at this point we will come around and make sure that you do not have a massive blue gum at the north of your house or your roof is pointing south or something like that. If you are good to go, bang; we will put the stamp on and we will open it up to the rest of the members for investment.

Once somebody has invested the amount of money that we have quoted to do the solar install, we will push the button and that will all go ahead. Once the solar install starts generating electricity, the customer pays their bill. That bill is actually discounted at 30 per cent off the standard price that retailers have to advertise. This is how the customer, even though they have paid nothing up-front, is still getting quite a good benefit by getting 30 per cent off their electricity bills, that part of it that they use from their roof. They have the same incentive as everybody else who has solar these days under a net metering arrangement. Self-consumption is the goal. You want to use as much of the electricity off your panels as you can. When people pay the bill, there is a portion of that bill that goes straight over to whichever member has paid the investment. That is how they get their discounts in the form of cash.

Regarding the community, like Kevin said, we could have it as a geographical community. The membership decides how much profit each local cooperative will make. We could have a community around the local school, so the P&C says, “Why don’t we start one of these co-ops?” The profits could flow out of that to the P&C, so that maybe when you move out of primary school into the high school, you change over to the Prepower Co-op that is supporting the high school P&C. It is very fluid as to which community you can be in. You get a participatory budgeting scheme, essentially, so that you can allocate your relative portion of the profits to different organisations who, of course, meet the criteria that we will set, which is building community and not ripping anybody off.

THE CHAIR: If you do have a blue gum in the wrong spot at your house, you do not actually have to have the solar on your roof to participate in the co-op?

Dr Cox: You can participate as an investor; that is right.

Mr Foster: We can also do things at the local school or at Royalla or anywhere else where we can put panels on. It is not restricted to your roof; it could be anywhere.

Dr Cox: I guess what you are saying is that you could look at it as a power purchase agreement. It is not a power purchase agreement because it is a membership

organisation and everybody involved is an owner of the business. That is sort of how it can work.

Mr Foster: Yes. The difficulties with these things tend to be rules around what goes on. You have to try and work within the existing rules that have been set for the current system. That turns out to be the hardest problem of all. For example, cooperatives cannot—cooperatives are not-for-profits—go to a bank and borrow money. Cooperatives are not-for-profits and we are not allowed to borrow money without us putting up our houses as security.

MR BRADDOCK: I just want to clarify what the difference is between a local non-distributing cooperative and a platform cooperative.

Mr Foster: A platform cooperative is any cooperative that operates chiefly on the internet. That is all a platform cooperative is. It can apply to any of the other co-ops, as long as their chief form of organisation, communication and doing things is not going and hanging out in a room, like the food co-op, for instance, where people are coming in and they are trading goods; they actually have a shopfront. If they did that all on the web and just sent things to each other, then it might be a platform cooperative.

MR BRADDOCK: Okay.

Dr Cox: Yes. A platform cooperative enables you to scale. It is actually the abstraction, if you like, of the functions that you have to do in order to run the organisation. You do not want every cooperative having to figure out how to run a business—they cannot do that—so you have platform cooperatives that run the businesses for the cooperatives. It does not have to be a platform cooperative. It could be something like an organisation that handles body corporates. Body corporates do not do all the mechanics of the body cooperate; they hire someone else to do it. You can also do the same sort of thing with cooperatives.

MS CASTLEY: I have just missed the point where this helps or gets lower income families involved. Can you explain that to me?

Dr Cox: Yes. If you want to join one of these things as a consumer, you simply sign up and agree to pay the bills. The cooperative comes along, finances and puts the panels on your roof. Certainly, initially, there would be a lot of people wanting to do that. So how do you now prioritise who gets the panels from your cooperative? We think that the way in which you should prioritise it is the people who cannot afford to do it in the first place. It does not really matter who gets it, in a sense. Sooner or later, they will all get them. But you prioritise the ones that need it the most.

Mr Foster: We have kept the membership fees very low, at \$10 or something, so that anybody can join; it is very accessible. You, as a consumer, are not paying anything up-front to get renewable energy installed on your home. The cheap electricity at that 30 per cent discount for whatever you can use off the roof is the benefit for the consumer.

Dr Cox: Another really interesting thing is that the capital gradually accumulates to

the people who consume it. Now if you go out and borrow some money and buy your panels, you own the panels. What we are doing here is this: as you consume the electricity and pay for it, you pay a bit more than the cost of operating it. That extra payment is capital and that capital accrues to the individual, the consumer. So you earn the capital by consuming.

MS CASTLEY: If I moved out of my home and had to leave the co-op and it still had not generated enough to pay off the panels and pay my bill to the co-op, how would that work out?

Dr Cox: We have a way of figuring out how much you have paid off and how much capital you have got. You, in effect, do not take it as cash; you just become an investor member, effectively, in the cooperative.

Mr Foster: I run the new economy network of Australia's Canberra hub and I also run a group called Co-ops, Commons and Communities Canberra. One of our projects is the Prepower Co-op. Another one is a community-owned farming cooperative that we are developing. We run a radio show every week and a podcast.

MS CASTLEY: What is the podcast called?

Mr Foster: "Align in the Sound".

MS CASTLEY: Do you need government support for these co-ops to exist? Where does the government's role come into this?

Dr Cox: Governments can assist by saying, "This is a good idea and we support it." Most of these things require seed money, if you like, to get things going. As I say, we go to the banks and they say, "We can't lend you any money." But one thing that the government could do tomorrow is to say, "We think that these things are a good idea and we will guarantee the first few loans."

MS CASTLEY: So like a pilot-type project?

Dr Cox: Yes. The government could say, "Yes, we will guarantee the first few loans." Then we go to the banks, probably the community banks, and the banks will say, "Yes, we can lend you the money because there is a guarantee. We are allowed to lend on that." They cannot lend us money; the law says that they cannot lend us money without a guarantee.

THE CHAIR: Going to the US, what would be a really good example of a co-op there that we could have a look at?

Mr Keightley: There are so many examples. There are some technologies that you also might want to look at. I am happy to give you a couple of links.

THE CHAIR: That would be great.

Mr Keightley: I think my contact information is on the sheet. There are some commercial ones, like Sunrun, a company that I am talking to. There are some very

interesting research projects which are in Colorado, which I can send you links to, and on IEEE. What I like about the corporate model is that it definitely returns to the community. At the same time, it is not an airy-fairy model that throws money away. Instead, it uses energy and power that are so important to the community for cooking, warmth and health. Whilst there are companies that come to mind, like those supplying technology—which I think also fit extremely well in the model and fit in the US models very well—other start-up companies and other exciting companies here in Canberra are not precluded from this. It is really a model for delivering these capabilities to a wide range of individuals in the city. I like that very much about this.

THE CHAIR: If you are able to send us some further information, that would be fantastic.

Mr Keightley: If you just email me, I can get it to you.

THE CHAIR: Yes, if you could follow up on that.

Mr Foster: Are you familiar with the history of the electric co-ops in the US?

THE CHAIR: No.

Mr Foster: When the grid was being rolled out in Australia, the government just went, “No, we’ll just put it there and fund it through a subsidy on everybody else.” There they said, “No, stuff it; we’re not going to give you electricity.” So people had a scheme where, if they were in the rural areas and it was going to cost the companies too much to set it up, they could set up a cooperative and fund it themselves through the community. There are many of those still there.

Mr Keightley: It is a very common model for farming as well. You see it a lot for green storage, power generation and farming co-ops. It is extremely common in the United States for making sure that large groups—say, farmers—benefit from it.

Mr Foster: Australia’s largest co-op is Co-operative Bulk Handling in Western Australia. They own railway lines, port facilities and massive silos. It can get quite large.

THE CHAIR: We are out of time, but I have one quick question about the professor’s comment earlier that they will be basically redundant and that all anyone needs is an electric vehicle battery and then you will be able to—

Dr Cox: There are a lot of ifs and buts there, and I think that could be true. But, again, it is going to require cooperation between members of the community, as well as the people who own the batteries. All of these things work best if the communities can be involved and can work together to solve their common problem.

Mr Keightley: There is no magic bullet. A very important thing to realise is that electric cars are not a magic bullet. They are part of a long-term solution. There are a number of technologies and capabilities that have to be brought into play if we are going to do the right thing by our kids and grandkids. I think electric cars are very cool. I just have some concerns that we think that they are the solution. As you

obviously know, a solution is complex.

THE CHAIR: Scotty, did you have one further comment?

Mr Foster: I was going to say that we have to do everything at once. The IBCC has given us until 2030 to turn the whole ship around. We need to do an awful lot. Let us try it all. If it all works, great; if only some of it works, great.

THE CHAIR: Fantastic. Thank you very much for all that information; it was very informative.

Hearing suspended from 10.35 am to 11.08 am.

ABEL, MS KAREN, Acting Head, Department of Building Construction, High Risk and Renewables, Canberra Institute of Technology

DUNCAN, MS TAMARA, Business and Industry Engagement Officer, Canberra Institute of Technology

MILLER, MS JAYNE, Director, Strategic Growth, Industry Engagement and Strategic Relations, Canberra Institute of Technology

VAN ZYL, MR JOHANNES, Teacher/Trainer, Electrical Trades and Renewables, Canberra Institute of Technology

THE CHAIR: Welcome and thank you very much for appearing before us today and thank you for your written submission. It was really interesting to read. Please be aware that the proceedings are recorded and transcribed by Hansard and will be published. The proceedings are also broadcast and webstreamed live, which we do not need to discuss. I also need to remind witnesses of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement before you on the table. Can you confirm for the record that you understand the privilege implications of the statement?

Mr van Zyl: Okay.

Ms Duncan: Yes, I understand.

Ms Miller: Yes.

Ms Abel: Yes.

THE CHAIR: Would you like to start by making a statement?

Ms Miller: I am appearing on behalf of Paul Ryan, the Executive Director, Industry Growth, CIT. I will just start by saying that we are really happy to be here. Thank you very much for inviting us.

We had a vision for renewable energy that was born out of some work that we did in 2015 with Neoen and the Hornsdale Wind Farm stage 1. We were very fortunate at that stage that Neoen actually came to us through the ACT government to commit some funds and some support to develop renewable energy training and skills development in the ACT.

The aim has actually been to work with industry, the renewable energy and sustainability industry, by delivering capability development and training to the industries, through deep and varied links with industry. The centre aims to develop new training programs to support the renewable energy and sustainability industry workforces by leading the development and the teaching of practical, technical skills which are required by industry across the ACT region, Australia and, we would like to hope, in the future into the Asia-Pacific region.

We have done this by positioning the ACT and CIT as leaders in the renewable energy workforce development. We have a dedicated brand, which is called the Centre for Excellence, and it is actually becoming known throughout the industry as a leading enabler for the future workforce of the sector. We do it by designing and

delivering outstanding, industry-focused courses; delivering contemporary work-simulated learning environments to the ACT region and we actually do this across Australia. A lot of Australians come to the ACT to do this study. We will be developing and delivering training programs internationally to meet industry and workforce demands in the Asia-Pacific region. That will be post-COVID. That is not something we can do at the moment. We are producing work-ready graduates across a range of renewable industries; promoting the adoption of renewable energy technology, through industry training to the ACT and nationally.

We work with the ACT government to ensure that the work of the Centre of Excellence is able to rapidly respond to the demands as a result of some new policy and directions. There, I would include actually in 2021 hydrogen and EV. They have become a focus for us. We are creating world-class, value-added partnerships with stakeholders, aligned through the Centre of Energy's vision and having a business model that is actually scalable, essentially financially viable and economically sustainable.

Innovation and commitment to explore the emerging sectors are actually key to the work that we are doing, and in 2021 it is about EV and hydrogen. We have spent a lot of time over the last four years developing battery, global wind training through high risk and we are also moving into battery. They are now quite firmly embedded and we have got a lot of runs on the board in those sectors. So we really are developing new partnerships and exploring hydrogen and EV and what we need to put in place to actually make that happen. That is where we are.

THE CHAIR: In terms of the initial starting relationships that you had with those two—wind and solar, is that correct?

Ms Miller: That is correct.

THE CHAIR: And since then you have been sort of self-sufficient, is that right?

Ms Miller: No, we are not self-sufficient. We actually receive some funding every year through the Renewable Energy Skills Centre for Excellence, through Neoen Wind—is it Neoen Wind?

Ms Duncan: Yes, Hornsdale stage 1.

Ms Miller: Hornsdale.

Ms Duncan: That was funded and the renewables board was then created from that; so that funds components of our projects but only a particular amount.

Ms Miller: Does that make sense? Sorry.

THE CHAIR: Yes.

Ms Miller: That is with Neoen. Neoen are actually major players on our board and they come in and we submit to them every year a work plan. Members of ESPDD are actually on that board as well. We talk through what we see as the priorities, and they

are normally aligned to the key industry engagement and initiatives of the ACT government.

We also have industry focus groups as well. We had one just recently, which was in EV. In EV we do not actually even know what training is going to be required. When we are at this position, how do we work out what is going to be required? So we brought in industry.

Ms Duncan: We have delivered electric vehicle training in the past. In 2014 we delivered to Nissan Australia. Their elite technicians would travel to Canberra and we would run masterclasses for them specifically. We certainly ramped up our electric vehicle training through the working group that we ran. We would bring in our partners and expert speakers from the ANU, the Clean Energy Council, the Electric Vehicle Council. They really set the scene for industry, CIT staff and peak bodies to really understand the local, national and international context. We can learn also from international best practice, from countries who are really leading the way in electric vehicles and hydrogen for vehicles.

We understand that it is quite broad; it is not just upskilling, reskilling automotive technicians. It is around electric vehicle safety training broadly, diesel to electric hydrogen conversion, charging infrastructure, ICT interconnectivity and cybersecurity. It is very broad. From that, we will then establish working groups or subcommittees in relation to those.

Since then, CIT sits on ACT government subcommittees in heavy vehicle and also Transport Canberra's Workforce and Skills Working Group; so we are very well connected with government and industry. But it is continuing that work and learning from other jurisdictions such as TAFE New South Wales and TAFE Victoria, and we are learning from the projects that they have underway and their developments and sharing and learning from their progress.

MR BRADDOCK: Just further on that, you seem to be at the consultation phase to develop this new broad range of training packages. When are those likely to become on the ground and available for people to start becoming an EV mechanic or reskilled from an existing diesel mechanic?

Ms Miller: We have already developed two packages, not in EV but in the electrical sector—and I will let Johannes talk about that—and also in the wind sector. We already have upskilled 442 people since 2017 in the renewable energy sector. The EV is just commencing at the moment.

MR BRADDOCK: What I suppose I am trying to seek out is: what is the time frame when you are going to be rolling out that sort of training and we will be able to start to foster that expertise here in the ACT?

Ms Duncan: In electric vehicles, we currently have development underway working with Transport Canberra. Their goal is to have training ready to deliver at the beginning of next year; so that is the time frame that we are working towards. There are components to that. It could be before or it could be after but that is what we are working towards. That is just one component of the electric vehicle training.

Ms Miller: The electric vehicle training is also a bit like when we started the renewable energy training. Our first vision was to bring all these people in and upskill them to connect houses to take solar. Then we realised that it was accredited training and it could be delivered only to people who were already accredited electricians.

It is going to be similar in the motor-electric side or auto-electric side in that the units of competency are bolted onto the existing training package. There is national work that needs to be done. Are those units in development or have they been—

Ms Duncan: They are in development and we are also working through micro credentials to be able to deliver safety training to not just technicians but first responders who turn up to an accident: how do I approach an electric vehicle safely in this scenario?

Ms Miller: It was really interesting, at the EV working group, learning that there are so many security and safety aspects of the EV vehicle. It is different to have to respond to one of those vehicles.

Actually, in the wind sector it was something we established quite early. Again, we thought we would deliver a certificate IV in wind and, as it turned out, the wind sector needed people who could work at heights and in confined spaces.

Ms Abel: Do you want me to expand on that?

MR BRADDOCK: Please.

Ms Abel: In our area we have been running the GWO training, which is really safety at heights training. It is safety training for people who are working in wind turbines. They do a bit of hydraulic, electrical and mechanical training, a sort of basic understanding of that, and then a lot of rescue at heights, working from heights, handling small emergencies for when they are in wind turbines. That has been running for three years now.

MS CASTLEY: Just on that, how many normal mechanical businesses are sending people for this additional training? What is the interest from a normal mechanical business, not from Lennox Motors or somewhere like that, who wants to just upskill their staff with the EV components?

Ms Duncan: I think we would actually have to find out what the answer to that question is. We are delivering training to one national provider of EV vehicles at the moment and we have seven or eight of their vehicles coming through.

MS CASTLEY: I imagine that if you buy a Tesla, you will take it to the Tesla people to get it fixed—and the same with Nissan. I am just wondering, in the future how many normal old-school mechanics are going to also want to get into the EV space if they want to stay viable.

Ms Miller: You would probably liken it to an electrician. When an apprentice electrician comes through and does their apprenticeship, their employer really dictates

what units of competency they will do as electives. Maybe it is data or installation. There was then a move towards how many apprentices now do we train.

Mr van Zyl: I am here as a subject expert. I would like to quickly put the EV industry in a little bit of perspective. What we are doing is fantastic at the moment and we are making really good headway. However, the individual manufacturers like Nissan and Toyota do all their training in-house, and we are tapping into that. We have now set up Toyota at our facilities and they are training our staff and are now part of our staff and our students. It is a natural thing to say that they would not just give away their industry secrets and training so that you can go and fix anyone's cars. As we progress into this industry, we see more Teslas on the road.

I have been to their testing facility in Adelaide. Tamara was there as well. It was quite secretive. We had to sign a lot of forms not to tell their secrets. They are the only facility fixing their own cars; they do not want anyone touching them. We really need to play nice to get them on board with us and we are making exceptional headway at the moment; but it is a slow process.

If I can mention hydrogen for instance, it is not just in 2021 that we started getting interested in hydrogen. I started dealing with Tracy Cui from energy innovation at the Environment, Planning and Sustainable Development Directorate from the ACT government in 2019. I was going to go to California and Korea to see what they are doing in hydrogen in early 2020—but because of the pandemic that was put on hold—so that we could get a bit of a foot in the door.

We have learned our lessons with the solar PV when the boom hit. There were no installers; and we are still playing catch-up to some extent. We are doing really well in that space too.

The floor was given to me now to say that we have incorporated the units that became available as electives in our apprentice program. So 70 per cent of our apprentices now take up solar PV. Almost every single electrician walking out that door can install PV.

That is the same process that we try and follow with the EV. We are talking about electricians being involved. It is in automotive industry. However, there are some electrical components and the big problem is that we have to cross-skill these guys. It is not just an electrician, it is not just an automotive guy, it is not a plumber or just an electrician; it is going to be combinations to work hydrogen and EV vehicles.

We are working very closely with the industry and our focus is to try and make that headway. I think we are sitting quite comfortably at the tip of the spear at this stage because we are working with international partners and national partners to try and deliver these on time.

Currently, within hydrogen, we have got three skill sets and six units in draft. As soon as that hits the floor we will definitely be delivering that.

MS CASTLEY: I know nothing about hydrogen vehicles but there is no conversion; you have to just purchase a hydrogen vehicle. Is that correct?

Mr van Zyl: At this stage, yes. A hydrogen vehicle is essentially an electric vehicle except that your electrical storage is not in a battery; it is in the form of hydrogen. You have got a hydrogen fuel cell which converts it back into electrical energy, which essentially is an electrical EV vehicle fuelled by hydrogen but it is still an electrical power. That is why the focus is quite strongly on the EV part for us.

THE CHAIR: On electric vehicles, there is a sort of call for government to subsidise them even further to encourage people to buy them. Do you think that there should be some sort of guarantee like Tesla saying, “We are not going to let anyone in the doors unless you are signing all these things”? Do you think that there should be some requirement for these car manufacturing companies, given that there are subsidies for the public to buy these vehicles, to be more open with and transparent with their training and—

Mr van Zyl: I think that will come in regardless. If you think about it, obviously you see more and more Teslas on the road now and you see more Nissan LEAFs on the road. It is going to get to a point where Nissan, Tesla and Toyota cannot service their own cars because there are too many and our general service companies will definitely have to pick up that load. So it is going to happen. The change is happening.

We look at other countries where this is already happening and it is just a matter of progress. Out of 100 cars on Canberra roads, there are only one or two EVs running. It is still fairly a combustion engine world for us here, although we are trying to change it. But it will happen as the change occurs.

THE CHAIR: Similarly, in terms of training overseas and what other countries are doing—I am not across it—I get the impression that other countries are a lot further forward in terms of EV technology. Do you look to other vocational educational facilities overseas and say, “We really need to be doing that now”?

Mr van Zyl: Yes, we are. I was going to go to the US and I was going to get training at their US centre for hydrogen safety, for instance. We are working with big international partners basically, and they were pretty happy to be on board with Canberra because the idea we have here in the ACT and the idea which California is running have the same goal. Everything came to a halt but we were working very closely with these parties, yes.

MR BRADDOCK: Just coming off EVs and onto heat pumps, I was wondering what is the local demand for qualifications in that space and do we have the workforce to match it?

Mr van Zyl: Currently there are no extra needed qualifications. Any electrician can hook them up and any plumber can install them. Mostly the training I think you are referring to is manufacturers’ training. It is the same as solar PV. You get SolarEdge or SMA and they will give you upskilling on their product, which is in-house training for them. They will be giving a lot of that back to us now from the middle of the year where it has to be an RTO who delivers this training.

That is coming back to us now, which is fantastic because then we can control the

value of it and the proper nature of it. Sometimes it slightly goes off track with this training but there are no specific certificates needed for this.

MR BRADDOCK: Is the workforce available? I foresee that there will be a big uplift in demand as we try to get off gas and onto heat pumps.

Mr van Zyl: I suspect that we have plenty of guys in Canberra that can do that. I work very closely with a few of them because I also run a solar company outside of CIT, my personal company, where I do solar, PV and battery. Usually it comes as a package: people want heat pumps, solar and battery, and these guys install them. I never had a backlog or any problem getting them installed within a week's time. Currently I do not think we have a problem. I was out at Ginninderry yesterday and all those houses have got heat pumps already installed, working, functioning.

MS CASTLEY: Just looking at your document about the cyberskills training, can you explain to me a bit about that?

Ms Duncan: I support CIT's business growth and development unit, working closely with industry. With regard to cybersecurity in the renewable energy context, we already have a range of cybersecurity training that is available to industry and we have delivered a course specifically contextualised to vest in wind technology. We have provided them with five units of competency, and that is working with a SCADA engineer going out to the local wind farm and understanding the needs of the company and then developing cybersecurity training that is specific to their needs so that their technicians who are working in and around the infrastructure and their assets have an awareness of cybersecurity and how to protect that.

MS CASTLEY: What could go wrong?

Ms Duncan: What could go wrong? It is as simple as jump over the fence, break into a turbine, have access to controls, do a cyber hack into their systems, into a control centre and switch off the wind turbines.

MS CASTLEY: Is that what the hackathon is?

Ms Duncan: Did you want to add anything to cyber?

Ms Miller: Most of the companies that are running our wind farms had their own in-house cybersecurity training themselves. This was really add-on training for those guys who were climbing into those wind turbines every day and doing maintenance. As we all know now, you click on the links in your phone. It can be as basic as that or as complex as USB sticks and things like that.

The hackathon was a different piece of work. It was really for us to try and place ourselves into working with industry, working with students, but also that creative sector, working with the Canberra Innovation Network and the renewables, and trying to solve simple problems by having a competition. This will be the third year that we run that.

Then our renewable energy skill centre also said, "Hang on, let us also do an industry

speaker series at the same time.” Now every year we run this competition where student groups come together and they really fast-track ideas. Two small start-ups have actually started from that competition that we have been running.

THE CHAIR: I am just wondering what your thoughts are around encouraging more industry investment into skills and training in the ACT.

Ms Miller: We really need it. I think that is really why we have been trying to work so closely with industry. We were talking about it on the way in. One of the things that we really struggle with is do we have funding to do the skills training. We do not necessarily. When something is new and emerging, we do not have the funding to set-up new infrastructure.

The wind turbines, the EV battery, the solar panels—all those things that are required to set-up a new sector cost an incredible amount of money. Our cybersecurity sector that we set-up in 2016-2017 was an initiative—it was an ACT grant plus a federal grant from AustCyber that we used to do that—where we had to go out and source a different funding to actually set that up.

THE CHAIR: Do you see that as something that the ACT government could facilitate in terms of being reactive to technology changes?

Ms Miller: Yes. I think if you look at cybersecurity, just this morning the ACT government is looking at a cybersecurity hub for the ACT. They are running co-design workshops with industry and education providers to see what we need to set the ACT as leaders in this space. We do need the same in renewables as well.

Mr van Zyl: We spoke as well on the way in about, for instance, the battery installations and the next generation grant. That was available to only very few companies and they have now literally opened it up to about 15, which I was fortunate to be part of. That helps a lot of our workforce to become battery trained. It is a tedious course, it is hard, it takes a lot of time.

A lot of the time some of these companies, a week before actual, practical training happens, will pull their guys out of the training course because they cannot afford to have them sitting for a week in a classroom. Then they cannot even tap into the rebates; but it is becoming more available now. Like I said, they have expanded the number from I think it was six to now 15 companies in town that can offer these rebates.

That was quite a big horror with training for us, getting people upskilled in battery installations in the ACT. We have guys coming in from New South Wales and going back to their communities.

Locally, we struggled to actually get them as an update. There was no real incentive for these guys because these companies, holding these rebate offers, can offer a battery system \$4,000 cheaper than the general electrician on the street. So that has deterred a lot of people; but it seems like it is picking up a little. That was one of the things that kind of hampered us in battery training, with our numbers.

Ms Miller: That would probably be the same in EV: how do existing motor mechanics afford to send someone to be upskilled, to do that additional training especially when they have already got an existing workforce? How do they send them back?

MR BRADDOCK: I do know of some areas where they are concerned about that workforce transition. How to manage it also in terms of EVs, which will require less servicing and, hence, what would be the impact on the total workforce involved.

Mr van Zyl: Yes. Talking about that initial setup for us—I could talk about PV and battery—every second year that equipment is outdated, it is off the CEC-approved list of equipment and we have to get new ones to train our guys; we cannot train them on equipment that is not approved anymore. So it is an ever-evolving area for us, as you can understand, with renewables in general. It is a fair bit off our profits. We have to do it every year, every second year at least, in PV, to stay on top of what is out there and get the guys proper training.

We are working on a commercial course in partnership with a Victorian wholesaler because there are just not enough installers for that area. It is, for us now, huge to actually get that course off the ground, and, with either course nationally, there is no other course on that scale for solar or PV. So it is a big ask, especially from Neoen, which is a wind company, to take their money and focus on solar for our area. But it is the reality for what we are facing.

MR BRADDOCK: Is there a national role to be played here in terms of setting out what certain competencies might be for delivery by various registered training providers across the country?

Ms Miller: I think they are being developed nationally.

Mr van Zyl: Yes, they are. The development of the course is now in the review. That is going to go out probably nationally, or be available nationally, as far as I understand. Is that correct, Tamara?

Ms Duncan: We would probably have to take that on notice. I am not 100 per cent sure.

Mr van Zyl: I guess that there is a national role to be played but, to us, it is our focus in the ACT to get that off the ground because we are getting commercial PV installers from out of town to do our PV on commercial buildings. We have got plenty going in, especially after the rail went in. All those Northbourne buildings are getting solar.

MR BRADDOCK: Are we operating ahead of where the national level is? The ACT is further down the path than the national, let us say, skills competency framework system? It has not quite caught up to with where we need it to be? Is that a fair statement?

Mr van Zyl: Yes. I definitely think that we are at the forefront of it. We are leading the industry in renewables, 100 per cent. We were in competition with South Australia a little while ago but I think we are way ahead now.

Ms Miller: We were probably there with cyber as well. With cyber we were definitely ahead of the track and we are probably doing the same thing with this.

MR BRADDOCK: Although renewable is not on its own in cybersecurity, in terms of there are a lot of industries in Canberra that also utilise that.

THE CHAIR: Thank you so much for coming and chatting to us today. That was very informative. It was great. Thank you.

Short suspension.

BULLING, MISS PETA, Project and Research Assistant, Smart Energy Council
GRIMES, MR JOHN, Chief Executive Officer, Smart Energy Council
SMITH, MR WAYNE, Government Relations Manager, Smart Energy Council

THE CHAIR: Thank you very much for attending today and for your submission. Please make sure that everyone is signed in on the COVID app.

I remind witnesses of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement, the pink sheet before you on the table. Could I confirm for the record that you understand the privilege implications of this statement?

Mr Smith: Yes.

Miss Bulling: Yes.

Mr Grimes: Yes

THE CHAIR: Thank you. Would anyone like to give an opening statement to begin with?

Mr Grimes: We thought we might all say a few words. I know we have a short time budget for our introductory statements, so we will keep it short.

I will just paint a picture of who the Smart Energy Council is. We are a peak industry body. We are a not-for-profit organisation. We trace our history back to 1954 in Australia. That makes us one of the oldest renewable energy organisations anywhere in the world. We have about a thousand members across the country. These typically are people working in the industry and in research. There are policy people also involved. They cover the whole gamut of what we term smart energy, which is distributed renewable energy; energy storage of every technology, type and scale; electric vehicles; renewable hydrogen; and control and energy optimisation technologies.

We are active right across the sphere in promoting the uptake and use of smart energy. We provide advice to state and territory governments and the federal government nationally. We sit on expert advisory committees for the energy ministers in Queensland and Victoria. We deal with AEMO and AEMC. We are a national organisation headquartered in Canberra. Of our 13-odd staff, about eight are physically located here in Canberra, so we are proud Canberrans to boot.

Going to the ACT renewable energy hub, we were awarded a contract by the ACT government to run the ACT renewable energy hub, which is about strengthening the networks and capability of this ecosystem in the ACT and attracting a disproportionate value to be retained in the ACT. We are interested in jobs, competitiveness, lowering electricity prices and creating the ecosystem so that young people who want to get into this industry have a viable pathway to get into a lot of opportunities here locally. That is a big part of what we do. We have run a whole bunch of activities through that; we have a ton of members. We could talk about that in more detail, but I might now pass to Wayne.

Mr Smith: I might add that the work we are doing in relation to renewable hydrogen is a really important focus for us. We think that there are significant opportunities for the ACT, as a knowledge economy, to be a national and international leader in renewable hydrogen.

As quick background, the national organisation called NERA, National Energy Resources Australia, provided some funding to set-up a whole bunch of hydrogen clusters around Australia. There is now a renewable hydrogen cluster in the ACT which we are proudly a member of. Evoenergy takes the lead on that; we work closely with the Australian National University on that as well. I know that ANU are appearing here today. That is about that leadership role.

There are a few significant opportunities that I will highlight right from the start in relation to the ACT. Firstly, we have the hydrogen refuelling station at ActewAGL, which is a national leader. Secondly, Evoenergy has a hydrogen test facility, also in Fyshwick, which is really significant; it is getting a lot of attention. The Canberra Institute of Technology has opportunities to take a leading approach nationally on hydrogen training. ANU is doing a lot of work in the hydrogen space and there are some global leaders in that space. I know that they are setting up a master's program in relation to hydrogen, which no doubt they will talk about today. Finally, the Smart Energy Council has established a zero carbon certification scheme, which is a world-leading certification scheme basically guaranteeing that what is actually being produced is 100 per cent zero-emissions renewable hydrogen or renewable ammonia. The first project that we are certifying is ActewAGL's hydrogen refuelling station in Fyshwick. We can talk about those things as well.

Miss Bulling: I assisted on the submission and I am here to help answer any questions you may have. My colleagues covered the opening segment really well; I have nothing further to add there.

THE CHAIR: We have lots of questions. We have just been talking about hydrogen. The professor we had this morning said that hydrogen is H for hype. I am interested in your thoughts, given that you have just explained that this is really future thinking.

Mr Smith: Hydrogen is really exciting. It is hype; it is also hope. It is really interesting. One of the reasons why hydrogen may be drawing a lot of attention at the moment, for good or for bad reasons, is that people see in hydrogen whatever they want to see. Hydrogen has enormous potential, but there are some real challenges as well. This is speaking at a national level, specifically, to start with.

To be honest, when the federal government talks about hydrogen, they are really focused on fossil fuel hydrogen. That is a way to extend the life span of gas. That is not our area of interest; our interest is in renewable hydrogen, renewable ammonia, with zero emissions. That is our focus, and that is our focus in the ACT; and because the ACT is a 100 per cent renewables jurisdiction, the hydrogen that is being produced is zero-emissions hydrogen.

That is part of our job in certifying the refuelling station of ActewAGL. There are two things we want to do. We want to prove that that facility is actually powered 100 per

cent by renewable energy. That will go to the issue about whether the ACT is in fact a 100 per cent renewables jurisdiction. That work will be completed by the end of July, and I am sure that you will all find that very interesting.

The second thing that we are looking at—we have a company called Point Advisory that is doing the specific certification work—is whether the hydrogen that is produced is actually zero-emissions hydrogen. The ACT government has a small hydrogen car fleet, which we strongly welcome. That will be a way of demonstrating that the car fleet that is being refuelled at the refuelling station is being refuelled with zero-emissions hydrogen. That is very significant.

To go to the significance of that, one of the things that we do is talk a lot to the embassies and high commissions around Australia and in Canberra. There has been a conga line of embassies and high commissions visiting that refuelling station. They want to see what is happening there; they want to see what opportunities there are from that and how that can be replicated in their own jurisdictions. I think that the first one in the world was probably in Austria, but the one in Canberra is one of the first in the world, and it is really significant.

We know that Evoenergy get a lot of visits from embassies and high commissions, and a whole bunch of other eminent people, looking at what they are doing in their test facility. It is nationally significant. One of the things that they are looking at is the extent to which you can integrate hydrogen into the gas network in the ACT. That is a really interesting question, and a vexed question as well. That is really important.

The CIT is working with people like Master Plumbers, looking at what sort of training programs can be put in place to develop the skill set that is going to be needed if there is going to be a hydrogen industry in Australia. We know that the institutes of technology, the TAFEs, from around Australia are really interested in what is happening there.

Finally, in relation to our zero carbon certification scheme, we are getting international interest in what we are doing there. We have a world-leading certification scheme. We have partnered with, among others, the German Energy Agency. We have partnered with COP26 climate champions; they are key people like Nigel Topping from the UK who are working with the United Nations to help business embrace net zero emissions. We have also partnered with what is called the Green Hydrogen Catapult, which involves the world's eight largest renewable hydrogen producers; we have a commitment to work with them globally on what is happening here.

We know that there is really strong interest in what is happening, and the ACT is a leader there. We are not going to be a massive industrial producer of hydrogen, but we can lead the world with our knowledge economy.

MR BRADDOCK: You have touched on the question of putting hydrogen through the gas network.

Mr Smith: Yes.

MR BRADDOCK: I am not so interested in the 10 per cent hydrogen mix, because that only gets you so far, but what do you think is the future for getting pure hydrogen through the gas network?

Mr Smith: Pure hydrogen through the gas network? It is a vexed issue. I think it is something that Evoenergy is looking at closely. We have been talking to other gas companies around Australia. One of the things that we have been looking at is whether—we have not made a decision on this yet; we are in the early stages with our certification scheme—it is possible and useful to certify that the renewable hydrogen that is going into the gas network is in fact zero emissions and not something else. That is a significant piece of work that we might be doing, but we have not made a decision about that. We are talking to Evoenergy on these issues pretty consistently. I would say that it is still a vexed issue. I am not sure that anyone has quite landed yet on what the future is for hydrogen in the gas network.

MR BRADDOCK: Can you explain why it is vexed?

Mr Smith: The question is really about the future of gas in Australia. We are absolutely committed to net zero emissions and 100 per cent renewable energy. In fact, the CEO of the Australian Renewable Energy Agency recently talked about a vision for 1,000 per cent renewables in Australia. It is all about creating huge export opportunities for renewable hydrogen and renewable [*Interruption in sound recording—*] within Australia.

We are looking at that; that is our vision. We are a renewable energy industry body; we are not that interested in propping up the gas industry in Australia. That is the truth; that is not our space. Is there a role there? Potentially. But I know that the ACT has a time line for phasing out gas in the networks in the ACT, and that is leading Australia. I would expect that over time that time line would become shorter and shorter—that is the truth—but you also need to take the community with you, you need to take the industry with you, and you need to take the workers with you in making sure that there are transition plans for people who are working in the gas networks at the moment.

MS CASTLEY: I am just looking at your recommendations. Recommendation 3 says:

Instigate a formal review of current policy infrastructure surrounding electric vehicle incentives.

What is wrong with the current policy?

Mr Grimes: Australia is a laggard when it comes to the uptake of electric vehicles. While the ACT as a jurisdiction has been quite electric vehicle friendly in having concessions for registration, for example, of electric vehicles, the uptake rate is still extremely small. It is not so much that the ACT is out of step with the rest of the country; we just need to redouble our efforts.

We spend a lot of time in this role travelling around the world and looking at manufacturing and big companies in this space globally. There is Tesla in the US, and

other companies, but what surprises me is just how many electric vehicles there are in China. China took the view that the rest of the world got the jump when it comes to internal combustion engine cars and it was difficult for them to compete, but with this new type of vehicle they can leapfrog into the game, and they have strategically invested in this.

For example, we were in the city of Shenzhen. In Shenzhen every bus in the city is electric—22,000 buses. Every taxi in the city is electric. They have been doing this for the last seven or eight years. They have huge numbers of fleets of electric vehicles and a lot of experience in running them. The number of models of electric vehicles that are available there is breathtaking—and really cheap ones, too. They probably would not have a huge market in Australia because they are entry-level vehicles for the Chinese market, but they start at about \$13,000, \$15,000, \$35,000.

In this country, we have a view that electric vehicles are massively overpriced and that we are not even close. The truth is that globally those things have already been solved. I think that we are on the edge of this happening much more quickly than many people realise.

Another example I will give you is BYD, a company that Warren Buffett invested in. They are a big Chinese vehicle and battery manufacturer. They unveiled a vehicle at our show a couple of weeks ago in Sydney. It is a hatchback that they are bringing in at \$30,000 and a luxury sedan that looks like a Tesla at \$60,000. The price is coming down.

We need to be sending a message that now is the time to transition. Pull the emissions out of the transportation sector. Letting people get rid of not just their electricity bill and their gas bill, but their petrol bill as well, is a great way to help them into—

MS CASTLEY: Would you say that the uptake is small because of the cost? Are there other reasons?

Mr Grimes: There are two things that are true. Manufacturings follow markets; people are not looking to manufacture in Australia because there is not a market. Even before that, people bringing in vehicles here were not seeing Australia as a strategic destination as part of their strategic global plan because the numbers are so tiny. We do not need much, but we need to get us over the tipping point. Then government can stand back, in much the same way that government has done with solar PV subsidies, and support. It now is at the point where solar is the cheapest way of generating electricity; it does not require that government support anymore. This is the same. I see it as a kind of transition, but targeted, short-term policy to try and get the numbers over the tipping point.

Mr Smith: I might add a couple of things and Peta might want to add something as well.

Going to policy measures, as a national organisation, we have been very critical of the Victorian government for introducing an electric vehicle tax. We have described it, as others have, as the worst electric vehicle policy in the world. We have been very pleased that the ACT government has come out condemning, criticising, that electric

vehicle tax. It is the wrong policy at the wrong time. It is really good that the ACT has taken a different approach.

We have been very pleased to see the ACT government's commitment to the policies around free registration for electric vehicles. We think that the no-interest loan program for electric vehicles is really interesting. It will be very interesting to see how the implementation of that goes and how much interest there is for the uptake of it. We absolutely commend the ACT government for that.

The final thing I would say is an obvious point, to be honest: the federal government have been particularly unhelpful, to say it politely, with their rhetoric around electric vehicles. There are reasons why companies are not looking to manufacture in Australia or even bring their electric vehicle product into Australia. The language from the federal government has been particularly unhelpful and the policy settings have been particularly unhelpful.

Miss Bulling: The theme of a lot of the research we did behind this submission is that the ACT government is already doing a fantastic job, but in terms of innovation there is still space to go, and electric vehicles are a place for improvement. We have come across that from our work predominantly through the ACT renewables hub. We have had a lot of feedback from members who are still priced out; even with the incentives that are currently in place, they are priced out from being able to get an electric vehicle.

Also, the incentives have not moved fast enough. There is no second-hand market. That makes it even harder for people who are priced out from a new electric vehicle; there is no option for them to get something second-hand either. So it is looking more towards that.

That is why we recommended a more formal review of the current policy. A lot of stakeholders in the ACT would be more than willing to have their two cents in that. We did not have the scope within our submission to include all of their perspectives, but we would like to flag that with you as a space for reform.

MR BRADDOCK: How much can the ACT achieve swimming against the tide of the federal government and the Australian market? That is the question in my mind.

Mr Grimes: It is a good question. I think that the market is the driver in this; ultimately, it will be the market. The market in the ACT is absolutely ready. If you ask people in the ACT whether they would be interested in an electric vehicle as their next car or whether they would consider an electric vehicle, a very high proportion of people would say yes. What we just need to do is match them with the market opportunities. If we become an electric vehicle friendly jurisdiction and we create those linkages, then I think we can.

The ACT is not going to sway the national market; we have to be realistic about our size. But a good example is the reverse auction policies with renewable energy. The ACT was the leader in doing that; we then saw other jurisdictions follow. There is an important leadership role, and I think that the ACT should not dismiss the influential role that it can play.

Miss Bulling: The ACT is in a really fantastic position. We have a lot of infrastructure for great innovation and great development. We have the universities here; we have a lot of industry meetings, people who come to Canberra to seek new ideas and seek businesses. As we are already at the forefront of this kind of innovation, in capitalising on all these resources, we have to develop this idea of a knowledge economy. That is the ACT's biggest opportunity.

THE CHAIR: Can you talk more about that? With a knowledge hub, what could we do to make that happen?

Miss Bulling: The ACT renewables hub has been fantastic in getting the industry together in the ACT and creating a fantastic platform for the knowledge economy to take flight. From there, the next step would be capitalising on what is already established, capitalising on those institutions. Wayne can probably speak on this better than I can.

Mr Grimes: Maybe I can make some comments before I hand over.

We hold networking events; in fact, we held one last week. I was surprised at the depth of the networks here in the ACT. We had about 100 people register for drinks a week or so ago in Canberra.

We talked to people like Neoen, one of the proponents in the reverse auction. One of the things that the ACT government stipulated was that anyone who won should establish an office in the ACT. They did that, and there are now 35 full-time staff working in Neoen in Canberra. CWP Global, CWP Renewables, was another early proponent in the reverse auction; their office, I understand, employs more than 25 people in the ACT. PGP, a recent winner, has an office in the ACT. Then we have other companies like Reposit Power; they remotely control batteries that are in the network and make money by trading on the energy market for themselves and for their customers. It is great innovation there. There are people like Ecomotive, who do electric vehicles, electric buses; they are going to do the recharging stations and the network for that infrastructure in both electricity and hydrogen in the future for light and heavy transport.

So the networks are real; they are quite significant. If we were to do an audit of how many full-time jobs there are in the ACT in research and in industry in this sector, I think that we would be surprised by the number of jobs. That means that we get young researchers.

A good example from a week ago is that we had young people finishing their degrees in renewable energy engineering at ANU and then stepping out and looking for jobs in the sector. There are connections being made all over the place, because it is a sector that really needs people, it is growing, and it is a place where the ACT can disproportionately attract talent and build industry here. In other sectors, it is hard, because they are mature sectors, but this is a growing sector and really could be significant.

Mr Smith: I might quickly add to that. We think that there are some really good

export opportunities for the ACT in relation to renewable energy. As I mentioned before, we are increasingly looking at renewable energy exports. Often when we think about that, we think about products being exported, such as renewable hydrogen being sent across to other parts of the world. But one of the biggest export opportunities is knowledge. The work that the ACT government has done in developing reverse auctions, for example, has international interest. The work of the Clean Energy Regulator, the federal government agency, in managing the renewable energy target is globally significant and there is strong interest in what they are doing. The development of standards in Australia has been important, particularly in relation to battery storage, where we are leading the world. The training that we do for solar installers and battery storage installers is internationally significant as those markets grow overseas—again, particularly in relation to battery storage. Each one of those presents trade opportunities.

We have had other companies, too. ITP Renewables, for example, do a lot of work in the Pacific. They are taking the experience from off-grid installations in Australia and applying it to the Pacific.

As another example, later this afternoon I am meeting with one of the embassies in Canberra to talk to them about matching them with Canberra companies and other companies around renewable energy. There is really strong interest there, and I think we could collectively do a lot more in that space.

MR BRADDOCK: In recommendation 5, you talk about a comprehensive and coordinated strategy for ACT's renewable energy future. What new initiatives would you like to see in such a strategy?

Mr Grimes: I think that the first thing we should do is tell the story of our success to date. A lot of people are ignorant about just how much we have achieved here. That is the next thing that we would like to do, working from an industry perspective—talk about the jobs, the employment opportunities and the innovation that is happening here locally.

Globally, we are in a very competitive marketplace; this is not the only jurisdiction that sees the opportunities of strategically investing in this sector. So, secondly, we have to get our skates on and raise our profile, both nationally and internationally, to win that disproportionate share.

Being a long-term Canberran but also head of an industry association in this sector, I see that the match of those two things is fantastic. We could set out to attract the best brains in the country—in fact, from around the world—in terms of our lifestyle and our access to cutting-edge research. I would not downplay what is possible; it is a significant opportunity for Canberra to grasp.

MR BRADDOCK: Are there any new initiatives apart from selling our success?

Mr Grimes: Beyond selling success, it is those practical linkages that Wayne was talking about—for example, showcasing what we have here to a global audience. We have all the ingredients right in front of us in the embassies and the diplomatic networks. It is those connections around real projects. That is the thing that is taking

off. Government does not need to do much, but it has to do something. It has to set the environment to allow those things to happen. That is where government can play the best role.

Mr Smith: Going to electric vehicles, we have touched on some issues already. As I mentioned before, it will be interesting to see what the uptake of the no-interest loans program is. It may well be that that needs to be supplemented by other areas of support to encourage people to take up electric vehicles. We are really interested in that.

Peta mentioned the second-hand market for electric vehicles. What can we do in the ACT to help create that market and also reduce the price of second-hand vehicles?

In the renewable hydrogen space, there are some specific initiatives that we would be interested in and have begun some preliminary discussions with the ACT government about. Here is one example. We think that there is a genuine opportunity to build a renewable hydrogen highway between Canberra and Sydney. ActewAGL has a hydrogen refuelling station in Canberra; we could build another one, let us say in Goulburn, in partnership with the New South Wales government and potentially in partnership with the Australian government. Maybe we could build another one along the Hume Highway and then one in Sydney. Then you have a highway there.

We have been talking to the NERA cluster in Mildura that I mentioned previously. They are looking at transport opportunities there around hydrogen. There are opportunities to build connections between Mildura and Canberra and have renewable hydrogen refuelling stations along the way. That is a really exciting story.

Renewable hydrogen has really good opportunities for heavy vehicles—trucks and potentially buses as well. Freight is definitely something to look at.

In relation to renewable hydrogen more broadly, there is the question that we touched on previously around the gas network. That will be an ongoing debate.

There are opportunities to build up skills training. I am sure that the Canberra Institute of Technology would say to you that they would love to see some funding for the CIT that would help them build the apprentices of the future, whether they are plumbers, electricians or people with other skills in that area.

Mr Grimes: I have another one to think about—to explain to ordinary householders that going all electric is absolutely viable for them as an option. The gas industry has done a great job of talking about natural gas, so in some ways people think that it is somehow a natural, clean product. It is actually methane gas. Methane is a very potent greenhouse gas. We are pumping that to people's houses.

People in the ACT use gas primarily for three things: for heating water, for space heating and for cooking. We can tell people that there are really viable opportunities that are going to slash their bills. For water heating, there is heat pump technology. You put one kilowatt hour of energy in and you get four kilowatt hours of energy in the machine; it is like magic, fantastic. For space heating, there is reverse-cycle air conditioning and heating through electric heating—absolutely viable today. The third

is the cooktop. That is the hard one, because people love the instantaneous control. It is a feature that people really like. We need to give people experience of induction cooktops, which are fantastic. They respond instantly. They are not like the old electric ones that took ages heating up; they were terrible.

It is about making the technology available and showing what is possible so that people can feasibly disconnect from gas. People forget about their gas bill. Even having a connection costs you money every single day, even if you are not using the gas. You can cut the gas completely. There is no reason why you cannot; there are alternatives for all of that right now. It is showcasing that and getting some thought leaders in, getting some high-profile chefs to talk about cooking with electric induction cooktops. That would be a really smart thing to do—as an example.

MS CASTLEY: I have a question about the Victorian tax put on electric vehicles. It started as covering the cost for roads. Half of our fuel tax goes towards fixing the roads—47c or whatever the amount is. What is the council's view on who is going to pay for the roads if we are all using electric vehicles? What are your thoughts there?

Mr Grimes: We talk to state treasurers around this issue. State treasurers are focused on it as a kind of linear thing: “Here is a bucket of money that we get today; we need to replace that with like for like.” The problem is that that effectively creates uncertainty. All of a sudden people say, “There is this rate. What is the rate? Does the rate change? What is the liability in that?” That is as opposed to fuel. Most people do not even know that there is a big excise tax in fuel that is levied and used in that way. It creates a disincentive because it creates that uncertainty and that kind of fear about what the cost is going to be, going forward.

At the nascent stage of development of an industry, you do not want to create any roadblocks to this; you want to have the take-up. I think that governments are sophisticated enough to look at the whole tax base across the suite to find alternative ways. We do not suggest that there is some magic pudding and you cannot make up the numbers; you have to make up the numbers, but I think that there are more sophisticated ways to do it.

Mr Smith: I think that the operative word there was nascent. This is the wrong policy at the wrong time. There is an argument for looking at tax reform over a period, but you do not impose a tax that kills an industry right from the get-go. That is the critical thing.

We were pleased that the Victorian government did, in their budget, announce a range of incentives for electric vehicles. That was useful. It would have been good if they had got rid of the tax, to be honest, but at least it was useful that there were some incentives there.

THE CHAIR: At the beginning, you described an ecosystem here, and you have talked about how we are doing really well and are at the forefront of lots of innovation. Where do you see a gap in what we are doing in this ecosystem or where could it be strengthened?

Mr Grimes: The hot issue right now is that we are transitioning from an electricity

system that was designed to flow in one direction. You put a power station next to a coalmine, you pump the electricity hundreds of kilometres, and then you use it through a distribution network and you do not even have visibility of what is happening on the distribution network.

All of a sudden, technology and economics are taking us to a solution that is multidirectional. It is about peer-to-peer trading of energy; it is about energy optimisation; it is about having customers respond to the energy network so that we shift patterns of demand, particularly with non-essential services.

That transition is complex; it is difficult. It is also a transition that the whole world is going to make. If we can get the smarts right in terms of how we put all this together and make it work in a seamless way for customers, that has global implications. That is the place that I think the ACT should be focusing on. How do you unlock more? There are companies looking at perovskite and other new solar technology, but it is hard to compete against solar modules that are made en masse in other jurisdictions. That horse has bolted. We should be focusing on the smart switching, the smart operation, turning on the headlights so that the network operators see what is happening on the network, and giving customers a way to interact with that so that they can save or make money in the process. That is fantastic. That is where we should be focusing.

MR BRADDOCK: My concern is about the network's ability to cope once you transition consumers off gas and onto EV. You have basically doubled the energy requirements going through your network.

Mr Grimes: I would not be surprised if the energy network that we end up with is 10 times bigger than the one we have today. I think that that transition is going to happen much faster than many planners think. It is economics that is driving this. Solar PV is now the cheapest way to generate electricity in the world, period. We are on the cusp of having abundant zero carbon, almost free, electricity. So the problem gets reversed. What do you do with that electricity? We talked today about all this electricity in the middle of the day being a big problem; I see it as a great business opportunity. How do you harness free electricity in the middle of the day and use it for proactive purposes—use it for transportation and other things and add value to our whole economy? That is the challenge that is before us.

MR BRADDOCK: I am also fearful about how the grid will cope with a huge uptake of demand without the network providers gouging the consumers at the end of it.

Mr Grimes: It has been frustrating for us. For a decade, we have been at the coalface of this and sounding the alarm bell for the network operations. Some of them are our members. SA Power Networks and Mondo are members of ours. They are thinking about this, but they are late to the party and I do not think that they really understand the size of the transformation that is about to occur. I do not think that they are ready for it.

This comes back to the overarching frustration that we have that we need a plan to transition. A plan makes the process as low cost as possible; it impacts people's lives less. If you have an uncoordinated, chaotic disruption, you have communities and

workers being left behind. Then you have unintended consequences. You have spikes in the electricity prices; you have lights going off. Nobody wants that.

The frustration is that, particularly at a federal level, we have not had an energy plan since 2014. We have not had a climate plan since 2014. That makes it really hard. You will find that it is actually industry crying out for this. They know that the game is up. It is no longer about fossil fuel versus renewables. The economics and engineering have resolved that problem. It is a question of making sure that you build ahead of the transition.

The analogy is that you are driving an internal combustion car and you have to convert it to an electric car while you are driving. You are not going to stop. You have to build a second motor so that you can click over and seamlessly keep driving. That is what is happening with our electricity network. A plan, leadership and certainty for industry are absolutely critical at the moment.

THE CHAIR: I want to go to consumers and your thoughts about educating the community. People struggle with understanding some of the issues. For example, I do not understand how you refuel hydrogen. Is it a liquid or a gas? I have no idea. People need to be educated if they are to take up these things. I am interested in your thoughts around that.

Mr Grimes: I think that work is critical. I agree that collectively we have not done as much of that as we really need to. It is a bit like the all-electric home of the future. These are practical things to demonstrate to people. You can think about hydrogen vehicles, but people just need to understand the economic narrative.

Ten years ago, a watt of solar capacity would cost you \$4.50. Today, that same watt of capacity costs you 17c. The price has reduced 21 per cent per annum every single year for the past decade. In fact, if you trace it back, it has done that since 1970. This has been modelled over a long time. It means that in about three years time, a watt of capacity, which is now way cheaper than coal and gas—way cheaper—is going to be 10c. That is in the next three or four years. This price reduction is not stopping. We have seen the same price reductions with battery storage technology. This has only begun; it is not the finish of it. These become more and more competitive in the future.

People understand the enormous economic opportunity that presents. Why is it important for Australia? If you take a solar panel and you put it in Europe—say in Germany, which is a big solar country—and you put the exact same solar panel in in Australia, you will find that you will produce up to 2.6 times more electricity from the solar panel in Australia. This is our national comparative advantage. We have fantastic solar resources and wind resources. The rest of the world is looking for stable, advanced economies with existing energy exporting relationships in place over decades, a trusted partner. They are going to say, “We can source our energy from you.” Wouldn’t it be better to get it from Australia than from the Middle East, for example, or from Russia, if you are sitting in Europe?

This is our great opportunity. If we seized the opportunity, we could reindustrialise our economy, which would create thousands of jobs. The difficulty is that a lot of people just do not understand the scale and the pace of that transition. I agree that we

need to do a better job of telling that story.

Mr Smith: I might just add to that and take it in a slightly different direction. We are fortunate in Canberra that we have a community that is very supportive of action on climate change and is very supportive of renewable energy. That is good, and there is strong support for the fact that Canberra is a 100 per cent renewables jurisdiction.

There will be differences in terms of emphasis around specific policies, areas of support and so forth, but you are not going to get a political party going to an election in Canberra with a climate-denying policy. That is just not going to happen. They would just get whacked by the ACT public. That is a great starting point.

John is spot on; we really encourage the ACT government to do more in terms of telling the positive story about the economic and employment benefits that come from zero emissions and 100 per cent renewables. They are really significant. It is really important that people are not left behind in that journey and that there is appropriate support, particularly for low income earners, throughout that process.

There is also an opportunity to tell the story to the public about what that transition looks like at a very local, house, level and what it means. What does a home in the future look like? What are the implications or the benefits of having electric vehicles? What happens with ride sharing? We are potentially looking at self-driving cars and so forth in the future, in electric vehicles. What does that mean and how is that part of the vision for Canberra's future? In telling that whole story, we will see that there are really significant economic opportunities for the ACT, and export opportunities as well, and good opportunities to snatch business from other jurisdictions, which is always a good thing.

MR BRADDOCK: I think it was the Australian Council of Learned Academies, but please do not quote me on that, who were saying that technology research is not really what is required. They said that what is really required is humanities-based research and asked how we implement that in basically an urban residential setting. What would you say to such a statement?

Mr Grimes: I would say totally. It is about policy. It is about people who are looking at policy and getting those policy things in place. The engineering and economics are really great, very advanced.

I will give you an example. We have members that do large developments of wind farms and solar farms around the country. They put more emphasis on community engagement—the business models that cut local communities into the profits of these projects going forward, getting people onside in terms of understanding the truth about what the impact is going to be rather than having people with fears around what the impact is going to be. They put the majority of the project focus on that area.

In terms of actually building a solar farm, you almost need a post hole digger and an allen key and you are away. It is not hard. But making sure that you have communities onside is really important. I could not agree more. We should not just think about this as an engineering jobs opportunity; it is an opportunity right across the spectrum.

THE CHAIR: We have one more minute, so I might ask about cooperatives. We previously spoke to Prepower Co-op One people. I am interested in your views around cooperative arrangements.

Mr Grimes: Fantastic, particularly if we can get new business models, innovations in business models. We can then let people who do not have access to a rooftop participate—people who live in apartments or, for whatever reason, cannot otherwise participate. That is really important. It is unlocking that last mile.

I was talking to a friend in an apartment block in Reid. They are now thinking about what happens when electric vehicles start to come into the apartment complex. How do you get the body corporate to deal with it? At the moment, the power in the garage is common power. How do you transition that to allow electric vehicle charging? This is going to happen quickly. There will be one, there will be two, and then there will be 50. How do you plan ahead for that?

These are all really critical things. The advantage is that in Australia we are figuring it out first. If we get good business models, good technology and good solutions to this, these are knowledge export opportunities for the ACT. My encouragement is: “Go, go.” We have a short window of opportunity; we should really go for it.

THE CHAIR: That is a wonderful note to end on. Thank you very much for your time today and for your submissions.

Hearing suspended from 12.25 to 1.04 pm.

REYNOLDS, MX ANNIKA, CEO and Founder, GreenLaw
BOONE, MISS ISABELLA, Researcher, GreenLaw

THE CHAIR: Welcome back to the public hearing of the Standing Committee on Environment, Climate Change and Biodiversity into renewable energy innovation in the ACT. Please be aware that the proceedings today are recorded and transcribed by Hansard and will be published. The proceedings are also being broadcast and web-streamed live. Thank you very much, GreenLaw, for coming and having a chat with us. I really appreciated your submission as well.

Can I remind witnesses of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement before you on the table, the pink laminated page. Can I confirm for the record that you understand the privilege implications of this statement?

Miss Boone: Yes.

THE CHAIR: Would you like to make an opening statement?

Mx Reynolds: Yes. Firstly we acknowledge that we are meeting on the lands of the Ngunnawal and Ngambri peoples and that sovereignty was never ceded. GreenLaw was founded in 2019 in partnership with the ANU College of Law, although we do have student members from universities across Australia. GreenLaw is a young persons' law reform and legal research institute, empowering the next generation of lawyers to tackle the climate crisis.

In the last two years we have worked with national and international NGOs, we have undertaken Australia-first research that has ended up in peer-reviewed journals and in major media outlets, and in 2020 we were recognised by the Australian Pro Bono Centre as a key civil society group tackling the climate crisis, which was endorsed by the UN Special Rapporteur on Human Rights and the Environment.

It is a pleasure to be speaking at the inquiry today on the importance of community-scale batteries and how the ACT government can continue to be a global leader in the incentivisation and rollout of community energy storage projects. But we do first want to turn the inquiry's attention to our recommendations regarding equity, which are discussed in our submission at pages 21 to 25. They are recommendation 9, regarding a human rights framework, recommendation 10 regarding rolling out knowledge resources in an equitable manner, and recommendation 11 regarding knowledge sharing to ensure that technicians and businesses in Canberra can really benefit from the renewable energy transition in an equitable way.

As we outlined in our submission at pages 21 to 22, although the ACT is relatively well off there are suburbs and groups in our community who are likely suffering from energy stress and would benefit immensely from community-scale batteries and a community-scale battery program that is rolled out with equity in mind. We strongly encourage the ACT Assembly to continue to be an Australian leader and, indeed, a global leader in both renewable energy innovation and rolling out renewable energy in a fair manner.

In particular, we note at page 23 that there is a Labor-Greens governing agreement that does outline discussions about introducing a right to a healthy environment. Reform of the Human Rights Act is not strictly within the ambit of this inquiry, but we encourage the committee, in the way that it conducts this inquiry and in its outcomes, to look at how it can be pushing the envelope on a right to a healthy environment.

We note that on 2 June, last week, the ACT government did formally endorse the Fossil Fuel Non-proliferation Treaty, which includes a call for a just transition, and we would argue that the inquiry should widely interpret this call for a just transition, not just for workers in the space and businesses in Canberra but also for consumers transitioning to clean energy. Because of these considerations, we call on the ACT government to implement further renewable energy reform through a human rights framework at recommendation 9.

What is a human rights framework? We argue that it has two dimensions to it, roughly. It is about empowering communities to be involved or to lead in the projects, to be leasing community-scale batteries, to be getting investment returns from community-scale batteries and also supporting the most vulnerable in our community, individual households and people, so that they can all benefit from a healthy environment and clean energy. I can speak to that further if the inquiry has any questions.

To wrap up my submission, I also encourage the inquiry to review our supplementary submission, which I know you have not had a chance to read in full yet, but our supplementary submission is very much about gas and gas infrastructure in the ACT. We applaud the ACT and all its parties for its leadership in transitioning off gas, and we strongly encourage further action in this space to ensure a just and stable transition from gas to clean renewable energy sources. Gas has very negative environmental and health consequences for Canberrans, and it is a more expensive energy heating and cooking source that really does directly increase the bills for Canberrans and local businesses.

We really encourage the inquiry to look at not only innovation in renewable energy technology but also innovation in urban planning and design to transition the ACT off gas and to be supporting the rollout of the electrification of heating and cooking across the ACT in a manner that is stable and just for everyone and that meets both our climate outcomes and also outcomes for the health and wellbeing of Canberrans.

My colleague will now continue with our summary of our submissions, moving from that equity framework, the importance of a just transition, to how that can be directly implemented through incentive programs to roll out community-scale batteries.

Miss Boone: We would further draw your attention to pages 10 to 14 of our submission, to the recommendations that incentivise the uptake of community-scale batteries under the existing Next Generation Storage Program, or the Next Gen Program for short. It is one of the largest battery rollouts across the world and has very ambitious targets that set the ACT as a national and global leader in renewable energy. The program has been really highly successful to date in the uptake of household-scale batteries, but the current limitations unfortunately prevent

community-scale batteries being incorporated and rolled out under the program. This ultimately hinders the potential benefits that communities can receive from emerging technologies in renewable energy.

On pages 10 to 13 of the submission, we outline the incorporation of community-scale batteries into the program. With the current high financial costs upfront for both community organisations and for government incentive-based rollout, there is a high financial burden, and this can be mitigated by the ACT government through this Next Generation Program.

The following recommendations stipulate the way that we see this needs to happen and the changes that need to happen in the current rollout program to accommodate community-scale batteries. On page 11 you will find recommendation 1, which is scaling up of the eligibility requirements under the current program, in both the size of the battery that is eligible for the rebates and also the eligible recipient group, which means community-scale organisations need to be included in that as well.

Under recommendation 2 on page 12 you will find the allocation of funding needs to be increased under the current Next Gen Program; as well, the modified set rebate that comes with the Next Gen Program for community organisations needs to be proportionate to the size of the battery in order to make it viable for both the ACT government and for community-scale organisations.

We commend the Labor-Greens parliamentary governing agreement, supplemented by the strategic indicator 3.2 of the current budget indicating that there was \$100 million supporting the rollout of large-scale batteries. We think this is an awesome initiative. We do, however, strongly encourage that under the current objective—it suggests a new program to roll out large scale batteries—you use the existing Next Gen Program. The existing administration setup and organisation costs are already there and are capable of funding community-scale batteries, and we think this enables the current allocated funding to be expanded and go effectively towards communities in the ACT and their uptake of community-scale energy.

To solidify this government-backed rollout, we would like to see the codification of the Next Gen Program into policy. This promotes certainty and transparency for all those involved but particularly this is important for industry and consumers to know that the ACT is committed to the rollout of community-scale batteries.

We thank the inquiry for the opportunity to speak today to the future of community-scale batteries and we urge the ACT government to ensure that this is done through a human rights framework, that there is continued and sustained action towards the transition off gas and that this rollout of community-scale batteries is done in an equitable and fair manner.

THE CHAIR: That was very interesting. We are talking about community-scale batteries. We had other submissions and presenters here today talking about cooperative arrangements. Is that sort of what you are talking about, the same thing?

Miss Boone: Yes, definitely. It falls under a cooperative style of energy, both production and storage. Currently the size and model that we recommend in the

submission on page 10 should house the energy of households of about a hundred houses in a community. It is quite a large-scale battery for the ACT.

THE CHAIR: How would it work? What exactly do you mean by a community-scale battery?

Miss Boone: It is a very large upscale of the current household battery, like the Tesla or the LG ones that you see on the side of the road. They are situated in a central place within a community and everybody's solar or production of energy from their households, depending on how that comes in, is stored in this location of the battery.

The model that we suggest in the submission is one that they rent space from to store their energy as part of an ownership model and, through that, they can feed off the energy that they have stored from their solar panels that they are not using—particularly at night, that is important—so that the energy that the households are producing during the day from their solar panels can feed back into their usage to lower their bills and to ensure that they have a clean and renewable source of energy that they can still use at night.

THE CHAIR: That would be available in a cheap way to households that could not afford it as well, if they do not have solar panels?

Mx Reynolds: Not every household is going to need solar PV. There are ways to regulate it that the community can come together and can be sharing energy between households. We would direct you to page 8 of our submission where we go through, in a little detail, the ANU's research into battery storage and the grid integration program. I believe they may be speaking to you this afternoon about this. I encourage you to talk to them more about the exact technical rollout. We can certainly speak to the regulatory and legal ways to incentivise it, but we are not engineers.

But we can say that not every household would need solar PV. You would have an amount in that community and it then would allow everyone else in the community to share the benefits of it.

We do note in our submission that, under the current Next Gen Program, even if it was expanded to community-scale batteries it is a little blind to equity considerations, and that is why we have made specific recommendations about those and we really think it is important for there to be additional supports for households that would otherwise not be able to make the upfront costs of participating in community-scale batteries to still benefit from those.

Bella, I believe you were talking about loan-free grants and stuff last night?

Miss Boone: Yes. The expansion of the \$15,000 interest-free loans that are currently being pushed to include community-scale batteries as one of the options for households to opt into is also a fantastic way to account for equity and to account for the upfront high costs.

Part of having a proportionate rebate under the Next Gen Program is that community-scale batteries, as the Smart Energy Council talked to you about before,

are rapidly decreasing in cost. The current rate is \$825 per kilowatt for a household battery. If you were to translate that across to a community-scale battery, in about five years time the ACT government will be paying for the full battery upfront; so we recommend something that is proportionate to the size of the battery so that the cost is still being covered, to enable it to be accessible to both community groups, organisations and universities, but also so that there is a sense of ownership in the model itself.

The interest free loans can certainly assist the households or community organisations particularly. As it is currently listed, the loans themselves can participate in community-style energy and community trading of energy.

MR BRADDOCK: Just a clarification question, do the hundred homes have to be co-located with each other or could it be just like a virtual grid of homes coming together to do that?

Miss Boone: That is a very, very interesting question. Currently, with community-scale batteries, the proximity of the houses is not super important; it can be quite a wide vicinity that houses are feeding into a community-scale battery. There is also a virtual power plant which currently operates through the household style of batteries. Unfortunately, both these limit equitable access of people and communities to a style of energy sharing through the virtual power plant.

In the ANU's reports with ARENA, industry experts found that the benefits that communities and people reaped from a virtual power plant or an online style of sharing of energy were significantly less than that of community-scale batteries the large-scale batteries. The proximity of the households is somewhat irrelevant to the way that the battery works but there are greater benefits to using that, because you do not have to have your own battery and you do not have to have your own solar panels to reap the benefits of the community-scale battery.

MR BRADDOCK: I definitely agree with that. It is just trying to get a block or a section of a neighbourhood to get on board and do it. I suppose I just see that as the challenge with it.

Miss Boone: Definitely there is the—

MR BRADDOCK: Sorry, I was just wrapping my head around it.

Miss Boone: No, that is totally fine. In the ARENA-ANU reports there is this beautiful graph—I believe it is references 1 through 3 in our submission—that shows the way that the uptake of the Next Gen Program has progressed both the uptake of household batteries and then solar PV in the same time period. I think in the latest one, in 2019, there were 43 households that took up the batteries under the Next Gen Program and there were something like 2,000 new installations of solar PV panels. There is quite a large disparity there where the solar PVs are not being used and the excess energy they are producing is being fed back into the grid, which is overloading the grid. The community-scale batteries have the potential to store that and then redistribute it to all those that do not have access to either a battery or solar PVs themselves.

MR BRADDOCK: How do you encourage take up from those who are under energy stress or financial constraints and who are probably the least likely to be thinking about setting up a battery at the end of their street?

Miss Boone: The style of ownership that we have suggested in our submission is one that the households themselves do not actually have to buy in to the initial setup costs of the battery if they do not wish. It is a third-party owned, community-operated style of battery—someone like ActewAGL. I believe their name is ACT Energy now.

Mx Reynolds: Potentially. You would have to check the national electricity rules and provisions but yes, as Bella was saying, the ownership models mean that not every single household that may eventually participate in a battery needs to be participating from the beginning. But to get at the heart of equity, as you mentioned, Andrew, we make really strong submissions that the ACT government should step up further and provide additional financial support and knowledge sharing as well. One of the barriers that households experience is going, “Yes, we would love to participate but we can’t afford to.” And that is where things like incentive programs, rolling this out with the human rights framework in mind, are really important.

But the other half of the story is also we know that when the benefits of clean energy are not communicated super well households can be just reluctant because of knowledge gaps. So we also make submissions about knowledge sharing and really giving communities ownership over the knowledge they develop and the expertise that they grow.

One of the fantastic benefits of the ACT is that we are a small jurisdiction and we can develop a really strong, community based, knowledge-sharing space without it being far flung across lots of different geographic regions. When we were designing our submission we were throwing around numbers like three decentralised hubs as probably all that is going to really be required to give communities a sense of intellectual ownership and drive over community-scale batteries which, coupled with incentive mechanisms, we think will really help vulnerable homes that are suffering energy stress to participate in these programs.

MS CASTLEY: I have so many questions. How many homes need solar to feed into a community battery that is feeding a hundred houses?

Miss Boone: The great thing about community-style batteries is that they are very easily sized up or sized down depending on what is being fed in. The other great thing about them is that they can hold loads from large-scale wind farms or large-scale solar farms or something like the solar-share farm in the ACT. The sort of household ratio does not have to be super high if you have got something like a large energy producer feeding into a battery as well.

The sort of average ratio is about half of the households that are using it to the households that are sharing the energy that is produced but that is 100 per cent dependent on the weather, how much solar energy the households are producing and what is not already being used immediately from their household consumption and what can be fed into storage.

Mx Reynolds: As of 2015, which we think is a bit out of date but we could not find much more updated statistics unfortunately, the ACT already has PV solar penetration of 13 per cent or over and there are areas of the ACT that are hitting 30 to 40 per cent solar penetration. There are probably areas in the ACT that, from a technical standpoint, you could smack a community battery in there already and you already have enough solar penetration.

Then it comes down to planning how you are going to support households to increase solar PV in an area if you want to put a community battery there or coupling it, as Bella said, with the community-owned energy projects that can work in conjunction with the community-scale battery. But there are options.

MS CASTLEY: It would be asking the people who have already got solar panels to change from whatever battery situation they have now to the community one?

Mx Reynolds: Potentially, if they have a battery. They may not have a battery; they may—

MS CASTLEY: Yes, it might just go straight—

Mx Reynolds: Yes. But batteries also do have a life cycle in them. If you got a battery when you put in solar PVs eight years ago you may be starting to look towards changing that battery anyway. Unfortunately, individual household batteries—and we made recommendations under recommendation 13, I believe, about recycling—

MS CASTLEY: That was my next question.

Mx Reynolds: Unfortunately individual household batteries have a shorter lifespan than community-scale batteries but both of them have recycling considerations and if we can develop this well we hopefully will have the first generation worth of solar PV and batteries to households across the ACT coming to the end of their natural lifecycle and then put them on a community-scale battery.

But the longer term benefits and savings from moving to community-scale batteries would be well worth it, provided you did not buy an individual battery four days ago and are then getting pushed onto a community-scale battery. It would be well worth that unfortunate change in investment, but we think there is a way to regulate this that does not have those negative externalities for individual households.

MR BRADDOCK: These batteries also provide services to the grid in terms of voltage regulation and that sort of thing. Who would profit from that?

Mx Reynolds: It depends on the ownership model. At page 8 of our submission, we outline the ownership models that we are pushing for. We think the ones that result in the profits going back to a community organisation to be distributed to the members through third-party ownership are the most equitable way to go forward.

But there are other examples in community-scale batteries in New South Wales—in particular, having batteries owned by a third-party for-profit company that is getting

profits out of this. That is a viable model under the grid, but with the equity lens that we have applied to this submission, which we would encourage the inquiry to use, we think that community-owned third-party batteries that get all the benefits of putting the energy in, getting cheap electricity and then getting the dividends of the electricity they have produced are the best way forward to support the ACT to roll out this program.

MS CASTLEY: With the community-based model, in a crazy weather event, with all this electricity that is stored in the battery, is there a chance that, even though it is a community one, all that could get drained out and sent to somebody else? Is that a crazy notion? Is your battery protected for your 100 people?

Miss Boone: Yes, absolutely. The battery is connected to the grid, and part of the conditions under the Next Gen program is that the battery is connected to the grid and can be fed into the grid, but there is exclusive control over where the energy comes in and out of it. In outages it is good for households to use that. The event of it being drained from the users is unlikely because it is controlled by the households, and whoever that third-party owner is has control over where the energy is being fed.

Mx Reynolds: If it was taken out into the grid because there was a major event, you have had an outage at a power station and the batteries have kicked in to supply that, then if it is community owned, they get the dividends from that electricity being used at quite a high cost. They will get quite a lucrative return on that. That is part of what it means to participate in the electricity market.

When things are running normally, the community-scale battery will be serving the community, working with the community. The dividends people will get will probably be modest, but they will get modest dividends and significant reductions in electricity bills, which is fantastic. Then, if there is a major outage—we are not regulators; we cannot tell you if the battery will continue to service the homes or be pushed out to the wider grid—they will get the return for that, as any other producer of energy would during a major outage.

I know that you have had the supplementary submission that we have put in for about 2½ minutes, but is there anything that we can speak to about gas or gas infrastructure? I am aware that that has come up today in the proceedings.

MR BRADDOCK: I have a quick question. On page 7 you say you encourage the inquiry to explore innovative options to support the transition, through urban planning and other legislative mechanisms. Are you referring to the two dot points you have underneath or do you have more in mind?

Mx Reynolds: Everything under “Reforms to support electrification of Canberra’s heating and cooking systems”, from page 6 to page 8, touches on various reform models. We would strongly encourage the inquiry to, as a first step, bring forward the time line for determining the phase-out of gas. Currently, the ACT climate change plan for 2019 to 2025 has given a very generous time line in not determining when gas will be phased out until 2024. We think that is a missed opportunity for our major distributor and supplier to be making sensible decisions over the next 10 years. It is also a real missed opportunity for individual households, communities and smaller

scale developers that are investing in gas infrastructure.

Even with the removal of the mandate for gas infrastructure, we are still seeing it being rolled out. We think stronger commitments need to be made so that this transition can happen in a well-planned manner. We also strongly recommend that the ACT government seek to phase out gas by 2030 at the earliest, not 2045. That is in line with our emissions commitments; it is in line with the health and cost impacts of gas. It is not benefiting anyone in the ACT.

Then we go through some other innovative mechanisms—as you pointed out, Andrew—in those bullet points about how that could be incentivised, in addition to the other mechanisms that have already been discussed in the governing agreement between Labor and the Greens.

Finally, we note on page 8 that, whilst gas infrastructure could feasibly be used eventually for hydrogen infrastructure, we would encourage the inquiry to focus on feasible innovative technologies that are working today at a cost that is reasonable for consumers and participants in the market.

We are sure that hydrogen will have a role to play eventually in transitioning, but we should not be delaying that important transition off gas because of the potential for hydrogen infrastructure in the future. It has ongoing and current cost impacts for households and businesses, it has ongoing and current health impacts for families and children—in particular, asthma and acute respiratory disorders are a big issue with gas—and it has severe environmental consequences and climate change consequences.

Getting off gas is a positive step for this inquiry to demonstrate that it has a commitment to innovation, not just in technology use but also in broader equitable urban design for everyone to benefit.

THE CHAIR: Thank you very much for your submission.

Short suspension.

DORAN, MR JARRYD, Chief Operating Officer, LGI Limited

THE CHAIR: Welcome to our hearing today. The proceedings today are being recorded and transcribed by Hansard and will be published. The proceedings are also being broadcast and web-streamed live.

I remind witnesses of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement before you on the table. Can you confirm for the record that you understand the privilege implications of the statement?

Mr Doran: I can confirm.

THE CHAIR: Would you like to give a brief opening statement to the committee?

Mr Doran: Certainly. LGI was founded in 2009. We are a specialist in the biogas extraction and biogas utilisation space. In particular, we harness the gas from landfill facilities down the Australian east coast and we convert that gas into usable electricity.

Since 2009, we have expanded to now 27 sites down the east coast, and we play a very key role in helping local governments manage their greenhouse gas emissions, their environmental compliance and helping their environmental authorities to operate those waste facilities. Without the collection and utilisation of that gas, there would be some odours and there would be potential gas migration, among the environmental issues. Turning that otherwise-liability into a usable product is where we have come to offer a key service to local governments and to the waste management sector.

We have a very different approach. All our sites are designed, built and operated by our team. We have a team of 30 based in Queensland. We also have a team of two who are based down here in the territory. As of last year, we commissioned our new facility at Mugga Lane, the Mugga Lane waste management resource recovery facility; we produce 4.2 megawatts of electricity every hour, 24/7, from that site. Irrespective of changes in weather or changes to the waste tonnage coming in, that facility is producing a consistent source of renewable energy.

Going to the broader collection of our sites across the entire east coast, we produce 80,000 megawatt hours of energy per annum. In that quantum, as well, you could power about 15,000 typical Australian homes. We also achieve an abatement of 3.6 million tonnes of carbon dioxide equivalent; again, it is a key part around capturing that gas and utilising it before it is actually emitted to the atmosphere.

The energy that we generate is connected into the distribution network, so it is essentially connected right down at the household level, which means that there are fewer energy losses; the power we produce is very close to us as household users and consumers of energy, so you see fewer losses of energy and it is a more efficient way of taking energy generation and delivering it right to an end customer. We also have a faster rollout of projects because they are in the distribution space, so it negates the need for significant network augmentation or for substantial transmission-related project costs.

The key also is that we have expanded this recently from being focused on biogas into an energy platform. Where we have these facilities, even if a landfill ceased operating or ceased receiving waste today, there is more than 20 years of gas that that facility will generate at a level where we can produce power. We are looking to use these key locations down the east coast and to expand them with solar generation and energy storage, and possibly even look at ways to take the gas, convert it to natural gas quality and use that in the existing gas infrastructure as a way of offsetting what would otherwise be fossil fuel derived gases. That is a fairly new space for Australia.

In our submission, we outlined the key points we identified from our experience most recently in developing the project in Canberra. We identified that the lack of cohesive alignment of the various governing bodies in the territory made it a bit difficult. With us being newcomers to the territory, we did not have existing relationships with the key network authority down here or the regulatory bodies. There was quite an extended delay in the project being commissioned because of the lack of government cohesiveness.

Both Matthew and I were a key part of the project, from design through to commissioning. In our submission, we simply highlighted one of the key points: that for any future project being developed in the territory, it would help the project developer if there was a more cohesive way in which parts of the territory acted together. We have seen in other states and territories that something like a champion or a project sponsor has worked quite well when that has been within the network authority or within the governing body. That means that once a project has been deemed approved, you have a facilitator that the project developer can liaise with to ensure that they coordinate with the relevant government bodies, and it all happens in a smoother, less stressful manner.

The second point was that there were a number of changes to the approval processes. We tended to be a test case. We would attain approvals which would later be deemed out of date, just through a change in legislation. This all happened within a fairly quick time frame. Given that the project we have recently developed has a 15-year life, if not beyond, it is quite difficult to design a piece of infrastructure with a long-term view and then to have to succumb to rapidly changing legislation through the design and approval stage.

More recently, we have been looking to expand the facility, either through extra gas generation or through biogas-fuelled generation, but also considering the options to put battery storage on that facility, to help work within the distribution network constraints.

What we have seen around Australia is that there has been a desire to shift from centralised generation from large-scale coal or gas generation to a more distributed generation such as what we have from the landfill gas fuelled assets. But when it has come to the battery transitions, the bigger battery projects we are seeing popping up through the approval processes would almost mirror the centralised generation model that we are moving away from. While having these large-scale centralised energy storage assets has been important for, say, South Australia, and probably will be important for many other states and territories, if it is favoured over decentralised generation, we see that the same problems will occur, in that you will have higher

reliance on these singular assets versus a distribution of connected energy storage.

They were the key three points we made in our submission: the lack of cohesiveness through the process; the changing space when it came to the approvals; and the issue of what looks like a desire to be tempted to go for larger, centralised storage options over decentralised ones.

THE CHAIR: Thank you very much. In your submission, you talk about renewable energy zones indicating the best locations for network storage and reliable energy. How would that work? What do you mean by that?

Mr Doran: With all network providers, whether it is a distribution network or a transmission network, the current infrastructure has a limitation. In many cases, they have over-installed in capacity, so there is some capacity for either more generation or more demand in those zones.

If it was to be highlighted and made available to the public, that would indicate an existing area within the network that—it might be storage, solar, or wind generation—could come into the network with far less complication. As a project developer, you are normally looking to secure land somewhere first; then you are working through the relevant approval process to get the land use modified to suit that project, but also looking to get a connection to the network. If it was simply done in the reverse order—if a public list or documentation was put out there showing where the network is quite strong and has the capacity to receive so many megawatts worth of generation—it would skip a few of those steps, essentially, in the process of identifying suitable land and a suitable part of the network.

MS CASTLEY: So the ACT is far more difficult to get off the ground compared to other zones?

Mr Doran: Yes. It is not just the ACT; all the networks around Australia are regulated in a very similar fashion. They produce reports on an annual basis which to some degree give an indication of where they are experiencing some issues but do not always provide with clarity information about where there is ample or sufficient capacity in the network for other projects to come in.

MR BRADDOCK: I want to ask questions about the ACT green gas project, which you mentioned in your submission. To clarify a couple of details, you say that this development could displace five per cent of the ACT's existing fossil fuel gas demand. Is that based on all ACT landfill contributing towards that biomethane?

Mr Doran: If we were to convert the current gas from Mugga Lane, which is being used to generate electricity to pipeline specification, that is what could achieve that offset.

Essentially, within all parts of the gas distribution network there are losses, and it is up to the pipeline operator and owner to manage those losses. Whenever they are charging a gas supplier and a gas consumer for gas, they need to be able to balance that equation out. Those losses are regulated as well. We have been working with Evoenergy and their partner, Jemena, to look at a way to potentially supply them with

the gas that is required in that balancing equation but from a renewable source.

MR BRADDOCK: What would be the benefit of doing that over generating electricity in the Mugga Lane facility and just getting more people off gas? I am just trying to make that equation work.

Mr Doran: The current gas network does have a finite life. The territory's position and desires are well understood, but even on that trajectory, there will be a requirement for gas until those years come through. We are simply looking at the benefit, the value, of using the gas that is currently being extracted from the landfill in different ways. While we use it right now to generate electricity, it is entirely possible to convert it to this form of gas and supply it for that purpose over those forward years. It is simply aligning the desires of Evoenergy and the territory with a practical solution that can be made available right now.

MR BRADDOCK: I am still trying to understand the benefit of doing that. I understand it in that it allows the replacement of that gas in the network, but we could just utilise the electricity and diminish the amount of gas being utilised. I am just not sure about the equation.

Mr Doran: Electricity prices on average are coming down; gas has historically been creeping up. If the network operator, Evo, is having to source that gas from the market, it is likely to continue increasing on a forward path. Potentially sourcing it from this resource at Mugga Lane may allow the network operator to secure the gas over the forward years at a set rate without that exposure of increasing gas prices. And again, it is coming from a renewable source, not a fossil fuel source.

MS CASTLEY: If you are producing gas you cannot be producing electricity. Is there a trade-off there?

Mr Doran: There is definitely a balance. The process of converting the gas is energy intensive; it does require electricity. We would propose to keep some of that existing generation onsite to power that facility. You could then, hand on heart, say that the process is still green. If it were to scale up to a point where the gas output was in excess of what could be offered or made available from the landfill side, it might be that the generation onsite could be scaled down to enable more of that gas throughput into the network.

MS CASTLEY: My question is along the lines of your recommendations. This seems like a good thing for the ACT. Why was there so much pushback for the approval process? Was it just the planning and the zoning?

Mr Doran: The pushback we encountered was not for the green gas project, because we are still working through the consultation phase with the various stakeholders. Where we saw pushback was with the current facility—the landfill gas to energy plan. It was pretty clear that the regulatory body did not have the in-house expertise to assess it. We already had lodged the application and achieved a development approval, we had the connection approval from the network authority and then we encountered the utilities technical regulator team within the ACT government. Given the nature of this project, it is not something they were familiar with. It required us as the project

developer to bring in an external third-party auditor to act on behalf of the territory. That added about 10 per cent to the project bottom line, just through getting third-party approval on already third-party approved designs and documentation. It was an unusual process for the territory. Obviously, solar plants and wind farms are more familiar. A gas to energy plan is something new.

THE CHAIR: You are based in Queensland. Do you see other technology being used in other jurisdictions that you think could benefit the ACT that is not here at the moment?

Mr Doran: Other technology from gas?

THE CHAIR: Maybe the biogas, yes.

Mr Doran: There was a recent announcement by Sydney Water about a project to upgrade the gas from a water treatment facility for a pipeline specification supplier. That shows that the Australian market is seeing the benefits there. It is widely used in Germany and in the US. The idea that Australia has copious amounts of low-cost gas has not required these alternatives to be explored in the past.

Going to electricity technologies, grid-scale batteries are growing broadly across Australia. We are unique in that—by potentially pairing a grid-connected battery with an existing and better generator—we have a very low cost source of charging that battery pack and we have control over that cost. A network-connected battery would otherwise be exposed to the fluctuating energy market and see volatility and commercial risk.

MR BRADDOCK: Going to the big battery project, other submitters have said that it is expensive and probably not worth pursuing. What is your response to that?

Mr Doran: Everything at scale becomes cost-effective. I have no objection to the idea of a large battery. If you buy hundreds or thousands of units of something, its cost will come down on a per unit basis. In particular, when you get up into that scale, you have a higher capacity to negotiate the connection costs with the transmission networks and with the network operators. In the distribution space, it is far more regulated, and the fees are set—they are generally set on a five-year schedule—so it becomes more challenging to negotiate your way through that connection process.

MR BRADDOCK: And that works even with a distributed battery project? I see from your submission that you do not want one large battery; you would prefer to put it in places where it can support the grid in various spaces.

Mr Doran: Yes. The approach is that a single large battery becomes no different from the centralised generation model that we are transitioning away from. By encouraging a decentralised storage option, you can have the same quantity of energy available to be dispatched but, by having it across multiple parts of the network, it is more likely to be integrated with less cost, because it does not require significant upgrades in the network.

There are already parts of the Evo distribution network that are succumbing to

network constraints just through high rooftop solar uptake. You will have energy which is back-feeding through their network when it was designed initially to flow in the other direction. They would be great locations for a battery project to be deployed. It would work in conjunction with what the network is trying to achieve.

THE CHAIR: Could you have a bit of both—have your large storage batteries but also community-scale batteries?

Mr Doran: Yes; they serve different purposes. I think there is a common misunderstanding about the benefit of a large battery. It is not so much about having a huge reservoir tank to draw from. The battery in South Australia operated in the market recently when we had the massive power outage in Queensland—across the entire interconnected system. Then you have the capacity for these big batteries to offer services even when they are in different locations around the country.

MS CASTLEY: This is the only facility in Canberra that deals with methane and turns it into energy. What happens to the methane if you guys cease to exist in Canberra? Does it just go into the environment? What is the impact to the environment?

Mr Doran: The landfill process by which the waste is received, placed and covered creates an environment for bacteria to break down the waste. Through that process, you end up with gases, some liquids and residual waste material. The gases consist of methane. Methane has a global warming potential of 25; it is 25 times more damaging to the environment than regular carbon dioxide. If you look at it as a potential resource, methane is quite energy dense. That is the main constituent of natural gas; that is where the energy comes from.

We have a sufficient volume right now to extract that gas and generate electricity, and we will do for some years going forward. The old west Belconnen waste facility was producing enough gas to generate power. We have recently installed a flaring unit there which ensures that the gas is still being extracted, destroyed and combusted to reduce the global warming impacts, but it is no longer producing a sufficient volume of gas where it is viable to operate a power station. It is just reflective of the age of the facility. It was the original waste facility for Canberra, and it ceased to receive waste, I believe, in the late 1990s.

THE CHAIR: We do not have any more questions. Is there anything that you would like to add?

Mr Doran: We are working with the ACT government over the next 15 or 20 years. We are technology agnostic. We are just here to try and provide a solution that is deliverable now, and not something which we are looking to propose and see in 20 years. There is the point of difference that we have a broad fleet of generation across Australia, so the issues faced by the territory are not only faced by the territory.

I would just like to congratulate you on your efforts so far for emissions reduction and renewable energy uptake.

MS CASTLEY: What more do you need the ACT government to do?

Mr Doran: For developers like us, once a project has obtained an approved status, to simply support that project through to commissioning and not introduce new barriers or hurdles which just push out the time frames.

In the instance of the Mugga Lane facility, COVID definitely had an impact on our time frames; it impeded our ability to travel from Brisbane down to the territory. But the regulatory process probably added about six or eight months to our commissioning date; it pushed it out. That meant we missed a commercial opportunity to supply energy directly to a large energy consumer in the territory.

THE CHAIR: One of the things that has come up through some of the submissions is the issue of diplomacy and the ACT as a knowledge hub. We may not have big industry, but we have knowledge resources here.

Going to your point that you had to get that third party in, there could be opportunity there. Obviously, we are not drawing on our knowledge resources very well. Perhaps we need to improve that in tendering projects down the track.

Mr Doran: I completely agree. Once a project has been deemed approved or valuable to the territory for its ability to assist with this transition, it would obviously be in the interests of the territory to see that that project comes through in a timely manner and is not delayed by some months or years.

THE CHAIR: Thank you very much for your time today.

Short suspension.

BILLING, MR PETER, General Manager, Evoenergy

HINCH, MR LEYLANN, Group Manager, Strategy and Operations, Evoenergy

THE CHAIR: We will resume. Thank you very much for attending the committee hearing today, and thank you very much for your submission. Please be aware that the proceedings today are being recorded and transcribed by Hansard, and will be published. The proceedings are also being broadcast and web-streamed live.

I remind you of the protections and obligations afforded by parliamentary privilege, and I draw your attention to the privilege statement that is on the table. Could you confirm for the record that you understand the privilege implications of this statement?

Mr Billing: We do. Thank you.

THE CHAIR: Would you like to begin by making a brief statement?

Mr Billing: Thank you for the opportunity to speak to our submission this afternoon. I will speak a little bit about Evoenergy, by way of context. We are Canberra's local distributor, and we own and operate electricity distribution and transmission networks in the ACT as well as the gas networks in the ACT and the surrounding areas. We have about 202,000 electricity customers in the ACT. We supply 5,280 kilometres of line and assets, and they are worth about \$1 billion. The gas network has about 160,000 customers. About 150,000 of those are in the ACT; the rest are in New South Wales. We service about 4,200 kilometres of gas network and associated assets. That is worth approximately \$400 million.

As an essential service provider, we are proud to serve the ACT community. We are committed to ensuring that the networks continue to meet the needs of Canberrans, particularly as we transition to support the ACT government's achievement of the net zero 2045 target. We believe we can add significant value, through our expertise and our experience, to help to achieve that target. We believe we have a unique skill set and a practical understanding of the ACT's energy infrastructure network constraints—it goes to what Jarryd was talking about previously—and the evolution that is both planned and is actually happening now in the network.

Evoenergy has recently restructured our business to put a greater strategic focus towards the changes that are happening in our network and in our environment. We believe that we are well placed to deal with those things—the penetration of solar, batteries, electric vehicles and so on. They are commonly referred to as distributed energy resources.

We are currently involved in a number of projects—the zero emissions vehicles project; the REVS project, an EV grid project, which is around the actual integration of EVs into the grid; and the Ginninderry residential battery trial, a large-scale residential battery tariff trial. It partly goes to what Jarryd referenced around regulation associated with the distribution network. There is also a hydrogen test facility.

There are some future opportunities with the Jacka community battery project; a

converged project on which we are working closely with ANU, as well as ARENA; and a successful non-network option for a network battery to defer the Molonglo zone substation. That blends in with what Jarryd was talking about regarding investment in the network and the role that a battery can play. We are actually facilitating one of those projects, virtually as we speak.

We have well-established customer and community channels that enable us to garner feedback and advice on the impacts of changes in technology, as well as the costs associated with it. This feedback from our connections with the community is an important part of our planning for the future.

We believe that the Evoenergy network will play a critical role—in fact, a crucial role—in the integration of renewable energy innovation, today and in the future. Evoenergy looks forward to working closely with the ACT government in creating a future network that meets those needs.

THE CHAIR: I am interested in understanding the network and what that means in terms of what the previous submission was talking about, with going to a decentralised network and community-scale batteries. Would that be something—

Mr Billing: Yes, all of those components, including large batteries, depending on where they are connected. If the large battery is connected to the transmission network owned by TransGrid, it does not have any direct impact on Evoenergy because it is dealing with supply before it gets to our network. It does not reduce the need on the network but it does reduce the impact and the need on the transmission network.

Anything that happens from there on, which is our billion dollars worth of assets, can have a positive impact, if it is managed in a way that supports that. Jarryd mentioned, for example, that you charge a battery. If you are charging it off solar, which a lot of residential batteries are able to do, we are not in that loop. If that charging is done at night, for example, and therefore not off solar—it is coming off the network—it can actually add load to our network. Rather than being a benefit, it can actually be an additional load. Potentially, we might have to build more network to allow that to happen. They can work very closely together, but it is around how they are synchronised in that process. That applies to residential, community and a large-scale battery like the Ginninderry one that I mentioned previously.

MR BRADDOCK: My questions are around the gas network. We have heard today people suggesting putting hydrogen or biomethane into the gas network. Are those just interim steps or is there a future for the gas network that is actually zero emissions or decarbonised?

Mr Billing: Certainly, with green hydrogen, when it gets to a price point around \$2, potentially that is a long-term solution. If you are producing hydrogen using renewable energy, electricity, you are not creating any carbon through that process; therefore the green gas itself is zero carbon. That really becomes the long-term goal.

Biomethane, as Jarryd talked about, can be there for as long as there is biomethane to be able to source. The limitation relates to how much biomethane is actually available

to create that. Green hydrogen in itself is potentially the long-term solution for the gas network that would enable the gas network to stay viable and be a low-carbon, zero-carbon, energy alternative for the ACT and other jurisdictions.

MR BRADDOCK: As far as I understand it, though, to go to a hydrogen-based gas network all of the appliances on the consumer side would have to be switched over or made compatible.

Mr Billing: Yes, there is a compatibility issue that needs to be dealt with. There are also regulation issues that need to be dealt with. The reality is, though, as you blend hydrogen into your network, people can look at that change as a long-term thing. You do not convert in a day. People upgrade their appliances today; if they were converting from gas to electricity, they would be converting their appliances. Those sorts of transitions can be done over time. Your hot-water service fails at a point in time; that is the time to make it compatible. If you want to upgrade gas cooktops, that is the time to make those compatibility changes. That is a way off. That is not happening tomorrow. But there is significant investment, both in Australia and around the world, on hydrogen technology. That does become a future option.

MR BRADDOCK: If that future option succeeds, that is great, but if it does not, how quickly do we have to disconnect people from the gas network, to meet our targets?

Mr Billing: We have not done any modelling around what would be required to meet those targets. We are certainly in the process of doing some of that modelling work. In fact, we are having a meeting later this week with a proponent that will help us with some modelling, to help us in that space. But we do not have those answers at the moment.

MS CASTLEY: Can you tell me a bit more about the hydrogen facility in Fyshwick—the testing?

Mr Billing: Yes. There are two facilities. Evoenergy is part of ActewAGL. ActewAGL has a retail business, as you would be aware; then there is Evoenergy. Evoenergy is the network operator. We have to provide, and we do provide, the services for all retailers, regardless of who they are. We are ring-fenced from the retail business so that there is no cross-subsidisation out of our part of the business across to ActewAGL's retail business. One of the facilities is run by the retail business, and that is the refuelling station. We do not have any direct involvement with that, albeit at a joint venture level the two parts of the business are under the one JV.

The test facility has put a small sample of the existing gas network into a test bed. It is producing hydrogen via a solar panel and testing to see how the network adapts and see whether there is corrosion. It is about what issues we see. We are able to do that. There is a plan to bring gasfitters and others through there so that they can see and feel what it looks like with a hydrogen-based network. That test plant continues to evolve as we understand more about what we need to do.

MS CASTLEY: In terms of technicians for your network and for these technological changes, we spoke to CIT before, and that was really interesting. I am interested to know whether you are identifying gaps in the training of your technicians, or where

they need to be.

Mr Billing: Part of the learnings that we will get out of that test facility is about what that training piece is. With respect to where the Australian industry is at the moment, Jarryd also mentioned a facility in Sydney, with Sydney Water. Jemena, who were part of that project, are also doing a hydrogen project in Sydney. AGIG, based in South Australia, are doing a conversion of a suburb ultimately to hydrogen. That piece around the transition of skills is actually being done at an industry-wide level. We will have the benefit of the results of that, but we are inputting into that by bringing gasfitters through that plant now, to see what we can learn from them as they go through.

MR BRADDOCK: In terms of the ability of a network to take the change that is coming with zero emissions vehicles or having to charge off it, and with more and more people putting power back into the grid and so forth, how is it positioned to take those two-way flows and provide that stability?

Mr Billing: There is not a single answer to that. It goes back to the comment I made before. If we are in a position where all of the batteries connected to the network wanted to charge when they were not on the network, and EVs were charging at the same time, we would have to build a significantly larger network, because that would be coming as load. If I use an EV as an example, you come home, park your EV in the shed at night, at 5.30, that is peak time; everybody is cooking and everybody is using energy at that time. If it sat there idly but connected, and then it got a signal at 9 o'clock to say, "Now is the perfect time to charge," it would charge, and it actually fills a gap, in effect; so that it levels the load on the network.

The reality with the electricity network is that it has to meet the peak. Everything that we build is for the peak because people do not accept—and nor should they—that, when a peak happens, the power goes off to deal with the peak. The power should be there 100 per cent of the time, subject to lightning and other forces of nature.

We build to that peak. If we use all of those resources, whether they are residential battery, home batteries or EVs, and look to flatten the peak around when they are being used, that will not work for everybody all of the time, but if that was the case at a level of principle, ultimately we do not need to invest more in our network, and it can actually work within the constraints that it has. At times of the day, the energy is flowing towards residential customers, towards customers, because that is how they need it, and that would be more so at night, when there is no solar and so on. During the day, that flow can be the other way. The key is that no one bit adds to the total volumes to any great extent.

I am not saying that there will not be any expansion of the network—there will be. It will not exactly meet the needs. The key is that we limit what that growth could be by providing the right signals for customers: "This is the best time to use it. It doesn't suit me tonight; I've got to go out again at 8 o'clock. I'm going to charge my car." And so they should. But, in general, when you come home most nights, you plug it in and it waits until that low period of time of usage, which flattens that peak demand. Ultimately, where the control sits and the amount by which we can flatten that load will determine the investment level.

The other issue to be cognisant of, particularly in the ACT and in some of the other jurisdictions as well, is that, progressively, as we take gas load away, that will add to the peak. If you are, say, in a location where there is either no gas at all or very low use of gas, we are really only talking about the current transition with EVs, batteries and solar. We do have the additional nuance of people being encouraged to go off gas and increase the electricity load as well. The modelling that I referred to earlier will play out in that space as well. We are keen to understand what that would look like and over what period of time.

MR BRADDOCK: So am I.

Mr Hinch: With respect to shifting the load, it is economically a good outcome for the customer as well, because shifting outside the peak area means that it is a lower tariff, and it is saving the person money when they charge their car.

Mr Billing: Picking up on the economic piece, with building the network, let us say that nominally our customer base stays broadly the same. The ACT is clearly growing, but it is not growing by 50 per cent in the next five years. It is steadily growing but, broadly, the customer base is the same size. If we have to invest, say, \$1 billion in the next 10 years to grow the network for the gas load that comes across, that \$1 billion gets spread across the existing customers, with that small amount of growth.

Normally, when you are building a network, it is purely on the basis of building for additional customers' additional load; whereas we are shifting load that has already been covered by the gas network and putting it onto the electricity network. That means there is less revenue flowing back into the gas network, but more work is required on the electricity network. There are really the two things at play—that distributed energy resources piece and the gas load.

THE CHAIR: Does that sound like it would be more expensive for low income earners who cannot transition to these new technologies?

Mr Billing: If you got to a position where, say, the gas customer base was a third the size that it is now, that fixed cost of \$400 million does get spread across a third of the customers. In effect, if those customers that are left are the ones that are not able to afford the transition, the network component of their bill will rise, yes.

MR BRADDOCK: Would the network then go into a death spiral?

Mr Billing: It does, ultimately, yes. As the owner-operator of the gas network, we obviously care about that \$400 million that we have invested in the gas network. Our preference is to find a solution for the gas network into the future that meets net zero by 2045. We want that outcome; we live on the planet as well, so we are all chasing the same outcome.

Financially, we feel that that would be a better outcome. We want to do the modelling that shows what that looks like financially. But we are also realistic and understand that we have to make climate action happen. If we could maintain a viable gas network into the future with a green gas, we think that is the best outcome.

MR BRADDOCK: GreenLaw recommended that we shut off gas by 2030. I would be keen to hear your response to that.

Mr Billing: I do not know how we would achieve that. I mentioned \$1 billion more, a moment ago, which was just a number that I have manufactured.

MR BRADDOCK: We won't hold you to it.

Mr Billing: I would suggest that it would be a much larger number than that, that we would have to invest in the existing electricity network, to facilitate that piece of work. Again, the modelling piece of work that we are looking to do is to look into that.

MS CASTLEY: It is more financially viable to keep working on the hydrogen option than to just upgrade electricity for the network?

Mr Billing: We believe that is the case; we cannot prove that is the case. That is what our modelling is going to look at. If the modelling says it does not make sense to do that, we will be the first to put up our hand. From our owners' perspective—and the ACT government is a 50 per cent owner through Icon investment—we have an obligation to look at how we achieve net zero by 2045 and how we manage a viable gas network into the future. If that can be achieved through green gas, our feeling is that that would be the best outcome, but we need hard information to be able to share with all of the stakeholders and say, "This is what it what it would look like over a period of time."

MS CASTLEY: It is not net zero at any cost; you have to weigh it all up. Is that what you are saying? You have to work out whether hydrogen is good, clean, viable and cost effective. And if it is good and clean but it is really expensive, it would be better to just nix that idea and go to clean electricity.

Mr Billing: Yes, absolutely. We accept that the answer is the answer. The advantage that the ACT has at the moment, and we have as a business operating a gas network, is that we are a small jurisdiction and a small organisation, relative to other parts of the world. There are literally hundreds of millions of dollars being invested into hydrogen as a technology for the future, so we are not alone in where that would go. That is a piece that we are piggy-backing on, but we do need those greater resources to do that piece of work.

As Jarryd mentioned, we are a regulated business; we get a new regulatory control period every five years. We know that the more we invest, the more prices go up. If there is an outcome that keeps prices more stable for customers going forward—particularly the disadvantaged, but all customers—that does not involve a lot of investment in the network and building a network, when there is a gas network there, that feels like it will be a good outcome for all customers. But we are not suggesting that it is a trade-off, and that you cannot have a net zero 2045 outcome.

Mr Hinch: The distributed batteries especially could play a role there, where we have constraints in the network. If you get a third party to put a battery there that alleviates that constraint, just for that peak period, maybe only for a couple of hours in the

evening, that will stop us building a network as well. The outcome for the customer, over time, is that there will be fewer charges around that infrastructure.

MS CASTLEY: When you say a third party, do you mean the household themselves buying their own battery?

Mr Hinch: It could be a household, with a residential battery; it could be a community battery that is by a third party. Evoenergy has rules that outline ring fencing. We cannot be a generator. There are certain things that we can use batteries for, but it is not to provide energy. We can use it for stability and other things. We can pay for that service, rather than build the battery ourselves. There are more income streams out of a battery than just providing power. There are things around grid stability and voltage control. They are all things that are important to us that we may find it is worthwhile paying for.

Mr Billing: If we are going to invest, in a single project, more than \$6 million, we have to do a regulatory information test for distribution. That means, in effect, that we go to the market and say, “We need to build something and it is going to cost more than \$6 million; have you got a solution that causes us not to build or, worst case, defer that build for a period of time?”

We did that for the Molonglo Valley, where we will, at some point, potentially need to build a new substation to deal with the growth that is happening out there. We went to the market and we had two viable proponents come back and say, “We believe, on the basis of the role that a battery could play, that we could put a battery in,” and that would mean we would potentially defer building for at least two years. So we do not need to spend the capital to build a new substation; that battery can sit there and play the role by taking some of the load off. Therefore the constraints are waived from the existing lines that are in that area. Hopefully, we will have that project live by January or February next year.

Mr Hinch: Yes, we are hoping by February and commissioned by winter of the following year.

Mr Billing: That is a great example. From the proponent’s perspective, they would be saying, “I can sell some of my services into the broader market,” into, in effect, the National Electricity Market. They know that we will pay them to be available for certain times of the day and certain times of the year to take that peak off, which means we do not have to invest in our network to the point that it is beyond the capabilities of that battery. It is a best-case outcome, really.

Mr Hinch: We believe we will be the first in Australia to achieve that. That will save consumers money, in providing for their infrastructure.

Mr Billing: Jarryd mentioned our annual planning report. It has our network constraints. The next area is the Gold Creek area. That could potentially involve, again, investment over \$6 million, so we will do the same thing. We will go out and do that test and see whether there is a non-network solution, so that we do not need to build anything; somebody else can provide a solution for us that keeps that load down. It is the responsible way of managing our network. It means that we do not invest tens

of millions of dollars. The customers do not have an impact on the quality of their supply and we maintain level prices through that, or a very slight increase.

Mr Hinch: One thing that the transmission of the big battery cannot provide is relief of those network constraints. It can do a lot of the services that the distribution battery can do. It can do all of the national electricity market things, and stabilising the grid, but it cannot defer network constraints. It is too high on the network; it needs to be distributed if you want to benefit the ACT customer area.

MR BRADDOCK: What is the level of distribution? Would it be down to every 100 houses, a suburb level or a district level?

Mr Hinch: At the moment we have integrated about 1,100 residential batteries that have come out of the next gen battery. They are live in our network and connected. We have real-time visibility of them right now. We can take them at that level, the household level. We can take them at the street level. We have a project that we are hoping to materialise, which is the Jacka community battery project, which is about putting a battery next to the street substation to soak up the solar during the day and return it to the customers in the evening peak. Therefore we do not have to upgrade the infrastructure. You can then go to the next level, which is like the Molonglo zone level. We can have them at all levels in our network.

Mr Billing: When we store it next to our distribution substation and put it back in, customers do not get paid for that, but we do not need to build a network to deal with the solar that is being pushed in, so they save. That build, ultimately, has to be paid for. So there is a saving and, in a way, a payment to customers. It is not a matter of saying, "This is what you get paid for," but the less we invest, the less we are spending on the network. At the end of the day, as a regulated business, with the money we spend on the network, we basically get it straight from customers through their bills.

THE CHAIR: I have a question on research. There are lots of comments in your submission around collaborating with industry, academia and trades. You mentioned in your opening statement some different projects that you had. I am interested to know how you see that, in the ACT, we could be facilitating those collaborations better. Do you have any ideas there?

Mr Billing: Yes. As I said in my introduction, we feel that we have a unique skill set. We feel that we can be part of the solution. Early collaboration and conversation with us enables us to explore the options before decisions are made. We continue to say, "We're here and available, we're keen to be involved in this transition all the way through." Our key objective is: the more we collaborate, potentially, the less cost the solution can be, but it can achieve everything that a solution is looking to do.

We do not see LGI, as an example, as a competitor; we see them as an opportunity to be part of the network that we have, whether it is through them generating into the electricity network, as they currently do, or through the green gas option that Jarryd talked about. I think that principle applies across the board.

Mr Hinch: The ACT government's Renewable Energy Innovation Fund is really

crucial for us as well, because we are regulated in our income sources, so it is a stream of income that we can use specifically for innovation projects that we would not otherwise have. That has sponsored a unique trial of residential batteries. We can defer expenditure out at Ginninderry—put in just the minimum capacity network and use the residential batteries in a clever way to minimise demand over the peaks. That is a unique project that we are doing at the moment, that is funded—

THE CHAIR: When will that have findings or results?

Mr Hinch: Through 2021, and through to the end of 2022. As the houses get built, they are putting batteries in 75 homes out there, around one of our substations. That allows voltage control and peak management. We will use the tariff trial that we have underway, which will start on 1 July this year. As customers come on, they can opt to join that. That is, again, a unique trial for the ACT, as a light on the hill project.

THE CHAIR: Thank you for your time today. It was very interesting.

Mr Billing: Thank you; we appreciate the time.

Hearing suspended from 2.32 to 2.42 pm.

OLBREI, MR ERIK KARL, Director, Harvest Hot Water

THE CHAIR: Thank you very much, Erik, for appearing before us today. I remind you of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement before you on the table. Can you confirm for the record that you understand the privilege implications of the statement?

Mr Olbrei: Yes, I do.

THE CHAIR: Thank you. Would you like to give a brief opening statement before we begin questioning?

Mr Olbrei: Thanks for the opportunity to appear today. To introduce myself, after completing a master's in climate change at the ANU, I set up Harvest Hot Water as doing my bit for action on climate change. Today I want to draw out some of the key points from my submission: firstly, that the ACT should position itself as a national leader in energy efficiency. Australia is right at the back of the pack; we are the worst performing developed country in the world for energy efficiency. ACT households are the second highest energy users in Australia, after Victoria.

More than half of the energy we use goes into inefficient gas home heaters and gas water heaters. Renewable space heat pumps—in other words, reverse cycle air-conditioners and water heaters—use far less energy than gas appliances. It has just recently emerged that gas in our homes—that is, methane—is a health hazard for children, who are more susceptible to coming down with asthma.

The ACT should aim to become the first jurisdiction in Australia to mainstream heat pump technology, so home heating and water heating. In doing so, we will show other jurisdictions the way forward. It would also support the ACT's goal of becoming a national hub for renewables innovation and it would involve quite a lot of local research because there is a lot that we can still learn about heat pump technology.

We already have an energy efficiency scheme, and that takes me to my second point, which is that the ACT's energy efficiency improvement scheme is badly underperforming; it could do a lot better. Canberra households pay over \$11 million a year for the scheme. Since 2018, it has been designated as a key delivery mechanism for achieving the ACT's emission reduction targets, but no plan or strategy was ever devised to deliver that outcome.

As a result, the ACT is tracking well short of our 2025 emission reduction targets. That is because of the EEIS. Let me explain that. Achieving the 2025 targets requires significant reductions in gas usage. The climate strategy shows that we need to achieve around 9,000 household disconnections from gas per year to deliver the reductions we need. The EEIS is the instrument to achieve that, by providing rebates to reduce the cost of replacing gas appliances with efficient heat pump alternatives.

A study done through Evoenergy back in January, which took careful account of the impact of the EEIS, showed that we are on track to achieve just 3,000 household disconnections a year over the next few years. So the EEIS is nowhere near achieving the gas replacements that are needed. Last year it replaced about 2,500 gas appliances.

With the funding that is available for the scheme, it could and should deliver around 10,000 replacements a year. That is entirely possible.

Another concern is that market competition is non-existent in the scheme. Not only that but also ActewAGL, as the sole entity implementing the scheme, and the ACT government, as a 50 per cent owner of ActewAGL, are almost certainly in breach of national competition law in the operation of the scheme. Maybe you would like me to explain that.

The national legislation sets out two tests for misuse of market power. The first test is whether the business has a substantial degree of power in a market. Clearly ActewAGL does. It decides which firms will be given access to the EEIS rebates. It has exercised that power by giving the rebates to just three firms in the ACT, and that is in a market that comprises 190 air-conditioning firms and at least 120 plumbing firms. All the rest are excluded.

The second test is whether the conduct of the business has the effect of substantially reducing competition in a market. Again, Actew's conduct clearly has that effect. The three firms which have access to the rebates are able to reduce their prices by anywhere between \$500 and \$2,000 per appliance. That has the effect of locking everyone else out of the market, because nobody else can compete.

So why is the EEIS underperforming? Apart from the problems I have already mentioned, there are no performance targets for the scheme. It is left to electricity retailers, and that is just ActewAGL, to implement the scheme as they see fit. ActewAGL uses around one-third of the rebates not to promote energy efficiency but to lock its customers into ActewAGL, because part of that rebate is paid out as electricity bill reductions over a three-year period. That is money that comes out of our pockets. Not one of the smaller retailers has participated in the scheme in the eight years in which it has been in operation.

To get the scheme working well, we need to set ambitious 10-year targets for climate action. The scheme should deliver 90,000 household disconnections from gas by 2030. For energy efficiency, it should halve energy use for home heating and water heating by 2030 and, for household energy bills, it should halve the cost of home heating and water heating by 2030.

To sum up, we cannot leave the EEIS to limp along the way that it is. If we want healthy homes for our kids, if we want reduced energy bills for Canberra households, if we want to meet our emission reduction targets and if we want to be sure that the ACT is not in breach of national competition law then we need to act now to ramp up the performance of the scheme. We can achieve that by opening the scheme to market competition, allowing all qualified ACT businesses to participate, and letting that competition drive down prices. We should require ActewAGL to purchase energy savings from the market, not from the three firms that it is associated with. We should require all electricity retailers to participate in the scheme. This can all be done if we only have the will. Thank you. I look forward to your questions.

THE CHAIR: Thank you. My understanding is that the tier 2 retailers pay a fee to opt out of the scheme, basically. I understand your point that that results in us not

meeting our objectives for healthy households, reducing climate change and that type of thing. Where I am seeing the issue is the fact that ActewAGL—not the fact that they are the largest market provider nor the fact that they are a tier 1 provider—have only the three installers. If ActewAGL had to open up to the market, as you said, would that solve the problem?

Mr Olbrei: I think it would. A tier 1 retailer is any retailer that sells more than 500,000 megawatt hours of electricity a year, and that is only ActewAGL. They are required to achieve—it used to be abatement—energy savings. Under the legislation, they have the option to (1) achieve savings themselves or (2) purchase savings from energy savings providers, Canberra businesses. They run tenders but, until recently, the only one to tender was the ActewAGL energy shop. In the last year, they have added two other firms, so now there is a total of three.

If that clause were struck out of the legislation, the clause that allows them to implement energy savings themselves, they would be required to go to the market. If the Environment, Planning and Sustainable Development Directorate, which manages the scheme, opened up the market and accredited other firms as energy savings providers then there would be a market there and ActewAGL could buy energy savings from them. That would have the effect that a large market of installers would have access to the rebates, and they would be able to drop the prices for households by as much as \$1,000 per appliance.

MR BRADDOCK: I am going to start by diving into the numbers of your estimates and so forth. Firstly, you are saying there are 100,000 gas space heaters and about 130,000 water heaters. What would be the average life expectancy for those?

Mr Olbrei: Estimates vary. We could say roughly 20 years. There is one figure of about 25 years for home heaters, ducted home heaters, gas heaters, and 18 years for electric hot water systems. There is an assumption that heat pump water heaters go for 10 years, but there is no clear evidence for that.

MR BRADDOCK: So you could run off a decent assumption that we would need to replace 115,000 every 10 years to roughly get in that vicinity of replacing them over a 20-year cycle. Is that correct?

Mr Olbrei: If we have 100,000 appliances that lasted 20 years, I get 5,000 a year. No, that is not right.

MR BRADDOCK: There are about 230,000 in total—

Mr Olbrei: That right.

MR BRADDOCK: roughly.

Mr Olbrei: When suggesting that the scheme could replace 10,000 a year, it would mean that over 10 years, by 2030, 100,000 would be replaced. Outside of that, there is the \$15,000 interest-free loan scheme coming in. The effect of opening up the market would be to drive down prices so that people would be increasingly opting to buy heat pumps, even outside of the scheme. I think we should be aiming by 2030 to largely

replace that stock.

MR BRADDOCK: That is what I am trying to wrap my head around. You also recommend a performance target of slashing energy use for space heating and hot water by 50 per cent by 2030. So that would be based off that roughly 10,000 a year, converting them to heat pumps, to do that.

Mr Olbrei: Based on the efficiency of heat pumps versus gas appliances, I have a table in my submission which shows that heat pumps use a fraction of the energy of gas appliances. That was a point that Andrew Blakers—and possibly John Grimes—mentioned. You have got an efficiency multiplier with heat pumps and for every kilowatt hour of electricity that comes in, it does not just produce one kilowatt hour of heating; it produces four kilowatt hours of heating. That is the magic of heat pumps.

MR BRADDOCK: And it is the magic of Evoenergy saying, “If we get off gas tomorrow, that load moves onto the electricity network.” You have to pay for the network improvements, but if you have energy efficiencies like heat pumps, you are essentially slashing that by half, as you say, in your targets.

Mr Olbrei: That is right. You are making a major reduction in the energy that is needed. It is true that, by shifting our energy use from gas to electric, it will increase electricity demand but it does not have to happen at peak hours. Water heating can happen during the day, outside of peak hours, so it would not place a burden on the peak.

MR BRADDOCK: So you are saying that we should average, say, 10,000 per year. We have fallen behind already in 2021; we are looking like we have only done about 2,000 or so. That means we will have to play catch up and do 9,000 in the next year; is that correct?

Mr Olbrei: There are two sets of numbers. One is the number of household disconnections and the other is the number of appliances replaced. What I am saying is that, while ActewAGL replaced 2,500 gas appliances, it does not mean 2,500 households disconnected. It might have been 1,000 because they might still have other gas appliances. With every removal of a gas appliance, the case for going off gas becomes so much stronger because just having that connection costs over \$300 a year, before you even start using any gas.

MR BRADDOCK: Thank you.

MS CASTLEY: Following on from that, I want to make sure I understand: not all electric appliances are heat pumps—

Mr Olbrei: No, they are.

MS CASTLEY: So when we are talking about people changing their appliances, it is purely a gas appliance to an electric appliance and that will increase the load. My concern is how on earth did we get to these figures in the EEIS? I do not know whether you heard Evoenergy?

Mr Olbrei: No, I did not.

MS CASTLEY: They said that the network is not ready for us to go all-electric. So where is the discrepancy? Is it that the scheme was incorrect or was it just saying, "Let's get off gas by this point and that's the best thing," except Canberra is not ready for that? I am just trying to understand the discrepancy.

Mr Olbrei: It is an issue, but it is not a major problem. Andrew Blakers said this morning that we should be aiming for far more renewables. In the ACT, we can run more reverse auctions for additional wind and solar farms; we can do that. I know that the ACT government is aware that there is an expectation of increasing demand for electricity. It is not just heat pumps; it is electric vehicles. That is going to be a major development. On a couple of occasions I have heard Shane Rattenbury mention that this is something that is under investigation as to what might be the anticipated increase in demand, and then planning for that increase.

MS CASTLEY: In the report it says that we need 9,000 a year to get off, and we know that that is the increase in the electricity demand. Can Canberra cope with that?

Mr Olbrei: I have not seen any analysis of that. I think we can be very confident that we absolutely can, because the electricity consumption of a heat pump is quite low; it is really low. A lot of it can be mopping up excess solar generation during the day.

MS CASTLEY: In relation to the technicians, we have spoken to CIT today. It was really interesting to hear their views on trying to lead the way in terms of the training that they are offering. I am interested in your thoughts, working in the field. Do you think there is more that we could be doing to train people and improve skills in the ACT?

Mr Olbrei: In terms of heat pump hot water systems, they are very straightforward. They mimic traditional electric hot water systems so that any plumber can install one. What is needed is more awareness amongst installers about the value of heat pump technology, particularly the benefits of heat pump water heaters as opposed to gas heaters. Most plumbers are deeply wedded to their gas hot water systems.

MS CASTLEY: That is interesting too, because one of the other things we have been talking about today is how to transition the public and the community more broadly, to educate people. That has come through as a really big thing that we need to be doing.

Mr Olbrei: It is. It is well recorded that the average householder, when the hot water system fails, misplaces their trust, in their plumber. Their plumber will say, "I can get you out of trouble. You've got an electric hot water system. I can get you a replacement electric hot water system today." Or they will say, "You've got a gas system. I'll bring in a new gas hot water system." Because the energy efficiency scheme is locked up to three firms, the plumbers, while they may be aware that heat pumps are an option, cannot get the rebates so they will discourage people from installing heat pump water heaters, knowing that these three firms can undercut them on price. There is a real need to sensitise plumbers to heat pumps because they are the first port of call.

I have one other point about increased energy demand. Part of the issue, which I think Andrew mentioned, is that there are probably 30,000 traditional electric hot water systems in Canberra. Replacing those with heat pumps will significantly reduce electricity use, because the requirement under the Australian standards is for heat pumps to use at least 60 per cent less electricity than traditional electric hot water systems. So there is one sort of benefit there.

MS CASTLEY: Great.

MR BRADDOCK: I am trying to find a reference, but I cannot. My advisers alerted me to the fact that the cost of disconnection is actually \$772, which I find quite amazingly expensive. It is a disincentive.

Mr Olbrei: It does not have to be. If someone is disconnecting from gas, they need to simply close the account. That might involve a final reading and the cost might come in at \$130 or \$140. If they take away their gas meter, they get into that terrain. So the shot is to say, “No, I like the meter; leave it there, just close the account.”

MR BRADDOCK: But at some point, if the gas network is to go, those meters will have to go.

Mr Olbrei: Yes, but whether the home owner has to pay for that would be something up for discussion.

MR BRADDOCK: Thank you for your very useful advice about just closing the account.

Mr Olbrei: Can I make one final comment? I have attempted a dialogue with the environment and planning directorate for over a year now, and there seems to be an impediment. I do not have a sense that there is a will to change the scheme. I think everything I said in evidence is all there. We can make that scheme work far better. It is puzzling that the directorate have not been enthusiastic. I am hoping that your committee might elevate their level of enthusiasm.

MS CASTLEY: Why do you think that is? That they are unwilling to change?

Mr Olbrei: I do not know. I cannot imagine why. I cannot imagine why they would not embrace those ambitious targets that I mentioned. In fact, the 90,000 household disconnections are straight out of the ACT climate strategy. Do we want to achieve the strategy or not? If so, we need the 90,000 disconnections. I think that the directorate should be much more proactive on this front.

MR BRADDOCK: I look forward to asking them those questions when they appear.

MS CASTLEY: Absolutely.

THE CHAIR: Thank you very much, Erik; we appreciate your time.

Short suspension.

McKENZIE, MS SHAHANA, CEO, Bioenergy Australia

THE CHAIR: I need to remind you of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement, which you have, I think.

Ms McKenzie: Yes.

THE CHAIR: Can you confirm for the record that you understand the privilege implications of that statement?

Ms McKenzie: Yes.

THE CHAIR: Wonderful. Would you like to make an opening statement before we start questions?

Ms McKenzie: Yes, sure. Ours is fairly simple. In relation to the work that is being done in the ACT, particularly around the inquiry into renewable energy innovation, there are probably a few key points for us. One is in relation to the phase-out of gas, and we would like to see that the ACT government put more of a focus into driving renewable gas solutions in the ACT. The second is around the role of renewable fuels, particularly in the transition to electrification. To be honest, they are kind of the two key major, overarching points that we would like to put forward. I can dive into further detail in relation to those.

THE CHAIR: Do you want to start by outlining what your business is and what you do.

Ms McKenzie: Yes, sure. We are Bioenergy Australia, the industry association for Australia's future bioeconomy. Basically, if you can imagine anything that is currently produced from a fossil base, it can be produced from an organic waste stream. We have close to 200 members as organisations, and they range from airlines—Qantas and Virgin—through to large engineering firms, global developers, project initiators and finance organisations. We have pretty much all of the state governments except for the ACT, as well as CSIRO, ARENA and CEFC as examples.

Basically our agenda, as the industry association, is to drive commercial outcomes for the development of the sector. I suppose the key major initiative that has taken place over the last two years was a commitment by the federal government through Angus Taylor to develop a national bioenergy roadmap. That is currently complete, and we are awaiting the minister to release that. We are hoping that that is going to take place in the next month. So that, for us, is really the major focus.

As an industry association, we run a number of alliances that are looking at the practical barriers, challenges and opportunities across different areas. We run something called the Sustainable Aviation Fuels Alliance of Australia and New Zealand, and that has all the airlines, airports, Boeing, financiers, fuel producers and the like. We run the Cleaner Fuels Alliance, the Renewable Gas Alliance and the Renewable Heat Alliance, as well as the Circular Economy Network, Bioenergy Government Network and a research network. That is us in a nutshell, but all of those

kinds of details are included in our submission.

THE CHAIR: Thank you.

MR BRADDOCK: My question is related to using biomethane injected into the gas network. Firstly, would there be enough feedstock from the ACT to be able to take over from the entire natural gas or is that just unrealistic?

Ms McKenzie: We have not done specific modelling in the ACT to show exactly whether it could cover the entire residential gas usage or industry gas usage and residential in the ACT. In terms of the modelling that has been done, I am very happy to come back to you in terms of specifics on that. We do have Evo as members of Bioenergy Australia. We have quite a number, including Jemena, who obviously have a leading role in the ACT as well.

The modelling that has been done in terms of current waste being seen as emitted into the atmosphere across the east coast—particularly across New South Wales—has shown that it would supply 80 per cent of the residential gas use in New South Wales. So we are fairly confident. I suppose some further work does need to be done on it in the ACT in terms of understanding the opportunity there. Currently the wastewater treatment plant is not capturing the gas. We have fairly significant quantities in terms of commercial and organic food waste that could be being utilised, and the back end of anaerobic digestion is providing a compost product at the end as well. So, whilst there is that extracting of the methane through the process of the anaerobic digestion, there is then that product that comes out the other end, which is a really high-value, nutrient-rich product as well.

So, whilst we do not have significant abattoirs, piggeries or other kinds of wet-waste streams in the ACT specifically, because we do have the hospitals, the stadiums and the fairly vibrant and thriving restaurant industry most of the time, we really do see that there would be a significant opportunity for facilities similar to, say, what Yarra Valley Water are doing. They are co-digesting. Their wastewater treatment plant is co-digesting with commercial food waste. They have done one project and they have actually just announced, in the last six months, that their second facility is being converted to that as well.

THE CHAIR: Sorry, can you explain what “co-digesting” means?

Ms McKenzie: Yes. Co-digesting is not a single-stream waste. So, it is not just about the sewage plant and capturing the methane from the sewage plant; it is about adding commercial food waste into the anaerobic digestion process in order to enrich the calorific value. So, effectively, it is going to provide you with a lot more gas and a higher-value gas. Basically, the anaerobic digester is like a big gut and it is about putting a lot more into that gut—rather than its going to landfill—in order for it to basically churn like a gut would churn and produce that methane, which would otherwise be emitted into the atmosphere. So capturing that methane through the anaerobic digestion and then injecting that into the gas network. Australia will have its first injection project, it has been announced, at Sydney Water. Sydney Water, as an example, have 10 out of their 13 sites as anaerobic digestors, and they are currently utilising that gas to reduce their energy usage by over 60 per cent across their sites—

just as an example.

MR BRADDOCK: I have a follow-up question. When we are talking about biogas, is that a half-way step towards a zero emissions future or do you see it as actually being able to achieve zero emissions from biogas?

Ms McKenzie: We would say that zero emissions is achievable, absolutely, in terms of biogas/biomethane. The BIEA report that came out—I think it was two weeks ago—was quite interesting. That showed that by 2050 biomethane was going to be pretty much on par, with hydrogen production at a global level. I think that right now there is a lot of hype around hydrogen, but the reality of hydrogen is really challenging, whereas biomethane is a natural gas replacement. It does not require any appliance upgrades. It does not have any corrosive effects on the pipeline network. It is otherwise taking emissions that would be going into the atmosphere and utilising those for an energy source.

So there is a significant opportunity there and whilst we are very supportive of hydrogen and we think that hydrogen has a fantastic role to play, biomethane could be being utilised today in the gas network. We are still going to have food waste in 50 years' time. We are still going to have sewage treatment plants in 50 years time. We are going to have to deal with this waste and we are going to have to manage it. And this is a really positive way of being able to do that and reduce emissions that would otherwise be going into the atmosphere.

Copenhagen, as an example, has committed to seeing 100 per cent biogas in its gas network by 2025. I think that in France they have just clicked over to 1,000 projects which are injecting into their gas network. So we are a little bit behind the game, but we are not that far behind. There is a really big opportunity in terms of us being able to catch up.

MS CASTLEY: I have so many questions.

Ms McKenzie: I love it.

MS CASTLEY: I do not know what I do not know, yet. How far away are we from using more of this biogas? The bioenergy road map will speak to that, but—

Ms McKenzie: We currently have over 200 projects in Australia that are capturing biogas. As an example, the abattoir at Goulburn—I am going to say Mikes Meats, but maybe it is not—is probably the closest one in terms of proximity to Canberra. That is a lagoon digester, and they are capturing the methane off that and using it behind the meter. At the moment we think that there are probably close to 300 projects across Australia—somewhere between 250 and 300. They are all utilising the biogas at the moment behind the meter for electric generation. So it is not currently going into the gas network. And you would say that it is probably the case—not just in Australia, but globally—that over the last 20 years there has been a very strong focus on decarbonisation of the electricity sector but not a strong focus on decarbonisation of the gas sector.

MS CASTLEY: Sorry, what does that mean exactly? Can you just break that down a

bit for me, for the numpty in the room?

Ms McKenzie: Yes, sure. As an example, in Australia we have had the RET, right? Whilst it is called the renewable energy target, it is not. It has been a renewable electricity target. Renewable gas projects did not qualify; it was around decarbonisation of the electricity network. Really, that has driven investment in developing biogas projects but instead of that gas being used for gas, that gas has all been used for electricity. So now we are seeing a strong push—predominantly, I would say, not initiated by government but initiated by the gas network themselves. As you can see in the ACT, they have seen that there is the potential for there to be a view that gas is going to be the fossil that will be left that will not be decarbonised, and instead of the agenda being around decarbonisation of the gas network, it will be around deleting the gas network.

So, we are seeing a really strong push in terms of a decarbonisation agenda coming from the gas network itself and its wanting to be able to facilitate that green gas. From their perspective, biomethane is the cheapest option, today. If we look at pricing for hydrogen, at what point is it going to reach a price parity with natural gas? It is a long way away. So, from our perspective, that is really where biomethane could be jumping in now, and injecting into the system. Now that we have had this first project that has been announced, ARENA is supporting it in terms of financial funding and the New South Wales government is also supporting that project in terms of funding. Our anticipation is that there is going to be a rapid escalation in terms of projects, and that hopefully with the release of the bioenergy road map at the national level, there is going to be some specific policy leaders that will support that.

One specific thing that we are working on at the moment, which was initiated by Angus Taylor, is the development of specific biomethane ERF methods—emissions reduction fund methods, through the climate solutions fund and the Clean Energy Regulator. We are working on that right now, and that is due for completion by the end of this year. That will provide a specific incentive for businesses to be reducing their emissions, capturing that methane and burning that methane through the gas network instead of through electricity, which is where it has been driven to before.

MS CASTLEY: Are we talking about big businesses? How easy is it for businesses, like Mikes Meats to set this up?

Ms McKenzie: It is certainly something where the cost of delivery is reducing at a rapid pace. We do not really have industry that it is applicable to in the ACT, other than the wastewater treatment plant. There is not, really, so the focus for us, in the ACT, would be on co-digestion—the wastewater treatment plant mixing sewage with commercial food waste and other waste streams that are applicable. As an example, there is a project in Perth which is basically just taking out-of-date soft drinks. I did not even realise there was that much out-of-date soft drink in the world—or in Perth—but there is. The market will be driven by large businesses wanting to purchase certified green gas, and we are already seeing that there is a significant increase in businesses that want to be able to access green gas for their own decarbonisation agendas.

So in terms of the facility in the ACT with the wastewater treatment plant, I am very

happy to provide you guys with specific details around all past funding of similar sized projects that are taking place across Australia. But it is coming in at the right time. We have seen a significant increase in international developers that are now developing projects in Australia, and that is driving down the cost of development significantly.

MS CASTLEY: I am interested in your statement in the submission that says, “We urge the ACT government to reconsider its plan of phasing out all gas use by 2045.” If the only way that this is really relevant to us is through the wastewater treatment plant, surely we can continue on our target—

Ms McKenzie: And conversion of organics.

MS CASTLEY: Okay.

Ms McKenzie: In terms of having a holistic and strategic approach to waste management, the suggestion that we would make would be to establish a large anaerobic digestion energy-from-waste facility. When I say energy from waste I do not mean thermal treatment. I am not talking about incineration; I am talking about a really large-scale anaerobic digester that would be located in close proximity to the ACT landfill. That would be diverting organics that would otherwise be going into landfill, into a specific AD. The energy would be extracted from that and injected into the gas network. As a new project, that would be our suggestion. I am talking about existing industry within the ACT. The only existing industry would be the current wastewater treatment project.

MS CASTLEY: You could convert that into electricity; correct?

Ms McKenzie: At the moment, at the current landfill site, LGI is tapping the landfill in the ACT. They are extracting that biogas from the landfill and that is being converted into electricity; that is correct. I suppose, in an ideal world—and certainly where things are moving internationally, and in Australia as well—it is a movement away from organics going to landfill. Landfill is really for the last thing left, which has no other treatment options available to it. So, from our perspective, the highest-value use for those organics in the ACT would be an anaerobic digestion process that would enable the extraction of energy. It would then be supplying a digestate product—a high-value nutrient product—out the other end, which could have a monetised value.

MS CASTLEY: Yes. The way that was presented in terms of the Mugga Lane facility is that it would provide an interim solution—you could provide gas to the gas network while we phase it out. So I am interested in the idea that you would not still want to phase it out and you would not use, for example, your technology to produce electricity. Given everything that we have heard today there seems such a huge amount of electricity available if we can just harness it. So I understand the environmental reasoning for wanting to reduce the emissions of the water treatment plant and the waste, but aside from that I am not really understanding why you would continue a gas market.

Ms McKenzie: From our perspective—absolutely I agree with you. What you are

going to extract from an anaerobic digester is going to be of high calorific value, with the organics that have been pre-sorted going into a facility that has been designed and built to deal with that specifically. It is not a municipal mixed waste site that is operating the way that things currently do. It is a specific site that would be seeking to extract the energy from those particular waste streams. Now, absolutely, whether that anaerobic digester is converting into electricity or converting into gas, either of those two options is significantly better than methane being emitted into the atmosphere.

So it would not be difficult or challenging, should there be a phase-out of gas entirely in the ACT—whilst we do not support that—to switch to electricity, and for that electricity to go into the electricity market. That would not be a problem at all. I suppose from our perspective, it is around consumer choice. It is around gas being required for certain industries and being more efficient in terms of its usage for certain industries and uses. From our perspective, there is the opportunity for us to be able to supply that renewable gas that would be going into that system—particularly in the interim—while we are moving to a place where hydrogen could play a larger role. That biomethane could be decarbonised in the network today and be supplemented further down the track by hydrogen. Does that make sense?

MS CASTLEY: Yes. Just to clarify, today we have been told that gas is not efficient, but you said it is; can you just clarify for me both arguments or your argument?

Ms McKenzie: Yes. I suppose I cannot really argue on behalf of the efficiency of gas in terms of why that would have been specifically said. From our perspective, it is around heat for heat, particularly in industries where there is a large amount of heat required. There is the opportunity there for gas to play a much stronger role in terms of what it can supply. I would strongly encourage you to look at—and I am happy to provide some additional information in this space that we can source from our members—our understanding, which is that, particularly for heat, gas provides a higher efficiency than electricity.

MS CASTLEY: I would love to get that information. I do not know whether I am just mixing the wrong things up, but we were told that, for instance, a heat pump in a home takes one kilowatt of electricity from wherever and it pushes four into your house—worth of heat. They were saying that that is more efficient than gas. So, yes, I would love to understand that a little bit more.

Ms McKenzie: Yes. If I can take that question on notice and come back to you with specifics, we would really appreciate that.

MS CASTLEY: Great, so would I. Thank you.

MR BRADDOCK: I have a question that I was trying to get an answer from LGI on. I am not quite sure if I landed on it.

Ms McKenzie: LGI are not members of ours.

MR BRADDOCK: Okay, sorry. The question was in terms of the economics of producing energy on site, with your next-generation anaerobic digester, or whatever it is, versus the economics of injecting that into the gas network. Do you have any idea

as to which way the economics works for that?

Ms McKenzie: So you are talking about the difference in cost of the current system, which is—

MR BRADDOCK: I suppose you could earn so much by producing electricity on site, and burning it straight away there, versus injecting it into the gas network and providing that to consumers. I am just not sure which way the economics works in that equation.

Ms McKenzie: Let's just say that you are excluding the capital cost of establishing the anaerobic digester. I guess I am just seeking to clarify that we are not talking about the current system of extracting the gas from the landfill site, but we are talking about establishing an anaerobic digester that we would be capturing the methane from. You are asking: is it cheaper to produce electricity, or is it cheaper to be producing and injecting the gas? The answer to that is very dependent on a number of different things. It is probably something that LGI would need to be providing you specific details on. And they have done a lot of work on gas injection and what they are looking to do in terms of gas injection.

The cost of upgrading biogas to biomethane for it to be injected into the network is highly dependent on what is required in terms of scrubbing the gas—what different elements are present, the levels of oxygen in the gas and the like. So the challenging aspect of being able to give a figure is around not understanding the specifics of that particular site or what the gas make-up looks like currently in order to then understand the cost of scrubbing. In saying that, there have been points, particularly recently, when gas was hitting incredibly high prices, where biogas was on par in terms of price. So key things—a policy landscape that was incentivising renewable gas—would have a significant impact in terms of how it compares to electricity generation.

The other thing I would say is that, as I was saying earlier, there are a number of businesses that we are working with at the moment that want to secure the green gas. They are big gas users, and they need, for their own decarbonisation agendas, to be able to say that they are decarbonising. So potentially there is a market for a premium product in the event that the policy landscape does not change in order for it to be incentivised in the way that is going to significantly lift investment. Does that help?

MR BRADDOCK: Yes. It helps me understand some of the factors in the equation; thank you.

THE CHAIR: Thank you so much. That was really interesting. If you can send through that further information, that would be very helpful as well.

Ms McKenzie: Definitely. We absolutely will. I hope you have a lovely day.

Short suspension.

PREST, DR JAMES, Senior Lecturer, ANU College of Law

SKRYABIN, DR IGOR, Business Development Manager, ANU Research School of Physics

STOCKS, ASSOCIATE PROFESSOR MATTHEW, Research Fellow, College of Engineering and Computer Science

THE CHAIR: Welcome. Everything today is recorded by Hansard and is livestreamed.

I remind you of the protections and obligations afforded by parliamentary privilege and draw your attention to the privilege statement on the table. Could you confirm for the record that you understand the privilege implications of the statement?

Dr Skryabin: Yes, we do.

Prof Stocks: Understood.

Dr Skryabin: We are here representing the Australian National University, in particular ICEDS, the Institute for Climate, Energy and Disaster Solutions, which was recently formed at the ANU to bring together the Energy Change Institute, Climate Change Institute and Disaster Risk Science Institute. Professor Stocks and I are traditionally engaged from the Energy Change Institute in activities relating to energy, energy research and energy education. That includes research and technology, economics and public policy relating to energy. Dr Prest, our lawyer, has been held up; he will be here later.

ICEDS works closely with ACT companies. We work on a number of projects, mostly on the development of new technology and new policy solutions. We are part of the recently formed NERA hydrogen technology cluster. Our students and our graduates work with local companies and also the ACT government. One of our key programs is a master of energy change degree. For this degree, we are training experts in energy transition. Our students are coming from technological and non-technological backgrounds. Those who come from non-technological backgrounds are trained mostly in technologies and those from technological backgrounds are trained in policy and economics relating to climate change.

That is enough for a general introduction. I am a physicist, and I have shared my career between academia and industry. I have spent probably half my working life in start-ups and different enterprises and half with universities.

Prof Stocks: My background is similar to Igor's. I have had time in industry and academia. I am working in the Research School of Engineering at the moment, looking at the use of renewables to reduce emissions, which is fairly well aligned with the topics of this inquiry.

I will touch on a few of the responses that we have brought and then Igor will talk particularly around the innovation aspects.

The first thing I want to touch on is that, while the ACT did a wonderful job of leading the country in terms of the development of the renewable energy auctions and

having 100 per cent renewables, unfortunately, because of the way emissions are reported in this country, businesses in the ACT do not get to benefit from that other than being able to put on their pamphlet that they are in the ACT.

The way emissions are reported, particularly scope 2 emissions, depends on how much electricity you use when connected to the grid. Unfortunately, we sit in New South Wales, not separately as the ACT. Because of the way the reporting works, it makes absolutely no difference whether a company is in Canberra, Queanbeyan or Sydney in terms of how it reports emissions. We do not benefit from the fact that we are in the ACT.

Therefore, one of the recommendations is around wanting to work with the Clean Energy Regulator, and potentially the federal government, around how emissions are reported when it comes to scope 2 emissions and how the system could be modified in such a way that ACT businesses can benefit from the scope 2 emissions reporting to say that they are zero-emissions businesses, rather than having to report exactly the same emissions as if they were sitting in Sydney or Newcastle.

The second issue I want to touch on is timing challenges. While the ACT has some very aggressive targets in terms of delivering emissions reductions—with zero emissions by 2045, again leading the country in terms of what we are trying to achieve there—one thing that seems to have not been well reflected in that document is the importance of lock-in: that decisions people are making today will affect our emissions in 2035, 2040 and 2045.

In particular, when you look at vehicles, the average life of a vehicle might be 10 years, but the average life at retirement is more like 20 years. The vehicles that people are buying today will affect what is happening in 2040, and in five years time they will affect the decision to be zero in 2045.

In terms of that recommendation, I am encouraging looking carefully at how quickly we are trying to achieve the transition towards zero-emission vehicles. If we do not accelerate that process, we are going to find that we are going to have to take vehicles off the road and effectively pay for it further down the road if we are expecting vehicles to not live the life that they were originally designed for or be used as they were planned for.

It is exactly the same situation with gas. Heat pumps have much lower emissions, particularly given that the ACT has already shifted to 100 per cent renewables, but again we are looking at a very long-lived asset and we are not pushing the changeover from gas to heat pumps. There are some incentives, but only a couple of years ago there were very solid incentives to put in a gas heater. Those systems are going to be here for 20 or 30 years. The one that I am about to replace is 30 or 40 years old. They hang around for a very long time and it is hard to break them. Unless we start to be more assertive around forcing change or encouraging change, we are going to lock in emissions well beyond the projections that the ACT government was hoping to achieve. There are some opportunities to look at how that might be accelerated.

There are also opportunities for innovation around how we can best use renewable energy in supporting a transition in Australia, particularly around the use of heat

pumps combined with thermal storage, whether it be for hot water or for heating buildings so that we can better use the renewable energy that we have, both locally produced and as part of the ACT auctions.

That highlights the few points that I would like to make. I will hand over to Igor.

Dr Skryabin: I want to concentrate on the innovation part of our submission. As you probably know, what you are doing is innovation, and research is the key component of innovation, so we are doing innovation through research and we are training through our educational programs.

I want to touch on two points of our activities.

First, I want to go to innovation itself through research. We are working with local companies. We can see contributions from the ACT government; we are beneficiaries of this contribution and our research benefits substantially from this contribution. I think it is important that, for any funding provided to local companies by the ACT government, there should be a requirement, a condition, that it is complemented or leveraged by federal funding. We voluntarily accepted that in our discussions with the ACT government for funding provided to us. Any funding provided to the ANU as funding arising from renewable energy auctions should be leveraged through federal funding like the Australian Research Council provision. That should be imposed as a condition. We suggested that it should be a condition.

Similarly, small businesses or companies in the ACT should be encouraged to use funding provided by the ACT government for leverage for more substantial funding by the federal government. We are a small jurisdiction, so obviously we will never have sufficient funds to do something on a large scale, but you can use these funds to encourage people to do large-scale work here.

The second component is about students. We encourage students to work with local companies and we introduce innovation and entrepreneurial training for students, in particular in energy change. That is a very important component of what we are doing. Generally, it works well.

The ACT government has two streams of activities in education and training for future energy professionals; the one run by CIT focuses on the training of tradies and the one run by the ANU is on a different scale. We are now trying to bring them together. We are not substantially successful, but we are trying to bring them together. It is important to be part of the training and innovation environment.

In particular, we are working through the recently established NERA hydrogen technology cluster that gives us a great opportunity to do it. The work is based at the Evoenergy testing facilities, and we implement our research outcomes at these testing facilities. We test our research outcomes jointly with CIT students who are trained for gas heaters or future hydrogen heaters. That is a very substantial component of energy transition in the ACT. One of the major components is not the creation of jobs, but the creation of experts for their jobs. We do not have a sufficient number of experts.

I want to touch on another matter, but James has arrived and I will pass to him first.

THE CHAIR: I will have to get you to agree to the privilege statement. The pink statement is to remind you of the protections and obligations afforded by parliamentary privilege and draw your attention to it. Could you confirm for the record that you understand the privilege implications of that statement.

Dr Prest: Yes; I have read the statement and I understand it. I apologise for coming later than I intended to.

I am with the ANU College of Law and I am also a member of the energy network that we have at the university, formerly known as the Energy Change Institute.

The statement I want to make broadly is around the notion of the innovation ecosystem. We need to be aware of the problem that we are trying to solve, to the extent that it is within the powers of the ACT Legislative Assembly to address particular issues.

I am drawing on my experience from involvement with the ECI and our various collaborations with industry, government and funding bodies. Broadly, I would say that we need to do what we can to reduce barriers to mobility between organisations. That is one of the suggestions that we made: the creation of some kind of mobility scheme which would aim to give people from participant organisations the capacity to move between organisations. We are aiming to get to a position where we see innovation as something that requires collaboration rather than competition.

Going to something that we did not mention in the written submission, there is the idea of having a clause in people's employment contracts which talks about not joining firms that would be in competition. If we look at California, they have a provision in their business and professions code, at section 16600, that essentially refers to a non-competition clause in a contract that is not enforceable in California. That has been in place since 1941. This is perhaps one of the reasons why we had this growth of companies coming together and working together.

We are not saying that participants are going to be free to leave one company and give all the trade secrets to another company or give all the IP to another company. We are not saying that. We are just saying that if a person leaves a particular firm in energy, a non-competition clause would then be clearly blocking them, saying, "Now you have to go and find a job as a rock-climbing instructor, an uber driver or whatever other things people do." That is one of the issues. Various of our researchers could speak on the experience of coming from private industry into the university and even a concern from some in industry about moving into a research institution and perhaps wanting to try to restrain this move.

That is something that could be considered. Other jurisdictions have an innovation fund. Victoria has a micro grid demonstration initiative. I am talking about a grant-based funding approach where you have a contestable fund. New Zealand also has this for electric mobility; the firms with the best idea when judged by an expert panel can access funding on various conditions. That is something that we would be advocating. We looked at that as being on the list. There might be a particular focus. For example, the Victorians have gone with micro grids and probably other folks from

the Law School who were here earlier today were talking about batteries. That is another question there.

My interest is to look at the regulations and legal framework and see in what way that might be a barrier to investment and companies coming here. I think our network tax, the utilities network facilities tax, is quite unique. The ACT taxes utilities on the number of kilometres of infrastructure that they have. I have done the numbers roughly. The electricity distribution network company has 2,394 kilometres of overhead lines and 2,694 kilometres of underground cables; they are taxed at \$1,283 per kilometre network they have. That is a tax revenue of around \$6.5 million a year just from the electricity network. That goes back to the customers. The customers end up paying for that unless those costs are absorbed.

The broad point I have been making is that if it is possible to amend the various forms of taxation in the ACT with a view to perhaps guiding or directing investment into particular broad sectors, that is something that could be considered. Obviously, an alternative to handing over money, is to say, “We will make it more attractive for businesses to invest in a particular sector.” I am not here to advocate for particular technologies, but the tax regime is part of the calculation of any company about where they are going to locate. If you look at it on a global scale, if not an Australia-wide scale, I am not suggesting a race to the bottom or some kind of low tax haven arrangement. There are many factors influencing the decision to invest but that is another policy lever that could be considered by the Assembly.

Another thing that we mentioned was the idea of procurement. Denmark looked at this in terms of innovation in the energy sector. They have what are called micro tenders, with the idea that they will seek to encourage green start-ups to get involved—still having enough probity in the process but trying to design the process so that the smallest businesses are not locked out from making a bid. That is another option. If they succeed in getting their idea up in a particular call, they are going to get revenue and validation from participating in the market.

Another part of this is the treatment of venture capital. From the list of witnesses, I do not know that we have anybody from the venture capital side of things coming to talk to the committee. I think that is a key part of what in the submission we broadly call the ecosystem. If you have a start-up, at some point you want to commercialise the idea. The question is whether you are going to give some kind of incentive to the start-up to work with the venture capitalist or for the venture capitalist to work with the start-up. In Germany, they give a tax break to angel investors for investing in various conditions.

I am not suggesting a festival of tax cutting, but payroll tax is another thing. As with employment, we would not disagree that there is a social good. But if you want to encourage more employment and growth in the energy sector, that is probably going to be part of the picture. They are some factors I want to pick up on.

I am going to go through a bit more of this. The regulatory sandbox is another idea that we mentioned in the submission. In Australian terminology, it would be the sandpit. This is subject to the caveat that the Australian Energy Regulator and the electricity law and the gas law are all set on a national basis. If you want something to

happen particularly in the ACT, there could be a departure or exemption sought for the ACT in relation to particular activities.

To give an example, the Australian Energy Regulator is currently looking into the question of whether distribution or transmission companies should be allowed to own and operate batteries within the network. The competition law says that, effectively, batteries are a form of generation. In disaggregating the previously vertically integrated industry of electricity, we are wanting to avoid the idea that distribution companies would own generation assets; but that effectively creates a disincentive for them to innovate and put that equipment into their network.

THE CHAIR: We did hear from Evo that that is exactly what they have done; they have bought trees so they can delay building substations and things like that. It can occur.

Dr Prest: It can take place. They have to get an exemption to do this.

Prof Stocks: They cannot benefit from the generation side of it. There are two value propositions here. One value is the support of the network; the second one is the energy storage aspect of it. Shifting energy from daytime solar to night-time—they cannot operate in that and trade that electricity, but they can use it for offsetting the development of a new transformer or things along those lines. They cannot get the full value; they can only work on part of the value or pay somebody else who can operate the battery in a different market structure.

Dr Prest: Broadly, I am making the case for regulatory innovation and perhaps social innovation as well as technical innovation. That is the broadest proposition.

THE CHAIR: We have some questions for you. Andrew, do you want to start?

MR BRADDOCK: On that theme, on page 10, you say:

... ACT should boost research aiming at understanding stakeholder interest, perception and expectations towards renewable energy innovation and adoption.

That sounds very much like looking into not technical innovation but sociological research and so forth. Can you please expand on that. It also aligns with what the Australian Council of Learned Academies has mentioned.

Prof Stocks: We have had a technology focus on renewable energy, but I think it would be fairly clear to anyone who understands what is happening around carbon emission reductions in this country that this is not just a technical problem; this is a social science problem. It is relatively difficult in this country to get funding for social science research around how people want the transition to occur. If you have a technical idea, it is relatively easy; you can go to ARENA and it is relatively easy to gain funding through an ARC linkage if you partner with industry. It is much more challenging to get money for social science research to understand how people are going to behave and how that might influence the energy and low emissions transition.

One of the things that the ACT could look to there is actively funding work or

supporting the funding of work around the social science and understanding of community expectations and how to make that transition smoother from a social science perspective rather asking, “How am I going to make a better solar cell.”

THE CHAIR: One of the things that came out of the submission was that, given that the ACT is a city-state, we have quite innovative policies and could be doing some really great social science research here in the ACT.

Prof Stocks: Embarrassingly, we do not have a social scientist sitting here for you; the law and social science do not quite overlap.

THE CHAIR: I am a social scientist.

Prof Stocks: Excellent; you can cover that one for us.

THE CHAIR: A few times today, we have heard about partnering with industry to get ARC grants and that type of thing. There is the idea of a sustainable innovation fund. There are those types of tracks.

Dr Skryabin: You are probably talking about the Renewable Energy Innovation Fund?

THE CHAIR: Yes.

Dr Skryabin: The innovation fund has done a good job. One option for the innovation fund was a diversified investment in social sciences. They have not been doing that. Another important aspect about this fund is that we need more transparency and separation. In particular, we have a couple of success stories, but we need to know about failure stories as well. We need to know where they were not successful—what happened with investment and why they were not successful. That is an important part. It is not very well known and publicised. If I ask questions, they will answer, but it should be publicised and known. If a company accepts public funds, it accepts the responsibility of transparency. That should be available.

I also want to use this opportunity to briefly talk about a mobility program and restraint of trade. James mentioned this. There is an option for the innovation fund to encourage the abolition of restraint of trade voluntarily by companies participating in this scheme. It is an important issue for me, because I particularly suffered from these conditions when I move from a high-tech company in the ACT some decades ago to the ANU. They tried to restrain me even with my employment at ANU, even when I moved to the ANU.

We have really given some thought to this approach. We think we can encourage local energy companies, start-ups in energy, to accept a voluntary code of conduct for the non-restraint of trade for energy professionals within themselves. They will all be beneficiaries. It is unlikely it will happen—I do not know—but if two high-tech companies work on the same kind of hydrogen storage in the ACT, they will both benefit from moving intellectual potential and human potential between the companies.

Particularly with the ACT government, this fund can encourage it by saying, “Yes, we will preferentially give money to these companies, because we will invest in the local growth of the labour force, with highly professional labour.” They can impose this condition. They can release the restraint of trade only, for example, if personnel are moving between companies as part of this scheme. It happened in California. It will encourage the creation of high-tech start-ups in the ACT.

You ask about other approaches. One of the other approaches is start-ups. I can understand that is important. That is when technological ideas are turning to reality, to business reality. We are working now in the hydrogen area, in the NERA hydrogen technology clusters. One of them is a high-tech start-up for hydrogen storage from the ANU, closely related to the ANU. Also, it is important that it is a great opportunity for students to work in start-ups, come back to university, and have a continuous movement of human potential, and humans getting into companies and universities.

Dr Prest: I want to go back to Mr Braddock’s question in relation to the stakeholder analysis. I just meant to encourage some of the parties who are not here and have not given submissions to this committee to give their views in relation to this topic. What is blocking them? Why have they chosen not to invest at this stage? I think it is important to understand that.

Dr Skryabin: Yes.

MR BRADDOCK: Thank you.

Dr Prest: I want to broadly go back to another issue. Some of the other objectives for the ACT in terms of the climate change response were related to looking at the waste sector and emissions from the waste sector. Maybe my views differ from those of Matt and some of the other researchers at ANU, but Igor and I have been involved in research projects in collaboration with industry in relation to biogas and biomethane as well as hydrogen. This is outside of my area of expertise, but there is some synergy in the chemistry around hydrogen, biomethane and biogas.

It should be within the knowledge of the committee that the Europeans, for example, when they launched their hydrogen strategy, on the same day they launched what they called the “sector integration strategy”, broadly looked at how the gas infrastructure and the gas sector could work in conjunction with the electricity sector.

There are a range of views about this; I am sure they have already been put forward to the committee. I do not think that we regard the Germans as a group of climate criminals; they are actively investing in large amounts of activity with biomethane. If we have a wastewater treatment works that needs to be upgraded in the ACT, there are emissions associated with that. There are emissions associated with food waste, with landfills. One of the questions is: if we just flare this gas or just burn it to make electricity, is that the highest value use of an energy resource?

For the ACT, without much heavy industry, this is something that we are not really interested in, but to say that all industry in Australia is going to stop using gas is perhaps a little unrealistic. That is a personal view. I am just saying that, coming from the perspective of an emissions reduction motivation, there is a lot of activity in the

agricultural sector, for example, in France and Germany, around biomethane. To my way of thinking, if you have an urban resource of food waste, why not investigate what can be done with that?

That is part of the conversation. It is an ongoing conversation, let us say, in the ACT, but these things depend on the economics. The government does not want to be supporting things that are uneconomic, but there are also opportunities where businesses are investing already in this sector of renewable gas around Australia, whether that is in hydrogen or biomethane. That work is already going on.

THE CHAIR: Can we ask questions about hydrogen? One of your colleagues from the ANU this morning said the H for hydrogen also stands for hype. I am interested in your perspectives on hydrogen—where that is going and the role the ACT can play.

Prof Stocks: I think for domestic heating it is really hard to push a case for hydrogen; it is a very inefficient way of taking electrical energy and converting it into heat. A heat pump can have two, three or four times more heat than the electricity you put in; with hydrogen you are looking at half to a third of the energy that you are putting in in the electricity. I would be very careful about considering hydrogen's role in domestic heating in the ACT context.

There are interesting questions around transport. With light transport, there seems to be a clear winner in battery electric vehicles, but there are still open questions around whether we would need hydrogen to manage the long-distance travel aspects of freight and heavy vehicles or whether a battery solution will emerge. I think there is still an open question in that space.

There is no question that the ACT is an attractive place, potentially, given that we are 100 per cent renewables and if you were to make hydrogen in the ACT, it would be green hydrogen. But I will come back to the comment I made earlier around how the reporting system works in this country: it is hard to demonstrate that benefit. If somebody came to the ACT and started producing hydrogen, it is not clear that under the standard accounting methodologies they could claim that that is low-emissions hydrogen, because we are connected to the New South Wales grid. That is one area that the ACT should have a look at. How do we benefit from the fact that we have 100 per cent renewable electricity? How do the businesses and people who are trying to develop green industries or low-emissions industries achieve the full benefit out of the 100 per cent renewables that the ACT invested in?

MS CASTLEY: What are scope 2 emissions?

Prof Stocks: Scope 2 emissions are the emissions that you report associated with the electricity you buy. When you are connected to the grid, if you are a certain sized business and you use more than a certain amount of electricity per year, you need to measure how much electricity you use and then report the amount of emissions that contributed to as a result of being connected to the grid. For every unit of electricity—in New South Wales, it is about 0.8 of a kilo for every kilowatt hour you use—you have to report that as part of your emissions profile.

Scope 1 is emissions that you produce—if I burn gas at my business or I am using

petrol at my business. Scope 2 is the emissions associated with the energy that you have brought in in the form of electricity. In some ways, it is double counting. It is saying, “This business has used this amount of energy and contributed to burning this coal in this coal gas plant,” or “This wind farm has contributed to that overall electricity.”

MS CASTLEY: On the bottom of page 5 you recommend that the ACT should:

Encourage research into the potentially disruptive net-zero and below-zero emission technologies that draw from renewable energy ...

Can someone explain what that means, please?

Prof Stocks: I am not sure if Professor Blakers would have touched on this this morning, but one aspect of what would have been referred to here is that one opportunity that is emerging is that if we have abundant renewable electricity in this country, we can deliberately extract CO₂ from the atmosphere and bury it—not burning coal and capturing the CO₂ or using it for that purpose, but simply capturing it from the air and burying it underground. We can reduce emissions or reduce the amount of CO₂ in the atmosphere without adding some associated energy process associated with it.

Similarly, there are a range of technologies being developed at the ANU around processes that absorb more CO₂ than they produce during that process—making cement that absorbs CO₂ from the atmosphere during the use of building materials, along those lines, or extracting minerals that react with CO₂ to bind the CO₂ in the form of carbonates rather than it being in the atmosphere.

There are a range of technologies which are not around reducing the emissions from what we are doing on a day-to-day basis but are trying to take CO₂ out of the atmosphere. There is research being undertaken at the ANU in response to this.

Dr Prest: Just to elaborate on the word “disruptive”, the meaning of that comes from the idea that, for example, even the mobile telephone disrupted the landline business. It is disruptive in the sense that new technologies may alter existing business models; that is all.

THE CHAIR: Are there final remarks?

Dr Prest: We would support the role of what was called the below two degrees renewable energy innovation hub. We found that a useful organisation to be part of. A question is about the investigation of what happened with the hub. Can there be some alterations or tweaks made to the model to make it an ongoing proposition to have a hub? Businesses in a start-up mode want to have access to mentoring and specific advice on specific topics. It does not necessarily mean that physical premises have to be part of it, but there does need to be some entity that is curating or helping to lead the innovation, just to build that kind of network and ecosystem of people.

This happens informally, but the more there is a structure to this the better. I am not saying that it has to be government led; it can be other organisations—for example,

the Smart Energy Council. They have had energy networking events. Perhaps more can be done to bring organisations together and look at the scope for cooperation between the ACT and other places.

Dr Skryabin: Yes, that is important. You mention mentoring; this should include technology help, business development help and innovation help. That is a very important point.

THE CHAIR: We had a company give evidence that their tender process was delayed by six months or longer because the government did not have the expertise to assess the tender. They sort of were saying that this is a potentially significant issue down the track when you get more and more technologically complex things that you are buying into.

Dr Skryabin: That is right. And we need to understand that, for a small business, writing a tender is a big exercise.

THE CHAIR: Yes, that is right.

Dr Skryabin: It is a big investment of their resources.

THE CHAIR: Yes.

Dr Skryabin: We should not always go to tender. We need to understand that some small start-ups are just not capable of doing that.

Prof Stocks: On the know-how comment, ANU has 500 people working in the climate energy and disaster solution space. We are keen to work with government; we have lots of ideas. There is a lot of intellectual power sitting there at the ANU, just down the road, and we are very keen to engage in and be part of the process.

THE CHAIR: I am glad to hear that. Thank you for your time today.

The committee adjourned at 4.27 pm.