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SELECT COMMITTEE ON FUEL AND ENERGY

Reference: Issues relating to the Fuel and Energy Industry

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**SENATE SELECT COMMITTEE ON
FUEL AND ENERGY
Monday, 29 June 2009**

Members: Senator Cormann (*Chair*), Senator Hutchins (*Deputy Chair*), Senators Bushby, Fifield, Joyce and McEwen

Senators in attendance: Senators Bushby, Cormann, Hutchins and McEwen

Participating members: Senators Abetz, Adams, Back, Barnett, Bernardi, Bilyk, Birmingham, Mark Bishop, Boswell, Boyce, Brandis, Carol Brown, Cameron, Cash, Colbeck, Jacinta Collins, Coonan, Crossin, Eggleston, Farrell, Feeney, Ferguson, Fielding, Fisher, Forshaw, Furner, Heffernan, Humphries, Hurley, Johnston, Kroger, Lundy, Ian Macdonald, McGauran, McLucas, Marshall, Mason, Milne, Minchin, Moore, Nash, O'Brien, Parry, Payne, Polley, Pratt, Ronaldson, Ryan, Scullion, Stephens, Sterle, Troeth, Trood, Williams, Wortley and Xenophon

Terms of reference for the inquiry:

- a. To inquire into and report on: the impact of higher fuel and energy prices on:
 - i. families,
 - ii. small business,
 - iii. rural and regional Australia,
 - iv. grocery prices, and
 - v. key industries, including but not limited to tourism and transport;
- b. the role and activities of the Petrol Commissioner, including whether the Petrol Commissioner reduces the price of petroleum;
- c. the operation of the domestic energy markets, and petroleum, diesel and gas markets, including the fostering of maximum competition and provision of consumer information;
- d. the impact of an emissions trading scheme on the fuel and energy industry, including but not limited to:
 - i. prices,
 - ii. employment in the fuel and energy industries, and any related adverse impacts on regional centres reliant on these industries,
 - iii. domestic energy supply, and
 - iv. future investment in fuel and energy infrastructure;
- e. the existing set of federal and state government regulatory powers as they relate to fuel and energy products;
- f. taxation arrangements on fuel and energy products including:
 - i. Commonwealth excise,
 - ii. the goods and services tax, and
 - iii. new state and federal taxes;
- g. the role of alternative sources of energy to coal and alternative fuels to petroleum and diesel, including but not limited to: LPG, LNG, CNG, gas to liquids, coal to liquids, electricity and bio-fuels such as, but not limited to, ethanol;
- h. domestic energy supply and the domestic oil/gas exploration and refinement industry, with particular reference to:
 - i. the impact of Commonwealth, state and local government regulations on these industries,
 - ii. increasing domestic oil/gas exploration and refinement activities, with a view to reducing Australia's reliance on imported oil,
 - iii. other tax incentives, and
 - iv. securing Australia's future domestic energy supply;
- i. the impact of higher petroleum, diesel and gas prices on public transport systems, including the adequacy of public transport infrastructure and record of public transport investment by state governments; and
- j. any related matters.

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Committee met at 8.59 am

CHAIR (Senator Cormann)—I declare open this public hearing of the Senate Select Committee on Fuel and Energy. The Senate has referred to the committee matters associated with fuel and energy including the price of fuel, regulation and taxation arrangements, and alternative fuels. The committee is due to provide its final report to the Senate on 21 October 2009. Today the committee is focusing on energy and fuel security, in particular to the terms of reference relating to the existing set of federal and state government regulatory powers as they relate to fuel and energy products; taxation arrangements on fuel and energy products; the role of alternative sources of energy to coal and alternative fuels to petroleum and diesel; and domestic energy supply and the domestic oil/gas exploration and refinement industry.

I welcome you all to this public hearing. Before the committee starts taking evidence, I remind all witnesses that, in giving evidence to the committee, they are protected by parliamentary privilege. It is unlawful for anyone to threaten or disadvantage a witness on account of evidence given to a committee, and such action may be treated by the Senate as a contempt. It is also a contempt to give false or misleading evidence to a committee. The committee prefers all evidence to be given in public, but under the Senate's resolutions witnesses have the right to request to be heard in private session. It is important that witnesses give the committee notice if they intend to ask to give evidence in camera. If a witness objects to answering a question, the witness should state the ground upon which the objection is taken and the committee will determine whether it will insist on an answer having regard to the ground which is claimed. If the committee determines to insist on an answer, the witness may request that the answer be given in camera. Such a request may, of course, also be made at any other time.

Finally, on behalf of the committee I would like to thank all those who have made submissions and sent representatives today for their cooperation with this inquiry.

[9.01 am]

HARRIES, Professor David, Director, Centre for Research into Energy for Sustainable Transport

CHAIR—Welcome, Professor. Would you state the capacity in which you appear.

Prof. Harries—I am the Director of the Centre for Research into Energy for Sustainable Transport, CREST. I was the inaugural Director of the Research Institute for Sustainable Energy, RISE, at Murdoch University, and I am also the President of the Conservation Council of Western Australia.

CHAIR—Excellent. I invite you to make a brief opening statement and then the committee will ask you some questions.

Prof. Harries—Thank you. I was contacted last week and invited to make an oral submission. I have considered what useful submission I could make. I have read a number of the submissions that have already been made and are on the internet site. A lot of the issues that I could discuss have been covered by a lot of those submissions. Regarding the terms of reference, I could talk on (a) (d) (g) and (i). However, I felt that it would be most useful for me to focus on some aspects that others are probably unlikely to cover in their submissions and which relate to the activities of CREST, the centre that I am director of, and RISE, which I was the director of. At the moment, RISE does not have a director. It is currently looking for a director, so I will make my initial comments relating to RISE.

The role of RISE has been to assist the development of Australia's renewable energy industry. It does this in several ways. One of its most important roles has been to provide testing for renewable energy systems and system components, and to participate in the development of standards for those systems. These systems tend to be small renewable energy systems that are either used as stand-alone systems in remote areas or as distributed small renewable systems connected to grids, which are becoming increasingly common. These include solar photovoltaic systems and their components such as inverters, charge controllers, batteries, small wind turbines and solar water heaters. RISE has the only NATA accredited testing laboratory in Australia for testing these solar PV components. It is also in the process of developing a national testing facility for small wind turbines, which are becoming increasingly popular overseas and are likely to enter the Australian market in an increasing way over the coming years.

This testing and standards development of these systems and components is of critical importance to the development of the industry. Without it, we do not get product improvement and we do not get market confidence in the product. The problem that this creates is that governments often fail to recognise the need for this testing and for the standards development, and this aspect of the industry development is often overlooked. As a result, the university has developed the expertise and capacity to work in these areas, but it is supporting this by going from grant to grant. This means that there is a constant risk that the work will be discontinued unless the university is able to secure another grant. Currently, there is no certainty that the

university will be able to continue to undertake this testing of the emergence in solar equipment, and this uncertainty impacts on the ability to retain expert staff.

There needs to be an urgent shift in the thinking within government away from considering this as supporting the university in something it wants to do and start to recognise that this activity is important for industry development. It is a service that needs to be undertaken, and the university provides this service on behalf of government for the industry development. Unless we start moving to greater certainty, there is a real risk that this activity will be discontinued by the university, and that will have quite significant impacts and consequences for that part of the industry that is relying on small, renewable energy systems.

The second aspect I want to talk about is my role in CREST. The role of CREST is to undertake fundamental industry initiated research into alternative transport fuels, to undertake trials and demonstration projects and to disseminate information on the options for using alternative fuels that will be required for us to make the shift that we need to make to alternate fuels over the coming decade. It is a Western Australian state centre for excellence that is funded by the Western Australian government through the Murdoch University, and there is strong collaboration from the Perth University of Technology. We are attempting to develop further collaboration with other Western Australian universities, including the University of Western Australia, and this is starting to occur. The idea is to bring together the considerable research capacity that actually exists in Western Australia and to use that to focus on the development of alternative fuels and to encourage collaboration between universities, industry, governments and other research organisations—including TAFE colleges, which are going to bear the responsibility to develop training in the fuel industry as these new alternative fuels come on line.

The CREST work program covers the full range of alternative fuels, as we have a philosophy that we need to look at all options, because it is unlikely that we will be able to rely on a single or very narrow range of options in the future and we are likely to enter a period of a far greater diversity in our transport/fuel mix. It is also important that, as we are looking at these alternative fuels, we look at local feedstock and develop the processes and capacity to develop fuels and to optimise the production processes for those fuels from local feedstock. Our current work program includes the development of coal to liquids, gas to liquids and biomass to liquid technologies and processes. These are all extremely important, as liquid fuels will represent the near-term alternative fuel options as they will not require investment in new engine technologies or in fuel supply infrastructure.

These technologies will be developed at various rates. Biomass to liquids, based on lubricous materials will be extremely important but would take several years to reach commercialisation. The benefits of doing so appear to be substantial both on the volumes of fuels that are likely to be able to be produced and in the long-term capacity to reduce reliance on imported oils. The benefits for regional fuel supplies, industry development and improved agricultural practices in biosequestration of carbon dioxide are also very significant.

Another technology that we will focus on is the production of oils from microalgae—those oils, which will be able to be produced as substitutes for diesel—is another incredibly important research area. We are still some years away from commercialisation, but this technology not only has the potential to provide significant volumes of fuel but also has other significant benefits, including the development of regional industries, fuel supplies and biosequestration of

carbon dioxide from coal and gas fired power stations. Other technologies and fuels that are being investigated through CREST include fuel production from waste oils, electric vehicles, hydrogen as a fuel and fuel cell technologies.

Given the projected decline in Australia's oil production rates over the coming decade and the indications for the balance of trade, unless we reduce our dependence on oil, the need to develop both short-term and long-term alternatives to oil is quite urgent, and this makes the work undertaken by research centres such as CREST extremely important. This is of national importance, and there will need to be strong collaboration between research groups around Australia working in this area. CREST is looking at opportunities for increasing collaboration with other research groups and industry around Australia.

CHAIR—Thank you very much, Professor Harries. You have given us a bit of detail on the work you are doing, but I am wondering whether you could give us a bit of a summary of the energy and fuel security challenges that you see emerging in the future.

Prof. Harries—There are three main drivers. Of course, we have greenhouse gas emissions, with transport accounting for about 14 per cent of Australia's greenhouse gas emissions, and we have local air quality issues caused by emissions from vehicles. However, we will have the capacity to look at reducing greenhouse gas emissions from the stationary sector. If that is easier, it may be an option to focus to a greater degree on capturing carbon dioxide from the stationary sector, and the greenhouse gas driver in the transport sector may or may not be less of an issue.

I believe the imperative driver for transport is going to be Australia's very, very high dependence on oil for transport and the projected decline of Australian production of oil. This is something that we have been aware of for quite a while. The economic imperative for us to reduce our dependence on oil over the coming decade is, I believe, very significant. Australia is a lucky country, in most of our energy sources other than oil. We do have large amounts of gas which will serve as a near-term alternative. We have significant other options. I believe Australia will need not to wait for the rest of the world to develop these technologies but will need to put a lot of effort into enabling us to meet that shift as smoothly and as quickly as we can. That will involve developing the expertise within Australia and gaining a familiarity with the technologies. It will require an understanding of those technologies and an understanding of our local feedstock and the processes that we will need to use here to convert those various fuels into suitable energy forms for Australian uses.

Australia is extremely blessed; we have probably got an embarrassment of riches with fuels compared to a lot of countries—coal, gas, solar, wind and uranium. We have a lot of energy resources. The biggest problem we have at the moment is carbon dioxide and greenhouse gas emissions from coal. There are several strategies for dealing with that issue, including carbon capture and geosequestration. The problem is that we are in a position where we do not know which of these options is going to be the most successful, when they will be commercialised and what the costs will be. I believe we are therefore forced to look at all options—keep all options open—and to be prepared to develop the capacities in all areas. Again, I think we are going to have to rely on a far greater mix of stationary energy supply technologies than we have in the past.

Even if, for example, we do find that carbon capture and storage is technically feasible and economic, we are going to be extremely unlikely to find it suitable in all locations. It might be more suitable in Victoria, where you have depleted gas wells, but it is going to be far less likely in other places, such as New South Wales. I do not think we can rely on any one technology. I think we are going to have to be prepared to agree to diversity based on a large scale. We are going to need to rely on large-scale renewables and we are going to need to rely on small-scale renewables and distributed energy.

This is going to create issues for our electricity network infrastructure. What investment is going to be required in that infrastructure in order for us to do this? Our quickest and easiest solution would be carbon capture and storage simply because the network infrastructure is already in there. If that solution is not cost-effective or technically feasible everywhere, we will need to look at other options and that will involve looking at the network infrastructure.

Senator HUTCHINS—Do you see that state by state? New South Wales, with coalfields everywhere, black coal everywhere, is not going to have the same approach to renewable energy as maybe another state—for example, Tasmania or Queensland? I would welcome your observations on that.

Prof. Harries—It will certainly be state by state. Renewable energy resources are dispersed around the country in different amounts. There is a lot of biomass in the sugar industry in North Queensland. There is a lot of solar energy up north. I believe solar thermal energy will eventually play a hugely important role. Wind energy and wave energy will be important on the southern coast. Wave and wind energy tend to be coincidental. That will be found in the southern states. Western Australia will be forced to look on it as a state issue. Western Australia does not have an interconnected electricity grid. That has implications for our electricity network and infrastructure, which is different to the national electricity market. I think there will be a mix of looking at it on a state-by-state basis and looking at it on a macro level.

Senator HUTCHINS—There have been significant increases in power in Western Australia—

Prof. Harries—In prices?

Senator HUTCHINS—Yes, for the consumer, the householder, and increases have just been announced for households in Queensland. We have relatively cheap energy in comparison to other parts of the world. Do you see that in the future we will have to gear up for significant increases in the prices of energy—electricity and fuels? We talk about energy and fuel security, as legislators are we preparing our electorate for significant increases in costs?

Prof. Harries—I think it is absolutely certain we are going to pay increased electricity prices for a number of reasons. I have submitted papers at conferences on distributed energy and have said that in the past when we looked at the policy mix, it was really something that slipped under the radar. I believe it is going to become more important largely because of the increased cost of supplying energy from centralised large power stations, both from the fuel supply and from the cost of building those power stations and the electricity transmission and distribution networks. The cost of building a coal fired power station has doubled. As we go to include in that the ability to capture and sequester carbon, the costs will go up further.

Senator HUTCHINS—Do you have any idea of the costs that we will be looking at?

Prof. Harries—I have seen large variations at the moment in the costs. I have seen that we can expect the cost of coal fired power stations to double, if we are going to capture the carbon and then liquefy the carbon dioxide and pump it off to storage. Depending on how far you have to pump it, those costs can be significant. A significant proportion of the energy generated by the power station will have to go in to capturing and liquefying the carbon dioxide which will add to the costs. I would say that one of the solutions in the future to the carbon dioxide issue related to stationary energy is carbon capture and storage. But it will significantly increase costs of electricity and it will make alternatives competitive, and this is one of the reasons that we have to be prepared to look at those alternatives.

Senator HUTCHINS—In some of the papers put before the committee has been the suggestion that biofuels put more carbon into the atmosphere than other fuels. What is your response to that?

Prof. Harries—I have recently written a paper on that. It very much depends on the feedstock in the process. Probably the worst case is corn producing ethanol in the United States, where in some cases you can eventually end up with less energy than what you put into the process to get it. In many of the other cases, particularly in terms of sugar and high-energy content, you end up with far more energy output than energy input. However, in Australia we have limited capacity to develop biofuels from traditional first-generation feedstock. One of the reasons is that we do not have the yields per hectare that they have in Europe and the United States. Our soils are not as fertile. We have higher transport costs in developing those biofuels. We also do not have the feedlot industry which provides an income stream for the biofuel industry to get the waste products from the biofuel. So trying to get biofuel plant and industry up in Australia is far more difficult than it is in Europe, the United States or Asia. This is why we need to focus so much on the second generation—the lignocellulosic, the micro algae.

Senator HUTCHINS—You also have to ask whether the cost to operate another power station will be double the cost it is now. Are we being forced to look at an alternative that might be cheaper than double the price of electricity now?

Prof. Harries—I think as prices go up, we will need to look at all options. I do not think we are going to be able to avoid increased fuel prices. I do not think there is a magic bullet out there which says that the cost of producing electricity from coal or the cost of oil is going to go up and therefore we look for another solution. I appeared before a Senate inquiry a number of years ago which was focused on the price of fuel. I said to them that we have quite a significant problem with transport fuels. Yes, we can use gas and we can use biofuels as alternatives, but anything that is internationally tradable is going to float to the price of oil anyway. So gas prices will go up and biofuel prices will go up. One of the big attractions of electrifying the transport fleet is going to be that it is one option that will provide some protection against those increasing prices. However, I think we can try to look for ways to minimise rising prices of fuel—electricity, gas, transport fuels—but I do not think we are going to be able to find a way of avoiding increases.

Senator HUTCHINS—Coming from New South Wales, as I said earlier, we have big deposits of coal right next to our power stations. Western Australia has just had significant increases in the price of energy and Queensland has just announced the same. It is going to be

very politically difficult at some point down the track for governments because they are going to have to juggle the future with the present.

Prof. Harries—I think we are caught between a rock and a hard place. I think you are right. I think we have got increasing electricity, gas and fuel prices, and that is coming from a number of causes. One in Western Australia is the massive investment required to upgrade our network infrastructure in order to meet projected increases in demand. That is going to mean that governments are going to be in the difficult position of being faced with increasing electricity, gas and fuel prices and having to develop policies that could include further increases and exacerbate the problem. That is going to be an awkward situation for governments and for policymakers. For example, with emissions trading, yes, the introduction of an emissions trading scheme will add further to the price of energy, but what is the consequence of not introducing an emissions trading scheme? I think if you look at the consequences down the track, they will be equally unpalatable. Like it or not, the government has some unpalatable, difficult decisions in front of it.

Senator HUTCHINS—I do not know whether you have had an opportunity to look at Western Power's submission to the inquiry?

Prof. Harries—Briefly.

Senator HUTCHINS—I am interested in your observations about their talk of intermittent sources of energy and how they are going to add to costs. What is your response?

Prof. Harries—I can understand the issue. I used to be the chairman of the network reliability planning panel in Tasmania, and I understand networks and how they operate and their issues and the legal obligations for them to supply safe, reliable power. Western Power quite legitimately sees a real problem if we are going to have policies that are aimed at increasing the amount of renewable energy connected through our grids. If a large proportion of those renewable energy systems are intermittent, that is, you cannot dictate when they can come on line and when they are not dispatchable, then it is going to have implications for the grid. Without any other solutions, the immediate implication is going to be a lot of investment in network capacity to deal with those. I think that would force us to look at a number of other ways of ameliorating those impacts. One would be to look at energy storage systems that can lessen and dampen the effect of that intermittent energy. Another option would be, for example, with wind, if you spread the amount of wind further around the whole grid—at the moment we have a large wind power station down at Albany, Esperance and one at Geraldton. Those come on line fairly predictably, often at night, but if we develop further wind power and spread that further around the grid, the times at which wind comes on will be smoothed. You will have different wind turbines coming on at different times. There has been some modelling done on the extent to which that can overcome some of those problems.

There are some wind turbine technologies that can help balance impacts as well—dampen the effects. There are improvements in wind turbine technologies that can assist with the fluctuations. I think we also need to recognise that we have got to develop the renewable energy technologies that are less intermittent—wave, geothermal and so on. I am not someone who tries to pretend there are no problems with renewable energy technologies. Geothermal has got quite a lot of issues. It is five kilometres underground. Yes, it is a great technology, it is a great source of

energy; it will take us time to develop the capacity on a large scale to use that. I think there are also problems in terms of the distance from the grid and so on. When I talk at conferences about energy, I often say that when you have a society that is as energy intensive as ours, it is not just renewable energy that is a problem. Any energy supply option is a problem. We have run out of easy options. I think we need to not be beguiled into thinking there are easy solutions anywhere, grab the difficult truth that we have faced with some issues and look at all of the options and work out what the best mix is to solve those problems.

Because I run research institutes for renewable energy, I am often expected to be an absolute fanatic of renewable energy and dismiss anything else. I say to people, 'I'm not a lobbyist; I'm an academic, and I try to look at things as dispassionately and objectively as possible.' If carbon capture and storage does provide a cost-effective solution in the near term, we would be mad not to look at it. The reason I think we need to look at alternatives is that I am not yet convinced that it will provide the full answer. I think we would be mad not to look at alternatives as well.

CHAIR—What about nuclear energy?

Prof. Harries—Presently I have got some real issues with nuclear. I say to people that if we can solve the difficult, rather vexed issues of waste and of a world that is less stable and more fissile material going around the place, if we can convince people that it is a cost-effective, economic option and government is not going to have to subsidise it, then I would be prepared to look at it. I would not close my mind to it. I think there are some difficult issues.

CHAIR—So you think that governments, in looking at the energy needs of the next couple of decades, at least keep an open mind and see how these issues evolve?

Prof. Harries—Always and forever keep an open mind.

CHAIR—Just going back before Senator Hutchins started asking some questions, you mentioned the network infrastructure. Can you talk us through what you think ought to happen in terms of the network infrastructure to prepare ourselves for the energy challenges of the future?

Prof. Harries—One of the interesting things is that when we had competitive reform to produce competitive electricity markets, we said prior to that if you built a power station the cost of the network was absorbed into the cost of power. A power station was not faced with the costs of connecting to the network individually. It was just all added to the network. The coal-fired power stations are in the comfortable position of they are sitting on the coalfields, the network to those power stations was built under a different regime. If you now want to build a power station—gas or wind, for example—you are faced with the costs of connecting to the system. Unfortunately with renewable energy, for example, our grids are like a large water supply system. You can imagine large pipes going out and getting smaller and smaller and smaller. What we are trying to do with wind turbines and solar thermal if we put them on the fringes of the grid and we suddenly turn that around and get large amounts of water, electricity, coming back in but the pipes are small. To deal with that, you are going to have to have investment in changing the way a system operates. And that is in sheer capacity. We are also going to have to invest in what is loosely called 'smart grids', which is better measuring, better communications, better ability to quickly respond to turn things on and turn things off, moderate demand, so that

our network infrastructure is more flexible and we are better able to deal with the intermittency and with a large number of small systems connected to the grid.

What we have developed in the past is administratively a very simple system. You have large power stations pushing power out. You can turn one off and turn another on—for maintenance or when it falls over you have got spinning reserve. It is administratively quite simple. In going to different types of systems, different scales and different locations, you really are going to have to look at how the grid needs to change to accommodate that. And that is where the infrastructure comes in.

CHAIR—Senator McEwen, do you have any questions?

Senator McEWEN—I am sort of on a different tangent. You have presented very interesting evidence so far, Professor Harries. You are an academic and I am just wondering if you could give us an indication, from your point of view, as to whether governments have invested enough in the research side of alternative fuel and energy technologies.

CHAIR—As an academic I am sure you are going to say no to that.

Prof. Harries—I am an academic but I have also worked in very senior positions in government and I have worked very closely with the gas and electricity industry. In terms of research, until recently I would say no. There were years when, both on stationary energy and on the transport side, there was almost a complacency. If you read the energy white paper from 2004, *Securing Australia's energy future*, there was very much a complacency written into it of, 'Well, we have natural gas and other resources if oil depletes, and research is expensive. We have got a limited amount of research capacity and funding, so we will strategically target specific issues and follow the rest of the world in other areas.' While it is sensible to strategically use what funding you have available, I think there was an overcomplacency and we did underinvest in our development, basically in our fundamental research and in our commercialisation research. Some of that I think is increasing over the years. We have got some significant renewable energy research and development funds now. I think in the transport area we have been sadly lacking for a long time, and that is where we are starting to catch up, but there is an urgent need for more investment in that area.

Senator McEWEN—Is there a need for coherency? It seems to me that there are a lot of programs and research programs, including your own. Is work in Australia being duplicated? Do we need to be a bit more coherent about where we are putting our resources?

Prof. Harries—I think you are right. I think there is some duplication and there are some gaps. I think the concept of trying to develop things, like the Australian Solar Institute, where you can start to get an overall picture of what research is being done, and work out and coordinate what needs to be done, will make far better use of what research capacity we do have. The more that is done the better.

I have to speak with my Murdoch hat on. There are a small number of universities that have been very good at the renewable energy research. The University of New South Wales and ANU have been the leaders. Murdoch is one of the universities that has been, right from its inception, strong in renewable energy but, being in the west, has often had to struggle for funding. It is not

close to Canberra and is not seen as visible. I think, particularly in the university sector, some of that research has been underfunded seriously, and universities have struggled to maintain the research that they are doing.

Senator McEWEN—What do we need to do to get more private sector investment in research in this area?

Prof. Harries—That is a curly one. I think we have an interesting industry mix in Australia. It makes working with industry a challenge. We tend to have large numbers of large industries with headquarters overseas that do their research overseas. We have many businesses and companies in Australia that have a historical view that government does research, not industry. And some industries are prepared to do it in-house. I know some companies that just would really not want to do research with anyone; they are very protective and want to do it in-house. We need to be careful; there are industries and there are industries. Different industries will come on in different ways. The renewable energy is a very diverse industry made up from very large wind farms, where overseas wind turbine generators do not need any work, to small-scale. The work on PV systems tends to be more on integrating the systems and how they connect to the network, and that work needs to be done.

I think the way that we could encourage more industry to work collaboratively is to approach industry and invite them to talk more about their needs and how research can assist them in doing what they want to do. I think it is going to be a two-way talk. When you put centres of excellence together we often make the mistake of having the academics driving it and wanting to do certain things, and then of going to industry to support that. I think that what we have to do is get government, academia and industry talking together and talking about policy needs, industry's needs and what academia can do with the expertise, and come at research from a more collaborative approach.

Senator McEWEN—Do you have any suggestions about regulatory or taxation reform that might assist, in particular, in generating more private sector investment?

Prof. Harries—No, I am not a taxation expert. I could make some comments but I will leave it to the experts.

CHAIR—Are you involved in any way at all in the federal government's energy white paper process?

Prof. Harries—No, I have not had any input. I have just been distracted and busy setting up and so on.

CHAIR—This committee knows where we can find very good quality witnesses, as you can see. Hopefully the government will take some notice.

Senator BUSHBY—Thank you, Professor Harries, for your submission. I think it is well put and most of my questions have already been answered, but I have a couple. You mention that, in looking at both transport fuel and broader energy scenarios, we are probably looking at a diversity of options for the coming decade. Do you have a view on where we are likely to come

out at the end of that decade? What is likely to actually be able to provide us with the baseload potential for transport and also the broader energy needs?

Prof. Harries—By the end of the decade?

Senator BUSHBY—Yes. What do you think is likely to be the most promising to be able to deal with this?

Prof. Harries—For long-term fleets, I think we are going to be looking at increased use of LNG and both diesel and hybrid vehicles, and increased hybrid diesel vehicles based on biofuels. I think the short-term solutions are going to be increased efficiency through hybrids, LNG and biofuels. In the longer term I think we are going to be looking at greater electrification of the fleet. I am cautious about how quickly and about some of the issues associated with electrification of the fleet in terms of further requirements for investment in electricity infrastructure and some of the costs of those electrifications. Battery cost will have to come down quite a way before it is going to be a viable alternative for most. We have issues of constraints in world supplies of lithium, if lithium batteries are going to be the solution.

Dealing with the longer term I think we will be looking at hydrogen and fuel cell vehicles. I know the issue with hydrogen relates to the purity of the hydrogen, the high cost of purifying the hydrogen, and also with the need for a whole new energy supply system to wrap around that. However, I do believe it will be an option that will become increasingly important. It will only take a couple of technology breakthroughs to actually make it far more viable.

I constantly get people pushing their pet technologies. For some people in Perth at the moment it has suddenly become electric vehicles. That is the magic lever that is going to fix everything and they just dismiss fuel cells as being totally unrealistic. I point out to them that all we need is a technological breakthrough in fuel cell technology where the purity of hydrogen can be significantly reduced and you would suddenly make the cost of fuel cell technology in vehicles much lower. I do not dismiss anything at this stage.

I can see a likely projection of liquid fuels in the near-term solution. Where do those liquid fuels come from? There are going to be a variety of them. One of the things that I think is one of the great attractions of the biofuel industry is that, if you supply regional areas, you can avoid the cost of transporting fuels to those areas. So those regionals can become more energy independent, if you like, while developing those industries. I see those attractions of regional employment, regional business development and regional local self-supply as being hugely attractive for those areas. The motor industries make huge demands for liquid fuels. It would be very difficult to find alternatives for liquid fuels for that sector in the short to near term. I think coal to liquids or gas to liquids are going to be part of that mix. Then I think the electrification gradually and the hydrogen and other alternatives will come in beyond that. I think we are going to see a stepwise progression.

Senator BUSHBY—So the extent to what actually wins will depend on the technological breakthroughs and when and where they happen. You mentioned also that Australia, because of its abundance of opportunities in terms of the energy sector, should be investing in a number of ways to try and basically take its own lead. Senator McEwen raised the issue of duplication; surely there are places around the world that are all trying to do the same thing. Wouldn't it be

better to work in a more coordinated way with the efforts and make sure that the dollars are maximising the benefit that we are getting for it?

Prof. Harries—I certainly believe in maximising the dollars and not duplicating. I think we need to be a little bit cautious about assuming that all the research will be done overseas and that research will be totally applicable to Australia. Also we need to be cautious about, if all the research is done overseas, how quickly it can be imported into Australia, because we do not have technical understanding, the expertise and so on. I think there is a virtue in investing in Australia having the capacity to welcome these technologies and to understand them. If we are talking about a 50-year period, I would be more complacent and relaxed but with Australia's significant projected decline in oil over the next decade, I just do not think we can afford that complacency and I think that creates a need for us to be prepared to invest more for that readiness.

Senator BUSHBY—Those two questions I asked were actually linked in a way. We are a huge country and we do not have infinite resources to be able to invest in these things. I was curious as to whether we should be focusing our research dollars on what we think are likely to be, or whether we try everything and spend lots to see what might work in case there is a technological breakthrough.

Prof. Harries—The Minister for Planning and Infrastructure here in Western Australia, when she was working on and supporting the fuel cell bus trial, asked me, 'Am I my backing the wrong horse?' I said that there are not that many horses in the race. In the transport field there are not a huge number of technologies or fuels out there. I think we can be fairly sensible about which ones are likely to be useful for Australia and the extent to which we need to pitch our limited research funding at those areas.

Senator BUSHBY—Which ones would you focus on?

Prof. Harries—For the ones that we really need to focus on, LNG and CNG, that work is happening. Large companies are investing in new, more efficient refuelling systems, and I think that is coming from overseas—we do not need to invest in that. Where we do need to invest is in our local feedstock, our biomass particularly. What are the particular issues related to that biomass? We could also look at some of our coals and even our gases. What are the particular variations to the processes and technologies that we are going to have to meet to optimise those processes? I think that is where we need to be focusing.

Senator BUSHBY—Should government be investing directly—you mentioned that large companies are looking at the LNG side of things—or should it be creating a climate in which it makes it attractive for private enterprise to do some of this research?

Prof. Harries—We should always be trying to get private enterprise involved as much as possible, for a number of reasons. I think there is a lot of expertise within the private sector and if we do not include it we are missing that expertise. I think there is a sense of ownership too—you get better research if the local industry sees the applicability to it. I am not saying it is easy—I think there are challenges—but I think we should be looking for ways to maximise the involvement of industry as much as possible.

CHAIR—Thank you very much for your contribution to the committee.

Prof. Harries—Thank you very much for the opportunity.

[9.47 am]

BARICH, Mr John Robert, President, National Civic Council

HARTLEY, Mr Dunstan J, Secretary, National Civic Council Western Australia

CHAIR—Welcome. I invite you to make a brief opening statement and then the committee will ask you some questions.

Mr Hartley—Our submission left power generation, industrial energy and so on to the big players. We concentrated, in particular, on biofuels and especially on ethanol as a particular biofuel. The petroleum industry, as you are probably all aware, is very limited in supply. Although it has been meeting the demands of the 20th century, it shows signs of diminishing quite considerably over the next century and, of course, demands are increasing, if anything, especially as the new economies of the world come into play—that is, China and India. So we have to look at alternative fuels. We think that solar, geothermal, water and so on are probably in the developmental stage at this stage, so we have to go for something a little more immediate and that is where the biofuels come in, in particular ethanol.

The biofuels are generally considered to be bad from the point of view of emissions, but I think you will find that that relates to fuels from things like corn, wheat and palm oil. The emissions problems with these are far greater than with ethanol. An RAC report put out recently by Mike Upton, its vehicle policy manager, stated that 10 per cent ethanol blends produced from wheat stocks result in a small reduction in greenhouse emissions but that there is little difference in the emissions of those fuels produced by corn. Ultimately, you have to look at ethanol produced by some other source. The source that we consider the most appropriate in this case is ethanol produced from sugar cane. One country, Brazil, is already producing ethanol from sugar cane to a large extent. It has now been overtaken by the US as the major producer of ethanol in the world and the US aim is to replace 30 per cent of its fossil fuels with ethanol by 2030. Ethanol itself is greenhouse neutral—that is, the more ethanol used in cars, the less net CO₂ is added cumulatively to the atmosphere. There is also quite a good reduction in exhaust emissions producing carbon monoxide, hydrocarbons and the like which are responsible for chronic illnesses. According to Professor Ray Kearney of Sydney University, about 1,400 people die in this country from pollutants emanating from fossil fuel vehicle emissions. He estimates that petroleum comprising 10 per cent ethanol can cut these problems by 50 per cent. The AMA has come on side as well: it supports 20 per cent of biodiesel in diesel and 10 per cent of ethanol in petrol.

Can the ethanol industry be established in Australia? The answer is, of course, yes; we are one of the foremost wheat producers in the world. The argument against wheat production for ethanol is that it will divert food from this country, and also from poorer countries which depend on it. That may very well be the case with wheat, but it is certainly not the case with sugar cane because, as you are probably aware, the sugar cane industry in Australia is underutilised. There is a heck of a lot of capacity with the ability to expand into areas in Northern Queensland plus the Ord River. The sugar cane produced in Australia is more potent, in a sense, than the sugar

cane coming from Brazil, so the amount of this high-quality cane required to make ethanol would be a lot lower than in Brazil.

Regarding the pricing of ethanol, we found that between 1980 and 2002—because of increased yields per hectare, content, ethanol yield and fermentation yield—the price fell in a linear fashion. That is predicted to continue with bagasse, which is a by-product of cane production, if it is used for ethanol production. The Western Australian and Northern Territory governments have investigated the feasibility of establishing a sugar and ethanol industry based in the Ord River and we were advised by the Premier's department last year that one of the options examined indicated that an ex-refinery price of 50 to 56 cents per litre could be achieved with our current production. This equates roughly to a crude oil price of about \$56 a barrel. About this time last year, the crude oil price rose quite considerably to about two and half times that figure. It has since fallen and the price probably is a lot less than \$56 a barrel at the moment.

The interesting thing though is that, whereas previously prices at the bowser worked in linear correlation with the crude oil price, the reverse seems to be the case now—that is, that as the price per barrel of crude oil is dropping the price at the bowser is still increasing. This means that we have a fairly urgent necessity to consider some alternative fuel—and we think ethanol is the one that would fit the bill. There is also the possibility of a spin-off for the car industry, which is pretty moribund in this country at the moment. Australia used to produce something like 70 per cent of the cars driven on the roads here but now, with import tariffs and things dropping to five per cent, there is a much greater demand for overseas made, imported cars.

Holden in this country is manufacturing a VE Commodore, which is exported to Brazil—where they use a 24 per cent ethanol mix to run their vehicles. There is no reason why Australia cannot regenerate its flagging car industry. We are looking at perhaps a figure of one million cars annually produced in this country. The Prime Minister recently indicated that he was going to supply Toyota with a grant to help them develop a hybrid vehicle. We think that in fact ethanol should be assisted as well because it will provide quite a lot of benefit to this country if that is done.

In the balance of trade figures that were around about three or four years ago, we ran up a bill of about \$12.8 billion a year for crude oil. Given that crude oil at that time was about 2½ times \$50 a barrel, the bill at that stage was \$32 billion a year. Anything that would enable us to reduce that balance of trade for crude oil would be highly appreciated I think in all circles. There is also the fact that if we have a vehicle industry existing in this country then spare parts will also be produced here. The deficit in relation to vehicles and parts is around \$18 billion—that was in 2005. If we use ethanol as a fuel base here then that would considerably lower those deficits—which is, we think, worthwhile.

The greatest thing on ethanol was something put out in the *New Scientist*, which I can give to the committee if you wish. That is an article about using ethanol to boost conventional car engines so that the ethanol gets used with the petrol. The Ford company considers that this type of association of petrol and ethanol gives this vehicle that it is developing an advantage over the hybrids, which are the ones I was talking about before which the Prime Minister has recently provided a grant for.

CHAIR—Would you like to table those documents?

Mr Hartley—Yes. In conclusion, I think that basically the country is well positioned to take advantage of the sugarcane industry at this stage and we need to cut down our reliance on overseas fuel because ultimately the OPEC companies are the ones that control its price. We are at their mercy virtually. If we can do anything to be self-sufficient in that regard, I think it would augur well for the future of the country.

CHAIR—You mentioned that the ethanol industry should be assisted similar to the way the hybrid Toyota cars were assisted. What sort of assistance are you thinking about there?

Mr Hartley—I am basically concerned about agricultural assistance to get the ethanol industry up and running—that is, some kind of assistance to the sugarcane farmers in the country.

CHAIR—Are you talking in terms of money or a policy framework? What is it that you are talking about?

Mr Hartley—I am not an authority on infrastructure for industry, but I think this gets into that sort of field. It is basically about agriculture to get the ethanol areas cultivated and then, once you have got that, you need to have plants for distilling the sugarcane and getting the ethanol out of that. We had a plant in the north-west of Western Australia which has since been closed, and that to us is a retrograde step. We need to make sure that these plants are available to actually produce the raw ethanol from the sugarcane.

CHAIR—Your basic proposition is that we have to reduce our reliance on overseas oil and that ethanol is the main answer on that. Do you have other avenues that you think ought to be explored in terms of reducing that reliance on overseas fuels?

Mr Hartley—I think basically we are looking at just ethanol at this stage. Liquid gas and that sort of thing is currently going ahead. People are using it. But it is not the complete answer obviously.

CHAIR—There is obviously the oil in terms to the transport fuel sector, so to speak. In relation to the stationary energy sector, do you have a view on nuclear energy as the National Civic Council?

Mr Barich—Can we come to it later? Do you mind if we exhaust the issue of ethanol issue first, because maybe we will table this as well.

CHAIR—Sure.

Mr Barich—Dunstan did not mention it, but we are really asking for mandating. That is in our brochure.

CHAIR—That is in relation to ethanol?

Mr Barich—Yes. New South Wales has mandated two per cent. We are asking the federal government to get involved in that debate.

CHAIR—Okay, if anyone has any questions in relation to ethanol, let's deal with them first.

Senator HUTCHINS—Do you think that there should be mandated ethanol?

Mr Barich—Yes, that is our policy. As Dunstan said, it was a great pity to see that the processing plant closed down on the Ord River. So we have all this cane growing up there and it is not going anywhere. It is not being used sugar; it is not being used for anything. We were very keen on that because up until that point only Queensland was taking part as an interested parties. Well, I think Western Australia is an interested party. I went to see the Farmers Federation, and I am disappointed that they are not giving evidence to you because they were very supportive. They took a hundred copies of that brochure that I just tabled. So I really think there is an interest in this state in not only sugar production but also ethanol.

The other thing that Dunstan mentioned was the conclusions of the premier's department. That actual report is worth getting. You should be able to get the report—I think it is about 20 or 30 pages. They spent about a year working on that, and you may have it already. The reason we got involved in this in Queensland of course is that there was a glut. They had so much sugarcane coming out that farms were being closed down. We felt this was very negative. These were family run farms and these people were going to be displaced. Some people are comfortable with that—they think that the sooner they are displaced the better. I am not comfortable with that, and our organisation is not comfortable with that. We feel that governments should preserve those family farms and that therefore it has to find outputs for them. Sugar is one of those, but the competition from other producers around the world is pretty tough. So why not produce ethanol, when Brazil has done it so well. Hopefully you are sending someone to Brazil to investigate it. I saw an ABC program which was unbelievable. It showed one of the cities—I cannot remember whether it was Brasilia or another city—before and after. Before it was like Beijing—you could not see two metres in front of you—and then they introduced ethanol and there were beautiful clear skies. It was proof positive that it works. Maybe that is enough on ethanol and we can switch topics.

Senator BUSHBY—You mentioned that ethanol could be produced for roughly 55c per litre.

Mr Hartley—The Premier's department said that, yes.

Senator BUSHBY—What sort of return does it provide to farmers?

Mr Barich—We are not agricultural economists, but people we speak to, the Farmers Federation here and our people in Queensland, think it is sufficient for them to be interested.

Senator BUSHBY—That figure is worked up on the basis of paying for the raw product, which would deliver a reasonable return.

Mr Barich—That is right.

Senator BUSHBY—You also say that that should be mandated. The National Civic Council is suggesting that there should be a mandated minimum level of ethanol in each litre.

Mr Hartley—Yes, in each litre of petrol.

Senator BUSHBY—Is that the only way that you think that ethanol could be promoted?

Mr Barich—That is the only way that we put in the brochure. Maybe there ought to be a tax incentive or an excise incentive. You have 36c in the litre, so you have a lot of movement. You could encourage ethanol use by reducing that cost to the consumer. I do not know.

Mr Hartley—There are other options.

Senator BUSHBY—What do they do in Brazil that has led to them having—

Mr Hartley—I really do not know. I have not followed that one up.

Mr Barich—I would say it would be mandating, mainly. There may be other things as well. We have a Brazilian ambassador in Canberra. Maybe he could tell us.

Senator BUSHBY—I am sure the secretariat will be able to find that out. Thank you.

Senator McEWEN—Can you explain why the ethanol plant in northern Western Australian closed down?

Mr Hartley—It was not ethanol. I think it was just processing sugar cane. Sugar production is on the decline because of various factors around the world—the dumping of sugar in countries and that sort of thing. That is why they could not compete. This is the same for people in Queensland who are growing sugar. They cannot compete and so—

Senator McEWEN—So it has not actually got to the stage of ethanol production.

Mr Barich—No. They are not producing it.

Senator McEWEN—The sugar cane is still growing there?

Mr Barich—Yes, as far as we know, and there are plans for more growth. But they have got to have a market. They cannot just grow it.

Senator McEWEN—I take your point. The main thrust of your submission is the security of transport fuels, but are you also interested in the potential for biofuels to reduce carbon emissions? Is that part of your program in this as well?

Mr Barich—Yes. That is in the pamphlet *Green Energy, Green Car* that we have tabled, absolutely.

Senator McEWEN—So what is the NCC's position on reduction of carbon emissions?

Mr Hartley—According to this paper that you have in front of you, the NCC's position on the reduction of carbon emissions is that ethanol is carbon neutral. That is all that I can go on. Whether or not that meets with the criteria that are currently being promoted around the world is anybody's guess, but certainly we have information that suggests that it is carbon neutral.

CHAIR—Did you have a view in relation to nuclear?

Mr Barich—Yes, we have a very strong view. We have always supported it from day one, given that it is so plentiful in nature. I was pleased to see the academic who gave evidence a minute ago mention lithium. Is not just uranium that is coming out our ears; we have lithium. It seems to me to be absurd to think that in a world that needs energy somehow we do not get interested in nuclear. I was on the Danube a few years back and I was just stunned. You go on the boat and you see a building that looks like the art gallery in Canberra, and it is a nuclear power plant. There is not a puff of smoke—nothing. Every time you see a vision of pollution they show you smoke stacks of the coal. By the way, that is a big lie because CO₂ is invisible. All they show you its fumes coming from stacks, which is water vapour. Anyway, that did impress me.

I know there is the problem of what you do with the spent rods. We should be researching new technologies with the Americans and others. Plus there is the fact that you can dispose of it in deep trenches and so on in the middle of Australia or Africa or somewhere.

Senator McEWEN—Or Western Australia?

Mr Barich—Well, yes. I am not against it. You have to take some risks. I do not think it would raise the risk if you used synrock and so on—but that is a scientific issue. We cannot turn away and say, ‘This doesn’t count.’ The other day we had a China expert give us a talk, and she told us something that is apparently a well-kept secret: by 2050 China will be completely nuclear. They are bringing in one nuclear power station a week, she said. We were talking about pollution due to coal fired stations. They are buying our coal, and we kept on saying, ‘Good on you, China.’ But their long-term plan for 2050, which is not long away, is to have total nuclear energy production. We ought to think about that.

Of course the Indians have already asked to buy our uranium, and we have said no to them because they are not a signatory to the nuclear non-proliferation treaty. I understand that. The NCC has supported nuclear power generation from the beginning.

Senator McEWEN—What about your support for renewable energies such as solar?

Mr Barich—Yes, we are keen on that. We have solar power panels on our roofs and we use wind energy. We do not like too many of those horrible-looking things. Some of our people in Victoria objected to them. You cannot have them for base generation. They are all right for adding two per cent, but base generation has to come from nuclear or coal or something really strong. The other things are really just add-ons.

CHAIR—Is there anything that we have not touched on that you think we should discuss?

Mr Barich—Yes. I will just mention the Kimberley hub. It was not a big issue at the time, but maybe the committee will have a view on it. I think you need to say something about it. People stop progress by inventing all sorts of problems with it, even to the point where former Senator Ellison, who I think was going to do a very balanced job, had his position threatened because they thought he had a vested interest in pushing for it. I think he probably would have come up with something. I know him. He is an honourable man.

CHAIR—What is the issue that you want to raise?

Mr Barich—I think the committee should look at the hub and ask whether it is environmentally sustainable and what it would add to the Australian economy and so on instead of just making it look like a Western Australian issue. I think it is an Australian issue because it is going to generate a lot of dollars for our economy.

CHAIR—We certainly have assessed issues related to the LNG industry in our hearings so far. Thank you for your contribution.

The committee will suspend because Western Power is not able to make it due to witnesses being ill.

Proceedings suspended from 10.13 am to 11.07 am

WILLS, Professor Raymond Thomas, Chief Executive, Western Australian Sustainable Energy Association Inc.

CHAIR—Welcome. Would you like to make a brief opening statement.

Prof. Wills—I know that I have appeared before the committee before but, for the record, I will make a primary statement on where the association has come since we were last here.

CHAIR—When we last met it was in relation to the Carbon Pollution Reduction Scheme. Have you been made aware as to what the current focus of the committee is?

Prof. Wills—Yes, I have that in front of me. The WA Sustainable Energy Association is now Australia's largest state based body in this sector, although it is a bit hard to talk about the sector of sustainable energy because it covers all things. We have everybody from architects and builders all the way through to renewable energy generators and retailers. We have both customers and suppliers as members of the association. Membership of the association is based on the criterion that a business is interested in sustainable energy, whether it is as a supplier or product producer or as a customer buying those services or goods. We are delighted as an association with the continuing and growing support we are getting from the business community for our work.

CHAIR—What do you see to be the major issues for Australia in terms of energy security moving forward?

Prof. Wills—There is a whole range of issues that come into play there. Obviously, one is that while Australia is an exporter of non-renewable resource energy in the form of coal and gas we are also a net importer of, particularly, liquid fuels and of petroleum and oil products. There is an opportunity through a range of measures to ensure that we are less exposed to that as a market and, also, less exposed in terms of the rising costs of those products. So there is an opportunity for Australia to take some action in that space.

The cheapest form of action is always energy efficiency. There is a range of measures that exist—and referring to the terms of reference—particularly within taxation that can encourage local production of fuel and a local reduction of energy consumption through energy efficiency. And there are a number of measures in the tax code—referring of course to your terms of reference (f) here—that can have bearing on that from not only a supply and demand point of view but also from the point of view of promoting security and also promoting national productivity. An example may be in the refrigeration area. In 1999, refrigeration standards around the world started to change on the back of both the Montreal protocol to do with ozone depleting gases but also on the back of the European Union's standards for refrigeration demanding increases in energy efficiency. Within our tax code, if you buy a piece of refrigeration kit or similar sorts of equipment, depreciation schedules are usually for about 16 years so if you find yourself having bought a unit in 1998 or 1999, before these standards changed—when energy efficiency increased—you still have at least another seven years of using that piece of equipment until such time as depreciation schedules allow you to retire it. There is a whole range of products that cross a range of sectors, whether it is printing equipment,

refrigeration equipment or motor vehicles, in which many standards have changed in a period of less than 10 years and very often tax depreciation schedules are set for a period of 16 years. I think that is a neat example of where the tax system actually encourages you to keep a less productive piece of equipment than might otherwise be the case if you were allowed to get to accelerated depreciation.

Clearly, one way of dealing with that in the tax system would be to indicate, perhaps through a ministerial measure or through some other measure that is written into the tax code, that there can be a trigger for it at which there has been a paradigm shift in technology, and that trigger point can then be applied to say, 'This group of equipment can now be retired on an accelerated depreciation schedule,' and therefore assist the business in becoming more efficient and more competitive as their energy prices or other attributes change. And it may not just be about energy; it could be a whole range of measures that allow that change to occur and create changes that will ultimately be measured in Australia's gross domestic product and in our productivity.

CHAIR—That is very much on the demand side of the equation. What about on the supply side of the equation? How do you see our energy mix evolving over the next decade or two in the context of meeting what is expected to be a growing demand for energy, even if we are as efficient as possible?

Prof. Wills—I guess that in that space demand side and supply side can be altered through the processes of alternative forms of, for example, delivering energy for motor vehicles. Electricity production is one way of doing that and electric vehicles are one way of doing that. While we are a net coal and gas exporter and, while there are opportunities—for example, for LPG vehicles to be making use of our domestic gas product—to actually impact on the import of oil and petroleum products, if we were actually looking as a nation, particularly through the Green Car Innovation Fund or similar mechanisms, to actually encourage electric car production as a mainstream thing that Australia did and as a mainstream piece of equipment that we utilised, then of course we could actually be using local generation of electricity rather than imported fossil fuels to fuel our motor vehicles and our automotive fleet.

CHAIR—Do you have a view on the hybrid car?

Prof. Wills—There is a range of technologies that we need to look at as we try to reinvent the efficiency of motor vehicle transport. While the combustion engine is a very evolved and very mature technology, it is still only about 20 per cent efficient. The energy that you put in compared to the energy that is utilised is only about 20 per cent. In electric vehicles that factor is about 80 per cent. So there is a dramatic improvement in terms of your ability to input energy and get work out of that energy.

CHAIR—But from an environmental point of view you end up with a battery at the end as a waste product. Those that argue against nuclear often point to the waste. It is a similar circumstance here isn't it?

Prof. Wills—Only because of the absence of scale in Australia. Batteries are 100 per cent recyclable and the materials are reusable. The problem for Australia is that we do not actually have those recycling facilities in Australia. So with nickel hydride batteries all of that can be recycled overseas; it is just that Australia does not actually have the demand internally to create

such a plant within Australia. The other part is that, for example, motor vehicles require high-performance batteries, and once they get to about 80 per cent of their capacity—that is, a 20 per cent reduction in their energy output—they stop being useful for motor vehicles, but they are actually still a valid storage device. So as you build up these banks of batteries, even though a car may no longer find them useful as a storage device, within an energy system there is still at least another decade of life in those batteries. You can actually still usefully store energy in them and take it out. So it is, ironically, an opportunity for the car to be in part an environmental contributor to the reduction of greenhouse gas emissions, to the development of energy storage, and to a range of other technologies that come in concert with that, that ultimately will provide greater opportunity for renewables, especially intermittent renewables, to be introduced into the grid because there will be a storage system as a part of that. The technology I am referring to is becoming widely researched across the world; it is being referred to with the throwaway line of ‘vehicle-to-grid technology’, whereby cars are used as an energy storage system as well as being a form of transport.

CHAIR—So what are the things that you think government should be doing that government is not? And I mean ‘government plural’; I do not mean this particular government. What are the things that governments are not doing that you think they should be doing to facilitate some of these things?

Prof. Wills—In sustainable energy use, there are a diversity of approaches. Energy efficiency is an important part of sustainable energy use. As you go through a process, the very first thing you should do in terms of energy use, just as with water use, is work out what it is that you do not need to use and then avoid its use; and, in the places where you do need to use it, you need to use it as efficiently as possible. In water use, we are seeing improved irrigation technologies and so on being applied, and the same sorts of rules apply to energy. So, within energy, after reducing unnecessary use, the next thing we need to do is be highly efficient in our use of that energy. Looking at the building we are in, I see we are still using some DC down lights, but there is also some compact fluorescent use. That is energy-efficient use: we are still getting the same amount of light but using about one-fifth the amount of energy to deliver it. That is becoming energy efficient.

The step beyond that, I guess, particularly if your target is to reduce greenhouse gas emissions, is to go to renewable energy sources where possible. And then, finally, where you continue to use greenhouse gas emitting fuels, you start to look for offsets and other ways of accounting for the fact that you are releasing carbon emissions, by going to an alternative way of attracting that.

Going back to my starting point about energy efficiency, though, the key there is that energy efficiency is properly acknowledged as the lowest hanging fruit; it is the easiest thing that you can do. In Australia, we really have not grasped that idea as yet. We really have not gone the hard yards to improve our energy efficiency, and in part that is understandable because energy in Australia has traditionally been cheap and therefore to spend money on saving that energy has not necessarily had an economic return. But, although we do not like to see sprinklers left on in summertime—or in wintertime—at the moment we are still quite happy to see the streetlights on.

Senator BUSHBY—Do you have access to any information that suggests what percentage of savings could be possible with a concerted effort on energy efficiency?

Prof. Wills—Yes, I do. There is a good amount of this information on the web, but I can certainly make those resources available, yes.

Senator BUSHBY—Thank you.

Senator HUTCHINS—Professor Wills, you referred to refrigeration and you said there was no taxation incentive to update the technology because of the depreciation—and the trigger point, you said, comes in the technology. Are there any other commodities that are in the same predicament, or is that almost all these devices?

Prof. Wills—Very often, the triggers for changes in the technology are preceded by a regulatory change that requires sudden innovation. For example, refrigeration was one of those, where there was a dual need in relation to ozone-depleting gases as well as a demand for more energy-efficient appliances. The same is true across a whole range of other equipment. Printing presses, for example, also started to be exposed to those European standards in the late nineties. They have changed dramatically. I note that that is something that the printing industry have raised with us as an issue for them. They would like to move to more energy-efficient appliances, but the reality is that, with the relatively low cost of power, the economic investment to do that is not there at this point, until such time as the tax system allows them to do it. So it is more cost neutral, and it is about overcoming that cost neutrality to actually gain some incentive and also to gain some momentum in the market to create those changes.

There are many, many examples. The motor vehicle fleet is another example. Vehicles that were built in the last century generally are less safe, more polluting in terms of particulate emissions and more polluting in terms of greenhouse gas emissions separately from particulate emissions. They are therefore impacting on air quality with the particulate emissions. They are less safe; they generally do not have airbags or a whole range of other things. If you look across many industries—in particular, the push that was created in Europe—there have been significant shifts in many areas and in many technologies, so there are great opportunities to actually harvest those at, I think, a relatively low cost.

Senator HUTCHINS—I presume Europe have high energy costs which have led them to make the changes.

Prof. Wills—Yes, and that is not only electricity but also of course motor fuels. With a much higher level of excise, motor fuels have been and are at least 50 per cent higher to double Australian costs in the same area.

Senator HUTCHINS—Are there any nations that have in their taxation system the ability to rapidly respond, rather than just saying that it is not there in our system at the moment?

Prof. Wills—I am not aware of it and I must say that I am certainly not a taxation expert. I am simply making an observation about opportunities for change. Having said that, I am also not aware of anybody drawing those examples to my attention—having had these conversations with those people. So I think it would actually be an interesting policy initiative from Australia's point of view to demonstrate some fairly simple regulatory measures or in this case some taxation measures that could create fairly rapid change.

Senator BUSHBY—Talking about carrots—effectively taxation carrots—what about sticks? Do you think there should be sticks on the other side of the coin in terms of technology that is not as attractive, or do you think that the best approach would be to make the path easier for alternative and more environmentally friendly sources of energy to be developed?

Prof. Wills—I think in any community, whether it is a business community or community more broadly, you always get a group of volunteers and there is always at least three or four per cent of people who are prepared to volunteer and step up to something. That is true in a business community as much as it is across the general public. After that you get a whole suite of folks—whether they are businesses or people—that are actually quite prepared to take measures, seeing that that group of volunteers are doing it, but are not necessarily prepared to change until they are told to. Of course, from a constituency point of view, it is really important that that extra cohort adds up to something over 50 to create some incentive and some support for that change. I think we are actually in that place. We have been in that place with water for 10 years. We are certainly now in that same place with energy.

Senator BUSHBY—You are talking about consumers. I was getting at the taxation treatment. You are talking about depreciation for consumer and business uptake, but what about the development of technologies?

Prof. Wills—Thank you for drawing me to the point. That is where regulatory measures can be quite useful because, in that situation, that scenario where you have at least half the population wanting to see change but really not prepared to undertake it unless they are told to, is where regulatory measures come in. You can only get so much volunteering, even with economic incentives in a population. At some point though people recognise the good of the move; it is just that they are not prepared to make it until they are told to. So in that balance you need character, but you also need stick. You need some regulatory change to create impetus for it.

At a business level, I think a very interesting example is that of Alcoa. Alcoa as a company that globally, since 1990, have reduced their emissions by—I believe the figure is—around 36 per cent of their global operation. One of the significant contributors to that change was in fact Alcoa changing the way that the anode in the smelting process worked. There was no financial incentive to create that change, but there was a technology that existed to assist the change.

Senator CORMANN—You say no financial incentive. Energy costs obviously are a huge driver of costs, so there really is a financial incentive to—

Prof. Wills—Absolutely, but in this instance the anode that they replaced with a new technology or with a different kind of anode did not consume any more energy, but it released a whole range of greenhouse gases. The only incentive was in fact that Alcoa, being an early mover in the US context, said, “Well, if we’re going to see a carbon price coming, we are going to do something about changing our anodes now,” and they changed their anode in this reaction. It was a cost-neutral change. There was no real incentive to change it from a financial standpoint, but with a view to the future of what carbon might cost them. They changed the anode in a cost-neutral way but in a way that actually reduced substantially their greenhouse gas emissions.

Senator BUSHBY—As an example of the stick approach, effectively.

Prof. Wills—Yes, it is.

Senator BUSHBY—There is a potential stick-up there and we would like to avoid that.

Prof. Wills—In a sense, as early movers, they did it by way of volunteering rather than responding to regulation.

Senator BUSHBY—As I understand it, in the aluminium industry there have been energy savings as well as emission savings.

Prof. Wills—There have indeed.

Senator BUSHBY—A lot of that has been driven by the potential, because energy is such a huge proportion of the cost of the aluminium industry. If they can reduce that by even small degrees, there are large savings to be made.

Prof. Wills—Absolutely.

Senator BUSHBY—So there is a financial incentive for them to do that as well. I am wondering to what extent should the government be involved in making it easier for the new technologies to be developed which allow business to then go out and say: 'There's something that can provide us with a financial incentive to adopt things like that. It's good for us as a business, it's good for the world in terms of emissions; it's good for the country in terms of its economy.' Rather than the stick, they are trying to pick winners—for want of a better term—that they can invest research dollars in or provide taxation breaks for if people are investing in technologies which may well deliver those sorts of outcomes.

Prof. Wills—Within the tax system, it is important that the tax system has the capability and expertise embedded within it to recognise those changes and the need for those changes so that the regulators can create measures within the tax system that do that. Moving back to the question of what governments can do, for the most part they can provide certainty in regulation. One example where we have seen a lot of fluctuation, causing market uncertainty, has been in the solar industry. Just about every year for the last eight years we have seen changes in regulations around the solar industry and what this year's form of rebate or support might be. My members have seen in the last eight years 12 months of sudden stimulus followed by another 12 months of the government backing down and then another 12 months of the government saying, 'No, we're going to stimulate the market again.' That is a degree of uncertainty that has been created by the government. Market certainty is one thing that governments can provide. From the industry association's point of view, the reason that we would like to see movement on an emissions trading system is to establish certainty. While I understand the complexity and the arguments on both sides as to reasons for moving quickly or slowly, my view is that the reason for moving quickly is in fact to introduce market certainty. We know with seeing that same—

CHAIR—As long as it is not the certainty of a bullet, as somebody else said.

Prof. Wills—That is right. It needs to be appropriately delivered—not the bullet, but the solution.

Senator BUSHBY—We are not here to argue that point.

Senator McEWEN—Aww!

Senator BUSHBY—I would love to take that one up and have a bit of a debate on that, because, in terms of certainty, what business needs in my view—and I would be interested in your view—is long-term certainty about the ETS will look like. That may not necessarily become apparent until we know exactly what the rest of the world is doing after Copenhagen.

Prof. Wills—We could get stuck on an ETS. I agree with you. If I can come back to the point, it is about creating conditions of certainty. Government is the facilitator of all things in the community and is a facilitator of business structures in the community through their legislative powers and through policy and practice. It is really important that there are constant and consistent signals coming from government. One thing might be at the simple base level of the government's own operations. If a government is looking to support renewable energy and looking to promote energy efficiency then that government should be an icon in doing those things in its own operations. At a federal level, the Australian government is a \$200 billion operation. There is a great opportunity through procurement and purchasing decisions for government to lead the way markets develop. The advantage of that is that you can send a consistent market signal as a purchaser of such scale without having to change a law or to change any other factor. There are some great opportunities to create that change as a market force, especially at the starting point. At the start of any new technology and market base, very often the cost is higher. If there is community desire to see those changes occur, then for the government to be expending public moneys to create that change as a starting point is a very attractive option.

Senator BUSHBY—I do not argue with that. That is probably a justifiable role of government. But it has to be balanced against an obligation to also provide taxpayers with value for money in terms of the services that it provides.

Prof. Wills—I agree. But it is also very important to not confuse least cost with best value, because sometimes the best value solutions are not the cheapest solutions. It is important that we keep that in mind.

Senator BUSHBY—I have one final question. In terms of lighting—and this is a very small point but it is quite important for the people it affects—I have had a number of representations from people who have lupus. They are photosensitive as a result of the disease that they live with, and the fluorescent lights actually cause them problems. There are also people with other conditions who are photosensitive and have the same problem. Do you have any views on how people with issues like that should be dealt with? They have real problems with the way that the lighting is going.

Prof. Wills—Yes, certainly. There are a couple of alternative solutions. The first is, of course, using things like modern skylights, which are effectively fibre-optic conduits of sunlight into buildings. That technology is freely available today. That can be used to light a building during

the daytime. Clearly at night-time there is a challenge; you need to actually switch on a light. The second part—and this is where government does have a significant role to play—is in regulatory standards around the lighting systems that we install. With the incandescent globe it was by default, without any planning, a suitable light for those sorts of conditions. In inventing and creating compact fluorescent lighting, nobody had any sort of forewarning that this might be an issue. So I think there is an opportunity for government to step into that space as a regulator and say, ‘Actually, we need to be aware of these sorts of things; this is important for the health of the community.’ Ultimately it is the public purse that generally pays for health of the community so it is important that government step into that space as a regulator. I agree it is of concern. I think it can be dealt with. It obviously needs to be dealt with at a global level in terms of setting global standards for this. I suspect the Europeans would be great allies in this as they have always been very good at creating good regulatory environments, for the most part.

CHAIR—Just going back to the question before in terms of valuing, you seemed to suggest that sometimes the more expensive is not necessarily a bad thing. Is that what you were saying?

Prof. Wills—Yes, indeed.

CHAIR—So how expensive is a good thing and when does more expensive become too expensive?

Prof. Wills—Again, where the expenditure of public moneys is concerned, I accept that it can be a sensitive question.

CHAIR—But even private money—

Prof. Wills—Even private money. I guess the very obvious analogy to draw would be—and I have used this now a couple of times; I hope I have not repeated it in front of you before because it will not be new—with the difference in getting engaged between a zircon and a diamond. They both glitter but one delivers better value. One is more expensive and that will get the result you want. You can carry that analogy right across a whole range of products.

CHAIR—Surely—

Prof. Wills—You may not get engaged if you offer a zircon ring; you are more likely to get engaged—

Senator HUTCHINS—Is that the result you were referring to?

Prof. Wills—Yes. If you are trying to avoid being engaged, I guess it is a separate issue! You can take that to a motor vehicle. Clearly people perceive that different vehicles have different values. If a cheaper vehicle has an ANCAP rating of five and a fuel economy of six litres per 100 kays and a more expensive vehicle has that same rating, people may still buy that more expensive vehicle because they perceive more value in it. Sometimes that value is real; sometimes it is not.

CHAIR—Let me go right back to basics in terms of what the committee is focusing on, and that is creating an affordable, reliable, secure supply of energy in as environmentally sustainable a way as possible. Obviously there are a lot of competing pressures in all of this. What we are

trying to answer is: how do we find the right balance moving forward, given the energy needs moving forward et cetera? You have talked about energy efficiencies and renewables. Is that going to be enough to ensure that we will have an affordable, reliable, secure supply of energy moving forward?

Prof. Wills—Very often the word ‘affordable’ is thrown in when the word ‘sustainable’ is proposed, and very commonly the response is that, if it is sustainable, it is not affordable. I guess my response, as you may predict, is that very often we are not prepared to pay the true value of things. It is really important I think in the context of—

CHAIR—That is what I am trying to get to: how much do you think it will—

Prof. Wills—One of the challenges for us at the moment is that 20th century economics tells us that we are allowed to have externalities, and through the 1960s we started discounting some of those externalities. Water pollution started to be addressed, and then we started to address air pollution in the seventies. Then that led to tightening of particular emission standards and ozone depletion standards all through the eighties and nineties. As we have actually built business we have recognised many of those things that in the 20th century we regarded as externalities we are now internalising because they do have real costs. What we have to get better at is appreciating the full life cycle cost of a product.

CHAIR—Could I just interrupt, because you are not answering the question. My question is this: we are talking about improved efficiencies and the contribution of renewables, but is it going to be enough to meet the energy needs of Australia, moving forward, on the basis of affordable, reliable, secure supplies of energy?

Prof. Wills—Yes, it is. If we look at all forms of renewable energy that are available within Australia, we know that, for example, there is sufficient wave energy crashing on our shores, if we harvest it, to power most of Australia three times over. With 90 per cent of our population living within 100 kilometres of the coast, wave energy is a fantastic, consistently available energy form.

CHAIR—But not something you can do everywhere.

Prof. Wills—No, but probably two-thirds of Australia’s population could actually be serviced by wave energy.

CHAIR—And you have studies that substantiate that proposition? We are going to visit Carnegie Corporation this afternoon—

Prof. Wills—Fantastic.

CHAIR—and I met with them last week. They have explored a site in Albany and Albany will not work, so they will be doing their first major demonstration project outside Rockingham. They were explaining that it does not necessarily work everywhere.

Prof. Wills—The Carnegie report is quite conservative. They have estimated that they could provide power to 35 per cent of Australia, based on the report that they have. They are better

versed in saying what is available from those sources. Certainly, in terms of geothermal resources, the geothermal industry are saying that they have, as an order of magnitude, more energy in geothermal resources than is required by Australia at this time.

If you look at the wind resources in Australia, you will see we have world-class wind resources on our landmass. The Europeans build in oceans purely because their wind resource on land is not as good as ours. They have to build in an ocean, but we do not need to because we have it on land. Admittedly, with wind energy there are still some challenges in despatch and storage, but that is just a question of—

Senator BUSHBY—And parrots.

Prof. Wills—And parrots.

CHAIR—This morning the president of the conservation council, Professor Harries—do you know him?

Prof. Wills—Yes, I do.

CHAIR—He said that he agreed we should keep an open mind in terms of nuclear energy for Australia into the future. What is your view?

Prof. Wills—In terms of a technology and in terms of the association's view, we are technology neutral, so we do not have a necessarily positive or negative view on nuclear energy. Within the context of nuclear fuels being uranium, uranium itself is a depletable resource that does have a limited life supply. We know that the world's economic resources of uranium have around 50 to 70 years of supply at current rates of consumption.

CHAIR—Thirty per cent of it in Australia.

Prof. Wills—Thirty per cent of it in Australia. As a mineral resource, is it a good resource for Australia? By all means it is. In terms of Olympic Dam, which potentially will be Australia's largest uranium mine, it is interesting to note that it is also Australia's largest water consumer. So a question needs to be considered as to how sustainable extensive uranium extraction in Australia might be, based on the fact that we have limited water resources.

Without commenting on any particular project, this goes back to my earlier point about needing to complete life cycle analyses to understand the real environmental costs of a particular product. In the generation of energy, starting from mine site and going all the way to the delivery of electricity to the kettle to boil water, we need to understand the energy efficiencies, the energy flows and the costs that are associated with that whole life cycle.

Senator McEWEN—I was going to ask about Olympic Dam. You mentioned the enormous usage of water that is required to process the uranium, and I was interested in how you are looking at the whole life cycle, I suppose, of a process. How would you build in the cost of the desalinated water? That, of course, uses power that has to be generated.

Prof. Wills—Yes. Again, just to put another explanation to the Olympic Dam thing, ultimately all I am saying is that we need to actually do the life cycle analysis for Olympic Dam to make sure that it is within that sustainability principle. In terms of a desalination plant, it is the same. To move water, for example, in Western Australia from the Kimberley to Perth, you would need about 16 pumping stations and it would take a substantial amount of energy to move that water about because it is quite heavy. So, from the point of view of creating water from desalination, if you can create that water at the point of use and you do not have to pump it very far then you can actually make energy savings even though you have to expend energy to take the salt out of the water. That is where the life cycle analysis comes in. You have to understand the whole-of-life-cycle energy use to understand whether the way you would produce a particular product is in fact the most energy efficient way you can do it. Moving water 1,600 or 1,800 kilometres with pumping stations is not as energy efficient as using the water locally and getting desalinated water out at the end of it. The only caveat to that is that, if you then had projects along the length of that 1,600 kilometres, you might come up with a different answer to the question. But, if all it was was a long pipe to deliver it here, the answer is that it is cheaper and more energy efficient to desalinate it at the point of use.

Senator McEWEN—Yes, but not energy neutral, because you still have to provide some power for desalination.

Prof. Wills—Of course, unless you are using wave energy to power that operation.

Senator McEWEN—Do you think we do this very well in Australia—this whole life cycle of a project in terms of energy usage?

Prof. Wills—It is challenging. There is nobody around the world who is doing it really well. There are certainly a few places, particularly some of the Scandinavian and other European countries, that are starting to do it pretty well. But in Australia, no, we do not. If you look at a whole range of Australian take-up of technology, particularly in the sustainable energy space, you see that we are actually lagging a long way behind. I recently—a couple of weeks ago—put out a statement that compared Australia's use of solar energy to Scotland's. Scotland, as a nation of five million people, has about 11 gigawatts of energy generation; Australia, as a nation of 20 million people, has about 50 gigawatts of energy generation. They have 70 megawatts of solar installed in sunny Scotland, and we have 35. If we were to match Scotland's investment in solar energy per capita, we would need 140 megawatts. So we are a long way behind what many OECD countries are doing in this space. There are different opportunities in different places, of course. Scotland has 19 per cent of its energy generation from renewable sources, but admittedly a fair swag of that is from hydro. We do not have that opportunity across Australia, but we have other opportunities across Australia that we are not using. It is reflective of the fact that we have a lot of resources that, understandably, folks who have leases on those resources would like to see dug up and turned into wealth in many different forms, but we have similar sorts of resources shining down on our countryside, blowing across it and washing up on our shores that we can use in the same way if we have a will to.

Senator BUSHBY—There is not a direct comparison with countries like Scotland and other OECD countries. One of Australia's comparative economic advantages is its abundance of cheap energy, and I would imagine that the cost of energy in Scotland—I would be interested in your view; I do not know the answer—would be much higher than it is in Australia, where we have

access to cheaper fossil fuel based energy on the whole. You obviously have to balance the policy outcomes you try to deliver. Although Scotland may have nearly 20 per cent in renewables and we do not, there may be a whole raft of reasons why that has come about based on policy issues or even access to energy. Solar may be the best opportunity they have because of the resources they have available.

Prof. Wills—This same report said that out of, I think, 19 or 20 cities that they compared the best place to do this was in Perth and the worst place to do it was in Edinburgh. It is in Edinburgh that they were doing it. Also, coming back to the question of cheap energy sources, I guess the challenge for us in this century will be that we will internalise the cost of carbon. As that cost of carbon gets recognised, it will be shown that what we are referring to as cheap energy sources have really been, in the last century, energy sources on sale. The discount phase is now over.

Senator BUSHBY—But, whether on sale or not, that has provided an opportunity for Australia's economic development that other nations did not necessarily have. We may well need to face up to the fact, and the debate on appropriate ways of dealing with that, in terms of ETSs et cetera, is certainly full scale at the moment.

Prof. Wills—I accept that. Based on that wealth we have generated, we are the world's 59th largest nation by population, we are the world's 15th largest nation by GDP and I think we are the 13th wealthiest people in the world. I think we are a nation that can actually now afford to make some of the changes that we recognise have to be made in the 21st century as a nation. If we are not ready to not only capitalise on the wealth of our renewable resources in the country but also make use of the innovativeness of Australians to tackle that space, if we use our fossil fuel wealth to stall our ability in the renewable space because of a perceived value of continuing to dig up and export coal, then I think we will miss an opportunity. If we see carbon tariffs from the US and Europe and instigated as well by China, who have been talking about it, that is where my concern comes from about energy security and national productivity. If we miss that boat and we are still trying to load a ship with something that we have dug up when in fact we could have taken it from shining on our land then we have missed an opportunity.

Senator BUSHBY—I accept all that.

Senator McEWEN—I hope the chair will allow me to ask this question. Can you give us your view on the ETS legislation that was passed in America yesterday.

CHAIR—Of course I will allow you to ask that question, because the ETS legislation passed in America includes 100 per cent protection for emissions-intensive trade-exposed industries. It is a much better piece of legislation.

Senator McEWEN—Particularly in terms of giving certainty to American industry.

Prof. Wills—I think there is a mix of challenges. First of all, the Europeans copped a bit of flak for their ETS. The problem was not that the market did not work; the problem was that the market did work because there were so many exclusions. The challenge with any emissions trading system is to be able to account for those externalities. A little like the GST, the more exclusions you make, the more complicated it becomes and the more overheads it generates as a consequence. A simple translation of that, of course, is that you should allow only a minimum

number of exclusions as a part of that process. It is challenging. I am not an economist and I guess, within the context of what the US are doing, it will be very interesting to see how the Senate deal with it. I know from a recent trip—

CHAIR—Do you mean the US Senate or the Australian Senate?

Prof. Wills—The US Senate; I was about to come back to the Australian Senate. I had the privilege of going to the UK and EU for a fact-finding mission a couple of weeks ago. One of the very strong messages that we got from government officials from both the UK and the EU was that they were looking very closely at what Australia was doing, and a number expressed concern that delays from Australia could translate to delays in Copenhagen.

CHAIR—So what are they doing in Europe to do the things that are being proposed to be done over here?

Prof. Wills—I do not want to linger too long on sunny Scotland but sunny Scotland have now announced Europe's largest emissions reduction cut, of 42 per cent, as their target for 2020. They have actually taken—and I think sensibly—the same caveat that Australia has, in that they have an escape clause that says that if Copenhagen does not deliver a solution then they will revert to a lower target. But the difference is that Scotland have gone out on the front foot by saying, 'We will take the high target first.'

CHAIR—Scotland is not a country. It is like—

Prof. Wills—Don't say that to a Scot!

Senator McEWEN—Yes, steady on!

Prof. Wills—It has got its own parliament and—

Senator McEWEN—It is run by Nationalists, not even the Labour Party.

CHAIR—Okay, it is like saying the great state of Western Australia is a country on its own. Scotland is not a member of the European Union; it is Great Britain that is a member of the European Union. And I would just note again that the EU, when they started their emissions trading scheme, provided more permits than there were actual emissions in Europe at the time and they continue to offer 100 per cent protection to their export industries, as would the US if their current legislation passes. But I ask you this question, given that Senator McEwen brought up the issue: why should Australia, in the absence of a global agreement, go down a path that will not result in a reduction in global greenhouse gas emissions but will put significant pressure on the economy and cost jobs?

Prof. Wills—The first part to challenge is that what the Europeans failed to do was in fact an adequate life-cycle analysis as we have previously been discussing. I guess the second thing is that I would certainly challenge that while the buggy whip manufacturers may go out of business as a consequence of an ETS the new technology innovators will be creating new jobs, new employment, and we will see job growth as a consequence of an ETS overall.

CHAIR—It is funny you should say that because we have had a witness here that was exploring new technology actually around Norseman, with coal to liquids. Essentially they had a

process which would significantly lower emissions in the traditional production process to produce petroleum. But there are still emissions and they will be bearing a cost that their competitors overseas, going through the traditional more polluting processes will not face. They are about to leave Australia if the emissions trading scheme comes on board because they will not be able to make it work and viable. Even though it would be a lower emission technology it would not be competitive if they are faced with a cost that more polluting traditional petrol producers overseas will not be facing. How does that make sense? How does it make sense that it will be harder for the LNG industry to reduce emissions for the world and that it will be harder for them to grow in Australia as a result of this scheme? In my view, and I would invite your comment on this, having a domestic focus in a scheme that should have a global focus actually results in counterproductive design flaws.

Prof. Wills—The first challenge will be that ultimately there will be a carbon trading system on this planet no later than five years time. I would say that based on all the political changes that are happening.

CHAIR—But if that happens then there is no problem with Australia getting involved. If there is a comprehensive scheme the problem disappears.

Prof. Wills—The challenge for us is to be on the front foot and to be in front of the wave. We can continue to follow, as we have done, in renewable technologies the rest of the world, because currently that is exactly what we are doing. Australia's energy generation of electricity from renewable resources is four per cent. We are one of the laggards in this space and have been so despite the fact that we have the world's best resources in this space. To me if we are going to focus effort to create change and be a part of the 21st century economy we need to be strongly engaging in renewable energy technologies because that area is where the game is this century.

CHAIR—Nobody disagrees with that.

Prof. Wills—I am pleased to hear it.

CHAIR—Senator McEwen, did you finish your questions?

Senator McEWEN—No, and have you finished your lecture? I have another question. It is not related directly to what we were talking about before. I guess this is a hypothetical question. I have noticed when I have gone to Europe that a lot of people drive Smart Cars but in Australia they are oddities. What makes someone in Germany go and buy a Smart Car? Is it the cost of the car? Is it the cost of the fuel? Is it the public sentiment about wanting to do something? Is it about government assistance and regulation?

Prof. Wills—I think the answer is yes to all of those things. The important thing in this space is in fact not to pick winners. The only way you cannot pick winners is to ensure that you are working on all of the fronts because undoubtedly some of the new technologies will fall over and undoubtedly some of them are going to be much greater successes than we ever dreamed—but part of the challenge at the early part of a technology is that it is hard to say what. One of the interesting things for me when I travelled through the UK and Western Europe was to see advertising billboards. By my estimate one in eight or one in 10 billboards in the UK had an energy message on it saying something about climate change or something about energy efficiency. In the north of the UK, up in Scotland, it was probably closer to one in six or one in

five. I would have guessed before I went to Brussels that it would be one in two with an energy message saying that acting on climate change is important and that renewable fuels are the way we are going to go. In Spain it was probably about one in five. So there is a much stronger message in Europe than I have ever seen anywhere in Australia. Clearly there is already a much greater political acceptance and that is reflected in the EU's trading system.

In Australia I guess the other challenge for us is that we have had cheap energy, though everybody is now accepting the fact that we need to act. The Australian Bureau of Statistics on 18 June published a new survey which showed that nine in 10 Australians want to see action on water management and 75 per cent of Australians want to see action on climate change. That is a new study which, interestingly, was not reported in the media. Of all of the news reports on that day, according to Google, the only news outlet had reported it was ABC Online, and I have never seen any mention of it in the press since. Australians clearly are willing and ready to act to have this change and I think what they are waiting on now is the leadership of our governments and our political representatives to actually create the change. I think there is a willingness in the Australian community to see that change happen. I do not know why it has not been reported in the media that way, because that is what the numbers are saying.

CHAIR—Is there anything in particular around regulation of the energy industry, leaving CPRS and renewable energy targets aside, that you think ought to be changed to set ourselves up for a secure energy future?

Prof. Wills—I have touched on a couple and I will very briefly reiterate them. I think the first thing that can be done in that context is market leadership from governments through procurement strategies. There is a great opportunity there. The second thing that governments obviously have direct impact on is legislative frameworks that create those changes. It is important that we avoid any perverse incentives to avoid that change. A classic example which I am sure you have heard is the FBT laws that suggest that the further you drive in a motor vehicle the bigger tax discount you get. That is a perverse incentive in the tax system to actually waste energy. There are lots of opportunities to ensure that our tax code actually reflects the policy of wanting to create change and reflects the need to do that. Then of course there are the larger legislative frameworks and many of these are across different levels of government. For example, local government planning laws in some places suggested that solar panels were unsightly and could not be put on your rooftop. The question is, if you cannot put them on your rooftop, where can you put them? The answer is, nowhere. So if you actually have planning law that says you cannot put a solar hot water system or a solar panel on your roof then clearly they are perverse outcomes to actually create the sort of change we believe we need in the 21st century. So at all levels of government there are opportunities to harbour those changes. I guess it is about being able to identify them and then developing that legislation sympathetically so that it can be complimentary in its outcome.

CHAIR—Thank you very much for your contribution to the committee.

Prof. Wills—Thank you.

CHAIR—We will meet this afternoon at Fremantle.

Committee adjourned at 11.59 am