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12th Assembly

Committee on the Northern Territory's Energy Future

Public Hearing Transcript

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Litchfield Room, Level 3, Parliament House

Mr Gary Higgins, MLA, Chair, Member for Daly

Mr Kon Vatskalis, MLA, Deputy Chair, Member for Casuarina

Members: Mr Gerry McCarthy, MLA, Member for Barkly

Mr Gerry Wood, MLA, Member for Nelson

Mr Francis Kurrupuwu, MLA, Member for Arafura

Dr Stuart Blanch: Director, Environment Centre NT

Witnesses: Mr Rob Law: Manager, Policy and Climate, Environment Centre NT

Ms Lauren Mellor: Nuclear Free NT Campaigner, Environment Centre NT

Ms Nina Bailey: COOLmob Program Manager, Environment Centre NT

Mr CHAIR: On behalf of the committee, I welcome everyone to this public hearing into key challenges and opportunities associated with meeting the Northern Territory's future energy needs. I welcome to the table to give evidence to the committee from the Environment Centre NT Dr Stuart Blanch, the Director; Rob Law, the Policy Officer; Lauren Mellor, the Nuclear Free NT Campaigner; and Nina Bailey, the COOLmob Program Manager. Lauren we have missing, have we?

Dr BLANCH: Yes. Sorry, she will be here soon.

Mr CHAIR: Thank you for coming before the committee. We appreciate you taking the time to speak with the committee and look forward to hearing from you today.

As you know, this is a formal proceeding of the committee and the protection of parliamentary privilege and the obligation not to mislead the committee apply. Being a public hearing it is being webcast through the Assembly's website. A transcript will be made for the use of the committee and may be put on the committee's website. If at any time during the hearing you are concerned that what you will say should not be made public you may ask the committee to go into closed session and take your evidence in private.

I will ask you all to state your name for the record and the capacity in which you appear. I will then ask you to make a brief opening statement before proceeding to the committee's questions. I presume that statement will be made by Stuart.

Mr LAW: By me.

Mr CHAIR: Could you all state your name and the capacity in which you appear?

Mr LAW: Rob Law, manager of policy at the Environment Centre.

Dr BLANCH: Stuart Blanch, I am the Director of the Environment Centre.

Ms BAILEY: Nina Bailey, Manager of the COOLmob Program at the Environment Centre.

Mr CHAIR: Rob, do you want to make the opening statement?

Mr LAW: Thank you for the opportunity to appear before the committee today. My name is Rob Law, and I am manager of policy at the Environment Centre which as most of you would be aware is the peak community environment organisation in the Northern Territory. I will make a short opening statement to support our submission and will be happy to further discuss any of these issues with you afterwards.

As an organisation we are often criticised as anti-business or anti-growth; however, we as much as anyone would like to see vibrant sustaining NT industries and businesses into the future. We look at the future of the NT primarily through the lens of ecological and social sustainability. Therefore, we have a responsibility to point out the serious environmental and social consequences of the current trajectory our energy system is moving in. For this reason I would like to acknowledge our bias in the energy policy up-front. We want to see more renewable energy and energy efficiency and will continue to campaign against the development of unconventional gas and oil, coal and nuclear as future energy options. We want a clean energy future for the Northern Territory. It is as simple and as complex as that, but we believe this committee has a real opportunity to orientate the Northern Territory in this positive direction.

We know we face an uphill battle to realise this vision for the Northern Territory where there is unrelenting optimism at the growth of the gas industry. From our point of view there are many reasons as to why such a vision is ill-fated and damaging to the future prospects of the Territory. The NT is one of the greatest renewable energy resources in the world in the way of solar, tidal and possibly geothermal. There are also other opportunities for waste to energy technologies, biofuels and to a lesser extent, wind power. Despite this, less than 1% of the Territory's stationary energy needs are met through renewable energy.

The NT is vulnerable to increasing price pressure on domestic energy that comes from network costs and upward pressure due to the global demand for gas. In the longer term we do not know for sure what the cost of gas will be, but it would be brave to bet on significant price reductions. By contrast, it is fairly safe to say the cost of renewable technologies will continue to fall. The cost of solar PV alone has fallen dramatically in the past few years, in fact 29% since 2011. In the Territory, the cost of solar PV is already at parity with gas in the retail market and will soon be in the wholesale market. It is an important opportunity and even a responsibility to put some

effort into enabling the integration of our enormous renewable resources. In time this will reduce the overall cost of electricity to consumers.

We have included in our submission the two Green Energy Task Force reports as we believe this is an important body of work that should be built upon rather than shelved and ignored. We would like to see realised the reports' vision for up to 160 MW of solar systems distributed throughout the NT networks and grids with minimal additional cost compared to business as usual. Such distribution could happen at many scales from the domestic to the large scale utility level. In Australia we have just passed the benchmark of one million households installing solar PV, and this market can be expected to grow and mature for many years.

There are also many commercial and government premises where generation could occur behind the meter to meet much of the daytime load that exists on site. There are a number of sites around Darwin where this could be important such as the hospital, the airport or Defence. Such sites could also support community owned renewable generation, as is happening throughout the country.

We would like to see more large solar farms operating in the wholesale market, feeding bulk electricity into the network, such as the Uterne system in Alice Springs. We can expect more of these in the future and it is important that legislative and regulatory infrastructure being developed around the NT electricity market has a long-term view which facilitates rather than frustrates such development.

We have been advocating for many years for the uptake of large solar plants for off-grid mining use and are yet to see this adopted in any significant way. This can provide reliable power at prices competitive with diesel, and hedge against future fuel price fluctuations and supply chain risks.

In our submission, we have briefly mentioned the potential for the Northern Territory to harness large-scale renewable energy as a future export to Southeast Asia. We consider this to be a really important opportunity and more desirable than connecting our gas resources to the eastern states.

Demand management and energy efficiency measures are the cheapest and most efficient means of reducing energy costs and consumer prices. Our COOLmob program has a long history of running energy efficiency programs to the Darwin community, and these programs are efficient and produce significant outcomes with little financial support.

We are currently witnessing a global energy revolution. We would be wise to be at the front of this and not continue to over-invest in fossil fuels and be faced with stranded assets. You just have to look at China to see they are taking renewable energy seriously. In 2013, they installed an enormous 14 GW of solar PV, which is nearly 30% of Australia's entire capacity in one year.

So, it is critical to have the issue of climate change front and centre in the energy debate, as it demands an urgency to reduce greenhouse gas emissions and shift to low-carbon technologies now. We simply cannot afford to develop our gas industry here in the Territory over the next 20 or so years with a view to transitioning to renewable energy in the distant future.

We believe that good energy policy will play an important role in ensuring the NT is front and centre in the emerging clean energy future. It is something the community at large wants to see happen, and it is the most social, environmental, and economically responsible path to take for the NT.

We wish you the best of luck navigating this complex field, and we place trust in you to orientate in the right direction.

Mr CHAIR: Thank you very much. We will give you the final report.

In your submission and also in what you had to say, you spoke about the demand side - management strategies and energy efficiency measures - playing an integral role in increasing energy productivity. Can you explain to us what type of energy efficiency programs and activities the Environment Centre is currently involved in, and how you evaluate their effectiveness?

Before we do that, we welcome Lauren. If she would like to state her name and the capacity in which she is appearing today.

Ms MELLOR: Lauren Mellor, of the Nuclear Free NT campaigner with the Environment Centre. I apologise for being late.

Mr CHAIR: That is all right, it is only for the people upstairs.

Ms BAILEY: I can respond to that. One of the ways we address energy efficiency and demand side management is through behaviour change and community projects like the COOLmob. COOLmob has been running for the last 10 years in Darwin, and primarily addresses the community education side of the Environment Centre's work, with a focus on energy efficiency and energy saving information.

We provide energy saving information in a very simple format for people, but we also provide tools and products people can use. One of the main ways we have been doing that is through home energy audits. We have been funded by the Territory government for most of the last 10 years, and also Power and Water, to do those audits.

We have found you can make recommendation to a householder; that just by targeting what is called the low hanging, easy things you can do to save energy yourself, you can cut your household's energy consumption by approximately 30%. We are also suggesting that people look at installing solar panels. Where we get our energy from as a society, it is really important, first, to look at the demand side management of it. If we reduce how much we use, then we do not need so much. We believe the two sides fit together. We look at where we get our energy from, and then we look at how we are using it now.

We are doing some evaluation now, looking back over the years, to find out a bit more about that data. But, on the whole, if you can recommend a 30% saving - it is hard to say what the average Darwin household uses in power because it does vary so much. If you have a house that uses a lot of air conditioning, they could be spending \$9000 a year on bills, whereas if you have a house with solar panels that is very energy efficient, by the time they get their rebate from their solar, they could be spending \$150 a year on bills. But, regardless, if you look at cutting about 30% of that through easy behavioural measures, it is a significant achievement.

Mr WOOD: Could I just jump off on that question? We had Power and Water here at the last committee meeting. They gave us the impression that even though we have now 5-star, 6-star, and 7-star energy houses, there has not been a great drop-off in energy usage. In other words, you are getting the impression that people still, regardless of how wonderfully energy efficient the house is, they still turn the air conditioner on. Is your message getting out there, or is it just 'I want a cool house, too bad'?

Ms BAILEY: That is called a negative feedback loop - that idea that if you advise energy efficiency and people cut use, but then they go on more trips overseas, buy more TVs or do something where their overall energy use is not reduced. Yes, we look at that and it is a continual barrier. There are behavioural steps you can take; there are mandated steps like product design, housing design, which need to be done together.

The message is taking off, particularly due to the price rise in power bills lately. That is really hitting home for people to try to use less energy, but there is a long way to go in having really efficiently built housing stock here. New buildings may be being built more efficiently, but a lot of buildings are not really efficient so you still have most people living in quite inefficiently built buildings where they may feel forced to use the air conditioner. There are always ways around it so we will look at steps that you can take before you need to turn the air conditioner on or, if you do, ways you can use it more efficiently by changing the temperature, by using insulation, closing windows, that sort of thing.

In some sense people might say it is small steps, but if you address them as well as larger issues like housing design and mandating good energy efficient design then we have to include all those steps together.

Mr WOOD: I think Power and Water would say they are building energy efficient designs into buildings ...

Ms BAILEY: New buildings.

Mr WOOD: New houses have to come up to a certain standard and be designed a certain way, but that should reduce the need for air conditioning theoretically, or energy. The impression I got from Power and Water is people, even though they have an energy efficient house, are using energy.

Ms BAILEY: Yes. A house built in an energy efficient way can still be filled with appliances and those appliances may be energy efficient or they may not be. It is important to continually look at behavioural remedies as well as structural.

Mr VATSKALIS: One of the most successful campaigns – and I do not know if it came from you – was switch off your appliances at the power point because they are still using 10% electricity. People started, all of sudden, because of the price increase, to think about it.

Ms BAILEY: Yes, exactly.

Mr VATSKALIS: Our problem is we have a significant number of people coming from down south, especially with the Defence force. They look at our houses and think they are flimsy because they are not the bunkers they get in Victoria or New South Wales and they demand that type of house. When they get hot to cool down they need a bloody air conditioner, and we should be targeting our houses are not flimsy but are built in such a way to cool quickly, rather than bunkers.

Look at what happened in Lyons. I think, 'How can they live here?' All the windows are closed, air conditioner blasting, and they think that is a house for the Territory. My house is the flimsy house. It does not get hot very quickly. I still use the air conditioner when it is hot, but not 24 hours a day.

Ms BAILEY: Yes. My house does not even have air conditioning so it is possible.

Mr VATSKALIS: Mine did not when I first came here, but I have become older since then and need it.

Ms BAILEY: Look at the house design, it is changing a lot. It is a common perception that we really need air conditioning. The number one power user in household energy consumption is air conditioning.

Mr VATSKALIS: The other message is how to use your air conditioner efficiently. You do not need it at 18°. I use my air conditioner at 24° rather than 18° and that saves power.

Mr McCARTHY: Power and Water confirmed the price point pressure was changing the behaviour so that should correlate with an increased demand for education and awareness.

Ms BAILEY: We target our messaging. For us, because we are an environment group, we would love it if everyone wanted to save energy to help the environment and help stop climate change. However, over the last five years or so in a program like COOLmob you look at the audience and you pitch the message accordingly to make it interesting to people. We certainly focus on price.

Mr VATSKALIS: That is the way to do it.

Mr CHAIR: You people are very strong supporters of the government putting up power prices?

Ms BAILEY: It varies. We do not have a policy on the government price rises. A way to address interest in energy use is to talk about how much it costs.

Mr CHAIR: That level of interest across society, how do you rate that on an understanding of power? If I take my wife out to buy a fridge it is the size of the drawers and the front door not the star rating. Are you seeing an increase in the level of understanding of people and interest?

Ms BAILEY: It is like the question about the house being built efficiently but filled with air conditioners. People have lots of different motivators for why they want to buy something, so how it looks. The energy star rating is a good one to mention because now we can point to that it is a helpful tool, it is a communications tool. People may be a little put off upfront by energy efficient products being more expensive to start with, but over the course of its life or every year's worth of usage it will use less. If you look at your fridge it might be the size of the drawers, but if you can explain that in a year you can save \$200 by turning your fridge off or by having a more energy efficient fridge.

Mr VATSKALIS: One question, I know you are the Environment Centre NT so you are a small office in a small jurisdiction, but I am pretty sure you are associated with other environment centres around. People will buy appliances. People will buy the television, the air conditioner, and the fridges like you said. Has your network put pressure on the manufacturers to make these appliances more efficient? Okay, you talk to the individuals, and it works, but the reality is if you buy 20 air conditioners, then what you probably save before, you are not going to. But, have you put pressure on the manufacturers?

You remember the first air conditioner that came out were power hungry and then they got the inverters - less power hungry. Plasma televisions you needed a power station to power it. Now, there came the LCDs which actually 60% less. Have your organisations put pressure on the manufacturers to produce these kind of equipment?

Mr BLANCH: Thanks, Kon. Not ourselves, but certainly environment groups - perhaps not the conservation councils that are equivalent to us, but certain groups like Boomerang, the Total Environment Centre in Sydney,

which focus on particular campaigns. What they have done is tried to work within industry. Some want to position themselves as super green and they get a greater market share or recognition. But, I think the energy efficiency or the equivalent water efficiency rating systems the federal governments have brought in and maintained, probably do more than trying to lobby the industry per se.

When we bought a fridge last year, it is very hard to actually find any accurate information about how much you would save over the life of that product, such as five or 10 years, if you bought a 4-star versus 6-star product. I do not think that information is as easily available as it should be. For a lot of the people, energy efficiency is not one of the top three points they will look at.

I was surprised when we talk to people at The Good Guys. They were actually better briefed, I thought, about the different rating systems and how much more energy efficiency in kW hours per use, which is encouraging. There should be big information right on the front of how much money you would save over five years.

Mr VATSKALIS: Well, you cannot, because power prices change. But, at least if you are putting kW, probably people will understand that it saves so much kW.

Mr BLANCH: I think that has a dollar sign in front of it ...

Ms BAILEY: If I could just add, in our messaging we do teach people to look at the kW amount on their bills, not just the dollar amount, because the dollar amount will change. It is the kW hours, or the kW usage they will take more control over ...

Mr VATSKALIS: Or the litres of water.

Ms BAILEY: ... so it is a very effective message, yes.

Mr VATSKALIS: The other thing is comparisons. The other day I entered in a big debate on Facebook about what is better, a top loader or a front loader washing machine. In Europe, they use the front loader because it saves water and space. Here in Australia they like the top loaders. Do you actually go to this kind of information when you have to tell people what is better for them to buy?

Ms BAILEY: I did not bring the materials on our website, coolmob.org. We have three publications and they each have quite detailed information. There are lots of web pages too, but they have information about that type of thing, and advice. So, yes, a front loader is better for energy saving and a top loader is bigger and uses more water. You make a decision: if your family is large and you are going to use it, it might be more efficient. So, yes, we help with that. It might be that people phone up and we will talk them through that on the phone, or we might run a workshop and present that kind of information to the public.

Mr Law: Can I just say something else? I do not know if anyone else has raised it yet, but a lot of the newer appliances have the new smart chip in them, so what you are seeing in other parts of the country, is behaviour change will only get you so far. So, people can sign up to schemes whereby the utilities can switch off certain appliances in the households individually. You can sign up to reduce your air con use by 20% on extreme days. That is a way of managing load.

Mr VATSKALIS: And we have seen the reaction down south that people do not like the smart metres, they are ...

Mr Law: There were issues at first, but a lot of these have been overcome, largely.

Mr CHAIR: When you talk about these efficiencies, in getting people to do it, how much scope do we have to make more savings in that area on that demand side? Initially, you must get many people pick it up straightaway, especially when they first get their increased power bill. Do you get a petering off and ...

Ms BAILEY: In my experience there is a lot to look at. If you talk to people who – high-income and low-income consumers are using energy differently. Both may be struggling and both may have easy low hanging (inaudible) they can start changing instantly. Once people understand that there is their direct energy usage, and there is also energy usage that is linked to embodied energy - so it is not even direct in their house energy consumption - there are more steps that you can add. What we tend to do is look at the things first - cooling and what you can do around maybe hot water use if they do happen to be using a lot. Anything that generates heat through energy uses a lot of power – air conditioning or reversing heat. Lighting is not a big one but it generates heat.

There is always another aspect you can look at and I do not think anyone has got to the point where they say, 'That's it; there is nothing more I can do' because then they can look at their consumption, the products they buy and the travel that do. Everything we do involves energy consumption it just may not be the thing people think of

first, which is your direct household energy consumption. Most of our focus on this submission has been about energy supply then the direct in your home use of energy, but it is a much more detailed picture than that.

Mr WOOD: One of the issues about energy saving devices is they are good for the world and that type of thing. Take the new lights they advertise, they are better than the ordinary old globes. They are dearer to start with, but who does the analysis of how what carbon emissions were required to use that new efficient globe against the old one? If you are looking at dollars an average householder might say, 'I want the old one. It cost me 50c at the hardware shop and this one has cost me \$4.80.' A lot more emissions were used to produce this so-called more efficient light globe.

Ms BAILEY: It is good to think about the embodied emissions. The price of new technology is coming down so compact fluoro light globes use to cost \$20 each a few years ago when they first came out, but now you can get them for \$4. LED lights are another one. A small replacement down light used to be about \$30 each and you can get them now for \$5 each. That is changing and the same with solar. In our submission we mentioned the price of solar panels on your house or large scale solar it is coming down as the technology improves.

Also, the newer energy efficient types of lights last a lot longer. I have heard stories about - an incandescent is what you referred to as the old style light bulb. They can last for many years but, in theory, most of them, when tested at the factory or in homes - compact fluoros have been in use for a long time now. They are meant to last about eight years, sometimes it is two or three years, but they have a really long life because they are very energy efficient. If you think about the energy used to make one globe it is better to get something that lasts longer rather than something that is cheaper or for whatever reason lasts less time, but it is good to think about the embodied energy.

Mr WOOD: That is the dollars but what is the carbon emission? What is the product in these new globes compared to what was in the old globes? It is no good, if we are trying to save energy and trying to reduce carbon emissions, if the new globe is costing more in carbon emissions.

Ms BAILEY: You need less of them. If you only need to replace them a third as much as the old ones then there is a savings to start with. Then the energy you use over the life of the globe is significantly less. An incandescent light globe might be 60 watts, 80 watts or 100 watts where a compact fluoro globe is 11 watts, 8 watts or 5 watts. It is such a scale less of energy use and why incandescents are being phased out.

Mr WOOD: I am not against that happening because I think the dollar is what drives people to become energy efficient, but if we are talking about the bigger picture - carbon emissions - it is a bit like where you get lithium. I think it is produced in Brazil and shipped to Australia and we say what wonderful things solar power and batteries are. There are a certain amount of carbon emissions to get it here and make the new globe. Did someone do a comparison?

Mr LAW: There has been a life cycle analysis which looks at overall emissions through the whole manufacturing and obtaining the resources and we can provide that to you. Do you want to see the ones for the LED versus the incandescent, which show significant lower emissions overall. Lots of these things still have an impact on the environment in resources extraction and the need to make solar PV panels, but all the analysis has been done and it still comes out far more favourable than any of the ones we have campaigning against. If you like I can follow that up and provide the life cycle analysis of light globes.

Mr WOOD: If you could that would be good. Send it back to the committee.

Mr CHAIR: If we could move to the generation side. Your submission suggested a rebate scheme should be introduced to increase the uptake of solar rooftop systems. We note over the last two years solar installations have increased by 75% as electricity prices go up. How would you rate the public's level of awareness regarding the small scale technology certificate rebates, feeding tariff subsidies and the availability of no interest loans on solar installations?

Mr LAW: I would say pretty poor probably. It is a very complicated thing to get your head around. I know people who are very interested in solar still struggle a little to understand the different subsidies and small-scale energy generation certificates they can obtain, and those sorts of things. For groups like us and for Power and Water, it is important to get that clear messaging out about the benefits and the costs. But, the costs still remain the main barrier for people to uptake solar on their households.

Mr WOOD: Have you run into any problems with Power and Water, in the sense that we have had Power and Water come here ...

Mr LAW: Yes.

Mr WOOD: ... and they have highlighted and given us graphs showing the surge in power when everyone has their solar panels going, and the difficulties they have with being able to control that. They even gave us practical examples where they might have a bloke – or a lady - working on a power line. They have switched their section off, they may have difficulties with someone putting power back into the line from the other end. They have raised this as one of the issues.

Mr LAW: Yes, there are definitely issues with over-voltage and voltage fluctuations with solar PV on households at the domestic level. There are solutions to that too; it is not an insurmountable barrier. There are inverters that can be applied. They are an extra \$1000 on top of the system, so 99% of people do not go through with purchasing these inverters. So, that is something to look at: potentially, how can we make the inverter more appealing.

Also there are things around that you can do to manage that as well. They are trialling in other parts of the country batteries in key weak spots of the network that can store power and reduce that intermittency. Many of the solar companies which have talked to us have expressed that there are a lot of difficulties with power purchase agreements with Power and Water. That is probably another issue altogether. Much of the time those statements about voltage issues on the network might be a little overinflated.

Dr BLANCH: If I might follow on. I think Francis Clark here would be a good person to talk to about the importance of small-scale fringe of grid, energy efficiency matters, and local generation rather than large centralised generation. The challenge in this century is, particularly with potential changes in the structure of Power and Water and who owns retail versus distribution, that distribution is what always costs us the most money, so who is going to invest in it?

Do we need to move from a system where there is half a dozen pretty large gas-fired generations which are very dispatchable, and move towards a more distributor grid where a lot more smaller distributors – generators which are renewable - and how to maintain grid stability? That is difficult. It is a real challenge. That is where enormous investment will be and most large state, or formerly state-owned, distribution networks do not have the money. They have over-invested in their centralised distribution transmission system with not enough for renewables in small parts of the grid, particularly around energy load centres in commercial areas around pubs and areas with large chillers where you need a lot of the energy, particularly if it does not get turned off on Saturday and Sunday, which is a legitimate issue Power and Water raise. That is a fundamental change in the direction of generation and distribution, and it talks about the democratisation of energy supply and ownership energy independents. Power and Water find that very threatening.

I have a lot of friends in Power and Water who struggle to make solar work. But, we have probably still have - I think the last I heard - 40 to 50 commercial scale solar initiatives for the greater Darwin system backed up, being held up by Power and Water. Why? What is the hold up? I know they have other things on their agenda at the moment, but you have business people who want to invest in solar – 5 kW, 10 kW, 20 kW, 100 kW, 200 kW to 300 kW. Why are they being held up? I do not think they require any government money at all.

Mr WOOD: Do you think one of the issues is that Power and Water owns the grid and people are putting solar panels on their industrial establishment or home and expecting to use the grid for nothing because that is how they get the advantage of it? Should there be some contribution to use of the grid? Obviously, the home person did not build those facilities, so they are getting that free really. Is that an issue as well?

Mr McCARTHY: Is that built into the subsidy?

Ms BAILEY: There is a service charge on the bill. I guess if you are generating enough that your credit discounts that then, yes, you are getting it for free. But, people are still charged for service, because there is the energy usage component in the service charge.

Mr CHAIR: As in the daily usage flat rate.

Mr WOOD: You get that when you get a bill from the ...

Mr LAW: Yes, and everyone pays network costs. There was a study done last year about this idea of cross-subsidising solar PV systems. Everyone is paying for this increased cost of the network because people are putting more solar PV on. It found that air-con use was five times the amount of that cost. People who do not have air conditioners are cross-subsidising people with air-con. There is an equity issue.

I would probably point out, as Power and Water told you, they have enough gas until 2034 and they have very little incentive to see more renewable generation into the market. They have to, obviously, meet their renewable energy target, but at the moment the majority of that comes from interstate so they are sending \$100m out to 2020 to southern states to generate renewable energy rather than here.

Mr WOOD: Speaking mainly about domestic, if I have a welding plant, an engine room plant in Winnellie, it can require a bit more than a few panels on the roof to keep that operating 24 hours to supply materials for INPEX. Where do you see our future in supplying what is normally called base power, industrial grade power?

Mr LAW: I believe a range of different scenarios could occur, distributed generation being one of them. We have many different renewable generations happening across a big geographic spread. There is still a grid it connects to. It is fed in with concentrating solar thermal or other technologies that have storage which can be more dispatchable, like waste to energy plants.

We acknowledge that in the short- to medium-term there will still be a need for gas to provide that back-up power. In the long term there are solutions there.

Mr WOOD: What do you see as a solution for real storage in the sense of not just for your home?

Mr LAW: I believe we are concentrating on solar thermal, there is molten salt storage being used in California - the world's largest one happening there. That enables capacity to provide dispatchable base load power 24 hours a day, and I believe there will be another range of solutions to that in local batteries and waste to energy systems as well.

Mr WOOD: Could I take that example? We have just had the monsoon, so two weeks of poor sunlight and your batteries are not being charged, plus the company wants to keep welding and making materials. Would you have enough storage for that? Not only are you not being charged by the sun, but your storage would have to last a fair length of time. They are the real issues people would have to put up with.

Mr LAW: Again, I believe it is about enough diversity in the network. More down towards Katherine when you get out of that cloud cover, when you have more sunshine throughout the year, you can have more large scale solar plants that can feed into the Darwin/Katherine system, as well as having this good spread of other different scales of systems.

Mr WOOD: You forgot our tidal, you see ...

Mr LAW: No, I mentioned it. That has a great deal of potential, but ...

Mr McCARTHY: You mentioned less than 1% in the Territory's renewable energy at the moment. A 2030 targets of government policy development, what would you say?

Mr LAW: There is a 2020 target for Power and Water now of 20%. I believe studies have been done by CDU looking at the impact of solar PV into the grid, and that at 20% there is minimal impact on the network, and then when you get higher you need to make investments to improve that. That is just looking at Darwin/Katherine. We would like to see, by 2050, up around 80% renewable energy.

Dr BLANCH: If I may add, I believe the key opportunity is when the take or pay contract with ENI expires. It is a great opportunity for large conversion, particularly as technology improves, costs come down, other places test these new forms of renewable energy and get them established and have deeper pockets and more players than we do, necessarily, up to that 2030 period. I wonder if we could get significantly around one third by 2030. I do not believe that is impossible. I believe it relies on government policy, but also cost curves falling and us positioning the Top End to benefit from investment from Chinese, German, Saudi or American investors in renewables. To do that we have to find a big load centre to justify it. Our markets are so small and we have so much gas.

If government and Power and Water, or other utilities, keep building large gas-fired turbines, you create these stream of assets which really have to be operated for at least 30 years to repay the debt. That makes it very hard, particularly for small governments with large debt loads, to invest. If we do not have very large load centres where private sector people can buy the power, it is hard to see how we get very far towards 20%, 30%, or 50% renewables in the decades ahead.

We are very much aware that challenge is there. I do not think it is impossible. We have a lot of sun, we are not going to run out of it but, in the end, we will run out of gas. Then, what is the future for the Territory? We can

delay it by having a large onshore gas industry, but the fundamental challenge remains: why is our economy based on our energy security if we are only focused on large-scale gas?

Mr WOOD: Well, we were told today - what was it?

Mr CHAIR: Five thousand years of a million people - there is enough gas in the Territory to ...

Mr Law: At what cost?

Mr WOOD: Can I just ask about Power and Water and legislation to break up Power and Water. What they are trying to do - and we have to look through it ourselves - is the generation side of the Power and Water will be separate. I do not know whether you want to make a comment on it, but do you see that as being advantageous to what you are trying to promote, or do you see it as disadvantageous? You may have some thoughts on it, because I certainly am interested. I am wide open on this, because this all so current.

Mr LAW: I would say we still have not made up our mind. There is a lot of diversity of views within our group and we are talking to people to just try to work it all out because it is quite complex. On one hand it might potentially make it easier for renewable generation but, on the other hand, it might create perverse outcomes. As I say, we are undecided at the moment.

Mr BLANCH: There is a range of views. We have not formed a policy view on it, and a lot of our members want to retain public utilities in public hands - not necessarily from an environmental point of view. If you looked at the environmental aspects of separation of the power and water part, or full privatisation in the future, or whatever, solely from an environmental point of view Power and Water produces 99% of its power with fossil fuels, dumps a lot of sewage in the harbour, and has long-term plans to dam rivers. Broadly, it is hard to see why you would say it is important to keep it in public hands because it is doing such a fantastic job from the environmental point of view. They are not investing in solar power, they are blocking it. So, why would we necessarily fight solidly on that matter to keep it in public hands – if it was, from an environmental point of view, to be discussed to privatise the generation assets, to do a better job than Power and Water currently is doing?

Our environmental laws such as the *Environmental Assessment Act, Waste Management and Pollution Control Act* regarding carbon emissions have to be strengthened otherwise I doubt private sector investors would invest as much as Power and Water does to the extent they do on environmental matters. I do not think it is a simple yes or no. There is a lot of context there about whether a private operator would do better.

The only comment I will make is I remember when Bob Carr in New South Wales tried to privatise the coal generation assets, I think for about \$15bn, he was stopped by the unions. When John Robertson finally did so for about \$5bn, \$10bn of value was lost. They are fundamentally a bad business now because they are coal.

Maybe we should not wait for so long to think about allowing private sector operators to operate our generation assets, rather than waiting for 20 years. A power utility owned by the public servants, own by the public, are big carbon polluters that no one will buy. It is a massive write-down of the public's asset. Maybe if the public is going to invest in an energy utility, it should be in solar, not gas.

Mr WOOD: You only have a month to tell us, because it is all the government it going to give us to discuss this issue which, I must admit, is too short for such an important debate. If you have some thoughts later on, I would love to hear them, because it is not far away before the government will just do it. Yes.

Mr CHAIR: I am keeping an eye on the time. There is one that interests me and this was this Southeast Asian grid. Can you actually give us a bit of a run down on that project?

Dr BLANCH: Rob was the brains here for that. I cannot talk about it.

Mr LAW: We ran a workshop last year looking at the idea, with Charles Darwin University as well, and we brought together different energy experts and policymakers from around Australia and also Southeast Asia - Indonesia and Timor-Leste - looking at this idea of connecting our electricity grids between northern Australia and probably through to Jakarta via a subsea high voltage direct current cable. It has been done in other parts of the world. It might seem rather outrageous but it has been proposed between Iceland and the United Kingdom for the United Kingdom to import geothermal energy and is also the Basslink between Tasmania and Victoria – this same technology. Someone from Basslink contributed.

Our incentives are around reducing greenhouse emissions primarily in the south east region. Their energy demand will grow phenomenally in the next 20 and 30 years and this is a long-term idea, not something that will happen in the next five or so years, but looking at feasibilities about the potential for us to harness our renewable

resources in the Northern Territory around solar and tidal and, potentially, geothermal and exporting that through high voltage direct current cables through to this high load in Jakarta.

Mr WOOD: I did not think you would be talking to Basslink. I know where they get electricity. You were saying you did not want to dam any rivers.

Mr KURRUPUWU: I represent the bush constituents and there are two other bush members. In my community, particularly the outstations, many people use solar power to generate water and power. Most people have difficulties with the water. In other communities they have chlorine to get rid of the bugs or whatever, but the outstations have a huge problem. What is the difference between the remote community and bush people living on outstations?

Mr LAW: There have been many programs in communities around solar through both Power and Water subsidiary and Bushlight doing some good things there. I think obviously we would like to see that happen on a larger scale. I think it is still round 1% of energy in communities comes from PV. Around the water I am not entirely sure I understand completely but there are solar systems now that actually operate as desalination plants as well so they are small modules that can desalinate the water. I am not entirely sure I understand that aspect. We would support a far greater investment in remote communities in renewable energy.

Mr KURRUPUWU: Where I am coming from is on Tiwi Island they have chlorine it goes to the community and it cleans and gets rid of the bugs and that sort of stuff but in other in outstations you might have it is a pure water but it sometime can be effected.

Mr McCARTHY: What do you say about chlorine Rob? In the drink you supply.

Mr WOOD: Look at what it has done to me.

Mr McCARTHY: Tennant Creek is going through that debate again, as we speak.

Mr WOOD: Fluor or chlorine.

Mr McCARTHY: Chlorine. We fought off a chlorination plant in Tennant Creek and now the Power and Water authority are back and the debates re-emerged. Does the environment centre have a position on that?

Dr BLANCH: We try to not have a position on that. All our members disagree.

Mr WOOD: Some of us have bore water and we could not care but there are issues there of course about sewerage and bore water and that is one of the issues even contamination of the bore fields is important, that is off the track anyway.

Dr BLANCH: Clean, Daly River water perfect.

Mr WOOD: I use to drink Daly River water and I could not call it clean.

Mr McCARTHY: What happens in Tennant Creek is that Power and Water authority want to come back this year and install a chlorination unit for a town of 3500 people. Who kept it away in the last round.

Mr WOOD: Just back on the energy. I was going to ask Francis and it is a similar area that Francis is talking about. For the small communities and I have family that live out at Bugla and they operate with solar. Batteries are very expensive I mean they do not have to pay so they are lucky, bush light they put them all in but you know with a bank of batteries there and my wife would like to go out to that same country and I think all right it is \$25 000 for a set of batteries it might last 10 to 15 years and there are some solar panels. Look, they work beautifully. I would rather not connect to the grid here, but the cost of storing the power is prohibitive for a lot of people. It is only because it is basically subsidised that people can afford it.

Where do you see the future for our remote communities? What we are looking at too is the energy future for the Northern Territory so those remote communities are important. They are subsidised quite a lot, I think about \$63m, through Indigenous Essential Services. Where do you see the future for power at a reasonable price?

Mr LAW: Yes. I do not really know the difference in the subsidies between the diesel use and the solar. Battery storage costs are coming down dramatically at the moment with developments in lithium ion batteries. I think the CSIRO released a report on the future of the electricity grid in Australia. They are predicting that by 2050 a third of the people will have left the grid because the cost of batteries have come down so much that it is very economical

to do so. In the longer term, hopefully, these costs will continue to fall for remote communities as well. I am not entirely sure about the differences between diesel and solar.

Dr BLANCH: I was involved in the previous government's Northern Territory Green Energy Task Force and we had a lot of discussion about that. I think it was a \$60m subsidy at the time through the IES program. We looked at some of the numbers if the government had removed its uniform pricing tariff which was socially and economically difficult to do, it frees up a lot of money to invest perhaps in bulk purchasing of panels or batteries.

One of the opportunities is gaining critical scale in purchasing of renewable energy set-ups for remote communities which may not be able to buy enough on their own, particularly smaller homelands. But, jointly you can buy a lot at bulk. If there is a financial mechanism to invest now rather than keep paying, particularly for diesel for decades or for years - a lot time - it pays for itself. Many of the communities do not have the money now, particularly if they do not have royalty streams near a mine or something like that.

As the cost of batteries comes down, that might be something innovative the government could do, or ABA: to invest in a lot of batteries and PV, particularly for smaller communities which will have to, year to year, pay for more diesel because they can never afford the capital cost.

Mr WOOD: Can I just ask another broader question too? Energy is also used for transport. I mentioned to Tenax Energy today that I am hoping they can maybe use their tidal power to produce hydrogen. That is one form of energy that, if it can be produced, obviously is clean. Where do you see transport energy going? We have road trains, railway, and people travelling long distances, which still uses energy that produces carbon emissions. What do you see as the future for that in the Northern Territory?

Dr BLANCH: I note that the big miners are leading on this. BHP, Rio, and Fortescue are looking at battery operated, even driverless, trucks. I wonder if it is a mix of battery power in the future supply by plug-in renewables, biodiesel, biomass - preferably generated by low impact third generation biomass, preferably here?

There is merit if you can convert from diesel to LPG or CNG. The trouble is if you have technological lock-in for a decade or two to make those investments pay, it defers investment in cleaner technology. That is the challenge.

Mr WOOD: Yes, I suppose what you want is technology that can be easily converted from one – if you have a truck, you can move from that truck which was set up for diesel to LNG, which they use in Western Australia. It is a cleaner form, but you are using the same truck. You just have to convert the method of holding the energy source there.

Dr BLANCH: If we had this discussion 10 years ago, it would make sense. But, the strength of the claims by world climate scientists about the need to quickly transition - we do not have those decades. That is our challenge. It would have been a lot easier if we had this debate 10, 20 years ago. We could afford another 10 to 20 years of a gas transition. I do not think we can now; that is the challenge. When we have so much gas, leaving it in the ground is, for some, just abhorrent. It is all those jobs and energy wasted. By the estimates by people like Bill McCubbin and the International Energy Agency, we have to leave around two-thirds of all the world's known fossil fuels in the ground - walk away from it.

It is easy for people to say, 'Let's walk away from all the coal in the upper Hunter'. It is harder for people to say, 'Without government leadership, or industry, we have to leave this gas in the ground.'

Mr McCARTHY: Going back to the Southeast Asian model, I had a recent trip into the northern rivers of New South Wales and saw very active community campaigns against coal seam gas. I have a theory that if the Territory is prepared to put resources into our alternative shale gas and create pipelines to the east coast, to supply that hungry energy market, we could put the CSG operation out of business.

Do you see realistic compromises?

Dr BLANCH: I am a reasonable person, Gerry ...

Mr McCARTHY: Having said that, draw a line with what we are doing.

Dr BLANCH: I would say we cannot have 50 years of gas-focused development in the Northern Territory and a major transition to renewables. It is just not the amount of money, or political or business capacity to play both games. If we are to look at major extensions of our energy markets to connect to bigger load centres, we could, potentially, connect to the east coast gas grid or down through Moomba, but that ensures we stay with decades of gas, and that is where all the money will go.

If we looked at the load centres north of us - much more challenging, longer distance, but we will not be using gas in 100 years, we will be on renewables. When do we start that change? I do not believe there is much difference between coal seam gas on the east coast and shale gas here; it is just there are just a few people here to oppose it with most gas very remote from where most people are.

Mr McCARTHY: It comes down to capital investment and infrastructure. We heard this morning the royalty streams into the Territory would be considerable and a real alternative to this tied Commonwealth funding. You would, hopefully, have a resource stream and a supportive government. There could be opportunities for funding the renewables we all desperately seek but there is no investment.

Dr BLANCH: No, there is not the investment. I do not see major investment in renewables and trying to get off gas at the same time we would be relying on gas. It is very hard for communities to do that and there is not enough load in the Territory. We have been quite unsuccessful even getting miners who are interested in renewables to invest in solar, solar backup, maybe even wind on the Barkly or in Arnhem Land. They look at the bottom line, particularly when commodity prices are low. I do not see the opportunity to have a gas and renewables joint focus for the next 30 or 40 years. I believe it will be one or the other.

Mr CHAIR: It is just so long. Nuclear is seen as a clean form of energy, and I believe someone flippantly mentioned pebble bed reactors for Nhulunbuy when the gas debate was going on. Why should we not go that way?

Ms MELLOR: The quick answer is there is not enough time. You look at the average construction time for nuclear power plants around the world where they are being constructed at the moment to replace older generation reactors, and it is in the scope of 10 to 15 years and longer. There are many project delays with the ones currently under construction in China and elsewhere.

There is not time to transition and, even if there was, look at what we are doing here in Australia digging up uranium for export. The commodity prices are at historic lows and have never been where they are now sitting at \$US30 a tonne. There is no incentive for investment, and now you are seeing many of the junior uranium players in the Northern Territory and elsewhere pulling out of the market – Paladin, Marathon, other resource extractors in Australia are getting out. Olympic Dam has canned expansion on the low commodity price.

In a global context, Japan is not likely to restart their reactors any time soon, and that was a large part of Australia's export market, so that has gone. That has hit Ranger's operations hard, so there is really nothing good in that sector at the moment. We are seeing a great deal of that activity drop out. In reality, nuclear power and our ability to create revenue for Australia in exporting to new projects is unlikely to come to fruition. A lot of those existing nuclear power plants that are there globally in the US and elsewhere are coming to the end of their life span now. They are ageing and are starting to get more and more problems. All of a sudden, they have become a greater risk and they are not being replaced simply because governments cannot afford to subsidise those industries anymore. They cannot insure them against accidents and that sort of thing. On a lot of those bases it is really hard to justify nuclear power as any sort of transitional solution to climate change ...

Mr WOOD: But China is. China is building quite a number at the present time.

Ms MELLOR: They do have a lot under construction, but they also have a lot of problems with those. Those are where you are seeing the time blowouts and things with construction there. What will be brought online in China over the next decade, you will see phase out in America and elsewhere. In global energy supply, nuclear really is not even keeping up with what they have been doing over the last couple of decades.

Mr WOOD: Yes. Without getting into the for and against nuclear power, I suppose I look at nuclear as saying you do not also close your eyes off it altogether. Technology changes, Mr Ford made a car that when you ran into a tree you died. Then they invented seat belts, air bags, embedded tyres and all this sort of thing. We know the technology works, but the technology has its issues. We know it does not produce carbon emissions except in the construction of it. Every product you talk about today produces carbon emissions because bauxite is used for aluminium, and aluminium goes around the frame of a solar panel, and a lot of energy is used in that as well. Just to keep that side out of it, it does not produce any carbon emissions. I do not know whether you get into a position where the Environment Centre says, 'We do not accept nuclear as always being part of the green scene out there', or do you say if certain things can be improved, then we see it as an option for high load base power?

For instance, if you are in Korea building ships, it is going to take a lot of batteries to keep that place going for welding and producing steel and all that. I see it on those pictures of building their superliners. There must be an awful lot of energy used to build those big ships.

I cannot see it being practical for a fair while yet that renewables will take over that particular role. If you want a baseload that does not produce any carbon emissions, like coal, oil, and gas - and I must admit I always cringe a little when people say gas is clean. No, it is cleaner, but it is not clean. Clare Martin said it was clean once and I had to laugh a bit. But, it does have some role to play even if it is only for a short term in reducing it.

I remember when Germany said it was not going to build any more nuclear power plants. They had one of their environmentalists who said, 'I do not like nuclear power, but I would rather they kept those going until you found an alternative to coal.' That is what they are trying to do, but he wanted to at least keep them going until they were able to replace them with something other than coal. That is the dilemma we have. How do you bring the carbon emissions we are worried about going up down quickly, and still bring in solar to do the same thing? That is the concern I have.

I am not advocating that we stick a nuclear power plant just down the road because, in theory, we have enough gas, so why would you even bother, economically, to build something when you do not need it. I would like to keep my mind open with nuclear. The technology works, it is just that it has problems.

Mr McCARTHY: When we talk about solar, it is better to talk about hybrid renewable ...

Mr WOOD: Well, it could be ...

Mr McCARTHY: ... not solar.

Mr WOOD: Most communities are hybrid. Most cattle stations are hybrid.

Mr McCARTHY: I would like to hear a comment from Lauren on that.

Ms MELLOR: Of course you have to go into the debate with clear eyes, but in 50 years of the nuclear power experiment, we know the risks of having to store waste and that sort of thing. We know that here in the Northern Territory and elsewhere. We know the risks with actually running those power plants. We know the risks with extracting uranium here, as a uranium exporter. All of those things, plus the water that industry requires - the clean water - and the potential to contaminate our water systems is huge.

I will just give you a figure here. If we are talking about a short-term transition fuel, it is impossible for nuclear to provide that. In the International Atomic Energy Association's latest figures, they predicted if there was a doubling of nuclear power output by 2050, globally it would only reduce greenhouse gas emissions by about 5%, less than one-tenth of the reductions required to stabilise atmospheric concentrations of greenhouse gases. There is no way it can play a significant role in it as a transitional energy source. As I said, with the blowouts with construction times and things like that, and the problems with subsidising and funding those, you are not finding anyone who is keen to invest in nuclear power to replace the existing plants we have around the world. There is not really a market for us exporting uranium any more.

There are very few jobs in that sector so it would make far more sense - you mentioned the example of Germany - to put a ban on any sort of new nuclear power and start transitioning to renewables, which they have done and now are producing more of their energy through renewable sources since 2011 when they introduced that ban than they were before. They have created over 300 000 jobs in that sector alone compared to only several thousand in the nuclear sector. You look at those examples around the world. It is possible to do that here and if we continue to make those subsidies and things to uranium exploration we are missing opportunities where we could be making investments in renewable that are far more sustainable into the future and means we are not destroying places like Kakadu and things like that into the long term.

Mr McCARTHY: How do we do that? We have car manufacturing plants - significant infrastructure shutting their doors. Do we produce the renewable hardware or do we produce the technology and on-sell that?

Dr BLANCH: The trouble is most of the better renewable energy resource is not where the large manufacturing hubs are. You could say South Australia has a lot of wind and sun and is looking at replacing Playford B, an old coal-fired power generator, with solar thermal. That is on the grid; that is in the (inaudible). That would make more sense if they could have major investment which provides a base load with overnight storage, which is still a technological challenge, to support manufacturing there.

When we had a discussion last year with Pac Alan Rio about the future of Nhulunbuy we had a long discussion about renewables and the mix. They said they brought out people from France to talk about nuclear and they brought in their renewable experts. They looked at it from all angles, had consulted publicly, of course, and they

ruled out everything except gas. One of the lessons from the bauxite industry is they are all moving into places with hydro - Quebec - even some new areas to be dammed up in Sarawak because the power is free, almost given away by state-owner power companies which dam their rivers and it is carbon free. If they invest in 50 years of plant they want to know there is not a carbon price in the future.

Mr McCARTHY: Are you advocating damming?

Dr BLANCH: No, but imagine solar, geothermal and tidal with a bit of wind. We have enormous resources which we do not use because it does not pay yet; it is cheaper to go with gas. We will not always have gas. We will not go nuclear power in the Territory so what is our long term energy supply and how do you invest in it? Imagine in 20 years' time re-opening the refinery out there and it was powered by a combination of those renewables with backup. That is not impossible. That it where you could have manufacturing, or even here in the Darwin/Katherine area if there was grid supplied renewables. You would have to strengthen the grid, but we have to prove overnight storage with solar thermal works in the tropics and no one has built one yet. No one will build one until we invest in one.

I make the point that Power and Water has been putting money on the train heading south every year to buy \$10m to \$20m worth of renewable energy target liabilities under federal law. Assuming the wreck continues, why do we do that? Why do we send our money to other states? Certainly, they have to spend more here than buying South Australian wind, but why can we not have a Territory-proud solar industry that has been invested in by our own utility that creates a future. We could have a manufacturing industry here just as Rio Tinto bought Alcan not because it wanted Gove, but because it wanted its smelters across in Quebec because they are all based on renewable energy. What is our long-term plan to have renewable energy that provided base-load power in 10 or 20 years to attract large scale manufacturing here. You could do it.

Mr McCARTHY: Do we have a significant brains trust in Australia developing renewable energy?

Dr BLANCH: Most of them left for a long period. They are coming back, but we are starting to build big solar now. I believe 100 MW is being built down around Broken Hill and Nyngan as part of the grid, but it required a lot of subsidises from the Commonwealth government and I think a lot of the brains trust is from outside the country.

Mr WOOD: Do we have any solar thermal, because Cloncurry got canned? Has Moree been canned? There was meant to be a large-scale at ...

Dr BLANCH: Mildura got canned.

Mr WOOD: Cloncurry was on the cards, then the new government said no funding.

Dr BLANCH: I think ARENA is only funding – it is 105 MW, isn't it, Broken Hill and Nyngan, two separate ...

Mr WOOD: Where is that?

Dr BLANCH: Broken Hill and Nyngan.

Mr LAW: 150 MW in total ...

Mr WOOD: Is that solar thermal?

Dr BLANCH: Solar PV.

Mr WOOD: Is there any solar thermal? That is what ..

Dr BLANCH: Not large scale. There is solar thermal with a trough, a lot in Spain and the US ...

Mr WOOD: That is what I ...

Dr BLANCH: The power towers, I think only exist in Spain and, now, in the US. We have more sun than they do.

Mr WOOD: I am trying to look for a place to go. I am going to go to Seville. I think that is where they are ...

Dr BLANCH: A hard life, Gerry.

Mr WOOD: Yes, I know. Then, I will probably look at the nuclear as well and the hydrogen ...

Mr LAW: We can come with you.

Mr WOOD: I would have liked to have seen whether we have solar thermal in Australia, because I gather there were projects. It would be nice to see if it was operating in our own country rather than overseas.

Mr LAW: It is still quite expensive, I think. That is the main barrier to get it happening. It is increasing globally at 40% each year in uptake of concentrating solar thermal. At the moment, we have to go to America or Spain. Yes, maybe we can do that trip with you.

Mr WOOD: Well, Stuart can come with me.

Mr CHAIR: Thank you. We are a bit over time. I thank you all for coming and I am sure we will talk again. Before we finish, is there anything you want to say?

Dr BLANCH: Thank you very much for the opportunity to present. I understand you have another two inquiries in the next three years? The 2015 next calendar year is focused on large-scale renewables? If you can get across to the desert country in southwest US and southern Spain, along the coast or up in the higher country, by the end of this year there will be even more built.

I guess my play is do not just listen to Power and Water Corporation on solar because they have never built anything big. Go and talk to people who have built things. Even just go down to Broken Hill, they are building them now.

Mr WOOD: Who built the Alice Springs one?

Dr BLANCH: Not big, tiny on the world scale, it is like a megawatt.

Mr WOOD: Big for Alice Springs.

Dr BLANCH: We have some of the world's largest renewable energy resources and we think little. We think big in gas. Why do we not think big in renewables? That is the future, it is not gas, in the long term. Thank you.

Mr CHAIR: Thank you very much.