



**LEGISLATIVE ASSEMBLY FOR THE AUSTRALIAN CAPITAL
TERRITORY**

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

(Reference: ACT greenhouse gas reduction targets)

Members:

**MS M HUNTER (The Chair)
MS M PORTER (The Deputy Chair)
MR Z SESELJA**

PROOF TRANSCRIPT OF EVIDENCE

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**Secretary to the committee:
Dr H Jaireth (Ph: 6205 0137)**

By authority of the Legislative Assembly for the Australian Capital Territory

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Amended 21 January 2009

WITNESSES

CRILLY, MR STEPHEN MARK , Communications Officer, ACT Council of Parents and Citizens Associations Inc	283
DIBLEY, MS DI , Director, Policy and Program Development, Greening Australia	258
FREUDENBERGER, DR DAVID , Director, Science and Major Projects, Greening Australia	258
JOHNSON, MS DI , Co-Convenor, Sustainable Working Party, P&C Council, ACT Council of P&C Associations	288
PEARCE, MS VIVIENNE , Convenor, Sustainable Working Party	288
SINGER, MRS ELIZABETH , President, ACT Council of Parents and Citizens Associations Inc	283
SUTTON, MR PHILIP , Convenor, Greenleap Strategic Institute	250
WRIGHT, MR MATTHEW , Campaign Director, Beyond Zero Emissions.....	270

The committee met at 1.03 pm.

SUTTON, MR PHILIP, Convenor, Greenleap Strategic Institute

THE CHAIR: Good afternoon everyone, and welcome to this public hearing of the Standing Committee on Climate Change, Environment and Water, inquiring into ACT greenhouse gas reduction targets. This afternoon we are hearing from a range of witnesses, including climate change campaigners, representatives of the ACT Council of Parents and Citizens Associations and parents. Two witnesses, Mr Phil Sutton and Mr Matthew Wright, will be joining us by phone from Melbourne.

Mr Sutton, I understand that the secretary has sent you a copy of the privilege statement. Would you please confirm for the committee and Hansard that you understand the content of the privilege statement that is before you?

Mr Sutton: Yes, I understand the content of the statement.

THE CHAIR: Thank you, Mr Sutton. Would you like to make an opening statement?

Mr Sutton: Thank you very much. Thanks for enabling me to present to you today. My background is that I am the Convenor of the Greenleap Strategic Institute. Also, I am co-author of a book on climate change, *Climate Code Red: The Case for Emergency Action*, and I am the Assistant Convenor of the Climate Emergency Network in Victoria and a co-founder of Safe Climate Australia. Clearly, climate is a major part of my work.

I would like to address the subject matter of the committee's deliberations, which is the question of greenhouse reduction targets, and put it in a context which is from the point of view of both the science and also the consequences, if you like, for policy action. I will start with the science. I think it is useful to recognise that at the moment the earth is already too hot and we already have too much greenhouse gas in the air. This obviously has enormous implications for then setting the reduction targets.

The argument that we have got too much heating already can be justified by looking very quickly at two particular case studies. One is that the Arctic summer sea ice has been reducing quite dramatically over the last 10 years or so. In particular, in the last five years the reductions have been massive. The implication of this is that it will cause a localised warming in the Arctic region which is massive—something like five degrees, of that sort of magnitude—which then has very significant implications for what happens with the stored carbon in the Arctic region, both in the permafrost lands and in the seabed of the Arctic Ocean.

In those two reservoirs, there is sufficient fossil carbon material there—in other words, old dead plants that have accumulated over hundreds of thousands of years—to increase the level of carbon dioxide in the atmosphere by four times its total natural level, which is way beyond anything that we have currently looked at in terms of the effects of fossil fuel burning. But if the Arctic region becomes hot enough, which it is expected to do by about mid-century, there will be a really major warming of that permafrost carbon, and a very significant proportion of it is likely to become

mobilised into the atmosphere. So we really face quite a dire situation in terms of making sure we can cool the planet enough to restore the Arctic ice and therefore stop the warming of the permafrost region.

The other thing, closer to home, is that the Great Barrier Reef first started suffering from excess temperature about 30 years ago. Obviously, there was not a huge impact at that stage, but the coral bleachings began about 30 years ago. Ten years ago, if there was an El Nino year, the coral reefs would have a bleaching event which would kill them off, and it takes about 10 years to recover from a bleaching event. The El Nino years were coming on about a four to seven-year cycle, so you can see that the recovery was not going to keep pace with the damage.

At the moment, the reef will have a bleaching event every year, unless there is some offsetting event. For example, the major rainstorms that occurred recently saved the reef from a major bleaching event this year. In 10 years time, the expectation from the Great Barrier Reef Marine Park Authority is that the reef will suffer bleaching events every year, which means that 89 per cent of the reef ecosystem will be destroyed over a period of not too many years following that.

So we have both a local and a global situation where it is quite clear that the earth is already too hot. And if it is already too hot, that is because we have already got too much greenhouse gas in the air. The question then arises as to what is the appropriate emissions target. If we want to avoid the damage that is implicit in the Arctic change and the Great Barrier Reef change, we really have to cool the planet. Probably rough estimates are that we need to cool it by about a third of a degree to perhaps as much as 0.8 of a degree, which is more or less the warming that has occurred since pre-industrialisation.

If we want to achieve that cooling, we really cannot afford to be putting more greenhouse gases into the air at all, whether it is from coal burning sources, from cars or from gas-fired power stations. So there are really significant implications of this question of whether or not the earth is already too hot and whether there is already too much greenhouse gas in the air. If it was accepted that that was true, the follow-on from that is that, if we do not want to add to additional warming and we actually need to cool the earth, we need to have zero emissions and we would need to do that as fast as we can. We also have got probably about 200 billion tonnes across the world of excess carbon dioxide in the atmosphere and in the oceans. So that has to be drawn down over a period of time, and it is likely to take anything up to four to seven decades to get that excess carbon dioxide out of the air.

Probably within a very short time, we are also going to be facing the need to do direct cooling, which means some form of environmentally safe geo-engineering, which I know a lot of people are very concerned about and would prefer to avoid. But I think we have now got to the stage where the climate issue is progressing so rapidly that even an option of geo-engineering would actually be something that you would have to consider from an environmental point of view.

Having said that, I think that we now need to look at climate change, in a sense, as a security issue. With respect to the impacts of many degrees of warming, which is what we are facing if these tipping points occur—anything up to nine degrees—we

have only warmed about one degree so far, just a fraction under one degree, so you can imagine what the impacts would be of warming an average across the earth of nine degrees. Basically, it is a civilisation-stopping sort of phenomenon. So from now onwards, it is actually useful to see climate change as a security issue and then proceed with the kind of seriousness that that implies.

Drawing my initial statement to an end, I think we face the need, firstly, for targets which are right outside the currently debated targets through the international negotiations, the Copenhagen process. They are based on compromises upon compromised original positions, and I think that somebody somewhere needs to recognise that we cannot afford those compromises anymore. And the approach to policy has to be quite different from what we are used to.

Normally, we define politics as the art of the possible and also as the art of compromise. But in this case, whether or not we know that we can succeed with tackling climate change, I think we simply have to set out to tackle it, whether we succeed or not. But we obviously have to make sure we do our very best to succeed, and I think we also need an approach which implies no major trade-offs and that failure is not an option.

These might sound rhetorical, but if you actually apply them in a policy setting to the greenhouse or climate change issue, I think they have very practical implications. I might leave it at that for the moment.

THE CHAIR: Thanks, Mr Sutton. You seem to suggest that Australian per capita emissions should reduce by 95 per cent by 2050; is that correct?

Mr Sutton: If we have got too much carbon dioxide in the air, with respect to the amount of greenhouse gas, we should put out zero and as fast as we can. I think that we do not have until 2050 to do that. So I think the reductions really need to be 100 per cent, and they need to be much faster than 2050.

THE CHAIR: So what dates would we be talking about and what sort of interim targets should be set?

Mr Sutton: I think that we can draw an interesting parallel with the approach that Al Gore is taking in America. He has challenged the American people to produce a clean energy system—in other words, a zero emissions energy system—within 10 years, rather along the lines of the Apollo moon shot program. I think that is quite a reasonable analogy for what we should be tackling.

THE CHAIR: What steps do you think governments should take to achieve these targets?

Mr Sutton: If any government went to the public now and said, “We need to go for 100 per cent reductions basically at emergency speed,” they would be met with amazement and incomprehension. So the very first task is not in fact to put forward a policy of that sort immediately, but to engage the community with the detailed scientific information about how severe the problem is and to establish the scientific case that there is already too much carbon dioxide in the air and that we are already

too hot. Once you have established that case with the community, through dialogue, I think it would be appropriate to say, “Okay, our aim is a 100 per cent reduction by 2020.”

In that context, there are quite a few local governments in Victoria that have already adopted that policy: Melbourne City Council, Maribyrnong City Council, Darebin City Council. The list goes on. There are probably 10 or 12 of them which have done that. Similar policies have been adopted by bodies like Melbourne Water, which is one of our major water corporations. It is roughly equivalent to Actew in some respects. So this sort of policy is by no means unusual, at least in the Victorian context. We have policies of that sort adopted by quite a few public bodies.

THE CHAIR: I will just ask a final question and then I will hand over to other committee members. Do you have a suggestion as to whether 1990 or 2000 is a better baseline year to measure reductions, say the ACT greenhouse gas reductions?

Mr Sutton: If the aim is to reduce greenhouse gases by less than 100 per cent, the baseline makes a difference. But, of course, with the baseline, the crucial thing is the actual effect on the environment from the reductions. So if you want to use any particular baseline, if you set a later baseline then obviously the reduction target has to be larger. So, in a sense, I do not personally see it as the key issue, because the crucial question is: what impact does it have on the environmental issue itself? If you accept the idea that we may already have too much carbon dioxide in the air, the baseline in fact does not matter at all, because going to zero means zero on any baseline.

THE CHAIR: Thank you. I will hand over to Mary Porter, another committee member.

MS PORTER: Thank you very much, and good afternoon. My question was around the matter that you were just discussing, that we should engage the community in consultation in the beginning before we start setting targets that they probably would not believe or would accept; I guess that is what you were indicating.

Mr Sutton: Yes.

MS PORTER: What has the reaction of the public been to this consultation that has been happening in Victoria in these different places? Has there been a variety of reactions in different areas? Has there been any change to policy in those areas since the consultation has been taking place?

Mr Sutton: The consultation in different parts of Victoria has been a bit spasmodic. I would not want to hold it up as a model to anybody. Darebin City Council, for example, engaged in a fairly limited amount of consultation around its zero emissions by 2020 policy. I think that the more seriously you take the target, the more consultation is actually needed beforehand; otherwise the target tends to become just a piece of rhetoric and nobody really intends to implement it or to act on it.

A model was developed by the Victorian Women’s Trust which looked at water issues. It was called the watermark program. That program ran over about 12 months with facilitated discussion and scientific input. It is like a gigantic citizen’s jury involving

thousands of people. It is actually worth a very heavy investment in public consultation, not in a watered-down program, but in actually getting people to face the full extent of the problem. People have more capability to do that if we take them into our confidence, but we do need to give them access to really good scientific information.

The other problem with the consultation and with the involvement of scientists is that scientists themselves have absorbed a considerable amount of the political scepticism or the assumption that very little can be achieved. So if you ask them to nominate targets, they will frequently give targets that would not actually restore a safe climate. But if you reverse the questioning and say to them, "If we were to have a safe climate, in other words, if we were to cool the earth by at least a third of a degree, what would you have to do to achieve that?" They will then tell you quite precisely what needs to be done and it is very straightforward.

MS PORTER: Could you go back to the watermark project, which sounds very interesting. Are you able to give us any feedback as to what has been the result of that particular consultation?

Mr Sutton: That involved about 2,000 people over about a year. It resulted, as I understand it—I was not directly involved in the program—in water issues becoming a really major policy question in Victoria. They obviously have been picked up by governments at all levels as a major concern. Clearly, the climate change that we have experienced over the last 10 or 15 years has contributed too, but the public discussion through the watermark project made quite a substantial difference in getting people to look with a greater degree of sophistication at the issue.

MR RATTENBURY: Philip, do you have a view on offsets as a policy option?

Mr Sutton: If the aim is to get to zero emissions, offsets are only useful as a temporary exercise. If you are trying to cut your emissions to a net zero position and you use offsets in the short term to make up a gap between real reductions that might occur in your home, in your commercial buildings or in your government offices or factories, that is useful if it is providing an offset reduction in CO₂ over, say, the next few years. But if the offsets are something that you structurally need to keep using over a period of 10, 20, 30 years, I think the offsets are an avoidance of the issue. They are not a real solution. The other argument is that a lot of the offsets that people are looking at are re-establishing or retaining bushland, forested areas, whereas we already know part of the reason why we have too much carbon dioxide in the air is that historically we have knocked down huge areas of forest around the world. The restoration of forest is actually paying back the past carbon dioxide debt from the previous clearing. It is not really an offset against industrial emissions.

MR RATTENBURY: Do you have any views on the permanency of forests or other vegetation as a carbon store?

Mr Sutton: If we were within a safe climate condition then forests would obviously be a perfectly good way of storing carbon, which is what they do historically. If we are moving into a global heated world, and obviously we are at the moment, the forests become less and less reliable as a carbon sink, simply because they are likely

to be burnt down at some stage due to elevated temperatures.

MR RATTENBURY: You mentioned earlier in your evidence Al Gore's plan for America to move to clean energy within 10 years. Are you aware of anybody that has done any modelling in Australia as to how that might happen and the potential costs of that?

Mr Sutton: There are two lots of work. There is one lot of work underway. Matt Wright, who will be speaking to you shortly, is involved with the Beyond Zero Emissions group. That group is actually trying to flesh out a structural change that would deliver zero emissions in 10 years. The other thing is that the core activity of the new organisation that I am involved with, Safe Climate Australia, is to extend that modelling of the very rapid transition to zero emissions and make use of the best possible expertise from across the corporate and government sectors and the research community.

MR RATTENBURY: I guess one of the things that this inquiry needs to do is to come up with practical policy measures over the next five to 10 years for the ACT. Are there specific measures you would recommend to us as perhaps the most effective to try and reduce emissions?

Mr Sutton: I understand that there is some question about the provision of energy to the ACT by supplementary energy sources. I understand there is some discussion about having a gas-fired plant to provide somewhat lower emissions—electricity production. My feeling about that would be that the investment in a gas-fired power station would be a long-term investment. You would be expecting it to be operating for 40 years or something. That, to my mind, is way into the period in which we would be wanting to have zero emissions. Zero means zero. We have to take 200 billion tonnes of CO₂ out of the air. Any gas-fired power stations that are operating are obviously putting CO₂ back into the air so we are creating an extra problem we have to then reverse. It seems like a false investment, to my mind.

MR RATTENBURY: And specific proactive policy initiatives that we might take?

Mr Sutton: One of the things that would be really useful would be to engage the community in a program that says that every household, every building, every factory—the owners of the homes or the operators of the factories or whatever—every government building et cetera should have their own plan to get to zero emissions within 10 years.

MS PORTER: One of the things that people are constantly saying is that the ACT should be a leader in Australia because it is a small jurisdiction and can show leadership. However, other people are saying that we are only a small place and that anything we do would be negligible and counterproductive and would drive people interstate. They would just take their emissions elsewhere, in a way. Can you comment—if we were to make a recommendation for us to be a leader in introducing zero emissions?

Mr Sutton: My understanding of the ACT economy is that it is essentially a services economy. Obviously, government is the major component of that, but there are other

private sector services, not the least of them being lobbyists et cetera. It is a complex services economy. I would think that Canberra would be the least likely place in the entire country for there to be much leakage of business due to going to zero emissions. Usually zero emissions is only a problem financially for companies or organisations that are very energy intensive. As to the small amount of extra costs that might be involved in going on to green power, you can shift the ACT economy across to 100 per cent green power with almost negligible noticeable effect on almost all economic operators in the region. Clearly, there would be exceptions to that but, as a broad sweep, that is probably more true for the ACT than almost anywhere else in Australia.

In terms of the ACT being just a small place, it is a small place but it is also the capital of Australia. The change in culture within the ACT would have a profound effect, I believe, over time on the operations of the federal government, no matter which parties were in power, and that would be a positive contribution to the long-term policy settings of Australia. The other thing is that the ACT can be an example to other parts of Australia and so help encourage people to get on board. When many people face an unprecedented problem they say, "Where's it been done before?" They look to other places to get models for action, draft legislation, administrative procedures, business experience and so on. If there is a place which is really doing what needs to be done then that is invaluable experience for our community, the wider Australian community, to draw on.

MR SESELJA: Mr Sutton, I had to step out for a moment and if this area has been touched on, I apologise. You talked about the Arctic summer sea ice and the melting of it. You said that in about mid-century, if warming continued, we were facing the loss of a significant amount of that and a significant amount of carbon dioxide as a result. Are you able to elaborate a little on that? You also spoke around the tipping point. How far are we from that tipping point on current projections? I know there has been IPCC modelling on that or suggestions about where that is.

Mr Sutton: Yes.

MR SESELJA: Where are we and how much of that ice would we expect to see melting in the mid-century if we do not do something?

Mr Sutton: In one sense, we are very close to the tipping point because there are such long lag times for acting. For example, to turn the economy around, the fastest that you could possibly imagine that occurring would be at wartime, Second World War speed, which means that it would take at least 10 years. That means that under the most optimistic assumptions possible you would not get the world to a zero emissions position in anything less than 10 years and we are already to 2020 by that stage. According to Jim Hansen, the Arctic sea ice could well take 20 years to re-form. In the years in which we are trying to bring emissions down, the world temperature will still be going up further and we will probably get to that.

Even if we set out now to cool the earth in a very deliberate fashion we would probably reach that tipping point in the permafrost area before we had actually managed to get our policy changes and our industrial restructuring completed. That is one of the reasons why I think that we need to look at geo-engineering as a supplementary measure, simply to avoid hitting those tipping points, even if we are

doing the very best we can to get to zero emissions at an extremely fast pace.

MR SESELJA: So where does that leave us if, even on an optimistic measure, it is going to take us 10 years? As you say, that is wartime, turning around the economy.

Mr Sutton: Yes.

MR SESELJA: If we are not there in 2020, if we are moving towards that and you say the tipping point may be reached, where is that likely to leave global temperatures come 2030, 2040, 2050?

Mr Sutton: Once the regional warming in the Arctic reaches nine degrees over pre-industrial—the Arctic regions heat up a lot more than the world average, so even though nobody is talking about the world becoming 10 degrees warmer by mid-century, it is quite possible that the Arctic region would be nine degrees warmer than pre-industrial. Once that happens, you get a warming which is so strong that, even if you were to subsequently re-freeze the surface of the Arctic, the breakdown in permafrost would provide enough biological heat from the breakdown of the old plant material. It is basically like composting. That would actually keep the process going. If we want to maintain civilization and most people and most species on the planet, we simply cannot allow that to occur. You can be sure that before we get to that point people will either be geo-engineering on a massive scale or they will be making the transition in the economy.

The trouble is that if we rely on geo-engineering as our only solution, we will just create environmental damage on an increasing scale through other means as a side effect of the geo-engineering itself. Geo-engineering may be necessary, but it is very much a double-edged sword and you want to have the least amount of it as possible. That is why I would be arguing that we should be acting now, rather than waiting until we can demonstrate the self-catalytic breakdown of the permafrost.

THE CHAIR: Mr Sutton, thank you very much for providing evidence to us this afternoon. We will be sending a copy of the transcript to you so that you can check that the evidence is correct. If you have corrections to make, please get in contact with our secretary. Thank you very much for giving your evidence this afternoon.

Mr Sutton: Thanks very much indeed.

DIBLEY, MS DI, Director, Policy and Program Development, Greening Australia

FREUDENBERGER, DR DAVID, Director, Science and Major Projects, Greening Australia

THE CHAIR: I welcome Ms Di Dibley and Dr David Freudenberger to the committee. Have both of you had a chance to look through the privilege statement?

Dr Freudenberger: Yes.

Ms Dibley: Yes.

THE CHAIR: And you both understand the contents of that statement?

Ms Dibley: Yes.

THE CHAIR: And it has been agreed. Did either of you want to make an opening statement?

Ms Dibley: Yes, we do have an opening statement. It will be a bit of a collective effort, but we promise we will not both speak at once.

THE CHAIR: Thank you.

Ms Dibley: I just felt from your description up-front, Meredith—if I can call you Meredith—that it might be necessary for us to say who Greening Australia is, who we are.

THE CHAIR: Certainly.

Ms Dibley: We are the largest environmental non-government organisation in Australia. We have offices in all the states and a number of offices in rural and regional locations around Australia. We have been around for 27 years, but I would make the point that we are not an activist group. We are politically non-aligned. We are practical and scientific in our orientation. Although I am the director of policy, our policy involvement is very constructive and will be reflected in some of the comments that we will make this afternoon.

Unlike the previous witness, I have to say that our view on biosequestration is that it can make a very positive impact. It can be a very important part of the ACT government's zero emissions strategy. We believe that because about 25 per cent of global elevated CO₂ is due to forest clearing, reforestation is in fact a very important mitigation strategy. Up-front though, I would like to congratulate the ACT government on your ambitious zero emissions target and also providing us with the opportunity to talk about the role that we see carbon biosequestration playing in helping you to achieve the target.

We are already working in the ACT on a number of infrastructure projects, offsetting carbon emissions associated with urban development in the new suburb of Crace and

also negotiating with Actew on a program to offset carbon emissions from the construction and operation of a new water infrastructure project that includes the new Cotter Dam and the Murrumbidgee to Googong water transfer.

The carbon sequestration work that we undertake is at two levels. One is large-scale, and that is conducted through the Greening Australia carbon business. This is where the biosequestration is connected with landscape-scale restoration work. At the other level, the household and small business level, we are engaged with people where there is an opportunity to offset carbon footprints through our “breathe easy” program.

We put in a submission to your recent review of greenhouse reduction targets and we identified in that the contribution that native forest carbon sinks can make both to carbon emissions mitigation and to climate change adaptation. The opportunity to achieve both carbon emissions reductions and a range of environmental benefits makes investment in conservation sinks outstanding value for money. I will now ask David to explain the way that Greening Australia works with carbon in the landscape. David is our director of science.

Dr Freudenberger: Thank you, Di. My role is to ensure that, as we develop a product in the market for creating offsets, they are quality and they are permanent. The previous witness raised the issue of both the legitimacy of offsets and permanence. I agree with the previous speaker that offsets are a transitional product, that we will not be able to go to zero emissions overnight, that the opportunity to use mechanisms of the market to create these offsets over, say, the next 20 years is a legitimate part of the process of reducing overall net emissions.

My job is to ensure that what we do at the paddock, property, landscape scale is permanent. We have agreed that we will be looking after forest offsets, forest sinks, for the next 100 years. Therefore it is in our self-interest to make sure that they are resilient to climate change, resilient to fire, resilient to floods and temperature changes, rainfall changes. One of the reasons we are harnessing our skills across the organisation and restoring native vegetation is that we see restoration of local native vegetation as the greatest means of reducing the risk to the loss of our forest sinks.

Our native vegetation has seen it all before. It evolved through a highly fluctuating climate for millions of years. Granted, we are now in an environmental space that this world has not seen for over half a billion years in terms of CO₂ concentrations. But we do know that our native vegetation has coped with rapidly changing climates due to natural climate change for quite some time. So we work hard to ensure that our offsets are based on as many native species as we can, with as great a genetic diversity within a species as possible, to ensure that there will be some genetic material of some species that is able to cope with the changing environment.

My own research prior to joining Greening Australia was with CSIRO. I led a joint project between CSIRO and Greening Australia looking at the effect of the 2003 fires on ACT landkeepers plantings, as well as plantings just outside the ACT. The good news is that our native vegetation is remarkably resilient and remarkably tough. If it is well designed, wide, large and well planned and the weed control is well managed, we found that, within five years, the Landcare-type plantings across the ACT rural leases had fully recovered. There was virtually no loss of species. Occasionally, there were

some eucalypts that were obligate seeders, that were not big enough to put down seed, but most of the eucalypts, acacias and shrubs came back after the fire, even though they were just sticks shortly after, as many people will remember.

The offsets that we offer to companies and right down to households is part of restoring and getting that double win-win of reducing emissions through biosequestration. Photosynthesis is a proven technology that has been working for a very long time to take CO₂ out of the atmosphere. It is a partial solution; it is not the only solution. It is part of a portfolio.

Finally, reflecting on what was said by the previous witness, and with respect to the role of the ACT, we are just a little country town compared to the urban landscape that I grew up in, which was Los Angeles. But it is around leadership and setting precedent. It has been a privilege to be a member of the ACT community for the last 17 years and to see initiatives like No Waste by 2010 become real. I think we have a proud record in seeing how household consumption can be reduced, and reduced significantly, against very bold targets. Likewise, it has been a pleasure to see how the ACT has taken leadership on reducing water consumption. Again, it starts with the household and household behaviours.

Likewise, this big global issue and imperative to reduce consumption boils down to what individuals do in their households and in business places, and how we move around our cities and towns in terms of public transport and other policies around transport. Reducing our energy consumption can be as simple as turning off the heater during the day. Nationally, we need to have major investment in green energy. Being able to restore some of our native vegetation through offsets, such as what we are negotiating with Actew, is one part of the policy mix that we are trying to roll out nation-wide. Thank you.

THE CHAIR: I want to ask you about this work you are doing with Actew around offsets. Could you give us a bit more detail and rundown on that work.

Dr Freudenberger: The fine detail is still tied up in negotiating contracts, but it is simply looking at offsetting the calculated emissions from the infrastructure development around the Cotter and Murrumbidgee pipeline and offering a price to offset those emissions through the restoration of native vegetation across a pool across southern Australia. We are building a national pool of offsets generated by restoring native vegetation. So we are not just working in one area.

Our carbon only goes into key landscapes where we are focusing our efforts. We have an internal accreditation process that is saying that carbon offsets only go in landscapes that are well planned. So we have landscapes in the Southern Highlands of New South Wales, accredited landscapes in Victoria, South Australia, Tasmania and Western Australia, as well as moving towards developing a project in southern Queensland, so that if a fire sweeps through and temporarily reduces the amount of carbon in one location, that is offset by trees fixing CO₂ in other parts of the landscape. So the carbon that will be absorbed from the development of the infrastructure for the ACT water supply will be absorbed from plantings right across southern Australia.

THE CHAIR: You were talking about the work you are doing around developing

offsets for the market. You talked about the importance of biodiverse native forest carbon sinks. How are you going to ensure that you can keep a diversity in there and will not end up with monoculture—just a monoculture of fast-growing trees?

Dr Freudenberger: We have developed our own internal standard so that every carbon planting needs to be based on regional native species that include a full structure of the native vegetation. So if it is mallee, it has got the mallee over-storey, the shrubs right down to the grasses. If it is a eucalypt woodland like we have in the ACT, it has the over-storey of dominant eucalypts, it has the mid-storey of the fast-growing acacias, it has the under-storey of smaller shrubs and the critically important native grasses. It is a matter of seeing carbon as a means of turbo-charging Landcare restoration rather than just a commercial means of rapidly growing trees in straight lines.

For the first time probably in human history, an economic value is being put on trees growing in place. Distance to market, distance to a pulp mill are not factors. They do not have to grow straight, they do not have to have a fine grain, it can be twisted and gnarled and full of hollows for parrots and possums, and that is still highly valuable carbon. If a fire goes through and burns the leaves, as we found from the 2003 fire, the vast majority of carbon is still there as living trunks, living root systems that resprout very rapidly, if you have that diversity.

So, yes, we did lose a few species during the 2003 fire. Those are the species that have to regenerate from seed. The beautiful thing about our native vegetation is that, as one CSIRO scientist put it, it is “God’s gift to biosequestration”. They have a massive root that just keeps coming back after major events such as fire, floods, Christmas beetles—you name it—if you have the diversity there. So we have this internal standard. Part of my job is to make sure that that standard is maintained.

MS PORTER: I would agree about the diversity. Being up there myself and planting trees with Greening Australia, up at the Cotter and at various other places, I notice how many different varieties there are that are offered for us to plant. It is fantastic.

I have been involved in that, but not so much in understanding what you are doing with the rural landholders, because most of the work that I have been doing has not been with those people. Also, with the “breathe easy” program, I was wondering if you could explain a little bit more about that for us, and the work you are doing out at Crace.

Dr Freudenberger: There were three questions there. I will start with how we work with rural landholders. That is a process that we are still developing. With respect to the initial, strictly from a business viewpoint, there needs to be long-term access to land because we are responsible for looking after the security of carbon sequestered in trees for at least 100 years, we need long-term security of tenure. What we have done in pilot landscapes, in an internationally recognised project, Gondwana Link in south-west WA, or the Habitat 141 project in Victoria and South Australia on the 141st parallel longitude, is that we are buying farms that should never have been cleared. So we are buying hardship, heartbreak farms.

I am looking forward to the day when we have a large contract of X tens of millions

of dollars to generate carbon credits, so that we are able go to a rural market and basically go to tender as to who is willing to put up parcels of land, what consortium of Landcare groups are willing to put up the back paddock, the bare hills and the eroded gullies to create that portfolio of land with long-term security of tenure, to be able to then use the carbon dollars to restore the degraded hills and such. We have not been able to secure those contracts yet on that scale to be able to fully engage rural lessees, rural landholders, but I look forward to that day.

In the meantime, to demonstrate our proof of concept, we have been buying whole farms, and putting down the majority of farm to trees, or we are looking at reconfiguring landscapes. Agriculture has undergone enormous rural restructuring in terms of farms getting bigger. The vast majority of farmers that were there 50 years ago are not there today, because of economies of scale. Often, we are looking at the social aspect of rural landscapes having changed but not the boundaries. The farms are still small, they are still fenced poorly. We are looking at helping to redesign rural landscapes so that the very best, deeper soils, the more fertile soils, continue to grow quality food and fibre.

Our best agricultural soils have been degraded by bare hills. Dryland salinity is a function of bare hills leading to rising water tables. At the bottom of the hills is where the best soil is. So we see an opportunity there through carbon offsets. Again, it is about a 20-year window of being able to work with a whole range of landholders, as well as Indigenous communities. We are working with the Indigenous community in re-engaging them with country of which we now have ownership or long-term leases.

The second question was around—

MS PORTER: “Breathe easy”.

Dr Freudenberger: With “breathe easy”, there are two emerging markets. One is a compulsory market, mandatory, covered by the proposed carbon pollution reduction scheme, which Di can give you details of. There is also the voluntary market, which “breathe easy” is designed for. For households to reduce their emissions, part of that is a web-based calculator to calculate your emissions and look at various strategies in terms of insulation, light bulbs, heating systems and double glazing to reduce the emissions, and purchasing green power. They are looking at the residual, and the residual is X hundred tonnes per household per year. You can then, through a credit card transaction on the web, purchase offset credits that will be as rigorous as any credits in the mandatory market, to offset your emissions that year from your household. Again, that goes into a pool of tree planting and native vegetation restoration across the 12 key landscapes that we have.

The third question was around the Crace development. Again, that was with CIC, and it was offsetting the infrastructure development of ditches, curbs and buried powerlines. GHD, as an independent consultant, went through it very carefully and wrote down the emissions per metre of ditch to work out those emissions. We then have a contract to plant native vegetation across the strategic landscapes to offset those emissions, looking at securing that and guaranteeing it for the next 100 years.

MS PORTER: Can I ask a further question about the rural one. You are talking about

buying large areas of land in order to be able to secure those for the future. I was wondering whether you know of any lessees who actually do not want to let go of their land but are happy to work under a long-term contract with you in a partnership arrangement, and whether that might be appropriate for some of our rural lessees in the ACT and the region.

Dr Freudenberger: We certainly want to move in that direction, as the whole economy understands and implements pollution reduction emissions trading. Di, do you want to mention some of the issues around leasehold versus freehold and some of the discussions you have been having with the commonwealth on that?

Ms Dibley: With respect to a few policy issues for the ACT—and some of these are policy issues generally as well—the one about leasehold is the fact that in the ACT the land is leasehold. It is virtually perpetual leasing because it goes forever, for 99 years, and then it is renewed. But the fact is that it is a different legal arrangement from freehold. The question about carbon rights, where they vest and how the relationship will flow with leasehold land as opposed to freehold is one that the ACT will need to be interested in.

I know that, at the moment, there is some conversation going on, and the department of climate change are very interested in this leasehold question. They think that probably the easiest solution is for it to have the same status as crown land. That would mean that all that would be required for a carbon right to attach to that leasehold land would be a consent from the minister. Obviously, that is an issue for the ACT that needs to be resolved, if you are thinking about biosequestration of carbon, and that being an integral part of your policy to meet your zero emissions.

There are some other policy issues. There is also the issue of Kyoto-compliant land, because if you want to account for your carbon permits, you have to be sequestering carbon from land that was cleared prior to 1990. Where that becomes particularly interesting in the ACT is that there is a lot of plantation forestry. The land for those plantations certainly was cleared prior to 1990, but historically, there have been plantations on a lot of that land ever since. For the purposes of carbon accounting, will that land be deemed to be cleared prior to 1990 or not? This directly affects, for instance, a decision to plant on land that was plantation land up to the recent fires. Will that be Kyoto-compliant if you decide to undertake restoration work with a carbon sequestration component to that?

The other thing I have noted here is the treatment of carbon permits. With respect to any of these offset permits that are generated either through household activity or through investment in landscape-scale restoration work at the moment, either under the CPRS, the current ETS that the government is looking at, or any similar instrument that they have discussed, and certainly under the national carbon offsets standard, what would happen to those permits is that they would get lost. They would go back into the scheme. They would go back into the system. Effectively, they would help to lower the price of carbon and be taken up by large polluters to continue to do what they do. We have made this point, as have many others, in submissions to the commonwealth government. Organisations that are concerned about that can make the decision that any permit that is created out of a voluntary offset could be ripped up, or it could be set aside and just held onto—the notion of banking.

There is certainly a fantastic opportunity in the ACT. Potentially, if you were creating a lot of offset credits in association with the realisation of your policy objective, this could have quite a lot of political sway. You could say: “Look, we want these to really count, we’re not going to put these back into the system. We want to be helping to bring the target down. We want this to be additional carbon. We want this to be real and meaningful.” There is a potential political play that could take place between the ACT, as a leader on this, and the commonwealth.

The other thing I was going to mention was incentives for people to invest in offsets. There are some land tax and rating regimes that do give concessions to certain activities. Some of these are controlled by both councils and state governments, whereby certain types of primary production are given exemption or are given a concession. We think it is really important. In the broader conversation we have, we think that conservation—because we are linking conservation with productivity—should be an acceptable land use that also qualifies for concessions if it is undertaken in the rural sector. Of course, because our carbon sequestration is associated with conservation work, and it is linked to restoration work, we think that a carbon sink is a legitimate land use in the primary industry sector, and it should qualify for some of the concessions that apply otherwise in that sector.

THE CHAIR: Mr Seselja?

MR SESELJA: Thank you, Chair. Was Greening Australia consulted by the ACT government when it was looking at its arboretum? Was Greening Australia at all involved in that?

Dr Freudenberg: I am not sure of the detail because we have a regional office based in Aranda that Mary works with, looking at the Cotter and working with the ACT landkeepers program. We were certainly involved with a lot of submissions post the 2003 fire, focusing on engaging the community in land repair. As regards the details of the arboretum, we certainly did not bid for the design or anything like that, but I am not sure whether we were involved in consulting on the actual operations.

MR SESELJA: I am interested particularly because the ACT government has now stated that is one of the key parts of its efforts to sequester carbon—and how that fits with what you have set out in your submission—by diverse native forest carbon sinks. You have got all of the different elements. I am wondering whether you have a view on how much the arboretum, from what you know of it, would meet any of these elements that you have set out to make—

Dr Freudenberg: It is all about the scale; so the scale of the offer of offsetting the emissions from the Murrumbidgee to Googong pipeline and the enlargement of Cotter dam is about 400 hectares and the arboretum is around 200 to 250 hectares. So it is a sizeable pool. Whether the trees are native or exotic, it uses the same chemistry called photosynthesis to do the job. And being an urban area, the risk of loss due to fire as such is reduced because of fire plans and the intensive nature of being an urban area. Again, likewise with the city’s urban trees, they are a significant means of increasing the net carbon that is fixed within the ACT.

A vast part of the ACT is old growth forest that is at a reasonable equilibrium. Right now it is fixing a whole lot of carbon because it is growing very quickly. As a bush walker, I can barely move through it post the 2003 fire. But that will reach an equilibrium and the acacias will start dying and rotting; and that rotting generates CO₂ from bacteria and such. So it is all about scale. There is not enough room in the ACT to be able to offset all the emissions from all the cars, refrigerators and plasma TVs and such.

At the same time, Australia has the advantage of being a vast continent, with 50 million hectares that have been cleared; so there is a little bit of room to reduce the over-clearing. But yes, every tree helps. It is about scale. And we are in the business of restoration at scale.

THE CHAIR: Mr Rattenbury?

MR RATTENBURY: Thank you. The government released last week its carbon sequestration audit that was prepared by the Fenner school at the ANU. Have you had an opportunity to look through that at all?

Dr Freudenberger: Just briefly. I saw the press release today.

MR RATTENBURY: In your submission you talk about being able to sequester 100 tonnes per hectare in the ACT. Can you take us through the science of that? Is that a per annum thing or an ongoing thing?

Dr Freudenberger: That is at the low end. On the web there is a national carbon-counting toolbox. It was a brilliant piece of work funded by the commonwealth, through the Australian Greenhouse Office which has now been buried within the Department of Climate Change. With that calculator, you can calculate the amount of carbon that is sequestered in any part of Australia over any length of time. Through our own research and research of others, this is a very conservative model.

In my briefcase I have got an honours thesis from that ANU Fenner school where they looked at the amount of carbon being sequestered in landcare plantings around the ACT, the Murrumbidgee-Murrumbateman arc, and it varies enormously. There would be 150 tonnes, very conservatively, over about a 30 to 40-year period per hectare; so it is building up the bank. Trees grow very quickly and sequester a lot of carbon early on and then start slowing down.

But the research from that school has shown that old-growth forests are important because they continue to accumulate a lot of carbon compared with native forests on an 80-year rotation of harvesting. The analysis, knowing the individuals in that school that were involved in that study, would be sound. Again it is about scale. Very conservatively, on a dry hill facing the west, you would probably secure about 150 tonnes of carbon equivalent over about a 30 or 40-year period. In other places, along a creek frontage, you can have three times that number.

MR RATTENBURY: I think the audit report talked about the non-urban forest taking up 0.07 tonnes per hectare per annum.

Dr Freudenberger: Correct. Assuming they are old growth, they are fully recovered from the 2003 fires; so they are losing as much carbon as they are gaining, simply because as trees die, lose branches, the wattles rot down, the termites eat it up and CO₂ comes out the back end of the termite because it is alive.

In order to increase the capacity of the ACT forest stock, you have to actually grow the stock, whereas, in parts of Victoria, you can actually grow the stock by buying out the right to harvest. Work by the ANU has shown that if you go from a harvested forest to a non-harvested forest you get another potentially 30 to 50 tonnes of additional carbon—that is just off the top of my head—because you are allowing trees to get old. Fallen timber on the ground can take decades to rot to build up that stock.

In the ACT, because most of our forests are within reserves, you do not have that policy option of removing native harvesting. To increase the native stocks you are looking at how you increase the new stock—additional trees, urban trees, arboretums, rural lessees, as well as offsets that are secured around Australia.

MR RATTENBURY: The report clearly identified that urban trees sequester much faster because they are new and growing, I suppose.

Dr Freudenberger: Yes.

MR RATTENBURY: If I can come back to what you were saying about your arrangements with Actew, are you actually doing CO₂ offsets or are you doing, I guess, land-clearing offsets or a combination?

Dr Freudenberger: They are just CO₂ offsets. I think Greening Australia was one of the—this went out to tender—successful tenderers. We do offer a native biodiversity solution but it was never calculated. We never went into any formal calculations of clearing offsets or anything like that. But we certainly see a scope for that. Over the next 20 years we see rural landscapes producing a lot of valued services, including delivery of clean water, reducing salinity risk, biodiversity farms as well as carbon farms. Eventually we will see a market that packages them together but right now they are sort of separate.

MR RATTENBURY: Can you tell the committee a bit more about, when you offer offsets to companies and households et cetera, what the price per tonne is, I suppose, and what the terms and conditions are? What is the product that you are actually offering? Can you tell us a bit more about it?

Dr Freudenberger: Under the voluntary, “breathe easy” offer for households and small businesses, it is \$30 a tonne. We negotiate below that for larger deals. Then, when it comes to large commercial deals like Actew, it is well below \$30 a tonne. So it is around volume and such things like that.

MR RATTENBURY: You described earlier you are doing vast plantings across south-eastern New South Wales. How does the volume change, I suppose, if you start taking large projects?

Dr Freudenberger: It is more of a value around transaction costs. It costs a lot to

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negotiate a thousand-tonne contract. And sometimes it costs even less to negotiate a \$10 million contract. It is the transaction costs. It is the transaction costs of delivering and reporting on voluntary programs. We issue a certificate. Under the former Australian greenhouse friendly program, we are an accredited greenhouse friendly provider. We meet all their very detailed scrutiny there.

What will replace the Australian greenhouse friendly certification program, we do not know yet but it will likely be similar in terms of making sure that it is genuine, it is in the ground, it is accounted for, it is run by rules and it makes sure we have the accounting systems, ongoing monitoring, the trees are there, they are growing. We keep open and transparent books on what has been sold, what has been grown, what is available for additional sale. All of our voluntary carbon we are not going to put back into the market in terms of mums and dads. It is retired, it is grown, it is there; we do not on-sell it or anything like that.

MR RATTENBURY: In those contracts, what guarantees are offered on permanence or how do you deal with permanence in offering those contracts?

Dr Freudenberger: Again, I am not on the detailed business side of those details. We can certainly provide that or it would be available through Actew. I am not sure with Actew what is commercial-in-confidence versus what is not. That is why we are building a national pool. We have arrangements with Swiss Reinsurance, an international insurance provider, to insure our plantings. And we never sell all the carbon we grow. We have an internal insurance pool and ongoing discussions with the commonwealth on how the commonwealth is going to deal with this issue: if you lose it, burn it or insects went through one area, who holds the risk? Who holds a pool to make sure that it is a genuine certificate that is issued for every tonne of vegetation that is grown?

We are conducting \$1 million worth of research, as we speak, on better understanding how you measure and model a complex system with acacias that are half dead and half alive, overstorey, the grass is growing. It is much more complicated to measure carbon in those circumstances than with blue gums growing in straight lines and that were all planted in the same year and all that.

MR RATTENBURY: One last question, if I might: you mentioned earlier in your evidence the impact of native forests on adaptation. Can you explain a bit more, I guess, what you envisage their role is in adaptation?

Dr Freudenberger: Yes, adaptation. How do we cope with increasing aridity, increasing intensity of weather patterns, firestorms and such? And I think in the ACT we know very much about adaptation. What we saw from the 2003 fire is that we lost the pine plantations, which were a major liability. The fire went through the native forests and, from my research and bushwalking, it shook us up a bit. The only liability we incurred—we, collectively, as a community—from the fire in our native forests was a bit of road maintenance.

So how do we restore that kind of resilience? We have gone from the driest 10 years in European records and our native forests are still there; they are still surviving, thriving. To me, the first really serious indicator that we have hit a tipping point is

when our native forests start to die and if it is a large block of diverse native forests.

To date I have not heard any reports that there has been any major loss due to climate change—whether it is drought, fire, lack of flooding. I take that back. We are losing the red gums due to lack of flooding. Yes, in those situations where we are actively trying to restore wetlands, we are really having to scratch our heads. Is it worth it on a wetland that is never going to get wet again? Do we look at alternatives? To me, that is the first indication that we are outside the envelope, when long-lived trees like the red gums are dying because they have not had a decent drink. Some of that is because of damming; we dammed off all the major rivers. But even with environmental flow being available, there is no flow to put down.

So in terms of adaptation, we recognise that, and that is why we are working with the CSIRO to redefine what we mean by local provenance. With local provenance, the idea is that you take the local seed from the local area and put it back on the farm. We are saying, “Is that really a good idea?” We are now looking at taking that species—say, yellow box; it grows native in the ACT; it also grows native up in Queensland, right down to northern Victoria—and saying that perhaps we are better off taking seed from yellow box in a much broader region, some from the north and some from the south.

We really cannot predict—the scientists cannot predict—exactly where rainfall is going to go. We know that temperatures are going up and in some cases Australia is getting wetter. The Top End is getting wetter. The ACT and northern Victoria are getting a whole lot drier.

We should take a whole diversity within a species and let nature sort it out because we know that, whatever the species, they do grow in an extraordinary range of environments. We know that some species that have adapted to the north-facing slope are very different to those that have adapted to the cool, wet, south-facing slope, even though the botanists call them the same species.

So that adaptation is about hedging our bets, increasing diversity. Adaptation from a biological viewpoint requires diversity. If you have one clone of *Pinus radiata*, that does not give you much to select from. You need diversity to let nature sort it out. Within species and across species, there is a whole lot of diversity. Some will thrive and some will not. And the beautiful thing is that we are not having to grow sawn logs. You have a market value for trees that are growing crooked and bent and providing lots of habitat for bees, birds and butterflies.

Ms Dibley: We are doing some of that adaptation and climate change resilience work in the agricultural sector. If anyone wants to go and have a look, there is some fantastic work happening out at Boorowa and Binalong, where farmers are actually re-establishing natural drainage systems, restoring soil health and bringing back native flora and fauna and at the same time creating shade for stock. There have been some other outcomes associated with stock being able to graze on a rotational basis in these restored areas where there is some greater resilience to bacteria and parasites.

We are also looking at the carbon. There can be some carbon outcomes in that as well; so it can perhaps provide carbon income as an alternative, as an additional alternative

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to the farming sector. It can prepare them for when agriculture is ultimately covered or responsible in one way or another for its own emissions and will be looking for offsetting their own liabilities. Yes, we are doing quite a lot of work linking agriculture, conservation and carbon.

THE CHAIR: You spoke before about this large research project you are undertaking. I understand from your submission that you are planning a study for the ACT. Is that right? When might you be undertaking it?

Dr Freudenberger: Certainly we have been involved in funding the ANU research looking at the carbon that was sequestered in landcare-type plantings. That work has been completed in this process and has been published. There has been a little bit of work on the carbon that can be gained from planting a scatter of trees, through working with some farmers around Boorowa and Binalong. So there is that work in progress. But the large project we are doing, funded by a large corporate emitter, is looking at what our native vegetation can sequester right across Australia. We did not do work in the ACT area because that work has already been done through the ANU.

THE CHAIR: Thank you very much for coming along and giving evidence this afternoon. We will be sending you a transcript. You can check over it and if there are any corrections you could let our secretary know. But thank you again.

MS PORTER: Thank you very much.

Meeting adjourned from 2.18 to 2.36 pm.

WRIGHT, MR MATTHEW, Campaign Director, Beyond Zero Emissions

THE CHAIR: Our next witness is Mr Matthew Wright who is on a phone hook-up from Melbourne. Mr Wright, I understand that the secretary has sent you a copy of the privilege statement.

Mr Wright: Yes.

THE CHAIR: Would you please confirm for the committee and Hansard that you understand the content of the privileges statement before you?

Mr Wright: Yes, I do.

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

Mr Wright: Yes, just to introduce myself, I guess.

THE CHAIR: Certainly.

Mr Wright: My name is Matthew Wright. I am a climate and energy campaigner in Melbourne. Beyond Zero Emissions is a group which I co-founded. Currently I do consulting with the likes of General Motors, a number of car component manufacturers and the CEO Institute. I am their main speaker in Melbourne on environmental and climate change issues. I also work with the CFMEU Victorian mining division. So I am fairly across the climate issue.

THE CHAIR: Thank you for that introduction. I believe we are about to go on to a PowerPoint presentation. This will be an interesting one—you will be driving it from Melbourne but we will be seeing the presentation here. We might get going on that presentation.

Mr Wright: We have an opening slide that says, “Net zero ACT”.

THE CHAIR: Yes.

Mr Wright: Initially I am talking about the electricity sector. I have some stats on that. You guys use 2.7 million megawatt hours of electricity a year. In Victoria, where I am from, we use about 55 million, so you are a little bit smaller than that. You have an average load there that gets planned for, I guess. The actual annual sales would be somewhere in the vicinity of 300 to 500 million. Switching to the next slide, you could pretty much generate that much electricity just for the electricity sector. The electricity sector, of course, is powering our air conditioners, projectors, laptops and things like that, and the lighting where you are. With 341 Vestas V90 wind turbines, which is a pretty standard wind turbine, we would produce the equivalent of the electricity of your stationary electricity requirements in ACT.

Moving to the next stage, an alternative option that you could go with and consider would be a solar thermal plant. Here we have one by a company backed by Google called E-Solar, and 21 of these E-Solar mirror fields covering about 1,344 hectares

would power your electricity sector. They have 18-metre high towers. If you move to the next slide you can see how big that would be in the ACT. Can you see the red square just above Queanbeyan?

THE CHAIR: Yes.

Mr Wright: The area of that would be about 3.6 by 3.6 kilometres. That is just a representation of the land area requirement. It would not necessarily have to be absolutely within the borders of the ACT, but it would be good to have a solution that had that in proximity of the electricity grid.

THE CHAIR: What would be the approximate cost of that?

Mr Wright: I will think about it and give an answer in a few minutes.

THE CHAIR: No problem.

Mr Wright: I will have to crunch some numbers on that.

THE CHAIR: If you like, we can follow that up with you afterwards.

Mr Wright: I certainly can price that. Another option might be that you go for something more akin to giving you the power when and where you need it and at the cheapest price. So you could go for something like 11 of those large-scale mirror fields, plus 164 Vestas V90 turbines. You are going fifty-fifty in that approach.

Next I want to talk about gas because gas is greenhouse gas as well. Fossil fuel gas results in greenhouse gas, as the heading will show up there. I think that moving to gas is actually short-term thinking. It is not getting us to where we need to be because we have already got too much carbon in the atmosphere. I am sure some other speakers have already talked about where the science is at.

THE CHAIR: Yes.

Mr Wright: So we must transition from gas. On the left I have taken a clipping from the *Canberra Times* where an Actew and AGL joint venture is just looking at building a 500-megawatt gas-fired power plant. Putting it on the local grid would pretty much make that the primary and only energy source in the region and would block out any opportunities for large-scale solar thermal plants or something of that nature. I would be concerned about that. Also, the use of gas in homes I actually see as hazardous. When you try to draught-seal homes for energy efficiency and things like that you cannot zip them up as tightly when people use gas cooking, as opposed to when people use modern European induction cook tops. Then you can actually more tightly seal your houses.

Here is an example. The New South Wales government—this is dated 28 May 2009—are still fitting dangerous heaters in their school blocks. These ones are unflued gas heaters. I thought that they had gone out before the 1980s, but looking for resources for this I actually found that it is contemporary; they are still going in. It would be very concerning if that is the kind of standard that would be in most places around

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Canberra. Certainly, two houses I visited had a one-way flued unit. This means they take their air from within the house so they reduce oxygen in the house but the worst case ones that exist actually take the air and expel the fumes inside the house.

Moving to the next slide, if you do choose a gas-electric power plant what you are really buying into is not a gas power plant; you are buying into seismic testing offshore in Longford or seismic testing in the Moomba gas fields, and onshore gas processing plants. That is where they actually take the gas offshore. They split a lot of CO₂, which gets booked as industrial process emissions, not as electricity sector emissions. If you move to the next slide you see the plant there.

If you go to the next slide you will see that I have got all the gas pipelines there. In the gas distribution network you get what are called fugitive emissions, so there is a lot of gas—methane—that is released into the atmosphere and that is very potent greenhouse gas. And that is before you have even got to your gas plant that you want to build. If you go to the next slide you can see a pipeline getting built and if you go to the next slide you will see there is a picture of Moomba just after they had had a fire. I have a few photos of that here.

We have had Longford, Moomba and Varanus Island all explode. This is the OH&S and the danger of a gas-based distribution network. In fact, domestic houses often go up in fire because of the use of gas. If you go to the next slide, that is what a localised pipeline explosion can do. This is an infrastructure that is already in the ACT and is already, essentially, a liability. That is something that I would think we should be moving away from.

Going to the next slide, I have got a few press clippings. One is “Lightning hits a gas pipeline in Sydney and blows it up”. Down the bottom I have got “Report reveals the full effect of a gas pipeline explosion”. With Varanus Island, they reckon it cost the WA economy \$6.7 billion there with the gas explosion. There is a lot of cost which is not up-front when you build a gas power plant.

Going to the next slide, I have got the gas power plant there—so finally you have built it. If you were AGL and the partner of Actew I think that you would be keenly trying to push the idea of building a gas plant because you had an interest in the gas industry. It would be good for all the other parts of the business as they were partners in gas pipelines, gas exploration, gas fields and things like that.

Moving to the next slide—and this is a juxtaposition—you can go with solar, and you can see that, according to Bloomberg, a 14,000-megawatt solar thermal plant is being planned and built in Spain and that is more than enough power for New South Wales. Spain does not have as good a solar resource as Australia. In fact, pretty much the best resource in Spain is consistent with Canberra’s resource. Spain is 37 degrees latitude, so it is like building a solar plant in Tasmania.

Another clipping says, “Now the Army launches new energy initiatives”. At the bottom it says, “The Army will partner with the private sector to construct a 500-megawatt solar thermal plant at Fort Irwin California in the Mojave Desert.” So you have got the US Army building solar thermal plants. If you move to the next slide, you will see that I have got a few solar thermal plant pictures. I think towers are

probably the way to go. Certainly ANU's dishes are fantastic as well, but not as commercial.

The next slide shows a bit about storage, if you are not familiar with it. The federal government have announced a \$1.35 billion solar flagships program. I think the ACT should really be considering partnering with them in terms of the solar thermal money that they have made available. The important thing with a solar thermal plant—and this is something that I am working on with the federal government at the moment—is that it has got storage. So you do not just have 25 per cent of the time when it is a solar plant and then you back it up with gas; you actually have storage. Have you got this photo, Andasol 1 and 2, on the screen?

THE CHAIR: Yes.

Mr Wright: You can see there are two tanks. They are brown-looking because they have not been clad yet, except for the front one, which has started to be clad, in this photo, with insulation. With respect to these plants, this one runs half the time after dark, so the whole area is the equivalent of 70 soccer fields, and 35 soccer fields worth goes into storage. The storage medium here is salt. The salt is just like fertiliser that is used in agriculture, so it is a mixture of potassium nitrate and sodium nitrate salt.

If you go to the next picture, you will see the size of the tank. So 35 soccer fields worth of heat off a mirror field gets heat exchanged into these tanks—just two of them. They are 14 metres high by 36 metres in diameter, so it is pretty amazingly dense, storing that heat in salt. After dark, or when there is cloud cover, you can heat exchange the salt back to steam, flash it to steam and then drive a turbine, just like a coal plant, a nuclear plant or a gas plant operates.

The next picture shows you the tanks once they had finished cleaning them and they were finalising building the pumps. This plant is actually operational and in summer right now in Spain it has been dispatching power 24 by seven, right around the clock.

The next picture shows the middle of the industrial facility where we have the salt stored between the two tanks. I have got a few photos just giving an idea of the engineering. If I am giving a presentation to SKM or someone like that, they all like these photos because they are the kind of jobs they are used to doing.

The next one is another engineering photo, and there is also another one. These are troughs. I showed you towers. My preference is probably for towers. Troughs are the most tried and proven system but they use more land. A parabolic trough plant uses about three times the land that a power tower plant uses. If you go to another one, you can see the troughs there with the pipes.

Finally, you should be at a picture of E-Solar's field, the one that I think is the pretty good one, and that has got a whole lot of individual heliostat mirrors that focus up on the central power tower. In fact, Worley Parsons are promoting a different company's power tower for their proposal for the federal government's \$1.35 billion solar flagships. The Worley Parsons one is possibly a more expensive technology than this one.

PROOF

If you go to the next page, you can see that, in this one, the mirrors are actually one metre by 1.2 metres. Instead of making ground penetrations—that is like putting foundations in—they actually use a racking system, so that the rollout is a bit cheaper and there is less impact on the surrounding land.

If you go forward, I have got Wizard Power there. Hopefully, we can get a bit more support for research and development from the federal government. They have got their own storage technology that is being commercialised now, but at the moment we can rely on the salt thermal storage, because that is already available, and if we hurry up the commercialisation process then certainly the ammonia thermo chemical storage system could compete. That is just down near Parkes Way, on the edge of the ANU campus. You can go and visit the dish. They have got a mass production dish at the ANU. They have almost built the first one and then, once it is going, they should be able to build something like a dish a day per gig out at any site they want to exploit.

If you move to the next slide, something else to be considered is the use of solar thermal industrial steam. The Pepsi company has built a large-scale solar thermal field. They have got a brand of chips that obviously motivated them initially, called Sun Chips, that they cook there, along with all of their other brands of potato crisps and things like that. They cook them using solar steam at that facility. If you have got some manufacturing on the way to Queanbeyan, you could potentially pair that with some solar thermal. Initially it could be hybridised with gas, because they are possibly using gas for their boilers or they might be using electricity for their boilers. It is quite easy to implement, so it is much more efficient if you directly provide the heat rather than provide it solely for electricity production. There will be some opportunities there as well.

If you go to the next slide, I mentioned that Spain has got 14,000 megawatts in the pipeline. In the US, this is just a small selection of the announcements that have been made there. There are massive trough plants getting built, power towers. The BrightSource Company is the one that is partnering with Worley Parsons here. Pacific Gas and Electric is building a number of projects. We have got announcements involving around 1,300 megawatts, which is really considerable. If those projects have storage, they are similar to the biggest coal plants in Victoria and New South Wales.

If you move to the next one, I have added gas in, and what it would look like. You are using 8,097 terajoules of gas. A joule is like sugar on your table: you count in joules. Terajoules are a lot of joules. If we do a conversion to the electrical equivalent, it would be 1,812 gigawatt hours, which is quite a bit. That is pretty similar to the total electricity supply. But what we can use is heat pumps. I do not know if you are familiar with heat pumps, but they are basically air conditioners running in reverse. If you use very small units, so you start with a house that is well insulated, for your domestic housing stock, you can use very small units and that will achieve between three and five times the heat that actually goes in to running them. In other words, normally, to run an electric bar radiator or an electric oil heater, you have a co-efficient performance of one. But if you drive these heat pumps, they will actually generate three bar radiators worth or three oil heaters worth of energy for the cost of one. So that is the advantage of using heat pumps.

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In Japan and in Europe, countries that have renewable energy targets also have heat pump targets to actually switch their heating over to heat pumps. That is very big in Japan, because they have got a very costly power supply with their nuclear power, and they want to get as much out of it as possible. So they have targets for heat pumps and there are subsidies there to get heat pumps installed.

I worked out what something like 1,812 gigawatt hours of gas would mean. You would get, if you are lucky, about 90 per cent efficiency from the gas. You would lose about 10 per cent of the heat up the flue, into the atmosphere, with the resultant carbon dioxide. You would get your efficiency from running as heat pumps, so you would only need a 544-gigawatt-hour increase in electricity demand. Effectively, we would need to supply 20 per cent more renewable energy in the base case of just doing the electricity sector. So it is not a huge impost if you combine it with using heat pumps. Of course, if we did insulate those houses, which would allow us to use the more efficient, smaller heat pumps, we would actually need less energy, because I have just taken the gross figures there.

If you move to the next page, this is a press release about Mitsubishi Electric's ground source heat pumps. They are what you would want to use in larger buildings, because you cannot really use the small, efficient air source ones. They are talking about getting 300 per cent to 500 per cent increases over conventional boilers—boiler-chiller operations. Those are the sorts of numbers that are out there, and this is from the UK.

If you go to the next slide, there is electrified passenger transport. So a very fast train is something we could advocate to get in to Canberra. Obviously, it would be the federal government's initiative. There are plug-in hybrid and pure electric cars. If you go to the next slide, we have got cargo trams, so there is the opportunity to have last-mile freight—small, light commercial freight operations. This is what Volkswagen uses in Dresden to move engines from their engine plant over to their assembly line on the other side of Dresden. This is a proposal in Amsterdam which is going to reduce absolute nitrous oxide and sulfur dioxide levels within the city limits by 16 per cent, by having 59 of these cargo trams and a series of these last-mile electric sprinter trucks. Those 59 trams are going to replace 2,500 trucks on the road, once that project gets up and is supported by Rabobank and a few big players there.

If you go to the next slide, electrifying long-haul freight is really important. It is something that you need to work with the federal government and the New South Wales government on, if you are going to be supplied that way and ensure your future energy security in Canberra. I did not include a motor vehicle slide and passenger transport, but I think that moving to a light rail vehicle based system is the way to go, as much as possible, and then, for the periphery and the people who are in the outlying areas and for those odd trips that you do that are not part of the normal moving patterns of the public, your electric vehicles are the go.

I have got some figures here. The limitation with this is that it is treating every vehicle kilometre as a passenger kilometre, but of course there is freight and light commercial in there as well. But it would be fairly indicative. So if we went to, say, 50 per cent rail and 50 per cent motor car, so that we have 1.7 million passenger kilometres from

PROOF

rail and 1.7 million passenger kilometres from cars, we would need an additional 51 gigawatt hours, which is not very much of an increase in energy production from renewables.

If we had electric cars that did 80 per cent of their range as electric—this is like plug-in hybrid electrics, so they are electric vehicles that also have an auxiliary motor, and if you exhaust the electric battery after you do your first 40 or 60 kilometres then the auxiliary engine starts up, you keep driving and you would not really notice that. But obviously you also visit the petrol station. Even though it is half of the transport, it actually takes a lot more electrical energy to power those vehicles, versus powering trams. So it would be 361 gigawatt hours versus the 51 gigawatt hours for half of the trips that are on rail.

If you go to the next slide, which looks almost the same, I have said: what if we were 80 per cent rail and 20 per cent motor cars? Instead of 310 gigawatt hours for the cars, they would actually use 124 gigawatt hours. So they would come right down. But the rail would go up marginally from 51 gigawatt hours to 82 gigawatt hours. Overall, transportation in the fifty-fifty case was 361 gigawatt hours and in the 80 per cent rail and 20 per cent motor car case it would be 206 gigawatt hours.

So there are very small energy requirements there, when you consider rail versus electrified motor cars. And even electric motor cars are a lot more efficient than internal combustion engine motor cars. The ratio there is about eight to one. So an internal combustion engine like a Ford Falcon or a Holden Commodore is using eight times the energy of an electric vehicle and they are using a significant proportion more than a rail car—something like a ration of, say, 60 to one would be for rail versus an internal combustion engine vehicle.

In the next slide, I have added it all together. If you had 2,717 gigawatt hours that your stationary energy sector is currently using, plus 544 for driving the heat pumps for the gas switch—and those heat pumps can be heat-pump-boosted solar hot water as well—plus 361 gigawatt hours for the more generous case of 50 per cent rail, 50 per cent motor vehicles, we would end up with having to build a renewable energy infrastructure that was 31 per cent bigger than just doing your electricity sector. So it is not a significant increase. Just one-third more will cover all of Canberra's needs. That would do 90 per cent of passenger kilometres electric and it would require 15 million litres of liquid fuel and save 135 million litres.

Let us look at the cost of oil being \$US200 a barrel. It is heading back that way now that the economy is starting to get legs, or when it does; and of course it hit about \$US150 a barrel before the global financial crisis. The Goldman Sachs prediction is \$US200 a barrel before 2015. Canberra citizens or the Canberra economy would be saving \$175 million per annum, which is a pretty good payback. If you move to the next slide, if you went for the other case, where we had 80 per cent of passenger kilometres on rail and 20 per cent on plug-in hybrid and pure electric vehicles, the fuel saving would be worth about \$187 million per annum for the people of Canberra.

Finally, going back to transport option 1, transport option 1 would be a solar field of 4.15 kilometres by 4.15 kilometres, and that is up from just 3.6 by 3.6 kilometres, if you just did electricity. Or you could go to 453 V90 wind turbines, and that would be

up from 341. There are already wind farms in the world that are operational at that sort of size. Or you could go to a 3.3-kilometre solar field and 218 Vestas' V90 wind turbines. You would also need eventually 833,000 barrels of biodiesel to replace that oil use. That biodiesel would be that last 20 per cent of range-extending that you get out of electric vehicles for the longer trips.

That is the end of that presentation. If you have got questions or would like some discussion, I am available now.

THE CHAIR: Okay, thank you very much, Mr Wright. Just to let you know, the ACT government has announced a policy of zero net emissions. We understand that you have developed a zero net emissions plan for Victoria, so do you have any suggestions on how the ACT government could achieve this zero net emissions policy?

Mr Wright: I think I have provided the idea that you could explore a blueprint of how it would work and then you could work back from there, from a policy perspective. We are working on transition plans now for the entire Australian economy. Our approach has been to find technology that is commercially available now, and not to rely on what is coming research and development-wise—what is on the horizon or on the radar. We need to plan that out and then back-check it and sanity-check it. For a government like yours, obviously you would want to create the mechanisms and instruments to make that happen, and provide the operating environment.

For something like a solar thermal farm versus a gas plant, the gas plant would be an example of a real false start and something you would want to leapfrog. Can you imagine in 40 years time, which would be the life of the gas plant, that you would still be using fossil fuels in major economies around the world? Also, you would be hooking into Moomba and Longford, which would have long passed their usefulness. So the cost of the gas would actually go up extremely high because we would have to build a pipeline to the North West Shelf, and that would have to be factored in. I think it is about checking each scenario as to how things would pan out, if you went for the gas plant versus the solar thermal farm, and those kinds of things.

THE CHAIR: Do you think it is possible for the ACT to reduce its emissions by 50 per cent in three years?

Mr Wright: Yes, I think it would, but obviously, given the kind of economy you have got, there would be a large requirement to go to renewable energy. In that sort of time frame, wind power would probably be your main option there. That is why 10 years as a planning horizon—a bit like the Apollo project—is probably best, unless you are talking about military time frames, which would probably be beyond the scope and capability of what a government currently could achieve. The major component of that would have to be the use of wind power, because it is off-the-shelf and a lot of organisations or companies are tooled up, equipped and ready to install wind farms with a development pipeline. Obviously, those would not be able necessarily to be that close to Canberra.

THE CHAIR: With respect to our terms of reference for this inquiry, I am not sure if

you know that part of it asks us to report on a target for level of peaking of emissions in the ACT—a target for 2012 and a target for reductions in 2020.

Mr Wright: Yes.

THE CHAIR: We understand you have not done any modelling for the ACT. However, on your experience with modelling in Victoria, what do you expect would be the soonest we could achieve a level of peaking in the ACT?

Mr Wright: You would probably achieve peaking of greenhouse gas emissions pretty quickly. At the moment, more Australia-wide, it is a fairly easy task because in New South Wales they are not even growing in power demand, but that will change as we come out of the financial crisis. Instruments for achieving that would be things like targets for solar hot-water units and heat pumps. You can't get a rail infrastructure out that quickly, but there would be targets for large buildings moving to ground-source heat pumps.

One thing about the ACT is that it is a fairly quantifiable problem because you do not have the industrial sector emission vectors and a lot of the other complications that we have got when you look at Victoria. So you are really hitting the electric and gas demand, pretty much, and certainly the electric demand is going to yield greater cuts. So you would prioritise that over the gas, but I would not leave the gas out of your longer term thinking and I certainly would not be thinking of gas switching as the option here, because that is just going to be using the energy resources of the territory and putting up the capital for something that you need to then get off before it has actually served its useful life.

THE CHAIR: With that in mind, what do you think would be a realistic target for reductions by 2020?

Mr Wright: By 2020, you could basically move to a net zero ACT.

THE CHAIR: And what sort of steps? You have mentioned some of them around power sources and so forth. What other steps could the government take to achieve this target? Have you had any involvement with things like retrofitting programs, for instance?

Mr Wright: I actually was involved a bit in and have trained in the government's housing sustainability assessment course, out of interest, to see what they are working at. I think their program has offered \$4 billion. The requirement federally would have been about \$40 billion. I can convert that to Victoria easily because it is divided by four, which means that to do Victoria would be \$10 billion.

I think that you could probably achieve, with reasonable success, bringing houses up to seven stars for retrofits and then using heat pumps for that auxiliary heating requirement which is obviously significant in Canberra. I do not know; do you have ministry of housing or department of housing kind of housing?

THE CHAIR: Yes, we do.

Mr Wright: One way I have considered would be useful to approach this would be to set up the environment for businesses to come in and get the contracts to work through the government housing. That would give them enough chance to upscale, to get some learning and a very secure pipeline of work so that they can invest in doing that. You give them clear opportunities to move their labour force from one abode to the next and so on and then, from there, once they are three-quarters of the way through that, open up incentives to move them into the broader, private housing market. I think, if you did a transition like that, then you could probably create the labour force and the businesses incentives so that it actually happens. I think you would need something like that to give them the up-front work volume and make it worth their while.

THE CHAIR: It is an interesting idea. That is underway at the moment. It is quite a large program of retrofitting the public housing stock. Just going back to the top three things the ACT community could undertake to reduce emissions, what would you put at the top three? You have given us a number of different options in your presentation this afternoon but, just to get it down, what would be the top three?

Mr Wright: I think I would pursue a solar thermal farm and it would have storage. There would need to be synergies on the electricity network there too because you would need a hydro scheme which is better for supply during the winter months. That is in terms of the electricity grids.

The second one I would pursue would be the light rail network and one that could accommodate off-peak cargo trams to significantly start switching freight over. My third option would be heat pump targets across the territory, both ground-source heat pumps for larger buildings and air-source heat pumps for small buildings. But the heat pumps and the energy efficiency program would have to run in tandem because the idea there would be to use smaller heat pumps which tend to operate more efficiently.

THE CHAIR: Have you got any ideas about how this could be financed?

Mr Wright: I am not aware, unfortunately, of the ACT's financial position, like I am with some of the other states. I think there are probably opportunities. If you are working through the department of housing, obviously the financing burden or organising that finance will be on the state. Given the paybacks could be quite short, you could probably organise rolling funds for internal projects where you set aside a fair amount of capital and you expect a payback and then the profits from that all get rolled back into the fund and then reinvested.

But in the domestic sector I think that, if you had matching subsidies and fairly consistent work that you are offering, where there are savings to be had, you could probably involve private funders such as progressive banks like the Bendigo and the credit unions.

THE CHAIR: I have my colleagues here, Ms Porter and Mr Seselja. Mr Seselja, did you have any questions?

MR SESELJA: Yes, thanks, chair. I have a couple of questions.

You argued very strongly against gas in your presentation. We have heard from particularly, and not surprisingly, ActewAGL, but I think possibly others who have said that gas is a good transition fuel for when we move to renewables, that gas is an important part of the transition until we get to low emissions and are relying more on renewables. What do you say to that? Do you not see any role for gas in the transition?

Mr Wright: I think the transitional gas is already out there and it has already been happening. We are coming to the end of the gas transition phase. It seemed to be a mixture of a diversity energy security kind of thing but it was seen as a cheaper way of providing space heating.

MR SESELJA: So you see the transition as being basically done in terms of infrastructure, that you would not need to see any additional investment in gas-fired power in order to transition to low emissions?

Mr Wright: No, I do not think so. You will be piggy-backing off a gas infrastructure in the ACT that has been built for Victoria and New South Wales. Both of those are in decline. If those governments choose to do that as well, then that means that they will deplete very quickly because at the moment, say, Victoria has got about 20 to 25 years at current rate but, if there is an upswing in gas use, then obviously those dates will come closer.

That includes all the new discoveries. The exploration that has been done in the waters of Victoria is really significant. The coverage is really good; so it is not like it is going to magically find new gas supplies there. Similarly with the Cooper Basin and Moomba, which has been set up for New South Wales, it is in decline.

So you have really got to consider that, if you build a gas plant, the cost of that is really that someone has had to capitalise an onshore processing plant; they have had to pay for exploration; there is a pipeline there. If you lose that piggy-backing off that 1960s infrastructure in Victoria and similarly Moomba, you have then got to somehow pass on the costs of building a pipeline to the North West Shelf and the processing that is going to have to be built there. So that will significantly impact price.

The national renewable energy laboratory cost curves, the US department of energy group cost curves for solar thermal, show that we are going to have level cost of energy between 3.2c and 6.5c—that is US—per kilowatt hour by 2020. So if you target the right technology you will find that these plants will come at a reasonable cost. They are just a small premium to the price of gas.

If the cost of dispatching gas in the ACT—I have not got any real figures—is 6c or 8c per kilowatt hour and the cost of a near-term solar thermal plant might be 8c to 11c, the thing is that you are locking that price in for good. That is the cost from a solar thermal plant forever and a day because it is a very simple plant that involves concrete, steel and glass, and fertiliser. It requires 28,500 tonnes of fertiliser if it is a 50-megawatt plant or, if it is a 500-megawatt plant, it would be ten times that, in the tanks. They just pump the salt back and forward each day and collect the heat off the field.

So it is very simple compared to a gas infrastructure which involves seismic testing, extraction, flaring, separation, CO₂ venting, future losses on the gas pipeline, gas pipeline damage and that is finally connected to your gas plant. It is a really significant infrastructure that you are plugging into there.

MR SESELJA: I have a couple of quick questions and you might need to take these on notice. You were talking about the solar power plant in Spain having base-load capacity. Do you have any idea how many homes that is able to power or what the capacity generation is and what the approximate cost of such a power plant was?

Mr Wright: I can probably tell you a bit of the answer and I will be best giving you the answers in a follow-up communication.

MR SESELJA: Sure.

Mr Wright: The plants in Spain, there are a number of them. The one that is already operating is 50 megawatts but that is mainly because the Spanish government decided that 50 megawatts was the size of a plant to garner their subsidies. It is 50-megawatt electrical and that plant has 7.5 hours of storage. On an annual basis its capacity factor is 50 per cent. So if it was just running on sun it would have a capacity factor of about 25 per cent, which would be similar to what you would achieve in Canberra on an annual basis. You would achieve about 25 per cent on sun.

There is another company which is backed by the Masdar initiative—Masdar is in the United Arab Emirates—and the biggest Spanish engineering company, Sener. It is called Torresol. Torresol are building a tower. The tower actually uses salt as a working fluid through the central power and a whole feed of mirrors. That power plant has an annual capacity factor of about 76 per cent. In other words, it will be operating 76 per cent of the time.

There are coal plants in New South Wales that operate at less than that. Victorian brand coal plants, such as Hazelwood or Yallourn West, which are the cheapest to dispatch, operate about an 85 per cent capacity factor. That is pretty good, a 76 per cent capacity factor.

You have got another company in the US doing the same kind of tower with the same storage, 16 hours storage, and it is called SolarReserve. It is part of one of the biggest defence contractors in the US, Einsman, and United Technologies Corporation, who build all the rockets for the Apollo missions and even today's rockets that send satellites into orbit. That company also owns the Carrier Air Conditioning company. They are one of the biggest companies on the NASDAQ.

So we have got some major players building this as low risk in terms of the various options to build in when building your plants. There are a couple of Australian options too. But definitely storage is the go.

In terms of the number of houses, a 50-megawatt electrical plant—if you give me one second I will give you a figure—is 219 gigawatt hours per annum but it is only running at a 50 per cent capacity factor. That compares to the ACT which uses about

10 times that.

MR SESELJA: It is about one-tenth of the homes in the ACT?

Mr Wright: That is one-tenth of the entire ACT electricity demand of today. If that was a 75 per cent capacity factor plant, then obviously there would be another 50 per cent again. It would be a seventh of the power demand.

MR SESELJA: And you can get back to us on some of the costs associated with a plant of that size

Mr Wright: Yes. There are definitely economies of scale to be had if you do decide to go with a large plant and with a development pipeline where you are going to build each module and keep building them.

I think a lot of problems with our renewable energy projects, including wind projects—and my brother-in-law has actually managed a big one, a wind farm called Walpro, the biggest to date in Victoria—is that, because of the way these projects come up as once-offs, there is a lot of down time on site with the labour force. He was project-managing the site and they would have three-month delays because equipment was not ready and they had not actually contracted all the workers and things like that.

So if you actually have a cleared pipeline and move from one project to the next, which is what they do in Victoria with roads projects, for instance—and the Victorian government and the road building institute is very good at lining up their ducks so that the project is finished and new projects come on line—if you could actually aim to achieve that, then that would reduce costs by 20 or 30 per cent.

THE CHAIR: Thank you very much for giving your evidence this afternoon. We will be sending a transcript to you so that you can check the accuracy of the transcript. If you do have any corrections, you could get back to our secretary. We look forward to also receiving the information about the cost and size of the different solar plants and so forth that you were talking about this afternoon. But thank you once again.

Mr Wright: Thanks very much.

CRILLY, MR STEPHEN MARK, Communications Officer, ACT Council of Parents and Citizens Associations Inc

SINGER, MRS ELIZABETH, President, ACT Council of Parents and Citizens Associations Inc

THE CHAIR: Good afternoon. We will now hear from Elizabeth Singer and Stephen Crilly from the ACT Council of Parents and Citizens Associations. Have you had a chance to look through the privilege statement?

Mr Crilly: Yes, we have.

THE CHAIR: When you first speak could you state that you understand the content of the privilege statement. Would you like to make an opening statement?

Mrs Singer: Yes, please. We do understand the privilege statement. I would like to thank the members of the committee for having us here to appear before you today. The council believes that every member of the ACT community should be involved in and educated on issues involving climate change, environment, water and reducing greenhouse gas emissions.

As the peak body representing parents through the government's school P&C associations, we would like to encourage the government to include in its plans, student learning and curriculum school management, school building and infrastructure around those themes of climate change, environment, water and greenhouse gas emissions. We believe that schools can both teach within the classroom and set an example by having appropriate sustainable practices for our children and that this will benefit our children, their families and the ACT community.

To do this, we specifically draw your attention to the need for a dedicated officer in the Department of Education and Training to advise schools on the curriculum in relation to teaching students about these matters; specific funding for the professional development of our teachers; the extension and availability of more appropriate options in terms of subject learning for students, especially within our college system; and funds to improve the carbon footprint of our schools and in fact reduce it. Thank you.

THE CHAIR: Thank you, Mrs Singer. Mr Crilly, would you like to make an opening statement?

Mr Crilly: No, I do not have anything to add to Elizabeth's statement. But, for the record, I understand the content of the privilege statement.

THE CHAIR: Thank you very much. To start with, we have heard that the department of education has some concerns regarding putting solar panels on school roofs and double glazing, due to the possibility of breakage, damage and maintenance costs. I wanted to get your view on that and whether you support the installation of solar panels, solar hot water and maybe double glazing, but could we start with solar panels and solar hot water.

Mrs Singer: We see solar panels as being a good direction in which to go. The feedback that we get from our parents at the moment is that a lot of our schools tend to have evening intruders on our school roofs. It makes it very difficult to find an appropriate location where that is not an occurrence. A lot of our schools have a high degree of vandalism.

THE CHAIR: Yes, I understand. Thank you for that explanation.

MS PORTER: In your discussions with the department, what solutions have you put forward with regard to the high degree of vandalism within schools? Have you been having conversations about things that you would see as disincentives in any way, shape or form, or about how you might involve young people in the district in having a sense of ownership of their school?

Mrs Singer: We have spoken to the Department of Education and Training about these issues. We have convinced them to trial putting in a fence around one of our high schools, to see if that reduces the degree of vandalism that that school gets. We are actually aware from ACT Policing that the department has spoken to ACT Policing and they have advised how to put in some partial fencing or some partial walls to reduce the incidence of vandalism. But we are also aware that some people that have been found out of hours on school property are actually not members of the school community. They tend to be slightly older members of our community.

THE CHAIR: I was just looking at the potential savings. Do you have an idea about potential financial savings that could be made by having greater energy efficiency in schools?

Mrs Singer: Some of our newer schools have been built to a very high energy efficiency standard, but some of the older schools, like Ainslie primary school and Lyneham high school, that are built to the old design, would benefit greatly from a range of measures that would allow them to be much more energy efficient. They were designed before any of those sorts of things were taken into account.

THE CHAIR: Very old infrastructure, as you say.

MS PORTER: So you would see retrofitting of those schools as being the way to go?

Mrs Singer: Yes, and extremely important for the running of those schools in the future. Energy costs are going to increase, and that is just a much better way to go.

THE CHAIR: Part of your submission, of course, was the council's policy—sustainability in schools. Can you tell us a little bit about that policy? Obviously, it was developed over time. What has been the implementation? How have you gone about promoting that or ensuring that school communities take it up?

Mrs Singer: This is a reasonably new policy by council. It was endorsed in November last year. It has been developed by a small group of parents who have a very large amount of knowledge about the issues. In terms of taking it up, we make sure that all of our schools, all of our school P&Cs, have a copy of the document and that they are aware of discussions that we have at council meetings around the

document. We have spoken to the minister for education about the policy that we have. We have conversations with the Department of Education and Training about whether, when they are putting in new buildings, they are thinking about energy efficiency, water tanks, and how they are going to cool the building without air conditioning, because we got very hot earlier this year.

Mr Crilly: I think a prime example of that, picking up on what Elizabeth was saying, was that last week, at our general council meeting, we spoke to several representatives, including Phil Tardif from the department of education, about the building the education revolution initiative. Several of our delegates raised the issue of sustainable schools and what features would be implemented to try and make them more environmentally sound. It is just a matter of bringing these things up whenever the opportunity presents itself, primarily.

THE CHAIR: In your opening statement you talked about the importance of having a dedicated position in the Department of Education and Training around promoting sustainability through the curriculum. I guess that would also be a bit of a catalyst to drive change within the schools. So there is a learning component, as you said; it is a way of changing physical infrastructure, behaviour and those sorts of things. Is this something that you have been lobbying the department of education or the minister for?

Mrs Singer: It is something that they are aware of—that we would like to have that particular person. They have just re-arranged the curriculum, and the curriculum will change a little bit more. That section tends to be very fluid, depending on where the emphasis on learning tends to be—their structures. It got rearranged dramatically a few years ago when the number of head office staff were reduced. It got restructured slightly when “every chance to learn” was introduced, so that they were meeting the needs of the schools for curriculum advice. We are hoping that, as they continually restructure, they will find an appropriate position. Most people in that office are employed at school leader C level, and we would see this person as probably being employed as a school leader C.

MS PORTER: Sorry, Mrs Singer; I did not hear the last sentence.

Mrs Singer: Most of the people within curriculum that are responsible are employed as school leader Cs, and we would hope that this person would be a school leader C.

THE CHAIR: At the moment, is there a lot of professional development going on for teachers around sustainability? Again, I note in your submission that it is around providing specific funding. Is that because it tends to get lost and this is one way of providing a bit of a focus and raising it as a bit of a priority?

Mrs Singer: Currently, each individual school gets an amount of professional learning money for their teachers and they spend those funds as they choose. The Department of Education and Training might have a promotion—something that it is putting forward. For example, last year they conducted a whole lot of professional development on the quality teaching model. It would be really good to have a large amount of funding set aside fairly soon for our teachers to do a whole lot of professional learning, particularly where our schools have a large component of

teachers that are in that older bulge in our teaching population, for whom this was not a subject that they were taught and are familiar with in their undergraduate education at university. Whereas it is part of the primary school curriculum at some of our universities now for our undergraduate teachers, a lot of our older teachers just have not had that sort of professional learning and it would make it easier for schools to take up the example.

THE CHAIR: I also notice you had a focus on the sustainable curriculum at the college level. I guess that is important if you are wanting to provide encouragement around looking at careers that might be available after year 12 or tertiary study. Is that another of your priorities that you would like government to take up?

Mrs Singer: Yes, it is another one of our concerns. The only course that is reasonably dedicated to this area at the moment, according to the Department of Education and Training's college disk for this year, is at Narrabundah college. It is run as a tertiary minor course and its name is Environmental Systems. But it is not available at any other college. We have suggested to the Minister for Education and Training that a program that is at one college should also be available at several others.

There are units within specific subjects. For example, if you are doing agriculture, there would be an element of sustainability in terms of farming and agriculture practice. If you do physics, there is a sustainability bit in the physics module. If you do chemistry, there is a sustainability bit in your chemistry module. But if you wanted to put it in as a tertiary subject and then feed in to the tertiary courses that are available at the University of Canberra or the Australian National University, there is currently not a lot of scope to experience it within the year 11 and 12 system.

MS PORTER: I noticed, particularly around Earth Hour and Environment Day—or is it week?

THE CHAIR: It is World Environment Day.

MS PORTER: When I was visiting schools in my electorate, a number of them have some very good whole-school initiatives, where the total school is involved in issues around water and energy saving and are very conscious of it. They also include those kinds of elements, not only in what might be called the environment section of the curriculum but across different areas of the curriculum. Would you say that would be due to some of the factors that you were talking about before—that some teachers are really quite au fait, whereas others need some more opportunities to develop that? Would you say that it comes always from the top, say the principal—that sort of assistance and direction that occurs in schools? Some of them have excellent programs.

Mrs Singer: Some of our schools have changed the way their students behave; they make sure they turn off lights, recycle and have appropriate watering. I think the school community as a whole is very important, as is having a principal that understands that they can make a difference, and who has that knowledge and support. Also, the school's business manager, who is responsible for looking at how the school spends its money, is an important person to educate in terms of this. The principal and the business manager could work together, and the principal would be responsible for

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making sure that their staff had the knowledge and skills and were able to put it into their curriculum and their classroom teaching, and the business manager could deal with the energy efficiencies needed for the buildings and staff behaviour.

MS PORTER: How much influence do you think that the P&C associations and also the school boards can have on those particular positions within a school, to promote these ideas?

Mrs Singer: I think it varies in our parent community—the amount of awareness of this issue and how to convey it well at a school board level or at a P&C level. So it depends. It is not that parents do not have the desire or the concern; it is just that some of our parents feel a bit more inhibited by the way they do that.

MS PORTER: Are you suggesting that the P&Cs and the boards need extra support in order to be able to present the case to their principals and to their business managers?

Mrs Singer: Yes. We have put in a submission to the school-based management review that they will talk about additional training and support for representatives of the parents.

THE CHAIR: You made reference to this before: do you know of any examples of where there is very good energy efficiency? You mentioned that new buildings tend to be better, but apart from new buildings, do you know of any projects or changes that have been made to current schools that have made savings and had benefits?

Mrs Singer: I would not like to mention a particular school.

THE CHAIR: In your view, there are a number of schools across the ACT?

Mrs Singer: There are a number of schools that are doing things. Some may be more water efficient, some might have moved into huge recycling, some have moved into vegetable gardens, recycling and lights, and some have a whole teaching module around Earth Hour.

THE CHAIR: Thank you very much for giving evidence this afternoon. You will get a copy of the transcript, and if you have any corrections, please let our secretary know. Thank you once again.

Mrs Singer: Thank you.

JOHNSON, MS DI, Co-Convenor, Sustainable Working Party, P&C Council, ACT Council of P&C Associations

PEARCE, MS VIVIENNE, Convenor, Sustainable Working Party; Assistant Secretary, P&C Council, ACT Council of P&C Associations

THE CHAIR: Good afternoon and welcome to Vivienne Pearce and Di Johnson, who are appearing as themselves—

Ms Pearce: That is right; larger than life!

THE CHAIR: and also as parents, obviously, of those attending school. Ms Di Johnson is co-convenor of the P&C Council's Sustainable Working Party. Ms Vivienne Pearce is the assistant secretary of the P&C Council and the convenor of the P&C Council's Sustainable Working Party. So a bit of confusion about who you are appearing for, but I think we might have sorted that out now.

Ms Pearce: We get a double take, you see.

THE CHAIR: That is right; indeed. I am assuming that you have seen the privilege statement.

Ms Pearce: Yes.

THE CHAIR: If you could also indicate that you understand the content of the privilege statement that would be great, and also for our *Hansard* record. Would either of you like to start with an opening statement?

Ms Pearce: I will let Di start first.

THE CHAIR: Thanks. Ms Johnson.

Ms Johnson: I understand the content of the privilege statement.

THE CHAIR: Thank you.

Ms Johnson: I thank you very much for the opportunity to speak to this inquiry. Whilst Vivienne and I, along with other interested parents, worked on this paper together, our individual focus, research and interests are weighted in slightly different sections, so we will give our own individual presentations to this committee. I speak as a person who has had over 40 years experience in endeavouring to gain greater environmental understanding and knowledge. I work from many different angles and life experiences, from a science and art perspective through to the study of people and societies. Specifically, I did an honours degree in anthropology with a paper entitled "Humanised Landscape".

You have our submission. I will just summarise it and touch on a few of the points, not necessarily reiterating every part of it. There are just a couple of major points. To maintain global warming temperatures below two degrees centigrade, compared with pre-industrial levels, the threshold beyond which the European Union Commission on

Environment and Climate Change believes that irreversible and possibly catastrophic changes are far more likely to occur, the concentrations of carbon dioxide equivalent in the atmosphere, which are currently at 385 parts per million, must be maintained at no more than 400 parts per million and reduced to 350 parts per million. To keep things under that two degrees of warming, we need carbon dioxide levels down to 350 parts per million. In our submission we urged that the ACT government adopt the precautionary principle and manage the risks by acting to mitigate the dangers of global warming.

In our submission I referred to a range of target options, specifically one recommended by the Australian Conservation Foundation, which referenced Garnaut et al, and Climate Action Network Australia. I mentioned their suggestions, their target options. We put our submission in on 7 May and we were very heartened to hear of ACT Labor's submission, or media release, on 12 May. We fully endorse the ACT Labor government's strong aim to set zero net emissions targets for Canberra.

The science on climate warming has been out there for many years. Greater environmental understanding and action upon that understanding is not just dependent on the science but on the education of people and also human nature. Human nature holds on to a world view and it is very difficult and scary to question and change your attitudes. We see that education is really important. We are very supportive of the Australian sustainable schools initiative and the national solar schools program. But these initiatives could be enhanced.

One way that I believe they could be enhanced is within the ACT curriculum framework. At the moment the essential learning achievement, ELA No 20—"the student acts for an environmentally sustainable future"—has been placed only within the science section. I believe this needs to be within the interdisciplinary section. Indeed, this is a framework and these are not delineated separate sets; they filter through to different areas. Like I said, science is a tool that gives us much information, but it does not give us the whole solution. To have greater impact on students' understanding and their wellbeing and to enable them to act in strong and healthy ways when faced with large problems and issues of the world then acting for an environmentally sustainable future needs to be worked through across all areas of the curricula.

I will just talk a little about Campbell high and their walkathon. I have actually organised that for the last five years and I am a "C" part of the P&C now. My children are at Narrabundah College. Walkathon builds up a greater environmental relationship between Campbell high and the nature park of Mount Ainslie and Mount Majura. It builds up that relationship through the physical wellbeing of going for a walk, but over the years we have gradually been able to add some more dimensions to the walkathon, like a science and history dimension through a questionnaire that I devised.

This year—and this is something I have been working towards for some time—we have finally managed to add a greater art component. At one checkpoint, about halfway along, on the saddle between Mount Ainslie and Mount Majura, we set up an art station. Children had art materials and cameras and could stay there for a short time, or as long as they wanted, within the structure of the walkathon and express their relationship to the environment through some of those tools.

The different disciplines, I would say, like the social sciences—science, English, the arts—have their own logic of thought and can thus be limited to the questions they ask and how they view the world within that logic of thought. Children have many skills, abilities and interests and concerns. I would say teenagers take the weight of the world on their shoulders. For them to be able to build their own creative environmental understanding and communicate that understanding in their own creative way we really need an interdisciplinary approach. Also, to support my children and their children's children, we need an environmentally sustainable education and to get that right across the curriculum. I would just reiterate a couple of things. One thing that has already been mentioned in the council's submission is that a dedicated position in the Department of Education and Training is needed to promote sustainable energy in schools through the curriculum and right across the school.

Just to give another example of Campbell high, Campbell high has been doing a lot of good things. With the assistance of AuSSI and the home energy assessment team, along with a group of dedicated parents, it has achieved energy savings through the installation of a daylight harvesting lighting system. This occurred at Campbell high partly because there was a dedicated small group of parents in the P&C that were pushing for more sustainable ideas at Campbell high. So the ball was already rolling a little bit. When some refurbishments were happening and the AuSSI program was there, it fed in more and we got the ball going a bit further along. These were dedicated parents. I am the only one left standing of that small group. It is dependent on the time and energy that parents can put in. That is why I am arguing that if there was a dedicated position there would be greater impetus to maintain that energy or build it in schools where there was not particular input. Professional development for teachers has been mentioned.

Ms Pearce: I will talk about that anyway.

Ms Johnson: Yes. I really think we need to have a population policy conversation. It is going to be very difficult and will bring up a whole lot of emotions and all sorts of discussions but, as a society, we need to do it. I think the ACT is a really good place to have our own discussion and start the ball rolling.

I mentioned transport. If you are going to be really serious about bicycle transport for commuting then you really have to work on the development of bicycle paths on and off the road. You have to give them similar legitimacy to cars. I used the example of sections of Belconnen Way where the surfacing goes as far as the white line on the other side where the bicycle path is.

Ms Pearce: You take your life in your hands.

Ms Johnson: It is a very irregular surface.

Just to sum up, we are very supportive of the government, amongst others, for adopting the following principles addressing climate change, such as a lack of scientific certainty. That is how science works. It does not give you a final certainty; it gives you probabilities. That lack of certainty should not excuse any inaction. This is the precautionary principle. Early action is much more cost-effective than late action

when you have to try and repair the damage.

Whilst responding to climate change requires a collective responsibility from all of us, we see that the government has responsibility to lead. As a society, we have a technical capacity and ability to reduce our ecological carbon footprints. We need to adopt greater social understanding, and the ability to act towards an environmentally sustainable future, not to be overwhelmed by the issues. Education of the entire community is one step along this path and environmentally sustainable education within our schools, across the entire curriculum, is an important support for our children.

THE CHAIR: Thank you very much for that. Ms Pearce, did you want to say something?

Ms Pearce: I am just going to emphasise the common points in the two submissions on sustainable schools because I really think that we have an opportunity with sustainable schools to make a real difference to our greenhouse gas emissions. I think the schools can be leaders in our societies. By making our schools sustainable, in a sense we can be leaders in Australia. I think that is important. In the ACT, with our relatively homogenous population, we can be leaders to reduce our carbon and ecological footprints in our schools.

This is action learning. It is not just sitting in the classroom; it is actually getting out there and doing things and learning things. It is also very cost-effective. Rather than running big ad campaigns to change community attitudes and actions, you can bet that if a kid learns to recycle, learns to change, learns how to reduce energy at the school and learns how to grow the veggie garden—and the teachers that have learnt that at the school—they are going to take that knowledge home, so it ripples out in our society.

How can we make this happen quickly? The federal government, with the AuSSI program, and the ACT government fund the two AuSSI positions in Minister Corbell's department. I was very happy with the questions that you asked the minister on sustainable schools the other day. The original policy that was put up to P&C Council was from my school, Lake Ginninderra. How can we make it happen more quickly? We are already doing stuff, but it is just that, as Di said, with the numbers that are coming in, the high predictions, we have got to do something more quickly than we thought we had to do before. So, first of all, there is obviously the AuSSI program, to support and enhance it. We have got two people at the moment in AuSSI and they have got all of the ACT schools to do something with. It is a huge job for them. They are doing very good work with some schools, but it is only some schools. We really need to step up the pace.

At present, as Minister Corbell said, eight schools have done energy audits, so there are a lot of schools out there and one of them is my school. We joined up to AuSSI two years ago. Because of problems with getting teachers to go to professional development and problems with teachers and principals leaving, we still have not got our environmental management plan. Unless you get your environmental plan, you do not know where you are going to go as a school. Are you going to concentrate on energy? Are you going to concentrate on waste reduction? Are you going to

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concentrate on increasing the biodiversity around your school, saving water? At the moment we have still only got 30 schools that have school environment plans. We have got quite a few schools signed up, like my school, but nothing much is going on, unfortunately, despite my best efforts to make something happen. I am getting too carried away here.

If we are to believe the science we must make things happen at a faster pace—things like school curriculum, management, physical infrastructure, energy, water, waste reduction and biodiversity and landscaping within and around our schools. In our submission, there is a big area for doing lots of stuff at school, even just the biodiversity stuff. The majority of our schools are biological deserts; they really are. I am a science teacher, and they are biological deserts. With seed money you can get really good things happening.

I was involved in the development of grassy woodlands at Kaleen high. I do not think we will get any legless lizards or sun moths fluttering over from Lawson grasslands, but you always hope. But at least there is a resource there. Kids can go out and look at native grasses. There might be a few lizards and a few birds, whereas before there was just a lot of fire hazard stuff, dead or old bushes—that sort of thing. I think there is a big capacity there for not a lot of money. Get the kids and the teachers involved and then the parents will say, “Instead of planting that agapanthus we might put in some kangaroo grass or some wallaby grass or some daisies and provide food and habitat.” It is like little pebbles in the pond spreading out, and that is what I see the schools doing.

On faster change, having seen the system as it works, a dedicated position needs to go into the Department of Education and Training. The Catholic Education Office did this. They only have six more schools to sign up to AuSSI. They have really pushed the agenda. The Catholic schools have done really well. Francis Xavier has a really good program going. A lot of the Catholic primary schools are really good, but they had a person in the office to get them going with their AuSSI programs, perhaps to let them know about the solar program in schools and help the teachers to find their way by recommending what professional development they should have so that they know about energy audits and waste audits. Otherwise it is just all too hard for the teachers to even start. I think that is a really good option that both the council and we as individuals are pushing for.

Turning to the specific funding for professional development of teachers in the area of sustainability, this has been a bugbear of mine as people that I have written letters to about it will know. Some of our teachers could not go to a waste wise thing because you get a certain amount of money for professional development and there are lots of calls on it. There are always more calls on it than there is money, unless you have got a really keen principal that puts sustainability above all else.

Sustainability is not part of the curriculum at the moment. It is down there at the bottom; it is seen as an add-on. If you had dedicated money for sustainability, all the teachers at every school could go and do some of these excellent workshops that the AuSSI people run. How can you make your school more energy wise? How can you make your school more water wise or waste wise? Then the teachers have a head start, so it is not a huge thing where they do not know where to start. Once you go to

professional development you get all enthused, you see what other schools are doing and you talk to other teachers. It is a way of pushing the change.

It will happen slowly. You will have enthusiastic teachers like at Evatt, near me; they have got a great program there in the environmental centre. A very enthusiastic teacher has driven it, but you do not have that in every school. You as a government need to drive it by making sure that you get the teachers involved through professional development. And do not forget the janitors and the registrars, because they are the ones that have to empty the bins and pay the energy bills. They need to have professional development as well. It has got to be made easier. If you have actually got a dedicated pot of money it will be easier.

Di has already talked about the curriculum. It has got to be embedded; it is not an add-on. We did some quite good work at the end of last year. The AuSSI people, with Minister Barr, launched a toolkit—curriculum resources—for the teaching of sustainability across the curriculum from K-10. That was excellent in itself, but you need the professional development to get that English teacher thinking about sustainability, to get that maths teacher to realise that you can calculate energy things; you can go and do percentages on the amount of packaging in your rubbish. There are all sorts of things you can do. The teachers have got to be alerted through professional development to actually embed it in their curriculum—not as an add-on, a special thing you do one day, but actually part of a life skill you are teaching kids.

At the moment it is just stuck in science, and it should not be. A few teachers have got it in other places, but I think the government needs to be driving it because teachers will be teaching the way they have taught for a number of years. At college level, where I have done most of my teaching, it is really stuck in science. It needs development of curriculum specifically. It should not be just for bright kids. There should be sustainability across the curriculum and, of course, vocational and green courses developed for senior students and also vocational guidance so that they can see opportunities in green industries. Evidently they had a course for counsellors the other day. What was it you were saying, Di?

Ms Johnson: AuSSI organised a course on green careers, green opportunities, and no school careers counsellors turned up for that.

Ms Pearce: And it is a big need.

Ms Johnson: So it is not on the radar for the schools—

Ms Pearce: For the kids to start thinking about those new jobs that are going to be coming online. Obviously, we have talked before about retrofitting older schools. My school desperately needs some airlocks to stop all of that loss of energy. It is a social equity issue. The changes that we are going to see in society are going to affect the poor the most. You have to, as a government, prepare those kids for the changed life. They have got to know things like how to grow vegetables, how to save energy, how to reduce their waste. Reduce, repair, recycle, reuse—all of these are life skills that they are going to need as things become more and more expensive. So we are doing a disservice to all of our kids, but in particular to those that come from poor households, because they are not going to have the money. They actually need these skills.

THE CHAIR: Thank you.

Ms Pearce: Sorry, I get very excited about it all.

THE CHAIR: It is an important area. Going back to the vocational and green industry courses, as you pointed out, this is a very important source of jobs and training. I was wondering about the relationship between schools in the ACT and places like CIT. You have got the Bruce CIT just up the road, which has a wonderful range of courses, and quite a few of them are oversubscribed. Young people are finding these courses. What are the links that happen between the colleges and, say, the CIT?

Ms Pearce: I will just speak of Lake Ginninderra, which is the school for which I am the council delegate. On our board we do have a guy from CIT. He is very much interested in that sort of thing. At the moment, I think colleges are trying, but perhaps again there could be more guidance from the government to encourage more of these links. We have various VET courses that link into CIT courses at the moment. I think it is a way of the future, and it is also a way of jobs for the future, that there should be more of these jobs.

In places like Germany, as jobs have become obsolete, say, in the coal industry, they have encouraged, in the Ruhr Valley, which used to be the coal-mining heart, the people there to have jobs in a huge solar industry. So I think we should encourage this new thinking as to where the jobs are going to be in the future. For some jobs, people are obviously going to lose out and are going to become redundant, and you cannot just leave those people on the social scrapheap. As a caring society, we need to start preparing for this now in our schools. There are going to be huge amounts of jobs just in the near future in insulation and putting solar things on people's roofs. I know it is really hard, and as a society we are faced with doing something relatively quickly which, in previous times, we would have been able to do at a slower pace.

This is probably why we need more direction from government. Things are going in a particular way, but because it has got to happen quickly, government can play a role in pushing the direction a bit, in being a leader. You do not want to be too bossy with people, but I think in the present circumstances it is probably warranted and I think people will be glad of some direction. So, yes, we can do things there.

THE CHAIR: It was mentioned a couple of times this afternoon about retrofitting buildings, particularly the older buildings, in which we do need to improve energy efficiency, in particular. Do you have any ideas about how that might be done with respect to financing? Would you see that it would be government's role to provide the funds to retrofit and then the school pays that back through savings in their energy bills?

Ms Pearce: I had not thought of that.

Ms Johnson: There are some funds there. It is happening with refurbishment of schools. I understand there are some pools of money that are available for schools to apply for if it is in the context of saving energy.

Ms Pearce: Schools have to be updated on a regular basis. There is capacity there, when schools are being renovated, to turn some of that money towards sustainability. In older schools, there is a crying need for things like airlocks because there are huge amounts of heat being lost. I know in our canteen at Lake Ginninderra it gets so cold because there are two doors—those big doors that open towards the outside. In a modern building, you would have some sort of airlock. You are losing huge amounts of energy. So there is a lot of capacity.

You were asking before about the schools that are doing energy audits. I think there have been savings of up to 25 per cent. The reason why the Catholic Education Office put in their dedicated person was not only that they have an ethical belief in stewardship of our planet earth but also because there were real savings to be made in terms of cost of waste. If you are recycling and composting, you are reducing your waste that has to be carted away and paid for, and in energy.

If we could have in every school, as we put in both of the submissions, an energy monitor, it would be great for maths classes, for doing all sorts of calculations on it; science classes could do all sorts of graphs and things. Kids could see that we can reduce the standbys on various equipment around the school by turning off this or that, and actually see the level of energy come down. This was in our submission as well: if each household in the ACT, as they are replacing the power boards, put in one of these which actually show the energy usage, it is amazing how that feedback affects people. They can see, “Oh, if I turn these appliances off, that really puts my power down.” They can use that in schools very much as educative things, and there are real savings to be made.

Those savings could be used. That is why we put, as part of our sustainability policy at P&C council, that the money saved goes to the school to do things like build an airlock or put in extra stuff that would make the school even more sustainable. If people can see it happening, if it is not just disappearing into a common purse, they are much more likely as a community to come together. I think it is an opportunity to bring our communities together as well.

MS PORTER: I have a question around teachers rotating from school to school and the transfers that you were talking about. We heard before that sometimes the issue is around the teachers being there for a long time and that maybe they need to move on and get some other education and have a chance to have some professional development and then perhaps be tapped back in again. But you are saying that the rotating and transfers are a problem; was I hearing that?

Ms Johnson: It just happened that the particular person at Lake Ginninderra that was doing that sustainability stuff left. I think that is always going to happen. With the rotation of teachers, sometimes teachers become way too stale in a particular place. I think there should always be the capacity to argue for a particular school that needs a particular teacher for a specific purpose that they may be able to keep them longer. But, no, I was not specifically arguing against that.

The professional development needs to be more widely spread. That is why it is unsustainable at the moment. In most of the schools where there are real things

happening, there are some really good examples. I know Evatt because it is just five minutes away from me. That is dependent on that particular teacher. We need to make it more sustainable than that. She has actually got it as part of the curriculum; there is an actual environmental centre. If she moved, another teacher would come in and run the environmental centre; therefore it becomes more sustainable.

We need to try and put it into schools so that it is not just dependent on the enthusiasm of one particular teacher. As you say, teachers move. In some ways it is a renewal for schools to have a fresh face. I would hate to go back to the system of people hanging around for 15 or 20 years and really being in a rut.

MS PORTER: Thank you for that. I also have a question for you, Di, in relation to attitudes because you talked about how difficult it is sometimes to change behaviour. I think in the early part of your presentation you were talking about that.

Ms Johnson: Yes.

MS PORTER: We can educate teachers through professional development, we can educate our students, we can educate the janitors and the administrative staff, business managers in schools, and the committed parents. But what about the general population? Also, what about the parents whose children go home and their parents do not want to know about it, necessarily, because they are up to here with all of this other stuff that is going on in their lives? You said it was a bit scary. Some people are scared of the information; they do not want to hear it. It is a matter of “what does it mean for my children?”

Ms Johnson: It is a big problem, yes. There are some big issues.

MS PORTER: You said you studied this area of human behaviour. Have you got any ideas? Should we be running classes or opportunities in schools for parents to come in—

Ms Johnson: That would be wonderful.

Ms Pearce: Actually that is not a bad idea, yes.

MS PORTER: and hear more about what they can do at home?

Ms Johnson: Yes. I will just mention Campbell high a little. With respect to the way the principal has managed to set up the timetable, I do not know the ins and outs of organising timetables, but she has managed to develop a time where there are electives. It is up to the teachers as to what they put up as possible subjects, and one teacher who had done a professional development course with AuSSI said that was the best professional development course he had ever been to. He is running a course—or was; I am not sure whether it is still called the same thing—called “think global, act local”. They did an energy audit. So they used devices to read the energy consumption of all the various appliances in the school. We are arguing that, as the children develop greater understanding through school, it is one way that it can really filter out to the rest of society.

PROOF

Ms Pearce: My school put up the sustainable policy last year; it had to go out to every single P&C and be discussed by that P&C. When we had our voting and stuff, we had some people that came along and were not happy, but with the vast majority of parents, I was really surprised by how few actually were not supportive. The main thing they wanted for us this year, which we have been doing, is to expand the policy in areas like curriculum and transport infrastructure, which is what we are doing, and it will come up to the August council meeting. So parents overall just wanted more.

With the people that argued against this and that, that was really good because it was actually making each P&C bring up that issue. We put a lot in our new policy, and we think that all of it will not get through, but that does not matter because every P&C will have to discuss it and argue about it. That is doing what you are talking about—actually getting the parents to think. For instance, at the next P&C council meeting, we have got an AuSSI person coming along to talk so that parents can be more informed before the policy conference. So, yes, we do need to involve parents.

Hopefully, it will happen as green teams are formed in the school. It would be part of the environmental management plan, I would think, for any school. At Lake Ginninderra I have been writing a “green spot” in the P&C news. It is not that we seem to have achieved very much, but that is the thing: it is not an easy task. That is why the government can play a role in helping schools to take a bit more of a leadership role with somebody in the education department. With all of these schools, just the two people in AuSSI really is not enough. It is a federally funded program that they are running, both for government and for non-government schools.

I agree that it needs to be spread out into the community. In the schools where it is really working well, it has been a whole community thing. I know that at Evatt they have their community very heavily involved. I know that Francis Xavier have been quite good. You will never get everybody; as you say, people are so flat out. How they ever get to write sustainability things, we do not know.

I really think that it is not an expensive way, compared to a lot of other things you can do, to get that lifestyle change out into the community. For input into the schools, it can be pretty cost effective. For a kid in kindergarten at age five, in 2050, they will be 45, so they will be wearing whatever is going to happen, depending on what we do with getting going on this reduction in greenhouse gas. They are going to need these life skills. So we need to get it embedded across the curriculum and get it happening.

We need a veggie garden in each school so that kids can not only learn the skills of gardening but also link it to fresh food, low food miles, lack of packaging, and help with child obesity. It is a marrying together—getting the kids walking, bike riding, bussing; it is all helping. It not only saves poor families money; it helps with the couch potato society and it also gets kids to lower their carbon footprint, and the whole family to lower their carbon footprint. You could get a lot out of seed money that is put into schools, compared to a lot of other glossy brochures, ads and things which people do not internalise.

THE CHAIR: Thank you very much to both of you for providing evidence this afternoon.

PROOF

Ms Pearce: Sorry that we harangued you so much.

THE CHAIR: We will be sending you a copy of the transcript and if you do have any corrections, please let our secretary know.

Ms Pearce: We were very pleased to come and talk to you.

THE CHAIR: We will adjourn the hearing for this afternoon.

The committee adjourned at 4.31 pm.