COMMONWEALTH OF AUSTRALIA

# Official Committee Hansard

# SENATE

## ENVIRONMENT, COMMUNICATIONS, INFORMATION TECHNOLOGY AND THE ARTS LEGISLATION COMMITTEE

**Reference: Kyoto Protocol Ratification Bill 2003 [No. 2]**

FRIDAY, 13 FEBRUARY 2004

CANBERRA

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## WITNESSES

**SENATE**

**ENVIRONMENT, COMMUNICATIONS, INFORMATION TECHNOLOGY AND THE ARTS LEGISLATION COMMITTEE**

**Friday, 13 February 2004**

**Members:** Senator Eggleston *(Chair)*, Senator Mackay *(Deputy Chair)*, Senators Bartlett, Lundy, Santoro and Tchen

**Participating members:** Senators Abetz, Bolkus, Boswell, Brown, George Campbell, Carr, Chapman, Conroy, Coonan, Chris Evans, Faulkner, Ferguson, Ferris, Harradine, Harris, Heffernan, Humphries, Knowles, Lees, Lightfoot, McLucas, Mason, McGauran, Moore, Murphy, Nettle, Ray, Watson and Wong

**Senators in attendance:** Senator Eggleston *(Chair)*, Senators Brown, Lundy, Santoro and Tchen

**Terms of reference for the inquiry:**

Kyoto Protocol Ratification Bill 2003 (No. 2)

**Committee met at 9.10 a.m.**

**CHAIR**—I declare open this public meeting of the Senate Environment, Communications, Information Technology and the Arts Legislation Committee and welcome everyone here today. The committee is inquiring into the Kyoto Protocol Ratification Bill 2003 [No. 2], which was introduced to the Senate on 30 October 2003 by Senators Brown and Lundy, and which was referred to the committee by the Selection of Bills Committee on 26 November 2003 for inquiry and report by 4 March 2004.

Today's hearing will commence with representatives of CSIRO Climate, who are to provide us with an authoritative presentation on the climate change issue. This will be followed by a series of panels. I should note that the panels have been arranged as a matter of convenience for the committee to enable it to complete its hearing program today, and we would appreciate the witnesses' cooperation in this respect. I stress that the evidence given by each witness is their own.

Before we move to our discussion, there are just a few procedural comments I would like to make. For the benefit of all witnesses here this morning, I point out that the committee prefers all evidence to be given in public, but should you at any stage wish to give your evidence, part of your evidence or answers to specific questions in private you may ask to do so and the committee will consider your request. You are reminded that the evidence given to the committee is protected by parliamentary privilege and that the giving of false or misleading evidence to the committee may constitute a contempt of the Senate. Finally, witnesses who are departmental officers are advised that they will not be asked to give opinions on matters of policy and will be given a reasonable opportunity to refer questions to superior officers or to a minister.

[9.12 a.m.]

**BATES, Dr Bryson Craig, Director, CSIRO Climate, Commonwealth Scientific and Industrial Research Organisation**

**HOLPER, Mr Paul Nicholas, Executive Officer, CSIRO Climate, Commonwealth Scientific and Industrial Research Organisation**

**CHAIR**—I now formally welcome our first witnesses from CSIRO Climate: Dr Bryson Bates, who I understand has come all the way from Perth, and Mr Paul Holper, manager with the CSIRO Climate division. The committee has received your submission, which we have already published. Do you wish to make any alterations or amendments to your submission?

**Dr Bates**—No.

**CHAIR**—I invite you to make a short opening statement, then we will move to questions from the committee. This is a public inquiry. We have three parties here, so we will divide the time available for questioning between the three parties. Would you like to make an opening statement?

**Dr Bates**—Yes, I would.

**CHAIR**—Please do so.

**Dr Bates**—Thank you for the opportunity to speak this morning. CSIRO is here to respond to questions of science relating to greenhouse and climate change. There are three key points we would like to make. Firstly, the emissions of the key anthropogenic—or, if you like, human induced—greenhouse gases are increasing. Regardless of the actions we take today, some degree of climate change is inevitable. There is evidence that some of this change is already with us.

Secondly, to slow global warming we will ultimately need to stabilise atmospheric greenhouse concentrations. Substantial emission reductions will be required. Carbon dioxide concentrations are approximately 370 parts per million. Stabilisation of carbon dioxide concentrations at, for example, 450 parts per million by the year 2090 would require emission reductions of about 40 per cent by the year 2050 and about 70 per cent by the year 2100. The greater the reductions in the emissions and the earlier they are introduced, the smaller and slower the projected warming.

Thirdly, tackling climate change requires a combination of mitigation—or, if you like, reducing greenhouse emissions—and adaptation; that is, dealing with likely changes. Most of the warming over the past 50 years is due to human activity. Over the past 200 years, carbon dioxide concentration has risen from a background level of around 280 parts per million to its current level of 370 parts per million and is now higher than at any time over the past 420,000 years. The rate of increase of carbon dioxide is also higher than at any time in the past 20,000 years.

Only half of the carbon dioxide emitted by human activities is absorbed by the oceans and the biosphere, leaving half in the atmosphere, where it has a lifetime of 50 to 100 years. Thus there will be a significant lag between reducing emissions of this gas and its concentration falling. The global average surface temperature has risen by about 0.6 degrees Celsius since 1900, with the warmest year being 1998, followed by 2002, 2003 and 1997. There have been

an increase in heatwaves, fewer frosts, warming of the lower atmosphere and deep oceans, retreat of glaciers and sea ice and a rise in sea level of 10 to 20 centimetres, and increased heavy rainfall in many regions.

Climate model experiments have been undertaken based on scenarios from the intergovernmental panel on climate change. The model simulations produced global average warming ranges from 0.4 to 1.3 degrees Celsius by the year 2030 and 1.4 to 5.8 degrees Celsius by the year 2100 relative to 1990. About half of the warming range comes from uncertainty about future emissions—that is, uncertainty in human behaviour—and about half stems from variations in model sensitivity. So there is an element of scientific uncertainty.

Due to global warming, CSIRO projects that Australia will be hotter and drier in coming decades, with more extremely hot days and fewer cold days. Over most of the continent annual average temperatures will be 0.4 to two degrees Celsius greater than 1990 by 2030. This would lead to a 10 to 50 per cent increase in summer days over 35 degrees Celsius and a 20 to 80 per cent decrease in frosty winter days in many locations. By 2070 average temperatures are likely to increase by one to six degrees Celsius. There will be slightly less warming in some coastal areas in Tasmania and slightly more warming in the north-west of Australia. In areas that experience little change or an increase in average rainfall, more frequent or heavier downpours are likely. Conversely, there will be more dry spells in regions where average rainfall will decrease. Potential evaporation will increase, and when this is combined with likely changes in rainfall the net effect is a drier climate over the whole of Australia.

It is the role of the government, not CSIRO, to determine whether or not to sign an international agreement such as the Kyoto protocol. However, even if the protocol were to come into force, it would represent just a first small step in slowing global warming.

In conclusion, CSIRO believes that the scientific evidence for global warming is compelling and that the world should not allow global warming to continue at the rate at which it is proceeding today and that we are likely to experience in the future as a result of human impact on the climate system. We believe that Australia should pursue a three-pronged approach. The first is to gain and provide better information about impending climate change, the second is mitigation of greenhouse gas emissions through new technology and reduced land clearing, and the third is adaptation to climate change. Thank you very much for giving us the time to present this statement. We would be pleased to answer any questions on the submission and on the science of greenhouse.

**CHAIR**—Thank you. We have got 35 minutes for questions, which means about 12 minutes for each party. Would you like to begin, Senator Brown?

**Senator BROWN**—Thank you, gentlemen. I will start first with a question about the Kyoto protocol because that is, after all, what this legislation is about. It has been said that we should not be bothered with signing the Kyoto protocol, because there is need to reduce greenhouse gases by 40, 50 or 70 per cent during the century. Do you think that that has a logic with it or do you think that signing Kyoto is a practical first step towards achieving the much bigger goal that is generally agreed?

**Dr Bates**—I think the decision to sign the protocol is really a matter of policy, and that is a matter for governments to decide. I believe CSIRO's role is to provide information about climate change and what we think might happen in the future. It is up to government processes to decide whether to sign the Kyoto protocol or to deliver reduced emissions through some other mechanism.

**Senator BROWN**—You do not have an opinion on it?

**Dr Bates**—No.

**Senator BROWN**—I find that unusual because the weight of evidence you have given here to sign the Kyoto protocol is compelling. Would you agree with that?

**Dr Bates**—I am here representing an organisation, not me.

**Mr Holper**—CSIRO would certainly take the view that, in order to restrict ultimate climate change, the world needs to cut back on emissions of greenhouse gases. The mechanism by which that is done is, quite rightly, up to government and all governments.

**Senator BROWN**—What is the alternative?

**Mr Holper**—The alternative is to have, as Dr Bates said in his opening comments, very significant climate change in the decades ahead.

**Senator BROWN**—So we either sign the Kyoto protocol and move on to further cutbacks or we get climate change, with everything that involves.

**Mr Holper**—CSIRO's view is that the world needs to cut back on emissions but, as we have said, the way in which that is done is open to governments.

**Senator BROWN**—I am asking what the alternative is to the Kyoto protocol track. What offer is open and out there for the world to take? Can you tell the committee that?

**Mr Holper**—We know that a number of alternatives have been proposed both recently and in the past. In any event, the Kyoto protocol would, as you said earlier, represent just the first step in ultimately cutting back on global emissions.

**Senator BROWN**—But the point is is that it is about a practical protocol. Many countries in the world have signed it. Of the rich countries, Russia, the US and Australia alone have held out. What is the practical alternative that is being offered by those countries?

**Mr Holper**—That is not a question of science that we can comment on.

**Senator BROWN**—I will ask other people that today, because I do not think there is one. I want to ask you about the claim by the Chief Scientist that the cost of so-called zero emissions coal—and you know that involves geosequestration—is less than $10 per tonne of carbon dioxide abated. Would you agree with that assessment?

**Mr Holper**—There is significant uncertainty regarding the cost and the efficacy of geosequestration. CSIRO would prefer not to comment on a cost per tonne, because of all the uncertainty; rather, we would prefer to describe costs in terms of megawatt hours. The latest literature available to us says that there is a $67 per megawatt hour cost associated with geosequestration, and that value would be roughly twice the cost currently of wholesale power. I emphasise the fact that there is considerable uncertainty about the actual cost.

**Senator BROWN**—How do you relate that per megawatt hour figure with the carbon dioxide abated figure? How does one convert from one to the other?

**Mr Holper**—I do not believe there is a direct conversion. That is why we quote the figure as per megawatt hours, rather than either per tonne of carbon or per tonne of carbon dioxide. I point out that there seems to be some misunderstandings associated with whether the cost one quotes is per tonne of carbon or per tonne of carbon dioxide. Depending on which you actually quote, it makes a very large difference. They are not the same.

**Senator BROWN**—The Chief Scientist says that it is $10 per tonne of carbon dioxide abated. The figures I have seen range between $40 and $200. Has anybody else come up with a figure in the range of $10 per tonne of carbon dioxide abated?

**Mr Holper**—We go back to the original comment that we would prefer not to talk about the cost per tonne of carbon or carbon dioxide but, rather, the cost per megawatt hour.

**Senator BROWN**—Okay. I will not pursue that. In your submission, in the middle of page 11, you have said:

Even if efficiency of energy conversion doubles via application of new technologies over the next quarter to half century, this would still not be sufficient to reduce greenhouse gas emissions if trends in energy consumption continue.

What you are saying there is that if we double our energy efficiency via new technologies we are still going to be losing. What I am very interested in is the positive side of Australia's positioning in the world in terms of not just renewable energy technologies or techniques but the technology itself, including solar power. What do you see as far as this century is concerned regarding the growth of renewable energy technologies and their place in the world market? I am talking about ecotechnology here as against the old coal and fossil fuel based technologies in terms of producing energy.

**Dr Bates**—I do not think that is really a matter of science; that is a matter of technological development. To try and predict how well these technologies are going to perform over the next 100 years involves a great deal of uncertainty.

**Senator BROWN**—In *Nature* magazine, January edition, you will be aware that 14 ecologists from around the world, including some from Australia, said that if global temperatures follow the optimistic midrange projections and rise by up to two degrees centigrade by 2050 about one-quarter of the species that they have studied will be committed to extinction and if groups of animals and plants from all regions of the world are included there is an estimate of one million species going to extinction within the next 50 years. That is horrendous. We are looking at a quarter of our fellow species on the planet going to extinction in the lifetime of the current younger generation on current trends. Would you comment on that *Nature* article and the projections that are being made there?

**Dr Bates**—I am not too sure about the actual estimates themselves but I would say categorically that there will be a loss of biodiversity, particularly for species that are in specialised regions, from where, once the climate regime starts to shift, they will not be able to move and adapt—so immobile systems, particularly in alpine areas; when the alpine areas warm up they will have nowhere to go. So I would expect massive biodiversity losses in those

sorts of situations. Also, part of the problem in this country is the fragmentation of natural habitat. That will put a lot of species under stress in the future.

**Senator BROWN**—What about bushfires? Is there going to be any effect on bushfires in Australia as a result of these increased temperatures and the changing of rainfall patterns you were talking about?

**Dr Bates**—Yes, I believe there is something in the submission about that. We certainly would expect the risk to increase with warmer temperatures.

**Senator BROWN**—I have seen figures saying that there would be a 28 per cent increase in the frequency of fires if you get a one degree increase in temperature, and a two per cent increase in the rate of catastrophic fires. While these things are hard to project, would you disagree with me saying that Australians are facing more catastrophic bushfires—like those that occurred in Canberra—if global warming continues even in the midranges projected?

**Dr Bates**—I think one of the key factors will be the management of the fuel load in future. But, if you look at the weather conditions, as we have said there will be warmer days. In terms of winds, the information is less certain. But I would expect that unless we manage fuel loads better there will be an enhanced risk.

**Senator BROWN**—By 'managing fuel loads better' I presume you mean that we have more burning off?

**Dr Bates**—This comes into the issue of carbon sequestration and carbon release and so on, that is true.

**Senator BROWN**—Then we have the change of species as a result of that. But as things stand, would you comment on the impact of global warming over the Murray-Darling Basin, where temperatures were above average throughout the drought, and on the drying out that was considerably above average on, for example, the Canberra bushfires?

**Dr Bates**—That drought in the Murray-Darling Basin was quite an interesting one in that it was due more to hotter than usual temperatures than to a massive decrease in rainfall. We have seen in the data since 1973 that droughts in Australia are becoming hotter.

**Senator BROWN**—I have seen scientists say that the impact on the Canberra fires was there to be seen and that you cannot discount global warming as having been a factor in those fires and other fires that we saw during the last summer.

**Dr Bates**—In our submission we say that there is evidence that the warming is taking place. When you come to individual events like this, it is very hard to separate out and attribute the cause to either global warming or natural variability or a mix of the two. We are doing some work in specific regions of Australia where we are trying to tease out just what the main factors are that causing some of the long-term climatic changes we are seeing, but it is a very immature science at this point.

**Senator BROWN**—Dr Karoly—you will know his work—has said that in the Canberra fires you can see for the first time the hand of global warming on a major event. Would you disagree with him?

**Dr Bates**—I am not saying that I disagree with him. It is more a case of: can you say whether it is strictly global warming or whether it is a mixture of natural variability and global warming? That is what I am—

**Senator BROWN**—Can you?

**Dr Bates**—I would say, at this point in time, no.

**Senator BROWN**—When can you? When would you?

**Dr Bates**—I think it will be some years yet.

**Senator BROWN**—How many years?

**Dr Bates**—I cannot say. It might be five, 10 or 20 years.

**Senator SANTORO**—My question goes to the validity of the science. At this point in time where does the science of global warming really stand? Do you think that there are greater certainties? I have read your 'Appendix: Global warming—the balance of evidence', and I think that I get the gist of what you think, but for the record could you give us some assessment of whether you think the science is reliable? In earlier days, when there was a lot of computer modelling, there was a lot of criticism and a lot of doubt was cast on evidence and the validity of evidence. Where do you think we are at today in terms of the validity of evidence and the certainty of the science?

**Dr Bates**—If you look at the level of debate, I think you will see that there is more consensus that it is a threat and that we are seeing some evidence of it occurring now. If you read the assessment reports that come from the IPCC and you compare the first with the second and the third, you can see that the confidence levels about these sorts of statements are increasing with time. I think you will find that people who were sceptical in the past are coming more on board, rather than going the other way, and I think that is evidence that the general opinion of scientists is moving towards global warming as a reality rather than something that can be seriously debated.

**Senator SANTORO**—So you think that, because more people are agreeing, the chances are that they are getting it right, as opposed to previously when there was some more heated debate?

**Dr Bates**—The technology has certainly improved markedly over the last 10 to 15 years. I think we are now seeing evidence and real hard data, not just from the models themselves, and that is what is helping to convince more people that we do have a problem.

**CHAIR**—You have talked about abatement being important. I understand that the current Australian programs and abatement policies have been effective in reducing the rate of growth of Australia's greenhouse emissions despite a strong period of economic growth. However, I think you specifically referred to land clearing in Queensland. Would you like to tell us a little about how that might contribute to the abatement of greenhouse gas emissions in Australia?

**Mr Holper**—There is no doubt that land clearing contributes to greenhouse gas emissions. So the less land clearing that is undertaken, the smaller the contribution to the emission of gases such as carbon dioxide.

**CHAIR**—What other abatement procedures could be adopted which would help reduce our greenhouse gas emissions of that kind?

**Mr Holper**—There are many approaches that one can take, including using energy more efficiently, swapping to different fuels that are less greenhouse intensive and using renewables. There are a wealth of options that will lower emissions of greenhouse gases.

**CHAIR**—Is CSIRO advising the government on the development of such measures?

**Dr Bates**—I think there are groups, particularly in the energy technology division of CSIRO, working in these areas, and they are certainly looking at improving the efficiency of coal fired power plants, combustion engines and so on.

**CHAIR**—What about the development of wind power and solar power?

**Dr Bates**—We do have active research groups. There is one in my old division of CSIRO—Land and Water—that is actively involved in doing modelling for wind farms.

**CHAIR**—How appropriate would you see wind farms as being to providing energy in Australia? We do not have the mountains or winds that perhaps countries like Germany and Denmark have.

**Dr Bates**—It is not going to be a matter of one magic bullet that is going to solve all our problems. I think we are going to have to use a large number of mechanisms to try and abate greenhouse emissions.

**CHAIR**—One of the points that I understand is well known about the Kyoto protocol is that many of the countries which are the largest emitters in the world have not actually signed on—including many of the developing countries and developed countries such as the United States and Russia—and I understand Australia is, in any case, on track to meet our Kyoto protocol target. What difference would it make in terms of meeting and reducing greenhouse gas emissions were Australia to sign onto the protocol?

**Dr Bates**—I think that is getting to the issue of policy again. I think the spirit of our submission is that we need to reduce emissions worldwide. Just how we do that and when we do that is for governments to decide.

**CHAIR**—In the spirit of science, one of the interesting things is that nuclear energy contributes very little to greenhouse emissions. Could you give us some detail about the role of nuclear energy in the mix of the European Union's greenhouse targets and emissions?

**Dr Bates**—Again we are getting to matters of policy, because there are issues with nuclear waste and what will be done about it and so on. I agree that nuclear power is, if you look at it superficially, cleaner than coal fired power, but there are other issues, and that is getting into the policy domain.

**CHAIR**—I can understand why you say that, but the European Union is particularly critical of Australia for not signing on to Kyoto, yet countries such as France, in particular, the United Kingdom and Germany—to a lesser extent, because they are closing down their nuclear power plants—use nuclear power, which in fact means that they are not emitting greenhouse gases from those plants. On a scientific basis, do you have any idea of the percentage of power generated in those countries by nuclear power and other sources which might contribute to the greenhouse targets that they achieve?

**Dr Bates**—I would have to take that question on notice. It is not information I have with me.

**CHAIR**—If you would do that, we would be very grateful. Please give us a breakdown.

**Dr Bates**—We will.

**Senator TCHEN**—I appreciate that it is likely that neither Dr Bates nor Mr Holper are biologists, but you were asked a question about species extinction. From your knowledge, perhaps from talking to your colleagues, is species extinction a rare event or is it a fairly common occurrence?

**Dr Bates**—Here you are getting into probabilities. It is also an issue of magnitude and the rate at which extinctions occur and so on. It is not a very simple question to answer, to be quite truthful.

**Senator TCHEN**—But it is not a rare event though. It happens.

**Dr Bates**—Yes, it happens.

**Mr Holper**—But there is no doubt that increased temperatures and a changed climate will put significant additional pressure on many species.

**Senator TCHEN**—Yes, it will put stress on the existing biostructure. You have also spoken about the loss of diversity with global warming. You were speaking about the loss of existing biodiversity, weren't you? That is because biodiversity tends to develop in any stable environment—or any changing environment, actually.

**Dr Bates**—Biodiversity does change with time, but the timing of the cycles of those changes under natural conditions is much larger than what we are experiencing now.

**Senator TCHEN**—It depends on what you mean by natural condition changes. The natural condition in earth's history has changed dramatically at various times.

**Dr Bates**—Yes, that is what I am saying. If you are talking about a geological time frame or the last 50 years, there is a large difference.

**Mr Holper**—The issue here is the rate of change that we are seeing at the moment and that we are projecting.

**Senator TCHEN**—You were also asked about last year's Canberra bushfire as an example perhaps of the impact of global warming. In your answers, I think some reference was made to forestry management. I think that is what the various inquiries have come up with—that that is a factor as well. By 'forestry management', do you mean more rigorous application of the management of forests—in other words, more human intrusion into the condition of the forest?

**Dr Bates**—Neither of us are foresters so we have to be careful here.

**Senator TCHEN**—But is that what you meant when you talked about it?

**Dr Bates**—Like all of these things, we know that, if we stay where we are in terms of the way our forests are managed, with climate change there will be more frequent and more intense bushfires than we have experienced in the past.

**Senator TCHEN**—I will draw Senator Brown's attention to your comments. In your submission you said that model simulations that are available now produce a global average warming increase of between 1.4 and 5.8 degrees centigrade by 2100. I take it that this refers to the extreme scenario of the carbon dioxide concentration.

**Dr Bates**—There are two major reasons for that large range in projected temperatures.

**Senator TCHEN**—Does even the 1.4 refer to a particular scenario?

**Mr Holper**—It is taking into account many scenarios and giving the full range of likely changes. We are saying that the changes we anticipate will be somewhere in that range. So, for example, by the year 2100 the likely temperature increase will be between 1.4 degrees Celsius and 5.8 degrees Celsius. It will be somewhere in that envelope.

**Senator TCHEN**—I am interested in your stabilisation level of 450 parts per million. How does that concentration relate within this range? I notice the worst-case scenario exceeds 950 parts per million, so what will 450 parts per million mean by 2100?

**Mr Holper**—Currently, carbon dioxide concentrations are approximately 370 parts per million. If the world decided that we were going to stabilise at 450 parts per million, as we say in our submission, very substantial emission reductions would be required. As Dr Bates said, they would be in the order of 40 per cent by the year 2050 and about 70 per cent by the year 2100. We simply chose that level of 450 parts per million as an example of what the world might decide should be the target to stabilise carbon dioxide emissions at.

**Senator TCHEN**—In your model, how much of that reduction in emissions would come from developed countries and how much of it would come from undeveloped countries?

**Dr Bates**—It is based on a global average. We have not gone into the mix of developed and undeveloped countries that that would involve as yet.

**Senator TCHEN**—Say the developed countries actually do achieve their Kyoto targets. What about the countries which are at this stage undeveloped but will presumably be developing in the future? At what sort of rate would they have to develop—or not develop—to achieve the stabilising level that you were speaking of?

**Dr Bates**—As we said in our submission and this morning, this is a global issue; it is not just Australia's issue. I think there are some real political issues about what will be the contribution of underdeveloped countries as they grow compared to developed countries. Again, I would see this as a matter for world governments to work on.

**Senator TCHEN**—Basically, you are saying that you cannot make a comment on that. We do not know how the developing countries of various degrees will behave.

**Dr Bates**—There is a high degree of uncertainty as to how their economies will change with time.

**Senator LUNDY**—Your submission characterises Kyoto as being a small step. Have you done any calculations about where Australia would be if that step had not been taken?

**Dr Bates**—Paul mentioned earlier the full range of temperatures by 2070 and so on. Most of that work is based on 40 emission scenarios, some of which do take account of deliberate reductions in greenhouse gases. There are some that are based on business as usual futures

and others on enhanced emissions due to the developing countries coming on line. That is about the extent of the work we go into.

**Senator LUNDY**—But that is three fairly complex scenarios.

**Dr Bates**—There are 40 in all. They are very complex, and there is a lot of work put into developing these scenarios. We try to capture the likely emission futures by having such a wide range of scenarios.

**Mr Holper**—These scenarios are used by the Intergovernmental Panel on Climate Change for their international assessments.

**Senator LUNDY**—Looking at those scenarios, are you able to make an assessment of the impact on Australia specifically, given that is your focus? From the various measures you mentioned in your presentation, we are likely to expect more warming in the north-west et cetera. Have you extrapolated those overarching studies to what the direct impact would be on Australia? If so, can you talk about the results of that?

**Dr Bates**—I think the submission did indicate what the likely climate future for Australia would be. If you are talking about impacts in particular, the work there is more fragmented. Some work has been done on particular sectors of the economy—but certainly not all sectors, and not all aspects of the environment.

**Mr Holper**—I draw your attention to the climate change projections that CSIRO produced and published in 2001. Those are publicly available documents.

**Dr Bates**—There you will find some detailed spatial information on likely changes to the climate between 2030 and 2070.

**Senator LUNDY**—Do you have maps and graphs that show that?

**Dr Bates**—Yes.

**Senator LUNDY**—Could they be provided to the committee?

**Dr Bates**—Yes.

**Senator LUNDY**—Thank you. Do those projections relate specifically to the impact that the Kyoto protocol has already had? Can you correlate some of those scenarios to Kyoto specifically?

**Dr Bates**—No, we have not done that.

**Senator LUNDY**—Why not?

**Mr Holper**—The projections are based on the range of possibilities for climate change. We are not taking into account the presence or absence of any particular measures to reduce greenhouse gas emissions.

**Senator LUNDY**—Why wouldn't you, given that that is one area where action has been taken?

**Dr Bates**—It is because there are 40 scenarios involved. There is a group of those scenarios that would encompass something like Kyoto. I think some of these scenarios are in fact stricter than Kyoto. They lead to greater reductions in greenhouse emissions than what is in the Kyoto protocol.

**Senator LUNDY**—I am trying to ascertain whether there has been any work done as far as scenarios go specifically on the impact of Kyoto to date.

**Dr Bates**—As far as I know in CSIRO, the answer is no.

**Senator LUNDY**—Are you planning to do any? I hope you are not going to tell me that is a policy question.

**Mr Holper**—When CSIRO do these assessments we take into account the full range of emissions and hence the full range of likely greenhouse gas concentrations in the years ahead. By doing that we take into account the range of possible policy options that governments around the world will adopt to limit greenhouse gas emissions. We are trying to cover the full range of possibilities.

**Senator LUNDY**—But that to me says that you would do an assessment based on what Kyoto has achieved to date and what it could potentially achieve if everyone became a signatory to it, for example.

**Dr Bates**—There are a number of demands on CSIRO, and quite rightly so, to provide information on this. What we try to do in a contribution to the international community is look at these 40 scenarios that have been developed by international teams that have a high element of credibility. That is what we have concentrated our resources on.

**Senator LUNDY**—Sure, but that is a bit off-track to my question.

**Dr Bates**—I know what you are saying, but as I said—

**Senator LUNDY**—Have you been told not to do it?

**Dr Bates**—No.

**Senator LUNDY**—Is it simply a resource question?

**Dr Bates**—Yes.

**Senator LUNDY**—Given that there is a lot of talk about costs and Kyoto, going the step further on this issue of scenarios, have you done any work in relation to the costs if we do not sign the Kyoto protocol and do not proceed down that path?

**Dr Bates**—I think the short answer is no. But we are going through a process at the moment of trying to see where the Australian Greenhouse Science Program is going to go. There are moves afoot to try and get something substantial going on impacts and adaptation. Part of that will involve economic assessments.

**Senator LUNDY**—If we have all this evidence about the theoretical costs of Kyoto, it seems to me a logical assumption that we need to understand the costs of not reducing emissions and not signing the Kyoto protocol.

**Dr Bates**—Yes. We thoroughly agree.

**Senator LUNDY**—Can you go through how you plan to address that and what studies you think you might be able to commit to or begin?

**Dr Bates**—The Australian Greenhouse Science Program goes through a competitive bid process. We would certainly be interested in any advice from the government as to what they

see as being the real issues and what they would like to see addressed, because that would certainly guide the way in which we would structure our future work.

**Mr Holper**—And we are certainly, as we said earlier, looking at the likely impacts of climate change in Australia. We are beginning to look at the costs of those impacts and at the way in which adapting to some of the impacts—being forewarned—can perhaps reduce some of the costs of those impacts. So it is work that we are beginning to undertake. But it is, as you would imagine, very complex.

**Senator LUNDY**—And would you agree that these types of costs, once you analyse them, should be factored into any cost analysis of whether we sign the Kyoto protocol?

**Dr Bates**—Yes. I think it would be useful background information to that decision.

**Senator LUNDY**—Can you explain that competitive process for getting the resources to undertake this study?

**Dr Bates**—Basically, certain moneys are made available through the science program and—

**Senator LUNDY**—Do you mean the budget allocations?

**Dr Bates**—Yes. Through that there is then usually a call for proposals, so you have individual scientists coming together as teams writing competitive proposals, which are then submitted and stand or fall.

**Senator LUNDY**—Have you submitted a proposal that has failed in the past on this issue?

**Dr Bates**—No, we are still waiting for the outcomes of the coming budget.

**Senator LUNDY**—So you have applied, if you like, for a budget allocation to fund a project into the cost analysis of not signing Kyoto or not reducing emissions in Australia.

**Mr Holper**—The costs we are looking at are the likely costs associated with climate change, and we have commenced studies of those costs.

**Senator LUNDY**—With the view that they need to be factored into the overall cost picture.

**Mr Holper**—Yes. It is a process by which in the first instance one works out the range of possible climatic changes and then undertakes an assessment of the likely impacts, but it is very important to work out the costs of those impacts, so that work is currently under way.

**Senator LUNDY**—Is the application for this funding essentially a decision of the minister?

**Dr Bates**—It is going through the Australian Greenhouse Office up to government. I was at a meeting earlier this week when we were told that it is being considered as part of the budget process. We will start thinking about writing our proposals and so on before the budget actually starts. But until we know money is available there is not a lot we can do.

**CHAIR**—I would like to thank the witnesses for appearing this morning.

[9.58 a.m.]

**ANTHONY, Ms Libby, Chief Executive Officer, Australian Wind Energy Association**

**BRAZZALE, Mr Ricardo, Executive Director, Australian Business Council for Sustainable Energy**

**THOMAS, Mr Martin Hallowell, Member (Australian Institute of Energy), Renewable and Sustainable Energy Roundtable**

**WAIN, Ms Fiona, Chief Executive Officer, Environment Business Australia**

**CHAIR**—Welcome. You were probably here earlier when we went through the statements we have to make about this being a Senate hearing and covered by privilege. We will proceed from that point. The committee has received your submissions, which we have already published. Would you like to make any alterations or additions to your submissions? As no-one does, would you like to make a short opening statement. I remind you that we have three-quarters of an hour allocated to you, so if you make short statements there will be plenty of time for the senators to question you.

**Mr Brazzale**—I might start. Thank you for the opportunity to appear before today's proceedings. Our organisation is an industry association that has over 250 companies as members across a range of renewable and sustainable energy technologies. Policies to address climate change, and ratification of Kyoto in particular, have a significant impact on our industry. There is no argument that large cuts in greenhouse emissions are needed. This is now well and truly accepted. Australia has committed to meeting its 108 per cent target by the first commitment period and has committed to substantially reducing emissions beyond this period.

The issue, as we see it, is not the cost or benefits of reducing greenhouse emissions per se; it boils down simply to whether there are more benefits in ratifying than in not ratifying Kyoto. The key point that we would like to reinforce is that, as Australia has committed itself to meeting the 108 per cent target for the first commitment period and given that ratification does not bind us to any target beyond the first commitment period, we believe that we should ratify it, as we get the benefits of access to the flexibility mechanisms under the protocol. This means that meeting the 108 per cent target that we have committed ourselves to meet will be easier and less costly, but also it provides our industry with access to import and export markets that would not otherwise be available if we were not to ratify.

**Ms Anthony**—I will just say one or two things regarding the Wind Energy Association. We have a membership of over 150 companies and individuals. We have been growing very rapidly, and the industry is still in its beginning stages. While we currently have 198 megawatts of wind energy installed as of 2003, there are over 1,630 megawatts that are already approved throughout Australia and there are over 3,000 megawatts that are in various stages of getting planning approvals.

Australia has some of the best wind resources in the world. We have wind speeds of eight metres per second or more in many locations around Australia, which the Europeans would die for because they usually have wind speeds of six metres per second, and they consider that good for their locations. Wind in Australia is an incredibly economic proposition and it has a great future in Australia if correct policy decisions are put in place.

**Mr Thomas**—Thank you, likewise, for the opportunity of presenting to you. The Renewable and Sustainable Energy Roundtable is a federation of other associations, of which my three colleagues here are all members, and therefore I speak with their voice. It was formed in 1999 to help coordinate dialogue between government and a very diverse—as you would understand—sustainable energy industry and to try to seek a unified voice where such is possible.

On Kyoto we very much have a unified voice. As Ric Brazzale has rightly said, we are very strongly industry driven. We do need those instruments which we believe Kyoto can deliver to prepare ourselves for an international trading regime in carbon, which we believe will undoubtedly come. We believe that international targets and the establishment of trading rules are crucial to that, and we believe that Australia needs to be at the negotiating table, as it was in the first round. Certainly we believe that if we are left out of it Australian industry will forego very substantial potential.

I will pass over some of the other points which will come out in questioning and close my opening remarks by saying, in support of my colleagues here, that our industry growth in Australia at the moment is looking at 30 per cent compound, which is quite remarkable for any industry sector. It is forecast to become one of the major trading sectors, even though at the moment it has a small share of primary energy. That will not be the case by 2020. We also recognise that 1½ to 2 billion of this world's population are without electricity and hence without education, health and all the other things that we take absolutely for granted. Those people will only be served by having the right market mechanisms in place, and we see those market mechanisms as evolving from the Kyoto negotiations. We must be there at the second round and we must therefore ratify Kyoto now. Thank you.

**Ms Wain**—I will quickly give you a bit of background. We see the Kyoto protocol as the only global framework that has taken over 20 years to reach. While it is not a perfect tool at the moment by any stretch of the imagination, it is the one global framework that we have to build on.

We are very concerned about the exponential growth curve of cost associated with a broad range of externalities, but certainly in relation to climate change. We have called on the federal government to do an in-depth externality study with a primary focus on the cost of energy—both fossil fuel energy and renewable energy. The reason for that is that we find it somewhat confounding and confusing that the energy intensive sector and the fossil fuel sector will say that renewable energy is too expensive for Australia and therefore not in the nation's best interest. It is impossible at this stage to compare the true cost of renewable fuels to that of fossil fuels, because renewables have all their up-front costs—early market penetration, early stage development, R&D, difficult access to finance—open, transparent and readily available to the marketplace to investigate. The externalities, hidden subsidies, perverse subsidies and preferential contracts associated with the fossil fuel industry are not evident and therefore are not transparently available to the market. The cash cost of fossil fuels is being artificially deflated and has been for decades.

We believe it is far less expensive to prevent harm than to clean up afterwards. We are very concerned about opportunities and the potential lost opportunity for the whole of the environment industry. We are also concerned by the need for a very long-term planning

horizon. The current focus on 20 years is not giving us a long enough time frame to create a framework whereby we can weave in and out the technologies, market mechanisms and, indeed, legislation that will allow us to create huge change. We may be at a tipping point globally in terms of climate change. There was some information leaked recently from the Pentagon and published in an article in *Fortune* magazine which I highly recommend to the inquiry.

**Senator BROWN**—Could you cite that article so that we can get hold of it?

**Ms Wain**—It is in *Fortune* magazine. I have not got the date but I am happy to supply it to you.

**Senator BROWN**—Thank you.

**Ms Wain**—I will email it through. We need some form of transition for the entire supply chain—whether for agriculture or manufacturing—to be put in place. We see Kyoto as being a catalyst for part of that. It is not the be-all and end-all; it is not the whole answer, but it is part of the answer. We are very concerned, as an industry representative, that the mechanisms under the Kyoto protocol—the CDM, JI and trading—are going to be denied to Australian companies at some levels and very difficult to access in other ways. Most of our companies are small- to mid-sized companies. They will, frankly, not bother to jump through the hoops of going through third parties and fourth parties to access the CDM. We are going to lose opportunities.

We do believe it is possible for the states to go ahead with an emissions trading system that could link into the EU trading system outside of the Kyoto system. But again, while we would support that at one level, we need harmonisation across the states—we do not want to see another piecemeal system set up in Australia. I strongly commend ratification of the Kyoto protocol as a way forward for Australia, and I do believe it to be in the broader national interest, not just the interests of this particular environment industry.

**CHAIR**—We will start off with questions from the ALP and Senator Lundy. We will allocate 15 minutes to each party for a start.

**Senator LUNDY**—I will ask my first question to Mr Brazzale. Is it possible for you to quantify in any way the export potential that you are being denied by the fact that Australia is not at the table at the moment?

**Mr Brazzale**—At present, it is very difficult to quantify, for several reasons: a lot of our member companies are quite small and diverse; also, the details of the flexibility mechanisms are still being worked out. To date, we have relied on anecdotal information or case studies, some of which we have included in our submission. But it is certainly an area that we have under focus and we think that is an important part of the benefit of ratifying—or, put another way, the cost of not ratifying—that also needs to be included in the mix.

**Senator LUNDY**—How strongly are the companies you represent experiencing the fact of Australia not being there inhibiting either their capacity to get capital to support their ventures—to get investment in their initiatives, if you like—or their capacity to grow as small companies with potential export markets?

**Mr Brazzale**—We need to bear in mind, in the renewable energy industry in general but the solar industry in particular, that Australia is a significant exporter of PV panels and other services, but we have a relatively small market. So, if we have to develop the industry, we need a bigger industry domestically, and schemes like the Mandatory Renewable Energy Target have been important in stimulating that growth. But we still need access to export markets, particularly developing country markets. As Martin said, a significant number of people in the world do not have access to power, so developing country markets are important for our industry. Having said that, an example that we included in our submission highlighted the problem for us. It was a project in Brazil where there was an export delegation of Australian renewable energy businesses. The Brazilian government effectively said, 'There's no point in dealing with companies from Australia, because you're not going to ratify Kyoto.' Under that particular mechanism, they would go for European companies.

**Senator LUNDY**—So you obviously would categorise the fact that Australia has not ratified Kyoto—even though it has, as we have heard, committed to the targets—as a direct inhibitor on your industry sector's ability to grow and develop your export markets.

**Mr Brazzale**—That is absolutely correct. Further to my inadequate response to your first question, we are struggling to actually quantify that, but we are getting more and more case studies of our members and others having trouble accessing international markets. Just to put that into context, we are up against a number of European businesses, in particular, who are coming down into our backyard in South-East Asia. They have a competitive advantage because they can make better use of things like CDM and factor them into their business propositions. So it makes it extremely hard for Australian businesses to compete.

**Senator LUNDY**—In your view, how important is developing scale in the domestic market to boosting the opportunity and the capacity of Australian renewable energy companies to export in the first instance?

**Mr Brazzale**—It is a fundamental issue. Unless we have a significant enough domestic market that can provide a base for sustainable manufacturing, we will not get sustainable manufacturing. The sort of view we have is that it is going to be hard for these sorts of businesses to be sustainable if they are relying on export markets for more than about 50 per cent of their sales. So we really need a vibrant domestic market. And I might also add that we really need a vibrant domestic market to meet our own greenhouse emission requirements, let alone for exports.

**Senator LUNDY**—So there is a double public benefit really?

**Mr Brazzale**—Yes.

**Senator LUNDY**—Ms Anthony, I want to go to the issue of wind. Based on your submission and your presentation, people do not often think of Australia as having huge potential for wind farms, although I know there are a number out there. But how do we rate in our potential on a global scale? If you listed countries not by what they have got but by their potential for wind farms as a source of renewable energy, where would you put Australia?

**Ms Anthony**—At the moment, regarding where Australia is considered to be within the developing global wind market, how much you can tap into the potential that is there depends on what sort of policy mechanism there is. We are just at the beginning of assessing what sort

of wind resources are out there that could be tapped into. Back in 2001, the Australian Wind Energy Association took what we thought was quite a leap forward by setting a target of 5,000 megawatts of wind in Australia by 2010. We already have identified on the board very close to that many projects as it is, and we are only a few years out from our original assessment. So we anticipate that we could truly do maybe 10,000 or more megawatts of wind in Australia. So there is a significant resource here.

Globally, a lot of European and American companies are looking at Australia as a potential market. I think they see us as one of the new upcoming markets for wind technology. The European Union has estimated that by the year 2020 there will be (euro)18 billion yearly of global wind business out there and Australia will certainly be part of that. As Ric indicated, there are already moves by European companies to go to China. China has a wind resource of over 250 gigawatt hours that is there to be developed, and by 2005 they want 1.5 gigawatt hours of wind developed.

**Senator BROWN**—What is a terrawatt hour?

**Senator LUNDY**—Lots of energy.

**Mr Brazzale**—I think it is a million megawatt hours.

**Ms Anthony**—Yes. There is a significant resource in China that is right on our doorstep, and we see great potential for Australia to tap into this market. Australia has already begun to take some significant steps to profile itself within the export market with the renewable energy exporter network, and several Australian companies are already accessing that program to begin to tap into export markets. We have had our first export of wind towers to New Zealand, which was a multimillion dollar contract that was announced in December 2003, and we have our first nacell assembly plant. However, as Ric was indicating, we are not going to get a really thriving manufacturing market here unless we have a significant domestic base market to drive its development.

**Senator LUNDY**—How does the question of either being or not being a signatory to the Kyoto protocol affect your capacity to develop renewable energy via wind in Australia, and can you briefly comment on the impact that is having on your ability to compete in export markets?

**Ms Anthony**—Not signing the Kyoto protocol does not really send a signal to our domestic market that we need to be tightening our belts with regard to energy efficiency or fuel switching—moving towards cleaner fuels such as wind or solar. Therefore, there is less incentive to do something about it. We have the Mandatory Renewable Energy Target, which is at a relatively low level compared to other targets that are set by other countries around the world. While that is of benefit to the industry, to get the truly robust manufacturing that will allow us to move into exporting we need a higher target. Also, we will not be developing all of those projects that I have indicated without a higher Mandatory Renewable Energy Target, and signing Kyoto sends a signal to our market that we need to do something about our carbon contribution. It would pave the way towards developing a more robust market for renewables here in Australia. It would also facilitate us being able to move, as Ric indicated before, more strongly into an export market globally. At the moment we are restricted in what sorts of markets we can move into and what sorts of relationships we can develop.

**Senator LUNDY**—Because we are not a signatory to Kyoto?

**Ms Anthony**—Yes, that is correct.

**Senator LUNDY**—Ms Wain, you wanted to comment on that?

**Ms Wain**—There is a comment I want to add to that. If we look further along the energy supply chain, start with the concept of a portfolio approach to energy and ask what are going to be the shifts as we go through 10, 20, 30, 40, 50, years, we see China already investing very heavily in hydrogen fuel cells and geothermal technology. Hydrogen fuel cells will need a base catalyst, and the Australian approach is that, since we have so much coal, we can always use coal as the catalyst for them. But I would query whether that will be acceptable to markets over the longer term as we see market trends increasingly demanding cleaner and greener sustainable production and consumption. If hydrogen is catalysed by solar, wind, geothermal, wave or tidal power it may be far more acceptable to the market than if it is catalysed by coal. So I do not think that the very protectionist attitude of some people—which I understand, because it is an industry and one wants to protect what one has—in the longer term is going to play out to be in Australia's best interests. We have to look at what those longer term catalysts and technologies will be.

**Senator LUNDY**—You used the word 'protection' there, which I think is a very pertinent point. Perhaps you and Mr Thomas could comment on the motivation of the Australian Howard government not to sign Kyoto. Is it just a way of elaborately protecting the fossil fuel industries at the expense of the renewable energy sector?

**Ms Wain**—There is a great deal of protection of the status quo. To be perfectly frank, the status quo is a very powerful and a very strong lobby, and it is the backbone upon which Australia has been built; let us not be naive about this. But, at the same time, we need to ask: is it Australia's future? I would say and my industry would say: no, it is not. We like the concept of geosequestration and clean coal technology, but can it be brought in at a cost that is similar to or lower than renewable energy, with the incremental growth in markets and the scale of demand which will reduce the cost of renewable energy quite significantly? Personally, I do not see us being able to capture $CO_2$, store and compress $CO_2$, inject $CO_2$ underground or in deep ocean outfalls and maintain it there all for the same cost of developing renewable energies.

**Senator LUNDY**—How would you compare the cost of renewable energy to the cost of geosequestration?

**Ms Wain**—It comes back to that issue of externalities. We do not have a handle on what all the externalities are costing us. Until we get that, we are constantly comparing apples and bananas. One thing Australia should do immediately is an in-depth externality study so that consolidated revenue knows what is being poured out at the back end and consumers and taxpayers can make a choice of whether they consume green energy at a slightly higher initial cost or whether as taxpayers they would prefer to pay for clean-up—which comes as a higher cost. As a consumer and a taxpayer I know which I prefer, but until that data is made available to the broader consumer and taxpayer groups in the electorates we do not have that answer.

**Senator LUNDY**—Mr Thomas, do you want to comment on that?

**Mr Thomas**—I will very briefly follow up a question you asked Mr Brazzale about the experience of his members, if I may just for a moment speak as one. I chair a small solar tower company with big ambitions called Enviromission. The financial modelling we are putting together at the moment—we are past basic feasibility—depends absolutely entirely on the valuation of the externalities, the thing that Fiona has just mentioned, as expressed through carbon trading. Within Australia, as you well know, we have the MRET scheme and that looks like being extended. MRET is fine but it is extremely limited, it is very local and it is time constrained. Our company is looking very much at export potential, which carries with it 2,000 or 3,000 jobs per tower. The technology is extremely simple; it is very large but very simple. But we are very much constrained in export considerations in any country other than the United States, which has quite an active secondary carbon trading market but is well outside the Kyoto regime. So from the point of view of a member of Ric's organisation, an internationally accepted and well-regulated carbon trading scheme—if you like, a world MRET—is essential, and we do not see that coming through any other mechanism available to the world at this time other than the Kyoto second round.

**Senator LUNDY**—So being a signatory to Kyoto is the only thing that would resolve that for you?

**Mr Thomas**—Yes.

**Senator LUNDY**—Mr Brazzale, what do you think about geosequestration?

**Mr Brazzale**—I was going to chip in and try to answer your question about the relative cost. Firstly, when we look at the cost of renewables at present we see that technologies like wind and solar are very low penetration, so cost is relatively high—roughly twice the wholesale price of coal fired electricity—but over the last five to 10 years we have seen the cost for key technologies like wind and solar reduce by five per cent per annum, and we see that continuing.

**Senator LUNDY**—So that is an established trend; it is still going down by five per cent?

**Mr Brazzale**—That is correct, and a lot of emerging technologies like solar and wind go down well accepted experience curves. For those technologies, the past has shown us that there is a cost fall of between 15 to 20 per cent with every doubling of installed capacity.

**Senator LUNDY**—So it is directly relative to take-up and penetration in the domestic market?

**Mr Brazzale**—That is exactly right. You have a chicken and egg argument; hence, the importance of a scheme like the Mandatory Renewable Energy Target, which is aiming to build capacity in the shorter term so as to drive cost reductions in the longer term. So, when we look at that type of trajectory, we see that the cost of the renewables is falling—that can clearly be demonstrated. On the other side, though, we have the cost of advanced coal technologies and then geosequestration, which is the capturing and then storing of carbon underground. Geosequestration is still being proven. We really do not have a good cost handle, but estimates from the International Energy Agency estimate that it will cost somewhere around $40 to over $100 per tonne, and you can equate that to roughly per megawatt hour.

**Senator LUNDY**—Yet for that there is not an identifiable and proven trend of cost reduction or anything like that?

**Mr Brazzale**—No, there is not. There is still a lot of work to be done. The other point worth reinforcing is that, at least, with renewables it will be a global market. We talked about the nearly two billion people who do not have access to electricity. They will be a significant target market for a growing renewables industry globally. We cannot do that with geosequestration. There are very few countries to which we can export 2,000-megawatt coal plants and billions of dollars of wells and infrastructure to bury the carbon. It may be an option in some places in Australia, but we do not think that it will be a major contributor to the global problem. It will help in some countries, but we believe renewables are the solution in both the near term and the longer term. I might also say that energy efficiency will also have an important role to play. We have not mentioned that to date, but that is an important part of the mix.

**Senator LUNDY**—On that point, if renewable energies do not have as great an opportunity as they could have in the domestic market, it follows from your evidence that that would keep the prices higher than they otherwise would be, so it distorts that trend.

**Mr Brazzale**—We think that is absolutely correct. By building local industry capacity and capability, we can reduce costs. For example, if you are only doing one wind project per annum, it is very hard to actually develop the learning, the local manufacturing, the support, the infrastructure you need; but if you are rolling out a significant number of projects then, on a per unit basis, the cost will fall.

**Senator LUNDY**—I guess this is a big question: with the target commitment there anyway, from your perspective, why wouldn't we ratify the Kyoto protocol? In your view, what possible motivation is there not to go down the Kyoto path and set the targets anyway?

**Mr Brazzale**— What motivation the government may have is a very difficult question to answer. But in looking at the submissions that have been made to the inquiry, we think that there is a clear-cut case showing that the benefits certainly outweigh any of the potential risks. I think to date, from the evidence I have seen in submissions, there is no quantification of any particular cost in ratifying. The arguments have been around possible risks and possible uncertainties about the future. The point we would make is that we are not committing beyond the first commitment period anyway and, by being part of the process, we actually have an important role to play in influencing and reducing that future uncertainty. We really do not know why we are not ratifying. To us it seems a fairly clear-cut case.

**CHAIR**—One of the things you have said, especially Ms Wain, is that we need one global forum. I would have thought that was a big flaw in the Kyoto treaty, because it is not a treaty that covers the globe. It is not a genuinely global agreement. I believe that something like 75 per cent of global emissions are not covered by the Kyoto protocol, which I think limits its efficacy. It is estimated that Kyoto will reduce global greenhouse gas emissions by just one per cent by the end of the first commitment period, which is 2012. Would you like to comment on that?

**Ms Wain**—I would be delighted to. The last time I looked at the UNFCCC site, there were 121 countries that had ratified. Those 121 countries are our major trading partners and

competitors, with the exception of the USA. We are all in agreement that Kyoto, as it stands at the moment, is not going to deliver a huge amount of change. But I reiterate that I believe it is the one global framework—one that we have taken so long to develop—that we can build on. There is a sense of goodwill around the world to do that. We know from the science that we need to really be looking at 50 to 60 per cent cuts, which makes a mockery of everybody crying that it is so difficult to achieve the very minimal cuts that have been imposed on a number of countries at the moment. One of the issues that I think is fundamentally important to bear in mind is that a global framework can facilitate; it does not sideline bilateral agreements. So, if we can develop bilaterals alongside the global framework, we get the best of science, the best of technology and the best of market opportunities.

In terms of developing countries, certainly in the conversations that we have had—not so much in India, although we do have companies over there talking to the Indian government from time to time—with people in China, there is a sense of disappointment that they are being held up in front of the world as not having ratified the Kyoto protocol. India and China have both ratified the protocol. The UN decided—I cannot remember what year it was, but it was about five or six years ago—that developing countries would not be asked to take firm targets until negotiation started at the end of 2005. So I can quite understand developing countries taking umbrage when they are being held up as a spectacle for not having accepted firm, negotiated targets that they have to reach. To my mind, the very important role that Australia can play—and it will play it far more easily under the Kyoto protocol than outside it—is in helping technology and finance transfer into those countries. We have China steaming ahead as the world's biggest manufacturing country. That is not going to slow; it is not going to stop. China does not want air pollution. It does not want soil erosion. It does not want climate change. But in its rapid growth phase it needs as much help as it can get. I would say exactly the same of India, Indonesia and Malaysia. Where are they going to go shopping for that help? They are going to go to their partners under the Kyoto protocol. We have already seen cases of Australian companies being somewhat sidelined in CDM projects.

**CHAIR**—I noticed that you say in your submission that India and China have both signed on to the protocol but they are not meeting the targets. You mentioned other countries which are our major trading partners—and one has to think specifically of the European Union. I believe that something like 13 of the 15 existing European Union countries are not meeting their targets. In many ways, Kyoto does seem to be a somewhat meaningless treaty, especially when the largest emitters in the world, the United States and Russia, have not signed on. Would you not agree with that? Then we come to the alternative, which exists in the form of the Montreal protocol, which I believe includes developing countries and covers 82 per cent of global emissions of ozone-depleting substances within its framework. The Montreal protocol, by contrast, has full compliance from the world community. I believe that without it ozone depletion would reach 50 per cent in the Northern Hemisphere's mid latitudes and 70 per cent in the southern latitudes by 2050—about 10 times worse than current levels. Australia is a signatory to the Montreal protocol, so surely that is a better option?

**Ms Wain**—That is a very interesting parallel, because the hue and cry about the Montreal protocol in the USA was phenomenal. It was akin to the USA Clean Air Act, where industry said, 'That's it; we're off. We're going offshore. We're not going to invest any more in this

country.' The USA Clean Air Act cost $400 billion over 20 years. It has made or saved trillions of dollars in the meantime. I reiterate what I said about developing countries: the UN has mandated that they should not be asked to take firm targets until the negotiation period starts at the end of 2005. Therefore, there is no reason why a developing country should volunteer to accept a firm target before the date that was set down by the UN.

I mentioned earlier the article that contains leaked information from the Pentagon, and how seriously in fact they are taking climate change and the potential for a global warming or climate change tipping point. I believe that the USA are investing many billions of dollars into clean energy, energy efficiency and renewable energy technology. There is a very good reason why Australia has a bilateral agreement with the USA—to help share that science so that we can both learn from that. In the negotiations on the Montreal protocol, the USA held out until they were quite confident that their industries were in a position to take a really strong and aggressive market share from new technologies to cut CFCs and other ozone-depleting substances. I would hazard a guess that at that point, once they got their technology and their industry up to speed, they stormed in, signed that protocol—and, thank you very much, their companies have done extraordinarily well out of it. It is something that we really do have to be very careful of with the USA, I think. Even with the current government in the USA, I would not be surprised to see ratification at some stage or another; I really would not.

**CHAIR**—It is possible, but Montreal nevertheless does cover the developing countries, and it is having a more substantial practical effect than Kyoto. There is the problem of the European Union countries not meeting their targets, whereas we, as a non-signatory, are. I understand that Canada, which is a signatory, is now seeking to have the rules changed. That is an interesting issue, because it is adjacent to the United States. Perhaps it is finding that having signed on is causing some problems in terms of industry and economic development. Do you not agree with that?

**Ms Wain**—The interesting thing about Canada is that prior to their ratification we had companies saying, 'Canada, if you ratify we're out of here.' The important thing to bear in mind about a lot of companies threatening offshore relocation is that there are very few companies with a reputation to protect who are going to seek a license to pollute from their shareholders, investors, customers, bankers and insurers and leave a very stable economic and political regime to seek a marginal decrease in energy cost—abandoning sunk assets at the same time, I might add—because of something that we do not know how long is going to last. There are lots of reasons for companies threatening to go offshore and do a lot of different things. But the threat of companies going offshore because of the shadow cost of carbon cannot be taken seriously—it cannot. I would go so far as to say it is blackmail. That is a strong word, I know, but that is exactly what it is.

**Senator TCHEN**—Ms Wain, you said global treaties do not preclude bilateral agreements. That is a sentiment that politicians will hold, but it is not a sentiment that I would attribute to a crusader.

**Ms Wain**—Look at the US FTA as a bilateral and the World Trade Organisation and the very many multilaterals under that. If we can strengthen the relationships that we have in terms of science and technology and on the ground activity and expertise transfer into various countries, all that goes well beyond any claims that may be made on us and, whether we ratify

the Kyoto protocol or not, we are helping the world to achieve something. But why not do that and achieve market benefit access and competitiveness access at the same time? To my mind, it does not make sense to stick up our hands and say, 'We are being really good but we do not want all those benefits and opportunities that come with being good.'

**Senator TCHEN**—So you are a sort of politicised crusader, then? I noted before I came in here that India and China both ratified in August 2002. But their ratification imposed no obligations on them at all.

**Ms Wain**—No. At this stage, in the first commitment period, that is true.

**Senator TCHEN**—As far as the first commitment period is concerned—I cannot remember now; I think it might have been Mr Brazzale who mentioned this—it only commits us to the first stage anyway. So in other words this is a very flexible commitment on China's part, if the same thing applies to them.

**Ms Wain**—As I said earlier, the UN was the body which mandated, with the agreement of the parties, that developing countries would not be asked to take targets to reduce emissions because poverty eradication had to be their first priority.

**Senator TCHEN**—At this stage, China is the second largest greenhouse gas producer in the world. India is fifth or sixth. What is stopping China and India—having ratified the Kyoto protocol—saying, after the Kyoto protocol comes into force as a world wide treaty at the end of the first stage, 'Right: we're out of here. You have an international treaty which governs what you have to do but we are out of here'?

**Ms Wain**—There is no vested interest for China to do that. China does not want climate change any more than anybody else does; in fact, China, along with Australia, stands to be very hard hit by climate change. They have very weak, old soil; they have horrible problems with soil erosion. So the more that extreme weather events occur, the poorer China is effectively going to become in an agricultural sense and a health sense.

**Mr Brazzale**—Perhaps I could try to answer that question. Australia is really in the same boat. If we commit for the first commitment period then that gets us to the negotiating table with China, India and the other countries that have ratified—to then work out a framework and an arrangement that will then commit us all for subsequent periods. I would like to put a question back to the senators: what other option have we got to get developing countries to the table to accept binding commitments? If there is some other mechanism, I am certainly not aware of it.

**Senator TCHEN**—The mechanism exists under the existing convention procedures. We continue discussion. Australia is still taking part in it.

**CHAIR**—Do not forget that we also have the Montreal protocol, which they are signatories to.

**Senator LUNDY**—What is the alternative? Is it business as usual?

**Senator TCHEN**—No, the Kyoto process still continues, whether it is ratified or not. The convention still continues.

**Ms Wain**—What we really need is a stronger Kyoto protocol, not having people watering it down and saying, 'We won't be part of it because it's too weak.' We need to make it stronger. We need 50 per cent to 60 per cent cutts in carbon emissions.

**Senator TCHEN**—You have already agreed that the Kyoto protocol has no teeth as far as some of the major greenhouse emissions countries are concerned.

**Ms Wain**—No, I have not agreed that. What I have said is that it is a global framework that needs to be built on. It is not as strong as we would like it to be at the moment, but it has the potential to be that strong. With 121 countries supporting it, I think that potential should be developed. There is an economic and moral obligation on the world to do that.

**Senator TCHEN**—Very good—particularly a moral obligation, with no practical obligation.

**Ms Wain**—I think there is an economic obligation as well.

**Senator TCHEN**—How many of the 121 nations actually have obligations under the Kyoto protocol?

**Ms Wain**—I will take that question on notice and get back to you. I cannot answer that off the top of my head.

**Senator TCHEN**—I would say about 100—probably a bit more actually. I have a couple of questions about industry and protectionism, and so on, but I will let Senator Brown go first.

**Senator BROWN**—I want to ask about the bilateral agreement that we have got in hand, which is the free trade agreement with the United States. Have you been able to look at that at all and see what impact the free trade agreement will have on the capacity of Australian governments to reduce greenhouse gas emissions, with mechanisms like the carbon tax and the carbon trading ban on the import of HFCs?

**Mr Brazzale**—We certainly have not been able to. One observation I would make, however, is that the sugar industry is a significant potential source of renewable energy and excluding sugar reduces the sugar industry's ability to deliver renewable energy into the future.

**Senator BROWN**—With the United States continuing to not ratify the Kyoto protocol, are you assured that the free trade agreement will not be able to be used to levy against Australia signing the Kyoto protocol?

**Ms Wain**—It should not be able to. We have only seen the umbrella papers at the moment; we have not seen the detail. There was a provision in there for quarantine regulations to be maintained and also for Australia to maintain not only its current environmental legislation but also to be able to develop future environmental legislation that is totally independent of any influence from the United States. Of course, the devil is in the detail. I have not read the detail and we will not see it for another month.

**Senator BROWN**—Just on the first of those points, according to Mr Zoellick it says that Australia's food protection barriers 'will be addressed'. On the second point, it says:

Environmental laws are married with provisions that promote voluntary, market-based mechanisms to protect the environment.

**Ms Wain**—I have not looked at the US web site since the first announcement, and it was not up at that stage, so I will need to go back and have a look at that. We were asking Mark Vaile about that yesterday and certainly getting the impression that environmental legislation would be protected within Australia.

**Senator BROWN**—That is not quite what Mr Zoellick is saying.

**Ms Wain**—Those aggressive Americans again, you see!

**Senator BROWN**—I will ask about the externalities. Currently we see the fossil fuel industry producing enormous externalities. When you go a couple of decades down the line, if the predictions are right about global warming we will see coastal erosion; some adjacent countries—island countries—disappearing; massive increases in both the number and power of bushfires, hailstorms, tropical cyclones; changing weather patterns and the extinction of species. Do you know of anybody who has tackled the costs of those externalities on the human community within a generation?

**Ms Wain**—No, and that is why we have requested that externality study from the federal government, to be done by the Productivity Commission. We really need to get a handle on that data and the economic cost as well as the environmental and the human quality of life cost.

**Senator BROWN**—What is the Productivity Commission going to do to evaluate the extinction of species?

**Ms Anthony**—The European Union did an externality study on various forms of energy, which I believe was mentioned before. It is called ExternE and it is available on a web site, the name of which I will get for the committee. It looks at a number of factors, which also include human impact. However, I do not know to what degree it covers the impact expected for climate change on the different energy sources. That gives a cost per energy source of external impacts.

**Senator BROWN**—What is that cost?

**Ms Anthony**—I do not know the figures on the different energy sources; I could get that for the committee. They update it regularly.

**Ms Wain**—The unknown quantity in your question is: we do not know if we can exist without a full complement of biodiversity. We do not know which bits can be chipped off and enable us to still survive and have the quality of life that we take for granted. The *Nature* article that suggests that between 25 and 50 per cent of species could be eliminated by 2050 is very scary. It is scary not only in terms of the amenities we have, the health we have and the quality of life we have but also in terms of the fact that agricultural productivity could just disintegrate. I know it is getting a little bit away from the Kyoto protocol, but these are some fundamental questions that do not get addressed when we take a short-term perspective on this issue.

**Senator BROWN**—So it is important to the Kyoto protocol, is it not—because you are saying that there is no other mechanism on the horizon that is an alternative way for the world to progress towards addressing this monumental problem for our age?

**Mr Thomas**—Senator Brown, I would like to add to that. I am glad to see the debate taking a longer term view. I think in the short term we have come an extraordinarily long distance in 10 to 15 years. The word 'Kyoto' was not even on the agenda 15 or 20 years ago. It is surprising how far we have got. A point you made earlier was that the life expectancy for children being born today means that many of them are going to be alive in 2100. The world population will be 10 billion to 12 billion. Our CSIRO friends will tell us that carbon dioxide will peak at somewhere near 400 parts per million before it will decline. That is almost inevitable with our industrial set up. There was comment in the early presentations on the effects of that in global warming alone. Ms Wain has commented on all the other issues. I think the ExternE project, which I have read, will point out some others.

I do not wish in any way to be alarmist, but I would like to make this point: if I were to be alive in 2100 I would be ashamed if our children were suffering some of the things that we can only predict now—and leading scientists do—and we chose not to be at the negotiating table when we could have been as one of the leading intellectual nations of this world. As the four of us have said, I cannot see what the downsides are commercially—or indeed politically, which is not my area of expertise. Commercially, we have all pointed out that the upsides are quite significant for the young and growing industry in which Australia is emerging as a leader, as you would well know. We are at a loss to see what the downsides might be.

**Senator BROWN**—That point is an interesting one. One point which may be essential to the defence of the non-Kyoto alternative that certainly comes from President Bush is that it will affect the economy and jobs negatively. You are putting the point of view that it will affect the economy and jobs positively.

**Mr Thomas**—I am speaking subjectively now, but—I will stop short of the word blackmail, but a phrase from another regime is 'reds under the beds'—the scare element of the negativities has been huge and very well argued but does not appear to have substance. We have not seen people going overseas with investments. In fact, it has been quite the opposite: we are seeing people look at this magnificent country as a haven for investment for a whole range of reasons which are obvious to all of us. We see the imposts, if there are any—and maybe there are some economically in the short term—as being absolutely minute. The companies we all represent see staggering upsides in terms of employment, business for Australia and political positioning, if you like. I cannot say whether there are alternatives to Kyoto but I do see, as I think the four of us do, that Kyoto at the moment is the best option on the table for Australia.

**Senator BROWN**—Would you like to elaborate on your contention that not signing Kyoto loses opportunities through not accessing the CDM component? Mr Brazzale, you gave an example, I think, of people in Brazil saying, 'You are outside Kyoto, we are not so interested in you.'

**Mr Brazzale**—That is correct. We have a number of case studies. We also have members who are actively developing bioenergy projects in China also being concerned that they cannot compete with, say, European businesses doing likewise. It is not a level playing field, because those businesses are from Australia.

**Senator BROWN**—Is that because we are from Australia, which has not ratified the protocol?

**Mr Brazzale**—That is correct.

**Senator BROWN**—Therefore, is it just a notional thing or in reality are there dollars involved in it?

**Mr Brazzale**—There are serious dollars involved, because European companies can take credit for projects done in developing countries in meeting their targets domestically. As an example, if you are a European solar energy supplier you can do a project in China and then earn credits under the EU emissions trading scheme which is being introduced at the beginning of next year. But what does an Australian company do? How can we factor in some sort of greenhouse benefit? We do not have any similar scheme.

**Ms Anthony**—There have already been contracts for wind energy let in China to German and Danish companies who are able to access soft loans in order to provide capital funds to put these in because of the clean technology benefits that come to those companies.

**Senator BROWN**—Who gives the soft loans?

**Ms Anthony**—The German or Danish governments do.

**Senator BROWN**—As a flow-on from that, if we compare the fossil fuel industries with the renewable energy industries that we are talking about—wind and solar energy and so on—what is the difference in the job development prospects in Australia?

**Mr Brazzale**—In terms of jobs per unit of output, renewables have a far higher jobs element. We actually undertook a study a couple of years back and we have the results of that. I cannot remember them off the top of my head but we are happy to provide them for the committee.

**Senator BROWN**—Would you do that?

**Mr Brazzale**—I certainly will. There are certainly more jobs in renewables, but also renewables are growing at a much greater rate and are dispersed and diffuse. That means that job opportunities are spread around Australia as opposed to, in the case of coal fire generation, for example, being located in particular regions. We have also seen the amount of employment in the coal industry specific to power generation fall significantly in the last 10 years or so.

**Ms Anthony**—In relation to job differentials, for every job in the coal industry there are six jobs in the renewable industry. The reason for that is that renewables are more labour intensive. For instance, wind turbines require people to install them and to do maintenance on them. So renewables involve a significantly greater employment of persons because of that factor. As Ric indicated, the renewable industry will be dispersed through regional and rural Australia because that is where the resources for renewables are located.

**Senator BROWN**—Mr Brazzale, you said that the cost of zero emissions coal was $40 to $100 per tonne. Is that carbon dioxide abated or carbon?

**Mr Brazzale**—It is $CO_2$, so it is the greenhouse equivalent. Also, technically, as we understand that, it is not zero emissions coal; it still produces about 150 to 200 kilograms per megawatt hour.

**Senator BROWN**—Finally, the provisions in the free trade agreement include monetary penalties to enforce commercial labour and environmental obligations of the trade agreement, which include voluntary market based mechanisms to protect the environment. How are you placed in assessing this free trade agreement, without being able to see that detail which will not be there until it is legally scrubbed up over the next month?

**Ms Wain**—To be frank, it is very difficult. From what I am hearing that you have seen on Zoellick's web site, there is another issue that comes into play here as well, and that is under the WTO. Under the current regulations, we—Australia in general—have a defensive approach that says that countries will not take sanctions against Australia for not ratifying because they are not part of the WTO agreement. The WTO appellate court could very well take a hearing, and probably will, very soon. It could be somebody taking an action against Australia or Australia taking an action against somebody else, or it could involve the USA.

The issue, as it stands at the moment, is that a country of import can only have environmental sanctions applied if the goods or services imported will affect that country. The issue of global warming or climate change is one of the commons, and an appellate court judgment that proves that it is the country of export, the country of import and countries in between that are affected means that that could pass into international trade law. At that stage, we are facing a very curly issue. Are Australian wines going to be as acceptable as French wines in England? Already we are hearing from Sainsbury's, Waitrose and a couple of others that maybe they are not at this stage, and that is before it goes through the WTO appellate court. Is Australian agricultural produce going to be as acceptable? Are we going to continue to be a breadbasket? Maybe not. It is not something that I have an answer to, but they are certainly questions that, to my mind, should be investigated very carefully because it is not just a question of the marketplace for renewable energy. We referred to China a minute ago. I have companies coming back from China that are bidding on major infrastructure projects in waste and water. The feedback they are getting is: 'The Germans and the French are here, who have, on par, pretty good technologies—the same as yours. The financing packages are good, but they can supply an additional level of financial benefit through a CDM or a JI.' We cannot compete with that. The margins on these major infrastructure projects are so slim and they take an awfully long time to amortise the projects and eventually make a profit. If we are not competitive in the early stages, then we are not competitive, full stop.

**CHAIR**—Thank you. We will have to wrap up now.

**Mr Brazzale**—I will just make one more comment. Whilst we have not looked in any detail at all at the free trade agreement, one of the market based measures currently under consideration in Australia is MRET. A growing number of US states, including California, have quite aggressive mandated market based measures for renewables. So, for some parts, there may be some upside, if we can get better harmonisation of some market mechanisms.

**CHAIR**—I would like to thank the witnesses for appearing today.

**Proceedings suspended from 11.05 a.m. to 11.21 a.m.**

**HAMILTON, Dr Clive, Executive Director, Australia Institute**

**REYNOLDS, Ms Anna, Climate Action Network Australia**

**CHAIR**—I call the hearing to order. One thing I forgot to say to the last two groups of witnesses is that we would like questions or matters that are going to be taken on notice to be reported by next Wednesday, 17 February, because this committee has to report to the Senate by 4 March, which is a fairly tight timetable.

I welcome the representative of Climate Action Network Australia. We have received your submission, which we have already published. Would you like to make any alterations or additions to it?

**Ms Reynolds**—No.

**CHAIR**—I now invite you to make an opening statement.

**Ms Reynolds**—The Climate Action Network Australia is the Australian branch of Climate Action Network globally. It is a peak body for 30 environment, energy and research bodies that are all non-profit bodies. My day job is working for one of those member groups, WWF Australia. WWF is the largest member based conservation organisation in the world, with five million supporters and a presence in over 100 countries. You will note that our submission to this inquiry touches on some very basic principles which we feel are important for us to keep communicating to the decision makers. We do not feel that we need to go so much into the economic arguments, as there are obviously strong voices for the pros and cons of Kyoto ratification in the business community, but we feel it is important to set out for the committee what role the Kyoto protocol plays in avoiding dangerous climate change. That is really the aim of Climate Action Network members, as we are all interested in avoiding dangerous climate change. I am sure that all members of this committee and all members of parliament are also committed to avoiding a dangerous level of climate change.

The Australian government has ratified the Framework Convention on Climate Change 1992, the aim of which is to achieve stabilisation of greenhouse gas concentrations in the atmosphere to a level that prevents dangerous interference with the climate system. So, in a sense, the Australian government, on behalf of the Australian people, has accepted that the aim is to avoid a dangerous level of climate change. We believe the Kyoto protocol is a crucial step in this very large task we have in front of us of avoiding a dangerous level of climate change.

Before I go into the role of the Kyoto protocol, I would just like to spend a little time on what is a dangerous level of climate change. It is a buzz word that is used a bit, but what exactly does it mean? We are talking about what is the global average temperature that we want to end up with. What is the average temperature of the world that would be dangerous? Is that one, two, three or six degrees above where we are today? What is the level of temperature change that is dangerous? Unfortunately, although this is a central question that should have been answered by now—because we need to know what we are aiming for if we are going to be able to avoid it—there has been a stand-off between decision makers and scientists for many years. The scientists say, 'We don't want to define what dangerous climate change is, because that is a policy matter,' and the policy makers say, 'Well, you're the

scientists. You need to tell us what's dangerous.' The good news is that we are starting to come to a point at which that stand-off will no longer occur. I think everyone agrees that we need to know what level of temperature increase takes us to a point which is dangerous. The scientists are rising to that challenge and a lot of decision makers and governments are too.

The closest the IPCC have come at this point is to set out three criteria for what they would see as dangerous: a temperature level that causes a risk to unique and threatened systems, a temperature increase that causes a risk of large-scale discontinuities in the climate system or large irreversible changes in things like ocean circulation and ice sheets, and a temperature increase that leads to an increase in extreme events. Those are the three key areas that they have identified.

I would like to focus a little on two of those—that is, the risks to unique and threatened systems and the risks of large-scale disruptions. For example, coral reefs are found around the world. They obviously have high local economic value and high biodiversity. The latest science suggests that a global temperature warming in excess of one degree Celsius would cause bleaching to become an annual event and cause severe and probably irreversible damage to coral reefs around the world. So, for coral reefs, one degree is dangerous. A study published in the *Nature* journal in January by 14 ecologists globally tried to work out what is a dangerous level of global temperature increase for the world's species. They looked at a mid-range estimate of the global average increase and found that by 2050, if there were up to two degrees of warming, 15 to 37 per cent of species would be committed to extinction. So for those species—which, if extrapolated to the global level, would be one million species—between 1.8 and two degrees increase in the global average temperature is dangerous.

On the issue of large-scale disruptions to major earth systems—and I think this is a really key issue for decision makers today because we are looking at very large, irreversible changes that could have an impact for many thousands of years—it is difficult to work out the temperature threshold that would lead to these dangerous changes. But just recently, in 2002 and 2003, there has been new scientific work being done on this. It focuses on a couple of things.

The disintegration of two large ice sheets—the Greenland ice shelf and the west Antarctic ice sheet—would lead eventually to sea level rises of between four and six metres, which by anyone's definition is dangerous and disruptive. It may occur over thousands of years, but once it has occurred—once the ice sheets disintegrate—you cannot reverse it; you cannot fix it up. Some limited evidence suggests that in the past the west Antarctic ice sheet may have disintegrated during periods just two degrees warmer than today. This study, which we submitted with our submission—and which was released by a German government advisory committee just at the end of last year—suggests that the Greenland ice sheet may be vulnerable to warming of just 1.5 degrees above the pre-industrial level.

The thermohaline circulation system is another key global system, and if it slows down or shuts down there would be major disruption to weather and rainfall patterns around the world as well as to the productivity of oceans. Again it is uncertain, but this particular report says that going above two degrees of global warming would place a higher risk on that system slowing and being damaged irreversibly.

Detractors of the Kyoto protocol say that it will make no difference to all of this, no difference to addressing the problem, but there have been several scientific examinations of what impact the Kyoto protocol does have. Everyone agrees that the Kyoto protocol on its own, if the targets stay just where they are, is not enough. That is not really the question. The question is how useful is the Kyoto protocol as a first step, and the key answer in terms of the Kyoto protocol's usefulness is its timing. The earlier global emissions peak and decline, the lower the stabilised concentration of $CO_2$ in the atmosphere, means the lower the level of absolute climate change we end up getting stuck with or future generations get stuck with.

We could leave emission reductions to later, the argument being that it would lower the cost. However, postponing mitigation requires unrealistically rapid emission reductions later if we are to try and achieve a lower temperature increase. I would like to highlight another study that we include with our submission, summarised in *Science* magazine in June 2002 by O'Neill and Oppenheimer. They looked at trying to keep the global average temperature rise to below two degrees. That was their reference case, that was the aim of the study. They looked at two scenarios: firstly, where industrialised countries meet their 2010 Kyoto protocol targets and then the rest of the world follows after 2010 with similar reductions and, secondly, where the Kyoto protocol is not met and mitigation is delayed until 2020, which is effectively what would happen if the Kyoto protocol does not come into force. What they found is that if the second scenario occurs—that means no Kyoto protocol—it is difficult to achieve the below two degrees temperature target. If we did decide, 'No, we've got to stay below two degrees,' but we did not ratify Kyoto, if we suddenly decided we needed to do that, global emission reductions of eight per cent every year would need to occur between 2020 and 2040 if we were to try and keep it at that lower temperature level. The emission reductions would have to be dramatic. If, however, the first scenario occurred and the Kyoto protocol is met by industrialised countries, it is much easier to achieve the below two degrees increase. It means that global emissions will peak at between 2010 and 2020 and then they still have to fall, but between one and three per cent annually between 2020 and 2040. So it is a much smoother path, much smoother and less disruptive economically and an easier process if we take the first step of meeting the Kyoto protocol targets. So the Kyoto protocol working is, in the view of Climate Action Network members, crucial to keep open the option of achieving a lower atmospheric concentration earlier and therefore a lower level of global temperature increase eventually. It is an absolutely crucial step.

Does Australia ratifying help the Kyoto protocol work is the next key question. In the view of our members, yes, it does. Ratifying signals that we are prepared to bind ourselves legally to the target. Not ratifying says to the world, 'We don't really want to commit fully.' Obviously Russia and the US are crucial, but do we want to play a positive role in working to get them on board or do we want to play a negative role in backing them up in their position?

Finally, does ratification help us meet the longer term reduction efforts of avoiding dangerous climate change? Again, yes, we believe it does, because the goal of getting global emission reduction targets after 2010—that means binding targets on all countries after the first commitment period—without the Kyoto protocol having come into force and being met will be politically and diplomatically impossible in our view. Detractors of the Kyoto protocol are against early global action, and they know this diplomatic stand-off will last for many

decades. They know that if the Kyoto protocol does not come into force it will delay that ultimate goal of getting global emission reduction targets across the world.

**CHAIR**—Thank you. I welcome Dr Hamilton. As you have not provided us with a submission, would you like to make a short opening statement?

**Dr Hamilton**—Thank you for the invitation to make a submission. I would be grateful if my comments today and a couple of documents I will table could serve as a submission. Over the last decade, the Australia Institute has conducted a wide range of research on climate change policy and climate change economics, so I will take a few minutes to comment on some of the most relevant aspects of recent times. Let me begin by stressing that over the last 10 years or so the evidence supporting the existence of a human induced greenhouse effect has accumulated steadily and is now overwhelming, yet in Australia the government, despite its protestations, is in a state of official denial, with no recognition of the extraordinary threat posed by climate change. The scientific warnings issued by the best climate science organisations around the world, and of course our own CSIRO, paint a picture of alarming change in the world's climate.

The Australian government accepts the science—at least, officially. But every now and then a government minister lets slip a comment that suggests that they really have not grasped the significance of it. Not long ago the Prime Minister said that the jury is still out on sea level rise. In fact, several scientific juries have delivered unequivocal verdicts and all appeals have been lost. There is no doubt about the science of climate change. Of course there is doubt within the science of climate change, but there is no doubt about human induced greenhouse effect. Whilst much has been made of recent declarations that Australia is on track to meet its Kyoto target, the fact remains that emissions from the most important sectors—transport and stationary energy—continue to grow rapidly, and it is possible for government to claim that Australia is on track to meet its commitment only because we have been playing our get out of jail free card—the famous, or notorious, Australia clause inserted in the Kyoto protocol literally in the last minute of the negotiations, at 2 a.m. on Thursday, 11 December 1997.

A month before the Kyoto conference, the government was publishing greenhouse gas emission figures that excluded land clearing emissions in order to emphasise how rapidly Australia's emissions were growing. It did this at the time so it could argue to the rest of the world that cutting emissions would be especially costly for Australia. The trick worked at Kyoto, and Australia was given special concessions on the basis of these figures. For the interest of the committee, I submit a press release pointing out this statistical trickery, which was issued by the Australia Institute on 27 October 1997. The decline in emissions from land clearing since 1990, the key date in the Kyoto protocol, has masked the rapid and relentless increase in emissions from all other sources and especially the electricity and transport sectors. At current trends, which are very likely to continue for the next three or four years, we will have played our land clearing hand fully and it will no longer be possible to conceal the real problem of our escalating emissions, and the government's manifest failure to control the rate of emissions growth will be plain for all the world to see. Now that the Beattie government has decided finally to abandon its attempts to cooperate with the federal government to end land clearing in Queensland and introduce legislation to stop the practice, we can expect land clearing emissions to decline even more quickly than they would

otherwise have done and for the underlying trends to become more starkly apparent in the next year or so.

The figures I have asked the committee secretariat to distribute—the table and the accompanying chart—show Australia's emissions between 1990 and 2001, which is the latest year for which official data are available. These figures are from the national greenhouse gas inventory. This table indicates that over the last 11 years emissions from energy, mostly from electricity and transport, have increased by 83 million tonnes of carbon dioxide equivalent. In the same period, emissions from land use change have fallen by almost exactly the same amount—in fact, by slightly more—completely offsetting the growth in energy emissions. The point is that, while energy emissions will continue to grow by around two per cent over the next five, 10, 15, 20 years, in a couple of years time the fall in emissions from land use change will stop; we will have exploited the Australia clause to the full.

This state of affairs has of course been well understood by independent observers from the outset. For example, on 11 December 1997, the day after the Kyoto deal was struck, my institute issued a news release headed 'Borbidge holds the key to meeting Australia's greenhouse target'. It pointed out that the effect of our special deal 'would be to require Australia to do almost nothing to reduce its energy emissions'. For the interests of committee members, and in the interests of pointing to the perspicacity of the Australia Institute, I table that media release for historical interest.

Despite the repeated claims of the federal government about all the efforts to tackle Australia's emissions, the fact is that very little of consequence has been achieved, and that is why the underlying level of emissions continues to grow unchecked. Early last year the Australia Institute published a detailed analysis of Commonwealth spending on greenhouse programs, and it became apparent that the Commonwealth government has consistently underspent the allocated funds. At the rate it has been spending allocated funds, it would not be until the year 2008 that the rubbery figure of $1 billion would be spent, and that seems even less likely with the winding back of the Australian Greenhouse Office, once the jewel in the crown of the government's greenhouse policy. A world beating initiative, so-called—it has launched a thousand forays into the international debate—looks increasingly like a joke. Moreover, even those programs that did get up have proven, not exclusively but for the most part, singularly ineffective, especially the much touted Greenhouse Challenge program, which in the end was little more than a taxpayer funded PR exercise for some of Australia's biggest-polluting companies. I table the Australia Institute discussion paper with details of that.

To finish, we know from the Intergovernmental Panel on Climate Change that Australia, along with the rest of the world, must cut its emissions by at least 60 per cent if we are to stabilise climate change. In the face of this enormous and unavoidable but achievable goal, the federal government has for seven years prevaricated and ultimately failed to act in an effective way. I have to say that, in all my years of close involvement with policy formation and analysis, I can think of no instance that represents a more egregious failure to protect the interests of this country than the refusal to ratify the Kyoto protocol.

**CHAIR**—Thank you. You have submitted several documents. Is it the wish of the committee that they be accepted? There being no objection, it is so ordered.

**Senator TCHEN**—Dr Hamilton, I want to quote from an address given by the Minister for the Environment and Heritage, Dr David Kemp, in February 2003. Dr Kemp said:

… the best data we have show that climate change is a reality …

… … …

The world is warming, and a warmer world is going to impact on many aspects of our lives, including our occupations, industries, and the risks we face.

Having heard this, don't you think that your opening statement that the government is in official denial is a bit of verbal trickery?

**Dr Hamilton**—The government has always said, 'We accept the science,' and it could not do otherwise. It would not want to associate itself with—

**Senator TCHEN**—But you say the government is in official denial.

**Dr Hamilton**—Senior members of the government have on several occasions over the last years made statements, often in private or in unguarded moments, that they do not actually accept the science of climate change.

**Senator TCHEN**—But your statement is a very sweeping one.

**Dr Hamilton**—One can interpret it as one likes, but it is pretty clear to me from the statements of senior government ministers over the years. For instance, the Prime Minister, Mr Howard, Senator Hill when he was environment minister and Senator Parer when he was energy minister made statements that suggested they questioned the science of climate change and that that was part of their argument, internally at least, for not acting on climate change in the way that it demanded.

**Senator TCHEN**—We can leave it at that. But, given that the government acknowledges that climate change is a reality—in fact, it is the basis of the government's policy—half of Ms Reynolds's opening evidence was probably unnecessary, because you do not have to persuade us. I will go straight on to the Kyoto protocol as a way to reduce the impacts of global warming. Firstly, in your assessment—either of you—what is the likelihood of the Kyoto protocol now coming into effect, coming into force?

**Dr Hamilton**—This is the big question that everyone is sitting around waiting for. It all depends on what Russia is going to do, as you know.

**Senator TCHEN**—Not Australia?

**Dr Hamilton**—No, it does not depend on what Australia is going to do; it depends on what Russia is going to do, because they would take us over the threshold. It depends on who you are talking to. The analysis that I hear going around the international community is that Vladimir Putin will ratify after the elections to the duma. Who knows whether or not that will happen. One thing is for sure: whether or not the Kyoto protocol comes into force, there is no question in my mind that over the next years the world will be forced to take action to reduce climate change, and there is no way a country like Australia can withdraw from an international process. There is no question in my view but that actions to reduce emissions will be increasingly tied to trade policy and that countries that refuse to do their bit—and Australia has a fair bit to do—will be penalised for it.

**Senator TCHEN**—Do you agree with that, Ms Reynolds?

**Ms Reynolds**—Yes. WWF does have a presence in Russia and, as far as I am aware, there continue to be forces for and against the Kyoto protocol ratification in Russia. But there is expected to be some resolution of it in the coming months, probably towards the middle of the year. Ultimately, my understanding is that it comes down to the relationship between Russia and Europe and the relationship between Russia and the US. The Kyoto protocol ratification is a central message that the Europeans are taking to Russia and, given that they are neighbours, I think that relationship will probably have the more dominant influence on the decision of the Russians. I am not there and I am not an expert, but that certainly seems to be the indication we are getting.

**Senator TCHEN**—So we do not know yet whether the Kyoto protocol will actually come into force. But, should it come into force, do you—either yourself or your organisation, Ms Reynolds—believe that the Kyoto protocol establishes a practical long-term approach for dealing with climate change, or does a lot of further work need to be done?

**Ms Reynolds**—The Kyoto protocol, in terms of its structure of having targets, is probably the best model for ensuring that countries have a goal, meet that goal and are legally bound to it, and that there are opportunities for emissions trading. There is nothing wrong with the Kyoto architecture in terms of the idea of there being targets and ways to meet them.

**Senator TCHEN**—We have the model. Any model, whether or not it is put into practice, would be an example for the future. But I am asking you: should the Kyoto protocol come into effect, do you believe that it will itself establish a long-term solution to dealing with climate change?

**Ms Reynolds**—Yes, the model certainly does. The targets to 2010, as I stated in my opening statement, are a crucial piece of the puzzle in avoiding a dangerous level of change. They mean that we get real emission reductions before 2010. As stated in my evidence, the earlier we get the global emission reductions, the lower the eventual temperature level will be. If Kyoto does not work and we have to start renegotiating targets that perhaps do not occur till 2020, if we want to stay at the lower level of temperature increase, we will have to have much deeper cuts much faster than if we take the first step, meet this lot of reductions and move on to another set of emission reduction targets that are deeper again. It is all about trying to make the process of change smooth. Meeting targets today rather than tomorrow means that you are helping to get the emission reductions down much lower.

As I also said in my opening statement, diplomatically if you have ever been to an international negotiation you will know that the Kyoto protocol is not just about emissions; it is also about diplomacy, politics and international relations. The reason it was established in the first place was that industrialised countries said, 'Yes, we will show you that we are serious; we will take the first steps.' If we do want to achieve global emission reductions after 2010 it is going to be almost impossible diplomatically to ask the developing countries to take on targets if the industrialised countries have not even achieved their fairly small Kyoto protocol targets. So for a range of reasons, scientifically and diplomatically, the Kyoto protocol is a crucial first step.

**Senator TCHEN**—Dr Hamilton, do you want to add something?

**Dr Hamilton**—Yes. The Kyoto protocol was 10 years in the making. It is one of the most extraordinarily difficult and complex pieces of international negotiation that has ever been conducted. It is almost in place. The Australian government agreed to it in December 1997. Senator Hill went to New York to sign the Kyoto protocol in March 1998 and it was only then that the Australian government, following the US government's lead, started to backtrack from it. The Kyoto protocol does provide a suitable framework because it is a very flexible framework. The conditions and structures that apply in the second and subsequent commitment periods after 2012 allow an infinite variety of targets, mechanisms and involvement of various countries. So you have a framework, an agreement, that provides a method for pursuing deeper emission cuts. To abandon the Kyoto protocol is effectively to say, 'Let's spend another 10 years trying to negotiate an alternative.' As we know from the science, turning around greenhouse gas emissions—to use the old cliche—is like turning an ocean liner. It takes a very long time and we do not have time.

**Senator TCHEN**—If the Kyoto protocol itself lapses, it does not mean that the climate convention lapses, does it?

**Dr Hamilton**—No, indeed. That has been ratified and has entered into force.

**Senator TCHEN**—The framework for ongoing work is provided by the framework rather than by the protocol itself.

**Dr Hamilton**—The framework was ratified in 1991, I think. It took six or seven years to develop the Kyoto protocol. So, yes, the framework convention remains in place and gives obligations to countries, albeit minimal ones, and would provide the basis for a new round of negotiations, but it would take a very long time.

**Senator TCHEN**—The Kyoto protocol has been described as a flawed agreement. People usually treat that word with different degrees of acceptance, but I think most people would agree that it is not a perfect agreement. Do you accept that?

**Dr Hamilton**—Is there a perfect agreement?

**Senator TCHEN**—Probably not. The question we now come to is: if an agreement has flaws in it, at what stage do you accept those flaws and go on with it? Some agreements would have flaws so large, so damaging to the signing party, that they are not acceptable. Do you accept the principle that every nation has the right to judge whether a flaw in a particular agreement is not acceptable to that nation, or should we go on regardless?

**Dr Hamilton**—Yes, but I also think that other nations have a right to penalise those that refuse to do their bit. Kerry Packer could argue that if he refuses to pay his taxes it would have no appreciable impact—

**Senator TCHEN**—He doesn't pay any.

**Dr Hamilton**—Assuming he did pay taxes— on revenue collected in Australia, so why should he bother paying? We know why he should bother paying: because, if he does not, other people will not feel any obligation to do so. If the country with the highest per capita emissions in the industrialised world—that is, Australia—refuses to participate, why should other countries participate as well? If they are, don't you think it is only fair and reasonable that they should penalise us for failing to do our bit?

**Senator TCHEN**—We do have a model, the Montreal protocol, which is an environmental protocol that is a global agreement that applies to all nations and is enforced across the globe regardless of whether it is a developed or developing nation. Don't you think that would be a more effective model?

**Dr Hamilton**—If we could have an issue that were as simple as ozone depleting substances—

**Senator TCHEN**—Global warming is pretty simple too, isn't it?

**Dr Hamilton**—No, it is extremely complicated. Controlling ozone depleting substances is, comparatively, a very simple matter. There were alternative technologies available at minimal extra cost. With the assistance provided to developing countries they were happy to go along with it. We have seen brave words, bold words, from developed countries to provide technical and financial assistance to developing countries, but some rich countries—and Australia, regrettably, is at the forefront—have refused to pursue those financial and technical avenues to assist developing countries.

**Senator TCHEN**—I am glad that we agree that global warming is a complex issue—there is no simple solution. The Kyoto protocol would come into effect if Russia but not Australia ratified it. However, I note that both India and China ratified it in August 2002. Both of these nations are not Annex 1 nations, but their emission levels are amongst the highest in the world—they are in the top 10. China is second, I think. Should China or perhaps India, which is easier to communicate with from an Australian point of view, be persuaded to voluntarily declare themselves an annexe 1 nation and accept targets for their own nations? Then the Kyoto protocol will be ratified immediately, won't it? Do you know of any efforts being made by the international community to persuade either India or China to voluntarily become an Annex 1 nation and resolve this problem about the protocol not being ratified?

**Dr Hamilton**—That is an interesting suggestion. I have not heard it suggested that a large developing country should be inscribed in Annex 1—

**Senator TCHEN**—I said 'voluntarily'.

**Dr Hamilton**—I suspect it would not work because the Kyoto protocol enters into force only if Annex 1 countries that were Annex 1 countries in 1990—that accounted for 55 per cent of $CO_2$ emissions in 1990—agreed to it. The point about China and India is that, when the Kyoto protocol was agreed—in fact, days beforehand—Prime Minister Howard rose in the House and made it quite clear that the Australian government did not expect developing countries to take on binding commitments yet. That position changed some months later. It was a very fair position. It was reflected in the framework convention, the Berlin mandate in 1995 and the Kyoto protocol itself. It seems to me that pointing to a flaw in the Kyoto protocol—that is, that developing countries are not required to take on binding commitments—was nothing more than a political ruse that was developed some months after the Kyoto protocol was signed. In fact, for some months it was an argument put only by the oil industry in the United States.

These developing countries have made it quite clear that they will honour the principles of the framework convention and the Kyoto protocol. That means that they will take on binding commitments once rich countries have shown the way.

**Senator TCHEN**—My time is up. I do have another question but I might leave that.

**Senator BROWN**—First of all, could you tell us if Australia is meeting its Kyoto agreement targets at the moment.

**Ms Reynolds**—I do not have that information off the top of my head. I think Clive reported on the most recent inventory. We are currently just a little above our 1990 levels, but only marginally. With projected land clearing declines, the government is saying that it is confident of meeting its target, but that really depends on how fast the stationary energy sector and the transport sector grow. The growth in the emissions from those major sectors, which produce up to 70 per cent of Australia's emissions, is just going upwards. It is has risen by 33 per cent since 1990. The Australian Greenhouse Office recently put out some projections of where the stationary energy sector will be by 2020. The emission levels could be between 60 per cent to 90 per cent higher than 1990 levels by 2020.

The short answer is that they are fairly close to the Kyoto target now, but solely through this one measure of land clearing emissions. The key sectors are growing and show no signs of turning around, and there are no plans to turn them around. So what the situation will be by 2010 is unclear. We will probably be a bit above the Kyoto target.

The land clearing opportunity was a great opportunity for Australia to take a below 1990 target in Kyoto rather than a plus eight per cent target. We had all of that. Once we negotiated to have the Australia clause included, we had that huge amount of emission reduction opportunity in slowing land clearing. If we had taken some measures to slow energy and transport emissions then we could have been well below 1990 levels quite easily.

**Senator BROWN**—What about the fate of Australia's biodiversity with current projections for global warming if you take, for example, the medium? We have been talking this morning about the extinction of 25 per cent of the species world wide. Is that going to be the sort of thing we will see in Australia or is it different?

**Ms Reynolds**—No, Australia is incredibly vulnerable because we have species that are currently sitting within temperature and rainfall conditions that are marginal. So any changes, particularly to rainfall, could have a devastating impact on a lot of Australian biodiversity. Australia sits in the mid latitudes of the world. It seems as though global warming will make the tropics and the high latitudes wetter but anywhere around that mid latitude belt is very likely to become drier. So when you are the driest inhabited continent in the world already and then you project it to become even drier, that has profound implications for species that are not even currently at risk because of the impact on water resources. Also, drought and more intense bushfires are real problems for biodiversity for Australia's forests and for species that depend on them.

**Senator BROWN**—We saw some catastrophic bushfires last summer. Do you see any component of global warming there or was that something that we could have expected under baseline conditions?

**Ms Reynolds**—WWF did some work early last year with two meteorologists—Professor David Karoly and Dr James Risbey—looking at the 2002 drought, and the temperature and conditions that accompanied that drought. We looked at Bureau of Meteorology data for all droughts since 1950. Meteorologists always expect to see a temperature spike during a

drought—it is normal—but, when you look at the droughts since 1950, the 2002 drought had an average temperature of an extra degree hotter across Australia. That extra degree does not sound like a lot, but just a small change in the average temperature can have a big impact on evaporation rates and also on vegetation dryness.

**Senator BROWN**—That is not a one degree increase in the maximum temperature for the day; that is a one degree increase 24 hours a day over an extended period of time. The average temperature is up by one degree, not just the spikes.

**Ms Reynolds**—They were the average Australian maximums. It is the maximum temperatures that really add the hit to the evaporation rates. The average Australian maximum temperatures were hotter in 2002 by a factor that does not sound like a lot to the average person but, to meteorologists, it is a very large increase and can have an effect of some magnitude on evaporation rates. The paper we did was only able to get 2002 data from one CSIRO station that measures evaporation. There is not a lot of evaporation data collected across Australia but, in that station in Griffith, the 2002 evaporation data was at record levels. It was about 10 per cent higher than any previous record because that extra hit of hot maximum temperatures adds extra crunch to a drought and dries things out faster.

Professor Karoly and James Risbey made a submission to the federal bushfire inquiry, saying that they believed the unusual record maximum temperatures in 2002 did have an impact on the dryness of vegetation, and which resulted in the tinderbox conditions which had an impact on the severity of the bushfires.

**Senator BROWN**—Making the bushfires more severe than they would have otherwise been?

**Ms Reynolds**—Yes.

**Senator BROWN**—From what you have seen about the free trade agreement, do you think that Australia's environmental laws, and Australia's ability to protect its environment, will be unaffected by that agreement?

**Ms Reynolds**—I would probably have to ask one of the other CANA members. I think the Australian Conservation Foundation, which is also a member of CANA, has done a lot more work on the free trade agreement. WWF has not done any analysis of that, so I cannot answer that. But I can take it on notice and get ACF to submit some material.

**Senator BROWN**—I might ask Dr Hamilton.

**Dr Hamilton**—I am afraid I have no comments to make. We have not looked at that.

**Senator BROWN**—Is this your paper?

**Dr Hamilton**—Yes.

**Senator BROWN**—How are the global warming gases coming from forestry in Australia measured? As you know, I have a lot to do with forestry, and I have seen a lot of forestry in Tasmania. I am not aware of anybody who is monitoring that coming up with the logging of those huge forests in any way that is related to what is going on there.

**Dr Hamilton**—It is a complicated and specialised scientific art to measure the emissions from land use change. The CSIRO, along with other bodies, has put a great deal of effort into

the science of measuring carbon dioxide emissions from forestry and other forms of land use change, particularly over the last six or seven years. It is still probably the part of the greenhouse gas inventory where most uncertainty attaches. Essentially what they do is take a hectare of land—old-growth forest, for instance—and look at the amount of vegetation on it that would die as a result of, say, clearing. They are able to assess the extent of carbon which has turned to carbon dioxide, as that forest either rots or is burnt, and make an estimate of the amounts of greenhouse gases released as a result of the change in the land use.

**Senator BROWN**—Do you know if that is happening anywhere in Tasmania? I have been totally unable to get anybody to give me a definitive assessment of what happens when the forests are cut down and burnt, with the subsequent release of gases, both there and at the end product, which is where the paper goes into a rubbish dump somewhere.

**Dr Hamilton**—I am not an expert on this, but I would be surprised if an assessment were not being made of particular forest types in Tasmania, where the use is being changed and, therefore, there is a release greenhouse gases. It would be odd to base estimates for Tasmania on different forest types, say, in New South Wales, so I expect that they are accounting for that, albeit perhaps in a rule of thumb way.

**Senator BROWN**—Would you be surprised to know that there is no assessment of what is going on?

**Dr Hamilton**—Yes, I would be surprised.

**Senator BROWN**—I would be very pleased if you could find any information on that at all because I do not think it exists. I asked a previous group of witnesses this morning about jobs. I have read quite often that, if we ratify the Kyoto protocol, it threatens not only our economic interests but also jobs. Is that your assessment?

**Dr Hamilton**—Yes, we have done quite a bit of work on the employment implications of programs to reduce Australia's greenhouse gas emissions, and there are a number of implications. The first one is to look at the employment implications of a shift from fossil dependent industries, or fossil intensive forms of energy, to renewable energy and energy efficiency. There is a pretty strong consensus amongst energy experts that there would be a net creation of jobs as a result of that shift, because renewable energy and energy efficiency industries do tend to be more labour intensive than fossil fuel based industries. Not only are there more jobs per unit of energy generated but they are better jobs, as a rule. That is pretty well established, although it is hard to be very precise about that, not least because in the major transition to renewable energy we are not too sure of exactly which sorts of technologies would predominate.

In addition, the participation in the Kyoto protocol would have substantial implications for a range of Australian businesses, that are not necessarily big energy users or producers, through the system of international emissions trading, which Australia could then participate in. There were a number of stories in the press a year or two ago talking about Australian firms looking to go offshore so that they could participate in international emissions trading because they believe—in my view, accurately—that if the protocol entered into force and Australia were not part of it then they could not participate as Australian based companies in that potentially lucrative new market.

**Senator BROWN**—I want to go back to the issue of forests for a moment. There is a generally accepted figure of about $10 a tonne in royalty coming from the logging of those forests. Have you got any assessment of what the per tonne potential is for carbon banks in a global trading mechanism for not logging those forests?

**Dr Hamilton**—A number of analyses have been done of that. Of course, that is relatively easy to do by converting the amount of timber into a carbon dioxide equivalent—the extent to which they store carbon in the atmosphere—and then comparing it to the expected price for a tonne of carbon dioxide that might be traded on the world market. Because that world market price, before the entry of the Kyoto protocol, is very much in a state of flux and because the Russians shot themselves in the foot by introducing more loopholes into the Kyotol protocol—to a point where they potentially increase the supply of emission permits driving the price down—it is a bit hard to tell. But certainly one of the benefits of keeping land area timbered is its function to store carbon. It should be pointed out, though, that it is quite possible that a certain type of forest, if it were cleared and allowed to regrow, may, over time—it might take 50 or 100 years—store as much carbon as it previously did, although in the interim there would be a net emission of carbon dioxide to the atmosphere.

**Senator BROWN**—On the matter of externalities, do you know of any study which puts a price on the loss of species and could be applied in the Australian economy to the industries which are causing the global warming which is leading to the extinction of species? Have you seen any study that puts a costing on the flooding of Tuvalu and the loss of that small nation in the Pacific? Do you know of any study, for that matter, which looks at the health costs to Australia? I heard, sadly, of the first death from dengue fever in 100 years in Australia, and I have seen reports saying that global warming might see that particular disease spread down the coastline to Brisbane and beyond. We know about the thousands of people who died in the heatwave in France and elsewhere in Europe and India in the last summer. Do you know of anybody who has put even a ballpark figure on what the industries and other agents of atmospheric pollution at the moment should be paying if they were going to cover these costs?

**Ms Reynolds**—There are numerous individual studies around. They are not covered in our submission, but I can table a few of them by the deadline. Work has been done by the World Health Organisation on the health costs of climate change. Some of the health scientists are analysing what the health costs in Australia would be if we had the same set of heatwave conditions as in Europe. I understand that will be out in the next couple of months. The large global reinsurance companies have done numerous studies estimating the costs of an increase in extreme events.

There has probably been less done in terms of the costs of the loss of biodiversity. Unfortunately, there does not appear to have been one major global study which tries to cost out climate impacts, but it is my view that the costs of climate impacts are massive and certainly need to be considered by decision makers as equally as important as the costs of mitigation. I really do not think Australian decision makers generally have made that fundamental leap. We need to consider the costs of this climate change problem as having equal weight to the companies saying, 'We will be damaged by having to change to non-polluting types of business.' To undertake a major analysis of the costs of climate change to

Australia would be a very large task. I think the government of Australia should do that, but it is a major exercise. It has not been done in a complete form.

**Senator BROWN**—It would be good if you could get any information, thank you.

**Dr Hamilton**—I sometimes dream about a government putting as much money into assessing the costs of damage from climate change as has been put into modelling the putative economic effects of reducing emissions. There is a huge disparity there and very little good, solid work has been done on the expected damage from climate change. The work that has been done has been reviewed fairly comprehensively by the IPCC's third assessment report, volume 3, which came out in 2001. The IPCC will be doing another report in 2006, which will update that considerably. It would be worth the committee consulting Professor Tony McMichael about the health costs associated with climate change. He is a professor of epidemiology at the ANU and a world authority on the health implications of climate change.

**Senator LUNDY**—I was going to start my questioning on the associated costs that do not seem to have attracted too much attention from government, certainly not the Australian government. We heard this morning from the CSIRO that it is applying for some funding through the budget process to conduct a study into some aspects of the costs if we do not proceed down the path of reducing carbon emissions. I am interested in both your observations of the work of CSIRO in capably fulfilling its role as an independent adviser, theoretically to all, not just the Australian government, on climate change matters. I asked the CSIRO this morning about its resources and capacity to do that. What are your observations?

**Ms Reynolds**—On the service that the CSIRO provides, I think I speak for all CANA members in saying that we certainly get great information from CSIRO and they are always open and available to do talks or provide some advice. That is to be applauded. It is pretty obvious, though, that there have been cuts and there are many additional projects and studies that they could do with more money. I think they do well with what they have, but it is fairly obvious that there was a recent round of cuts about 12 months ago or less than 12 months ago and I think that has had a fairly major impact.

**Dr Hamilton**—I have always found the CSIRO division of atmospheric research to be highly professional in its work. If you go around the world and talk to other climate scientists, there is no question that the CSIRO is up there with the top two or three in terms of international reputation for its pure climate scientists. They are extremely highly regarded. They obviously walk a tightrope in the sense that they are dealing with an exceptionally important issue which has profound political implications and so they must at all times protect their independence and scientific credibility, which I think they do extremely well. What is interesting is that several other divisions of CSIRO in the last few years have seen climate change as being something critical to their future and have increasingly devoted resources to looking at various implications of climate change.

I think there is real scope, following Senator Brown's question, for additional resources to look at the implications of climate change for all aspects of Australia. They did a very interesting study about five years ago that received almost no publicity when they looked at the implications of climate change for the Macquarie River region in northern New South Wales. They said, 'What's going to be the impact on the agricultural industries in the Macquarie River region of increasing temperatures and changes in precipitation?' They did an

economic analysis and they found that the economic damage in net terms for rural communities would be quite severe. That was one study of one relatively small region, and I think we need a dozen of those to get a proper picture of the sort of economic impacts of climate change in Australia, and the CSIRO is in an excellent position to do that sort of work.

**Senator LUNDY**—Who did that study?

**Dr Hamilton**—It was the CSIRO in conjunction with another group whose name I have forgotten.

**Senator LUNDY**—Are you aware of any other studies like that applying to geographic areas or to other aspects of the externalities as a result of climate change?

**Dr Hamilton**—That is the only one of that type that I am aware of.

**Ms Reynolds**—Some of the state governments are now commissioning regular reports about the impacts of climate change in the states. I think most of those studies just relate to temperature and rainfall projections but I think the Victorian department—I think it is the Department of Natural Resources in Victoria—for example, has overlaid that CSIRO information with its catchments. It is starting to look at, if these projections are right, what that means for river flows in these various catchments, what it means for dam levels.

**Senator LUNDY**—Coming back to very prosaic and fundamentally important issues like water resources as well as some of the agricultural challenges are all part of that. Dr Hamilton, you mentioned other divisions of CSIRO. Do you know what those other divisions are?

**Dr Hamilton**—I certainly know that the energy division is taking account of the implications of climate change in some of its work. The Division of Wildlife and Ecology, which changed its name last year, has done substantial work on the ecological implications of climate change, and also the Division of Water Resources has done a lot of work on climate change.

**Senator LUNDY**—In terms of the comments you made in your opening statement about the Greenhouse Gas Abatement Program, could you go into a little more detail about your views on the effectiveness and usefulness of that program in the broader context of the government's agenda on climate change?

**Dr Hamilton**—The Greenhouse Gas Abatement Program—which, I am sure you will remember, was part of the deal over the GST—at least potentially provided the opportunity, with $400 million, to promote some new activities in Australia and really give a boost to renewable energy and energy efficiency industries. The overall impact of that spending, to the extent that the money was spent—and it was seriously underspent—was a disappointment because many of the activities that received support from GGAP were activities that were only partially related to climate change, were going to be undertaken anyway by the companies in question or would have only a relatively small impact on the emissions in question. So I think there were a lot of lessons to be learnt from the failures of GGAP, which is not to say that a similar program more effectively applied in the future could not have a much better effect.

**Senator LUNDY**—Are you aware of whether there is a figure available on the reduction of greenhouse gases as a specific result of GGAP?

**Dr Hamilton**—The government certainly made estimates, which it included in its national communication to the UNFCCC in 2002, I think, and perhaps they have been updated more recently. I took the view that there was a lot of puffery in the figures on emission reductions claimed—that they were not really due to GGAP, that you could not really attribute them to the government's program or that they would have happened anyway, for example. I forget the figure exactly but six million tonnes comes to mind for some reason. The estimates that the government has made are certainly in the national communication. A review of GGAP was undertaken, which the AGO commissioned from a number of consultants. That went onto their web site about 18 months ago. In those consultants' reports some pretty searching comments were made about the failures of GGAP.

**Senator LUNDY**—Perhaps I should have asked this question of an earlier witness; I do not know if you can help. How was it perceived by the renewable energy industry sector?

**Dr Hamilton**—My feeling is that it was a bit of a disappointment. Their view is that far more resources should be specifically targeted at them—of course, all industries believe that, but they have a much better claim in the public interest in this case. I think they felt that much of the money was devoted to activities which were not important in the long term for tackling this problem.

**Ms Reynolds**—My understanding is that energy efficiency measures that were not, at large, industrial, stationary sources of emissions—for example, a program to put energy efficiency improvements in public housing across a couple of councils—

**Senator LUNDY**—Child-care centres or something like that?

**Ms Reynolds**—Yes. It was very difficult to meet the various thresholds to get GGAP funding if you did not have a singular source. I recall some councils saying that it was a missed opportunity. There were some good ideas out there for energy efficiency measures, but it was difficult to attract the GGAP funding to those kinds of programs.

**Dr Hamilton**—I think it is important to point out that there are tremendous opportunities for energy efficiency to reduce greenhouse gases in Australia. Many of those have been investigated and exploited by the Sustainable Energy Development Authority in New South Wales. There was one story which I discovered is not apocryphal and does illustrate the sorts of gains to be made. An energy audit expert went to a registered club in Western Sydney and, in the course of doing an energy audit, decided to look above the lighting system. They went up into the ceiling and discovered that a false ceiling and a new set of lights had been put in, but the old lights had been left in there and they had been left switched on. So for some years they had had this well lit cavity in the ceiling and it was just a question of disconnecting the old lights.

**Senator LUNDY**—They would not have found it had they not done the audit.

**Dr Hamilton**—Exactly. These sorts of crazy energy wasting practices are everywhere, apparently. If we put the energy audit cleaners through Australia we could have very large reductions, according to estimates, at virtually no cost.

**Senator LUNDY**—In a number of the submissions from the witnesses we are seeing this afternoon—the industry groups—there is a lot of comment about the potential for trade retaliation against Australia if we sign the Kyoto protocol. Yet we have heard that the government's view is that we are going to meet those targets anyway. What are your observations on the irreconcilable nature of those two comments? What is your understanding of how real the threat is of potential trade retaliation should Australia sign the Kyoto protocol?

**Dr Hamilton**—There is no doubt that it depends a bit on who you talk to. One thing is clear; that is, there is a tremendous amount of resentment against Australia as a result of what happened at Kyoto and our subsequent refusal to ratify. I think we will be lucky if we do not suffer payback as a result of that. The European Union made it very clear a couple of years ago when Australia said, 'We are not going to ratify' that the question of trade penalties was a very real one.

**Senator LUNDY**—But the other way as opposed to—

**Dr Hamilton**—For failing to ratify, yes. I find that bizarre. Who is going to retaliate, other than the United States, if we undertake our international obligations? It seems to be a bizarre claim.

**Senator LUNDY**—Do you think the US would retaliate if we signed the Kyoto protocol?

**Dr Hamilton**—Of course not. It is much more likely that the US will ratify without telling us. I daresay President Bush would ring up the night before and say, 'I am sorry, Prime Minister Howard, but we have changed our mind.'

**Senator LUNDY**—It would be interesting to see how fast Howard moves.

**Dr Hamilton**—When I was in the US talking climate change three or four weeks ago in Washington it was a real eye-opener. The McCain-Lieberman bill, which was designed to legally cap emissions from electricity, was almost passed in the Senate. No-one would have anticipated that. We have seen the defection, as it were, of some very high profile Republicans to the proclimate change cause, including Senator McCain himself, Senator Lugar and Senator Chuck Hagel. Some of the people who seemed to be real dinosaurs on Kyoto are now talking about their legacy to the nation. They do not want to be seen to be the ones that stop the United States from tackling this critical problem. Some people in the beltway believe that it is perfectly possible that the Bush administration—let us not wait for a Democrat to become President—may well change its view on Kyoto. I do not think that is impossible.

**Senator LUNDY**—In the scheme of things and in the context of the free trade agreement, with that occurring in the United States, it does not seem that it is a very credible argument to say that there is going to be trade retaliation against Australia if we do sign it. What your evidence suggested was that the potential for trade retaliation exists if we do not sign it.

**Dr Hamilton**—I have heard no-one say anywhere that Australia will suffer trade retaliation if we do ratify. I have heard plenty of people say that Australia will suffer trade retaliation if we refuse to ratify, including senior officials from Europe. Japan has introduced a coal import tax. It is just inevitable that these issues will be tied to international trade issues.

**Senator LUNDY**—Finally, signing the Kyoto protocol provides for flexibility of the framework. Are you in a position to perhaps reflect upon why the sector and industry here in Australia, by their opposition to us signing the Kyoto protocol, are seemingly so uninterested in the flexibility that those provisions provide?

**Dr Hamilton**—For those remaining industry sectors that are opposed to Kyoto—and the mining industry lost control of the BCA on that about 18 months ago, and the BCA now takes a neutral position—they are not willing to look at the opportunities in the Kyoto protocol in the future. In 2005, if the protocol does enter into force, negotiations will begin for the second commitment period. Basically all bets will be off then, and a long and difficult negotiation process will then be undertaken and built, one hopes, on the increasingly alarming science. It is certainly strongly in Australia's interests to be at the negotiation table when those discussions begin in 2005. If we refuse to ratify we are essentially saying, 'We'll sit at the back and watch proceedings,' and our interests will be damaged, particularly as the Australian position will be treated very unsympathetically by other nations. They will not be doing us any favours at all as they did at Kyoto.

**Senator LUNDY**—Does your organisation have a view on geosequestration?

**Ms Reynolds**—It is probably too early to say that there has been a collective view established. I can give you some thoughts from WWF's perspective. We really believe that it is a bit early to say completely whether it is a good idea or not because it has not been proven as a safe technology. WWF had some concerns a few years ago with the idea of biological carbon sinks. The reason we were concerned was that the pollution goes into the air and is meant to be held by the trees, but if the trees are destroyed or burnt down then that is not a secure form of carbon. So our key concern with geosequestration is how secure is that store of carbon. Until that is answered by independent monitoring over a period of time we remain to be convinced. It very much should be considered at the moment as a sunrise technology rather than something that is ready to go and available. Climate Action Network members generally are concerned that this has become the latest fashion in federal government policy, just like the biological carbon sinks were the fashion for a while, and any realistic approach to getting the needed emission reductions will require full and serious attention being given to the full basket of solutions.

At the moment it looks as though it is just a strong desire to pursue the geosequestration solution and all the other ones are really not getting the same serious money and mandatory measures required to implement them. Finally, with the geosequestration option, a key factor is that it probably needs to be seen as only a bridging technology. The more stuff you put under the ground, the higher the risk is of something going wrong. If it is seen as safe and is used, it should only be used—

**Senator LUNDY**—It is for transition.

**Ms Reynolds**—for a short amount of time to lower the risks.

**Dr Hamilton**—Even the advocates of geosequestration see that it will be a good 20 years before it can contribute in any major way. Of course, 20 years is far too long to wait. From my perspective, to put all our eggs in the geosequestration basket, which seems to be the federal

government's preference, thereby withdrawing funding from renewable energy and energy efficiency to invest in this highly speculative technology seems to me to be extreme folly.

**Senator TCHEN**—I have a question regarding the ratification bill itself. I hope you have a copy; if not, you will have to take the wording. It says:

> The object of this Act is to enable Australia to meet its international obligations under the Convention and the Protocol.

Then, in clauses 7, 8 and 9 it says that the minister must prepare a national climate change action plan, the minister must ensure that Australia's aggregate human induced carbon dioxide is below the target and the minister must establish a national system for estimation of human induced emissions. Do you think, Dr Hamilton and perhaps Ms Reynolds, as experienced political observers, this wording binds the proponents to supporting the minister in whatever he comes up with, or would there still be plenty of room for political gain?

**Dr Hamilton**—There is always room for political gain.

**Senator TCHEN**—So the bill does not say what it does.

**Dr Hamilton**—One tries to define things as tightly as possible, but there is always grey, even within black.

**Ms Reynolds**—The CANA submission says that it supports the bill in principle and as a framework, but, if this were going through the parliament tomorrow, we might want to provide more detailed comments.

**Senator TCHEN**—It is before the Senate now.

**Proceedings suspended from 12.41 p.m. to 1.41 p.m.**

**CURTIS, Ms Karen, Director, Industry Policy, Australian Chamber of Commerce and Industry**

**ACTON, Mr Lawrence Tristram, Chair, Land and Vegetation Task Force, National Farmers Federation**

**POTTER, Mr Michael James, Policy Manager, Economics, National Farmers Federation**

**HOOKE, Mr Mitchell Harry, Chief Executive, Mineral Council of Australia**

**KNAPP, Mr Ronald Wesley, Executive Director, Secretary, Australian Aluminium Council**

**WALLER, Mr Steven Leonard, Greenhouse Opportunity Manager, Woodside Energy**

**CHAIR**—Welcome. As I said this morning, these panels have been arranged as a matter of convenience for the committee to enable it to complete its hearing program today. We appreciate the witnesses' cooperation in this respect. I stress that the evidence given by each witness is their own.

Before we move on to our discussion, there are a few procedural comments I have to make. For the benefit of all witnesses here this afternoon, I point out that the committee prefers all evidence to be given in public, but should you at any stage wish to give your evidence, part of your evidence or answers to specific questions in private you may ask to do so and the committee will consider your request. You are reminded that the evidence given to the committee is protected by parliamentary privilege and that the giving of false or misleading evidence to the committee may constitute a contempt of the Senate.

Finally—although this does not apply to you—witnesses who are departmental officers are advised that they will not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions to superior officers or to a minister if necessary. The committee has received submissions from each of you, which we have already published. Would any of you like to make any alterations or additions to your submissions? There being no alterations or additions, you may like to make brief opening statements and then the senators will ask you questions. We will begin with Ms Curtis.

**Ms Curtis**—The Australian Chamber of Commerce and Industry appreciates the opportunity to present before the Senate committee today. I will try to keep my opening comments to two or three minutes, as I was earlier asked to do. Firstly, I will talk about ACCI. We are a broad based industry association representing about 350,000 businesses around Australia through our membership of other industry associations. They comprise the state and territory chambers in all the states and territories and about 20-odd different industry associations in fields as diverse as housing, hotels, paint manufacturing and the like. So we would like to consider ourselves very—and truly—representative of Australian businesses in all states and territories, from the largest to the smallest businesses. Probably about 280,000 of our members' members are small businesses, so I would particularly like to focus on that sort of aspect.

I will go to the key points in our submission. The first point I would like to make is that ACCI shares the wider community view that global warming is an issue and that it needs to be addressed. We also see it as a community issue, such that all sectors—business, government and individuals—should bear responsibility for addressing the issues. We also want to make it clear that, although we are opposed to the ratification of the Kyoto protocol, that does not mean we are opposed to doing things about reducing our greenhouse gas emissions and also adapting to a future of climate change. But our view is that if the bill were passed it would not give the optimal policy responses for Australian business and, therefore, the wider community. There are probably more effective and cost-efficient means to adapt to climate change and to reduce greenhouse gases. We outline those in our submission. Things such as fiscal measures, R&D tax concessions and voluntary agreements should be pursued. We also think that Australia must continue its international efforts to abate greenhouse gases through the United Nations Framework Convention on Climate Change.

However, simply put, the key reasons why we do not support the ratification of the protocol are really that without US involvement the protocol only covers about 25 per cent of the world's greenhouse gases in binding targets and without those developing nations in particular having binding targets under the protocol there will not be a reduction in global greenhouse gases. We are interested in outcomes and therefore believe that the mechanism is flawed without resulting in decreased global emissions. We also think that Australian businesses could lose competitiveness against businesses from countries that do not have targets—commonly referred to as carbon leakage. Therefore, the Australian economy would be affected without reductions in greenhouse gases resulting.

**Mr Waller**—Woodside Energy would like to thank the committee for the opportunity to make a presentation and to answer questions about its submission on the Kyoto Protocol Ratification Bill. Like Ms Curtis, I will give a quick introduction. Woodside Energy is Australia's largest independent petroleum exploration and production company. It is the operator of the North West Shelf project and has oil and gas projects under development both in Australia and overseas. It is a company that over time has taken seriously the challenge of the reduction of greenhouse gas emissions from its operations. Abatement measures that are implemented or planned will avoid around about 40 million tonnes of carbon dioxide equivalent over the lifetime of those facilities, and Woodside continues to search for additional ways to cost-effectively reduce greenhouse emissions from its operated joint ventures.

To give you an example of that, the latest LNG train on the North West Shelf is, as a result of technological innovation, about 30 per cent more energy efficient than the ones that were constructed in the late 1980s and early 1990s. Additionally, it should not be overlooked that liquefied natural gas is providing the capacity for a host of other countries, mainly in Asia, to reduce their own greenhouse gases. As those more greenhouse intensive fuels used in countries such as China are substituted for the natural gas which has become available to them, those emissions are reduced. So, while the emissions are happening in Australia and we take the pain for them, these other countries are actually getting quite a greenhouse gain.

However, to cut to the chase, at the moment Woodside does consider that the risks and costs of ratifying the Kyoto protocol have not really been fully evaluated. Certainly we

consider that they outweigh the benefits. We think that the absence of developing countries and the less than extensive coverage of the protocol at the moment in terms of countries that have targets is working against it. Certainly the withdrawal of the US has meant that the actual environmental impact of the protocol will be less than three per cent—and maybe considerably less than that. In addition to that, Australia is moving to the point where the projections seem to indicate it will meet its target. Therefore, it has time to consider what a sensible, comprehensive, long-term and cost-effective solution to a sustainable downward trajectory in its greenhouse gas emissions might be. We suggest that the effort and monetary resources that go into establishing Kyoto allied institutions within this country could be better utilised to put Australia in a greenhouse gas regime of its choice, rather than one which was imposed upon us.

**Mr Knapp**—The Australian Aluminium Council thanks the committee for the opportunity to come along this afternoon and talk to you. As a council, we share the global and national public concern, including that of the parties supporting this bill, about possible climate change and the adverse global man-made impacts of the natural greenhouse effect. Indeed, we support the bill's preamble, with the singular exception of the ratification of the Kyoto protocol. We do not support ratification. We are not convinced that ratification is an appropriate first step or, indeed, in the national interest. Our principal concerns are with the Kyoto protocol's limitations in achieving the UNFCCC objectives, the negative impact on the international competitiveness of Australian industry, the implications of its uncertain future development and the need for the Australian government to be unfettered in its efforts to address these deficiencies. We do not believe that these matters can be ignored in arguing for ratification of an international instrument under which the Australian government would be bound, with the potential for other ratifying countries to determine, under decision-making processes embedded within the protocol, the future commitments to be met by Australia.

The AAC and its members have maintained our strong support for efforts to put in place effective measures for greenhouse gas abatement. We believe these actions must be tailored to the particular national circumstances— economic, social and environmental—of Australia. We must select those measures best suited to our economic circumstances and other national criteria, recognising the particular challenges faced by industries exposed to international competition.

Climate change is indeed a global problem requiring a global solution, and Australia's interests reside in an effective global response that includes all major emitters, both current and potential. The Kyoto protocol is a partial and ineffectual approach to a global problem. Global greenhouse gas emissions are not covered by the Kyoto protocol, and the last six years of negotiations have made it abundantly clear that the Kyoto emission cap approach will not be accepted by many countries.

We welcome the government's committing Australia to the task of continuing to strive for an effective global response to climate change and to Australia not ratifying the protocol unless and until it is demonstrated to be in Australia's national interest. We remain committed to working with Australian governments, at federal, state and territory levels, to take cost-effective measures to abate greenhouse gas emissions within a flexible framework that does not undermine Australia's international competitiveness. Indeed, resolution of the issues

identified in the preamble of the bill under inquiry will require the casting off of the shackles imposed by the Kyoto protocol and the early implementation of workable global arrangements that recognise national interests and attract the support of the major emitters of the 21st century.

**CHAIR**—Mr Potter?

**Mr Potter**—Mr Acton will be presenting.

**Mr Acton**—Thank you for the opportunity for the NFF to appear before the inquiry. Obviously, we are representing agriculture, and climate is a very important issue for agriculture. You only have to look at the seasonal conditions over the last two to three years, and particularly in the last 12 months, and the impact on agriculture and on rural communities to see that. There is potential in climate change for a range of effects on farming: increasing temperatures, reduced rainfalls, increased evaporation and an increased frequency of extreme events like droughts, floods, fires, cyclones and so on. These are things that have a major impact on our people.

Unfortunately, little is known about climate change in agriculture and the greenhouse emissions in farming. There is the fact that there are few viable options for agriculture to reduce its emissions, and I can enlarge on that if you wish. I guess one of the things that you probably are aware of is that through the government-business climate change dialogue NFF actually chaired the group that put together a report to the Commonwealth government from our agriculture and land management working group. One of the things that was advocated there that NFF is very much advocating is a significant increase in research about climate change in agriculture. The research is vital to ensure that agriculture maintains its importance for the regional economies in Australia as a whole and also to enable it to play its part in reducing the concentration of greenhouse gases in the atmosphere.

At this stage NFF does not support the Kyoto protocol as an appropriate way to reduce emissions. Firstly, NFF has concerns that Kyoto deliberately excludes developing countries from having emission caps, and this puts Australia at a competitive disadvantage for no real greenhouse benefit. It creates a number of potential problems, including the possibility of industry shifting to developing countries, encouraging developing countries to increase their use of fossil fuels and particularly discouraging exports of clean technology to those countries. Secondly, NFF has concerns that Kyoto has the potential for high cost and low benefit, particularly with regard to agriculture. Once again there are some examples of cost that we can provide. Kyoto has rigid emission targets and that means the cost of abatement could become extremely high. The third issue is that in terms of agriculture there are some important problems, and we have had some interaction both at an NFF level and at a state level with the Greenhouse Office. But one of the problems, very clearly, is that Kyoto does not include some emissions such as woody weeds and vegetation thickening, and there are a range of problems there because of that. Finally, on one of the arguments put in support of Kyoto, there are no grounds yet for trade retaliation for this country not ratifying the agreement. If that becomes a problem then we are prepared to look at and deal with it. NFF believes that Australia should not adopt the policy of ratifying Kyoto and then attempt to change it from inside. We argue that the alleged benefits for Australian farmers are debatable and may be illusory.

In summary, NFF is rightly concerned that climate change has the potential to greatly affect farmers. We therefore support more research, as I said, through the report that went to the government on the impact of climate change on farmers. I should have said up front that we do accept that there is a need to address greenhouse emissions. There has certainly been a lot of research done through a number of our major industry sectors trying to find viable commercial solutions to some of the problems, but at this stage we do not support the ratification of the protocol, because it excludes many countries, it creates perverse incentives and it does not deal appropriately with uncertainty. I think I will leave it at that.

**Mr Hooke**—I share with my colleagues an appreciation of the opportunity to put my organisation's position before you. The Minerals Council of Australia is the peak national organisation representing the Australian minerals industry. Its members cover about 85 per cent of this nation's production of minerals and probably slightly more than that in terms of exports. Like others before me, we also have a position in appreciating that there is some concern about the impacts of anthropogenic greenhouse gas emissions on the world's climate system. We have practised, if you like, what we support in terms of the precautionary principle out of the Rio declaration—that is, that the lack of absolute scientific certainty is no grounds not to do something—and that is what we are committed to: supporting a global response to managing climate change that is real and effective in reducing greenhouse gas emissions, that does not undermine Australia's industrial competitiveness and that promotes real business opportunities.

In making a judgment about the ratification of the Kyoto protocol we reconciled it with the fundamentals of what would constitute a global solution to a global challenge. Our submission details those fundamental criteria. For the record, they centre on internationalisation, comprehensiveness, equity, non-discrimination, consistency, cost-effectiveness and market based measures. Our submission details the fact that the council concluded that the protocol fundamentally fails the test of those criteria because: it does not cover about 70 per cent of current global greenhouse gas emissions; it provides no clear pathway for developing companies to participate; it is projected to stem growth of emissions by around only one per cent on the first commitment period targets; it provides no detail on any second or subsequent commitment period beyond 2012—nor is there any certainty in any binding rules or operational institutional arrangements for the so-called three flexibility mechanisms; and it sets targets that are relatively low initially for some of the major emitters, particularly some countries in Europe, making compliance relatively easy—and that in turn undermines any incentive to participate in the three flexibility mechanisms.

In addition, it fails the test of sponsoring significant business opportunities, for the reasons I just went through, and, having spent a fair amount of time in international trade politics, I can say that this is founded in international trade politics. It is essentially about those who have a competitive disadvantage seeking to externalise their competitive disadvantage to ours. Accordingly, we support the sovereign determination of this government's position not to ratify the protocol until it can be demonstrated that it is in Australia's national interest to do so. One can only conclude that that, prima facie, will be the case when there is a global solution, and we are a fair way off that. Australia's interests do reside in there being an effective global response that includes all major emitters, current and potential. It is not

possible to have a comprehensive solution if there is not a commitment from the top six emitters—the United States, China, Russia, Japan, India and the European Union—which account for about 73 per cent of emissions. We only have two of those.

In the second instance, we need a commitment from the next six major emitters, which account for another 12 per cent—that is, Canada, South Korea, Ukraine, Mexico, Australia, South Africa and Brazil. The Ukraine and Canada are the only two out of that lot. So, out of the top 21, five countries have stepped up to the plate. We do not expect that situation to change for some time. Indeed, it is increasingly unlikely that Russia will ratify—nobody has put enough money on the table. Accordingly, the minerals industry has moved on. We have moved on beyond the question of ratification of the Kyoto Protocol and moved to the point where we as an industry might do things that are effective that are within our own purview and where we might encourage policy makers to focus their efforts.

We are committed to working with government to determine a suite of policies and strategies, and that was evident in our intersection with government in the climate change dialogue. We are looking for things that are broad, market based, efficient and demonstrably effective, things that are part of a global solution, provide real business opportunities and maintain—or, certainly, do not erode—our international competitiveness, while not disadvantaging early movers.

Like all progress, technology is the key. Our focus is on 'what' and on what will be the drivers. We have committed heavily to investing in research into and development of existing and new technologies for the reduction of greenhouse gas emissions through abatement and improved eco-efficiency and energy efficiency practices. Our submission details a synopsis of a broad range of technology options to contribute to lower emissions and the forums the industry is engaged in to that end. We are cognisant of the challenge in stimulating the development and uptake of new technologies in respect of broad based market measures and the essentiality of the business case. You cannot be green if you are not in the black.

The industry is cognisant of the challenge it has in terms of the extent of economy wide instruments. We do not see that necessary in the short term—certainly that which would give rise to carbon price signals in the first commitment period—because we think industry is well advanced in that area, and we certainly do not see it as necessary for the acceleration of technical research required to lower GHG emissions. But there is an imperative to accelerate and broaden that process, and that will require government intervention in the form of fiscal incentives, which will need to be applicable comprehensively, and engaging the community in both benefiting from the outcomes and sharing the costs given the broader externality effects of greenhouse gas emissions and climate change.

In what in all reality in the longer term will be a carbon-constrained world, carbon price signals may be important, particularly from the perspective of prospective development and investor confidence. How to deliver those signals is a matter for government and business to cooperatively determine—with the community as well—but we should rule out right up front a broad-based indiscriminate blunt carbon tax on any economic or social criteria you care to consider. We also consider that it is very premature to be considering the introduction of any broad-based market measures, specifically emissions trading, until there is something approximating an international regime, and that it is effective. Australia can meet its

international obligations if it concentrates its focus on a combination of abatement measures and innovative technologies while building a strong internationally competitive economy and we are not continually distracted by a belief in the Kyoto protocol's potential effectiveness.

**CHAIR**—Thank you very much. We will go for an hour, so each party will have 20 minutes. We will begin with the Greens, then the ALP and then the coalition.

**Senator BROWN**—I might start by giving a summary of your submissions, for which I thank you, as I heard them and then ask you to comment on that and some questions that will come out of it. Your submission is that we ought not to ratify the Kyoto protocol but is totally bereft of any real alternative global mechanism now which would be a better option for us to take. I want to put this question to you before I come to some specifics: don't you worry about the global scientific evidence coming from thousands of scientists and hundreds of Nobel laureates saying that we have to change course now? There are studies that show that millions of species on this planet will go to extinction, according to current forecasts, in the lifetime of our children, that sea levels will rise—they have already risen 20 centimetres, but they are going to rise further, and most populated areas of the world are just above sea level, including our capital cities—and that storms are going to get worse and already are. The international insurance industry is pointing to the enormous cost of those and the massive death toll which is potentially going to come from global warming and which is already showing up in the increased intensity of storms, such as the record number of tornadoes in the United States last May, for example, the heatwaves in Europe and the bushfires that we have seen in Australia.

Australia is the worst per capita emitter of greenhouse gases in the industrialised world. You repeatedly say to this committee that other countries are not being held in check by the Kyoto protocol, but you know that their per capita pollution is nowhere near that coming out of Australia and the United States. You know that we are in a world which is globalising and which must be based on one person, one value. If you disagree with that, tell me how you disagree, because it is very important. We had Mr Hooke talking about the fundamentals of an agreement being equity and nondiscrimination. I ask any of you: do you adopt therefore the idea that whatever regime comes in, it should be based on the one person, one emission value permitted in a future regime around this planet or do you think that other people are not as valuable as you or the people you represent?

Do you think that the nondiscrimination that you present the committee with involves you and your industries being able to pollute at a rate far above that of people in the developing world in the majority but you should not pay for the costs, for example, of island nations which will disappear this century if projections are right and of the storms and damage there is around the world? Or do you believe in polluter pays, do you believe in user pays? That is your own principle, I would presume, unless you tell me otherwise. That would mean that those people who pollute should pay, and not just for things which are difficult to cost but for everything. Those are the two questions: one, what is your alternative to this flawed Kyoto protocol, except for a set of principles to try and obfuscate and ignore the urgent and immediate need to do something about what is happening to this planet and our kids' right to inherit a decent planet? Second, don't you feel a bit worried about the onrush of real science showing that that impact is going to change radically for the worse the lives of everybody on this planet, including all our kids and grandkids? Doesn't that really figure enough for us to be

taking drastic action? If it does, what is the alternative to the protocol and the follow-on from it which this committee is considering?

**CHAIR**—There are a lot of questions there. Who would like to lead off?

**Mr Hooke**—Given that I got caught in the crossfire on equity and nondiscrimination, if my colleagues are comfortable with that I will kick off.

**CHAIR**—You can all contribute, of course.

**Mr Hooke**—Let me address your question, Senator, with almost as much passion. Firstly, every speaker here today prefaced their comments by saying that there is no contention among us about the application of the precautionary principle with respect to the anthropogenic influences of greenhouse gas generated emissions on the climate. That is the first point. Secondly, I take exception to the accusation that we are bereft of any global alternative; it is quite the contrary. Let me put the question back to you and you might like to answer after I finish talking. Don't you worry about proposing a global solution that in fact will fail and that you will provide some salvation to people that Kyoto will do something meaningful, will take the drastic action that you exhort us to come to the table to with you, which we concur, and that in a few years time people, looking over their shoulders, will say, 'Boy, we were sold a pup,' and that there was some salvation in the Kyoto protocol that could not be realised and was not manifest?

Our submission talks about the fact that there is and there needs to be an exhortation to our key policy leaders to get focused on really developing a proper global solution rather than giving some testament to something we know as an international treaty is a failure and will be a failure. The Montreal protocol on ozone depletion is one that actually worked and is one that a whole stack of people signed up to. Many people talk about the WTO, the World Trade Organisation, and like to paint it as being something that has problems. But it is a global treaty. There are 146 or 148 countries that have ticked off on a rules based system. So there are means by which global treaties can be effective. That is my first point. Let us stop the myth of something that ain't going to work and give people false comfort and concentrate our efforts on developing something that can.

**Senator BROWN**—What is that something, Mr Hooke?

**Mr Hooke**—An international treaty. I used the Montreal protocol as an example—

**Senator BROWN**—No, we are talking about global warming here, and the question to you is the one I put and I want you to answer this question: what is the alternative to the Kyoto protocol? Spell it out.

**Mr Hooke**—Another international protocol.

**Senator BROWN**—Which does what?

**Mr Hooke**—Which brings developing countries to the table—

**Senator BROWN**—They are at the table.

**Mr Hooke**—Against the principles that we have outlined, it needs to be comprehensive. I will come to the second point I wanted to make about nondiscrimination and equity. We put that within the context of the economic application—that is, nondiscrimination between

particular projects and locations and not disadvantaging early movers, those who have already got ahead of the game and are going to be penalised or could be penalised if you did not take account of early movers. The second thing was that we did not want there to be size or ownership discrimination, and we wanted it to be trade and investment neutral.

**Senator BROWN**—That is what you do not want. What do you want? We want to hear what you have as an alternative.

**Mr Hooke**—I have already told you that.

**Senator BROWN**—No, you have not.

**Mr Hooke**—With respect, I have said—

**Senator BROWN**—Let us have the alternative, in specific terms, that you would put up to the Kyoto protocol, rather than just a list of the shortcomings of the protocol.

**Mr Hooke**—What I said, with respect, was that we would exhort our parliamentary leaders to go to the international table and seek to establish a truly international protocol.

**Senator BROWN**—Which does what?

**Mr Hooke**—That is the first point.

**Senator BROWN**—Spell it out.

**Mr Hooke**—What do you mean by 'Which does what?'—which reaches an agreement on emissions reductions—

**Senator BROWN**—You do not have one. That is the problem. You do not have an alternative to put to this committee.

**Mr Hooke**—That is not right. I contest that.

**Senator BROWN**—Well, spell it out.

**Mr Hooke**—I have spelt it out. I have spelt out the fact that you need to come to—

**Senator BROWN**—You just do not have one. That is the truth.

**CHAIR**—You mentioned the Montreal protocol.

**Mr Hooke**—I did.

**Senator BROWN**—But we are talking here about global warming and we are talking about a solution for a much more complex problem than that, and a whole range of other international treaties. You have said that you worry about putting this forward and it failing. If we worried about failure in innovation in world affairs, we would never get anywhere. What I am saying is that you have not given and cannot give to this committee an alternative to the Kyoto process. That is what we have to look for if we say no to that.

**Mr Hooke**—Senator Brown, did you read the set of principles that we spelt out in an attachment to our submission?

**Senator BROWN**—I am looking for a treaty which says—

**Mr Hooke**—Hang on, are we going to have a two-way discussion here? You asked me a question and I asked you a question back.

**Senator BROWN**—I have read the principles and they do not satisfy the question I am asking.

**Mr Hooke**—They do, because those principles—

**Senator BROWN**—We are looking for an alternative, and you do not have one, do you?

**Mr Hooke**—We do actually. Those principles—

**CHAIR**—Senator Brown, let us take it easy. There are other witnesses here who may wish to contribute. You made a general statement. Do any of the other witnesses wish to make a comment?

**Ms Curtis**—With the Kyoto protocol as an instrument under the United Nations framework convention, our organisation would be really keen to see if developing nations could also have binding targets. I am not suggesting that immediately but some process put in place. That is why we want to see the Australian government continue dialogue under the United Nations umbrella, to try and look to the future. That will have some more balance with it.

**Senator BROWN**—Would you be happy if that solution—to use Mr Hooke's terms—of equity and nondiscrimination came to a global arrangement where per capita emissions were the same for each person and each nation according to their populations around the world?

**Ms Curtis**—I am always uncomfortable because I am always struck by China and India with their huge populations. It is a disadvantage when you start to do some mathematics and you compare them to a smaller nation like Australia. I do not say for one moment that one Australian is worth more than one Indian or one person from China in any way, but I think we have to be very careful when we are using emissions and population interchangeably as somehow a contribution to the problem of global greenhouse gases. I do not like it being reduced to just per capita. I think it is a misuse of figures in some way.

**Senator BROWN**—But per capita fairness is what equity is about, isn't it?

**Ms Curtis**—I think equity is about everyone addressing the issue and addressing the problem.

**Senator BROWN**—In the same way.

**Ms Curtis**—But it does not come down to one person.

**Senator BROWN**—Equity is one person, one value, isn't it?

**Mr Knapp**—Senator Brown, I would refer you to the UNFCCC, where it talks about 'common but nationally differentiated responsibilities and respective capacities'. Let me give you just a very simple example, because we do not have two weeks to debate this.

**Senator BROWN**—Unfortunately.

**Mr Knapp**—We could spend two weeks debating it. Let us compare a country that is dominated by hydroelectric opportunities with a country that is dominated by fossil fuel opportunities. A mix of developed and developing countries—for example, China, India, Australia and South Africa—all rely on fossil fuels. If you at look at another set of countries that rely on hydroelectricity, there is a very different greenhouse impact. That is why the

UNFCCC itself identified the need for differentiated capacities. I dismiss, categorically, the suggestion of per capita emissions. That is a classic example of why that is the case.

I have a farm on the floodplain of the Shoalhaven River. I have about three feet of dry land, if you want to put it into that context. If I get flooded I will be one of the first people to recognise that ocean levels have risen by three feet, because I will be under water. So let me assure you that we are just as concerned and passionate as you, but we also temper that with the fact that the Kyoto protocol itself does not include a mechanism to reduce emissions. All it does is put a target on some countries to say 'stop'.

**Senator BROWN**—So my question to you though—

**Mr Knapp**—Mr Chairman, I want to answer this.

**Senator BROWN**—is to say: what is the alternative to the Kyoto protocol?

**CHAIR**—Mr Knapp has not finished his comments, so we will let him finish what he wants to say.

**Mr Knapp**—There is no mechanism inside the Kyoto protocol to reduce emissions, there are only pressure points. The protocol shifts emissions from one country to another; it does not include a mechanism to reduce emissions.

**Senator BROWN**—Do you think it should?

**Mr Knapp**—It doesn't.

**Senator BROWN**—Do think it should?

**Mr Knapp**—That is why we need an alternative mechanism, an alternative treaty, which focuses on technology solutions that are actually going to deliver major change. Kyoto does not deliver. Kyoto does not give you a solution. You presented it to Mr Hooke before that it included—

**Senator BROWN**—And he was unable to answer me. Now I am going to question you as to what your alternative is, Mr Knapp?

**Senator TCHEN**—Let the witness answer, Senator Brown. You asked the question.

**Senator BROWN**—You are not in the chair.

**Mr Knapp**—You presented the Kyoto protocol as including a solution. It does not include a solution. I would like you to go back to that point. Do you accept that Kyoto has not got a solution embedded in it? My contention to you, contrary to the view that you put and that Mr Hooke responded to, is that there is not a solution embedded in the Kyoto protocol. Can we discuss that point?

**Senator BROWN**—I will put the question to you again, because it is very important for you to recognise—and I know that the aluminium industry is the most polluting in terms of—

**Mr Knapp**—I take offence to that.

**Senator BROWN**—You can. It is the most polluting of the metallurgic industries in terms of emissions. For example, it uses more than 10 per cent of the electricity in Australia, and most of that is coming out of coal fired power stations. The Kyoto protocol does have a mechanism for ensuring that countries do find means of reducing their contribution to global

warming, it is incumbent on them. The protocol does not say exactly how they are going to do that, but the agreement is there to reduce emissions to meet targets. My question is: what is the alternative to the Kyoto protocol in addressing this global emergency that global warming presents to us and the next generation? What is your alternative? Spell it out if you will.

**Mr Knapp**—I will go back one step to the point about the most polluting industry. I object to that—

**Senator BROWN**—You may.

**Mr Knapp**—I would like to see the process by which you come to that conclusion. It is a very emotive statement. I do not believe that you have evidence or anything to suggest that that is the case, I would be happy to see it.

**Senator BROWN**—I stand by it, but the question to you—

**CHAIR**—We can register Mr Knapp's objection to your comment.

**Mr Knapp**—I would point out that the aluminium industry has a very active and passionate interest in reducing its emissions. We have reduced our emissions significantly. You might be aware that our PFC emissions are approximately 70 per cent lower now than they were in 1990. We are working to continue that process. We have shifted our direct emissions—those emissions inside our plants—from comprising 24 per cent of total emissions in 1990 to only 15 per cent of total emissions. The other emissions are coming through embedded energy through the transmission of electricity into our plants. We have shifted dramatically.

The answer still comes back: Kyoto does not include the solution. We are not starting from a point where we are rejecting a solution; we are starting from a point where we still do not have a solution. The solution is going to require the engagement of the major emitters globally and the solution is going to require changes in technology. Changes in technology are not going to occur overnight. We can achieve some enhanced improvements technologically by greater distribution of that technology on a global basis, but that is not necessarily going to take us to the point where we perhaps need to be in 2050 or further towards the end of the century where we are going to actually need very substantial reductions in overall global greenhouse gas emissions. We accept that.

For example, we are talking about and working on different things for use in aluminium smelters. We are talking about and looking at carbothermic smelting rather than the existing electrolysis processes. None of these things occurs overnight and companies are very anxious to deliver and change. We have a number of major aluminium companies around the world that have signed up. They have volunteered their own personal targets to achieve reductions in greenhouse gas emissions. We recognise those issues. But we do not have the total solution on a technological base at this point. We do have a number of solutions technologically. But the cost to the global community is too great at this point in time. We can get to a point perhaps where we could have almost zero emissions, but the price would be something that I do not believe you could justify and go out and sell to the community.

**Senator BROWN**—We are looking at cost estimates of trillions of dollars per annum from global warming in our children's lifetime. The question I wanted to ask any witness, because we have not had an answer to it, is: what is the alternative to the Kyoto process which now

gets us into dealing with this menace of global warming—which is not in the future but is with us now and is going to get manifestly worse if we do not deal with it?

**Mr Acton**—We certainly have made it very clear that we are concerned about climate issues and climate change issues. It is a major issue for agriculture, as it is for all other industry groups and people in the community. We certainly would not support a per capita approach to this. In our view, it would discriminate against this country and internally in this country it would discriminate against agriculture. That is a good enough reason for us at the moment. But we are trying to be proactive.

As I said, we led the discussion and chaired the group that responded to the Commonwealth government on behalf of the Agriculture and Land Management Working Group. We believe that there is a necessity for a lot more work to be done, particularly in terms of the impact on agriculture. If you look at agriculture and forestry, which work together in this working group, there is more information and there has been more work done and there is more data available for the forestry sector than there is for the general agriculture sector. But in general there is certainly a need to do a lot more work.

If I can change my hat for just a moment—I am also president of AgForce in Queensland—we have recently had the Greenhouse Office up in Queensland and out in the paddock trying to determine some of the issues that need to be addressed at a property level—a farm level—or even at a regional level. Major issues in terms of elements of agricultural management, land management generally and vegetation are completely left out of the Kyoto protocol. We believe the Kyoto protocol is a blunt instrument. It is very proscriptive and it is about targets; it is not about anything else. If we are going to address the issues that are concerning Senator Brown and the rest of us about climate change, we have to put our emphasis on, for instance, the management of thickening, which the Greenhouse Office, after they came and looked at some of the situations in Queensland, were very concerned about in terms of emissions and the agricultural and economic issues. There are also things like the decay rates; there is no answer to that. They take an average from Darwin to Dubbo. You cannot get those sorts of answers at a regional scale. We are much more focused—a lot of money has gone into research in the livestock industries to try to come up with commercially viable control of methane emissions. But, until we get that, those industries have a choice: either they continue to operate, or they shut down. We have to address it from that point of view—from our perspective.

**CHAIR**—Thank you. Mr Waller, would you like to make any comments in response to Senator Brown?

**Mr Waller**—Yes. Woodside certainly supports the reduction of greenhouse gas emissions. We realise, keep abreast of and understand the science that underpins the global concern about this. We are concerned about it enough to have spent, probably since 1999, many millions of dollars in order to make sure that our own emissions intensity is on a downward trend. So in common with every other organisation at this table, I think it would be very difficult to say that we are not concerned about this and not doing our utmost to turn the train around.

We support global frameworks where they result in real emission reductions; we support them where they are fully inclusive of all emitters, including those in developing countries. We support frameworks that are able to take into account a country's particular circumstances.

We very much agree with Mr Knapp's views that Kyoto, with its very low level of environmental effectiveness—less than one per cent has been quoted; it is one of the figures but it is generally in the ballpark—is really a nonsolution to the amount by which it has been suggested emissions need to be reduced. Therefore we are wasting quite a considerable amount of energy here in Australia worrying about how we are going to ratify or not ratify something that is not going to do any good in reducing greenhouse gas emissions or stopping climate change. What we really need to be doing is focusing on the issue at hand, which is: how do we give Australia—our bailiwick, our own backyard—a workable, comprehensive, transparent, cost-effective and long-term framework for global climate change? Ratifying Kyoto is not going to do it. What is going to do it is the engagement of all parties in Australia in a sensible dialogue on how we go about something that is important to us all.

**Senator BROWN**—You are asking a series of questions on how we go about getting an alternative. My question to you is: what is the alternative? This committee has to determine that many other countries like Canada, New Zealand, the European countries and Japan have signed the Kyoto protocol and they have not lost business, they have not had people go offshore. They have signed up to Kyoto as a commitment to the future of the planet.

The great minds in those countries believe that this is the one track that is working, and of course it has a long way to go. But you come here and say, 'No, we should not do that,' even though a lot of questions have been asked about what else we should be doing, and you do not have an alternative and there is none on the global horizon. Frankly, that is not going to, and should not, win across people to an alternative viewpoint. You do not have one. There is not an alternative there. That is the problem. Global warming is upon us and our kids. It is upon this whole planet.

**Senator LUNDY**—My first question—and it will really help if you can just give me a yes or no answer to this—is that, without the protocol's one per cent reduction in emissions, the emissions are projected to increase dramatically—that is, by 30 per cent without the protocol in place —so the protocol will reduce emissions compared to 1990 levels. Do you agree or disagree with this?

**Mr Hooke**—No. Those are the projections.

**Senator LUNDY**—Do you agree?

**Mr Hooke**—No. I said those are the projections.

**Senator LUNDY**—Does everyone agree with that?

**Mr Knapp**—I am sorry. I want to clarify the question. Are you suggesting that emissions are going to fall below 1990 levels by one per cent?

**Senator LUNDY**—Without the one per cent reduction in emissions, they are projected to increase dramatically. So the protocol will reduce emissions compared to 1990 levels.

**Mr Knapp**—No.

**Senator LUNDY**—You do not agree?

**Mr Knapp**—The protocol will not reduce global emissions below 1990 levels.

**Senator LUNDY**—You do not agree with that. Does anyone else?

**Ms Curtis**—I think Mr Knapp is right. It is highly unlikely that those Kyoto protocol targets will be met by all those countries. Most of those who have ratified it see it as a target.

**Senator LUNDY**—But don't the current reports say that those targets will be met?

**Ms Curtis**—No, they do not.

**Senator LUNDY**—We will just go back to Mr Hooke. Why did you say you agreed?

**Mr Hooke**—I did not say I agreed.

**Senator LUNDY**—I am sorry, I thought you did.

**Mr Hooke**—No, I did not. I said those were the projections. But Mr Knapp was quite right—the protocol is not going to do that. The projections are that if the protocol came into force and if those flexibility mechanisms worked—all those ifs—then the prospective reduction in emissions would be a one per cent effect on the growth of global emissions.

**Senator LUNDY**—To get the point straight, that is what is anticipated with all of those ifs in place.

**Mr Hooke**—It will be a one per cent growth in global emissions reduction.

**Senator LUNDY**—What is the comparison if it is not? What is left?

**Mr Hooke**—Are you asking me?

**CHAIR**—Do you mean what are individual countries doing regardless of the treaty?

**Senator LUNDY**—No. I am trying to clarify a really significant point, which is: with the protocol in place and with all the ifs that you talk about, including the prospect of Australia signing the protocol, it will actually achieve something—and all the evidence and projected data says that. But what we have heard today is a list of reasons why the protocol is not suitable and a series of adjectives of the sort of agreement you are all looking for—equity, non-discriminatory argument, internationalist, comprehensive, certainty, cost-effectiveness, market based measures, workable, transparent, sensible and regionally focused. There are all of these conditions. But, like Senator Brown, I want to try and pin down what some of those adjectives actually mean in what you think is a viable alternative to getting an outcome. What I hear is that you are all very supportive of the fact that we have to address climate change, but there seems to be a complete disconnect, based on the submissions I have read and what I have heard, between expressing that sentiment and a willingness to engage in a whole raft of incentives to which these adjectives apply—but for some inconceivable reason that does not link across to the Kyoto protocol and signing the Kyoto protocol.

Perhaps I could just go to specific questions to each of you, based on your evidence to date. My first question is for the Minerals Council: you talked about the Montreal protocol with respect to ozone depletion. But, following your logic of using that as an example, what you really see as the key factor in the failings of the Kyoto protocol is the lack of signatories; and if there were more signatories to it and it was more comprehensive it would fundamentally satisfy your major concern. Is that a fair point?

**Mr Hooke**—No, it is not fair.

**Senator LUNDY**—What other conditions would you attach to it?

**Mr Hooke**—That there be a potential for all emitters to become signatories. At the moment there is not.

**Senator LUNDY**—I know. But, if everyone did become a signatory to it, would you have a problem with Australia being there as well?

**Mr Hooke**—Not if there were a global solution that covered emitters and that approximated the Montreal protocol—where all players came to the table. It is a shame that Senator Brown has left the room; his concentration on per capita, on Australia and on developed economies will only serve to export emissions to countries that are not constrained and limited by the target disciplines of the Kyoto protocol. I can see where your line of questioning is going, but the bottom line is: do you tick off on an international treaty, as Mr Knapp has very articulately said is not a solution, and does not even purport to be a solution? It is not a question of us rejecting a solution; it is a question of us saying we ought to have a solution. If you are going to have a solution to a global problem, it has to be a global solution. Going back to your question, 'Should Australia be a signatory to a global solution that conforms to all the criteria that we think ought to characterise a global solution?'—which I was trying to get to with Senator Brown but, quite frankly, was so rudely interrupted that I could not get there—we do not want to see a partial ineffective solution which, again, as my colleague Mr Knapp said so eloquently, will serve to have perverse effects. I have not had an answer to my question, which is—

**Senator LUNDY**—Chair, I do not have time for this. Can we just get people to answer the question?

**CHAIR**—No. Mr Hooke is making his point, so let him finish.

**Senator LUNDY**—I have questions for everybody.

**CHAIR**—All right. Mr Hooke is going to make his point.

**Mr Hooke**—All I was going to ask was whether Senator Brown, or anybody else for that matter, can live with the consequences of the perverse effects of the myth of signing on to a treaty that is not going to be effective.

**Senator LUNDY**—Going back to my original point, if everybody—all countries—were signatories, would that satisfy your test or not?

**Mr Hooke**—That depends on what they were signing up to.

**Senator LUNDY**—I am asking you the question in the context of the current agreement, the current protocol.

**Mr Hooke**—Then, no, because the current protocol is ineffective. It fundamentally fails. That is only one aspect. The other aspect is that it does not have the sorts of things it ought to have, which we have outlined in our submission—in other words, the fundamental criteria that we would see as an effective global solution.

**CHAIR**—Does anybody else wish to make a comment?

**Mr Knapp**—Could I just offer two points of clarification to Senator Lundy. Firstly, at the bottom of page 248 of the submissions there is a graph of global emissions from 1990 to 2020 that shows the very enormous growth in global emissions over that period—under

'projections'. That might help clarify some of the misunderstanding from before. Global emissions are going to grow. The Kyoto protocol, if it is ratified, if it enters into force, will have the effect of reducing that growth by one per cent; it is not going to change global emissions.

The other point that I want to clarify is your comment about signatories. Almost everybody is a signatory to the Kyoto protocol ratification. There are over 100 signatories—I forget what the most recent number is. The issue is not whether countries have ratified; it is whether they actually have any obligation, commitment or target under that process. Again, on page 248, you will find that the bulk of global emissions are not covered by the Kyoto protocol. That is the issue; it is not the number of signatories.

**Senator LUNDY**—But the point is that the next round will pick up those countries that do not currently have obligations.

**Mr Knapp**—I am sorry, Senator. The issue has been stated very categorically by those exact countries at COP8 and at COP9—that is, that they do not intend to take on commitments under the Kyoto protocol.

**Mr Potter**—Or its successors.

**Senator LUNDY**—I think that is part of the global challenge. I think the point here is that, in the presentations I heard at the start, there seemed to be a litany of reasons and conditions that the industry is prepared to set in place as to why Kyoto is unsuitable. Yet, clearly—and based on evidence we heard at this committee this morning—the Kyoto protocol and Australia's participation in it offer the best and most comprehensively agreed pathway forward. The prospect of having an alternative model, as Mr Hooke outlines, is just not realistic; it is rather a straw man in the debate about how to progress the issue.

**CHAIR**—With respect, I think that was the opinion of those witnesses.

**Senator LUNDY**—Sure.

**CHAIR**—These witnesses have a different point of view.

**Mr Knapp**—And, if I may, I would say that that is a flawed pathway and it is not going to achieve the outcome desired. Putting it in the context of Australia—and, again, hopefully Senator Brown will have the opportunity to read *Hansard*—we have in fact a situation where the Australian government is working towards achieving its international obligations: the famous 108. Ratification is not going to deliver anything more, in that sense. I think all the industries here have demonstrated and identified a commitment to reducing emissions. We recognise the issues; we are reducing emissions, but why do you wish to destroy Australia's international competitiveness for no additional gain?

**Senator LUNDY**—Can any of you tell me whether there are any specific companies which have identified themselves either as being vulnerable or as making a decision to move offshore if indeed Australia were going to sign the Kyoto protocol? Is it that dire? The sentiment that there is a competitive threat to Australia and that that would be untenable and an undesirable outcome has been strongly expressed in your submissions, but where is the tangible evidence of that threat from your member companies?

**CHAIR**—I think perhaps you could comment on that in terms of having signed on and the impact of that.

**Ms Curtis**—Put very simply, if Australian businesses were competing for a contract within another country against a business from a country that did not have a binding target under the Kyoto protocol and therefore did not have a cost of carbon built into the product that it was selling, it is likely that those Australian businesses would not be as competitive and might not win those contracts.

**Senator LUNDY**—I understand the theory. Can you name any companies which have articulated the view that they would leave our shores if we became a signatory?

**Ms Curtis**—I do not have a specific one.

**Mr Knapp**—We do not have companies that are going to suggest those types of outcomes; they are decisions by boards. The real question is—

**Senator LUNDY**—No-one can give me a company name?

**Mr Knapp**—Just a second—the real issue is that you are not going to see new investment coming to this country. In the aluminium industry we are talking about companies that are globally oriented, and they have a choice of putting their next smelter in Australia, South Africa, Brazil, Canada or Iceland, and their competitors are also going into other countries, such as those in the Middle East or China. It is not a case of seeing somebody leaving your shores tomorrow—they are locked in; they have a plant here. You do not close a $3 billion aluminium plant and walk away; you run that plant until the end of its life—

**Senator LUNDY**—So it is about people coming here.

**Mr Knapp**—and the end of its life may come sooner through economics.

**Senator LUNDY**—Perhaps you could tell me whether there have been any significant new investments recently in the aluminium industry.

**Mr Knapp**—There are no greenfield smelters or new potlines in Australia. Companies do not tell us their decision processes or their decisions; in fact we read about them in the press. But we have noticed in recent times that a number of companies have announced new smelters in Brazil, Canada and South Africa but not in Australia.

**Senator LUNDY**—Why do you think that is?

**Mr Knapp**—It is a combination of factors—it will not be one factor—and, indeed, it will be a combination of options.

**Senator LUNDY**—What are the factors?

**Mr Knapp**—There will be a range: the social issues—

**Senator LUNDY**—Like what?

**Mr Knapp**—The relative stability of one country versus another, the access—

**Senator LUNDY**—So we are less stable than Brazil—is that what you are saying?

**Mr Knapp**—No, but when you combine a whole series of points, including perhaps the cost—

**Senator LUNDY**—But social stability would surely be a positive for Australia.

**Mr Knapp**—Yes, it has been but it may not always be.

**Senator LUNDY**—What are the negative points for Australia?

**Mr Knapp**—The cost of energy because, in Australia, you may have to factor in an unknown greenhouse cost attached to a potential Kyoto protocol ratification.

**Senator LUNDY**—But we have already set the targets, despite Kyoto. One of the government's key points is that we have set our own targets. Is that not certain enough for your sector?

**Mr Knapp**—That is certain enough for a period of five years. We are talking about an investment for 40 years.

**Senator LUNDY**—So you are saying that these investment decisions have been made even when we have not signed the Kyoto protocol?

**Mr Knapp**—No, I am identifying a range of factors and there are costs attached to that. Take New South Wales, for example: there is already a cost penalty on energy. That is a clear example where people can factor that in.

**Senator LUNDY**—So where was the most recent aluminium industry facility built in Australia?

**Mr Knapp**—There are a number of brownfield expansions: in Tomago, New South Wales—that was before the government put on that additional cost, and nobody has committed to further developments there, in terms of new potlines or new smelters—in Queensland, and in Portland, Victoria.

**Senator LUNDY**—You said that there are a litany of factors—social issues was one of them, but I think we have agreed that that probably works for us and not against us. What are the other factors?

**Mr Knapp**—When you take an investment decision, it is going to include access to raw materials and access to major inputs. For aluminium, energy is the dominant, single most important input.

**Mr Hooke**—The other point to add to that is that investment decisions in our industry are taken over a very long time frame. It is not unusual to look at a 10- to 30-year time frame. Investment decisions, as Mr Knapp was saying, are made on the basis of a composite of a number of factors, and they rarely boil down to projections of the likely productivity or the access to markets. Productivity includes the relationship between inputs and outputs, so they will take into account the costs: what the socioeconomic business environment is likely to be in Australia versus what it is elsewhere.

It needs to be clearly underscored that this is very much a global industry. While smelters and refineries, and even mines for that matter, are sedentary kinds of investments you can close them down pretty smartly and move elsewhere to other mines. When whoever was handing out natural geological wealth, they did not just pick on Australia. There are vast economic demonstrated resources for our mineral products right around the globe. Even one of our great burgeoning markets, China, has huge economic demonstrated resources that will

come clearly into stark contrast with us as there is converging global supply chains—and increasingly profoundly so.

Our companies will make decisions as to where to strategically locate their mining production and product-producing investments and activities. Sometimes, sitting around a board table, it can simply be the sentiment. When we were considering the R&D tax concessions in this country and we were cut from 150 to 125 per cent, that had a profound impact at board tables about where those global companies were going to be investing. It was not the cost issue; it was a question of whether Australia was fair dinkum about R&D.

**Senator LUNDY**—I am interested in any investigation you have done into the cost analysis for signing on to the Kyoto protocol or the alternative. Can any of you nominate studies that assess the cost to your respective industries of not signing on and not proceeding down this path?

**Mr Potter**—You can refer to the government's own modelling of it—

**Senator LUNDY**—That does not necessarily support the case.

**Mr Potter**—My understanding is that the government's modelling does indicate that it will have a negative effect on Australia's GDP.

**Senator LUNDY**—I think you will find that some of the government's modelling released early in the year showed that not signing—

**Mr Hooke**—Are you asking us about the modelling of not signing?

**Senator LUNDY**—That is right. Not signing has a negative effect on GDP. Have any of you made an investment in assessing, for your own interests, the cost to you and, particularly, the agricultural sector of not signing, given the challenges to them of climate change and the impact of that. We did hear some interesting evidence this morning about impacts on the health sector and on sectors far more diverse than your own immediate sectors, but what we heard was that there are very few of those studies actually done. I am trying to be comprehensive to see if you can nominate any at all. If you cannot, then how strong is your claim that your analysis of costs shows almost consistently that they are too high? You have not got the alternative costs to offset against what you say the costs of compliance and signing up will be.

**Mr Knapp**—The situation in the next 12 months is that we will be downgrading the growth expectations for aluminium smelting in this country.

**Senator LUNDY**—Is that is a cost of not signing? We are not signing at the moment.

**Mr Knapp**—That is reflective of issues such as, for example, New South Wales costs coming into the system.

**Senator LUNDY**—Is it a cost reflecting that the government has made a commitment to achieving a reduction in greenhouse emissions? Is that nominated in your study?

**Mr Knapp**—No, not at this stage. It is unlikely that anybody is going to provide us with an issue that they can say, 'That is the specific; that is it.'

**Senator LUNDY**—Okay, but please bear with me. My point is that, given that the government has made a commitment anyway and that signing Kyoto will not change that, what is the difference?

**Mr Knapp**—It creates incredible investor uncertainty going forward when you have unknown second commitment period goals—

**Senator LUNDY**—Bear with me—

**CHAIR**—Let Mr Knapp answer.

**Mr Knapp**—You have unknown second commitment period goals. When you have a choice of places where you are going to put that next potline or next smelter, do you go somewhere where there is that investment uncertainty or do you go somewhere where you are able to sign contracts that will not have that clause in them?

**Senator LUNDY**—So you think having a program for the next round of the Kyoto protocol is less certain than having no plan at all.

**Mr Knapp**—I am sorry, I just do not follow the question.

**Senator LUNDY**—On the issue of certainty, you said signing—

**Mr Knapp**—Ratifying?

**Senator LUNDY**—Ratifying the protocol creates more uncertainty in terms of the future program of managing greenhouse emissions than not signing does, even though there is no alternative proposition on the table.

**Mr Knapp**—In terms of the issues facing investment in Australia, to ratify you are then an unknown quantity in commitment periods beyond 2012, which tends to increase the investor uncertainty. I would go back to the point that Senator Brown made, basically a throwaway line, that Canada, New Zealand, the EU and Japan have not lost business by signing the Kyoto protocol, but that is subjective. We do not know whether that is true. The other point is that the Kyoto protocol has not come into force and the impacts will not start to come into play until 2008, when we are already getting responses back from industry in Europe that are concerned about the national division of greenhouse emissions.

**Mr Hooke**—I understand the line of questioning here, and that is the cost of not signing on. The question is, have we looked at the opportunity costs? To go down that path we would have to make three fundamental leaps of faith. The first is that Kyoto can in fact be effective, and for all the reasons we have been through here we have made the conclusion that it will not. The second is that we can achieve a better global solution, and we have not given up on that. The third is that it presumes that industry is not doing something now and that ratifying would in fact cause industry to do something more. The fourth point, which I thought my colleague Ron Knapp made very well in his opening remarks, is that if you do ratify you are then bound to a whole stack of legal commitments over which you have very little say and very little determination, without any understanding of what the second commitment pathways are going to be. The point we keep making is that there is absolutely no basis to be confident that it will include the major emitters, China and India, who have had the most growth in emissions.

**Senator LUNDY**—Can I just finish my questions on that point and go back to the ACCI—

**CHAIR**—We have to move on, Senator, because we are a long time over your time. You must be very quick.

**Senator LUNDY**—This is a specific question about a comment made I think in the ACCI submission about this concern you have about a hodgepodge of state regulations developing effectively in the absence of some strong federal leadership and ratification of the Kyoto protocol. You also mentioned earlier the US as being probably a pretty good indicator of what would start to constitute critical mass. So is it your organisation's view that, were the US to sign, that would clear the way in policy terms for your organisation to move ahead? I am sorry, I am using 'sign' interchanged with 'ratify'. I do mean ratify. Do you think that having that strong federal focus on that issue would start to solve your issues and problems with states leaping ahead and doing their own thing in an inconsistent manner?

**Ms Curtis**—Firstly, in relation to the question of states going in an ad hoc fashion, as a general policy principle we see that for a national issue—and obviously climate change is one—any state based mechanism to deal with it is not in the national interest, because a lot of businesses do operate across state borders; they do not operate just within a state. So it is an extra cost burden for them, and there are inconsistencies. So we think it should be a national strategy. We look forward to the government releasing its forward climate change strategy in the near future. We want to see that coming out.

Secondly, if the US were to ratify the Kyoto protocol, that certainly would be a strong signal for the rest of the world to look very carefully at it. Obviously I cannot commit at this point in time to say that ACCI would definitely change its policy. But it certainly would be a good step in the right direction.

**Senator LUNDY**—I should say, Chair, that my terminology in using the word 'sign' when I should have been using 'ratify' is my mistake.

**CHAIR**—In terms of what you were asking about modelling scenarios, it has been pointed out to me by the secretary that the New South Wales government submission includes a reference to the report of the Kyoto Protocol Ratification Advisory Group, which on page 16 goes through some modelling scenarios. This was a document prepared on behalf of the New South Wales, Victorian and South Australia governments. You might care to look at that. Does that conclude your questions?

**Senator LUNDY**—I think you have told me it does. I could go on for hours.

**CHAIR**—It is just that we have time constraints.

**Senator LUNDY**—I understand.

**CHAIR**—We will go to the coalition.

**Senator SANTORO**—I am going to pursue a different line of questioning from that of the other senators. I want to put into context what I am trying to do. This committee is meant to report to the parliament about the desirability or otherwise of ratifying Kyoto. That is the mission of this committee. If I believed some of the evidence—let alone all of it—that has been presented here by other witnesses, including some of the line of questioning that has gone on in this particular segment, I would walk away believing that the people sitting in front of me are representatives of sectors of Australian society and the economy who are the

ultimate environmental vandals. On that basis, I would probably have to say that perhaps Kyoto, on balance, is worth all the risks that are involved in it. But I do not believe that. So I want to take a line of questioning that asks your opinion and seeks your advice on your evidence from a local, global and industry perspective.

I will give you a bit of advance warning. I would like all of you to inform this committee and, through this committee, the parliament—at least the Senate—by outlining what your industries are doing in terms of reducing emissions. What are your industries currently doing? Let us take the submission from the Minerals Council, which has been heavily criticised during the session. When I studied the submission, I had a look at what you are doing with your cooperative research centres, your COAL21 program, the Carbon Sequestration Leadership Forum, the International Partnership for the Hydrogen Economy and the climate action partnerships. It seems to me that industry, for which you are all representatives, is doing an enormous amount already at a local industry specific level. I will put a couple of other questions to you that seek to draw you out a little on evidence, but for the sake of balance—because I think we need to try to achieve a balanced outcome from the perspective of both this committee and the Senate—I would invite you to make additional submissions after the hearings today if necessary so that people like me can speak very specifically and seek to answer some of the questions that have been raised by Senators Lundy and Brown. I should add that I am quite impressed already with some of the material that is contained in your current submissions.

Obviously, you would appreciate that the Australian government is already very actively engaged in international forums and with major strategic and trade partners to address the other serious issue of climate change. In October last year, for example, Australia and China signed a far-reaching joint declaration on bilateral cooperation on climate change. This involves very practical measures that can be taken to limit the effect of global warming and is particularly important given that China has the status of being a major atmospheric polluter. I would like to ask you: what is your opinion? Are you basically in agreement with me that maybe bilateral agreements are effective in dealing with the issues that we are addressing here today?

**Ms Curtis**—ACCI have been talking to the Australian Greenhouse Office about how we can help bring to the attention of business the six bilateral climate action partnerships that the government has in place. We think that potentially Australian business and businesses from those other six countries may be able to find some solutions that result in decreased greenhouse gas emissions, so we very much support the idea of business being involved in those action plans.

**Senator SANTORO**—But in terms of bilateral agreements, do you think that they are a more practical way of achieving practical solutions?

**Ms Curtis**—In the absence of being able to achieve a global solution, the bilateral agreement is a good idea, just as we have found with trade agreements—that is why we are doing Singapore, Thailand and the US.

**Senator SANTORO**—Particularly when Australia, currently enjoying a very close political and economic relationship with China, is able to have considerable influence on what

is ostensibly one of the greatest polluter nations in the world. Would you agree that that is a very—

**Ms Curtis**—It could only be a positive outcome, if there was—

**Senator SANTORO**—I am not trying to put words in your mouth.

**Ms Curtis**—No, I agree. It would be a positive outcome.

**CHAIR**—Mr Waller, would you like to comment on that?

**Mr Waller**—Yes. Speaking perhaps as a single company representative—and maybe the only one at the table—I would just echo what Ms Curtis has said. We would definitely support bilateral communication, exchanges and technology swaps—that sort of thing—between countries. We have already seen evidence of this in the fields of carbon capture and geosequestration—that is, the putting of carbon dioxide emissions underground for long-term storage—where there is a considerable momentum happening internationally, and Australia is very much a part of that. This is due to the large amount of international cooperation that sees this as one of the more 'hot to trot' type solutions and to the fact that we do not have the full answer here, and it is also through the good offices of the Australian government in promoting that communication. We have gaps in our knowledge, and we are able to take advantage of that communication by accessing knowledge overseas.

Geosequestration is a great thing for the Australian gas industry and also for COP. It is one of the more potentially major ways that we have of reducing our emissions in Australia. Certainly, bringing down the cost of that is absolutely essential. It is expensive at the moment. International cooperation is helping us to leverage both research and development and demonstration projects that are going on in other countries to help us to bring down that cost, and that is very important for us. So we would actively support those climate action partnerships. We would actively support all measures that are into R&D into abatement—that would help to reduce costs for abatement and make that more accessible to Australian companies.

**Senator SANTORO**—Just on the point of reducing costs, I noticed, and in fact I am impressed with, one of your suggestions—that is:

The Greenhouse Challenge program should be compulsory for larger companies with an opt-in provision for smaller companies.

Do you speak there for your industry generally?

**Mr Waller**—If I could just clarify that: that is a Woodside type position, but we refer mainly to the reporting. We think that reporting is a very good thing. Obviously, you limit the scope so that you are able to be efficient, rather than reporting every last jot, but certainly reporting across the board is something that helps the whole country. It also helps us to understand our position and to be rigorous about our inventory, and certainly most major Australian industries and industry groups are in the Greenhouse Challenge already. So that statement is more allied to reporting than anything else. We think that the more information you can get on Australian emissions, the better off you will be in the long term.

**Senator SANTORO**—Does that view have general industry support?

**Mr Waller**—I cannot speak for industry generally here at the table. I certainly think that Woodside considers that it has got a very large amount of benefit out of the Greenhouse Challenge project, and its reporting has certainly gone up the curve towards completeness. We would like to see that replicated in other companies within Australia.

**Mr Acton**—The document that was put together by the Agriculture and Land Management Working Group—*Implications of Climate Change and Greenhouse Policy for Rural and Regional Australia*—indicates that there needed to be an alignment and an integration between the natural resource management policies, land management systems and greenhouse and climate change policy. I will speak specifically about some of the sectors; I am not going to address all of the sectors. For instance, for quite a considerable number of years now the livestock sector of agriculture has been putting a lot of research dollars into trying to come up with a mechanism for controlling methane emissions from livestock and then getting that into a commercially viable form. Meat and Livestock Australia, Dairy Australia and some of the broader research bodies have certainly put considerable funds into that.

The farming sector generally, and particularly the broadacre dryland farming sector, has looked hard at—and has adopted in some states more than others—minimum till and zero till farming mechanisms and things like that. Farm forestry is obviously something that we are very much involved in and that is why we work together with the forestry sector. NFF is involved in the private farm forestry coordinating committee. I am going to that meeting next week.

Again, in this document, *Implications of Climate Change and Greenhouse Policy for Rural and Regional Australia*, we have indicated that, along with the forestry sector, we believe that there needs to be a lot more work done by the Cooperative Research Centre for Greenhouse Accounting on the national carbon accounting systems. There is a range of issues that we have outlined in that document. In our submission we mention the fact that trade reform and the move away from subsidised production in some of the countries around the world—and all those sorts of things—can contribute to reductions in greenhouse emissions. We can get you more of the detail on the livestock research programs into methane reduction.

**Senator SANTORO**—For the sake of balancing up the argument against some of the other statements that have been made here today I think industry should comprehensively—and I am not trying to give you advice; I stopped being a consultant when I came to this place—and forcefully promote those particular actions that you are undertaking which portray you as better corporate citizens than you have been portrayed in some places.

**CHAIR**—Mr Acton, you have referred several times to a document. Would you like to table that?

**Mr Potter**—We can certainly do that.

**CHAIR**—Is it the wish of the committee that the document be tabled? There being no objection, it is so ordered.

**Ms Curtis**—That is a part of a suite of documents.

**CHAIR**—By all means table the entire suite if you would like.

**Ms Curtis**—It was part of the government-business climate change dialogue last year. There were five working groups and that is only one of the reports.

**CHAIR**—We would appreciate having them.

**Ms Curtis**—I can arrange for you to receive a copy of the whole lot.

**Mr Knapp**—I wanted to respond to Senator Santoro's comments. Firstly, I will touch on Greenhouse Challenge. As an industry we fully support and endorse the comments made by Mr Steve Waller earlier. We support a stronger Greenhouse Challenge and recognise the opportunities that that can bring to reducing greenhouse gas emissions. Secondly, on the broader issue of achievements that you raised, I would like to table, in a minute, some further information on that. We would like to put very clearly the fact that the aluminium industry is focused on reducing its environment footprint, including greenhouse gas emissions. We will submit some detail that identifies the emission intensity reduction that we have achieved since 1990. We have achieved a 13 per cent reduction in emission intensity in aluminium smelters and we have achieved an 11 per cent reduction in emission intensity in alumina refineries over the same period.

The greenhouse issue is part of the broader picture of sustainable development and we look at related issues. We are focused on the opportunity for light weighting of motor vehicles and other transport systems. One kilogram of additional aluminium in a motor vehicle saves approximately 20 kilograms of $CO_2$ emissions over the life of that car—and of course, there are more savings in buses, trucks and trains. With the additional take-up of aluminium in the transport sector, the global industry is moving to a positive global greenhouse lifecycle position as a result of the light weighting outcomes. That is not happening overnight, but expectations are that, within the next 20 years, that may have been achieved.

The other issue that we are very focused on is that recycled metal takes only approximately five per cent of the energy to recreate it as new aluminium. Recycled aluminium metal already satisfies around 25 per cent of annual world demand for aluminium—and that is a growing proportion. All these issues come together and provide us with a much more positive focus for the future. I table a set of slides that provide details of those emission intensities and recycling issues.

**Senator SANTORO**—I was particularly interested in the 11 per cent and 13 per cent reduction in emission intensity that you mentioned. Assuming that we ratified Kyoto, can you make an assessment of what the practical outcome would be in further reductions in emissions? Have you extrapolated any further reductions in emissions from a ratification and implementation of stage 2?

**Mr Knapp**—No, we have not. Those emission intensity figures are continuing to reduce over time.

**Senator SANTORO**—Those figures are from 1990 to 2001?

**Mr Knapp**—From 1990 to 2002. We can identify some further changes that will come through and we see a continuation of that in the immediate future, but it will depend on the life of the plant and when the opportunity for replacement plant arises and, indeed, on how much new investment comes into Australia to bring in the next generation of technology. That is where you are going to see the largest gains.

**Mr Hooke**—Thank you very much for referring to the list of initiatives that the industry is working through for increasing thermal efficiency: improved technology in conventional coal-fired power stations for base load supply, interaction with improved integration of gas, the cogeneration issues, the demand management of energy use, alternative fuels, renewable electricity, and the whole issue of gasification and the integrated gasification combined cycle technologies.

This is all very exciting stuff. These initiatives—and the COAL21 program, which has the objective of cleaner production or, even, zero or near zero emissions—are all indicative of what many in the minerals industry consider to be a paradigm shift over the last decade or decade and a half. The industry has made a very strong commitment to improving its environmental and social stewardship responsibilities. This is not just well-meaning rhetoric, but performance and outcomes.

That is one aspect of that commitment. We have also talked about our contribution to sustainable development. Mr Knapp has talked about the concepts of sustainability and the perfectly recyclable properties of metals. Of course, how we as a country with brown coal reserves of 800 years and black coal reserves of 300 years use that inherent natural resource more efficiently and more effectively, in terms of thermal efficiency and reduced emissions, is exactly where the industry is focused, and that is the commitment to those programs you are talking about. That is part of the real solution rather than the myth of an international treaty that is really not going to add anything. The message coming through here today is about what industry is doing that is real and tangible, as distinct from some prospective judgment about the additional effects of an international treaty that is flawed.

**Senator SANTORO**—In a previous question, the suggestion was made that the insurance industry has basically agreed that global warming has contributed to some of the natural calamities or incidents that have been referred to during this cross-examination, if I can put it that way. Have any of you had indicated to you by the insurance industry that there is a direct correlation between incidents which led to insurance claims and global warming? In other words, can that statement, which has been made in this place today, be backed up by any evidence that has been presented to you when you have been undertaking your approaches to the insurance industry? Has the insurance industry put any pressure on you in any way when you have been negotiating insurance matters with them, in the context of global warming?

**Mr Acton**—From an agricultural point of view, no, definitely not.

**Senator SANTORO**—So they have not said to you, 'The reason there are more bushfires, more erosion, more flooding and natural calamities occurring at a greater frequency is global warming'? I am just interested to test, from your knowledge and experience, whether the insurance industry has in fact made that claim.

**Ms Curtis**—The Insurance Council of Australia is an ACCI member, so I can undertake to seek information from them. But to my knowledge the Insurance Council of Australia has never made that claim.

**Senator SANTORO**—I do not think so either, but it would be of assistance to the committee to confirm that one way or another. I do not mind what type of answer I get.

**Mr Potter**—In the appendix to our submission, we address a related assertion that the drought that has taken up most of the past couple of years was caused by global climate change. We say that there is no firm evidence that that has occurred—that it is possible but not certain.

**Senator SANTORO**—Chair, I have many other questions, but in the interests of time limits I will stop now.

**CHAIR**—Thank you, Senator. Ms Curtis, could you please provide the answer to that question to the secretariat by next Wednesday, because we have a tight time frame for reporting.

**Ms Curtis**—Certainly.

**CHAIR**—That concludes our session with this group of witnesses. Thank you very much for appearing. It has been a very useful session.

[3.31 p.m.]

**CARRUTHERS, Mr Ian, Senior Executive Manager, International, Land and Analysis Division, Australian Greenhouse Office**

**TERRILL, Dr Greg, Head, International and Strategies Branch, Australian Greenhouse Office**

**LANGMAN, Mr Christopher, Ambassador for the Environment, Environment Branch, Department of Foreign Affairs and Trade**

**WILSON, Mr Bruce Andrew, General Manager, Environment Branch, Energy and Environment Division, Department of Industry, Tourism and Resources**

**CHAIR**—Welcome. I will repeat a general statement which is made to departmental officers. You are advised that you will not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions to superior officers or to a minister, if you so desire. Do you wish to make an opening statement or just go to questions from the senators?

**Mr Langman**—We do not wish to make an opening statement and would be happy to take questions.

**CHAIR**—That is the usual format with government agencies.

**Senator BROWN**—I might begin by trying to see whether you can give the committee any known alternative mechanism to the Kyoto protocol that is tangible for furthering the attack on global warming that we as a global human community have to undertake.

**Mr Langman**—I will start, but certainly my colleagues might like to add to what I say—I think we have to understand that certainly some countries have decided to use the Kyoto protocol to take some initial steps to address climate change but there is an increasing view in the international debate on climate change that this approach does not represent an effective way of dealing with this very large-scale long-term and important issue. The debate internationally—and you have had much discussion on this already—has focused on, amongst other things, the critical question of how we engage major developing country emitters in action to reduce those emissions over the longer term in a way that is consistent with their economic growth. I am sure we all agree that that economic growth is an imperative; it will happen. The question is: how can we engage India and China, where most of the growth in the global emissions will take place over the next several decades, in a way that is effective from an environmental point of view? At this time I have very little sense from the international negotiations that the protocol, and its approach of binding quantitative caps on emissions, is feasible in terms of engaging those countries.

To come to your question, which was what alternative exists, I do not think there is a simple answer to that. In the same way that the Kyoto protocol is not an effective approach, there is not a simple answer to what might exist as an effective approach. But that would be, it seems to me—

**Senator BROWN**—There is a complex answer—

**Mr Langman**—Yes, there is a complex answer—

**Senator BROWN**—which is available to us.

**Mr Langman**—and it is one that is full of uncertainty and fraught with difficulty but one that we are certainly making very vigorous efforts to facilitate. I think one of the answers needs to be that we need firstly to overcome the political stalemate that exists on this issue in the formal debate in the United Nations. The nature of that stalemate is this: in the past when industrialised countries like Australia, Japan and the United States and the European Union, have talked about actions that developed countries might take to constrain greenhouse gas emissions in the long term, it has always led to a breakdown of the discussions—to walking out—or to incredibly difficult, all-night discussions that produced very little.

The truth is that at this time that is not an effective way to engage developing countries on this issue. A much better approach, I think, is to start by working with them in a careful way to understand the long-term threat that climate change poses for them and for us—for all of us, as you have said, Senator Brown, many times—so that we can find a long-term step-by-step path.

**Senator BROWN**—But Mr Langman, that is fudge. The fact is that this is an urgent problem—you know that, they know that. We do not have to educate them about that at all. They are very well aware of it. Kyoto is what we have. It is a step towards a binding agreement. It is the only option to lead the world towards a 50 to 80 per cent wind down of global emissions this century, which is the minimum requirement, as scientifically agreed around the world. You have no alternative to that. But you are telling the committee that there is an increasing view that it is not the way to go. Can you substantiate that?

**Mr Langman**—I said that informal discussions that have blossomed, let me say, over the last two years. Some we have organised with groups of countries, including key developing country emitters, in others Japan and Brazil worked together, for example, to draw together a group of key countries to talk about the long term. How can we move toward a more comprehensive approach? How can we work towards an approach in which countries like China and India build climate change into their economic development planning?

**Senator BROWN**—Which countries have told you—so that we can put this on the record—that the Kyoto protocol way is not the way to go?

**Mr Langman**—Countries do not say things like that directly. Obviously the United States is clearly on the record as saying it does not believe that it is a sustainable long-term approach. Other countries, such as China, are increasingly interested in cooperating and working with countries like Australia. In fact, one of your colleagues on the committee referred earlier to the bilateral agreement that we reached with China last year. In that—in the agreed statement announcing that cooperative arrangement—we included agreed language that says climate change is a major issue for both of us and we need to work together to deal with this. I realise it is difficult to conceive that that in itself is major progress.

**Senator BROWN**—No, it is not at all, but you said there is an increasing view that Kyoto is not the way to go. I want to know who said it.

**Mr Langman**—I did not say it was countries that were saying that. Countries are very careful—

**Senator BROWN**—Well, who said it?

**Mr Langman**—about what they say. That is a view I hear increasingly in the international debate about how to construct future cooperation and arrangements on climate change. For example, at COP9, the last ministerial meeting of the Framework Convention on Climate Change in Milan in December last year, many people noted that the discussion in the formal sessions was much less interesting than the vigorous debate in many side events such as the event—you will know the Pew Centre, for example—sponsored by the Pew Centre to discuss the longer-term future. It is in those kinds of informal discussions that we are increasingly debating how we can move forward. Some of the debate is about Kyoto, and whether you can build on Kyoto, but increasingly that is not the focus. The focus in these discussions is on how we can begin to make incremental steps towards a more comprehensive global response to this problem.

**Senator BROWN**—That is fudge, because you have not given us what those steps are and you have not named who these people are. I have never been to a conference where the most interesting components were not in the side rooms. That is just fudge. What we are trying to get here are some specifics on what the alternatives are and who has signed up who might be saying, 'Well, we should not have done that; there has to be some alternative.' If they are saying that, where is the alternative?

**Mr Langman**—You suggest, and I don't think it is correct, that key developing countries are asking themselves whether there is an alternative to Kyoto. It perhaps suggests, for those who know the protocol less well than you, that those countries have real obligations under Kyoto. The point is that they do not. The point is that whenever in the Kyoto negotiation there was an effort to discuss how developing countries might contribute to the mitigation of greenhouse gas emissions within the framework of the protocol—or later on; say in the second commitment period—that led to a breakdown of the negotiations. Those countries are not talking about an alternative to Kyoto because Kyoto does not have an impact on them in that way. What some of them are now starting to look at is how threatening climate change is to them in the longer term, and the fact that they will need to help us work to address this issue over the longer term.

**Senator BROWN**—Of course they do; they know the problem. Ask Tuvalu. Look at its statement to the earth conference. It is patronising to say that they are beginning to understand; they know what problems are. We are trying to find solutions and, if there is an alternative to Kyoto, I have not heard it today. I have heard from Mr Hooke, who was here a moment ago, that we should be looking at equity and nondiscrimination. I think that is something we should be thinking about when we are looking at the developing countries. I am just wondering if any of you other gentlemen have an alternative to Kyoto that you would like to bring forward that we might consider.

**Mr Langman**—Could I add a few points?

**Senator BROWN**—Please be brief, because we are running out of time.

**Mr Langman**—I think I said we do not know what the solution to climate change is in the long term, but I think we have a good idea that it will take measures of many different sorts. There are things we have been working on that have the potential to make considerable contributions over the longer term. One of the things we should keep in mind—you

mentioned this yourself—is that the best science we have at the moment suggests that we will need very considerable cuts to greenhouse gas emissions over the term of this century.

To achieve those kinds of changes to things that are fundamental to our existing economies will take an immense effort, and it will take significant changes to technology, so we should be looking at ways to foster and facilitate technology development and diffusion. We should be looking at ways to help the developing countries as a whole develop their economies and achieve prosperity in ways that are less emissions intensive than the traditional path of industrialisation. I think all of those things are fairly well known.

Some of the things that we have done that can make a real contribution over the longer term, include building cooperation at a bilateral and regional level, for example our bilateral agreement with China will have a significant technology focus, as will working together with groups of other countries on these huge technological challenges. Clean coal technologies are almost certain to play a key role as we seek to handle this issue.

**Senator BROWN**—Just on that, the Chief Scientist has said that the cost of so-called zero emissions coal is less than $10 per tonne of carbon dioxide abated. Do you know anybody who agrees with that?

**Mr Langman**—Let me defer to my colleague.

**Mr Wilson**—I think the point to make with the Chief Scientist's estimate is that it is the Chief Scientist's estimate. It is not a government estimate; it is not a government number. There is a range of estimates that vary quite widely on the possible costs of clean coal technology, geosequestration and alternative abatement technologies. That is just one estimate.

**Senator BROWN**—Would you agree that that range is about $40 to $200?

**Mr Wilson**—I do not have the technical knowledge to agree or disagree with that number. I have seen numbers floating around that fit within and without that range.

**Senator BROWN**—Have you seen anybody's numbers that agree with those of the Chief Scientist?

**Mr Wilson**—Not personally.

**Senator BROWN**—That is two of us.

**Mr Wilson**—But I am certainly no expert in this field.

**Senator BROWN**—I am concerned about the Chief Scientist there, too. You indirectly raised this query about geosequestration—the burning of clean coal by putting the carbon dioxide underground and so on. Is it true that there is no existing coal-fired station in Australia that is amenable to that? You are talking about fitting future coal-fired stations, and it is really not an option for turning around and reducing gaseous emissions.

**Mr Wilson**—If you are looking for a least-cost approach, that is probably quite correct. Retrofitting existing stations is at the higher end of options. It is technically an option, I am told, but it is a higher cost.

**Senator BROWN**—Except that it is a theoretical option because geosequestration is not a technology that is available.

**Mr Wilson**—That is true.

**Mr Langman**—This is what we were saying, and we were talking about this a short while ago. Clean coal comes with a whole range of issues about how you use coal. Geosequestration is another issue. There are many strands that will be needed, no doubt, and others to make a contribution to dealing with this issue. It seems to me that these are challenging and, in some cases, longer-term solutions but there are not any magic bullets. There is not a single thing you could do today, short of turning off the power generating plants, that will suddenly cut the emissions. Of course, we must make a contribution here but the real issue for the longer term is how to help—

**Senator BROWN**—If I may interrupt, are you sure about that? Isn't it true that energy efficiency could cut emissions today by a minimum of 10 per cent and potentially 30 per cent or 40 per cent?

**Mr Langman**—I am not expert on that, and I am sure my industry and AGO colleagues could give you more technical answers, but want to make a broader point about how to address climate change. These are facts. I do not know to what degree they will change but the analysis done—the best analysis we have—of energy demand in the very large industrialising developing countries suggests that they will be installing massive amounts of new generating capacity over the next decades. At this point there is about eight per cent growth in energy use in India and China every year compounding. Most of that will be coal based. These are facts. This is to do with countries that are providing basic services to their citizens. I am sure we would not want them to not do it, but to do it over the longer term in a way that will be compatible with managing the greenhouse issue will require new technologies. These are things that are not immediately relevant here.

**Senator BROWN**—Don't you take into account that it will require human effort to put in energy efficiency? I have to part company with you there because it is not true that the option for us and those countries is coal. We have had evidence about that this morning, and there is a big debate about that. In the short time that is available here, let me bring you back to the US-Australia free trade agreement. What is in that agreement that would assure me that, in itself, it may not trammel future efforts to protect or reduce greenhouse gas emissions through such mechanisms as a carbon tax, carbon trading or a ban on the import of CFCs?

**Mr Langman**—In the free trade agreement, the key obligation that relates to environment is one that requires both Australia and the United States to enforce effectively their own environmental laws—where failure to enforce those laws can be shown, after careful examination, to have had an impact on the trade between the parties. I do not think there is anything there that would cause you a concern.

**Senator BROWN**—It does say also that there will be a marrying of voluntary environmental measures with environmental laws coming down the line. Would you care to tell us what that means? On the last page of a document from the Office of the United States Trade Representative in Washington, headed 'Free trade down under', it says:

Environmental laws are married with provisions that promote voluntary, market-based mechanisms to protect the environment.

What does that gobbledegook mean?

**Mr Langman**—I cannot comment on that now, but I can say that as far as I am aware the trade agreement ensures that both countries retain the right to establish our domestic environmental regulation laws and to change them if we want.

**Senator BROWN**—Is there a dispute mechanism?

**Mr Langman**—There is a dispute mechanism in the trade agreement as a whole. The obligation that I referred to earlier, which is that each country enforce its own environmental laws, is potentially subject to that dispute mechanism if it meets a number of conditions, the principle of which is that it has an impact on the trade of the other.

**Senator BROWN**—And the laws are 'married with provisions that promote voluntary market based mechanisms to protect the environment'. 'Market based' means where the dollar comes into consideration on such things as water, forests and pollution control.

**Mr Langman**—I cannot comment on a document that I have not seen.

**Senator BROWN**—But this is Mr Zoellick's document.

**Mr Langman**—I have not seen it, I am afraid.

**Senator BROWN**—So you cannot reassure me that that does not mean that market based mechanisms will have equal sway with environmental laws and that a dispute mechanism is available there for people in the market who—

**Mr Langman**—Senator, if you are referring to something that has been discussed in the past, and that is an investor state provision, which I think you raised some time ago, my understanding is that there is no such mechanism in the agreement reached with the United States. It may be that the reference there is to a suggestion that both sides could work together in some instances if we judged it appropriate, to do things like share information and work together on a range of ways of achieving our environmental goals, and they could include market based mechanisms. So it was in that context; it is not part of the agreement in the sense that you might interpret from what you read out.

**Senator BROWN**—Well, it is, because this comes before dispute settlement, it comes under the heading 'Commitments to cooperation to protect the environment' under Mr Zoellick, so it is there.

**Mr Langman**—As I said before, my understanding is that the only element relevant to the environment that is subject to dispute settlement relates to the obligation that I started with; that is, that each party implement its own laws.

**Senator BROWN**—So how is the balance going to be there? It is quite important to this debate. We are talking now about two countries outside the Kyoto protocol but we are looking at whether this country should endorse the Kyoto protocol and that has obligations with it which would put it into nonsymmetry with the United States if that happens. I want your assurance that there can be no dispute from the United States through this agreement with Australia signing the Kyoto protocol and proceeding to implement mechanisms that would make it reach its provisions under the Kyoto protocol. Can you assure me that that is going to be the case?

**Mr Langman**—My understanding, as I said before, is that both parties will retain fully the right to make their own environmental laws and to enforce them. The obligation relates to the

failure to implement our own laws, or in the US case their own laws, if it could be shown that that was motivated by and was helping to achieve some form of competitive advantage. That seems to be the inverse.

**Senator BROWN**—I am still struck with the fact that it is going to be married with provisions that promote voluntary market based mechanisms. That is a rocker, if you like. The market has failed miserably to protect us from global warming and a lot of other things. I guess we are caught here. We have not seen the document, so we cannot know. But I am interested to hear your comments on that. Thank you.

**Senator TCHEN**—This question probably should be directed to Dr Terrill and perhaps Mr Wilson and Mr Carruthers. This morning we heard witnesses suggest that the Australian government should ratify the Kyoto protocol without delay, partly because it would encourage the government to achieve the Kyoto protocol targets for us. The impression one gets is that the Australian government has done bugger-all to achieve it and therefore ratification will help. However, witnesses this afternoon suggest to us that industry together with the government has done a great deal in terms of reducing greenhouse gas emissions in Australia. Can you gentlemen give us an outline of what action the Australian government has taken and is taking to reduce greenhouse gas emissions in Australia? Could you also outlined any particular programs to facilitate these actions?

**CHAIR**—Senator Tchen, you used an expression which meant that the Australian government had done very little. The comment you made was unparliamentary so I suggest you change the words.

**Senator TCHEN**—In that case I withdraw it.

**Mr Carruthers**—It is appropriate that I speak to this as I represent the Australian Greenhouse Office, which is the Australian government's lead agency on its national greenhouse response.

**Senator TCHEN**—I am sorry; I thought you were from the department of industry.

**Mr Carruthers**—We work very closely with the industry department and a range of other departments to produce a very effective result for the government and the nation. The Australian government has been very focused, from the very time of the Kyoto conference, upon galvanising an effective national response to climate change. On the eve of the Kyoto conference, the Prime Minister announced a $180 million package of measures across a whole range of fronts. This was followed up in 1999, in connection with the broader agenda on tax reform, with a further major investment in a range of other measures. The Commonwealth government alone has committed almost $1 billion to addressing a greenhouse response. Most of that has been focused upon emissions management. Looking at the track record to date, we can see from the latest and regularly published assessment of Australia's emissions trends that, by the time of the Kyoto target period, across a range of sectors greenhouse measures in Australia will have delivered emissions reductions of 67 million tonnes. To put that in context, at the time of Kyoto it was projected that Australia's emissions, without measures, would grow to 128 per cent above the 1990 level. With a 67 million tonnes reduction, the projection is that Australia will be at around 110 per cent of 1990 levels. As the government has said, with the current measures we are within striking distance of achieving Australia's

Kyoto target. With further actions, such as the government's focus on a good outcome on reductions in Queensland land clearing, there is every prospect for Australia to achieve its Kyoto target.

The saving of 67 million tonnes, to give it some local interpretation, would be the equivalent of removing all vehicles off Australia's roads. That represents a very significant shift. I heard discussions earlier this afternoon about the efforts of industry through the partnership program known as the Greenhouse Challenge. The Greenhouse Challenge is projected to deliver savings of 13.2 million tonnes as part of that overall figure of 67 million tonnes.

To go to another area, the government has made a huge investment of over $300 million in renewable energy. Perhaps the flagship of the government's major thrust on renewable energy is the mandatory renewable energy target, which was the subject of legislation by this parliament. The commitment to the mandatory delivery of 9½ thousand gigawatts of new renewable energy capacity in this country—enough to service the homes of four million people, or the city of Sydney—will deliver emissions savings of 6.5 million tonnes.

If we go to the goods in our homes and in offices, such as refrigerators, washing machines and the like, the mandatory labelling of efficiency standards will deliver 6.9 million tonnes of emissions savings. The Australian Greenhouse Office, under this $1 billion investment by the government, has something like 30 programs in place. This effort is not just from the Australian government; it is an effort from industry and from the community. The Cities for Climate Protection program involves 180 local governments, covering 70 per cent of the Australian community, which are involved in a community action agenda to contribute towards the national response. The states are playing a major part in addressing this. The message has come through that an effective response to climate change is a very big challenge.

Greenhouse gas emissions result from every sector and activity in the Australian economy and society. We need a comprehensive, broad based approach. The Australian government has been an early mover in this area. It is recognised internationally that we have a very effective program that is delivering results. That is the credibility of Australia on the world stage.

**Senator TCHEN**—Thank you. That is more comprehensive that I anticipated. In a way I am glad Senator Brown, with his passion for substantiation, did not ask you any questions. If, as you say, Australia is within striking distance of our Kyoto targets, why not ratify the treaty?

**Mr Langman**—The government's view is, as we have said already, that the Kyoto protocol is not an effective approach to address climate change over the longer term. It does not cover the greater part of global emissions. In fact, it would cover only 25 per cent of global emissions in a four-year period, and that percentage share will go down over the longer term. To make it quite clear, the Kyoto protocol requires only two of the six largest greenhouse gas emitters to take measures to reduce their emissions—that is, at this point it requires the EU and Japan to take measures. The United States, India, China and Russia—the rest of the six largest emitters—are not going to take measures. That is over 70 per cent of global emissions, and that percentage is going up very fast.

Secondly, there is no sign that the key developing countries or the United States would accept Kyoto's approach of fixed, legally binding targets. So, in those circumstances, the protocol, which only applies to a small proportion of global emissions and only for four years, will not be the basis of an effective approach to dealing with this very large issue. Thirdly, there are serious concerns that to ratify a legal instrument of this sort when so many of our key international competitors do not face constraints under the protocol would send a very negative signal to investors in Australia and undermine our international competitiveness. Australian governments have consistently said that they will not do that, so those are the reasons that the government has decided it will not ratify the protocol.

**Senator TCHEN**—You were talking about whether the leading developing countries would accept the Kyoto model or a structured approach. Earlier Mr Knapp, from the Australian Aluminium Council, reported to this committee that, at COP8 and COP9 I think it was, both China and India made it quite clear that they were not contemplating a structure similar to the Kyoto protocol in the first stage. Can you confirm that?

**Mr Langman**—That is quite correct. India and China, and indeed the group of developing countries—the G77—have made it quite clear that they are not willing to accept or discuss anything that looks like a legally binding obligation to constrain their greenhouse gas emissions. Many developing countries are taking actions relevant to greenhouse. China have said publicly on many occasions that they do not believe it appropriate for them to take such constraints when they have such an urgent need for basic economic development and that they would not contemplate that for a very considerable period.

**Senator TCHEN**—In the light of this position of G77, can you comment on the suggestion made this morning that the so-called Australia clause, clause 108, in the Kyoto protocol was somehow seen as unfair and diminishes Australia's international commitment to reducing greenhouse gas. It was also said that Australia's per capita greenhouse emissions are the highest in the world, which again puts us in the category of international pariah. Can you comment on both of these suggestions.

**Mr Carruthers**—I will take the first part of that question. The so-called Australia clause relates to the way emissions associated with land use change are accounted for in the national greenhouse gas inventory. In Australia's case, over 20 per cent of our national emissions in the base year 1990 were associated with land use change emissions; that is, the activity of removal of forest cover to open up agricultural lands. In terms of Australia's overall greenhouse emissions picture and given that for an effective response to climate change we need a comprehensive response that deals with all significant sources of emissions, it was entirely appropriate for Australia that we have the capacity in connection with meeting our Kyoto target to effectively introduce policies and activities to reduce emissions from land use change. I might say that a range of policies and programs in particular by the Australian government, with its objectives with the Natural Heritage Trust and the national action plan on salinity, have very much been focused in that area, along with very much encouraging effective state action on vegetation management. So this was quite an important part of the Kyoto target arrangements for Australia. But of course Australia is not like countries that developed their agricultural lands decades or even centuries ago. These land use changes in Western Europe occurred a long time ago and are not a big issue for them.

The way land use change emissions are accounted for by Australia under this provision is exactly the same way that countries generally are required to account for them for the purposes of the UN framework convention on climate change, so there is nothing unusual here about the accounting arrangements. Indeed, with new arrangements for land use change emissions accounting as it was introduced for other countries that did not qualify under this clause, they have since Kyoto recognised that they created rather a problem for themselves. In the Marrakesh accords which provide for the implementation rules of the Kyoto protocol a fix was provided for Western European and other countries to deal with that headache for them. So what has turned out in practice is that all countries are on a similar playing field in the way that the Kyoto targets treat land use change emissions.

**Dr Terrill**—I will respond to the second part of the question, which relates to Australia's per capita emissions. Australia's per capita emissions are amongst the highest in the world. However, it is important to recognise that emissions per capita in Australia are projected to decline by approximately 10 per cent in the years between 1990 and 2012.

It is also important to recognise why Australia's per capita emissions may be high. It is a feature of the nature of our economy and the energy sources that we choose to use. In that regard, as different from a number of European countries, Australia does not generate nuclear power. It is also a factor of our geography and our geographical situation. Our economy has specialised in emissions intensive activities. The degree to which we are more efficient in those activities than the rest of the world is providing a global benefit in the emissions that are occurring in Australia. It is also important to note that the emissions per capita is only one possible greenhouse indicator. Another one that is commonly spoken of is emissions per dollar of GDP. Between the years 1990 and 2000, Australia's emissions intensity declined by 24 per cent. Over the period 1990 to 2012, Australia's emissions intensity is projected to decline by around 42 per cent.

**Senator TCHEN**—Mr Langman, in the course of your discussion with Senator Brown on fossil fuel, Senator Brown made the assertion that coal is not an option and you did not ask him to substantiate. Can you talk about what you see as the role of fossil fuels generally in the energy futures of developing countries? Is Australia working with developing countries to assist them to choose energy pathways for the future?

**Mr Langman**—I am certainly no expert in this area, but I will make a few general comments. My colleagues may know more about energy issues than I, but it is clear from all the analysis that I have seen—including that of the IEA, which is generally seen as an authoritative source—that fossil fuels will play a very significant role in the major industrialising developing countries over the next several decades. This is not least because they have, in some cases, very significant fossil fuel resources themselves. China, for example, is now the world's largest producer—and user, I think—of coal by a significant margin, and increasingly so. It is worth noting that, for obvious reasons, energy and the provision of energy is one of the key developmental goals of many of these countries.

At the World Summit on Sustainable Development in Johannesburg, we had a very extensive debate about energy and the role of providing basic energy services in overcoming fundamental problems of poverty, health and development. In that debate, some argued that there should be much more focus on renewables in the energy goals of countries around the

world. The major developing countries were very unhappy with that proposition. Their fundamental point was: 'We are struggling to provide basic energy services to hundreds of millions of people. To do that, we need to use resources that are available, and we need to do it in the most cost-effective manner.' This reality brings with it the concern that, if there is a massive expansion of fossil fuel, coal based energy production in countries like India and China over the next 20 to 30 years, we will have a huge task in dealing with the potential climate change that could arise from that and other emissions globally. Therefore, it seems critical that part of the long-term solution needs to be to work with those countries on the technologies that can make a difference. I am putting your question into a somewhat larger context. I hope that is acceptable but my sense is that is why it is so important.

**Senator TCHEN**—That is fine, Mr Langman. The picture you have brought to us from the conference floor, as it were, is somewhat different from what has been presented to us from other people who claimed to be observers. What in your estimation is the role of Australia in future negotiations on climate change?

**Mr Langman**—It has been suggested sometimes that the government's decision not to ratify the protocol has diminished our international influence. I think the evidence is simply not there for that. My colleagues and I are on the floor of the negotiations in the UNFCCC and in other international forums, and I have not seen it. At the last climate change conference of the parties in Milan in December, Australia was asked to chair two of the major negotiating groups. Australia was successful in taking forward the two major practical outcomes from the meeting that were not related to rules issues. Australia is asked to participate in an extremely wide range of formal meetings on climate change and, importantly, in an extremely wide range of informal meetings—the sorts of discussions I mentioned earlier in response to questions from Senator Brown.

I have a sense that we will remain a country that is seen as able to make a very practical contribution to this large issue and a country that others want to have in the discussions. Certainly others have come to us and said, 'We want you to be part of the discussions about future arrangements.' So I think Australia's role in future negotiations will remain significant. I would add one thing. We have traditionally chaired an important coalition of countries in the climate negotiations under the UN framework convention, and that is the umbrella group of countries. That group has a wide range of members whose views differ on several important issues. Some are Kyoto parties, like Norway, and others are not, like the United States. It contains a number of countries. But the bottom line is that that group continues to work together to discuss this important issue and to look for constructive ways to add value to the effort to address climate change.

It might be worth adding that the Australian government has consistently given a high priority to Australia playing an active part in the pursuit of an effective international response to climate change. The Australian government, for example through its work on climate change science, well recognises that climate change certainly will have impacts on the world at large and as part of that Australia is potentially significantly affected as we look into the decades and century ahead at the impact of climate change. Yet Australia accounts for perhaps one per cent or a little over one per cent of world emissions. So for Australia to address its concerns on its own account about climate change impacts, we need an effective international

framework that involves all major emitters—Australia to play its fair part in that—but we need all major emitters to be part of that effective international response. That is very much the driver for why Australia will continue to be an active and creative participant in the international efforts to that objective.

**Senator TCHEN**—I have one question on nuclear power. Nuclear power is a strictly emission free power source. However, the concept of nuclear power at the moment is absolutely abhorrent to particularly environmental groups: don't even think about it. Mr Langman, have you ever come across any suggestion that, in the calculation of greenhouse emissions or the industrial base for greenhouse gas emission, nuclear power should be penalised?

**Mr Langman**—Mr Carruthers might want to add to this but, in the negotiations on the Kyoto rules, some parties to the convention wanted to exclude nuclear power from the clean development mechanism. The final outcome was not a legal exclusion but certainly suggested that nuclear power was less acceptable. Let me explain. The clean development mechanism is the Kyoto mechanism that allows Kyoto parties with targets to use credits generated through projects in developing countries. So the rules discourage parties from using nuclear power. It is not quite clear how strong that is. However, our view is that it is not legally binding but it is certainly a strong discouragement.

**Senator LUNDY**—Chair, I have a number of questions and I am very conscious that we have been out of time for 25 minutes. In an effort to facilitate proceedings, is it possible to provide some questions to the witnesses, with a view to getting responses by next Wednesday?

**CHAIR**—Do you wish to place some questions on notice?

**Senator LUNDY**—Yes. I am trying to get confirmation that we will get responses by next Wednesday.

**CHAIR**—If questions are placed on notice, they have to be answered by next Wednesday because we have a very tight reporting time frame. We have to report to the Senate by 4 March, so if they are placed on notice I would ask you to answer them as quickly as possible.

**Senator LUNDY**—Will that be possible?

**Mr Carruthers**—Wednesday is not far away. Not knowing the nature of the questions, we can certainly undertake to make our best endeavours to provide what information we can.

**Mr Langman**—I would be happy to answer questions that I can within the remaining time.

**Senator LUNDY**—We ran out of time 25 minutes ago.

**CHAIR**—We allowed for extra time with the industry group.

**Mr Langman**—We can only say that we would do our best.

**CHAIR**—It is just an issue of writing the reports and that the information is there if other senators want to write reports.

**Senator LUNDY**—Perhaps I could go to this point about Australia's reputation. We obviously used to take a leading role in climate change discussions. In an answer to Senator Tchen, you said that you did not think that had changed. In the context of Australia initially

supporting ratification of the Kyoto protocol and then making a decision not to, very specifically, what has changed? How has that impacted on Australia's reputation and the capacity to provide leadership in climate change talks?

**Mr Langman**—Those countries that were very strongly supportive and are very strongly supportive of the Kyoto protocol—the European Union, for example—would certainly prefer that Australia ratify, but they recognise that we have taken significant action on domestic greenhouse gas emissions and that we are very serious about climate change. I have spoken with many of their representatives at international meetings and they are aware of the commitment that Australia has made to dealing with this issue domestically, the significant investment of resources, the creation of the Australian Greenhouse Office. That does not mean that they would not rather we ratified the Kyoto protocol, and they will say that publicly, and do, but they recognise also that we are very serious and that we have made major progress and have done many innovative things, and they are interested often in some of the programs that we have put in place domestically.

Also, they take note of the government's commitment to continue working to meet our 108 per cent target. It really is worth noting that increasingly it is clear that we are further along than most other countries when it comes to meeting our Kyoto target. The European Commissioner for the Environment, Margot Wallstrom, speaking last year, underlined her deep concern that 10 out of the 15 member states at that time—that is before the enlargement—were well off the trendline needed to meet their target. So individual EU member states have a long way to go. I am simply making the point that it is recognised that Australia has done a lot already to address the issue of climate change. From that point of view, of course there is rhetoric, but I think there is a genuine understanding too of the context in which our decision was made. On the point of our ability to influence negotiations, from my perspective I sincerely think it has not been an issue.

We continue to bring new ideas to the process. For example, at COP9 we brought forward two proposals, which others had contributed to along the way but fundamentally they were Australian ideas. One was to help build the information base within the climate convention so we can understand this issue properly. It does not exist at the moment; it is very limited. We need to understand where the emissions are, in which sectors in which countries, and we have only got a partial database. It sounds very basic and it is very basic, but it is very necessary. That was one idea we brought forward, and we made some progress there on that. The other was to help build a better global system to monitor climate. Again it is very basic, but it is not in place yet. We have a long way to go on this very big and complex issue, and Australia's leadership in the UNFCC process on those sorts of practical issues I think is widely recognised. We met, for example, with the chair of the ministerial meeting at COP9. He commented on the constructive and practical focused role Australia plays both as chair of the umbrella group of countries in the negotiations and the discussions and on these kinds of practical issues. So my sense is that we remain a player that can bring serious and practical actions to this process and that that is recognised.

**Senator LUNDY**—Is it your role to be involved in discussions with other countries? Has the department or the government in any way made representations urging those nations which have not yet ratified the Kyoto protocol not to?

**Mr Langman**—To my knowledge, Australia has never urged others not to ratify the Kyoto protocol.

**Senator LUNDY**—In terms of Australia's position on the protocol specifically, has the department or government been approached by other anti-ratification countries to work together to try and develop an alternative, a definitive alternative proposal, given all of the arguments the government puts forward against it?

**Mr Langman**—We have certainly talked at length with a wide range of countries about how we can build a more global approach that will gradually draw in a larger number of emitters. We have had discussions on that topic with the European Commission and Japan. We participate in an informal process involving key countries—China, India, Brazil, the EC, the United States, Canada and others—that Japan has organised. There have been two meetings of that small group. We have discussed this topic with the United States and Canada. It is in some ways the key topic. In spite of all the formal processes and procedural issues we dealt with at the ministerial meeting in Milan, it is the topic that is on everybody's lips. It is what people are thinking about and talking about. There are no definitive and easy answers yet.

**Senator LUNDY**—Alternatively, have you ever participated in discussions urging other countries to ratify the protocol?

**Mr Langman**—No, I have not.

**Senator LUNDY**—I could probably leave the rest of my questions, but I have a couple for industry. Have you identified the sectors of industry that would benefit from the ratification of the Kyoto protocol?

**Mr Wilson**—There has been a wide range of analysis of the impacts of ratification on the Australian economy and on industry, within government and outside government. It has identified a range of sectors that suffer negative impacts from the protocol and some sectors that suffer, as far as we can tell, much smaller benefits from ratification. We have not identified particular individual businesses.

**Senator LUNDY**—But you have identified a sector that could benefit?

**Mr Wilson**—The analysis has shown that some sectors show small gains. The gains are generally much smaller relative to the sectors that lose, and it always comes out as a net economic—

**Senator LUNDY**—I am not asking for a subjective answer. I presume those studies are public.

**Mr Wilson**—Yes.

**Senator LUNDY**—Can you make sure the committee has all of the references to those studies that have been done?

**CHAIR**—Again, by next Wednesday.

**Mr Wilson**—Yes, certainly.

**Senator LUNDY**—Have you done any further analysis on the export potential of those sectors were the protocol to be ratified?

**Mr Wilson**—Beyond the economic modelling that has been done more generally, no.

**Senator LUNDY**—Have you done any studies on the costs to Australian industry across all sectors if it is not—specifically not—ratified?

**Mr Wilson**—I believe that it is certainly one of the scenarios that was modelled by ABARE that is publicly available.

**Senator LUNDY**—So you have an analysis, if it is not ratified, of the impact on coral bleaching and on the tourism industry in Queensland and those sorts of things?

**Mr Wilson**—Not specifically. The aggregation involved in the economic models is quite large.

**Senator LUNDY**—Is it possible for you to break it down for this committee? We are having a great deal of trouble finding any of this type of analysis.

**Mr Wilson**—Not beyond what is publicly available. That is the limitation of the economic models.

**Senator LUNDY**—But, from what you just said, those models were compiled by looking at sector studies. I presume specific sector analysis would have to have been done to get any figure at all.

**Mr Wilson**—'Sector' can be a very broad term; it is not specific industries. For instance, the tourism industry would not be represented in detail in an economic model.

**Senator LUNDY**—But it is an important externality. It is an important impact that surely the government would have factored in in any of their cost analyses.

**Mr Wilson**—The government certainly has considered those issues in the analysis.

**Senator LUNDY**—But they have not studied them?

**Mr Wilson**—This is just a limitation of economic modelling. There is nothing that can be done about that. The impact of coral bleaching on the tourism industry is not an impact that is related to ratification, though.

**Senator LUNDY**—That is debatable.

**Dr Terrill**—Broadly it might help you to refer to two sets of relevant analysis. One was released publicly and is on the Australian Greenhouse Office's web site.

**Senator LUNDY**—I am familiar with what has been released publicly. I am trying to drill a bit further down to see what studies underpin some of the modelling that has been done, to see where it goes.

**Dr Terrill**—On your second point in relation to impacts, you might be aware of a report released late last year by the Australian Greenhouse Office on the science produced by CSIRO in particular. It is called *Climate Change: An Australian Guide to the Science and Potential Impacts*. It is probably the most considered discussion of these sorts of issues but, as I think my colleague from the industry department is pointing out, the limitations of analysis at the moment do not permit being very precise about the economic dimension of impacts. But this guide provides a comprehensive overview to the degree that is possible.

**Mr Langman**—I might underline one point that Mr Wilson noted. The question of whether or not we ratify the Kyoto protocol is not relevant in a direct sense to the potential costs of the impacts of climate change. The question of what is the most effective way to deal with the global issue of climate change is, of course, important and relevant but not directly relevant—

**Senator LUNDY**—But you agree that these sorts of studies would be useful anyway, regardless of the protocol. Is that what you are telling me?

**Mr Langman**—I am sorry—

**Senator LUNDY**—You are saying that, regardless of ratification of the protocol, because we have targets in place this information should be gathered.

**Mr Langman**—No, I am saying that the studies that were done were based on a set of assumptions, and of course you can use other assumptions. This is an area that is complex and you need to make assumptions about the future which are very much questions of making the best effort to choose a potential path forward, but there could be others. But those studies were about costs related to ratification. It is a separate issue to ask about the potential costs, say, to the Australian economy of the impacts of climate change. The work that Dr Terrill has referred to goes through the potential impacts in great detail. It also underlines the high degree of uncertainty about specific impacts. Of course, we know that changes in temperature can have effects on coral reefs, and that is a very significant concern, naturally enough.

**CHAIR**—I have a question which relates to the discussions or conferences that might occur in relation to the post 2012 targets. This morning it was suggested that, because Australia and the United States have not signed on, they would not have any capacity to be involved in that kind of discussion or conference. I wondered whether that is the case since, as you have said, we are fairly heavily involved and well-respected within the world of environmental policy on an international basis.

**Mr Langman**—The Kyoto protocol itself suggests that the discussions and negotiations on the targets, the commitments, that would be in place in the second commitment period—that is, the period after 2012—should begin from no later than the end of 2005. There is some uncertainty about that date because there is some uncertainty about whether the protocol will enter into force. Having said that, to answer your question, it could be assumed that parties to the protocol—that is, countries that have ratified the protocol—will be involved in those discussions at one level. But there is no doubt that all parties would be involved.

There is no sense, talking with any other country, that there is a desire to exclude Australia or to exclude the United States. That would make no sense in terms of the objectives of the countries that support the Kyoto protocol because they want to deal with climate change through that means. The objective of the European Union and Japan, and I am sure the other parties to the Kyoto protocol, is to make progress in addressing climate change. They know that it is critical to that that there is a comprehensive and global response. It is hard to imagine such a response without the engagement of the United States and the developing countries in practical and meaningful mitigation actions. So I see no chance that we would be excluded. In fact, we have already been approached by many countries saying they very much hope Australia would be part of any discussion of future arrangements, whether it happens under the protocol or outside that framework.

**Mr Carruthers**—Just to remind the committee, Australia is a party to the UN Framework Convention on Climate Change. It is the framework convention that sets the long-term objective of the international community to deal with the global threat of climate change. As we look at climate change as a problem that will have to be confronted by an international response over a period of decades and through this century, Australia, as a party to the climate change convention, will be a full participant in the design of an effective long-term solution.

**CHAIR**—Thank you very much for those answers. With that, we will draw this hearing to a close. I thank the witnesses from various government agencies and departments for appearing today. I thank the secretariat for arranging the submissions and the agenda of the conference in such an orderly way, and I thank Hansard.

**Committee adjourned at 4.47 p.m.**