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## SENATE

RURAL AND REGIONAL AFFAIRS AND TRANSPORT  
REFERENCES COMMITTEE

**Reference: Australia's future oil supply and alternative transport fuels**

WEDNESDAY, 12 APRIL 2006

PERTH

BY AUTHORITY OF THE SENATE



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**SENATE**  
**RURAL AND REGIONAL AFFAIRS AND TRANSPORT REFERENCES COMMITTEE**  
**Wednesday, 12 April 2006**

**Members:** Senator Siewert (*Chair*), Senator Heffernan (*Deputy Chair*), Senators McEwen, Nash, O'Brien and Sterle

**Participating members:** Senators Abetz, Adams, Allison, Bartlett, Boswell, Brandis, Bob Brown, George Campbell, Carr, Chapman, Colbeck, Coonan, Crossin, Eggleston, Chris Evans, Faulkner, Ferguson, Ferris, Fielding, Hutchins, Joyce, Lightfoot, Ludwig, Lundy, Ian Macdonald, Sandy Macdonald, Mason, McGauran, McLucas, Milne, Murray, Nettle, Payne, Polley, Robert Ray, Santoro, Stephens, Trood, Watson and Webber

**Senators in attendance:** Senators Milne, Nash, Siewert and Webber

**Terms of reference for the inquiry:**

To inquire into and report on:

Australia's future oil supply and alternative transport fuels, with particular reference to:

- a. projections of oil production and demand in Australia and globally and the implications for availability and pricing of transport fuels in Australia;
- b. potential of new sources of oil and alternative transport fuels to meet a significant share of Australia's fuel demands, taking into account technological developments and environmental and economic costs;
- c. flow-on economic and social impacts in Australia from continuing rises in the price of transport fuel and potential reductions in oil supply; and
- d. options for reducing Australia's transport fuel demands.

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**Committee met at 9.08 am**

**CHAIR (Senator Siewert)**—The Senate has referred to the committee the following matter: Australia's future oil supply and alternative transport fuels, with particular reference to four points, which I am not going to read out now because I know you have all read them very carefully, and we talked about them yesterday. The committee is due to report to the Senate on 15 June. The committee has received a number of detailed submissions. Thank you very much for those.

These are public proceedings, although the committee may agree to a request to have evidence heard in camera or may determine that certain evidence should be heard in camera. 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. If a witness objects to answering a question, the witness should state the grounds upon which the objection is taken and the committee will determine whether it will insist on an answer, having regard to the grounds which are claimed. If the committee determines to insist on an answer, a witness may request that the answer be given in camera. Such a request may, of course, also be made at any other time. That does not apply to the current witnesses.

[9.10 am]

**BENNETT, Dr David, Founder, Sustainable Transport Coalition**

**FLEAY, Mr Brian Jesse, Private capacity**

**ROBINSON, Mr Bruce, Convenor, Australian Association for the Study of Peak Oil and Gas**

**CHAIR**—I welcome the witnesses. Do you wish to make an opening statement?

**Mr Robinson**—I will run a little bit of the history of ASPO by you. ASPO was formed in late 2000 by Dr Colin Campbell—this is ASPO in Europe. It is a network of professionals, including the German Geological Survey—BGR—and the Norwegian Petroleum Directorate. It held a number of international workshops in Uppsala in 2002 and has held some annually since then. ASPO Australia and the Sustainable Transport Coalition that is its parent body are the only bodies in Australia that have been represented at any of the international workshops on oil depletion. Dr Bennett and I went to the one in Berlin and I have been to all four. We did not see anyone from the federal government or ABARE there. It has been historic watching this thing happen and I am very privileged to have seen it grow. The ASPO workshops and the degree of professionalism have been great.

This is a network of professionals. A lot of them are retired geologists concerned about the future of their grandchildren. They do not have any particular political or commercial barrows to push.

There have been a number of things done. The last workshop was in Lisbon. I was fortunate enough to be invited to give a paper on the impact of oil depletion on Australia that Mr Brian Fleay and I and the Deputy Convenor of ASPO, Dr Sherry Mayo, were co-authors of. It generated quite a lot of interest. The next international workshop is in Italy in July. I am hoping to attend. I certainly hope that people from the federal government and the senators here might also attend. To have ASPO Australia being the only group represented at international workshops at which this crucial thing is being discussed is interesting, to say the least. It is an honour for us to be the only people from Australia there.

ASPO Australia was formed by Professor Aleklett, the international president, in November last year—coincidentally, in the media room of the Royal Automobile Club downstairs. ASPO is a network of professionals. We are not taking any particular political or commercial stance. We are keen to represent a middle ground, if you like—middle of the road activity. It is a number of professionals working together. We have set up a number of working groups, because the peak oil aspect is so big. What about peak oil? What about Australia? It gets very complicated or hard to grasp.

We have an urban transport planning working group and a financial sector working group. The urban transport one is based in Sydney; the financial sector working group is based in Melbourne. We have a social services sectors working group based in Adelaide and an active



transport working group—looking at pedestrians and bicycles and so on—also based there. I hope that those working groups and the conveners of those will be invited to appear before these hearings when they go to Adelaide, Sydney and Melbourne. Our oil and gas working group—the crux of the thing, if you like—is headed by a Shell engineer who is working in Aberdeen on the North Sea. He will not be back in Australia until July so that one is a bit out of reach.

There are a number of working groups, but we have a main submission, and that is the one that I am talking about. It is a really crucial area and I am concerned that there does not appear to be any independent source of advice to the government on this issue. There has been some discussion about ABARE and yesterday I drew up some graphs looking at ABARE's estimates and what actually happened. Perhaps I will table them. This is a graph of the New York Futures Exchange—the metals exchange. This is the current oil price, or the one for delivery in May, and this is where ABARE 18 months ago or so estimated it would be now. ABARE thought only a year or two ago that it was going to be here. This is an ABARE graph from one of their reports.

**CHAIR**—Do you want to give us those? Then we can look at them as you are pointing.

**Mr Robinson**—The New York Futures Exchange is not infallible. It is just people having punts as well. On the bottom right there are some examples of NYMX graphs. There was an oil price surge in 2000. Tony Blair and the French president were under fire and they stopped the fuel escalator and things. NYMX said that in 2000 you could buy oil for delivery today at \$21 a barrel. They were obviously wrong. The shape of the curve has been changing, but the point here is that 18 months ago ABARE was wrong by a factor of two on delivery now, when blind Freddy would have thought that was a bit iffy.

The ABARE graph on the bottom left is again from the same report of around 18 months ago. I think it was March 2005. They were saying that prices were going up and the price would go down from wherever their forecasts are. Their forecast for 2011 in their submission I think suggested an oil price of \$39 a barrel. If ABARE are right, they can make a killing because they can speculate on the New York Futures Exchange. ASPO certainly would think that these curves are all wrong. They are likely to go up. Forecasting oil supply is hard enough. Forecasting oil price requires an extra degree of bravery. That is just an example.

On the same topic about the gulf in the economic view of the world, when ASPO Australia was formed, the *Financial Review* ran a story. Professor Aleklett was coming to Australia to launch it. He is a nuclear physicist. He is not a rabid greenie. There was a Nobel laureate in Sydney. The Nobel laureate, Vernon Smith, said that ASPO's oil predictions were loony and an economic fallacy. He said confidently that he expected oil to sell for \$15 a barrel in the near future. There is a gulf between the economists, the market forces and the peak oil predictions. I think it is really crucial that everyone recognises this gulf.

The problem is that ABARE is just showing one side of the spectrum of probabilities. ASPO are trying to portray in our submission a set of probabilities. We cannot say when peak will be. I think there is a 30 per cent chance that it will be within the next parliamentary term, while the senators just elected are still sitting. I am not sure, but there is a probability. We could put probabilities on our probabilities. But for anyone to say categorically what the oil price will be in 2011 and put a number on that requires a fair degree of bravery. I admire ABARE for being so brave.

We really need an independent source of advice to government about the probabilities and about strategies for mitigation and adaptation. The problem is that you need to start a lot of these things a long time in advance. The Hirsch report—there is a graph on page 3 of our submission; this was a report to the US Department of Energy—suggests that a lot of these countermeasures have to be started 15 or 20 years before peak. These countermeasures have to be started not in token ways, with a couple of biofuel plants or something, but with crash programs the size of the Manhattan project. If you do not do that, we are going down a ‘business as usual’ path. That is fraught with all sorts of difficulties.

We see enormous flow-on economic and social aspects unless Australia wakes up and takes notice of these things. If we do, there are all sorts of options open to reduce consumption. In our health sector working group we are suggesting that perhaps the lives of 800 Australians a year might be saved by peak oil because of less emphasis on car transport. Just dropping the speed limits from 110 to 100, for instance, would save a lot of lives. There is a whole range of issues that will make life better for Australia. Peak oil has a lot of economic problems but a lot of economic advantages too. That might be a lot of kids walking and skipping to school instead of being strapped into four-wheel-drive vehicles.

That is a broad summary. I guess the other point aside from our main point is that ASPO Australia is recommending no technological solutions but, rather, people solutions and behavioural solutions. These are precursors to any technological things. We need to have the community engagement that Brian Fleay talked about in the session yesterday. We need to empower people to understand peak oil and to have all of the possible micro solutions discussed.

With individualised marketing, the TravelSmart people can reduce their travel behaviour substantially, by 13 per cent, just by using proven techniques. We will not be in the majority in saying this, but we feel that the fuel price should go up, that there should be a fuel tax escalator along the lines of Margaret Thatcher’s, and that a smartcard, a tradeable fuel allocation system, should be ready in the event of sudden oil shortages. Also, there should be a sensible, rational allocation. I got here today by catching the train. I walked 200 or 300 metres across one road, caught a train here and walked across one or two more roads. Not everyone in the Australian community can do this. People in the farming community cannot do this. So the requirement for fuel varies. I refer to people working on nightshifts in hospitals, and people running farms and businesses. Not everyone can have all the fuel that they will need in the future, if there are fuel shortages—and, certainly, that is what we predict.

**Mr Fleay**—My submission is a personal one, although I am a member of the executive of ASPO Australia. That is because it is such a new organisation, and there are a range of subjects that I want to cover. Consequently, I thought it would have been quite wrong of me to have put in the submission as an ASPO submission. In my rush to get here this morning, I have forgotten my hearing aids, so I have a little bit of difficulty in that regard. Hearing aids do offer a great advantage: you can be selective in what you hear. I put in a late supplementary submission. It has not been posted on the website. I have copies of it, if people want to look at it.

**CHAIR**—We will circulate it here so that people can look at it now.

**Mr Fleay**—There are two principal things that I want to talk about with respect to the supplementary submission. Much of what I would have said was dealt with yesterday, which is

great, because I can now concentrate on certain things. The first one is to amplify in a little more detail the whole concept of this participatory approach in order to give a bit more strength to it and explain it in a bit more detail. I said some of it yesterday—the bit about road trains and residents. It explains in a bit more depth what has already been said. The person who organised the Department for Planning and Infrastructure's direction on this was Janet Hartz-Karp. I could, if you like, contact her and make a further short submission, in order to give a bit more detail, because I think this is very important.

I do not want to say any more than that, except to refer to my introduction to that section and our ex-Governor, Lieutenant General John Sanderson. The University of Western Australia has just published a book of his speeches during his term as Governor here. He was well known for dealing with lots of subjects, and this speech touches very closely on what I was saying. He called the book *Ride the Whirlpool*, for these reasons:

I have seized on the metaphor of the boat in the whirlpool to emphasise the point that the chaos into which we are moving is a natural thing, far more natural than linear stability and order. We ride the whirlpool in many forms in nature, and we evolve personally and socially to do so. The individuals and organisations that will be successful in this will be the ones that unleash the creative genius of their people. This is the essence of modern leadership.

I mention that to show that the sorts of propositions at section 1 of my submission are not something that I have dreamed up. They are starting to spread deeply through the advanced pattern of thinking in our society, and no less than with the person who is at the top of our military in Australia.

I will move on. I will not say much about the other section in my submission, except to say that there is no real conflict between what I have said and what Geoscience Australia have said. They are a bit more cautious in talking about peak oil, I think, because of their situation as a government agency, but there is not any fundamental disagreement.

I want to make one comment about biofuels. I am very concerned about some of the propositions that came up about using some microbiological product to take all the waste—to virtually strip the land bare of all so-called wastes—and convert it to ethanol as a way of getting resource. This has a disastrous impact on soil, because the organic content of the soil is extremely important in providing the environment for the great mass of invertebrate organisms and other things that are critical to soil fertility. This process is, in effect, mining the soil. I have put in a recommendation about having a rigorous approach to assessing these alternative fuels. This includes finding the energy input and energy output and, where you are doing it from crops, including the impact of the process on the soils. We cannot afford to diminish the property of our soils.

The main addition that I have made in this submission concerns road and rail transport. It was one of the last things I did and, as I was getting a bit rushed and a bit tired, I did not do an adequate job. A lot of things were dealt with yesterday, but the one that was not dealt with very well was the problem with the process of funding of transport, federal-state relationships and the whole tax system. The fact that roads are funded from taxes is, in effect, a sort of subsidy, whereas funding for rail is through borrowed funds on which there is interest. This is a very lopsided thing; it is very unbalanced. I talk a little bit about that, but that is a very big subject that has not had enough attention.

I am sorry that Peter Newman was not here yesterday. Studies done throughout history have found that over the last 2,000 years cities in general are about an hour wide—that is to say, people are prepared to spend about an hour each day travelling to and from work. If people were walking, that determined the size of the city and so forth. The important point about it is that a lot of the justification for tollways and road tunnels and so forth is being made on the basis of time saving. That is not valid. About a week ago, I picked up an article in the *Financial Review*, on 28 March 2006 page 59, headed: ‘Tunnels worth the toil: mayor’ in which the mayor of Brisbane discusses his election two years ago on a multibillion dollar program for four road tunnels in Brisbane.

It is justified on the basis of commuters saving time. I think you should make a recommendation for disallowing saving of commuters time as a benefit in cost-benefit studies of road works, certainly in urban areas. Sydney is in the same position. It is getting into a state of gridlock because over the last 10 years the tollways, roads and tunnels have got into a financial bind that has been brought to a head with the recent Cross City Tunnel. That is the last straw that has broken the camel’s back.

**Senator NASH**—Sorry to interrupt, but I am a bit mindful of the time and that we may not get an opportunity to ask you some questions. We will certainly go through your supplementary submission in great detail, but I would be inclined to move to questions.

**CHAIR**—Yes.

**Mr Fleay**—I will jump through to some of the recommendations.

**Senator NASH**—Perhaps you could come to those in your answers to our questions. Some of them might relate to what is in the submission. We can read this, but we will not have another opportunity to ask you questions.

**Mr Fleay**—Right. This book, *Back On The Track*, by Phillip Laird, Peter Newman, Mark Bachel and Jeffrey Kenworthy, which was published in 2001, is excellent on this subject and deals with those questions I have just been talking about. In my submission I talked about the road deficit that exists on a huge scale and the costs of congestion. The linear approach, the failure to take together all the complexity and interactions, is at the bottom of the problem of road planning. I have listed under ‘b. Linear policy approaches have led to these predicaments’ five points:

. Building roads is merely to ease congestion; it does not create—

any other problems—

. Land use patterns, the physical form of cities, especially the density of development, does not have much impact on transport patterns.

. Public transport needs to be efficient, so reducing services will save money and enable reinvestment to occur.

. Increasing the speed and efficiency of traffic has no impact on cycling and walking modes.

. There is little you can do to get people out of their cars; thus traffic levels will rise inevitably.

This pattern of thinking is at complete variance with the reality. As a consequence of that, the authors have come up with a number of propositions. These are:

... There should be no 'road funds' just transport funds.

... The federal government should not assign transport funds to projects. They should just ensure a process of regional planning has occurred to determine how best transport priorities should be assigned to their transport funds.

... State governments should abolish the planning powers, guaranteed funding and direct access of their road agencies to ministers.

That is for exactly this reason, and it is starting to happen here in Western Australia. Finally:

... Transport funding should be assigned only after a process of planning has occurred in cities and regions based on a full analysis of all options.

The participatory democracy approach, as I was saying, has had its beginnings here as pointing the way. So these are vitally important things. I am going to contact Phillip Laird to make sure that he comes and gives a submission to you, because he has made a quite lengthy submission that deals with these questions.

**Senator NASH**—Bruce, in your opening statement you mentioned, I think, a meeting in Berlin. You made the comment that you did not see anyone from government or ABARE there. What meeting was that?

**Mr Robinson**—There have been a series of international workshops on oil depletion held by ASPO, the international body. One was in Uppsala, one was held by the French institute of petroleum and one was held by the German geological survey in Berlin. The last one was in Lisbon. There have been four international workshops and there was no-one who travelled from Australia to represent any Australian organisation.

**Senator NASH**—What is the process for attending that? Are people invited?

**Mr Robinson**—Like any other conference, it is on the web and people are invited.

**Senator NASH**—Do you know if the federal government and ABARE were specifically invited?

**Mr Robinson**—They were specifically invited in the sense that it was on the web. There was a specific invitation last year to the state minister, Alannah MacTiernan, but that fell through. It is no secret that there is the International Energy Agency view of the world, which ABARE parrot, and a whole range of other diverse ones. It is not clear who is right. It would be useful if the federal government were looking at both sides. The federal government's energy white paper is substantially short, to be charitable, on the forecasts of what might happen.

**Senator NASH**—I am sure it is. You said that it takes an extra degree of bravery to forecast even price, let alone volume. Some comments were made yesterday not just by you but by others who attended about ABARE and their particular performance. On what criteria should this Senate committee judge the performance of those making the predictions? Why should we, say, take the view of ASPO compared to the view of ABARE or anybody else?

**Mr Robinson**—Firstly, no-one has a crystal ball. I think it would be much better if all the possibilities and scenarios were discussed wherever possible when advising the federal government. In the Bureau of Transport and Regional Economics *Working paper 61*—I did not see that put in a submission—Lyn Martin attempted to summarise the situation, I think with a degree of economic bias. I think it is pointless trying to forecast oil price for five or 10 years. Rather than economic modelling we should be doing scenario planning on what will happen if oil is in short supply. The federal government should be getting advice from all sorts of people, including the International Energy Agency but also the people who think the International Energy Agency is really just going down the same path as Enron.

**Senator NASH**—So you are saying that, while it is difficult to make any of these predictions, you would prefer government to take a broader range of views into account—

**Mr Robinson**—I think so, yes.

**Senator NASH**—and not just ABARE's. I am just trying to clarify that. What is the Manhattan Project that you referred to?

**Mr Robinson**—In the Second World War the Americans threw everything at making an atomic bomb. The Manhattan Project was the funding to create the atomic bomb for Hiroshima and other things. I was not necessarily suggesting a nuclear solution.

**CHAIR**—Let us get that on the record!

**Mr Robinson**—I think it was bigger than putting man on the moon. It was a very large allocation of national resources at very high priority.

**Senator NASH**—I did not think it was a specific program.

**Mr Fleay**—I will give a bit of an explanation about bodies like the International Energy Agency. There are people in those agencies who accept what we are saying about peak oil, but they cannot say that publicly because it is not acceptable to the governments in the organisation. I will give you an illustration. In 1998 the International Energy Agency published a report that said that conventional oil was peaking around the time we are talking about and then said in just a bald statement with no explanation that unconventional oil would fill the gap to 2020.

I was communicating with Colin Campbell at the time. They thought, 'That's not good; we have to do something about that,' so they arranged for some people to write a report that got published in the *Guardian* and eventually in the *Melbourne Age* that took that to task. Some of those people visited the International Energy Agency to express their concern about the report and what they had done. The people they talked to were delighted. That is exactly what they hoped would happen. They deliberately put in that bit about conventional oil meeting the gap

with no explanation in the hope that somebody would come along and ask about it, and that is what happened. It is what they wanted to happen. You have to consider the difficulties governments have in coming out and saying this. It is about the politics and the like and the uncertainties and untrustworthy character of projections of reserves for countries like Russia and the Middle East in particular. Does that help?

**Senator NASH**—It does.

**Mr Fleay**—I might add that ABARE is in the same boat.

**Senator MILNE**—Bruce, I want to follow up on your proposal that we have an oil vulnerability task force. That links into something that Brian just said about the unreliable reporting on potential sources from various fields, including particularly the Saudis but also ex-Russian territories and so on. Do you think the current Australian projections are reasonably accurate, does Australia's existing supply shield us from the reality of what is going on globally and is that part of hiding what is going on? In particular, on the oil vulnerability side of it, how would you propose that the federal government might proceed? How would you propose such a thing be set up and where would you suggest it be housed? What is the practical reality of setting up an oil vulnerability task force? What have you thought about that?

**Mr Robinson**—I think it is probably quite hard in the current situation. There were a number of questions there. With regard to the oil vulnerability task force, I do not know much about the workings of federal government, but it would probably be better to be independent, to be set up by a university, a research organisation or something like that, because of the constraints, real or imagined, that ABARE and a whole lot of other people face. The predominant thing we need to look at is international oil vulnerability, what happens with the international oil price—unless we run a barrier around it. What we can do nationally is to look at our oil usage and mitigation and adaptation strategies. Unlike in the greenhouse situation, where mitigation by reducing coal fired power stations et cetera has a lot of economic disadvantages and is completely separate from adaptation—for example, how we are going to make do with less water in Perth—in oil, adaptation and mitigation are interwoven. Putting up the petrol tax, for instance, and using that to create better public transport is both a mitigation and an adaptation strategy.

You asked about the Australian assessment. As far as I know, Geoscience Australia do a very good job. ABARE has criticised them because some of their projections in predicting geological discoveries and things have been wrong. Inevitably they are going to be inaccurate, but there is very good data available. I am sure it could be improved, but I do not think that is particularly important. We know roughly that Australia is on a decline, and it is much more about how we adapt to declining national production and, importantly, declining international production. One of the things to do would be to stop exploration and to stop development of our existing fields, to buy the oil and gas internationally while it is still cheap and then use our resources in the ground in 20 or 50 years time. No-one is going to do that, but that would be the rational thing to do—to stop exporting and to stop exploration.

**Senator MILNE**—Can I just follow up on how liquid natural gas plays into that. Yesterday we discussed liquid natural gas as a transition fuel, and somebody commented briefly about the merits or otherwise of continuing to export liquid natural gas. Do you want to comment on that in this scenario about adaptation and mitigation and so on?

**Mr Robinson**—Certainly, if we are to think, as Colin Campbell and Jean Laherrere do, about our grandchildren, not just the kids who are now getting a licence but their kids, what will kids in Australia in two or three generations cook on and use for power? If we sell off our oil and gas in 20, 30 or 50 years what will be left? There is a lot of wishful thinking like, ‘No worries, the boffins will think of something; technology will invent something.’ But market forces are not all that powerful. If market forces were that good, market forces would be creating oil by having more dinosaurs fall in swamps in the Jurassic. The physical laws are such that we cannot rely on people inventing a new source of energy, so I think we should be considering a long-term scenario in which the world’s oil and gas resources are seriously depleted. If we have sold off all of ours very cheaply, which is something that I particularly object to—I think the federal government should ensure that there is no forward selling of gas and things at very low prices. I think that is criminal.

I am not sure that answered your question, but I think we should be thinking about the longer term rather than just the next election. I know we are all constrained by what the petrol price is today or tomorrow, but we should be looking much further ahead. The oil and gas are so valuable, and can certainly be used as transition fuels. Brian has put out a paper about the magic pudding: it is not a thing we can just take more and more of and then it regrows. It does not regrow.

**CHAIR**—The issue of hydrogen came up yesterday, and there is a difference of opinion. I have heard from various experts who say either that, ‘Hydrogen is the way to go,’ or that, ‘Hydrogen is not the way to go.’ What is the opinion of ASPO?

**Mr Robinson**—One of our working groups, which is on the list but has not yet taken off, is called ‘Hydrogen: is it a real alternative?’ I am not a lawyer, I do not have an economics degree and I am not a member of parliament. I am blighted by having scientific training. There are some substantial problems about the hydrogen economy. First, you need a source. No-one has identified a source. We can only make it from wind and solar energy when all these lights and all the computers are already running on wind and solar energy. We can make it from coal, but it would take a long time. We can make it from nuclear sources. There is no source for hydrogen. It is an example of technological cargo cultism: no worries, the boffins will think of something. President Bush thinks hydrogen is a really good idea, or he did in his first State of the Union speech. The real question is: where do you get the hydrogen? It is not an energy source. It is an energy carrier. Where do you get the energy to make it?

Second, it is a very recalcitrant sort of molecule. You cannot compress it and you cannot put it in tanks. It is not nearly as nice as methane or petrol. There is a lot of wishful thinking going into the hydrogen economy. I refer you to the book entitled *The Hype About Hydrogen*, which was written by a former researcher at the US Department of Energy, as I recall. There are a whole lot of questions and I do not think we should be clutching at technological straws unless we have a fair idea that the technological straws actually have some substance.

**Mr Fleay**—I would like to add a bit to that. Certainly the energy sources you have to use to manufacture the hydrogen is a critical factor, but also there are factors from the transport point of view. Because hydrogen is the lightest of all the elements, when you have a tank of compressed hydrogen that has the equivalent energy content of a tank of compressed natural gas the



hydrogen tank is much bigger. Not only that, a greater proportion of the energy content of the hydrogen is needed to compress it than is required for the natural gas.

If you want to get a really good summary of this, I think it is in the May 2004 issue of *Scientific American*—it might be June, but I think it is May. It has an excellent article that compares a whole range of fuels in this way, from energy in, energy out and over the lifecycle, and greenhouse gases and so forth. It gives a good, quick overview, and one of the conclusions that article comes to is that the one area that hydrogen and fuel cells are least likely to be successful is in the field of transport. It is basically a problem of energy density.

**Senator WEBBER**—I want to return to the issue of ABARE. I was interested in the discussion yesterday, particularly the evidence from three different state government agencies which said they also do not feel that they can rely on the data. Has this been a long-term problem with the data that ABARE has been providing or is it a recent development? That is question no. 1. Question no. 2 is: if I cannot trust their data, who can I trust and where should I go?

**Mr Robinson**—Firstly I do not think it is necessarily fair to single out ABARE. They are just representing the economist's view of the world. When we have a business as usual situation and we are going to deviate from that by five or 10 per cent the economic models probably work quite well. I am not an economist. When we have things like climate change and loss of biodiversity—we hear people have stopped chopping down the jarrah forest and you cannot get jarrah floorboards—when there are resource limitations, physical things, then there are models of the Australian economy, the Australian Stocks and Flows Framework for instance, which do the modelling in concrete terms in things such as wood, concrete, oil and steel. If you just say this is an orange with so much dollar value and compare it with an apple and you just do it in dollars, you have an intrinsic problem. Dr Campbell, the founder of ASPO, has some rather unkind words to say about economists and has medieval paintings of people who at that time thought the world was flat. There are still some flat-earth economists. What we need, and certainly ASPO has been trying to set up, is an economics working group but we have not found an economist capable and brave enough to do this although we have not looked all that hard!

We should be looking at economics with a resource basis and not just with the clear bias towards existing models. ABARE are just an example and there are a whole lot of people in financial planning. Your superannuation might be going into urban tollways and things. There is a whole lot of financial planning based on this assumption that there are no worries and the tollways and all these things are going to be good. What was your second question?

**Senator WEBBER**—Which data can I trust?

**Mr Robinson**—Firstly anyone who puts an absolute number on it is coming to the same thing. If we look at the forecasts of peak oil and they are particularly fuzzy then what will happen to the price is even fuzzier and what will happen to international relations is even harder to outline. I think we should all be looking at scenarios rather than hard numbers. Anyone who puts a high precision on their forecasts is almost sure to be wrong. We need error bars on the forecasts. It is really important that this committee does try to get a broader range of input into these things. There is an energy futures forum, set up with the conservation movement, which was meant to be discussing both the greenhouse and oil side of things. I understand that some of the conservation groups pulled out of that because the economic modelling was being run by

economists and they would only model things that the economists could model. We need to be looking at things that the economists cannot model.

**Mr Fleay**—Could I add a little bit?

**CHAIR**—Please keep it very short because I would like to have as many questions as possible.

**Mr Fleay**—I made some comment on ABARE in the last bit of my report on the Asia-Pacific Partnership on Clean Development and Climate. I have amplified that in my supplementary submission here. In essence, what ABARE projected for China was an increase from five million barrels a day consumption in 2001 to nearly 20 million barrels a day in 2050. For the USA, the projection was from about 20 million barrels a day to 28 million barrels a day.

China University of Petroleum is predicting that Chinese oil production will start to decline at the end of the decade and that by 2050 they will not be producing from existing sources and nor will the USA. In effect, that is saying that we will need practically another Middle East to supply China's needs in 2050 and nearly 1½ Middle East to supply the USA. This is way off the planet. Their report did not mention even one word, hint or suggestion of anything about this. I can sympathise with ABARE over the dilemma they are in, but you do need to make some comment on this. It is necessary for an organisation like ABARE to at least acknowledge that there is this serious debate taking place.

**CHAIR**—The point is well made.

**Mr Fleay**—Even if they disagree with the conclusions, they need to engage in the debate.

**CHAIR**—Yes.

**Senator NASH**—One of the points you make in your submission which I think is very valid is about low-income people who live in the outer suburbs of metropolitan areas. You say that they are far more likely to be affected by rising fuel prices in terms of social impact. You also put forward the idea of escalating the fuel tax. How do you reconcile the increase and how that would actually exacerbate the problem for those people living in outer metropolitan areas?

**Mr Robinson**—That is a real problem. During the war, for instance, there was petrol rationing, which continued in Australia up to 1950. If there is not enough oil to go around shortly, if the price rises, people living in the leafy suburbs with four-wheel drives taking overweight kids to school will outbid the people in the rural areas and the outer suburbs. So there is a problem now. If we keep the costs down for the people with the big Toyotas in leafy suburbs in capital cities that will not necessarily help the people in the outer suburbs. We have to have a more targeted way of assisting people in the regional areas and the outer suburbs. Keeping the price down, perhaps by reducing taxes or keeping them flat, is not a good way to do it, because the vast majority of it will go to other people. We need to target it.

**Senator NASH**—That did not really answer my question. I understand the point that you have just made, but under that scenario that you have put forward you are going to increase the cost for those people who are socially less able to deal with it.

**Mr Robinson**—The smartcard system had a sliding scale, like the Perth water pricing scheme. Certainly, I would like to see an increase in the fuel tax and the smartcard system come in that way—

**Senator NASH**—So that there is some sort of sliding scale.

**Mr Robinson**—so that there is a gradation and everyone gets a base allowance. In Perth it is 150 kilolitres of water per household at the base rate. You could do that for every person. My mum lives in a retirement village and she does not have a car. Under the current emergency plans she does not get any allocation at all. There are a whole range of things that we could do. Certainly we could provide a base allocation for petrol, a smartcard. Petrol is a necessity of life in a broad sense, like water, and, as with water, we need to be frugal with it. We should reward the people who are frugal and penalise the people who use it as if it grows on trees.

**Senator NASH**—Just on that four-wheel drive issue, would you differentiate between the four-wheel drive scenario you are talking about in metropolitan areas and four-wheel drive usage in regional areas? They can be two entirely different things.

**Mr Robinson**—I mentioned that.

**Senator NASH**—I was not adding that on to that question. You referred before to four-wheel drives and that we needed to have a certain treatment for four-wheel drives. I am asking whether, under that scenario, you have differentiated between metropolitan and rural usage. They are very different.

**Mr Robinson**—There are people in the country who are frugal with fuel, who stay on the farm and only go to town once a week when they need things or when the tractor breaks down. There also people in the country who do a lot of unnecessary miles. Overall, everyone can use fuel much more frugally, and we should, as people did in the Depression and have done in farming traditionally. Back to criticising the economists: there are market forces saying that we need more rain in the country. We have to adapt to the resources. Petrol is like rain. We have to make do with the resources we have. If we drain the dam of petrol that we have, there will not be any for later. So it is complex; it is very hard. I think we should start discussing it. I think the smartcard system has a lot of potential. It is very flexible. It could be very equitable. It could be transparent because the computers can just say where the money is going. This goes to what Brian referred to: if people know the system is fair then it will be much more accepted.

**Mr Fleay**—It is crucial to success.

**Senator NASH**—Dr Bennett, you made a comment yesterday on your concern about the diversion of human and animal food to fuel.

**Dr Bennett**—Yes.

**Senator NASH**—There was a comment made later—I cannot remember who made it; I think it was apropos of the Western Australian Farmers Federation conference and the farmers comments at that—about the requirement for the farmers to supply food, that nobody was paying them extra money when wheat was worth 140 bucks a tonne so why should there be a

requirement for them to supply the food and that they would sell it to the highest bidder. I was interested in your comments in response to that.

**Dr Bennett**—The point that I was making originally was that there is moral hazard in moving to biofuels. I was emphasising that the expansion of palm oil plantations and sugar cane in tropical areas is causing the continuing loss of rainforest. I do not object to farmers selling their produce at the highest price. What I object to is the government intervening—and it already has—in providing funds for biofuel facilities and expanding the market. It seems to me that it is reasonable to let the biofuel industry sort itself out. For the future there are two components that the Treasurer has foreshadowed. There is the 2011 component, when ethanol is traded on the world market. There is concern that Brazilian ethanol will undercut Queensland sugar ethanol. Then there is the 2015 component where the Treasurer has signalled that he is going to apply equal levies on all fuels. So it is not a free market originally.

I am not advocating that the Treasury is correct; what I am saying—and I have a reasonable economic background—is that in this case the market should determine where the agricultural product goes. To add a little to that, the situation with canola is that the German government subsidises biodiesel, and we do not have a very large livestock feed market. So it is very sensible for Australian farmers in WA to sell their canola to Germany without pressing the oil out of it because the Germans will pay more for the feed as well as the oil. It seems to me to be inappropriate for the government to intervene to provide an incentive more than the market does for canola to be treated in some way that encourages local pressing.

**Senator MILNE**—I have a final question in relation to where Australia fits into the global scenarios. The WTO processes seem to be pressing on with the direction of free trade and as much global free trade as is possible, assuming that that can go on indefinitely. The UN Framework Convention on Climate Change argues for a reduction in fossil fuel use, which is in complete contradiction to the WTO's strategic direction. Then we have the whole scenario about global vulnerability to oil shortages. Where does this debate on oil fit in to either the WTO or the FCCC and, if it does not, where is the work happening with ASPO or the peak oil organisations around the world to get some involvement so that that debate is taking place in the fora where it needs to so that we can start looking at this on a global level?

**Mr Robinson**—Those are hard questions. Currently, oil is largely a global commodity with minor geopolitical things saying you cannot export oil or whatever. ASPO has put forward a Rimini protocol saying that all countries should agree to reduce their oil usage proportional to the global situation. That is quite unfair, because it means that the US has to reduce by two per cent and Bangladesh has to reduce by two per cent. In our paper to the Lisbon conference we suggested an international convention like Kyoto and that, with respect to the reduction in oil usage—which has to come, because there is not enough oil to go around—it is much easier for the US to reduce its oil consumption by 25 per cent than it is for Bangladesh. So you could have a Kyoto-like protocol. That is why I am quite keen on, firstly, an intergovernmental panel on oil depletion. Whatever the failings, the climate change debate, plus an intergovernmental panel, is much better than oil depletion. I think that, because they are related, you could, firstly, spin oil depletion into the existing intergovernmental panel on climate change and, secondly, aim for a Kyoto-like protocol. You can allocate the world's dwindling oil supply by market forces, you can allocate it by a Kyoto-like protocol or you can allocate it by gunboat diplomacy. The Kyoto-type strategy would be much better.

**Senator MILNE**—If you were to initiate a profile, you would envisage that under the Framework Convention on Climate Change or as a separate protocol but related?

**Mr Robinson**—I do not envisage that high; I am only a small envisager.

**Senator MILNE**—Just to clarify that, is any work being done by the peak oil groups globally? Has any country taken up this matter in global fora? Has anyone initiated this kind of thing?

**Mr Robinson**—No. There is a taboo of talking about oil depletion. ABARE is under serious pressure not to mention it. I am not sure whether the Senate inquiry is a first, but we are breaking a lot of new ground in Australia. Certainly there has been no discussion of a Kyoto-like protocol on oil depletion, and I think there should be.

**Senator MILNE**—Even at these meetings?

**Mr Robinson**—I mention it but, relatively speaking, ASPO is on the fringe with respect to what governments do. Greg Bourne mentioned that with these things he thought that the interaction between climate change and oil depletion should be mentioned more. I am concerned that the climate change people do not mention oil depletion and they have scenarios that are unrealistic for the amount of oil. I think it would be really useful if climate change and oil depletion matters for Australia and internationally were looked at together, because a lot of the mitigation and annotation are the same.

**CHAIR**—That is right.

**Mr Robinson**—There certainly should be energy taxes, but we should not tax just carbon, because carbon from oil and natural gas is more valuable than carbon from coal. It should not just be on an atom basis. In a climate change sense they are valuable but, in a resource depletion sense, carbon atoms in oil are much more valuable than carbon atoms in coal.

**Senator NASH**—You just said that ABARE was under pressure not to mention it. Can you substantiate that fact?

**Mr Robinson**—No.

**Senator NASH**—It is your view?

**Mr Robinson**—Yes.

**Senator NASH**—It was a fairly strong statement. I wonder whether you are basing it on anything or whether it is just your view.

**Mr Robinson**—I am not privy to what goes on, but there has been a lot of public debate about pressure on government organisations talking about climate change and all these things. I am jumping to an extrapolation and it is unfair.

**Senator NASH**—I just wanted to clarify that.

**CHAIR**—We are over time. If you have anything more you want to forward to the committee, please do so. Thank you for your submissions and your time.

**Mr Robinson**—Thank you for starting this process. I am confident it will be very productive and I certainly hope it continues.

[10.10 am]

**PYTTE, Mr Anthony Mark, Australia Country Manager, Sasol Chevron Consulting Ltd**

**CHAIR**—Welcome. I remind you that the giving of evidence to the committee by witnesses is 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. If a witness objects to answering a question, the witness should state the grounds upon which the objection is made and the committee will determine whether it will insist on an answer, having regard to the grounds which are claimed. If the committee determines to insist on an answer, a witness may request that the answer be given in camera. A request to give evidence in camera may also be made at any other time, and the committee will determine whether it will allow it. I invite you to make an opening statement before we ask you questions.

**Mr Pytte**—Australia is at a crossroads regarding energy supply and security for the 21st century. The declining domestic supply of oil combined with the growing demand for transport fuels is increasing Australia's dependence on oil imports at a time when the cost and security risk of these imports is also rising. However, Australia is a wealthy country, rich in natural resources—except oil—and is well placed to adjust policy to promote indigenous solutions to this pending domestic oil shortage. The government's white paper in 2004, *Securing Australia's energy future*, was a step towards establishing policies for dealing with these issues. This Senate inquiry into Australia's future oil supply and alternative transport fuels will add to this important debate, and Sasol Chevron appreciates this opportunity to participate.

Sasol Chevron is the leader in developing a new global industry to convert natural gas into a clean, environmentally friendly, synthetic transport fuel which we call GTL diesel. Australia has an abundance of natural gas off the north-western coast of the continent and has the potential to become a foundation of this new global industry. In addition to becoming a leading supplier of the next generation of super clean transport fuels, improving both the global environment and global energy security, Australia itself could become energy independent with regard to transport fuels for the foreseeable future.

Sasol Chevron's submission to this Senate inquiry in February was a description of this new and developing industry. Gas to liquids—GTL—is an enormous investment requiring trillions of cubic feet of gas supply, billions of dollars of investment and millions of man-hours to construct. A project of this scale needs support and alignment from multiple stakeholders—the upstream and downstream proponents, state and Commonwealth governments, and local and regional communities. GTL must offer a compelling value proposition to all these stakeholders to be successful.

Government has a key role to play to represent the nation's interests. Fiscal and regulatory regimes are set up and modified to reflect these interests and have a significant impact on major investment decisions. This government has systems and policies to support strategic investments, and incentives are already in place to promote certain alternative transport fuels. These incentives could be extended to include GTL diesel. Australia faces a future of steadily

increasing demand for transport fuels. Australia's natural gas resources combined with Sasol Chevron's gas to liquids technology is available today to meet this demand with environmentally friendly, synthetic transport fuels.

**Senator MILNE**—I suppose that this technology could best be described as a transition technology, and by your own statement here it relies on an abundant supply of competitively priced gas. Surely the assumption can be that there are limited supplies globally, so how long do you think the current global supply of natural gas would last in a scenario where liquefied natural gas became the transitional replacement fuel for oils? What are your scenarios for that?

**Mr Pytte**—First, I would comment that the truest thing I can say about all forecasts is that they will be wrong. So, with that caveat, I will be happy to give you my opinion. There is currently a greater amount of known gas resources globally than known oil resources globally. There are, in addition, many basins in many remote parts of the world where gas is believed to be present but nobody is looking for it because there is no local market. I think BP, British Petroleum, gives a very good statistical overview every year which is publicly available—an assessment of oil and gas reserves globally and their likely consumption and usage. Gas will not replace oil, but it can greatly supplement oil resources as they are today and it will continue to do so for many decades. My view on the issue is that gas, especially if we do take these newer technologies and make gas more readily usable in transport fuels and such, will greatly extend—by many decades—the current supply of hydrocarbons for global transport.

**Senator MILNE**—By 'many decades', are you talking about 30 or 40 years, or 100 years? I know this is a best-guess scenario, but the question here is: do we invest vast amounts of money in a transitional solution or do we leapfrog it? This is the question with nuclear power as well, of course. There is only a limited supply of this. It will only buy us a certain amount of time, at great cost.

**Mr Pytte**—There are many comments I have about what you said in that statement. You said 'at great cost'; actually, I would suggest this is perhaps the lowest cost transition alternative for transport fuels. So it is not at great cost; it is at marginal, incremental cost. Secondly, I would say 'many decades'. I would not go so far as to say 100 years. I cannot see out that far, but I do have a long background in the upstream end of geology and resource management and exploration. So I would comment that we do not know what we do not know about future resources. We only know if it is actually there when we explore, and there are still many areas left to explore for oil and gas. It is becoming more expensive and it is becoming more difficult, but I do believe we will be able to extend the current supply systems of hydrocarbons for many decades by using gas as a transition fuel.

**Senator MILNE**—On that scenario, you might have heard here this morning, and certainly yesterday, the discussion about whether it is wise for Australia to allow the sale of its liquid natural gas offshore, given that there are known reserves and that long-term pricing structures are being entered into which are selling it fairly cheaply in the context of depleted oil supplies and likely price scenarios. If the Australian government were to take the view that it was in our strategic interest not to export natural gas, would your project collapse? Does your GTL project depend on global investment and global exports for cash to get going?



**Mr Pytte**—Not commenting on the policy situation you made but rather commenting only on your question, which was, ‘Does the gas-to-liquids project require the export of natural gas to be viable,’ I would say, no, it does not and that there is sufficient demand in Australia for our product to satisfy the needs of at least the initial investment in our project.

**Senator MILNE**—So we could have a policy setting which limited the export of natural gas without jeopardising the investment, if we were to decide to make that investment in it as a transitional fuel. Is that what you are saying?

**Mr Pytte**—What I am saying is that, with our project, all of the diesel product we could produce could readily be consumed in Australia, at least for the initial investments.

**Senator MILNE**—Okay. Thank you.

**Senator NASH**—Just reading through the submission and the dollar figures of what it would cost, it certainly would be an enormous investment. You did say in your submission, when talking about the government’s role, that a number of mechanisms are available which could allow a more competitive payback for the investor. Can you run through what you think those mechanisms may be?

**Mr Pytte**—I have had discussions over the last number of years with the Department of Industry, Tourism and Resources and the Department of Transport and Regional Services. There are processes and mechanisms of review and support within those departments, in Invest Australia and in AusIndustry. There are also mechanisms at the state level with regard to infrastructure support.

**Senator NASH**—Are they financial type mechanisms or regulatory?

**Mr Pytte**—Those are processes I am referring to. As far as the specific mechanisms that could be used to support projects, from my understanding they are determined by the government based on their review of particular projects or industries. There are a number of mechanisms in place today to support certain projects and certain fuels which are out there. You are probably very familiar with the support mechanisms in place for compressed natural gas and LPG fuels, which are the effective excise rebates of varying degrees. There are supports for some remote area projects with regard to the government subsidising or paying for infrastructure. In the case of the North West Shelf LNG project there was a pipeline built and there were long-term domestic gas contracts entered into to support the initial investment. Of course there were other obligations in the state agreement with the North West Shelf project.

Without my suggesting what would be the best mechanism, there is a range of focus mechanisms. Mechanisms could be geographically focused around infrastructure. There are mechanisms which could be focused on a particular fuel type, which are being used today for biofuels, compressed natural gas or LPG, which have to do with excise rebates to the fuel producers. There are also more general fiscal incentives which can be put in place—for example, accelerated depreciation, which would allow large capital projects to be more commercial than they are today. There are also the upstream secondary taxes—the PRRT, the petroleum resource rent tax—which could be modified to allow less taxation on the upstream resources, which could then flow through to a gas-to-liquids project. So there is a whole range of potential mechanisms,

most of which I know are being used today in one way or another for various industries and projects in Australia.

**Senator NASH**—Obviously the declining supplies of oil in this country and our self-sufficiency decline is contributing to the balance of trade figures. What potential does GTL have to reverse that trend? Or is that just too difficult to answer?

**Mr Pytte**—No. In fact we have modelled it in the past both through Access Economics and through ABARE, I believe, a number of years ago for a previous proposed project, and that has been shared publicly and with the government. Basically, if we, for example, produce 50,000 barrels of diesel a day which is consumed here in Australia or exported—either way—it would provide several billions in revenue per year to offset that trade imbalance. Currently, I believe, we are importing roughly 40,000 or 50,000 barrels a day of diesel into Australia as a finished product, so we can certainly produce that amount indigenously and improve the trade balance.

**Senator NASH**—Finally, there has been some comment—and I am sure there will continue to be—on ABARE and ABARE's performance. What is your view of ABARE's performance in predicting and analysing about the general oil future? That is a very broad question. I am really asking for your view of ABARE's performance in general on how they are assessing the current oil industry needs and future needs.

**Mr Pytte**—I used ABARE's forecast in my submission, as I viewed it as a neutral third-party perspective on the future supply and demand in Australia. I was happy to rely on that, because, even relying on ABARE's forecast, there is a substantial wedge of increasing demand for imported fuels in Australia, which I feel Sasol Chevron's project can help to address. With regard to ABARE's forecasting mechanisms and ABARE's forecasting results: as I said before, all forecasts end up being wrong.

I am not speaking as a Sasol Chevron representative here—rather from my long background in exploration and the upstream—but I personally believe that it will be very difficult to maintain the current liquid fuels production rate for the next 30 years, which is what is forecast by ABARE. My view is somewhat more pessimistic: I believe that that rate will be declining. How steeply it will decline and what that rate of decline will be would be a whole study in itself.

**Senator MILNE**—I am interested in the costs here—\$A20 billion, including offshore gas development, as the capital cost of the project. What level of government support is being asked for or is required?

**Mr Pytte**—First off, that would be the very approximate cost of building a 200,000 barrel a day project and all the offshore infrastructure and production facilities—a massive investment, similar in scale to the current North West Shelf LNG project, which I think would be of a similar cost, perhaps even more, if converted into today's dollars.

With regard to what support we are currently requesting from the government: we have not asked for any support from the government on an out-of-pocket basis, and I do not necessarily believe that it is required. I think there are mechanisms the government can put in place which take advantage of the different time value of money, for example, between industry and government which can allow effectively cash neutral support from the government—for

example, accelerated depreciation, where you get to accelerate your capital more rapidly than over the life of the asset. That does not actually grant money to the proponent but rather accelerates their deductions, so it is a time value issue. The government still gets just as much tax revenue as it would ever get; it just gets it a little bit later in time. We are not out there asking for any direct support.

There are other issues which have been proposed by certain parties in government or certain other people in opposition, many of which could work. I am not out there right now, and Sasol Chevron is not out there right now, asking for a specific level of support from the government. But I would point out that some of the mechanisms that have already been put in place for other gas based alternative transport fuels would very likely be more than sufficient for a project like ours to go ahead robustly. I expect the capital for that project to be all private.

**Senator NASH**—What is the cost of a litre of GTL diesel as compared to conventional diesel?

**Mr Pytte**—The cost to produce it or what we would sell it to the consumer for?

**Senator NASH**—Both.

**Mr Pytte**—The different economics between diesel that comes from crude oil and diesel that comes from natural gas is a very good question. Basically, producing the diesel from natural gas requires much more capital investment upfront. It also has a higher plant operating cost. But what you gain is that the feedstock cost—that is, the cost of the raw resource; the cost of the natural gas versus the cost of the crude oil—is substantially lower, and that is where you make it up. With regard to our modelling and how we would expect the economics to work: we would expect to sell the fuel at parity cost—at the same cost as the clean diesel in the market at the time.

**Senator NASH**—Is there a particular point in terms of the oil price where it no longer becomes feasible to do GTL? Would that fluctuating price per barrel of oil have any effect on future production of GTL?

**Mr Pytte**—As oil price goes up, all of these investments become more attractive.

**Senator NASH**—I guess I was asking about it going the other way. Is there a bottom end at which GTL is really not economic to produce?

**Mr Pytte**—Yes. Because there are so many other factors involved—the fiscal regime, the cost of construction, labour rates, whether you have existing infrastructure in place or not and so on—it is a totally different question if I am answering it, for example, in Qatar or Nigeria, where we have projects under way, versus in Australia, particularly in the remotest and most distant parts of Australia where there is nothing in place and therefore costs are higher. You will not get the same answer. Every project will have a different answer for that. But the general answer is that you are getting at a big issue for GTL, which is that as the price of oil goes up it becomes very attractive; as the price of oil goes down, depending on how far down it goes, it is at great risk. The specifics and exact numbers will vary with every different project and with the cost of gas and the cost of the development. I cannot give a specific number there.

**Senator NASH**—Obviously, your company has enough belief that the price of oil will not drop below a certain level, given that you are prepared to put so much financial input into the investment. You are not seeing it as a short-term thing; it is a long-term thing.

**Mr Pytte**—It is a long-term thing—exactly right. You have to make the investment now based on today's costs and based on today's forecasts, but the project will go for 20, 30 or 40 years and so you are worried about what the oil price is going to be like and what the diesel price going to be like out over that very long time frame. Clearly, we have found an economic solution that works for us, both in Qatar and in Nigeria, and that is why there are projects under construction there today.

**CHAIR**—I have a question that follows directly from that. We are talking about this product as a replacement for diesel. One of our terms of reference is the impact of rising prices on the community and the economy. This product comes in, from what I can tell from what you just said, at the same price that petroleum diesel does. It is purely a replacement fuel; it is not at a lower cost. The implications for the economy of the cost are still the same, whether it is petroleum diesel or GTL diesel. Am I understanding that correctly?

**Mr Pytte**—I would explain it differently. I would not say that that is wrong, but there is a much bigger picture than that. We look at these issues with regard to ensuring adequate supply. If supply is restricted, prices will go up. If you mandate prices, and those prices are below global commodity prices, supply will go down. That is the danger if you try to regulate price rather than enable supply. Anything you do which brings new supply into the marketplace helps the global supply and therefore helps prevent global prices from rising. Does that make sense? Anything you do which adds to the incremental global supply of these products will help with regard to managing prices and keeping them from rising where they would have done so if you did not have that supply.

**Senator NASH**—Can I clarify? What you are saying is, regardless of cost of production, the cost of the GTL will be linked to conventional diesel.

**CHAIR**—Yes. I understand what you are saying, but it also has an implication for our terms of reference in terms of the costs to the economy. We are still talking about paying a higher price if it is linked to the price of existing supplies. But you are saying that cost is affected by supply.

**Senator NASH**—We are not arguing what you are saying.

**CHAIR**—I am just trying to clarify, that is all.

**Mr Pytte**—Our assumption is that we would sell our product into the global marketplace. Even if it were consumed in Australia, Australia would be part of the global economy and the global marketplace, and we assume that the revenue we would receive would be comparable to revenue that other clean diesel would attract.

**Senator MILNE**—There is the question about policy in terms of it being very unlikely in the current scenario that Australia would legislate to secure its own supply; therefore you are selling into a global market and the global price will be whatever the global price is. Therefore, it does not really resolve our issue in terms of an oil vulnerability analysis and how Australia copes in

the future with increased prices. Getting back to the price, you are saying that you are planning this infrastructure development on assumptions about increasing prices of oil or a price of oil in the future. Presumably that is commercial-in-confidence, but are you prepared to comment on what your thinking is in terms of the oil price? You were saying that this project is a 20- or 30-year investment. What is your thinking in relation to the oil price over 20 or 30 years?

**Mr Pytte**—We always look at scenarios in a range of prices. It is not for me to determine what they are; they are determined by people who are really smart at this stuff, I guess. Again, they are always wrong, but they are used for planning bases. The way in which we use oil price forecasts is not in order to know, because we will never know until we get there what the price is going to be, but to help us manage our investments and to make sure that we are making the most sensible investments and use of our shareholders' capital as we can in a given year. It would not be appropriate for me to comment on what my company's forecasts are.

**Senator MILNE**—That is what I thought. I was just fishing.

**Senator NASH**—Does that theory apply to politicians as well? Can we be wrong and still be really smart?

**Mr Pytte**—I won't comment on that!

**Senator MILNE**—From our point of view, if the government were to invest a similar figure, \$20 billion, in alternative strategies such as public transport and a range of other fuel efficiency initiatives, we might end up with something more than a transitional arrangement. Are you at all concerned that governments might decide to take the demand side reduction option and efficiency option and not invest in this, to the extent that it is a transitional strategy?

**Mr Pytte**—We are in favour of all governments and societies taking appropriate conservation measures on this limited resource—absolutely. In fact, if you look at what has been going on for the last 10 years in Europe, you will see that they have made some very strategic decisions in this area. One of the major decisions they have made—it is not in every country, but as a whole it has been implemented in different ways in different countries in the European Community—is to move aggressively to diesel engines rather than spark or petrol engines. They have achieved dramatic improvements in transport efficiency across the entire continent through fairly modest measures—tax incentive measures. I would encourage North America and Australia to consider that, if you wish to look at ways of conserving this limited resource—moving to more efficient consumption. With regard to your other comment, about government investment schemes, Sasol Chevron is not proposing a government investment scheme. I am just discussing with you and telling you about a potential private investment—

**Senator MILNE**—No, I was not inferring that; I was just putting the other side of the scenario where we assume we could reduce demand rather than continually look at increased supply.

**Mr Pytte**—I would commend you to look at both.

**Senator NASH**—Following on from what was said yesterday, and the point that Senator Milne just raised, there does seem to be the need for a combination of factors.

**Senator MILNE**—Yes, everything feeds into it.

**CHAIR**—I would like to ask a question, linking it back to the issue of climate change. We heard comments from our last witnesses, and yesterday too, about the possibility of converging what we do about climate change and peak oil and oil depletion. Can you outline how this product deals with CO<sub>2</sub> and the issue of CO<sub>2</sub> emissions.

**Mr Pytte**—It is a very complex issue, as you would be well aware. In fact, in our submission we included reference to some fairly substantive life cycle assessments on the GTL industry and its comparison with the refining industry. It also included an executive summary of that report in the appendices. The short answer as to the result of this in-depth study—which was a consolidation of a multitude of studies carried out by Sasol Chevron, Conoco Phillips and Shell separately and with different contractor and consultant support and then brought together by Five Winds; I think that was the name of the consultant—is that if you take a life cycle assessment which goes from the production of the product all the way through to its end consumption and you look at like for like with regard to the totality of the products and activities where the fuel is consumed in the end and where the fuel comes from, the gas to liquids industry is on a comparable basis to the refining industry. There are error margins in our assumptions in here, but it is about the same amount of CO<sub>2</sub> emissions.

If you were going to try to produce additional transport, power, petrochemicals and a range of heating and energy products and you wanted to go the current route of expanding or building a new refinery and using crude oil and whatever other products you need versus using gas to liquids and other gas supplies, they are comparable. There is not a penalty in the CO<sub>2</sub>, but a lot of energy is consumed in the production of gas to liquids, the production of the synthetic diesel, and whenever you consume energy you burn, oxidise and create CO<sub>2</sub> as one of your by-products. However we get it, we make all of that up in the usage, because the products are so pure and they get used in diesel engines which are very efficient—more efficient than most other engine types. On a whole basis, you come out roughly neutral or slightly better than the refining industry. While it is not greenhouse gas, if you then look at the other air emissions, with no greenhouse penalty you get a major reduction in all your other air emissions—nitrous oxide, sulfur, particulates and volatile organic carbons. Those are all reduced and that helps clean up the air, particularly in urban environments.

**Senator MILNE**—Can I just ask a question following up on that.

**CHAIR**—One last one.

**Senator MILNE**—If globally we do eventually get a substantial price on carbon, what does that do to the economics of the sale of this product?

**Mr Pytte**—I suppose it would depend on the details of what that tax would be, how it would look and how it would affect this investment versus other investments and where the cost would be recouped. If you raise the cost of energy, someone is going to pay for it in the end, and it usually is the end consumer who ends up paying a higher price. I cannot answer on how it would impact our specific project.

**Senator MILNE**—Basically, what you are saying is that if the world came to a decision to put a price on carbon, then it significantly increases the price for the consumer of this product, which comes back to the terms of reference of our inquiry about supply and price.

**Mr Pytte**—No, I did not say that. What I said was, without knowing the details, I cannot predict what it would do. What I would say is that if you add additional taxation on carbon, it will have an impact across the board for energy consumption. Whether it would have a larger impact on our project versus, for example, electricity generation from coal or standard diesel generation from a refinery, whether that would help or hurt our project on a relative basis with all those other alternatives, I cannot answer.

**CHAIR**—We are running out of time, so we will have to finish your evidence. Thank you very much. It is much appreciated. If you have any extra information you want to give to the committee, please feel free to send us anything that you think is appropriate.

**Proceedings suspended from 10.45 am to 10.59 am**

**BEVERIDGE, Mr Andrew, Project Manager, Commercialisation, Office of Industry and Innovation, University of Western Australia**

**HARRIES, Professor David, Director, Research Institute for Sustainable Energy, Murdoch University**

**SCHLAPFER, Dr August, Lecturer, Energy Studies, School of Science and Engineering, Murdoch University**

**SELWOOD, Mr Richard Neil, Chief Executive Officer, Natural Fuels Australia Ltd**

**CHAIR**—Welcome. I remind you that the giving of evidence to the committee is 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. If at any stage you want to give evidence in camera please let us know and the committee may agree to that. Thank you for your submissions. I invite you to make brief opening statements and then we will ask questions.

**Mr Selwood**—Natural Fuels Australia Ltd is a biodiesel development company. Ultimately in Australia we will be a manufacturer. We are currently building a 150 million litre plant in Darwin in the Northern Territory. It comes on stream in about October of this year.

**Prof. Harries**—At the Research Institute for Sustainable Energy at Murdoch University we test and undertake research in a variety of renewable and sustainable energy areas.

**Dr Schlapfer**—My area is mainly energy economics and energy policy, as well as renewable energy and sustainable development.

**CHAIR**—Energy economics—I feel a lot of questions coming your way!

**Mr Beveridge**—I will restrict the comments in my brief opening statement to the liquid biofuel sector, which is the area of interest which my submission relates to. I think that biofuels have a key part to play, but they are really only one part of the solution. There are three parts of the solution which are: one, energy efficiency; two, tax treatment; and, three, improvements in exploration technology. The key issues, as I see them, are that we have a triple bottom-line approach to assessing how and why and when to introduce biofuels. The first is financial. Everything has to be economic, but it is driven by the fact that we have this forecast \$12 billion a year deficit in the year approximately 2015, which is forecast purely based on the oil crisis that is heading our way. If we do nothing, we are staring down a \$12 million a year deficit—and they are not my figures; they are other people's figures.

The second point is that the economic impact on the issues that are facing us are going to have a severe adverse impact on growth, employment, the current account deficit, tourism and all things along that line. Probably the most important thing here, I would argue, is the environmental impact. Again, a lot of people talk about renewable fuels; a lot of people talk



about gas to liquids. That is great, but we need to accept that a lot of these fuels are going to have an impact on global warming if they are not generated by carbon neutral means. So carbon trading has a role to play. I believe that gas to liquids should be seen as a transition type approach due to the adverse global-warming impact that gas to liquids has. You are basically unlocking the carbon that has been stored underground in the gas bank and you are converting that to ultimately CO<sub>2</sub>, whereas with renewable biofuels you are capturing CO<sub>2</sub> from the atmosphere, growing crops, and then releasing the CO<sub>2</sub> back into the atmosphere when you burn that fuel in a vehicle—so you have a closed system which has a carbon neutral impact.

Moving on to biofuels, I am talking about biodiesel and bioethanol, which are No. 1 renewables. I believe that the current target set by the government is far too low. We have the 350 megalitre target. It is good to have a target, but I think it is far too low. Experts tell me that we should be aiming for 30 per cent biofuel use by the year 2015, which implies roughly nine billion litres per year, which is a pretty big ask when you look at what we are doing at the moment.

With the current plans, we will achieve only roughly 1.5 billion litres a year in 2010. So we are going to have a major problem in terms of scale-up. My roadmap looks at how we can ameliorate this. I am looking at two things. Firstly, we need to develop an accurate financial and economic agribusiness model which we can finetune and test over the next three to four years to enable massive investment in terms of scale-up around 2010 so that by 2015 we have a fighting chance of heading off the \$12 billion a year deficit. Secondly, we need to establish rapidly a technology demonstration program in both biodiesel and bioethanol. There are some very good companies gearing up and already producing biodiesel and bioethanol, but it tends to be done on very much a kind of almost industry secret basis. People are very unwilling to share information—and I quite understand why, as a lot of this is done on a commercial-in-confidence basis. However, there are lots of pockets of activity happening around the nation.

As well as biofuels, we are looking to set up power cogeneration facilities. Again, Perenjori shire near Geraldton, the University of Western Australia and RISE are leading the charge in this respect. What we are looking to do there is to set up a quite a large—in our scale—25 million litres a year bioethanol plant, which has a cogeneration plant generating power for the three mine sites that are due to go into the Geraldton area and require 60 megawatts of power over the next five years.

Finally, there is a need for a variety of cropping technologies and hybrid solutions such as power generation. Many of these solutions will depend purely on the local macro-economics of the region. So a syngas plant in Queensland might go well; a wheat waste plant in the wheat belt might go well here. There is a place for fermentation, a place for gasification, a place for biodiesel and a place for different technologies and different crops. However, we need a very accurate but also stress tested model which we can use to convince the investment community in 2010 to massively scale up the production of liquid biofuels.

How might we do this? No. 1 would be via a state or federal centre of excellence in transportation biofuels, followed by a CRC where major universities, research institutes and industry partners such as Holden, Sasol Chevron, BP, Shell—all the big power companies—share information in an expert way and allow the community, which is the main stakeholder—you and I as voters—to have an involvement in this. But the problem is one of timing. We have

only about four years to get the model and the technology demonstration program going, because by 2010 we need to press the button and get the financial institutions to rapidly scale up so that by 2015 we can head off the \$12 billion-a-year budget deficit.

**CHAIR**—Does anyone else want to make some opening comments, other than your name and organisation, before we throw it open to questions?

**Prof. Harries**—I would like to make a few brief comments. I would like to start by saying that I come to this committee not expecting anyone to assume that I am an expert, but I add to that by saying that George Pompidou once said that three sure paths to ruin are to gamble, to chase people of the other gender and to listen to experts. I am not an expert. Andrew has covered a lot of the ground that I was going to cover, because we work together, collaboratively.

I think we all know certain things. One is that oil prices are going to rise, but there is a huge deal of uncertainty and unpredictability about how much and when. We do know that increases in oil prices will be inflationary, and this can result in economic and social hardship. We know that the economic hardship is likely to be uneven across sectors and social groups, with those more dependent on private transport being affected the most; it will be the outer suburbs and rural and remote communities that are highly dependent on transport. And we know that global growth in demand for oil is exacerbating these problems.

The degree of Australia's self-sufficiency in oil is going to decline sharply in coming years unless Australia reduces its dependence on oil, and its exports will increase significantly. Concerns over rising oil prices, security of oil supplies and environmental impacts of fossil fuel are driving major R&D and investment in more efficient vehicles and alternative fuels, especially in the USA, Europe, Japan and other countries. Australia is relatively well positioned to strategically develop transitional alternative fuels, especially natural gas and liquid biofuels. Given the relative certainty over Australia's coming decline in self-sufficiency in oil, combined with the high degree of uncertainty over the scale and timing of future oil prices, the sensible strategy for Australia is to accelerate the transition to greater fuel efficiency and to alternative fuels or to at least position itself in a state of readiness for an accelerated transition.

Currently, Australia's strategy appears to be one of relying on overseas research and development—that is the 'fast follower' approach; increasing conservation; encouraging the reduced use of cars and increased use of public transport, cycling and so on; and providing some 'market pull-market push' type incentives. While this is a low-cost strategy, to me it is fraught with inherent risks and could result in a degree of economic and social hardship that could be avoided. The current strategy grossly underestimates the dependency on private vehicle use that we have built into our systems and our lives. The current strategy also grossly underestimates the complexities involved in the established markets for new fuels.

There is also what I call the jokers in the pack. There are a number of issues lying there and, if we do not take notice of them, they are going to really confound any strategy we try to develop. One of them is the cost of alternative fuels and how safe it is to assume that the creation of markets for alternative fuels will provide insurance against increased fuel costs. Let us take biodiesel. If the price that producers can obtain for their biodiesel is greater in Europe and China than it is in Australia, they will export their fuel to those countries. Natural gas will be exported if the price on the world market is high. Another joker is environmental impacts. There could be

a tendency for social and economic imperatives to override environmental concerns. Globally, palm oil is one issue that is being debated right now. Another will be local pollutants and greenhouse gas emissions.

The third joker in the pack is better information on oil reserves. While better information will enable better planning, there are inherent problems in obtaining accurate estimates of oil reserves, and history has shown that political factors can be just as, or more, important. It will be therefore difficult to predict future oil prices, and we will need to accept that we are going to be facing a higher degree of uncertainty.

The fourth one is that oil is not only used for transport. The impacts of rising oil prices go beyond transport, as oil is a feedstock for many other products. A carbon tax on transport fuels would increase the drive to increase efficiencies and low carbon or renewable transport fuels. However, it will be politically difficult to impose taxes on fuels when prices are rising rapidly, unless other taxes on fuels are reduced and, therefore, any carbon tax may have to be introduced with a total review of the taxation system on fuels. The transport fuel market will be a lot messier and more complex than the current one, and the optimal mix will be highly location dependent.

The last joker in the pack is how to protect against world trade in oil transport fuels. A lot of what we are doing in the USA and other places is protecting against supply disruptions and sudden price increases; it is not about protecting us against a total, slow rise in transport fuel prices. One of the solutions that we will have to look at is how to provide local fuels that are not part of a global transport market but locally based; therefore, we are going to have to look at a range of technologies and fuels. Things like electric battery vehicles are going to play a major role for those reasons.

**CHAIR**—Do you also want to make some comments before we throw it open?

**Dr Schlapfer**—Yes, I will talk a little about where I am coming from. A lot has been said about economists and, although I am not a trained economist, I have been in the field for quite some years. I find that we have to be careful when we label economists, because there are economists who are taking the ecological system into account. They are resource economists who are not just looking at the neoclassic model; therefore, we should not be too hasty in judging all economists in the same way. They have a role to play and some of those models are very useful, as long we accept their limitations.

The other thing that I will add is in relation to David's comments about oil and gas as a resource. We should widen the debate a little. Some people would argue that to burn oil and gas is a great waste; it is too valuable a resource. When we have this debate about transport, we tend to forget that oil and gas have characteristics that are to some extent irreplaceable. We can replace the fuel. We can produce biodiesel, but we cannot replace some of the other characteristics of these substances. So I think we should take that into consideration as well when we are talking about a finite resource and how it is allocated.

**Mr Selwood**—I guess I am the commercial person here. Whilst I agree wholeheartedly with a lot of the comments made by the three previous speakers, it all comes down, really, to dollars—to attracting the investment income from people like yourselves and others who want to invest

their superannuation or whatever in creating something. In this case, the ‘something’ in our business is to produce biodiesel as an alternative to mineral diesel. I know that our company has been tagged with the brush of being the baddies who are going to use palm oil. I do not think our company has ever issued a statement to that effect. We are looking at all sorts of oils. As of today, we have not placed an order for palm oil or any other oil. We are looking at what is generally available, and we are working with SARDI in South Australia. We have worked with Professor Harries of RISE, who is here, looking at alternatives: little bugs to turn muck into oil, to use laymen’s language. Long term, I think that is probably where we have to go.

In the short term, we will use what is commercially available. Currently, there are some 130-odd million tonnes of vegetable oils available. Predominantly, soy and palm would be the major ones, followed by canolas, mustards and so forth. I have a 30-year background in the agricultural industry here in Australia. I have been trying to convince my farmer friends to grow mustard, because it is a relatively easy crop to grow. The yield is not particularly great, but researchers have been working on that for a long time. Because I have spent a lot of time in the US, I know that in Idaho they now have what is called Idaho Gold, which is a variety of mustard seed which is getting close to the yield of canola. From a farmer’s point of view, it has to be economic for him to grow it and for us to be able to buy it and turn it into a fuel. Up until recent times, it definitely has not been viable for anyone to produce biodiesel economically.

With oil at \$US68 a barrel, which I think it was this morning, that means that the refined product is well over \$US100. I think people forget that sometimes, when you see it on the TV each morning at \$US60 or \$US70. We are paying about \$1.40 for diesel at the pump at the moment. As I drive a diesel vehicle myself, I wince every time I have to fill up. But biodiesel can be produced now with government assistance via the clean fuels grant and can be retailed at a lower price than mineral diesel, so I think that is a plus. I agree with Andrew’s earlier comment that the 350 megalitre target is a joke. Why put a cap as such on it? Why put a number on it? Surely we should be trying to create liquid fuels from all sorts of sources. Biodiesel is just one. It might be three or four per cent of the total that we require. Ethanol is the same. There are an awful lot of opportunities.

We talk about fuel cells and things like that but, realistically, that will cost a lot of money because you have to change your infrastructure and so forth. You are talking about, to use an American term, trillions of dollars. If we use ethanol and biodiesel, there is no real change to the existing infrastructure or engine requirements and things like that. There are untold millions of engines out there now. We use the same sort of thing. The only real advantage is that we are cleaning the air, because it is a cleaner fuel. That is a big plus. We are making a product that can be termed renewable, because it is generally grown. The closed loop appeals to me. If you look at what we do as a manufacturer, you see that our plant is a closed loop. There are absolutely no emissions whatsoever. It runs on vacuum. Our waste products are all reusable or recyclable. The only real waste that we have can be used as a cattle feed supplement. It is a sweet, sticky glycerine residue.

The argument about using fossil fuels to grow crops is valid, but then why shouldn’t you use biodiesel to run the tractors, to grow the crops, to run the harvesters, to harvest the crops? The whole system could use renewable energy. We believe that and we have put our money on the line. We are a Western Australian company that have, quite frankly, put \$50 million on the line in Darwin, and we are doing it in Singapore and Houston—many hundreds of millions of dollars.

Our shareholders are mums and dads and they believe in it, they have put their cash into it, and we have leveraged it and joined the financial institutions to make it happen. But in the long term, as Andrew said, if you have a closed circuit or a cycle—and it should be carbon neutral—we are all for it and we will back it, and we will back it with dollars.

I would like to make the point that I have had a lifetime in the agricultural industry. I know it costs a heck of a lot more just to drive your vehicle in the bush because the cost of freight, getting your fuel to wherever you want it, is always dearer, and we rely very much on transportation. While four-wheel drives, SUVs, are a bit of a pain to some city planners, to a country person they are a godsend; they really do make a difference. The roads are not too bad, really, in Australia, compared to some parts of the world I have worked and lived in, but they still have their moments, and that is when a four-wheel drive is fantastic. Most four-wheel drives, to be fair, should be diesel driven, because that is the only way to get any reasonable mileage out of them, and biodiesel goes straight into the tank and works perfectly. I run my vehicle on biodiesel. It does not smell. It does not smell like fish and chips, I have to tell you that; I read that in the newspaper all the time. I suppose if you make it out of fish-and-chip oil it will smell like fish and chips, but generally if you use a vegetable oil or a neutral type of feedstock it does not smell like fish and chips. But it does not smell acidic like diesel either, and it does not have the tailpipe emissions and it is biodegradable. They are all pluses.

I would also like to say that we possibly will use some palm oil. I may get daggers thrown at me, but it is a 33 million tonne production right on our doorstep. We are members of the Roundtable for Sustainable Palm Oil. Our membership number is really easy to remember: we are member 100. We have convinced all our suppliers to be members. I think that, whatever percentage we use, it will be from operations that do abide by the code of practice. I guess you all know the roundtable was set up by the World Wildlife Fund, and we happen to agree with their aspirations. I dare say at some stage the soy growers might also have something similar, because I hear similar complaints about soy growers. I spent a lot of years in America too, and soy is a huge crop there. To keep farmers viable, they need a market, and the human consumption market unfortunately does not take care of it all. The industrial markets are very large for most crops grown today.

**Senator WEBBER**—I will pick up where you left off—that is, on palm oil. Whilst I do not necessarily want to get into the environmental arguments about that, the flipside is that for our nearest neighbour, Papua New Guinea, palm oil is its largest export. So it seems to me that when we debate the use or non-use of palm oil we have to take into account their economy and their sustainability as well, particularly from an Australian point of view, looking at the amount of aid that goes there.

**Mr Selwood**—We have representations made to us regularly by the governments of Indonesia, Malaysia and Papua New Guinea. You have to look at both sides. There has been illegal clearing, for want of a better word. But realistically a lot of it has been cleared for timber. Rubber plantations have been cleared now and replaced with palm. It does employ a huge amount of people. It gives them an income. We would love to be neutral on the subject, but we felt that the only way to be realistic was to try and be a good corporate citizen and be part of the RSPO—not just a member with a few dollars attached to it but a member which encourages all those that are going to be servicing our company. When you think about it, many hundreds of

millions of dollars are involved in turnovers and things going between Indonesia, Malaysia, New Guinea and Australia. So we are happy to do whatever we can to keep it transparent.

**Senator WEBBER**—One of the things that we are already—although it is very early in the inquiry—in furious agreement on is that there is no one solution to this problem. We do have to always look at both sides of the argument. There is another quick general point I would like to make. One of the reasons I was a little bit late this morning was that I was listening to the radio about this business roundtable that we now have on climate change. There was an interview with the chair of BP Australia, who is on the roundtable. He felt that we were not doing enough to address the challenges of climate change. One of the other points he made was that in his view a carbon tax is inevitable, which I thought was an interesting comment from a major player in the sector. Is that your view as well?

**Mr Beveridge**—I would like to support that. I think it has to be a combination of carrot and stick. I think a carbon tax that is used in the right way can be very valuable. Also, I think it has to be balanced out with incentives to encourage people to switch to renewable fuels and adopt vehicles that are more efficient and hence do not have the same impact on CO<sub>2</sub> emissions. So, yes, a carbon tax is probably the right way to go.

People do not seem to realise, as well, that we can, as a nation, participate in the carbon-trading system. There are some very smart models in the US that are used to very great effect with the pig-farming industry. Those models could be used here today. It does not require legislation. The LETS system, which is in place, means that people here, if they ameliorate CO<sub>2</sub> or methane emissions, can actually sell those reduced emissions on the carbon-trading market. In fact we just made a back-of-the-fag-packet calculation with BHP-Billiton the other week. They are producing hydrogen down at the Cronulla refinery. They produce 20 tonnes of CO<sub>2</sub> per hour. So they produce 240 tonnes of CO<sub>2</sub> a day, seven days a week, 365 days a year. If they were to bolt on the technology that we are developing, that would generate additional revenue just for that one operation of \$4.4 million per year. They can do that today. It does not require any legislation.

**Prof. Harries**—I have always seen a carbon tax as inevitable. I take it further. I assume, personally, that it is going to be in the form of emissions trading, because that is going to be the lowest cost form of doing it.

**Senator MILNE**—I want to pick up on a couple of things. Obviously sustainability is the key issue with regard to palm oil, soya or any other oil. That has been a problem with the carbon debate, but it has been taken off on its own without the connection to biodiversity. That synergy between all of the conventions needs to occur to get a sustainable outcome. I think that is the key point that you are making here. That leads me to research and development, which is essentially the nature of your submissions. It seems to me that across Australia there is no coordinated research effort around this whole area of alternative and sustainable transport fuels and that several universities and several research institutions are doing bits and pieces. We have all acknowledged that all the bits and pieces need to come together to form something of a big picture. You have put forward a proposal to develop a centre. From what I have read it is for Western Australia; it is not a national research institution as such.

Can you just give us a sense of whether we are right in assuming there is no coordination across the country in terms of research institutions around this issue of how we are going to develop alternatives and how they fit together. If that is the right assumption, what recommendations could we make to change that? Do we need a CRC on this? Do we need a central agency associated with the Greenhouse Office or something? What would be your ideal scenario to start recognising the role of R&D and the complexity and interrelationships to get something of an outcome that would lead to the base for investment and so on that you are talking about?

**Prof. Harries**—At the Murdoch University Research Institute for Sustainable Energy we decided about 18 months or two years ago that we saw a lack of coordinated research. We were involved in the fuel cell bus trial and we thought it was a good opportunity to start bringing together bits and pieces of work that were going on around Western Australia, for a start, to try and build up a critical mass of research expertise, which we thought was critically needed. We are coming from the point of view that research is there to help market development. Often people overlook the nuances of what is involved in trying to get a market up. Little things can go wrong if you have not done your trials, if you have not done your demonstrations. For example, with LNG here in Australia there were some small things that went wrong with some of the trials. There was an assumption that you could take an LNG tank from the United States and put it on a prime mover here. That went wrong because the distances travelled here are much further, so new tanks had to be built. That really impacted on the whole prime mover. The second thing that went wrong was the pumps. There were no readily available pumps that could manage this, and they were the biggest things that failed. Finally, one of the problems they discovered with the LNG trials was that every time you fill up your tank there are certain contaminants that remain that are not used and you increase the concentration of those contaminants every time you refuel. There were things like that which people never saw.

My view is that there is going to be far more research needed than people realise. What we wanted to do here in Western Australia was to start bringing that together to look at quite a broad section of basic research on fuel production, on demonstration trials, on bringing together the TAFE systems for the training of how to get the skill base to put these in. We were hoping that this would then act as a fillip for going into something national. We have been talking to interstate universities and organisations such as the CSIRO about using this as a stepping stone to say we do need some national research group. It is sad at the moment when you look at the CRCs and things around: there is an awful lot on coal and natural gas in terms of cleaner burning and geosequestration, but there is nothing on this really important area.

**Mr Beveridge**—I think what is really good—and again I have come to this relatively recently—is that there is an awful lot of very high-quality capability research and activity happening in the state. I am sure you will find this in other states on your travels. What is blindingly obvious to me is that there is no real coordination. People are beaver away and doing great things, and we have got CRCs on things like salinity, but, for example, people are looking at using mallee roots as a biofuel and yet they do not talk to other people who are working on biofuels. What was really good was that the state biofuels seminar that was held in Perth around 10 February really brought together a lot of these different groups. It is quite exciting how much activity there is, but what is slightly scary is that there is no real coordination.

**Dr Schlapfer**—In addition to that, we need training. I have just read in a report on the nuclear industry in the States that they are in disarray because they do not have the trained engineers anymore. I am not advocating nuclear energy, but I am saying that a similar thing applies to renewable energy technologists and people who can do it and do it well. Therefore, in addition to research we also need to train the people that come up so that when it takes off they are there and there is that skill base.

**Mr Beveridge**—Just following on from Christine Milne's comment, it does not necessarily have to be done via a CRC. The problem with CRCs is that they can have a time lag in some of the verification processing getting going. I think the next round is not until 2008, so it will be 2009 before we can even get some funding to carry on. I am saying that we need to get moving. We need to develop a sense of urgency. It could well be a research institute with two different states—for example, South Australia and WA are making noises. That might be the way forward, but we need to really get things moving in 2006 not in 2009, otherwise we are going to be staring down the deficit without any chance of heading it off.

**Senator MILNE**—To follow on from what you have said, what about a pathway to get from where you are now, which is a Western Australian based initiative, to getting a national overview and some national direction? I just said a CRC because that is a logical way of going, but you say there is a time lag. We are looking for this committee's report to the government to be about what should be the priority. Obviously, R&D has to be a priority; obviously, bringing together people from across the country to somehow get this is a priority. I am interested to see what your ideal scenario is. Is CSIRO the logical place to imbed something like this with outreach across the country? A research institute is what you just said. Have you had the discussion about what the pathway is? What about CSIRO? Is that not appropriate?

**Prof. Harries**—We have had limited discussions because of the processes involved. Essentially, when you are an academic you are flat out trying to do a job; you have not got time to run around the country and talk to everyone. Our effort has been to try to use the application of a centre here to bring people together. That has worked very well. We have Curtin University, Murdoch University and UWA talking together quite well. We are already starting to go out and talk to South Australia, to the University of Melbourne and to others. It started that talk happening. What the next steps are, I do not know. As Andrew says, yes, a CRC takes time.

**Senator MILNE**—Thank you. I would just like to congratulate you on this terrific initiative.

**Prof. Harries**—I should add, another problem with CRCs that I see—this is a personal opinion—is that the rules for CRCs militate against small industries. We have not had a lot of research undertaken in Australia, largely because a lot of the companies are headquartered in Europe, the USA and so on, and they prefer to do the research there. With research, the companies that are here in Australia are too small, too busy, want to do it in house or cannot afford to commit substantial funds to it for seven years. So, for some areas of research, it is quite difficult to use a CRC model.

**Mr Selwood**—I have a final comment on that. Having applied for various government grants in those areas and others, particularly in the renewable fuel area, in the last three years or so, I find they are unnecessarily complicated and require a heck of a lot of hard work and a lot of dollars and then you never hear from them half the time or it goes to someone else. It is not a



case of sour grapes, but generally, when you look at it from a commercial point of view, you just say: 'Why did they make that decision? It's not going to work.' We have done everything without government assistance. The taxpayer has not contributed to our business, and I guess it probably will not, other than maybe through the clean fuel grant, which I also find a bit of a nonsense in the way that it is set up. As a renewable fuel industry, we pay excise duty and then under a clean fuel grant we claim it back, but then the distribution groups, including oil companies, want it back off us—so it is a bit of a lose-lose situation from our point of view. It could be a lot easier. In fact, the European models, and even the American model, work a lot better for us. It is not that we are particularly looking for government handouts, but it just should be a lot simpler. It becomes unnecessarily complicated.

One of the other points I would like to make is that from July this year the government—I think it goes to parliament around now—has the simplification of excise duty. Literally, what that means is that we will become almost the cheapest country in the world for diesel fuel, in particular, because hardly anyone will pay excise duty—other than the people, like ourselves, who drive on the roads and drive vehicles of less than 4½ tonnes. Any vehicle over 4½ tonnes will get excise rebates. Any business, industry or whatever will not pay excise under the new white paper that has been out for some time now. To me, that is just a nonsense, but there you go! You will have, literally, an excise-free economy as far as diesel fuel is concerned.

**Mr Beveridge**—Following on from Richard's point, again I would like to congratulate Richard's company for doing all this without any government support. The sad thing is that he has had to do that because he has found it too hard to get support. We have such a dangerous situation developing that we could argue that we have market failure in the oil replacement industry. If we agree that we have market failure we ought to encourage industry and others to go away from this rather archaic dollar for dollar system to one where, maybe, for market failure type situations you can get 80c in the dollar support rather than dollar for dollar, and that would really transform the ability of companies like Richard's to kind of turbo charge their own capital resources.

Coupled with that you have to make the grant application process and the time frame much simpler otherwise people like Richard say, 'Oh, it is all too hard; we will go to the market and raise money.' That is what you have done and I applaud you for doing that, but you should not have to do that. You should get some help from the state and federal governments because there are enough grant funding programs in place but a lot of them are too hard to access for small companies who are busy doing good things.

**Senator NASH**—I think we are all in furious agreement that there needs to be a nationally coordinated approach to research and development for renewable fuels. Professor Harries hit it on the head when he said that he is actually too busy doing what he is doing to go out and try to develop that further. It would seem that we need all those players, be they research institutions, business or those oil companies that are eventually going to have to sell this to the consumer, to come together. Perhaps one of the things this committee should consider is playing a lead role in coming out with some ideas as to how we could convene some kind of body to look at all this. Over the past few years it has been very ad hoc and things have come up out of the woodwork in a very odd kind of way—biodiesel, bioethanol or any of the others. There has been no strategic approach to the end goal of renewable fuels being good for Australia. I think that is something we can definitely look at.

In relation to the 350 million litre target, it was never intended as a cap by government. Certainly, at that time, a target was necessary to show the intent of government to take this very seriously. I agree with Andrew that it is too low in terms of the percentage of the total fuel usage of the nation. It is not nearly high enough to play a real role, and we could do it a lot higher. But, my question is: in the practical world, as much as we would love to see greater use of biofuels, and ethanol is in there, how do we reconcile a higher target with—and you hit on this in your submission as well, Andrew—this reticence of the oil companies to take it up and use it?

**Mr Beveridge**—I think it is a real challenge. I am trying to bring the oil companies along with us, even though they see the whole renewable fuel industry as a bit of a threat purely because their business model is completely different. It relies on this massive infrastructure investment of one or two very major refineries whereas the whole biofuel industry will evolve with maybe 10, 15, 20 or 25 much smaller facilities like the one Richard's company is building in Darwin. At the end of the day, we need to bring the BPs and the Chevrons on board with us. We do not want to have a daggers drawn situation.

We will end up having small refineries using things like wheat waste. We grow 20 million tonnes of wheat in Western Australia a year. We are looking to build a plant in Perenjori which will use 100,000 tonnes of wheat waste. That will produce 25 million litres of bioethanol, and that is the smallest quantum that we can go for. We will probably end up building a bigger one but we are going to start small, do a demonstration program, cut our teeth, get the farmers inspired, involved and comfortable and get consumers comfortable using E10 and ideally E100. Again, why are we making E100 cars in Australia which we are exporting to Brazil? Why aren't we running our E100 cars here? I have no idea. As I say in my submission, E10 should be a mere pit stop on the way to E100.

**Senator NASH**—I have that tagged in your submission. I like the reference to it being a pit stop on the way to E100. Certainly, I agree with you that we need to bring the oil companies along with us. There are things like their MTBE replacement. Ethanol is the perfect solution for that. Interestingly, just this morning they were talking about that in terms of the states. I have two more quick questions. This might be a Dorothy but I think it is important to have it on the record. Following on from what you were talking about happening in Brazil—and in the States last financial year they used nine billion of ethanol—why has Australia been so far behind in taking up renewable fuels such as these when there are so many instances across the world where countries have been pro developing these types of renewable fuels?

**Mr Selwood**—Back in 2002 we looked at starting this business in Australia. To be honest with you, the numbers would not stack up because there was no government policy on renewable fuels and there certainly were no clean fuel grants. We went to the US instead where those things were available to us and in 2002 we started a business in the states—Houston in our case; their office was in Boston, a much better city to live in. In late 2003 the Australian government did bring out its biofuels policy and that attracted us to come back and start again. So we are where we are.

The attractions that are available to us in the US and in Europe are so much higher. The US, for all its sins, offers biodiesel producers \$1 a gallon as a blending subsidy, for want of a better word. You would think they could give it another name but that is really what it is. Almost every state has its own policy as well. In Minnesota it is mandated that at least two per cent of diesel

has to have biodiesel in it. In Texas, where we are, we get a state producers subsidy capped at \$3.2 million per annum to encourage those sorts of things. We were talking about carbon trading before. Carbon trading is not in the states because they are not a signatory but try to build a plant in Houston, for argument's sake. If you are going to exceed various emission limits you have to buy credits from someone. So it actually happens in the real world. NOX credits are over 1,000 a metric tonne. So, those things happen.

In Europe we have things like mandates, and in the UK, which I think is a smarter idea, there is an obligation to use biofuels. It is a bit softer than mandatory. Their target is to get up to 10 per cent—but it is currently five per cent. Basically, the way it works is that there is an obligation on road transport, for argument's sake, to use biofuels. The downside is that you will be fined the difference in the excise, which is 20p per litre. It is a softer mandate but it has the same effect.

Germany is looking at it at the moment. There is quite a lot of debate going on in parliament now about taxing biofuels, which have been tax exempt up until now. I think the new government is going to put on a 10 euro a litre tax. They are going to make it not a mandate but an obligation that all fuel companies must use a blend of at least five per cent. Those things are around and they encourage the use of renewables. They are made from all sorts of products.

**Mr Beveridge**—I think there are two real issues. First, the oil companies, and I am not being critical of them when I say this, use a certain degree of self-interest and protectionism to avoid going into biofuels—until very recently. Their business model is very different. They are now having to realise that their business model needs to change rapidly to be able to embrace biofuels.

The second issue is that I think that, to a certain degree, although perhaps it is not misinformation, consumers are almost being ill-informed with regard to what is being pitched as the detrimental aspects of bioethanol particularly. I think the oil companies need to take that on board, take it on the chin and say, 'We have an obligation to educate our consumers that bioethanol, E10 for sure, is not going to damage their engine.' If you can buy a car in Brazil that can run on E100, there is no reason why Holden cannot introduce the same vehicle here. They make them in Australia. Why can't we introduce that here?

There is an education program that the oil companies need to embark on. As to the trial that was conducted a few years ago—I am not really going to mention names—really that could have been fixed by a fairly short, sharp PR campaign to explain why certain vehicles had certain problems. Yet the oil company chose not to do that. To me it was a simple case of political spin that the oil companies chose to ignore the PR problem.

**Senator NASH**—At the beginning of that you said that oil companies had an obligation to get into consumer confidence. Why should they be obligated to do it?

**Mr Beveridge**—Maybe they should not, but you could argue that they are in a pretty cosy situation, because they have this exploration and production model which has worked well for the past 100 years.

**Senator NASH**—I agree with you, but—

**Mr Beveridge**—What I am saying is that I think now, with peak oil being somewhere on the agenda, they are starting to think, ‘Gosh, we need to do something different.’ They are now realising that they have to move into what they might have termed slightly bizarre alternative fuels a few years ago. They will become much more mainstream. So I think the tide is changing. It is changing very slowly. But oil companies are having to get involved in renewable fuels such as bioethanol and biodiesel—what alternative is there?

**Senator NASH**—In your submission I note that under your roadmap section you said:

... a target of 20%-30% is eminently achievable without compromising Australia’s food supply or biodiversity.

What did you base that on?

**Mr Beveridge**—That is based on me talking to experts. They are not my figures. That is me talking to experts who have agri-biotech-biodiversity knowledge that I do not have.

**Senator MILNE**—I just wanted to follow up with you this issue of food supply and biodiversity. In terms of Australia’s food supply, you cannot isolate food supply and biofuels in a globalised WTO scenario. My real concern here is that we are looking at one issue in isolation from others, which is what has happened a lot with the carbon issue and biodiversity. That is where we have come unstuck. My concern is that you are going to have the multinational oil companies moving over into buying up large contracts to produce fuel from land that could produce food. You are going to have at some point this global conflict about how we are going to produce enough food for six billion people if we go and convert that land or some of that producing land to biofuel. You still have petroleum based fertilisers used in this cycle.

In talking up biofuels, clearly there is the advantage of reducing the cost of production if you produce your own. That is quite significant and that has occurred here in Western Australia to some good effect. I am concerned about looking at the global model before we go too much further down the track on the capacity of biofuels to replace diesel so that we can all press on regardless. What sort of modelling have you looked at in terms of that conflict between food supply and fuel supply and the fertiliser issue?

**Mr Beveridge**—I would echo your concerns. It is a real challenge. Certainly the debate has to take place. It probably has not yet been had to the level of detail that is really required. It is a major problem. I would be the last person to suggest that we should all race off and produce biofuels to the detriment of or putting at risk either Australia’s or the world’s food supply. I think that very strategic question needs to be debated fully. I do not think it has been debated as fully as it might be.

**Senator NASH**—I would like to add to that, because I think it is a very good question that goes to what we were proposing earlier about developing the research and development side of things. There are a lot of things that can go towards those renewable fuels that are not necessarily food type things. There could be more research on the cellulose base type products and that type of thing. While it will still obviously take landmass, the end result might be a lot lessened. So I think those types of things could be looked at on the research and development side.

**CHAIR**—To pick up on that, looking at the Narrogin power plant in Western Australia, for example, I understand from the trials that have been going on over the last 12 months that the end product is turning out to be much better for ethanol production than was thought. You talked about synergies and joining research, so have you done any work on that or has there been any discussion about that?

**Mr Beveridge**—We are certainly aware of what was the actual Narrogin plan. Again, mallee oil is a great crop, and the farmers are now talking about growing 10 per cent mallee and 90 per cent wheat to ameliorate the saline problems and the high watertable. So there could be a combination of producing food and using the wheat waste and mallee crop to produce bioethanol. So there is a lot of talk, yes.

**CHAIR**—I am not going to let the economist off the hook so I want to ask this question. I think you were here when we were talking earlier about ABARE and the straight economists' view of the world. You said you are a resource economist. Can you explain how you would do the figures from a resource economist's point of view and how that is different from the way ABARE are doing it, which I understand is from the straight economists' point of view? How would that change the figures or how would you view it differently?

**Dr Schlapfer**—It is a pretty difficult question as to how you would address that, but obviously you would include all the resources. Where I am coming from is that you have a closed system—we work within a closed system and the figures have to be within that system in terms of input and output of energy. You have output of energy but you also have waste. You have to incorporate all the externalities in the figures; if you do not internalise those then they are distorted. I feel sometimes with organisations like ABARE that they are driven by a fossil fuel based funding and therefore some of those figures do not necessarily stack up. So it is about being more inclusive and treating the system as a closed system where you take into consideration the laws of entropy and the second law of thermodynamics. If you do not include that in the figures then they are not really representative of the real world; they are a model. We have to accept that most economic models are exactly that—models. They are tools to use to derive figures.

**CHAIR**—Bearing that in mind, what would you say are the figures we should be using? We have heard a lot of criticism of the ABARE figures. I think it has been universal criticism. Yesterday, when we had a roundtable discussion, and this morning we heard that we should be looking at independent figures or at a range of models and not just picking one. What other things should we be taking into consideration? What other models should we be using?

**Dr Schlapfer**—It is mainly the things that I mentioned before. We have to be more mindful of what we include in the figures.

**CHAIR**—Where do we go to get that information?

**Dr Schlapfer**—The information is out there. It is a question of using it.

**CHAIR**—Who is using it? Who is collecting it and where do we find it?

**Dr Schlapfer**—There are some institutes—for example, the Australia Institute would be one that uses more figures like that.

**Senator MILNE**—It internalises?

**Dr Schlapfer**—Yes. It is the way we teach it: when we look at figures we always say we have to include all the externalities in the cost.

**Senator WEBBER**—To try and be vaguely fair to economists—and I will declare that I have actually studied economics but I have been very quiet about the criticism of them to date—the economic modelling is only as good as the data that is provided from all the other experts, be they geologists or whatever. As the committee secretary and I discussed before, it is a bit like what they say about computing: ‘You put crap in, you get crap out.’ You can only develop a model as good as the data.

**Dr Schlapfer**—With all data collection there is the problem of asymmetric knowledge: who knows more about it and where you get it from.

**Mr Beveridge**—I think that is exactly right, and I think we need to take a much more holistic view in terms of our modelling and use this like a triple-bottom accounting approach, where you have the environmental, social and economic impacts. You need a body that is completely independent to do the modelling. It is no good having an organisation which the oil companies are providing funding to, because they are going to skew the data to suit the oil companies. That is why I am saying we need an independent body—it might be a research institute or whatever—that has absolutely no axe to grind with anybody.

**CHAIR**—Thank you very much. We could be at it for hours with each set of witnesses. Please feel free to send to the secretariat any extra information you want to provide to the committee.

[12.01 pm]

**NEWMAN, Professor Peter William Geoffrey, Director, Institute for Sustainability and Technology Policy, Murdoch University**

**BENNETT, Dr David, Founder, Sustainable Transport Coalition**

**WORTH, Dr David John, Convenor, Sustainable Transport Coalition**

**CHAIR**—Welcome. I remind you that the giving of evidence to the committee by witnesses is 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. If a witness would like to provide any evidence in camera, please indicate that to the committee, and the committee will determine whether it is appropriate to hear that evidence in camera. I invite you to make an opening statement before we ask you questions.

**Dr Worth**—I want to table some new documents, three of which are policies. The STC was set up about five years ago not to deal with oil but to deal with transport, because Perth is one of the most car dependent cities in the Western world. Hence, we brought together organisations that were advocates for bicycling, walking, public transport and so on. In 2003 we had a conference around oil issues, but it was mainly to look at what the impact on the agricultural sector as well as transport was in Western Australia. It was really because of that conference that our interest in oil heightened. I suppose it was because we saw that Perth would have a different society and transport system with oil at \$60 a barrel compared to \$10 or \$20 a barrel, which it then was. Thus, I have given you copies of policies that we have developed from that time around cycling and walking. I have also given you the *Oil: Living with less* policy, which was mentioned in *Hansard* in 2004—the Prime Minister had a copy in the House of Representatives and was talking about it. I have also given you some pictures, because I think, as they say, pictures are worth a thousand words. I want to spend two minutes going through those pictures.

I mentioned the first picture yesterday. It shows that since 2002, when oil was about \$20 a barrel, there has been a rapid rise in the production of oil. We have seen it go from about 75 to 76 million barrels a day in 2002 to around 84 to 84½ million barrels today. These figures are from the EIA, the Energy Information Agency, the US Department of Energy and the IEA, the International Energy Agency, so these are the sorts of things that ABARE have been using as their data. What is interesting about those figures is that for the last 18 months they seem to have plateaued. The question is: why is that? There are two other issues, one of which is: in that time, the consumption in America and China has grown by another one to two per cent. So while that supply has plateaued, somebody is missing out on that oil, and that is mainly Third World, developing countries.

Secondly, the mature oil fields are declining at a rate of three to five per cent, so you are looking at another three or four million barrels a day of new oil having to come onto the market to maintain the 84 million barrels a day. The second figure shows you that the two countries that have provided most of that oil in the last four years are Saudi Arabia and Russia. In the last two

years, Saudi Arabia's production has plateaued as well, at around 9½ million barrels a day. Once again, these are figures from the past, so there is no argument about them. Yesterday we talked about data and about the future. This is the past; we know what has happened.

The third picture shows that, in the last 10 years, there have been two other plateaus—one at around 75 million barrels a day and another at around 78. This was around the time when demand decreased because of the Asian meltdown in 1978, and with the IT meltdown in 2001 there was a slowdown in the economy. I now want to show you information from the EIA, and I refer you to D and E, which show figures that you will find replicated by ABARE. The first one is from 2003, where the EIA estimated that, from about \$30 a barrel, oil would reduce out to 2004 and 2006 to less than \$30 a barrel—very optimistic. Where are we in 2006? We were at \$65 and yesterday it went to \$69. What does the EIA say? It will go down again. This is the sort of optimism coming from the EIA and the IEA that is being adopted by ABARE and going straight into government policy.

Chart F shows you the main reason I think the price of oil has risen dramatically in the last three years: the surplus spare capacity on the world market has decreased from about eight per cent down to almost nothing—about a million barrels a day. Once again, the EIA is saying that that spare capacity will double next year. Somehow there will miraculously be more oil coming onto the market. Page G is really interesting. The media has had a go at OPEC, but, if you look at the last column, there is no spare capacity in OPEC. All of the OPEC countries are pumping like mad. The only country that has spare capacity—about one million barrels a day—is Saudi Arabia. Why aren't people buying that oil? It is heavy crude that is high in sulphur and there are no facilities to refine it. Saudi Arabia is about to build its own refinery at a cost of \$US10 billion. But at the moment there is no spare oil available out of the Middle East.

The last chart looks at non-OPEC countries. If we cannot get any extra oil out of OPEC countries, what about non-OPEC countries? You will see that the only countries that are likely to provide oil are countries like Angola, Russia, Brazil and so on. Once again the EIA is saying that last year America reduced production by half a million barrels a day, but somehow this year it will increase production by half a million, so there will be a turnaround of one million barrels a day despite the hurricanes. That is one of the reasons why ABARE is on the nose: it is using data from these two other agencies that is just not believable. Finally, here is a document that came off the web this morning from the *Financial Times* in London. The International Energy Agency is admitting that Russia will not be able to meet its forecast production in the next four years. So Saudi Arabia and Russia have underpinned the growth in oil production. Saudi Arabia cannot produce any more and now Russia will not be able to produce any more. I present these documents to the committee.

**CHAIR**—Professor Newman?

**Prof. Newman**—I am Professor of City Policy at Murdoch University, where I have been since 1974. I am also the chair of the Sustainability Roundtable for the state government and was responsible for the state's sustainability strategy, where we had a section examining the topic 'Oil vulnerability, the gas transition and the hydrogen economy', which was one of the first times the state government actually recognised the potential issues and put them on the table. That came out in 2003, but I have been researching this issue since 1974, which seems like a long time ago but it has gone pretty quickly.



I was at Stanford when M. King Hubbard appeared in his late 80s to say, ‘I told you so,’ when the first oil crisis emerged. He said, ‘This is nothing compared to what will happen in the first part of the 21st century, when world oil will peak. Get yourselves ready.’ That has informed my life and I have been very involved in the politics of transport and sustainable transport ever since. Perth is one of the few cities that have begun to oil-proof themselves, and I have been very involved in the process of rebuilding the rail system and trying to make urban sprawl more focused on public transport and other alternative forms of transport.

But the issues are coming to a head, and I believe that the peak is happening. But it would not matter whether it is five or 10 years hence, the issues are the same. As we build our cities over the next 50 years, if we believe they will be under the same conditions as the last 50 years we are fooling ourselves. So this inquiry is very important to prepare us and our institutions for thinking differently.

My emphasis is on how we can reduce our fuel use. I think that if we see it only as a technological issue we will miss the point. There are ways of managing the transition. I am a big supporter of the use of LNG in transport, particularly for freight, and I have proposed a diesel-free Pilbara as an experiment we should do to bring about the change. We have the gas there but do not use it; we do not even produce electricity from it. We use diesel to produce electricity in the Pilbara, of all places. So producing electricity and running the rail, the trucks and the mine machinery should at least be a demonstration of how we can convert to the use of LNG, which is now feasible. Wesfarmers have all the technology available.

For me that is only one part of the story; the other part is what we have to do in our cities. We are not really gearing up for that. We need an urban infrastructure program that will fund new public transport. This federal government is the only one in the world that I know of that does not fund cities and their public transport systems. It would be unthinkable for the government in America not to be involved in the funding of urban infrastructure. There are 100 cities in the US that are building rail systems funded by George Bush. They are fully aware of the need to overcome their car dependence. They may have lots of rhetoric about how difficult it is but they are furiously building new rail systems.

Perth is the only city that is doing this. I tried very hard in Sydney. We got somewhere: we have a promise of a new rail system, which has been released. But my two years there as the New South Wales Sustainability Commissioner have finished and, although the plans all show where the new rail system should go, there is still no funding. Funding is a major issue. I think we are heading down the track of doing public-private partnerships, with all the risks and problems associated with them. There are already proposals to do that with rail, because we are not getting funding from the federal government that can seed state and local governments to do the right thing on urban infrastructure. That is a major issue that this inquiry should deal with.

**CHAIR**—Dr Bennett, do you wish to make a statement?

**Dr Bennett**—I founded the Sustainable Transport Coalition in 2001, and I think I will wait for the senators’ questions to expand further on the issues.

**Senator MILNE**—I have a number of things that I want to take up, but I would like to start with what you just said, Peter, about the federal government funding urban infrastructure. The

Treasurer says that we have a surplus in this country. Other people would argue that, in the absence of appropriate spending on infrastructure, we do not have a surplus—in fact we have a long-term debt. Essentially it would require an overriding of state powers or a special COAG meeting to deal with this issue. What practically could we recommend that the Commonwealth get itself involved in as sustainability commissioner and so on? What were the barriers you experienced in New South Wales, apart from the money? Or is that the only barrier to investment in the rail system?

**Prof. Newman**—It is the only barrier. The plans are all there; everyone knows what to do. They just cannot bring themselves to find the funding. It is always going to be health, education and police which take priority, so it is the politics. It has got to the point now in Sydney, where transport is the No. 2 issue, that they will do something. Melbourne is becoming similarly prioritised and, as they come up to an election, I think the government will probably pull a rail rabbit or two out of the hat.

It is not the way to go about it. There needs to be a proper program in place, and it needs to be done through COAG. The *Sustainable Cities* report from the House of Representatives says it all. It shows exactly what needs to be done. That report sets out that COAG should have a meeting to agree on an agenda, with sustainability objectives which are clear and which can be reported on. They need to have a commitment to an urban infrastructure program. That would involve rail. There has been a significant problem about rail in the past. To me, it is the key.

We have done it in Perth. We have had to spend \$2 billion of our own money to do it. The freeway that the railway runs beside is paid for by the federal government. It is not a level playing field. It does not require the federal government to manage that. They have always come back and said, 'But we don't want to take over the rail systems in the cities.' Who has ever said that? No-one has even mentioned that, but that is always what they say. They do not even begin to think about it. It makes me very angry how offhand they are about it. The federal Treasurer said that.

To me, it is simple: you do the same kind of thing that the Better Cities program did, where you have a partnership program. You set the objectives, you come out with the projects, you examine the criteria for them and how they are going to be funded and you then see how federal funds can catalyse the rest of the funding. The Better Cities program received \$1 from the federal government for every \$5 from elsewhere that came in. We could do even better with that if we also involved private sector funds, which they do in the US. Rail lends itself to that because land developers like to build around stations, so you can do this in partnership.

We need to set the agenda. Governments need to say where they want the rail and set about getting partnerships with the federal government. It is very straightforward—the US do it extremely well. It is a democratic process—it is all voted on by cities. They know how to do it. It works. Every five years, they renegotiate that funding process and they get almost 100 per cent support in both houses. It is a bipartisan approach now. I see no reason why we should continue to think that our cities are things that are not parts of the federal government agenda. They are central parts of the economy and they are under threat as the driving forces in our economy for the future unless we deal with this issue.

**Senator MILNE**—I will change tack. The other big issue I am worried about is the World Trade Organisation and the promotion of free trade as the ultimate in terms of how we run our global economic system and the clash between that and peak oil and what it is going to mean to Australian agriculture as freight prices rise. Would you like to comment on what we should do in terms of strategic planning around that issue?

**Prof. Newman**—My paper tries to look at some of the myths around collapse. I do not believe that the agricultural system or the cities need to collapse in this change. We need to be serious about it, however. If we keep denying it, they will. The agricultural regions will for some time be dependent on fuel to make them work. We are not going to get to a situation in which people are going to be producing food in their backyard and replacing that. There are some romantic models around that suggest that there will be an agricultural collapse and that the only survivors will be urban peasants. I have tried to address that and say, ‘Let’s get serious about it.’ But you only have to get on the Internet for a few minutes to see that there are hundreds of web sites saying that that is going to happen. People are getting desperate as they look at peak oil. We need to be sensible about that. The options are there to partly use biofuels, but we have to use the gas that we have in Australia in our transition.

Major freight on rail and road can use LNG. It is now possible to get small LNG tanks on the back of trucks and trains and make them operate for those long distances that we have. We are a special case: we have long distances for freight. I do not think we ought to build our cities so that we have long distances for people to travel. We need shorter distances. We can do that and it is shown that there is a market for that. But it is not going to change out in the bush. So I think we need those new technologies to be introduced and helped in the process. They find it very hard to even get into the policy arena for people to be able to talk about these things.

**Senator NASH**—I want to go back to the urban congestion issue, which I think is really important, certainly in terms of this inquiry. What we are looking at is reducing the fuel dependencies in cities. You mentioned the US experience. Has there been any data collected on either individual cities or cities in general and the funding that you say has been very clearly agreed to by government going to those cities for the transport network that links that to reduction on fuel dependency? That would be really interesting to see.

**Prof. Newman**—We collect data on cities. That is what we have done at ISTP. We have the global cities database, which is the world source for data on cities. The last data we have is from 1995. We are about to begin the 2005 data process. We have 100 cities in the database. It is quite an extensive process to deal with. The period that we have covered shows increasing per capita use of fuel in all the car-dependent places of the world, in the US and Australia. It is slowing down in Perth, surprisingly—or perhaps not surprisingly because we have begun to intervene in that. But the only cities that have stabilised are those that have built public transport in a fairly transformative way. If you have done only a little bit then it does not show up.

Vancouver is the first city to show a reduction in the actual total number of cars in the city, as well as per capita car use declining. That has come about through the building of its rail system. It has a very innovative approach to the ticketing. They have annual passes now, and they have made it basically part of students’ guild fees—to raise another issue. These guild fees cover annual public transport. So there has been a mass movement of both school and university

students to using public transport. It has picked up enormously. They build very strategically around their public transport system.

There are a number of American cities that are beginning to rebuild themselves like that. Denver is the classic example of a city that had less than one per cent of their travel on public transport. They have gone through a 20-year visionary plan, which was raised by the community. It got political legs and eventually was voted through in November last year—an \$8 billion rail program, which has six major lines. As soon as that was put on the ground, showing exactly where it would be, real estate development began to pick up in those areas around the proposed stations. That is what happens. The city starts to rebuild. People want other options.

In Australian cities, the wealthy have chosen to live now around transit oriented development places where you have other options. The poor are getting further and further out and driving further. Transport is becoming a higher proportion of their household income. In some places we have found 40 per cent of household income going on transport. It is no longer affordable housing that is the issue for the poor; it is also affordable transport, and that means where they live.

**Senator NASH**—Is that coming as a result of governments building the infrastructure where the major central population is—and those major urban centres are where you get the higher costs of housing—so people cannot live in areas that are less economically well off?

**Prof. Newman**—It is a market trend—

**Senator NASH**—Or is it people, as you said, choosing to live around where those infrastructure facilities are built? It is a sort of chicken and egg question. I guess I am not putting that very well.

**Dr Bennett**—Both Professor Newman and I live in Fremantle. The house and apartment prices in Fremantle have risen fairly rapidly, although there is a residual population of old fishermen and similar people who bought at a much lower price. The state has converted one area to state housing. I do not think that it would be possible for the poor to live in Fremantle without some state support.

**Senator NASH**—I will go back again to the urban infrastructure issue, which I think is really important. I guess, looking at it in a practical sense, we want, by having better infrastructure in cities, to increase the desire of people to use it, thereby taking away the reliance on car transport. Even if the federal government were to fund the infrastructure component, how would we ensure the running of that network so that people would want to use it? I am a New South Welshman and I would not get in a train in Sydney for love nor money, no matter how many tracks and buildings they built. I take your point that we need the funding for the infrastructure, but then how would we ensure that what we are trying to achieve was done through the running of that infrastructure?

**Prof. Newman**—That is the big issue in Sydney. Dealing with the problem of overmanning and the whole administration of the rail system there is a major issue. It is excessively overmanaged. That kind of issue was sorted out in most of the other states. It certainly was here. So you can do it; it is just a question of political will. It has not happened yet in Sydney. That

would not make it safer for you. I would suggest very strongly that safety is an issue in your head rather than in reality. I have to talk a lot about this to people. I do not use a car. Public transport has never been even approaching unsafe.

**Senator NASH**—I was not talking about the safety aspect; I was talking about trains running on time and people needing to get from point A to point B in a certain time.

**Prof. Newman**—That is sort of related. I thought you were talking about safety, because I do get the reaction, especially from women, ‘I’d never go on it because it’s too dangerous.’ On-time running is an issue. It is down to about 40 per cent in Sydney. Ours is 98 per cent, and we are not from Mars. It is just a matter of sorting it out.

**Senator NASH**—I guess my point was that if a federal government of any persuasion were going to invest in what in this country is seen as a state issue then the outcome would have to be guaranteed in some way. I am just a bit unsure that at the moment you could make it work properly.

**Prof. Newman**—Make it part of the contract. You do that sort of thing all the time with competition policy. You have all kinds of provisos to do things. You say, ‘You’ll get the money if you do this and you’ll get fined if you don’t.’ It is the same model. You should try to do that.

**CHAIR**—To get people to catch public transport there is a fairly standard formula: you ensure that safety and the perception of safety is there, you get quality, you run it on time, you have interconnecting services and all those sorts of things. It is textbook stuff now, isn’t it?

**Prof. Newman**—And you make it faster than travelling by car.

**CHAIR**—The will to apply it is the issue.

**Senator NASH**—Can you go and talk to the New South Wales state government?

**Senator WEBBER**—And Victoria too!

**Senator NASH**—It is the same thing. We can fix everything while we are here!

**Dr Worth**—There is also a barrier institutionally. We have talked about economists a lot. We have been to lobby the treasury here about putting more funds into public transport in WA. Their view is: ‘It loses money. Why would we want to spend more money on a system that costs the state money?’ So the system, say, from Fremantle in the peak hour is like it is in Tokyo. The trains are absolutely packed. They need to have more carriages and the railway stations need to be made longer. But treasury is not willing to put more money into that system.

**Prof. Newman**—Treasury has never been willing, and yet we spent \$2 billion. So these things can happen.

**Senator NASH**—I have a question on a different issue. On page 2 of your submission you make a couple of points, which I think you raised yesterday, David, about motor vehicle registration charges and third party vehicle insurance—that type of thing—going from a fixed

payment to a payment based on kilometres travelled. I am interested in whether you have taken into account the effect on regions, where people have to travel a great deal further. Having regard to the sheer tyranny of distance, if you are going to do something on per kilometre usage, how would it affect the regions as opposed to urban areas? Did you do work on that before you came up with that recommendation?

**Dr Bennett**—No. It is simply a general recommendation in relation to thinking about a retired older person who only uses their car on a very limited basis yet is charged the same licence fee, insurance et cetera as the rest of us. I am in that category. We have not thought through the whole issue yet. There is obviously a large amount of calculation to do, but the worst part of it is the federal-state relationship—the fact that the states charge the licence fee while the federal government charges the fuel tax.

**Senator NASH**—I certainly understood the premise you were getting at yesterday, and I think it is quite a valid point to look at. But the flow-on effect might be felt by somebody who has to make a 70-kilometre round trip just to get to the nearest shop. It would affect them enormously, as opposed to somebody who might do 70 kilometres a year in driving to the golf club once a week. I understand your premise but I think more work needs to be done on the effects of it before looking at that kind of recommendation.

**Dr Bennett**—It possibly goes back to Bruce Robinson's smartcard.

**Dr Worth**—The Oregon state parliament did an inquiry into this proposal. I do not think they have implemented it yet, but certainly they looked at some of those social issues around moving the way of charging. In the end, a litre of fuel burnt in rural Australia is producing the same sort of CO<sub>2</sub> as is occurring here. That is the other issue about oil—its link with greenhouse gases. So government is going to have to deal with that. Do you want people to keep travelling those long distances in rural areas and producing greenhouse gases? Maybe they could use gas powered vehicles that produce less CO<sub>2</sub>. In a policy sense, you have to look at both. It is not just a matter of trying to cut costs, say, for people living in rural areas; it is also a matter of how we deal with greenhouse issues.

**Senator NASH**—I certainly was not indicating cutting costs. I was trying to avoid an increase in costs, not cutting them.

**Dr Bennett**—There is an additional point regarding rural areas. A sociologist in Victoria described rural Australia as being either where people like to live and have off-farm employment et cetera—we can name many such areas around the major urban areas—or the places where living is not quite hell but not as easy as that, where the major aspect is to make a living. There may well need to be a differentiation. I have friends who are barristers who live 80 kilometres out of Melbourne on a small farm. Do we classify them as people in need?

**Senator WEBBER**—I would like to make two points. Professor Newman, you were talking before about development in Perth—the only city that is putting some money into the development of public transport. In fact, it is not the first time it has happened here. When the northern suburbs train line was developed, it was the only large piece of public infrastructure that was being developed throughout Australia.

**Prof. Newman**—I meant the whole rail project.

**Senator WEBBER**—To be fair, whilst I appreciate what you say about the need for federal support, it is an interesting divide in that the feds pay for roads, which are helping to create some of our problems. We need to support the infrastructure that may help us to solve this problem. State governments have been letting us down for a very long time by not providing that infrastructure for expanding cities and also by not maintaining it—hence the problems in Sydney and Melbourne. I would be interested in hearing your views on that. Also, when we talk about strategies to address these issues and the socioeconomic impact, I would be interested in everyone's comments on the system that operates in Singapore and the UK with the congestion tax. That may be an interesting way of hitting the people who really are creating the problems in our inner cities—the carrot and stick approach that we need for these things.

**Prof. Newman**—Talking about the carrot first: the rail project that I was talking about in Perth really began with the electrification in the northern suburbs and then in the southern suburbs, and the \$2 billion covered all of that. It has been a 25-year program, and I have been involved pretty closely in each step of that. When it first happened in 1979, when the rail was closed down by the Sir Charles Court government, it was at the height of the first oil crisis. So people did understand that, long term, this was crazy, and they started to think of Perth without its rail system. It was a major political issue and one of the reasons the government lost office. Every now and then we have had the odd spook about oil, and it has helped in the decisions that have been made about our trains. There is this idea that people do not understand oil. There is a level at which they think it will come back down again eventually, but they certainly realise there is a vulnerability there and that car dependency does mean something and can mean something politically. So you can use the carrot approach and you can win elections because of it.

**Senator WEBBER**—Absolutely.

**Prof. Newman**—With regard to the second point, about the stick, I have never been one to push the stick because it has always been very hard. Ken Livingstone, who did it in London, made a very brave move. People thought it would fail and that there would be an enormous backlash. There was not, because immediately the city became so much more liveable, the traffic was manageable and the money was going back into public transport. You could see that it was not going into general revenue, and that is what people hate. Treasuries love it. They want to get in all the money and have the power to decide where it all goes. But if you have a hypothecated tax and people know where it is going, they do not mind. London has been a model for that. Very few other cities have followed. It is still politically difficult. Edinburgh voted it down. But I think it is now on the agenda as having been a successful experiment. Sydney is thinking about it. As part of my processes there, we certainly have it on the table, but it is very difficult to say whether it will happen during this term of government.

**Senator WEBBER**—I bet it will not come in between now and March next year.

**Prof. Newman**—It is not a panacea, but it is certainly now part of the arsenal, and that is one of the things that London has done for us. I think the carrot is still there. It has to be a good carrot: it has to be a quality rail option, it has to be faster than the traffic and then people will use it. Transport choices are not always about money; they are usually about time.

**Dr Worth**—At the moment the Victorian government have an inquiry into congestion, and that is one of the things they are looking at. They are just calling for submissions at the moment. But it does require a good option that people can move out of their cars and into something, and at the moment Perth's public transport systems are full in peak hour and we could not take another 10 or 15 per cent of people.

**Senator MILNE**—The best example of that is the train out to Sydney airport. You just would not take your car, even if you were really rich. It is just a nonsense. There has been a lot of talk about carbon tax, changes to fuel excise and all that sort of thing. There has been a lot said about tax reform. In fact, it is not tax reform; it is just tax cuts—who gets them and so on. That is what constitutes reform in the Southern Hemisphere. But in deciding how to deal with peak oil, climate change and the imperatives in that sense, is it time to completely scrap the tax system? Have any of the organisations you represent looked at directing taxation away from income and onto energy?

I understand that that is essentially what Sweden is doing, and I would be very interested in your comments about how successful that has been. They have set a strategy for oil use to 2020 and they have changed their tax system—over a period of, I think, eight years—away from income and onto energy use. That has been a fundamental tax reform. I wonder whether you have looked at it, because I am concerned about all these incremental taxes in addition to income tax and every other tax. You cannot fight tax on 100 fronts, but you can get people to start thinking about the rationale for taxation and shifting from one system to another. I wonder whether you have done any analysis on the tax.

**Prof. Newman**—I certainly have not done that, and I do not know anyone who has. There has been discussion about energy based tax and land based tax as well, rather than income tax. I would not hold my breath waiting for it. It is so fundamental a change that I have a feeling that we would do a lot better just getting out and funding the rail projects that we need to do.

There is no shortage of money. The superannuation firms are desperately looking for opportunities to fund infrastructure. They are going overseas to do it. Australian super funds are building rail projects in America, Europe and Asia now. This is crazy. We need to have a proper program that they can be part of. They need to be part of a partnership. They are not going to do it by themselves; they cannot do it by themselves. They are feeding into the partnership programs that are happening elsewhere.

Sweden has a minister for sustainable development and now has a commitment to be oil free by 2020. They are the first country I have seen do that, but they have had a long history of dealing with car dependence. Their cities are some of the best models of how to live in a very liveable city and to have a car but not have to need it for every trip. The data on Stockholm, for example, shows about one-fifth of the per capita fuel usage of Australian cities—one-fifth; not five per cent less or something. It is significantly less and yet they have higher per capita incomes. It is the same in Singapore. And I have just been in Hong Kong where they have the same per capita wealth levels as us and use one-tenth as much fuel.

There is no real relationship between wealth and car use. People use cars because they have to. Car dependence has become a dominant phenomenon. There is a lot of nonsense about how you will never get people out of their cars. You will not get them out of their cars unless you give



them a better option, and then they will. There are plenty of cities that show that. Sweden is definitely going to show the way ahead on oil. They have fully accepted it. It does not take much to set a program together like that. Hopefully, this inquiry will help us. It is the first step towards that. I think if we can get an office of oil vulnerability set up that has similar staffing to the AGO then we will get somewhere.

**CHAIR**—I have a question which picks up the point that you just made—that is, the office of oil vulnerability. Where would you put that?

**Prof. Newman**—In Treasury or Prime Minister and Cabinet; it has to be central.

**Dr Worth**—Can I make one final comment? In terms of the urgency, I have given you some information today about oil production using real figures because it is in the past. But, certainly, the other factor that needs to be considered is timeliness. It is all very well to have an office of oil vulnerability and a 10-year plan but one of the things that has been missing from a number of the submissions is the decline rate of some of these oilfields. Gippsland oil production is declining at 15 per cent per annum, so in four years it will be down to half what the production is today. An article, which I did not print off today, from Saudi Arabia says that their production is declining at eight per cent per annum. So we are looking at great change, very quickly, in the oil being produced about the world. We are not looking at 10 or 20 years time or at being able to manage and plan our cities. We need to do things quite urgently. I think that is the tenor of a lot of the submissions to your inquiry. It is an urgent issue.

**CHAIR**—The point that seems to have come out today that did not come out so much yesterday is the cost of alternative fuels. They are going to be the price that oil is at now or in the future. When we are talking about bringing on alternative fuels we are not talking about bringing on cheap alternatives. That is my understanding.

**Senator MILNE**—We are just talking about alternatives.

**CHAIR**—Yes. So the point to our inquiry is the impact on the economy of increasing oil prices. It is relevant whether it is fossil fuels or alternative fuels. The point is that we still need to plan for how that is going to impact on trade, transport and everything that we do. We have not got on to agriculture yet, and I am hoping that we will when the department comes. There is a big issue there.

**Dr Worth**—One of the hard things about planning gets back to the economists again. One of the big issues that is overlooked is that about 85 per cent of the world's oil reserves are controlled by oil companies run by countries, not by Caltex, Chevron, Shell or whatever. So geopolitics comes into it. If those countries do not want to sell you the oil and gas, as we saw with Russia this winter in Europe, it is no use worrying about markets. Those countries control their resource. We cannot plan on going to the market to get oil and gas, as our fields decline, because 85 per cent of the reserves are controlled by countries. Would anyone like to guess the only major country that will be self-sufficient in oil and gas in five years? It is Russia. Meanwhile, China is going around doing deals with countries because they realise that. They are tying up gas and oil for the next 20 or 30 years with countries. We are waiting on the market to give us oil and gas in five or 10 years time. That is a big risk.

**CHAIR**—Thank you very much. As I have been saying to everybody: if you have additional information, please send it in.

**Proceedings suspended from 12.47 pm to 1.40 pm**

**GRIFFITHS, Dr Cedric Mills, Theme Leader, Maintaining Australian Oil Self Sufficiency, CSIRO Petroleum, Commonwealth Scientific and Industrial Research Organisation**

**RONALDS, Dr Beverley Frances, Chief, CSIRO Petroleum, Commonwealth Scientific and Industrial Research Organisation**

**CHAIR**—I would like to let witnesses know 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 the committee. If you wish to make any comments in camera, could you let the committee know and we will talk about whether we think it is appropriate and go from there. Would you like to make an opening statement before we get into questions?

**Dr Ronalds**—We have a number of points here. Australian oil production has been declining since 2000, and the gap between domestic supply and demand is growing. Combined with higher oil prices, this gap can generate significant trade deficits. Similar production declines are being seen in various other regions, including the North Sea and the Gulf of Mexico. Many industry observers predict that oil production worldwide may peak sometime in the next 30 years and possibly quite soon. At this time new oil supplies will not be able to keep pace with growing global demand and it may then become more difficult to import our oil needs from overseas.

Aspects of refining relating to both the mix of crude that can be handled in Australia and the overall capacity may need to be examined to ensure that Australia is able to respond to a wider range of imported raw oil in an increasingly uncertain supply environment. There is a broad portfolio of options that Australia could pursue to assist in matching future transport fuel supply and demand. First, in comparison with other petroleum provinces, Australia is lightly explored. The possibility exists that further exploration could find one or more new petroleum play fairways that could help maintain or increase our oil self-sufficiency. New technologies to increase the recovery from our currently producing oilfields also hold promise.

Our large coal and gas resources offer strong opportunities. Gas may be used directly as a fuel. It may also be converted to liquid fuels or to hydrogen, and greenhouse gas emissions could be reduced by capturing and sequestering into geological formations the CO<sub>2</sub> by-product. Increased gas production and utilisation has the further advantage of increasing the production of petroleum liquids because of the significant natural gas liquids, or light oil, in the gas fields. Biofuels may also offer significant alternative fuel sources for Australia. Finally, there is scope for improved management of demand growth.

Research and development is needed in all these areas to help manage uncertainty and to ensure a smooth transition to cleaner future fuels over the next 30 years. Research should focus initially on unique local challenges and opportunities. In the medium to longer term, however, Australia has the opportunity to develop leadership in fossil fuel technology on a world scale as the traditional offshore technology leaders, such as the North Sea and the Gulf of Mexico, continue to face production decline and as demand for our fossil fuels continues to rise in Asia and beyond.

Reliance on multinational energy companies to invest in research and development to address Australian transport fuel issues may not be sufficient. State investment may be beneficial to ensure strategic transport fuel security issues are adequately addressed for the benefit of Australia. In conclusion, there are multiple options, challenges and uncertainties in future transport fuel supply and demand, but these offer opportunities for Australia if we prepare now to develop them.

**Senator MILNE**—I must say I am concerned about the focus on fossil fuels in what you have just said and in the submission. In the submission you acknowledge that we are going to have a shortfall in the fuels that we need in the future. One of the things you suggest is that we develop strategic relationships with countries with excess capacity. That is assuming there are countries with excess capacity in a world with growing demand and reducing supplies. You talk about going with liquid natural gas and liquefying processes et cetera, assuming carbon capture and storage. On what basis do you assume that carbon capture and storage is going to work and be a permanent solution to CO<sub>2</sub>?

**Dr Ronalds**—First of all, we are both with the petroleum division, so our expertise is related primarily to fossil fuels. When you have the hearing on the east coast, the people coming along from CSIRO there will be able to talk about biofuels and the other areas of CSIRO's research portfolio. We in our division do have expertise in CO<sub>2</sub> sequestration and are working actively with the CO<sub>2</sub> CRC to see if it is feasible and the technology that is required to demonstrate whether CO<sub>2</sub> sequestration is feasible long term. We are actively working in that area now.

**Senator MILNE**—What is your time frame on that?

**Dr Ronalds**—The CRC plans to begin its first pilot demonstration in Australia later this year, going into 2007.

**Senator MILNE**—The concern I have here is that everything is based on the assumption that it works. What if it doesn't?

**Dr Ronalds**—I think our submission is trying to say that there are very many uncertainties, and a wide range of different options need to be considered. I do not think anyone knows a single right answer at the moment. There is a wide range of research and development needed into many different options. As technology breakthroughs occur, as new things like CO<sub>2</sub> sequestration are proved up, the future will start to become more certain. No-one knows all the answers now.

**Senator MILNE**—If they are proved up. The nuclear industry, of course, also says all options must be considered. I would put to you that in a situation of urgency, such as we have in relation to oil supplies and climate change, some options are better than others: they are cheaper, they are permanent and they are available now. I would also like to ask you about Australia's oil reserves being underexplored. Given the interest that the global oil companies have in looking at the whole planet and identifying where these oil reserves are likely to be, why do you say Australia is relatively underexplored?

**Dr Griffiths**—You mentioned the multinationals there. Multinationals are corporations and they owe a duty of care to their shareholders, not to the Australian public. They will, as many

Australian companies on the Australian Stock Exchange do as well, be looking for the maximum profits around the world. Australia is not the most profitable place to look for oil, and it is in their interests to look in the Gulf of Mexico, west Africa, the former Soviet Union and other places rather than Australia. So, in the Australian national interest, it might be worth our while examining whether we can make it more attractive for them to examine our underexplored basins and what role the nation should play in stimulating exploration. It is not necessarily in the multinational oil companies' interests to look for oil in Australia.

**Senator MILNE**—Are you saying that they do not know whether or not there is oil there or that they just do not know how profitable it is at the moment to exploit it?

**Dr Griffiths**—Success breeds success in the oil industry. If you have a known province where large oilfields have been found, then it attracts investment. It is a proven successful area. Gippsland operated like that, the Carnarvon basin has operated like that and the Gulf of Mexico and many other places around the world have. West Africa is just beginning to operate like that. Suddenly one or two major fields are found and a lot of other companies, both large and small, are attracted to that area.

In Australia we have significant basins, such as the Great Australian Bight, where there are half a dozen bore holes. Not enough work has been done to show whether or not these large fields exist. It may be that there are no large fields, in which case the companies were justified in not looking at it, but we just do not know at the moment. The question is: should we be doing more to stimulate discovery or should we just write it off because the majors are not interested?

**Senator NASH**—On page 8 of your submission there is a graph of volumes required to supply projected transport fuel energy needs. Unfortunately, it is a bit black and blurred. Can you outline for me the third point: 'not all potentially useful fuel types are equally practicable in the volumes that would be required'. Which ones are useful and which ones are not? You say not all are potentially useful, so I wonder which ones are not potentially useful.

**Dr Griffiths**—The aim of this graph was to show the relative energy density of different fuels in relation to the refining capacity. You will see that, in 2012, if we sourced all our transport fuels from petroleum alone then we could just about keep pace with our refining capacity. If we mix and match, we have different volumetric requirements. Let's say in 2040 we use half petroleum, half diesel, some LNG and hydrogen. If we only source transport fuels from hydrogen, the volume of hydrogen would potentially be of a magnitude greater than that required for petroleum. The energy densities are different.

**Senator NASH**—I see what you mean.

**Dr Griffiths**—Just the sheer volume of gas required to source transport fuels from ethanol or liquid hydrogen may preclude their use alone, but that does not preclude their use in a mixed environment.

**Senator NASH**—Can you expand on the 'microbially enhanced oil recovery'?

**Dr Griffiths**—Around the world there are several types of oil which are very heavy. They set like bitumen between the quartz grains or in the cracks in the limestone where the oil is found,

and it is very difficult to get them out. In Canada and Venezuela, steam is often used to inject into the rock to try to heat up the oil and make it more liquid so that it flows and can be pumped to the surface. A lot of energy is used to generate the steam. There are techniques available which use microbes to add surfactants around the denser bitumen and the oils to enable them to move through the pore space and eventually migrate to the producing wells. It is a technique that has been around for quite a long time. Getting it to work commercially on a large scale has proven difficult. There are some Australian oils around Enfield, and probably some of the biodegraded oils in the Canning Basin, which could benefit from this technique. We have a program starting to look at the feasibility of 'Australian microbes for Australian oils' and we will see whether we can do anything there.

**Senator NASH**—In your submission, one of the things you said is that Australia is likely to produce 500 million litres of biodiesel by 2007. What are you basing that statement on?

**Dr Ronalds**—We would prefer to leave that question for our colleagues over east to talk about.

**CHAIR**—We heard this morning, when the representative from Sasol Chevron was talking to us about its GTL diesel and the issue of selling it, that global demand will not necessarily mean that a product made in Australia will stay in Australia, because of the global market. That is to say that if we find more oil in Australia it would not necessarily be used here. If there is global demand and globally they are prepared to pay higher prices it is not necessarily going to mean that that oil will go to the Australian domestic market. Therefore, it does not necessarily help in dealing with Australia's oil depletion issue. Do you have any comment on that? Did I understand that correctly?

**Dr Ronalds**—It is certainly a global industry, and it would be very difficult to put a trade barrier into or out of Australia, or any other country with large or little resource. One simple advantage of our producing oil domestically is that it is of great financial benefit to Australia as the oil price increases, as distinct from the financial drain of importing. That is probably the primary advantage.

**Dr Griffiths**—The current situation is that we do not use most of the oil we produce in Australia at the moment. We import most of our transport fuel. We produce good, high-quality oil, which is exported, and we import poorer quality oil suitable for our refinery feedstock, which provides petrochemicals, plastics and other products. So there is always this trade. What it does mean is that it is economically neutral: we export as much as we import. Whereas if we were importing transport fuels it would have to be set against gas, which has a lower value, or against our coal exports, which we may not want to do into the future.

**Senator NASH**—What is the difference in the value of those different grades of oil that we export and what we import? What is the difference in value per barrel of what we export as to what we import?

**Dr Ronalds**—I do not know that, but I believe there are financial benefits that way in that our light, sweet crude does gain a higher price than the poorer quality that we import. I cannot quote on it per barrel.

**CHAIR**—If Australia did find more petroleum resources, how many years globally—I am taking it that that would be then part of the global supply—do you think that supply would be available? My question is leading to: aren't we really talking about maybe just putting off the peak for a couple of years? It is not getting over the fact that we are going to have a peak come what may or that we have passed the peak, depending on which particular evidence you go with.

**Dr Ronalds**—I agree with that. Even in a very optimistic future scenario for Australia finding a lot more oil, it would be a lot in the Australian context but it would be a very small amount in the global context. So in terms of the global peak it would have little influence. Because oil is so valuable, though, it would have an enormous monetary value to Australia.

**CHAIR**—The monetary value would then have to be put against how much money we will have to invest to find alternative fuels and to deal with the consequences of peak oil. So where should we be investing our resources? Do we invest in finding that last skerrick of oil around Australia, which we know will have only a certain percentage impact on peak oil? Or should we invest in those resources, jump over that—because we know we will have an issue there—and invest in dealing with peak oil and alternative fuels, transport infrastructure and all those things we heard about this morning?

**Dr Ronalds**—In my view it needs to be all of those, and more, because the greatest benefit to us could be a smooth transition over time from one to the other. Investing just in future fuels is not necessarily going to lead to a smooth transition. Having more oil and using gas and using coal, developing alternative sources for the future and trying to reduce demand all play a part in that. I do not feel that we know enough yet to back just one horse.

**Dr Griffiths**—I think a potential danger for Australia is this. On a global basis in the late 1970s we saw that the price shock of oil had an effect of stimulating a lot of investment in alternative energy. A lot of wave power work, a lot of solar work and a lot of wind work was initiated at the end of the seventies and the early eighties. As soon as the oil price dropped again, all that work was stopped. The danger is that if you invest in alternative energy only as a function of an increasing oil price then you will always be behind. The technology will never be at a level where you can substitute in time. It is a challenge for taxpayers to fund alternative energy while the oil price is still low, while there is not that economic driver for replacement. It is a strategic decision rather than an economic decision.

**Senator MILNE**—Can I follow up on that, though. Surely, with the climate change imperatives, we are now in a different scenario from what we were in the seventies. We are not talking about just a high oil price; we are talking about an imperative to reduce CO<sub>2</sub>. Therefore, we are likely to get a carbon tax. Sooner rather than later or whenever, we are going to get that. I put to you: what are the assumptions that CSIRO is making in relation to fuel supply and a carbon tax and what are your assumptions about fuel prices into the future? Are you accepting ABARE's recommendations on likely fuel prices?

**Dr Ronalds**—CSIRO are doing R&D into a broad range of future options. We are not making assumptions as to prices and policy to say which one is the best. We are looking at technological options that we can offer to feed into those types of policy decisions by others.

**Senator MILNE**—You are doing the work on carbon sequestration because that makes coal to liquids and the gas options et cetera better options in terms of fuel prices, if you like. But that is not going to be so if you make some assumptions about climate change. I am really quite devastated by what I am hearing here, I have to tell you.

**Dr Griffiths**—I cannot speak for CSIRO in the policy context. On future oil supply and alternative transport fuels, would it not be wise to retain as many options as possible for as long as possible? If there is uncertainty about whether CO<sub>2</sub> can be sequestered successfully, Australia should be in a position to have some research on potential Australian localities and technologies that could be used to sequester the carbon. We are not saying that is the way the country should decide to go. We are saying that if the country decides to follow that option then we have should some technological solutions which may be of use. It is the same with exploring for more hydrocarbons. If it is going to take 10 years to ramp up to an ethanol based transport fuel economy, what are we going to do in the meantime? Do we abandon all oil exploration and improved recovery from existing fields and concentrate on only one potential future route or do we cover all our technological options?

**Senator MILNE**—That is the point I put to you. Every dollar that is spent on these particular carbon options is an opportunity cost to alternatives, to replacement fuels and to options that are not CO<sub>2</sub> problems. In an ideal world, where you had money to research everything, you could research everything equivalently. But we do not. What we are hearing is that there is no strategic plan across Australia to be looking at integrated research and development work in alternative fuels, in demand side management and initiatives and so on. But what we are hearing also is that there is money to focus on the research potential for extending the life of existing technologies—some new technologies, if you like—with carbon, which have significant greenhouse costs. There may be alternative fuels to keep the car going, but that is not going to be much use if the west Antarctic iceshelf breaks off.

**Senator NASH**—You mentioned, quite rightly, the economic driver in terms of alternative fuels, and you referred to the late seventies when the dollar per barrel came down and the interest and enthusiasm in alternative fuels dissipated. What do you see as other drivers for alternative fuels that we should now be considering? A lot of the projections are that the price per barrel will go up, but today we have been saying that we have to look at all sorts of scenarios. If the price per barrel came down, what would be the other drivers that we could look to to ensure that the alternative fuel environment keeps going?

**Dr Griffiths**—You mentioned climate change, and that must be a significant driver.

**Senator NASH**—In terms of the environmental nature of some of the alternate fuels?

**Dr Griffiths**—A lower carbon content.

**Senator NASH**—Are there any others?

**Dr Ronalds**—Having a basket of options has got to be an opportunity, rather than our depending on just one option and not being certain—because there is so much uncertainty—of how long that will last and in what form.



**Dr Griffiths**—Could you refine the question?

**Senator NASH**—If the economy is the main driver in exploring alternative fuels and that economic driver disappears because, for instance, the price per barrel drops, what other drivers can government look to to ensure that we continue to work on an alternative fuel environment?

**Dr Griffiths**—I would say a consensus among both environmental scientists and energy scientists as to what the strategic benefits of the various options are—more of a strategic view than a short-term economic view.

**Senator MILNE**—I want to ask in particular about the demand side. We have spoken about finding new oil wells, getting more out of the existing ones and opting for technologies to liquefy and so on. Let us go to the other side—the whole strategic planning for demand-side management and reduction, and more investment in public transport and those sorts of initiatives. Can you outline what initiatives CSIRO is taking in that regard?

**Dr Ronalds**—Again, I think that one would be much better dealt with by our colleagues on the east coast.

**CHAIR**—Where do we get information about the level of investment that CSIRO is making in the various options—petroleum investigation, biofuels, alternative energies and demand management? Where would we get a table of those figures? Do you have them?

**Dr Ronalds**—We would be able to generate them.

**CHAIR**—But you do not know what level of investment CSIRO is making in each of those areas?

**Dr Ronalds**—No, I do not have the numbers to hand.

**CHAIR**—Could you take that on notice, or should we be asking the alternative fuels mob when we talk to them in Canberra?

**Dr Ronalds**—I can certainly ask them to have those numbers ready for that hearing.

**CHAIR**—It would give us a good understanding of where CSIRO is putting the emphasis.

**Senator MILNE**—I referred initially to one of the suggestions in your summary, that Australia should develop strategic relationships with countries which have excess supply, and in exchange for our technology in helping them to get it out of the ground they could give us long-term supply contracts. Which countries are we identifying as having excess supply?

**Dr Ronalds**—That is not a specific area that we are pursuing. We put that in just as another of the many opportunities or options, if you like, because we are noticing that there seem to be tendencies by some other countries to pursue that approach.

**Senator MILNE**—Is it very wise to put a position when, if you look at the geopolitics, there are not many countries in the world with which Australia could do that? I think it is a good idea

in theory, but I would be very interested in some practical examples of where that could be effected.

**Dr Ronalds**—Perhaps one way of looking at that would be to look at the range of countries that Australian oil companies are currently exploring in. There are an interesting range of countries, including parts of the Middle East, west Africa, Russia and the US. There are a wide range of countries.

**Dr Griffiths**—The reason that was put in was to in some way counter the claim of multinationals that there is not a problem and that Australia will always be able to buy oil on the spot market: you whistle up a tanker as it goes past and it comes and drops it off in Australia. The point of including that was to say that it may not be the case in the future. So how do we handle that? Japan has developed strategic relationships with other countries. China is in the process of developing such relationships. Those tankers may not be freely available in future, and it may not be so far in the future. So how do we handle that?

**Senator MILNE**—That is right.

**CHAIR**—You touched on hydrogen before and your submission touches on it as well. I asked this question this morning: do you feel that hydrogen is a viable option? We have heard various opinions, and this morning we heard what sounded like major problems with that as a fuel in the short term. What is your opinion on hydrogen as an alternative?

**Dr Ronalds**—At one level I think CSIRO believes that there are a very wide range of very exciting fundamental science challenges in moving to a hydrogen economy.

**CHAIR**—That would be an optimistic way of putting what I heard this morning! What are some of those? What are the key things that we would need to overcome and how feasible would it be? Should we be saying about it, ‘Yes, we could overcome this if we invested this amount of money; it is viable,’ or is it less attractive than some of the other options?

**Dr Ronalds**—I am not an expert in hydrogen, so this is a personal opinion. First of all, I think we need to look at whether Australia should do research and how much research it should do versus what is going on in the rest of the world. We are about two per cent of the world’s R&D effort, so focusing on unique issues and opportunities is certainly one path to dealing with the fact that we are a small component of the world’s R&D. We are seeing North America and Europe putting considerable research effort into parts of the hydrogen economy. Are there specific challenges here to do with the size of our country distribution networks and those sorts of issues? What breakthroughs might be happening overseas and what can we learn from those? But, at a personal level, I feel that there are large challenges, particularly in the storage and distribution aspects of hydrogen.

**CHAIR**—As there are no further questions, thank you very much.

[2.14 pm]

**MIDDLETON, Mr Antony, Managing Director, Advanced Engine Components Ltd**

**CHAIR**—Welcome to the inquiry. We have your submission. I remind you that evidence to the committee is protected by parliamentary privilege. It is unlawful for anyone to threaten or disadvantage a witness on account of evidence given to a committee. 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. If you would like to give evidence in camera, you are entitled to ask for that and the committee will decide whether it is appropriate for us to hear it in camera. I invite you to make an opening statement.

**Mr Middleton**—First of all, thank you very much for the opportunity to speak to you today. I believe that the topic we are talking about—namely, the chance or the certainty that oil will run short and, thus, the use and development of alternative fuels, particularly for vehicles—is a very important issue not only for my company and Australia but also worldwide.

By way of prefacing my remarks I would like to take a few moments to tell you about Advanced Engine Components Ltd because that will give you a bit of a context to our submission. Although much of our work is done overseas, Advanced Engine Components Ltd or AEC is a home-grown Western Australian company. All of our research and development is done here in Malaga. Our corporate headquarters are here in Malaga. We employ about 31 people. We are listed on the Australian Stock Exchange. We have been listed since February 2000.

To date, cumulatively we have spent something like \$27 million on research and development specifically in alternative fuels and specifically in natural gas in either of its varieties—compressed natural gas or liquefied natural gas. Our flagship product is to do with a natural gas vehicle system which is a system of components that fits onto engines and allows the engine to run on natural gas rather than on diesel. We can fit our component either as a retrofit to an already built vehicle or, as we have done in France, on the production line. The engine comes down the production line a certain distance—it is a base engine—and it can go down the diesel track or down the natural gas track. It is an important consideration, because economies of scale are what make engines economical.

The product is commercialised. We started commercialisation in 2001, shortly after we were listed. We have 600 buses running in France now on our system. We have 35 buses running in Perth on our system. Cumulatively, those buses have covered something like 70 million kilometres in route service. The point of that is that it is not an emerging technology, it is a proven technology. It is one of many technologies that are available in natural gas.

Our work is predominantly overseas. We have work in Australia, but predominantly it is overseas, particularly in China, with buses and trucks. We have an office in Beijing. We see China and the Asia-Pacific as really our market. In addressing this inquiry, we address mainly term of reference (a), which is to do with the depletion of oil, and, secondly, term of reference (b), which is to do with the use and development of alternative fuels.

I was present yesterday at the public hearing with the expert forum. I was very interested to hear the academic and technical arguments that were presented. My presentation is more about a pragmatic approach to what we are doing. I posed three questions in the submission: why are other parts of the world looking at the issue that you and we are looking at, what are they doing about it, and what could or should Australia do if we believe that the first of the two are relevant?

Other parts of the world are looking at the issue of air emissions from the transportation sector. Australia is particularly vulnerable in the transportation sector because of its big distances and an increase in goods. It is becoming one of the prominent environmental and socioeconomic issues around the world. Therefore, the alternative fuels industry has moved into the global spotlight primarily due to three global developments. The first is the issue of climate change, and the previous witnesses talked about climate change. The second issue is air pollution in the major urban cities. China, India, Pakistan and places like that have hugely polluted cities. It is not so evident here in Australia, but particulates from diesel are still a health issue. The third issue—and you asked about drivers of alternative fuels—is national security and therefore using what is your own available resource but also including the price of oil. The Chinese are paranoid about national security. They have huge resources of natural gas, as we do, in the north-west, and all of their people live in the east. They are busy piping it from west to east to address the issue of being self-sufficient in energy.

We have heard about many available transport fuels. If you look at them, there are many with different advantages and disadvantages. I have a check list of what should be the criteria for an alternative fuel. It should be technically developed. In other words, you should not be looking at a technology that is emerging but something that is at least proven. It should be cost effective and widely available. If possible, it should use existing infrastructure, including distribution networks and engines, and it should replace imports. Yesterday I think one of the experts said that Australia was spending something like \$17 billion on oil imports per annum. The last criteria I noted was that it should be environmentally and health friendly.

Of the available fuels, I think Gary Ireson mentioned yesterday that the gaseous fuels—namely, compressed natural gas, liquefied natural gas or LPG—have a special role to play in Australia because Australia has large resources of gas. LPG is already well established, with distribution infrastructure and vehicles in place. About eight per cent of motor cars run on LPG. We are not in the LPG business, but my belief is that there is plenty of room for all sorts of alternative fuels in the transport sector.

Others are saying that we should use a mix of various fuels. At the present time the market is dominated by diesel or petrol, but there are others available. Even the most zealous of the natural gas vehicle supporters, such as our international association, targets only 25 per cent of vehicles to run on natural gas. Even that is a very optimistic target. But there are some other overseas initiatives. The European Commission is talking about 20 per cent of all vehicles by the year 2020 running on alternative fuels. The European Natural Gas Vehicle Association says that that will be 23 million vehicles. To put that in context, there are now about four million vehicles around the world running on natural gas. The US already have tax incentives in place for alternative fuels.

Interestingly, the High Court of India recently handed down a decision to say that all public transport vehicles in New Delhi must run on CNG. They were as specific as that, and everybody said that it could not be done. One of the comments made by the experts yesterday was that if you do not put the infrastructure in place it just cannot happen. But everybody said that it could not be done in New Delhi, and the High Court there said: 'That's fine. You can run your buses on diesel but you will pay a fine of 500 rupees a day.' Almost overnight, they found ways to put it in place. If you go to New Delhi now, every vehicle that has a green stripe down its side runs on natural gas. If you have the will or if you have a real driver, you can do it.

China is a hugely polluted country. They have already said that there are 17 regions within China where the preconditions for use of natural gas are there—that natural gas is available, it is piped there, the cities are polluted and there is a price differential between gas and diesel. So the preconditions are there. They have said that the government will support running public transport primarily, but trucks as well, on natural gas rather than diesel.

So what can Australia do? Australia has some of these preconditions already. We have lots of natural gas. It is freely available and it is piped to most parts of the country. There is a good distribution network. We do not have the polluted cities yet, but we do have health issues to do with diesel fuel. Also, from a national security standpoint, it would be prudent to minimise our imports of oil. We could consider the following. We could set targets, which is what they have done in Europe. At least that brings it to top of mind for people. One of the other comments yesterday was about raising public awareness and having an education program for people to become aware of what is happening. We could support what is already being done by the federal government in terms of the alternative fuels conversion program where, if you have an alternative fuel vehicle, CNG or LPG, you get paid half the differential in cost between the two vehicles. We could continue to keep the price differential of natural gas to diesel or petrol where it is.

I used to run buses before I joined this company. It does not matter how environmentally friendly you purport to be, unless it is financially beneficial the operator will show you the door—they really will. It has to be financially viable, and that is where governments can come in. They can also deliver grants, as the federal government is doing at the present time. It is a vital issue and I believe it is one that probably needs to be addressed sooner rather than later.

**Senator NASH**—In your remarks you mentioned that China and the Asia-Pacific region are your target market. Why not Australia?

**Mr Middleton**—It is.

**Senator NASH**—I was interested because you made a specific point of saying that that was your target market.

**Mr Middleton**—We are looking in the future for a third of our income to come from Australia. We have a consortium which operates in Australia. The issue up to date with Australia has been that there is no-one out there to go to you as an operator and offer you the complete package. The consortium that we are involved in says: 'If you have a fleet of 100 trucks, 50 trucks or whatever, we will sell you the gas at the main and we will provide you with the refuelling station, the compressor, the dispenser, which we will build, own and operate. We will

sell you a truck running on natural gas or lease it to you if you would prefer. We will buy it back from you after five years. All you need to worry about is that you will save 20 per cent of your fuel bill.' That is what appeals to people, and that is what has been missing up to date.

**Senator NASH**—This sounds a bit simplistic but one of the main reasons we are here is to look at alternative options to oil because it is a finite resource. I take your points about gas—and others have made them before you—but, again, that seems like a finite resource. Be it five, 10, 30, 50, 100 or 200 years, at some point it will run out as well.

**Mr Middleton**—Sure.

**Senator NASH**—I am assuming that you are putting it into the mix as part of this broader solution of a whole lot of things that we are going to need to look at.

**Mr Middleton**—I think that is right. It is only one of many in the mix. Someone yesterday did say that originally we had 80 to 130 years of gas available but then if we use it quickly we will only have 30 to 50 years. My longest horizon is five years. If we had 10 to 20 years, it would still be commercially viable for us.

**Senator NASH**—I fully appreciate the commercial viability. I am thinking of my grandchildren.

**Mr Middleton**—Yes. It is a bridging fuel perhaps to the hydrogen economy.

**Senator MILNE**—This is very much the issue I want to take up. Every dollar spent on a bridging technology is a dollar not spent on long-term alternatives. The issue is whether you leapfrog or go with a bridging technology, and I am not sure about that, so it is interesting to hear everybody's perspective. On the subject of barriers, you have identified ways you could increase the uptake by setting mandatory limits or targets, whichever way you wanted to go. I am interested in that from the perspective of fleets—taxi fleets, hire car fleets, bus fleets and that sort of thing. What sort of response have you had from state governments and operators of those fleets to making the conversions you are talking about?

**Mr Middleton**—In broad terms, the response has been excellent. In Perth, for example, the decision has been made that all buses will run on natural gas. That is a very big commitment. In Brisbane I believe they are running most of their buses on natural gas. Similarly, in Adelaide there is a big fleet of natural gas buses. The issue to date has been the lack of refuelling stations. If you can target a fleet, like a bus fleet, which is homogeneous and comes back to base at night, you can put in one refuelling station to cover the whole fleet. They are expensive—I think you could spend \$1 million on a refuelling station for a large fleet of 100 buses or so—and that has been a barrier to date. But it is not an insurmountable barrier if somebody comes to you with the package. To answer your question, certainly buses are almost a done deal in Australia.

**Senator MILNE**—What about things like hire car companies?

**Mr Middleton**—Hire car companies tend to go more for LPG; maybe LPG is a better option for motor cars. But, having said that, worldwide I think there are something like 2½ million motor cars running on CNG. It is a question of horses for courses. If you have a fleet and you are

willing to address the issue, the technology is there to have a central refuelling station, which is what they used to do with LPG when it first came in for taxis—you would go back to your taxi depot.

**CHAIR**—An issue with hire cars is that they go out for periods of time; they do not return every night to a central depot.

**Mr Middleton**—That is right. If you were looking at ways to introduce it, you would look to fleets that come back to a depot at night—government fleets, for instance. We are looking at truck fleets such as those owned by Toll, Linfox and the like, which run city delivery trucks, so pollution is evident and there is the good corporate citizenship side of it to be addressed. They come back to a depot at night and are homogeneous in make and model.

**CHAIR**—While we are on that issue, if you were looking at a city fleet, would it be better to go to natural gas? Or are you better off with those little electric cars if you are looking at couriers and city fleets that travel relatively short distances?

**Mr Middleton**—If it is a short distance to return to a depot to be recharged or refuelled, it is probably quite viable. If the vehicle technology is available at a reasonable price, there is no reason why electric cars, especially with their environmental benefits, could not be used. It is very much a question of what preconditions exist and what best fits the requirements of the customer.

**Senator WEBBER**—You mentioned earlier the Western Australian state government's decision about the bus fleet going to gas. I wonder whether, in a more holistic sense, you feel that governments at both the state and federal levels are doing enough to encourage the transition, be it the short-term transition or the leapfrog that Senator Milne is talking about. Are they providing enough encouragement? Do we have the balance right in terms of carrot and stick?

**Mr Middleton**—It is an interesting question because, if you have a look, the federal government are doing quite a considerable amount. They say to you, 'If you go out and buy a truck and the difference in price between the diesel truck and the natural gas truck is \$40,000, we'll give you a grant of \$20,000.' That is a pretty big incentive for a start. Then there is the price differential between natural gas and diesel. Providing that that is kept in place and somebody can go to a truck operator and say, 'I'll save you 20 per cent of your fuel,' that is a fairly potent incentive in a very competitive market. There is always more that people can do, but what the government are doing is pretty reasonable. That is only in the heavy duty market, though—4.5 tonnes and above—which is the market we deal in.

**Senator NASH**—I want to follow up on that. What is the ratio of litres per kilometre for diesel versus gas for the heavy vehicles you are talking about?

**Mr Middleton**—For a Transperth bus to travel 100 kilometres, it will take about 45 litres of diesel and about 58 to 60 cubic metres of gas, and you can buy diesel at \$1 or \$1.10 and gas at, say, 44c. In very broad terms, for a city bus, because of the government initiatives, you almost halve your fuel cost. A Transperth bus uses about \$15,000 a year in fuel. That is a big benefit.

**CHAIR**—One of the submissions that we got questioned the reliability of the systems for natural gas. Is that an issue? They are saying that when you get to a certain number of kilometres it is unreliable. Is that a genuine concern?

**Mr Middleton**—It is, and there are a huge number of anecdotes around about the unreliability of natural gas, and some of the early systems were unreliable. Ours—what we call NGVS4—is a fourth generation of what we have been doing. I think that by and large the latest vehicles are reliable. The difference is that diesel has been around for 100 years and is almost bulletproof in terms of its reliability and acceptance. If you introduce natural gas to a fleet, it is a different regime of maintenance, so you have to train people who are diesel fitters in a spark ignited engine. Ours is more like a petrol engine; spark ignition is a compression ignition. It is a different thing, so you have to train the people differently. I think DaimlerChrysler did some long-range tests because they have quite a big fleet in South America, and they found that the cost of maintaining a natural gas vehicle was slightly less. As numbers improve, the cost of the natural gas engine will come down as well, because of economies of scale.

**CHAIR**—This morning we heard about gas-to-liquid diesel. I am looking at the climate change aspects. Have you done a comparison between the CO<sub>2</sub> emissions from GTL diesel and natural gas? Has that work been done?

**Mr Middleton**—I have not done it and I am not aware that it has been done, but it may well have been done. We were required by the Australian Greenhouse Office, when we did the work on the 25 buses here in Perth, in order to substantiate the grant that we got, to prove that the greenhouse gas emissions were at least five per cent better than the diesel emissions. The tests that we did showed that the figure was eight to 10 per cent—certainly better than the requirement. The other comment that I heard yesterday was that we should not be narrowing down our focus just to greenhouse gas; that it is air quality as well. Air quality was the big driver in Delhi, for example. What happened was that two greenies, I guess—

**Senator MILNE**—Anil Agarwal and Sunita Narain. I was at their first public meeting in Delhi in 1996, where they launched their ‘slow murder’ campaign—not to put too fine a point on what they were suggesting about air quality in Delhi. It shows what can happen from nowhere. People were dying from respiratory illnesses in Delhi. This public meeting was held, which I attended, along with 200 or 300 other people. They were really nervous that they were going to be arrested, as this idea of having a public meeting on air quality was such a novel idea. That couple from the Centre for Science and Environment in Delhi have altered the whole lifestyle of the city in a decade. It shows you what can be done if people get behind it. And Delhi is relatively poor in the scheme of things.

**Mr Middleton**—Those two people were recently given an award by *Time* magazine. That is how I read about it. They mounted a High Court challenge, and that was how it all happened. Talking about anecdotes, when I was in Delhi recently, they said: ‘When we first started, we had to convert our buses because we didn’t want to pay the fine. We’d spend one day in the queue waiting to get filled and the next day working.’ So it takes a bit of spine occasionally to get it done. But you are right: now, in Delhi, it is better.

**Senator WEBBER**—That goes back to my point that governments can provide incentives but in that case they used the stick as well.



**Mr Middleton**—Yes. I am not sure whether I would advocate that in Australia. It is a pretty big stick. Interestingly, they are doing that right through India now. They have gone on to Mumbai, Chennai, Hyderabad and places like that. That is why we see India as big business for us.

**CHAIR**—My understanding is that the best application for this approach would be for the fleets that have a central depot—the bigger trucks. Taxis are already using LNG.

**Mr Middleton**—LPG.

**CHAIR**—Sorry, LPG. They are better off staying with that. Is that correct?

**Mr Middleton**—It is a very good way and it seems to be working. You can now buy Fords which are purpose built to take LPG. It seems to be working. Having said that, in Germany, for example, they have quite extensive public refuelling stations with natural gas. Mercedes have come out with a natural gas E200 which they use mainly as a taxi. So it can be done, but my feeling is that if you already have someone doing it, let them go ahead. It is easy for me to say that because we are not in that market!

**CHAIR**—Is there any final comment you would like to make?

**Mr Middleton**—Public awareness is probably very important. Therefore, inquiries like this one give many people an opportunity to say things like this and maybe that is an opportunity that should be taken.

**CHAIR**—Thank you very much.

**Proceedings suspended from 2.45 pm to 3.02 pm**

**HEAD, Mr Glen Michael, Director, Perth Fuel Cell Bus Trial and Transport Sustainability, Department for Planning and Infrastructure, Western Australia**

**RICE, Mr David, Principal Network Planning Officer, Department for Planning and Infrastructure, Western Australia**

**SAMNAKAY, Mr Iqbal, Policy Officer, Transport, Department for Planning and Infrastructure, Western Australia**

**CHAIR**—Welcome. I remind you that the giving of evidence to the committee by witnesses is 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. Commonwealth and state officers are reminded that any claim that it would be contrary to the public interest to answer a question must be made by a minister and should be accompanied by a statement setting out the basis for a claim. Also, if a witness objects to answering a question, the witness should state the grounds upon which the objection is made and the committee will determine whether it will insist on an answer, having regard to the grounds which are claimed. The Senate has resolved that an officer of a department of the Commonwealth or a state shall not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions asked of the officer to superior officers or to a minister. This resolution prohibits only questions asking for opinions on matters of policy and does not preclude questions asking for explanations of policies or factual questions about how and when policies were adopted. Do you have any comments to make on the capacity in which you appear?

**Mr Rice**—My background is as a civil engineer. Prior to entering the Department for Planning and Infrastructure I had a long history with Main Roads, and I have seen a lot of road construction.

**Mr Samnakay**—I work in the office of the Minister for Planning and Infrastructure.

**CHAIR**—I invite you to make an opening statement before we ask you questions.

**Mr Head**—Firstly, the WA government wishes to express its sincere gratitude to the senators and staff for conducting this inquiry. Australia's vulnerability to price fluctuations, to supply interruptions and to climate change combine to make this one of the most important policy areas that require government attention. It is no exaggeration to suggest that our choice of transport fuels today will affect the quality of our children's and grandchildren's lives and their livelihoods as well. When thinking about what we wanted our take-home message to each of you good senators to be, we did consider many things, but it eventually became clear that there was one thing that loomed large above all others and was clearly a job for government. That one thing is telling the story. Without understanding the size of the challenges we face or the consequences of not rising to the challenges, how can we get Australia's communities and industries to bring their considerable talents to the table? How can we expect the voting community to stand by the governments that are willing to take necessary steps that might involve short-term pain for long-term gain? The answer is that, as things stand, we cannot. What should we do? How can we

generate awareness without panic? How can we create understanding without weighing people down with huge amounts of data? How can we engage people's hearts and minds?

Quite simply, we as policy and law makers and as industry people are on a journey of discovery, and we need to bring the Australian public along with us as opposed to taking it ourselves and then saying, 'This is what we found out.' People are sick of being told what to do and being told what the expert answers are. Too often, in hindsight, we have been led down the wrong path by accepting those so-called expert answers. Nowadays, people want to be informed, empowered and given responsibility. Luckily, there are now proven ways to achieve this. They are not perfect, but they are better than anything we have had before. They can still be improved. I will not go into detail. I had planned to spend a bit of time talking about the dialogue with the city process that we undertook here in Perth and some of the citizens juries that have been raised on particular topics, some transport related and some urban planning related, and inquiry by design as well, but I think Brian Fleay has covered some of that in the morning session so, in the interest of time, it is best to skip over that. There are some fairly innovative processes that really do engage people and allow them to have a longer term contract rather than just a workshop where you express your opinion and then wonder what happened. We need to be exploring those options vigorously.

The first and most important thing to take away from today is that the government needs to develop the knowledge, share the knowledge and share the responsibility for finding and implementing those solutions. No-one else is going to do this. This is a market failure simply because there is no market for it. Sure, government can partner with non-profit organisations like the Sustainable Transport Coalition, tertiary institutions and industry, but the government itself must fund and drive the process. This is our primary recommendation to the Senate inquiry.

After yesterday's discussion, it became clear that there is more that government can do and that this should be done in parallel with what we have spoken about so far. Quite quickly and relatively painlessly, state and federal governments can put together some high-profile initiatives that clearly demonstrate that transport energy is now being taken seriously and that high levels of state-federal cooperation are possible. You need to demonstrate that, because there is a lot of scepticism out there. I will give a concrete example that highlights some of the problems that we should try to overcome and then we can talk about what governments can do about it. One thing that sprang to mind when considering it was the difficulty of implementing a green vehicle registration charge as an attempt to improve vehicle efficiency, which is supposed to be the low-hanging fruit of demand management. The barriers that we are facing here and others have faced in the past in terms of the bureaucracies and the political perspectives are general inertia—people do not like change—and political conservatism in that everything has to be cost-neutral so as not to be seen as imposing a new tax with all the electoral backlash. There is also the issue of departmental resources. Our minister has an intellect as big as a room but, when it comes to having the departmental wherewithal to back it up, we have very smart people that are stretched so thin already and every new idea compounds that. We now have to come to terms with that. It is a real limitation.

There is also a perception that whatever it is—in this case, a green vehicle registration charge—it will be ineffective in the face of opposing forces. People say: 'Yes, this is going to help, but look at all the things that are working against it, such as fringe benefit tax, stamp duties and import duties, so why should we make this effort in this instance when everything else is

working against us?’ That is a component of what I call the jigsaw dilemma, which states that looking at any one initiative or program in isolation is like looking at a single piece of a jigsaw puzzle: there is no way you can tell if it is the right way up or where it fits. At the very least, the government through consultation with others should provide the picture on the box. If we are trying to put the jigsaw together, what does the picture look like? We cannot see where the jigsaw piece of green vehicle registration fits and we have no idea what it is contributing to. The picture can evolve over time and new pieces can be added as well, but there has to be a picture to work towards. Beyond this, there is a need for governments to demonstrate willingness to re-evaluate the policies and laws that work against what we all agree is a critical challenge. At the moment, there are far too many sacred cows. There are things that we as people who provide policy advice either know or believe that we have to steer clear of, and we need to have the ability to express that without fear or favour.

**CHAIR**—We might have to ask you what some of those are. Do not forget the in camera bit!

**Mr Head**—Getting rid of sacred cows and providing some sort of picture or context for the changes we need to be considering are two concrete things that government can do right now. I will leave you with our take-home message: please generate some good data. ABARE data on oil is just not up to scratch. In fact, the word I have written down is ‘sucks’.

**CHAIR**—I think we might come up with a more technical term for the report.

**Mr Head**—Feed this good new data into robust, iterative consultation processes. Keep it coming. Develop the data, but do not wait until you have it all; bring it into some process as it comes to hand and just keep refining that picture. Support technological research in fields that the consultation identifies as important. Keep working on the big picture, refining and refreshing, but actually do things to work towards it so that we can see a pathway and see that there is a thread of actions leading from where we started to where we want to end up. Even if it is small things, it is important to show progress, otherwise things stagnate and people lose faith and momentum. Make a start on some of the ‘no regrets’ options that many of the submissions from around Australia advocate. On behalf of some of our colleagues: one of the things that you could recommend supporting is the WA Cycling Committee’s suggestion that \$200 million worth of cycling and pedestrian infrastructure around Australia would be a damn good start. Thank you.

**Mr Rice**—I would like to make a statement about the resources. There is a military strategy which is: commit sufficient resources to achieve the task. In the military sense, if you do not, they all get killed. In the Public Service sense, we do a little job here and a little job there and our interest wanes and we do not really achieve anything. I believe that prioritisation is really important. It is something that we are trying to work on. If the Commonwealth and state governments and the community can identify and set priorities, again, we will achieve something.

**Senator MILNE**—Firstly, I would like to say how impressed I have been with the submissions from the government. One of the great advantages of this committee system is that it is not just the ministers who go to COAG who can find out what is going on around the country; it is a two-way process. It has been great to come over here and see the level of planning that has gone in.

The thing I am really interested in relates to the way that you have been able to look at the transport task and integrate land use planning with that. That seems to me to be central to it, whereas in a lot of other places you have the transport infrastructure being planned and then somewhere else dealing with land use planning and the shape of cities. I am interested in how early on that was identified and how that was achieved, and whether that has been a critical strategy in getting you to where you are. I might let you answer that and then go on to the next bit.

**Mr Samnakay**—I presume that this would have started off as a commitment at the 2001 election, when the minister was very clear that she wanted the transport portfolio and the planning portfolio combined.

**Senator WEBBER**—That is right.

**Mr Samnakay**—The Minister concentrated on getting quite a clear planning focus in there from a philosophical point of view or at the strategic level. Then the likes of Main Roads can do the operational stuff and the PTA can do the actual transport of passengers. Clearly, that was her intent and she has achieved that by amalgamating the Western Australian Planning Commission and the department of transport.

Another aspect of it is that she has also started working with local government authorities and changing some of the thinking that goes on at the local government level. I presume from what Glen and David were saying that there is a philosophical issue and then there is what you can practically do to achieve outcomes. From the minister's perspective—if I can push the bicycle issue a bit more—she is getting local government grants out there so that local governments can pick that aspect up and start putting bicycle paths in. Equally, we said that, when the planning commission develops policies and develops suburbs and when new suburbs are being rolled out, they have to think of pedestrians and cyclists and alternative modes of transport as well. There is a clear hand-in-hand strategic and operational aspect to it. Answering your question: that was one of the issues. What she has done is combine those portfolios and started to work with other arms of government.

**Mr Rice**—I will comment a bit further on that. First of all, there are some things that state governments do that professionals do not necessarily agree with. However, everybody who you come across agrees with the integration of land use and transport. It is an absolutely sensible idea. I would like to quickly go back through history and say that in Perth we have a very strong background in that. It started in the 1950s with Stevenson and Hepburn, but we have ended up with this plan, the Metropolitan Region Scheme, which, in very simple terms, is a land use-transport plan. It has industrial areas, residential areas, recreational park areas and so on. It also has areas for the catchment. It has the major roads and the major railways. Suffice to say, we have a very strong legal base for doing that and a 40- or 50-year history. It has evolved through different centres, policies and so on. What we have now is the result of Network City, which was the largest community consultation process in the Southern Hemisphere, if you have not been told about it before.

**CHAIR**—We have.

**Mr Rice**—We now have philosophical input from the community, which we are trying to interpret professionally. Again, that is really all about land use and transport, and we are developing the idea of activity centres, activity corridors and transport corridors, and another version of the state planning policy. It is happening.

**Senator MILNE**—If I can go on from there: the thing about the demographic of Western Australia is that, if you do Perth, you do the majority of the population in Western Australia—I am assuming—unlike the eastern seaboard, where you have ribbon development from one end to the other. I was interested in your point about the participation in the planning processes, and Brian made that point earlier.

I can see how it is achievable when you have got the bulk of the population in one state living in a defined area so you can do that. Whatever we recommend has to be something that can be replicated or managed across the nation. Do you believe that the process that you have set in place in Perth would be able to be replicated at a regional level or just at a city-to-city level? How would you see rolling this kind of idea out across the Australia population instead of just for one city in a state that is sort of set aside?

**Mr Head**—It is infinitely scalable. The methodologies work across a huge variety of scales from, essentially, metropolitan-wide, which was the dialogue with the city process, to regional centres like Geraldton and Bunbury, where we have had similar kinds of exercises, right down to the local council neighbourhood level, where they are looking at redevelopment of a shopping centre and adjoining suburbs. The processes apply across that full gamut of scales. Investment in getting the processes right would be infinitely applicable.

**Mr Samnakay**—An example of a really local one is the development of the Scarborough area, which was done through a similar process.

**Senator WEBBER**—It has been done up in Wanneroo too. There have been processes about land use and what have you up there.

**Mr Head**—Even right down to the community level, where you have got a developer who is essentially fighting against a community on how a piece of land should be developed, as a means of resolving that the minister or the local government has stepped in and said, ‘Here’s a process; let’s go through that.’ The outcomes have been very surprising—you would not intuitively go in thinking that that is going to be the outcome—and people do not walk away thinking there are winners and losers. That is crucial. Those processes are excellent, but they can be improved. I guess the improvement would be on the follow-through side, in terms of ensuring that the outcomes of those processes get turned into an on-the-ground reality—there is a very clear link there—because that will increase the amount of faith that people have in these processes and how willingly they engage and create the better outcomes.

**Mr Rice**—If you are thinking about the whole of rural Australia, as distinct from the cities, about 10 or 12 years ago we did an exercise with all of the rural areas looking at the transport needs—which were essentially road needs; land transport—and we had a heap of community input. We took into account the existing and the future aspirations and needs and whether it was mining development or woodchips in the south-west or the fishing industry. That, remarkably, has stuck very well because there is a very close relationship between the state government and,

particularly, rural local authorities in WA. I do not think it is quite such a close relationship in some of the eastern states. Certainly, there is not that feeling between the Commonwealth government and local governments, or there has not been. That nexus between state and local in regional Australia is an area where you can do an awful lot.

**Senator NASH**—You mentioned in your submission the Biofuels Taskforce that was set up in 2006. I note that the department is a member. Who else is on the task force?

**Mr Head**—There is the Department of Industry and Resources. It is driven by the agriculture department. It has a Greens senator. It has a Liberal MLC.

**CHAIR**—You mean a Greens state member, don't you?

**Mr Head**—Yes, sorry—Paul Llewellyn. Well done. There is the department of health. It is a fairly homogenous group.

**Senator NASH**—It would be very interesting to see the outcome of that. One of the things you raised which has been raised previously and is something which I have a real interest in is the impact of higher oil prices on people in outer metropolitan areas. You raised in your submission, I think, that the social impact of this for those people as a group, regardless of whereabouts in Australia they are, is going to be quite enormous if we watch the fuel price rise any more either from just price rises or other recommendations—increased taxes or whatever. Do you have any thoughts or recommendations on how to deal with that if it happens? I know it is a big question but I think it is one that, from a society's perspective, we are really going to have to deal with.

**Mr Head**—It is. The answers to questions with that level of complexity are going to come out of these ongoing processes. It is really unrealistic to sit down and ask any small group of people or organisation what the answer is. It just will not work, because there are huge trade-offs. People will be willing to trade off for themselves in one area if they can see a long-term societal benefit, but at the moment there is just not that ability to see the societal perspective. Any recommendations we would make now would be almost irrelevant. Having said that, there are oil vulnerability maps that have been produced. Griffith University—

**Mr Rice**—Yes. I could expand on that.

**Mr Head**—Please do.

**Mr Rice**—Griffith used their available census information and produced fairly simplistic maps for Sydney, Melbourne and Brisbane. We have taken that on and we have replicated those maps and we are improving them. If you want to know how we are improving them, I could tell you but it is probably not worth it with the time we have. It is sufficient to say that we are adding more data to them. I mentioned very briefly yesterday that, for instance, we are adding the availability of public transport to those maps, because obviously it means that you are either more or less vulnerable to major oil price rises if you cannot access public transport readily. When I say they were a bit simplistic, I mean that they did not even have public transport on them.

Having done that, we have then got the spatial picture broadly of where the problems might be and we can then think, 'What can we do about it?' There are a lot of things we can do about it. We can perhaps add more public transport. We can go out and talk to the vulnerable communities. We can, first of all, check that we have the right data and check the presentation is good. In all of this mapping exercise I have a little simple model, which is that you have data and then, if you can improve that and present it well, it goes to information and then, if you can interpret it well, it goes to knowledge and, if you are really good about that, it goes to wisdom. A lot of that is in the data that starts it off—it has to be good data and you have got to have realistic analysts. I was going to say intelligent analysts, but you need sanity-checking analysts to do this work because we could put out the wrong maps and it could create a lot of angst or a lack of credibility. So we are deliberately going a little bit carefully with our Perth map, but we expect to have it fairly soon.

**Mr Head**—One of the key things for me is that, once a map like that is produced, we cannot make the same mistake or keep making the same mistake. We can identify what really categorically does not work and say, 'Don't do that again, please.' At the moment that is what we are doing: we are allowing developments around Australia that we know are just not going to work and know are going to leave people vulnerable. That has to be our first priority.

**Senator NASH**—Mr Rice, is it possible to get a copy of that work or is it still in an ongoing form?

**Mr Rice**—It is ongoing, but I will undertake to send it to somebody—

**Senator NASH**—To the committee.

**Mr Rice**—as soon as we can. We have presented it to the WA Planning Commission in its interim form and they said, 'Great! We love it, we want more of it and we want it quickly.' We are definitely not officially releasing it until we have done a sanity check on it. Are you saying that you would like it in its present form or once we have done the sanity check?

**Senator NASH**—I think just in an easily digestible form for us. We are happy to take it knowing that it is not in a sanitised form, if you like. I just think it would be quite useful.

**Mr Rice**—If it is in confidence at this stage, then I do not see any problem with that.

**CHAIR**—It would be particularly useful to see what you are adding on, because we have the Griffith stuff and to see how you are adding on to that and what issues you are including in the consideration for Perth beyond what Griffith has done I think would help us a lot.

**Senator MILNE**—It also goes to the issue that, if you have a national office of oil vulnerability, this is the kind of mapping you would expect the national office to coordinate around the country and then integrate into the model.

**Senator NASH**—Urban congestion and the need for better infrastructure in the states were raised in relation to funding—and I am sure the states would love a bucket of federal funding. In a practical sense, how have you managed the funding of what you have done? I am sure you will tell me that it has been an enormous stretch and that you have pulled it out from under rocks but,



realistically, whose responsibility should it be to develop these types of plans? You have done one specifically in Perth. Is it realistic to expect any funding from areas apart from the state?

**Mr Rice**—Is your question about congestion management?

**Senator NASH**—It is about the infrastructure funding for states, in either towns or regions—wherever you are going to look at doing it—in terms of addressing the congestion issue.

**Mr Head**—On a broad level, in Western Australia—and I believe it is very similar in other states—transport energy in particular falls between portfolio cracks, because the office of energy tends to concentrate on stationary energy and does not want to know about it if it is in a vehicle and the transport agencies have not traditionally had a focus on the energy that they use to get around. It is just: ‘Where do we put them? Where do we funnel them? What sort of road do they need or what sort of rail do they need?’ So this is quite innovative from our perspective. There has been quite an incremental change in our mindset and our resourcing. There is no formal mechanism. There is no particular pot of funds or programs that we as agency people can access, so it is all very ad hoc, on a case-by-case basis and/or officers using a lot of their own initiative and saying, ‘This just needs to be done,’ and negotiating with their own management to allow it to happen. This goes to the overall focus of the Commonwealth government as well and the need to show some leadership that this is an issue of importance, and that can or would be reflected by the state agencies and there would be dedicated funds put to it.

**Mr Rice**—I would like to add to that. At the local, grassroots level our minister set up a local impacts committee to look at the impact of not having the Fremantle Eastern Bypass or another section of the Roe Highway in the south-west of our area.

**CHAIR**—Do you really want to go through that?

**Mr Rice**—It was pretty controversial. It was a very wide-ranging committee with a membership of parliamentarians, local councils, members of the public and transport representatives. There were political differences and we had 2½ years, roughly, of debating the whole thing. We did an interesting mixture of technical and community analysis. One of the bottom lines at the end was that the committee considered that we cannot build ourselves out of congestion. We were suggesting a lot of road improvements and still they would not have made a dent in it, really. We had to move to a congestion management strategy, and we had to move also to what we are calling an environmental and social enhancement strategy. Because part of the process was that we identify the problems, another part of the process was that we identified about 78 solutions. We got community input into those solutions. The solutions that were most popular for the community were the small, local improvements, like better walking and cycling facilities at intersections and the better treatment of water flowing off roads into wetlands and that kind of thing. That was from the grassroots level up.

If you take the congestion management output of that, at the same time we have COAG saying, ‘Gee, we’d better look at congestion because it’s upsetting our exports, and the AusLink process is interested in it.’ So it is happening at all sorts of different levels. So the time is right for that.

It goes back to the whole sustainability issue—not just oil but including oil—to do with air pollution, to do with available land and to do with a whole heap of things; it is really a watershed of changing society views. I guess that we are, collectively, the opinion leaders. That comes back to our first point: we need education and we need input from the community. We can get those two things in one process.

**Senator WEBBER**—I initially wanted to go back to the comments about ABARE and the need for reliable data. We have had lots of discussions about that. Accepting all the people's comments about how unreliable the data is from there, what other sources of data does DPI use to get the plan right? Therefore, where else would you suggest that we as a committee should look?

**Mr Head**—Good question. The alternative sources of data are limited in number. They do not necessarily have the widespread support of the official agency view. The Australia Institute was mentioned. There are particular models of oil vulnerability put together by certain practitioners, professional associations and the like. We can get lists of them to you. In my work I do not use them, because I do not need those figures for my particular area of work. I might defer to my colleagues.

**Mr Rice**—I can answer that quite straightforwardly: we do not use them either. There are myriad sources of not just the geology of oil and international prices and so on but also community values changing. About 15 years ago, when I was planning freeways, I was asked at a committee meeting: 'Why on earth are you planning this? Cars are not going to be around in 20 or so years time.' It initially started us thinking a lot and from that we developed a metropolitan transport strategy and a lot of things. You cannot but turn on the television or the radio and hear something today about the lack of sustainability. This morning on the radio there was talk about an increase in oil prices. It is coming at us left, right and centre. The only people who seem to be missing it are ABARE.

**CHAIR**—I think we are going to have to give ABARE some therapy after all this.

**Senator WEBBER**—They might get a bit of a complex. Obviously, being a Western Australian and a Labor senator, I have a great deal of praise for the state government and particularly Minister MacTiernan. The community consultation model has been driven a lot by not only her but also our previous Premier, who believed in community involvement, citizens juries and what have you. The stability of having the same minister for five years now allows you to do a lot more of that long-term planning. Apart from that, we have talked about things like the southern rail line being the only large piece of public transport infrastructure being built in Australia. It was the same when we did the northern suburbs line, the electrification and what have you, before. What is it that makes Western Australia so different in driving that process? Is it just because we have all these very clever people in the now new, shiny DPI, which is a model that is now being followed on the east coast as well?

**Mr Samnakay**—Part of it is that you have the political will to start working on that. I doubt there would be many other people who would like to put their hand up to look after planning and infrastructure as a whole.

**Senator MILNE**—We are told it is a different country.

**Senator WEBBER**—It is a different country!

**Senator MILNE**—Can I just add my perspective on this? Maybe Senator Nash will too, since we have biased people in between us.

**CHAIR**—Purely unbiased.

**Senator MILNE**—That is why I asked the question about the majority of the population living in Perth and there being a huge area between Perth and the rest of the country. You have a focus that you can deal with, a level of population that you can deal with. It is different once you get across to where state boundaries are not as significant in planning. You do not do bi-regional planning; there is no interstate planning on those kinds of issues. It seems to me that there has been an opportunity to do things here. That is not to in any way denigrate the political will. As I said, I congratulate the government. I think they have done a great job with this. I am wondering how we can get that same level of cooperation across state boundaries. If you plan for the Murray-Darling, you need across-state work done.

**Senator WEBBER**—Obviously, I accept the community consultation model, although I do actually agree that it is a model that can be used anywhere. But it is also that investment in infrastructure.

**Senator MILNE**—I agree.

**Senator WEBBER**—There are train lines crumbling in Sydney and Melbourne and we are building new ones here.

**CHAIR**—I think there is another element. Maybe I should declare my hand here. Having been on the other side of the table presenting to committees and working for an NGO in the past in this area, I know the NGO community—and we have heard from the sustainable transport coalition this morning—in Western Australia has been very active and focused on this. I think it would be fair to say that the NGO movement has been driving the department and the government as well. I think that would be a fair comment. Having said that, the government also included the community in the decision-making as well and it listened.

**Senator NASH**—I would just add something on the end of that so that we can do the whole lot. Obviously, this is nothing I know anything about. You often hear Western Australians talking about how removed they feel from the rest of the country. Do you think it has developed because you are used to developing things over here in isolation, whereas, as Senator Milne pointed out, in the east it often has to be a collaboration between a whole lot of different regions or communities or something else? You can make a decision over here and it is entirely your decision because it relates to what you are doing. There are no other interests around that you have to take into account or deal with or negotiate with. Has that made a difference?

**Mr Head**—I would have to agree with that generally speaking. It is an opportunity that we have that others do not. I do not think it is unmanageable in those other areas. It should not put us off trying, if you like. We should not just say, 'WA is a special case—let's not even try to do what they are doing.'

**Senator NASH**—I was really just following on from what Senator Milne said before.

**Mr Head**—I guess we do recognise it.

**Mr Samnakay**—It is a benefit in itself being a bit isolated because it does do that. But equally, I think, you have to confront those issues and deal with them. With some of the issues that have been tackled, like Bunbury and so on, if you did not have someone who was game enough to tackle them, you would just leave them. I think you need that boldness to do it.

**Mr Rice**—Just to reinforce what Iqbal was saying: I think there is still a pioneering spirit in WA. It is one of the things that I really enjoy. From a national perspective, we are isolated and things are pretty simple because it is only one state. But, if you get to the state level, where you start talking to this council versus that council, we still have very similar problems. One of the advantages we have in the metropolitan area again is that plan, because that plan, the Metropolitan Region Scheme, is an overarching one that sits over the top of all of the individual town-planning schemes. I think that is more powerful than most of the situations in the eastern states.

**Mr Head**—Our isolation is also a double-edged sword. We have this isolation, which gives us some freedom in a policy development sense, but what we do not have is the economies of scale that you have in the east and the population densities which make a lot of things possible or more attractive. So there are no excuses, guys.

On your point about the NGO sector driving things over here, I think there were some comments yesterday—I am not sure who they were made by—that there is a perception of a gap between where the government thinks it is at and where the government thinks the community is at and that that gap is actually a lot narrower than people expected. I think having the NGOs coming out with a particular point of view so strongly and publicly gives the government the confidence that the community is not far behind or is actually slightly in front of them. It will allow them to act upon those things that they always knew were the right things to do. So I think NGOs have played an exceptionally useful role. They should be supported further.

**Mr Rice**—I think maybe that our isolation tends to give us a greater sense of trust in our community. In this Local Impacts Committee that we had, when that first started off the views were chalk and cheese. After a while, we developed a genuine sense of trust between people. We still had different ideas, but we respected each other.

There tends to be a bit more of an adversarial approach in some of the eastern states' actions. I worked in Canberra for eight months with the National Transport Planning Taskforce. I was amazed at the views of the Commonwealth public servants. WA barely existed. They had not even heard of local government. It was amazing. Yet those are your grassroots people and our grassroots people. If you have that kind of feeling filtered through, it does not do anything for trust. At least in a lot of areas of the state we are working alongside local government. Most of the people want a bitumen road, a new port or something like that and are pretty happy to have it. It works quite well. It is much more complex in the city. Having the trust to talk to each other is fundamental.

**Senator NASH**—Obviously if we could start anywhere with a brand-new city and plan it from greenfield it would be absolutely fantastic. We spoke about the model you have used, and you could use it on small areas and regional areas. How would it go transposed to a larger city—say, a city with three times the population? Would that increased density of population make it more difficult or could you just slot it over?

**Mr Head**—It actually increases the range of options available. The kinds of processes we have been using have been pioneered in North America with much larger communities.

**Mr Rice**—There are strengths and weaknesses in a system like that. While it is a land use transport integration, a lot of people are now criticising it because it is mainly road based, which is really what was intended and wanted at the time—efficient freeways and things like that were the answer. Society's values are changing faster than the city is changing. Yes, we have still got a lot of Perth to build and so we have still got a lot of opportunities. There is a lot of Sydney to build and so on. However, I do not think that is the issue with oil or with sustainability. I think the issue really is in our minds and our attitudes. There is so much low-hanging fruit that we can gather by having smaller cars, by getting rid of the perverse signals that are currently around. I do not know whether we could make a 30 or 40 per cent difference without much in the way of infrastructure changes at all. I am only guessing at those figures, but there are really big gains that we can make relatively easily.

**Senator MILNE**—Chair, I presume you are going to get to the sacred cows.

**CHAIR**—Yes, I am.

**Senator MILNE**—I will let you go to perverse incentives and sacred cows in a minute. I want to ask about Western Australian government policy on peak oil. Has there been a statement from government about assumptions for Western Australia, an acceptance of peak oil as an idea and so on? Secondly, is there an official view about the role of natural gas as a transition fuel or as a phase that is to be leapfrogged as quickly as possible? Is it actually an official view or is it just individual views in the bureaucracy?

**Mr Head**—As far as the official view is concerned, our minister, Minister MacTiernan, has come out strongly and publicly in recognising the issues of peak oil. For instance, we have included a quote of hers on the front page of our submission. So there is an explicit recognition at cabinet level that peak oil is real and an issue that needs to be dealt with.

**Mr Samnakay**—I do not recollect having natural gas as a transitional issue. Not that I am aware of.

**Mr Head**—At the bureaucracy level there are different points of view within different agencies. I do not think they have been formally brought together and thrashed out. I am hoping that one of the things that will come out of the Senate inquiry is that we will have to sit down and have those discussions. The Department of Industry and Resources want to look at developing export markets, growing the economy and so on—they have a particular perspective. The greenhouse unit, part of the Department of the Premier and Cabinet, have particular perspectives on climate change and CO<sub>2</sub> emissions which are diametrically opposed, if you like, to using natural gas as a transport fuel. Sitting in the middle are the Department for Planning and

Infrastructure, who are trying to take on board all of those issues and make recommendations. At this stage there is no consensus that we can point to or any hard policy document that I know of.

**Mr Rice**—The only other thing I would add to that is that it is our role to be portfolio leaders, and so we should be facilitating this process more within WA.

**Mr Samnakay**—From my perspective, we probably have to focus on the transport issues, but this goes more broadly to the whole spectrum of energy use.

**Senator MILNE**—It goes to the heart of the sustainability issues and to the fact that—as I was saying before when CSIRO were here—every dollar spent on one technology is an opportunity cost to another so you have to at some point decide what fundamental principles you are going to adhere to and then tick off things in relation to those principles. That is why I was asking if there is a considered view. In terms of the Senate inquiry, I guess one of the recommendations that we can make is that there be a national discussion, because that is what it really takes, about the strategic use of natural gas in terms of climate and energy security so that we get some sort of consensus across the country about the role of natural gas.

**Mr Rice**—That would be useful as an interim measure between where we are now and where we are going in the longer term, in 20 to 30 years.

**Senator NASH**—I think Senator Milne's point is about whether we see it as an interim measure or we just leapfrog it completely, I guess.

**Senator MILNE**—Is it possible to leapfrog it?

**Senator NASH**—Is it possible or do we need it as an interim measure because there is nothing else and we specifically need an interim measure? Those are two points of view.

**Mr Head**—Is there the potential to take off the state government hat and put on the personal hat?

**Senator MILNE**—Okay, do that.

**Mr Head**—So you have all waved your magic wand?

**Senator MILNE**—Yes.

**Mr Head**—Thank you—so noted in *Hansard*.

**Senator MILNE**—So this is a personal statement.

**Mr Head**—It is. Natural gas is a transport fuel. As we discussed before, the limitations on the quantities available to us and the sort of time frames and lead times for technology change mean that natural gas is perhaps not a good candidate for general transport fuel. Perhaps in regionally specific instances Peter Newman's vision of an oil-free Pilbara might be a valid goal to go towards. But, in terms of offsetting a significant proportion of our transport task, unless we can find ways of using natural gas without making significant changes to our vehicles and our

refuelling stations, I do not think we should pursue it, because we would have such huge sunk costs in that new CNG infrastructure at about the time where we would start needing to plan for the next step. I suspect that there are other things that could be done in the shorter term that would mean that we would not need to rely on the natural gas.

**Mr Rice**—But CNG, which is what you would use for heavy trucks, would be different to—

**Mr Head**—We would use LNG for heavy trucks.

**Mr Rice**—Okay, sorry. At the moment in the taxis we are using LPG and we have already got the rudiments of infrastructure and a car fleet. I personally believe we have to build on that because that is what will give us some time. But even that, although we have already started it, is only a very small start compared to what we would have to do if we were to replace a significant amount of petrol with that. What we would do with the diesel in the heavy trucks would be even more of a problem. Because we have plenty of it—for the moment forgetting the global greenhouse problem and just looking at Australian survival—we have to strategically look at it. In fact, I think we have a huge strategic advantage over most of the rest of the world by having such large supplies and if we do not use it for personal and freight transport in some way then we are missing an opportunity. We could easily get much better at using it for personal transport by having much more efficient vehicles, using yesterday's technology.

**Senator MILNE**—But you cannot take off your greenhouse hat. You simply cannot put aside greenhouse.

**Mr Head**—If we look at greenhouse and climate change as the electric chair, what we are talking about with using gas is wearing a crash helmet and elbow pads so that if we fall down between here and the electric chair we will not hurt ourselves.

**Senator MILNE**—That is a different image.

**Mr Rice**—But, if you are talking about the electric chair and the electric vehicle, whether they be battery or hydrogen driven, you are talking about coal versus nuclear energy in the long run. It is either sequestration or nuclear energy if you are going to avoid a lot of carbon. I believe it is one of the unmentionables at the moment that needs to be debated more fully. That is a private comment, not a DPI comment.

**Senator NASH**—I think you will have a very interesting morning tea tomorrow!

**CHAIR**—I want to get to the sacred cows in a minute. I have a question, going back to what you were talking about with transport energy and stationary energy. The Sustainable Energy Development Office deals with stationary energy in WA and not transport energy?

**Mr Head**—Correct.

**CHAIR**—DPI, as far as I understand it, is picking it up because somebody has to; it is not a portfolio that somebody said the department should do. You have picked it up because of the things that you have to do. Is that correct?

**Mr Head**—That is correct, in my understanding.

**CHAIR**—Would I then read that it would be preferable to have a specific area portfolio office dealing with transport energy?

**Mr Head**—It would be very useful to have a resourced area with staff who were able to concentrate on these issues as opposed to fitting them in between their other day-to-day duties. It would be good if it were given the level of recognition and importance that correlates with the challenge we are going to face.

**Mr Rice**—It is important to resource it. It is vital to resource it. Resourcing is a huge problem at the moment for us in WA, with the resource boom. I am not sure where it should fit, but it would not automatically be a separate department.

**Mr Head**—No.

**Mr Samnakay**—It could be within the department, within the Department for Planning and Infrastructure. It is policy driven incidentally rather than primarily. What you are asking is: do you need to have a primary driver for that now? I think the pressure is going to come on for that to happen.

**CHAIR**—I want to go into these sacred cows. What are the sacred cows, low-hanging fruit or perverse incentives? Can you identify them? What are the ones that you think we could be dealing with?

**Mr Samnakay**—Will you answer this with your personal or departmental hat on?

**Mr Head**—Departmental—what the heck? It is hard to know where to start, and it is also dangerous to start. I have a particular point of view, the department has a particular point of view and the minister has a particular point of view, but what we have not done is taken those out and tested the market, if you like, with these consultative processes. It is almost premature to talk about those low-hanging fruit. The WA Cycling Committee will tell you that it is getting out there and building better pedestrian facilities and following examples such as those of Denver, Colorado, and Portland, Oregon. They have done some incredible work out there. They have turned everything on its head in prioritising infrastructure and spending for the different categories of transport. Yet other groups will give you a whole different suite of what they think the low-hanging fruit are. I am not trying to be evasive.

**Senator MILNE**—What are the taboos? What are the sacred cows you cannot mention?

**Mr Samnakay**—I suppose the one that we were looking at was with respect to a corporate fleet or a government fleet. We were looking at incentives to use four-cylinder vehicles or alternative fuel vehicles instead of six-cylinder vehicles. The sacred cow is this. Try doing that with the group of people you have to deal with who want a six-cylinder car.

**Senator MILNE**—Ministerial people?

**Mr Samnakay**—No, I am not talking ministerial. It would be the senior executive service.



**CHAIR**—We discussed this yesterday.

**Mr Samnakay**—It is the same even with the corporate fleet. We figure out the number of vehicles that are bought commercially as commercial fleet and used for very short trips. What can you do to change that focus, to change some of those things?

**Mr Head**—Anything that requires a significant change of mind set is a sacred cow, because from a political point of view it is a case of, ‘How do we sell this?’ That becomes the challenge. As soon as you realise something is the right thing to do, you have to temper that with the political realities that surround it.

**CHAIR**—Can I throw one up? Is it a sacred cow that, if you interfere with somebody using a car, you are interfering with their freedom, and therefore government cannot possibly intervene to restrict people’s freedom by restricting their car use?

**Mr Head**—It is a huge one. It is a mind set.

**CHAIR**—Those are the sorts of things that you mean by sacred cows. Government, for example, are too scared—and I am not trying to be critical here; any government of any persuasion—and do not want to touch things because they think the community will not wear it.

**Mr Head**—Absolutely. Vehicle safety is another one. You have different categories of vehicles that have different levels of safety. There are two ways you can address it. You can either make the small cars much safer, which gets rid of all your fuel economy advantages, or you can make the big cars much smaller and so when they bang together it is not so bad. Again, it is a sacred cow. You would not necessarily suggest that because the political response is: ‘It is all too hard.’

**Senator NASH**—It comes back to what you were saying initially, though, about educating the public and increasing the awareness of these types of things so that people consider will them. We could then hope that, regardless of what is happening within government or with government policy, when people go to buy a car what will be lodged in their minds will be: ‘This is the type of car I should buy, for these reasons.’ At the moment that level of awareness is not there.

**Mr Rice**—I think there is a lot to do with what Western society values. One is to do with freedom, rights and the American way of life, if you like. We have responsibilities, and I would argue that we have more responsibilities than rights. You could think of the commons situation in the England of old, where it was in your self-interest to use up the common grazing areas, or of the atmosphere or the road space of today, versus the common good. If we were in an enlightened communist country the common good would probably take precedence over individual rights, and it might in some other countries that I am not familiar with, but it certainly does not happen here. But giving up ‘personal rights’ is a sacred cow, I believe, that people get very prickly about. You could say, ‘It is my personal right not to wear a seatbelt,’ but education, encouragement and so on have changed that. So I believe we can do it. But I think that is actually one of the biggest sacred cows.

**Senator MILNE**—I would like to follow up on what Senator Nash said and what you said initially. You said the main message, the take-home message, here for us is: go out and tell the

story. Obviously Western Australia is more advanced than the rest of the country in telling the story, and part of that has been the education through this participatory consultative committee. But it had to start somewhere in terms of telling the story. Clearly the minister has been quite up front in getting out there and telling the story. What would you identify as the key strategies? I understand that it has been underpinned by this massive consultation program, but what were the strategies of actually getting out there and telling the bare bones of the story before the consultation process took place?

**Mr Head**—I may stand corrected by my colleagues but probably the best way to get information across is to not let it happen in isolation but make it around a real issue and involve as many people in that real issue as possible. It should not be talking in the abstract. There is no pre level of public awareness raising. It is: get in there and deal with an issue and involve as many people as you can in that issue. That then becomes your base, because for every one person you engage with it then gets out to 100 other people in the community.

**Senator MILNE**—So it was the broad process that told the story; there was no softening-up process to start the story?

**Mr Head**—Not that I am aware of. Can you think of any?

**Senator WEBBER**—No, we just went straight into it.

**CHAIR**—There had been a lot of other things going on. We said it went straight to the community but there had been a lot of controversial planning stuff going on in dialogue with the city. It was not a clean slate when that process started.

**Senator WEBBER**—No, but there was not a softening-up of the community to say, ‘This is the kind of model we are looking at happening.’ There was a vision that was given to them: ‘This is what we are going to do and this is how we are going to manage it.’

**Mr Rice**—In WA we had a citizens jury on how to manage water. As part of that we had a 20-minute session at which people could volunteer to facilitate tables. I facilitated a table on oil vulnerability. In 20 minutes, with just a group of people who came in, we came up with an amazing set of suggestions, including most of the things that we have discussed today plus two that we have not discussed. One was: use Cuba as a case study, because they have done brilliantly. The second one was: what is the meaning of happiness? It goes back to that question of rights and responsibilities, or what is genuine happiness versus ‘a big four-wheel-drive gives me happiness’? That was in 20 minutes. There is a heap of creativity there. So that would be at a grassroots level. At a top-down level, I can see in my mind’s eye now the television pictures of John Howard meeting Alan Carpenter, and they are both stepping out of Toyota Priuses. Just do it!

**Senator MILNE**—That’s a dream!

**Mr Rice**—Yes. I know there is a security issue, but if John Howard can walk and have security, I am sure he can travel in a Prius—perhaps not a Prius, but a hybrid car.

**Mr Head**—Further to that, we are looking at Western Australia possibly being a little bit ahead of the pack. What gives you some understanding is to travel overseas to see where the overseas communities are at. Let me tell you, Western Australia is completely off the radar as far as the efforts overseas and the level of awareness of the communities and the policymakers and so on. The rest of Australia could and should leapfrog what we are doing, as we have been suggesting, and go to a whole new level of engagement. Despite the magnitude of the processes and the fact that we have proved that they have an outcome and an effect, we still do not have that groundswell of understanding for day-to-day ordinary people. When you talk around the barbecue, the talk would probably be similar around a Perth barbecue to that around a Sydney barbecue, whereas the talk around a barbecue in Stockholm would be completely different.

**CHAIR**—We have gone over time now so we will have to call it quits here, although I sense that we would have a lot more questions if we had more time. Thank you very much. If there is any further information you would like to send the committee, we will gladly accept it.

**Mr Rice**—I will follow up on that oil vulnerability information.

**CHAIR**—That would be great. Thank you.

[4.08 pm]

**CREEMERS, Mr Alexander Henricus Maria, Private capacity**

**CHAIR**—Thank you for coming to the committee hearing. I welcome you and remind you that the giving of evidence to the committee is 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 contempt. It is also a contempt to give false or misleading evidence to a committee. There is the opportunity, if you request it, to give evidence in camera. If there is a request, the committee will consider it. I invite you to give a brief opening statement before we ask you some questions.

**Mr Creemers**—I am here representing myself and I must say that, coming in between the Western Australian government and the Western Australian Farmers Federation, I feel ever so slightly outnumbered! Thank you for the opportunity to represent my views on the subject of the potential of new sources of oil and alternative transport fuels for Australia. I have been an engineer in the oil and gas industry for the last 20 years. For the first 11, I was with Shell International. With them, I worked on the technical development of shale oil and gas to liquids processes. I immigrated to Australia in 1996. Since then I have worked with John Holland and, currently, with CBI Constructors. Again, this has mainly been in the field of oil and gas. With John Holland, I was project director for the commercial development of ethanol plants in Queensland. It was not a successful development but I certainly learnt from it.

I have tried to outline in my submission some of the points that I came across in the course of my work on those three issues. In summary, shale oil was something that I worked on for 3½ years, and I could not wait to get out of it. I do not know if anybody out there is trying to revive shale oil as a potential fuel source for Australia. Certainly, we do have very good reserves. However, the problem is that the technology is not fully developed. It is going to cost somebody hundreds of millions of dollars to do so. There is very little incentive to do so because, world wide, it is considered that there are no more than about a dozen fuels that are economically viable at prices that are well above today's oil price of \$68. So in your position I would remain very wary of the potential of shale oil.

Gas to liquids was the second process that I worked on. I believe you have had a representation from Sasol, so I hope they have already told you everything about how this works chemically. As Sasol would have told you, it is a very well proven technology, both technically and nowadays, at the current oil price, commercially as well. For Australia, gas to liquids could be a very good source of transport fuels. We have the gas reserves, we have a stable investment climate, we have declining oil reserves. It would all seem to add up.

There are some obstacles. The first would be that, of course, there is competition for our gas. At the moment our infrastructure is set up to export gas, not to process it and reuse it as a transport fuel. There is a mind-set that goes with it that I think would need to be changed. We then come to the more technical issues, such as the comparatively high cost of construction in Australia, when we compare ourselves with other countries that have large gas reserves. As an Australian builder, I am quite happy to take on any European or US company but I feel at a

distinct disadvantage if I try to price something at the same level as, for instance, a gas to liquids plant in Qatar. There are the transport costs from the locations where we would be likely to put gas to liquids plants, such as Karratha or Darwin, to the main user centres. Shipping costs around Australia are very high. That, again, drives an export mentality. It is cheaper to get the liquids across to Singapore than it is to get them across to Sydney.

Also, there is an impact on the refineries. At the moment those refineries are all humming along very nicely at almost full capacity. Therefore, they are fully viable. It does not take much to bring a refinery into a zone where you have to close it down, even though it is operating at about 80 to 85 per cent. It is not a very good prospect anymore. That is a disincentive for any of the gas reserve owners who also happen to have refineries in Australia to set up a GTL. I believe that it would be a disincentive, at any rate.

Lastly, not all gas to liquid products make good transport fuels. Methanol, for instance, is the most common gas to liquid fuel. At the moment we cannot use it in cars unless they are dragsters.

**CHAIR**—And we're not going to have that!

**Mr Creemers**—I do not think it would be socially acceptable to go to that way. In a few years time, I believe that fuel cells will start to play an increasing role in personal transport. At that point, methanol will be of interest, and I am sure somebody will put their hand up and say, 'I'll supply it.'

The main obstacle, I believe, is competition for the resources. My suggestion would be that the committee consider whether it would be worth while to provide incentives for gas to liquids plants producing for the domestic market that are not available for export facilities that produce LNG, gas to liquids or whatever. From a strategic point of view, such a move would make sense.

A second thing would be that, if the government is interested in going this way, you might want to consider targeting owners of gas reserves who do not happen to operate refineries. For them it would be a lot easier to make a decision to set up a gas to liquids plant. Alternatively, if it is one of the refinery owners who would be in a good position to do so but is hesitating, the government might consider assistance to offset the cost of closing in refinery capacity, and that could be done in a variety of ways. Those are serious issues that need to be tackled. Nevertheless, if we were to consider the proposition that we stay with the current transport structure then gas to liquids is the best option we have to secure transport fuels for the next 20 to 25 years in abundance and of a very high quality.

The last subject that I have addressed in my submission is ethanol. We are moving to a situation where everybody is agreeing that renewable energy is preferable to non-renewable resources from an environmental point of view. In the context of this inquiry, strategically it is even more so. Once we have used those gas reserves they will never come back, as our oil reserves will never come back again. Ethanol is one of the main biomass fuels that is going to be available on the market. Its use is technically well proven and in the current climate it is commercially well proven as well.

When I was working on ethanol plants I considered a range of options—grain, molasses and wood. In the end I ended up with sugar cane as being the best source for ethanol. The technology to make ethanol from sugar cane is very well known. It has been used in Brazil for more than a quarter of a century. It is not just well proven, it is widely available and it is cheap. We were targeting a price level of about 65c to 75c per litre of ethanol ex refinery, which at the time was only just higher than petrol but at the moment is well below. Environmentally, there are little or no drawbacks to the production of ethanol from sugar cane. I would be happy to take questions on that. The produced fuel is an octane booster. It is a high-quality fuel. Finance for ethanol plants would be readily available as long as you have normal investment criteria in place.

The main obstacle to overcome, as I personally found it, is the vertical integration of our oil industry. Our distributors are also the refiners. If the distributors add a percentage of ethanol to fuel they turn down the refinery by that same percentage. Then we come back to the viability issue. That is the main thing that needs to be overcome. All the other issues around it—security of feedstock supply, transport costs and storage costs are minor by comparison.

What I suggest is needed is a way to ensure an initial market for ethanol. To that end I propose a scheme similar to the renewable energy credits that have been used for some time in the power industry. That is, we combine a mandated and growing use of ethanol in the fuel pool with incentives to continue the development of lowest cost options. In other words, we give the industry a leg up and after that the normal processes of competition will drive the cost down to a point where I believe we would not only be able to supply Australia but also global demand.

There is going to be a demand for ethanol coming from places like Japan and Europe that is definitely not going to be met by their domestic capabilities. Australia would be in an excellent position to provide such fuels but we would be in an even more advantageous position to provide our own fuel and get to a higher level of independence than we have at the moment. My recommendation would be that the biomass fuels, and ethanol in particular, can and also must make a contribution to the fuel pool in Australia. To that end I recommend that the committee consider a scheme similar to the renewable energy credits.

**Senator NASH**—Your presentation was so good that I do not think I have any questions.

**Senator WEBBER**—I take it from not only your recommendation about coming up with a mandatory scheme but also some of your earlier comments that in looking at replacement fuels for oil you do not believe that governments at both the state and federal levels are doing enough to encourage that.

**Mr Creemers**—I would not phrase it quite as such, Senator. In terms of biomass fuels, more could have been done in the past few years. When I was working on ethanol in 2002-03, there were a lot of companies getting ready to produce ethanol. There were a lot of people putting good money into it. Virtually everybody at the time would have said that we needed some sort of mandate to initiate the use of ethanol. So far that has not happened. I do believe that something could have been done. But that is in the past and certainly we do have an opportunity to catch up. Most of the investment opportunities that people were looking at three years ago still exist.

In terms of gas to liquids, there would be more than enough people to consider it on a private basis, but the danger that I see is that they would consider it for export rather than for domestic use. In that case I would advocate incentives to maintain the liquids in Australia.

**Senator WEBBER**—Are incentives the way to go or do we also need to look at the whole carrot and stick thing?

**Mr Creemers**—I am not sufficiently familiar with the legislation that covers our oil and gas reserves to say what powers the Commonwealth has in that regard. Certainly, as a European I sometimes feel that the regime that we have in place in Australia is overly liberal. I will give you an example from Holland, where I come from. When Holland found its main gas supply in the onshore fields in Groningen, the first thing that was done was to set up the Dutch Oil Company. It is a state company and it automatically owns 50 per cent of the resource. It does not operate, it leaves that to the private sector, but it does have a say in how the resource is to be applied. Much to the disgruntlement of the private operators of the field, it was the Dutch government that decided to turn down the output of the field and become a swing producer rather than keep the taps open full time and keep on exporting. I am not sure we have those kinds of possibilities in Australia. The problem is to introduce it once you have already got a liberal regime. I cannot see how you can do that without damaging your reputation with business in the longer term.

**Senator WEBBER**—I have one other question, and it is probably stealing some of Senator Milne's thunder. In looking at a lot of these issues of alternative fuel supplies, one of the debates has been about the diversion of food into the provision of fuel. That is obviously a conflict and a challenge for us as a global community.

**Mr Creemers**—As a global community, yes; as a domestic producer, no. We export most of our sugar cane. I think only something like 10 per cent stays in Australia as sugar; the rest goes overseas. As for the global community, that is somewhat outside the remit I looked at in the first instance. I would say that there are opportunities to move away from the food source for biomass fuels. People are looking at wood as a basis for ethanol, and that could be a good option as long as we do not start chopping down the Amazon for ethanol. But within Australia at least we have no such problem.

**Senator MILNE**—I guess I do not just think in terms of the national context. I do not think any of this can be just seen in a national context. And, in fact, it is soya beans that are knocking down the Amazon at the moment. But coming back to this issue of the realities, you talk about sugar cane being the best option for the production of ethanol. Let us talk about that in an Australian context. There is already considerable competition for former sugar-growing land, particularly, of course, in Queensland.

**Mr Creemers**—I found that out in my cost, Senator—that was what killed one of my two projects.

**Senator MILNE**—You are talking about mandating a certain level of ethanol for Australia. Have you done any kind of back of the envelope calculation of the land area which would be required, if sugar cane were the source of the ethanol, to achieve that level of supply if, for example, it were E10? Or are you assuming E100?

**Mr Creemers**—No, I would not assume, in the short term at least, that we would move much beyond E10 or E15. Certainly the current sugarcane crop would support that without further expansion. But I do not believe that sugar cane, even though technically it has advantages for the production of ethanol, would ever be the only source of it. The first ones to start up are likely to be grain based ethanol producers. In terms of landmass that would be under crop for ethanol, I do not think Australia would need to cultivate further fields than we have already.

**Senator MILNE**—I was going to suggest that if you are talking about an ethanol industry based on sugar cane we have real issues in terms of land. But on the actual embedded energy cost in the production of ethanol from sugar cane, you say in your submission that that has been rebutted. I am not sure that that is the case, so I think we will have to agree to disagree on the efficiency from sugar cane.

**Senator NASH**—I will have to disagree with the senator as well.

**Mr Creemers**—I would put it like this. With the sugarcane crop from a small area like Nambour, where there was a crop of about 500,000 tonnes of sugar cane, a refinery would produce roughly 80 million litres of ethanol. I could use ethanol directly in a diesel engine. So if I start to look at how much diesel would be used in harvesters, trucks and so on to bring the ethanol around I am quite sure that I would still be left with a considerable amount of ethanol from my 80 million litres after I have brought in next year's crop. So, yes, I do think that there is a net benefit; in fact, I am sure of it. But I am happy to disagree with you.

**Senator NASH**—Following on from that, I think perhaps it comes back to Senator Milne's question about this fuel-food discussion. I think as we go along with the inquiry we will look at that a lot more. But there are also the other alternatives which come back to the research and development idea about growing more tonne per acre, on the same land, of grain and of using grain that is not going to human food. A lot of the grain is only feed grade for stock, so it is not actually taking away from human food. I think we can go into a lot of that stuff.

**Senator MILNE**—The fodder produces the food.

**Senator NASH**—It does indeed, but it is an alternative. They would still be eating something else if they were not eating that.

**Mr Creemers**—One of the alternatives might perhaps be the good cellulose in the stalks of the grain. You can make ethanol out of that as well. We need to be a bit more creative about how we look at that.

**Senator NASH**—That was mentioned earlier too in terms of the research and development—that cellulose base idea for going into ethanol and what we can do down that track.

**Mr Creemers**—The one disadvantage of that is that to start off the industry we need to come up with something that is both technically and commercially proven. And that will lead us, for the first few plants at least, to either sugar cane or grain.

**CHAIR**—If you are going to set up an industry you have to have a guaranteed source, so farmers are going to need to commit. It is not going to be: 'Will I get a better price for my sugar



on the international market, or should I commit to ethanol?' Aren't the producers going to need guaranteed feedstock?

**Mr Creemers**—Yes, they will. That is the second issue on the list, straight after the vertical integration of the oil industry. But the sugar industry in Queensland—I cannot speak for the grain industry—is already tied in to a degree that you barely see outside of communist countries. Farmers can only supply to one particular mill. All that needs to happen is that sugar farmers change from a sugar mill to an ethanol refinery. The structure stays the same, but rather than being tied to the sugar price, the ethanol plants, in the way that I was looking at it, could in fact guarantee farmers a base price with a component of inflation correction. I recently spoke with some of the people whom I worked with on ethanol and they were rueing the fact that they had not gone into it, because by now they would be getting about \$28 a tonne, and on the world market it is \$24.50.

**CHAIR**—One of my questions was going to be about price.

**Mr Creemers**—The other thing is that it could well be set up in such a way that a component of the price—and I am talking about the sugarcane price—is tied to the world oil price, because why should ethanol be sold at a constant price of, say, 75c a litre when petrol gets made at the moment for \$1.20? There is no reason why you should not take at least part of that pricing and distribute it back to your farmers. The distribution mechanism is very important, and that is why molasses is not suitable. Molasses is very good for the sugar mill operator to make ethanol from, because he gets the molasses anyway—it is just a final product for him—but for the sugar farmer there is nothing in the ethanol that is made from molasses. There is no money that comes back to him. You need to have something that rewards and ties in that farmer.

**Senator NASH**—I have a comment on what you said about having to have producers committed being a negative way. That can also be positive way. Producers are often very happy to lock into knowing that they have a certain market to sell into. So I think that works both ways.

**Mr Creemers**—It does, but I also found that there is considerable concern about locking into a 10-year contract, even though when every sugar farmer buys into a sugar farm he automatically goes for a lifelong contract with a mill. That seems to be okay. But a 10-year contract for ethanol was seen as something that was novel, and the fact that it was not sugar that was produced was seen as a negative. That was something that surprised me. The mind-set was that producing food was a farmer's business; producing biomass fuel was not.

**CHAIR**—Thank you very much. If you have any other information you want to send to the committee, please do so.

[4.34 pm]

**DeLANDGRAFFT, Mr Trevor Frederick, President, Western Australian Farmers Federation**

**HARDWICK, Mr Ross, Executive Officer, Western Australian Farmers Federation**

**CHAIR**—Welcome. I remind you that giving evidence to the committee is 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 of parliament. It is also a contempt of parliament to give false or misleading evidence to a committee. If you would like to give some evidence in camera, please make your request to the committee and the committee will consider it. I invite you to make an opening statement, after which we will ask questions.

**Mr DeLandgrafft**—Thank you for allowing us to appear before the committee. Ross, as Executive Officer of WAFarmers, has responsibilities for issues of business and transport so it is pertinent that he has been the key author of our submission. As we are appearing so late in the afternoon I am sure you have heard most things so we probably do not need to repeat too many. Our organisation has 4,000 members. They come from 2,500 farm enterprises that stretch right across Western Australia. Primarily we are a grain-producing organisation and our members have a significant vested interest in what might come from alternative fuels.

The issues that we want to address within the inquiry probably come under terms of reference (b) and (c). We are interested in potential new fuel sources—and previous witnesses have talked about the biofuels, both with ethanol and with biodiesel—and the flow-on economic and social impacts in Australia. As agriculturists, we operate in regional and remote areas so the cost of fuel has a significant impact on us. We have a fuel component in all of our input costs, in all of the costs of operating a farm and in all of the costs of getting our outputs to the marketplace. Any increase in the cost of fuel impacts on farmers greatly. It is not simply the cost of the fuel to bring the fertiliser and the parts to a farm and to take the grain out but also the cost of the fuel required to take the tractors around and the significant fuel component in fertiliser. We really do have a significant vested interest in the way in which fuel is supplied. The surety of fuel in Australia, and for Australian farmers in particular, is very important to us. With those introductory remarks, I will contribute as we go and leave it to Ross to make some further remarks.

**Mr Hardwick**—We would like to see a strategy, particularly for Western Australia—whether or not it is for Australia is up to the government of course—both with biodiesel and ethanol that would make us self-sufficient from an energy perspective within a five- to 10-year time frame. This energy would come from general sources, basically from ethanol from sugar from Kununurra and from biodiesel from both the tallow or abattoir waste output and the biomass output from Kununurra and the grain-producing areas. That is the broad strategy that we would like to see adopted. In particular, as fuel is governed by Commonwealth legislation we would like to see the right policy and excise settings to facilitate that. That is it in a nutshell.

**Senator NASH**—It is a great target to be self-sufficient within five years. Is it possible?

**Mr Hardwick**—I think it is. Again, it comes down to the right settings, particularly how you deal with and manage the input parity excise and how the infrastructure development to deliver this material is fast-tracked from the point of view of both environmental and social issues. That is why we strongly suggest that this infrastructure is developed in regional areas where the feedstock is located. In particular, I am focusing on the cellulose or catalytic depolymerisation process and I know it is still being further developed from a usage point of view.

We see, particularly in the grain belt, straw from the grain crop being used in that process. So, effectively, grain is not necessarily diverted from food, whether it is animal food or food for human consumption. There are a lot of flow-on effects, particularly from grain and animal protein production. That is what we would like to see.

**Senator NASH**—I think that is terrific. Apart from excise issues, in terms of other policy settings, what would you see as necessary from government for that five-year target to be met? You can answer that broadly. You do not have to be too specific.

**Mr Hardwick**—I think the impediment effectively is the control of the distribution network by the fuel companies. I basically put it that rural and regional areas are effectively held to ransom by how they control the distribution networks. Also, it is just access to fuel in general. In the current environment, if you produce biodiesel yourself it is not an issue, but, as soon as you go to sell it, there is a whole raft of issues. I am not saying that there is anything necessarily wrong with that, because you need to maintain some standards. But the way that is structured at the moment is a direct impediment to its production.

**Senator NASH**—In terms of biodiesel, do you think it would be possible to look at alternative distributors or an alternative distribution network? I am being quite theoretical. A large agricultural organisation might become the distribution network for that.

**Mr Hardwick**—Yes, all of that—even from the point of view of cooperatives doing the processing and farmers effectively putting in and taking out in their own right. We are using third parties.

**Mr DeLandgrafft**—We had a conference recently which looked at alternative fuels. The American experience was looked at. Cooperatives were used right across the regional areas to produce fuel, but they also acted together to ensure that the pricing was kept at a point that was profitable, because there was obviously the opportunity for the large multinationals who currently control fuel to be able to dictate the terms to those small producers. Obviously, legislation would need to be in place so that those cooperatives could in effect collude.

**Senator NASH**—That was my next question.

**Mr DeLandgrafft**—But within North America, of course, you have the Capper-Volstead act, which allows them to collude for this kind of purpose in agricultural products. In other words, as price takers they have some sort of protection there. Looking at Western Australia, what is happening now and the five-year target, last week or the week before we had the announcement by BP about the ethanol plant in Kwinana. Of course, that process actually burns the by-product to generate the energy. In Kwinana that is probably okay. It may not be acceptable in the wheat belt, where perhaps we could use the by-product for feeding stock and those sorts of things. But

I think the significance of that project and why it needs to be encouraged is this: now that BP as a world player have done that, with their experience in ethanol in Australia and overseas they will crack the market. They will make the market open to ethanol use. We have had some difficulties in getting ethanol into the market previously, but I think they will do it because they are committed and they are a large company. I believe that will allow the smaller players—and they are the ones that we would like to see encouraged to operate in the regional areas—to get into the market, because the back of the market will be broken. I think the government needs to give assistance and encouragement. It could be in the way in which investment is made. If there are cooperatives that start out in the regional areas, there are processes through which governments can back cooperatives. With new age cooperatives, they back the raising of capital.

**Senator NASH**—They underwrite the raising of capital—is that what you mean?

**Mr DeLandgraff**—Yes. The new age cooperatives do allow that process. I think that will be important. Those regional companies, which will have a vested interest to actually operate in the regions because they will be driven by regional people, will be able to ride on the back of what the corporations managed to establish within the capital cities and get those networks going.

**Senator NASH**—That is very interesting.

**Mr Hardwick**—Can I ask a question of the committee? Are you aware—

**CHAIR**—This will be interesting.

**Mr Hardwick**—Are you aware of the ethanol plant that operated and the feed processing that occurred in Wagin in the 1970s in WA?

**Mr DeLandgraff**—Wagin is an inland wheat belt town.

**Mr Hardwick**—It was as a consequence of wheat quotas. We had cars running around. The Farmers Federation drove this whole thing. We had cars running right across Australia on 100 per cent ethanol. The by-product had nitrogen added to it and was producing feed pellets for livestock.

**Senator NASH**—What happened?

**Mr Hardwick**—Once quotas went, it died. But it proved everything, from cars to the whole lot. I keep on asking: where has all that information gone?

**Senator NASH**—That was my next question: where would be the information that surrounds that and that particular time?

**Senator MILNE**—The Farmers Federation might have it.

**Mr DeLandgraff**—We could certainly track it down. They called it grain alcohol in those days, of course.

**Senator NASH**—If you could supply that to the committee—if you would not mind—that would be very useful.

**CHAIR**—Would the department of agriculture have it?

**Mr Hardwick**—They may do. They were involved. The reason I know a lot about it is that I was also involved in a lot of the feed trials from the by-product and visited the plant.

**Mr DeLandgraft**—We can certainly undertake to find out as much detail as we can about that grain alcohol.

**Mr Hardwick**—In the interim, it does not have as efficient a conversion ratio—unless we start breeding wheats that have a higher starch content.

**Senator NASH**—I have one final question. Your five-year plan is not contained in the submission. If you would like to supply the committee with a copy of your plan, along with comments about how you feel it would work and what you would see as necessary support from government in a perfect world, that would also be very useful.

**Mr DeLandgraft**—Yes. The other side of a biofuels industry is that if you go to grain alcohol—we produce plenty of grain—and use canola to produce biodiesel, that opens up the ability for the agricultural areas to develop feed-lotting industries. Western Australia does not have the amount of feed lotting you do on the eastern seaboard. That would allow farmers an extra outlet for their grain. At the moment, we are highly export dependent and, from a social impact perspective, we would really appreciate some more inland industries. That is another industry that could be positioned inland. That is value added. Most meat products are exported. From a national point of view, agriculture is very well placed to take a significant role in the production of biofuels.

**Mr Hardwick**—If we had really pushed this properly from a whole farming system point of view and headed towards total use of our grain from a domestic value-adding perspective, we probably would not have had the problem that we have with the Cole inquiry.

**CHAIR**—Let us not go there, okay? Everyone resist the bait.

**Senator MILNE**—You talked about whole farm planning or whole farm utilisation and so on. I take note of the recommendation in your submission for greater R&D in alternative fuels. That is something that has come out strongly through the whole inquiry from all different perspectives: that we do not have an integrated national plan in research and development in this area. Everybody has recognised that this is something that would be extremely useful. Lots of people are doing bits and pieces but no-one has brought it all together to look at how it all fits and what is needed. We will take that recommendation on board and it will feed into everybody else's recommendations regarding that.

With that goes the need to look at the synergies to make sure that we do not provide alternative fuel if it means that we are going to end up with a landscape that is destroyed in the process. Sustainability issues, such as identifying appropriate feedstock, come into this very strongly. You mentioned, for example, using the wheat stalks to produce an alternative fuel, but

what are the implications in terms of soil quality and long-term sustainability in not maintaining those on farm and using them that way?

Secondly, what about the level of fertiliser that is required to generate the crops in the first place, since most of those are petroleum based? Where is the whole analysis of the cycle? Have you done a lot of work on that? I would certainly see part of that as being the R&D work. What achieves soil sustainability? What is sustainable in inputs? What can we get out at the other end that answers some of those questions?

**Mr Hardwick**—We have done a lot of work in that area from a conceptual point of view and through an interrogation of existing information. To give you a bit of background, I am running a state based project with environmental management systems—the Pathways to Industry EMS project—looking at whole-of-farm approaches and how of all this stuff fits together. So I do have a little knowledge. Regarding the straw, at the moment all the R&D from a crop growing point of view is focused on grain for food use. I think that farming systems should be looking at grain production from a cellulose capacity point of view. We need to give some direction to the R&D to look at a crop that produces cellulose, can grow in low-rainfall areas such that it does not need a high input of fertiliser and that has both a grain output which could possibly be used for animal feedstock and a high-bulk cellulose production that can be harvested and used for biofuels.

**Senator MILNE**—What about soil quality?

**Mr Hardwick**—There is a measure being developed—it is taking a long time; you may know about it, Rachel—to do with active carbon content as a pseudo-market for soil health. An integral part of that is finding that component of the cellulose that you can remove and still maintain the soil.

**Senator MILNE**—That is certainly one of those things that feeds into this R&D process to get it right.

**Mr Hardwick**—It needs to be looked at as a total picture, not just in isolation.

**CHAIR**—Have you been looking at the stuff that has come out of the Narrogin plant? I heard about two weeks ago that they feel the stuff coming out is going to be really good for ethanol production.

**Mr Hardwick**—That was Western Power.

**CHAIR**—The oil mallee part.

**Mr Hardwick**—Again, we see that whatever is coming out during catalytic depolymerisation of all the cellulose—even with the waste from the mallee oil; the chunky bits breaking down into fibre—can basically be a feedstock directly into biodiesel, let alone ethanol.

**Senator MILNE**—As a final comment on the interrelationship of all this, what is the overview on climate change and rainfall in looking at lower rainfall areas?

**Mr Hardwick**—All that has been mapped—where it is going to be shifting and so on. As the rainfall and temperature patterns shift, to me work also needs to start on what farming system we are going to have to develop to replace the existing systems.

**Mr DeLandgraft**—In many respects that is work that probably needs to be done anyhow, whether or not we pursue alternative fuels and biofuels.

**Senator MILNE**—Absolutely.

**Mr DeLandgraft**—If you look that ethanol production from grain, I suppose grain is going to be produced no matter what—farmers will continue to produce grain for food and sale anyhow. So whether we are using it for ethanol or not, I guess the only question is if you decide to use more of the straw. But, of course, some farmers—

**Senator MILNE**—That comes back to what is achievable within the carbon limit.

**Mr DeLandgraft**—That is right, and some farmers do actually burn straw now in any case.

**Mr Hardwick**—But they are moving away from that.

**CHAIR**—We are trying to discourage that.

**Mr Hardwick**—It depends on what happens first. The only reason they burn stubble now is disease control. If they have to burn, it is as late as possible, before the break of the season. Yes, there are some who still burn willy-nilly, but people who are in farming for the long haul are doing the right thing.

**Senator NASH**—That is a really good point to be noted by the committee: most farmers are doing it on an environmental basis, realising that, if they do not do the right thing by the land, the land is not going to give them what they need out of it. I think there is a bit of a perception that farmers burn willy-nilly, but there has been a lot of change over the last few decades.

**Senator MILNE**—Intergenerational. You find a lot of change in the new generation.

**Mr DeLandgraft**—Put it this way: we cultivate far less than we used to. A lot of farm operations are kept to a minimum from the point of view of not just the environment but the economics. Using straw, say, in ethanol or biodiesel production means that you would essentially cut the crop shorter. You would not take it all; you would leave quite a short stubble. One of the reasons farmers need to rake some of the stubble and burn it is that they cannot get the tillage equipment through it. You might even find that—we would have to test this—if you cut the straw shorter and sent it away, it would save you from thinning the straw and burning it. You would probably be left with the same amount of biomass in any case. Perhaps we need to do a comparison of that. Farmers cut hay and send it away. We do not get too worried about that. We have a major hay industry in Australia that would leave about the same amount of residue as would ethanol production with the straw being taken away.

**Mr Hardwick**—The issue of straw utilisation is interesting. Two years ago, I had a call from some Chinese contacts who were looking at the supply of straw for paper production.

**CHAIR**—I remember when they tried to get that paper plant up at Moora.

**Mr Hardwick**—There is now a lot of post-harvest straw being baled and used for feedstock in animal feed.

**Senator MILNE**—I see it as part of the R&D in looking at the whole picture of climate, sustainability, various alternative uses and what the most achievable outcomes are. It all has to be looked at.

**Mr DeLandgraft**—What needs to be recognised, too, is that the Western Australian minister for agriculture, Kim Chance, has taken a big interest in biofuels. Has his department made submissions to the inquiry?

**Senator MILNE**—The government has.

**Mr DeLandgraft**—Whilst he may not have done a lot of in-depth work, I think he has raised awareness of this issue and how it is done in Brazil. He has demonstration plants in biodiesel. That has created a lot of interest, and a lot can be built on it. If we are looking at a national strategy here, the Western Australian department of agriculture could use some national funding to continue their work.

**CHAIR**—We will write that down!

**Senator WEBBER**—When I leave here, I am going to see Kim Chance.

**Mr DeLandgraft**—Put in a good word!

**Senator WEBBER**—Absolutely. I will tell him that you have been saying nice things about him and that you have recommended that his department get some national funding. He will be very pleased. I am interested in getting more information about your five-year plan. Earlier on, the committee had a discussion—and it came mainly from DPI—about the need for community education and leadership. I am interested to know what has driven the development of your five-year plan. Has the executive of WAF been talking about it to its membership or has it come from the membership saying that this is a real priority and it has to be addressed?

**Mr Hardwick**—Trevor is the elected member.

**Senator WEBBER**—Do I get two different answers?

**Mr Hardwick**—I do not think you will.

**Mr DeLandgraft**—It probably is a top-down approach. I guess part of our role, apart from representing industry, is to also give it leadership. A lot of these issues and initiatives do come from high up. They come from the federal sphere, which Ross becomes part of, and we need to pick these things up and run with them. I think that running a conference such as we did, focusing on alternative fuels and fuelling agriculture, is one of those things that generate enormous amounts of interest. Farmers can see by the Logue family producing enough biodiesel on their farm to put the crop in that people are very interested. Farmers are interested. They are



innovators. They like to save a quid. They like to leave their farms to their children. They really like to leave the whole environment better than when they came to it. I think that farmers are logical drivers.

**Senator WEBBER**—That is great. DPI talked a lot about the need for government and this committee to tell the story and provide that kind of leadership role, so the fact that as an executive you have been prepared to do that with your membership is good.

**Mr Hardwick**—Again, we have probably done it in conjunction with the EMS pathways project, because we have driven that from a whole-of-farm, not just an EMS, perspective. When you look at the whole of farm from a systems point of view, this is just one part of it, and that is where it has come from.

**Senator NASH**—Were there any motions to the conference that related to this inquiry and what we are doing?

**Mr DeLandgrafft**—No.

**Senator MILNE**—I came over to one of the conferences on biofuels recently. The person who won the WA rural woman of the year was talked about—

**Mr Hardwick**—That was Bev Logue.

**Senator MILNE**—and the fact that they had engaged the whole process as a way of cutting the costs of production rather than looking at the production of biofuels as something to be sold and distributed—another commodity. Rather, it was talked about as a way of farmers being self-sufficient in producing their own fuels and significantly cutting the costs of production. That is another way of looking at it. I think most people, when they come at the biofuels issue, think of it purely as growing another part of the industry. I found that really interesting, and I think it would have a huge amount of appeal because it is localised and consistent with sustainable ways of production in rural districts. The model that she has developed is well worth showcasing around the country, because I do not think it is well known.

**Mr DeLandgrafft**—The other side of it is that if you have another enterprise going on your farm which is reducing costs to this extent it allows you to utilise labour or probably, more importantly, to hold another family member on the farm. Because of the pressures, and because of rationalisation being the logical answer to farmers in terms of trade, having another enterprise is another way to do it. Using the bioproduct perhaps in feed lotting and also having the extra labour unit or keeping the family member there so that you can save money from fuel production becomes quite important. The labour issue is a big one for farmers.

**Mr Hardwick**—To me, it is single farms or collective farming groups doing that, but in the context of the overall picture, from a market driven point of view, it is actually a very inefficient use. Using canola to produce biodiesel is very inefficient. You are better off using the canola oil for human consumption than for biodiesel. I am speaking purely from an economic point of view. But the social aspect in a regional area is a starter, and that is why our model looks at cooperatives on a more regional basis and takes it to a commercial context from the localised context.

**CHAIR**—I have a paper by Ross Kingwell. I am trying to encourage him to make a formal submission to the inquiry, but we are still chasing that. Have you seen it? It is called *Oil and agriculture: now and in the future*.

**Mr Hardwick**—Is that the one he delivered at that biofuels conference?

**CHAIR**—I have certainly seen two papers: one about the general impact of urea and fertiliser and all that and then one directly about agriculture in Western Australia. That is where I am keen to develop the discussion a bit further into the future. We have talked about the transport field, but he talks about the impacts of people generally on agriculture and regions. It will not be a pretty picture if action is not taken. Have you looked at that more broadly? We have talked a lot about biodiesel and ethanol and those sorts of things.

**Mr Hardwick**—That is where we have come from to get to the strategy of self-sufficiency, because it deals with all the security issues and all of those issues that when you look at peak oil and what that causes from a nation's—

**CHAIR**—There are impacts that increased prices are going to have on things other than transport.

**Mr Hardwick**—Exactly—fertiliser, chemicals.

**CHAIR**—It will impact on all of your imports and your ability to export those sorts of things. Have you looked at those broader issues?

**Mr Hardwick**—From the R&D point of view, we are going to have to look at the context of synthetic fertiliser as distinct from petroleum based fertiliser. We are going to have to look at what that will mean for the farming system, because of the reliance on chemicals. Those are things that we need people working on from a blue sky point of view so that we are not locked in to the multinationals. I am not saying that as a dirty word.

**CHAIR**—We take what you mean.

**Mr Hardwick**—Given that we function in the global context, we have to make sure that we have an alternative. Again, knowing full well that it is market drivers that will ensure that this happens, we have to get the framework in place and all the background up and running before the market drivers hit. If you leave it until then, it will be too late. We do not want a collapsed system in WA.

**CHAIR**—Thank you very much. Your contribution is much appreciated. If you could give us that additional information, that would be really appreciated.

**Committee adjourned at 5.07 pm**