

**THE PARLIAMENTARY JOINT STANDING COMMITTEE ON ENVIRONMENT,
RESOURCES AND DEVELOPMENT MET IN COMMITTEE ROOM 2,
PARLIAMENT HOUSE, ON MONDAY 15 OCTOBER 2007**

INQUIRY INTO ALTERNATIVE FUELS

Mr DOUG LING, CHIEF ENGINEER, RACT, WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

CHAIR (Mr Hall) - Welcome, Doug. We have a pretty comprehensive submission from the RACT which is in a separately bound folder, if I recall.

Mr LING - Yes, that is right.

CHAIR - It is submission 25. Doug, you cover a lot of ground in that submission so I would ask you to give some evidence to the committee, please.

Mr LING - I will summarise the executive summary, if that is okay.

CHAIR - Yes.

Mr LING - Alternative fuels, and particularly biofuels, have a significant and important place in meeting Australia's long-term energy needs including environmental outcomes. We believe that there are a number of important alternatives which, if developed, will help towards protecting Australia from the adverse impacts of future price volatility for crude oil and therefore help ensure Australia's long-term energy security and assist it improving environmental outcomes.

These alternatives are biofuels, including biodiesel and ethanol; natural gas products, such as compressed natural gas, liquefied natural gas and natural gas to liquids; coal-to-liquids; and hybrid vehicles, such as those that utilise electricity or hydrogen.

We believe that the successful development of these alternatives requires a plan as well as a commitment by government and industry to ensure their long-term sustainable development. We also believe there needs to be a national policy approach to developing alternative fuels with Tasmania contributing where it considers it is appropriate.

Australia is behind a number overseas countries in relation to developing alternative fuels. We do not support the mandating of ethanol and biodiesel levels but we support the maximum ethanol blend being limited to 10 per cent and the biodiesel blend to 5 per cent, while the vehicle manufacturers maintain their position of not honouring engine warranties where fuel which exceeds these limits is used.

CHAIR - Are they consistent about that?

Mr LING - The manufacturers?

CHAIR - Yes. Some of them appear to be moving somewhat, don't they?

Mr LING - Some manufacturers are producing vehicles that will accept a higher level.

CHAIR - That is on E10s or more?

Mr LING - Yes, up to 85 per cent but they are not available on the Australian market at this stage. We believe there needs to be mandatory labelling of that fuel so people will be aware of what they are buying.

While we support government assistance in establishing biofuel production, we do not support the ongoing subsidising of biofuels. They need to be produced efficiently and be competitive with other fuels and with world markets. We do not object to lower excise levels being placed on those alternative fuels.

We believe that there should not be restrictions on importing low-cost ethanol from overseas countries such as Brazil. That would give an injection of ethanol into the Australian market and encourage the use of ethanol across Australia and enable the sale of these flexible fuel vehicles that will take much higher ethanol levels.

CHAIR - Rather than produce it here?

Mr LING - The difficulty is actually producing enough here and also the effect that that could have on crop prices and therefore food prices in Australia. Evidence from the US shows that a lot of crop growings turned to ethanol has really pushed the price of cereal products up in the US.

Mr HARRISS - But in addition to that, Doug, it is true to say that your submission suggests that that may provide a bit of a boot in the pants to the local industry if there is some importation.

Mr LING - Yes, it would increase demand so there would be more availability of it and then the local industry could come on board and compete with the imported fuel. Currently the imported fuel is subject to full excise which means it is uncompetitive to bring it in.

The other issue we have raised is that we believe the use of compressed natural gas in Tasmania should be pursued and that the Metro bus fleet would be an ideal fleet to demonstrate that on. I am sure there would be Federal Government funds available to set up a refuelling station. Obviously Metro would not have the capital to do it themselves so it needs to be a government thing.

CHAIR - Have you spoken to Metro about that?

Mr LING - Yes.

CHAIR - Are you aware of their decision on that at this stage?

Mr LING -Yes, and I am aware that they have tried biodiesel, not that successfully with the product we have but they are using a tallow-based diesel which is not very suitable for Tasmania with the cold weather.

I guess the other issue with biodiesel is that the Federal Government have not provided any incentive for the production of that. They seem to have ignored that and are just supporting ethanol. In our paper, there is quite a high use of biodiesel in Europe's and there has been support for the development of that. Whether there is an opportunity for the product to be grown in Tasmania and produced here is another issue. It is clearly a matter of creating a demand for it in the first place. That is basically my introduction, if you would like to ask any questions.

CHAIR - As you are aware, there was an inquiry on CNG four years ago, I think it was. We have not moved very far in that respect. From your perspective in the RACT, if the infrastructure was there, do you think motorists would actually buy dedicated CNG vehicles?

Mr LING - I do not think motorists would. I think the opportunity for CNG is in heavy vehicle transport.

CHAIR - Or there is LNG for heavy vehicle transport.

Mr LING - Yes, because of its lower energy provision and also the requirement for a lot of extra storage of it, it is really not suitable for passenger cars. The Cripps Bakery demonstration was quite effective. They did it with a small -

CHAIR - Who?

Mr LING - Cripps Bakery. You can buy heavy vehicles that are designed to run on CNG and that is probably the direction it would really need to go. It is also suitable for bus transport, particularly when they are coming back to a depot on a regular basis so they can be refuelled.

CHAIR - What sort of indications are the RACT getting in regard to fuel supplies worldwide, people, all that sort of thing. Are you getting any definitive data? We have been told that for many decades, we are about to run out of fuel supplies, but it all keeps rolling along, doesn't it?

Mr LING - Yes, I guess that it is about the cost of extracting oil. If the price of oil goes up it then becomes more economic to extract oil when it probably previously was not economic to do so. I guess we are not concerned about the peak oil argument. We see that as a 20 to -30-year time frame, and within that time there will be an opportunity to develop other sources of fuel if we do run out of oil, particularly converting coal to liquid fuel, and gas to liquid fuels. The alternative fuels are really only a contribution to the fuel usage. They are not an alternative to petroleum, at this stage. We would not see that, no.

CHAIR - Your comment before was that it really ought to be a national approach. As you know, we are doing our inquiry, the Victorian State Parliament recently did one as well. Are you are saying there ought to be some consistency in national policies?

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Mr LING - Particularly with the encouragement of, say, development of biodiesel and so on, there needs to be consistency. If tax incentives are provided the Federal Government will need to be involved. Excise will be coming on the alternative fuels so that all needs to be fairly clear to people before they go and invest in production of various alternative fuels.

Ms THORP - I want to ask you about the Fuel Tax Act 2006. What do you think the impact has been and will be?

Mr LING - I guess it gives some certainty to people who are going into that area, that they will be up for an excise over a period of time. It would still be a much lower excise than that on petroleum products so it does give them an advantage. Whether that is sufficient advantage for people to go into production or not remains to be seen. It would be great if they reduced the excise on petroleum products, it would make fuel a lot cheaper.

It is really a matter of why we ought to pursue alternative fuels. Is it for environmental reasons or is it to give us some security of supply so we are not so reliant on overseas imported oil? Obviously, in the longer term, they will be an alternative if oil eventually runs out. We do not see that it ought to be pursued as just subsidizing agricultural production. It needs to be considered from a whole-system point of view and what effect it will have on the economy, particularly if you look at what is happening in the US with the driving up of the price of cereal products. These things need to be taken into account if you are looking at it from an economic point of view, but the other issue is a strategic issue about being reliant on overseas oil. It is not a simple issue.

CHAIR - Certainly not.

Mr LING - You have the sugar producers who want subsidies to develop ethanol which is fine, but you really have to look at the total cost to the community.

CHAIR - The RACT keeps a tab on new vehicle sales and it seems, particularly from Europe, we are getting a lot of very fuel-efficient low-emission diesel vehicles at the moment. Do you see that trend continuing?

Mr LING - Definitely, yes. We are following particularly what is happening in Europe and those vehicles will become a greater proportion of sales. That again gives some opportunity for biodiesel use as well so there is an opportunity in that market, provided biodiesel is -

CHAIR - What about dual fuels and hybrids?

Mr LING - Yes, we see those as really an interim measure until they develop fuel cell vehicles in the longer term. That really is about when peak oil might occur by the time that the development of hydrogen vehicles may be an alternative. That is probably 20 to 30 years away.

Mr GUTWEIN - In your submission were you saying that you think that the Government should take the lead through Metro with CNG. In an ideal world how would you see that role?

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Mr LING - That the Government provide or fund the refuelling plant and that be made available for other industries such as the Cripps Bakery-type operation and other heavy vehicle users, particularly couriers which could gain supply of compressed natural gas. The other issue is if you have a plant in Launceston and you may be on the north-west coast, whether you have enough for someone who is running heavy vehicles or freight service on the main track and that becomes a viable option. You may to have to have one at Campbell Town as well for refuelling, I am not too sure on that.

Mr HARRISS - Just taking that one step further, Mr Chairman, you have acknowledged that if the Metro fleet is to make some conversion, then given their funding arrangements, it has to come from a government initiative. You also mentioned, Doug, that CNG is probably ideal for that process and maybe LNG for longer-haul heavy vehicles. But what about the capacity for passenger vehicles to refuel at home, with a small compressor installed? It might take a longer time, obviously. The real thrust of my question is, what is the purpose of it all? Is it in recognition of diminishing supplies of fossil fuels or is it primarily to address environmental issues, or is it a mixture?

Mr LING - Or an economic reason and that is why people do it. Although people may have environmental considerations, it is really down to what it costs them to run their vehicle. There are the home units available. You can fill your vehicle. But, there again, it is only really for a commuter-type vehicle because of the short distance you get out of the fuel. So it could be more applicable in the larger city where people are just using their vehicle to commute. The problem, I guess particularly in Australia, is that people use their vehicles for all sorts of things and in Tasmania we just drive to and from work. That is a bit like the electric vehicle arrangement. It is fine if you just want a vehicle to drive to and from work and you can plug in at work. But we have had the hydro-electric battery vehicle. We have had that at the RAC for a number of years. It has just gone back to the Hydro. Some of our staff have used that to commute to and from work which is fine for them, if you are not in a great hurry. Generally, the normal motorist does not want a vehicle like that. They want to have the flexibility to be able to go where they want to go.

Mr GUTWEIN - What have been the shortcomings of that Hydro vehicle?

Mr LING - Apart from its performance and the fact that it has 14 large batteries in it, it is very heavy, for a small vehicle. It depends. It probably only has about a 60 kilometre range. So if you just go on that it is fairly economical to run. The big problem is replacing the batteries which you need to do about every four years and that is about \$2 000. So it is an expensive option to start with, I suppose, to buy the vehicle. Until they develop a longer-life battery, in the long term they are not a very good investment really. Generally, the automotive manufacturers are really going away from research on a pure electric vehicle. Obviously the hybrid-type vehicles are a much more flexible type of vehicle.

There are quite significant advances in hybrid vehicles and particularly Toyota are bringing in quite a range of their vehicles and providing good performance as well. Most people, and it depends on their view of life, but generally they do not want to sacrifice the performance of a vehicle to something that is very sluggish and slow. As I said, I

think the hybrid vehicles in the longer term are probably an interim measure. But no doubt quite a lot of those will come on the market in the next five or 10 years.

CHAIR - Are you aware of any performance difference between a dedicated CNG motor vehicle, if it is put out by Toyota or Ford, compared to a straight-out, petrol-powered vehicle? Are you looking at those, shorter range?

Mr LING - That is the biggest problem. Because of the heavier fuel tank for heavier vehicles.

CHAIR - It takes up cargo space.

Mr LING - Yes. It is a heavier vehicle to start with.

CHAIR - That probably is fairly problematic too because historically, if you look at the mainland capitals, they have all had access to natural gas for many years - all the bus fleets apart from Melbourne which has trams of course. There has been a push to make sure that those Metro bus fleets have access to refuelling stations, yet it seems as though there are very few individual car consumers who have taken up the challenge of buying a CNG-dedicated car. Is that a reasonable statement to make?

Mr LING - I would not see the demand for that.

CHAIR - But it would rely on the transport industry, as we said, to make anything approaching viability here in Tasmania, apart from the public bus fleets. Is that your view?

Mr LING - Yes, that is our view. It is not really an alternative for the normal motorist but it could make a contribution for the heavy vehicle with a high consumption of fuel.

CHAIR - Are you aware of the LNG option?

Mr LING -- Yes.

CHAIR - There has been work done with DED, I think, and Gunns in particular, and maybe Fonterra, the milk company, to look at it.

Mr LING - That is encouraging. I guess now that the mill has the go-ahead that part of their business will proceed. That has a lot of potential.

Mr HARRISS - The other matter too, Mr Chairman, - just to get it on the record, Doug - is that your submission goes to the matter of not putting all our eggs in one basket as it were, that there will be emerging technology and continually developing technology and that whatever we might do now, if it be the Metro bus fleet, that might simply be a bridging process until other matters are more highly developed.

Mr LING - It is a matter of looking to reduce reliance on purely petroleum-based products. Also for an environmental reason. I guess in the paper when it was written in January they were saying that if world oil prices are consistently about \$75 a barrel that can have a major effect on Australia's economy. What has happened since then, because we have

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had well above \$75 a barrel for some time, is that the thing that has countered that is the revaluation of the Australian dollar, which has gone up 20 per cent. If that had not happened, we could have been in quite a severe situation as far as the price of fuel is concerned. It would concentrate people more on alternatives. People are accepting the price now. Today it is about \$1.25. It is not a shock but if it goes up consistently to \$1.35 or \$1.45, then \$1.50 which we were heading to at one stage, people then start to become concerned about it.

When we had the oil crisis in the 1970s, the price of oil then in today's money would be about \$120 a barrel. So it is quite significantly more than it currently is. Back then it did have a major influence on people's suddenly going to very small cars. That was quite a major shock back then but we are having little shocks now so people are getting a bit more used to it, I think.

Mr HARRISS - Doug, in the context of prices being paid in other countries for a litre of fuel, are we overreacting in Australia because we have been a bit spoiled over the years?

Mr LING - Probably. It depends. In Australia we are very reliant on our vehicles, particularly compared to Europe and so on. In Tasmania we do not have a good public transport system and we do not have the population to support that so people are very reliant on their vehicles. Even though the average distance travelled in Tasmania is considerably less than interstate, people do more country driving than the other States where they mainly just commute. We are very reliant on our vehicles and when we do have a sudden increase in price that is the sort of thing that people stop doing; they do not go for their Sunday afternoon drives. It does not stop people using their vehicles. The evidence is that the number of vehicles will increase; the percentage increase will be greater than the population increase. Our ownership is quite high. I do not believe that people will suddenly say they will stop using their car and use public transport or ride their pushbike to work because it is not convenient, you do not have the security, you have not the flexibility that you have with a motor car. I am getting off the point a bit.

Mr GUTWEIN - I am getting even further off the point. In regard to the use of public transport in Tasmania and whilst we are looking predominantly at vehicle fuels and what powers those vehicles, what do you think we need to do to encourage more people to see public transport as a reasonable and viable option? How do you make Metro more sexy from the RACT's point of view?

Ms THORP - It is not just Metro, it is the private operators as well.

Mr BEST - I answered that one for you in Parliament that time.

Mr GUTWEIN - I obviously was not listening.

Laughter.

Mr BEST - So you are going to get me back?

Mr GUTWEIN - I do recall it.

Mr LING - I worked at Metro for five years but I was not successful in making it very sexy back then.

The main problem is that these days people do not just go from home to work and back again, which is really what public transport is set up to do. People do all sorts of things during the day; they need to go out at lunchtime and go shopping or pick up their kids or after work they have to take them to sport or whatever. When private car ownership was not as high and people went to work for the whole day and came back, public transport was very suitable for that.

Ms THORP - My dad caught the train.

Mr LING - Yes.

In larger cities you have the population to be able to support a public transport system. That still obviously costs money to run.

The other issue from the environmental point of view is that people see their motor cars being an evil and we have to reduce the number of motor vehicles or the motor vehicle use. Private motor vehicles or light motor vehicles have a very small impact on the environment compared to everything else that is going, compared to heavy vehicles and so on.

Mr GREEN - Are Brazil exporting ethanol?

Mr LING - Yes.

Mr GREEN - Significant amounts?

Mr LING - Yes and they tried to bring it into Australia but because of the excise on it no-one would buy it because it would be too expensive. It was the ethanol lobby in Australia that said do not allow it to come in.

Mr GREEN - Opposing it?

Mr LING - Opposing it coming in, which we see as a bit short-sighted. You have to create the demand for the product in the first place. Unless you have it and it is widely available, it will take a long time for ethanol to become a significant percentage of fuel in Australia. The Federal Government's target of 350 million litres is still an extremely small amount. It has a very small effect on fuel in Australia.

Mr GREEN - But it has been extremely significant in Brazil, hasn't it, because the majority of cars run on ethanol?

Mr LING - Yes, and they are producing 100 per cent ethanol vehicles as well. It can work but it has to be government driven.

Mr GREEN - Have the RACT and other bodies of a similar ilk around Australia been advocating on behalf of drivers generally to have the warranties changed with respect to vehicles or have you just accepted the industry position?

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Mr LING - We have accepted the industry position.

Mr GREEN - Why would you want to accept the industry position?

Mr LING - With the vehicles that are currently on the Australian market, we accept the position that they shouldn't run on more than 10 per cent.

Mr GREEN - But most people would say that that is a very conservative figure that the industry has put on with respect to the fuel mix and the warranties et cetera.

Mr LING - I guess it is a low level, a catch-all level. You may have noticed that at the Sydney Motor Show Holden has just released a E85 flexible-fuel vehicle. They are building that in Australia to export to Brazil, so we have that technology here. If the distribution network was there for particular types of vehicles that could take the higher level of ethanol, that should be encouraged.

Mr GREEN - Or become an option.

Mr LING - Yes, become an option for people.

Ms THORP - What is Brazil making its ethanol from?

Mr LING - Sugar.

Mr GREEN - With respect to compressed natural gas - and you are saying that Metro ought to take it on. The RACT is always suggesting that the Government ought to provide everything. We have had some interesting evidence with respect to other organisations such as the Hobart City Council thinking about alternative fuels as well. We have talked about partnerships et cetera and whether or not that would be a viable opportunity with respect to at least getting the ball rolling from the point of view of compressed natural gas. Do you think that partnerships would be an advisable thing? As the RACT, would you be encouraging all like-minded people to get involved?

Mr LING - Yes, I think I indicated that if the Government -

Mr GREEN - I want to focus on Metro.

Mr LING - I guess as an initiative you make it available for other organisations and, if they wanted to contribute to establishing it, that would be -

Mr GREEN - Metro has suggested that if it was to go down this path they would want their own stand-alone refuelling operation. They may remain to be convinced otherwise on it because the industry itself is interested in providing compressors et cetera, as they have done in other States, if they had the economies of scale to be able to do it. My view is that an organisation such as yourself could play a very important role in advocating a partnership arrangement on a site that is suitable for, say, the Hobart City Council, Glenorchy City Council and Metro - just to use Hobart as an example given that gas is here - to shake things up and put some pressure on to get that done. I am very confident,

as a result of what we have heard, that the industry would be keen to support a position such as that.

Mr LING - We would be very supportive of that approach.

Mr BEST - Congratulations on a very good submission. There is lots of good information, I think all committee members would have to agree on that; it covered the topics very well, and I suppose not single-handedly in a sense. So far all the submissions have been pretty narrow in the sense of what different groups are after.

We have had an array of submissions, and one of the things that was interesting that we had last week - I will chase up the gentleman's name, but it was in relation to one of the options that is out there fairly heavily, which was kelp and that sort of thing - just on the matter of the Government's involvement, one of the things that came about was perhaps - a different industry of course, but the softwood project for example, was a project where the Government lined up all the ducks in a row and said, 'Look, here it is, come and do it'. Do you think that is something that might be of more assistance in this area of biofuels, if the Government was to grab the issue and line all these things up and then see what might be possible with bringing companies together and that sort of thing, or just interested as partnerships and that sort of thing?

Mr LING - I guess it is similar to what Bryan Green was saying, that approach - the Government really needs to be leading it and, I would think, needs to put in some seed funding to get it going.

Mr BEST - Yes, because what we are hearing is that maybe there is assistance and policy in some areas and there are other areas that I suppose are a bit vacant, in a sense, and needing to be picked up, so that is something that I was certainly interested in.

You have a very comprehensive submission here, and there are some very interesting things in here. If you were to look towards the future, and these things are always hard to predict, how would you see perhaps alternative fuels unfolding for Tasmania? I suppose the next obvious option is the use of gas.

Mr LING - From the General Motors point of view I see more use of ethanol-blended fuels. Currently they only have the one supplier, and it is a couple of cents cheaper than normal unleaded. It also has a high octane rating, so hopefully the other oil companies will see fit to bring it into Tasmania. There is some resistance by some motorists to buy ethanol-blended fuels, and in some old vehicles it is not advisable to use it, but that is a small percentage. From the General Motors point of view I would think that the ethanol-blended fuels probably in the near future is really the only thing that may happen for -

Mr BEST - For private vehicles, more or less?

Mr LING - Yes. The LPG situation in Tasmania, because of the pricing we have here, it is not attractive. Currently, it depends where you buy it, but it is sort of 20 or 30 per cent dearer.

CHAIR - Why is there such a big discrepancy between here and Melbourne, for example, with LPG?

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Mr LING - It is a small market - there are only two suppliers -

Ms THORP - Coles and Woolworths.

Mr LING - Yes, it is a bit like that, but it is getting the fuel here too, because it is only brought in in small quantities, because of the size of the market, so that is a disadvantage. For the private market it is not really a viable option, even though there are quite a few who have taken it up, with the subsidy for conversion, but unless you are doing 30 000 kilometres a year it is not really a viable option - it is not an attractive option..

Ms THORP - Just one last question - have you given any thought to the proposition of wood waste, or biomass to create biofuel?

Mr LING - You can use it from lots of different things.

Mrs THORP - We are not big sugar growers, are we.

Mr LING - No. I mean, you can grow sugar beet and that sort of stuff - the issue there is if you are growing that, you are using land that could be used for other products. It really depends on if you are using it on -

Ms THORP - Sugar beet.

Mr LING - If you are growing that on land that is not much good for anything else, there may be an option there. It really needs to be looked at from an overall economic point of view, I think. We have our expertise from an agricultural point of view on what is economic to grow and what is not.

CHAIR - Do you think from a RACT point of view it is important that we be taking these steps at this stage?

Mr LING - Yes. What is the likely outcome of this committee? When do you come down with your findings?

Ms THORP - It will have to be pretty soon, won't it?

CHAIR - Yes. We have two or three other references as well to deal with so we do not want to fiddle around with it for too long but by the same token, I am aware that we have requested other information because it is a moveable feast all over the world so we need to make sure we encapsulate some of that as well.

Mr LING - It is likely to be done this year or early next year?

CHAIR - That would be our intention, yes.

Mr BEST - Why are you saying ethanol is not available here? Is it because we have not driven the market for it?

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Mr LING - The oil companies have not seen fit to bring it in because it is another product they have to handle, I guess.

Mr BEST - I see. What would we need to do then to get something like that?

Mr LING - United Petrol have brought it in and they are selling it at a couple of cents less so that might put pressure on other oil companies to bring it in. BP were going to bring it in a couple of years ago but just have not got around to it.

Mr BEST - It is fine in most modern cars, isn't it?

Mr LING - Oh yes. It is only some pre-1986 vehicles. I guess it is also the storage requirement for it and the handling of it and so on which took United a long time to get sorted out.

Mr BEST - 70:10, isn't it?

Mr LING - Yes. One of the other issues that is emerging is that in New South Wales in particular at a number of stations where BP are retailing it they do not have normal unleaded so the choice is being removed. It is a bit of an issue from -

Mr BEST - The super version of unleaded or ethanol, is it?

Mr LING - Yes -

Mr BEST - Premium or -

Mr LING - Yes. There is no standard unleaded available as an option. They are just sort of replacing that with the ethanol so there is a bit of an issue there about choice for consumers but that is something -

Mr BEST - Can you run it in outboard motors, that sort of thing, or is it really only in post-1986 cars?

Mr LING - You would need to go back to the individual manufacturer for a particular motor, yes.

Mr BEST - Thank you.

CHAIR - Thanks very much, Doug. Thank you for your presentation.

THE WITNESS WITHDREW.

Mr JAMES FOX, FOX DESIGN, WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

CHAIR (Mr Hall) - Thank you very much for coming along, James. We have your submission; you have given quite a diverse presentation there. I invite you to give us some of your thoughts.

Mr FOX - You all have a copy of my written submission so I won't address that in too much detail.

CHAIR - Where are you from, James?

Mr FOX - I am based in Hobart and I run an engineering and design manufacturing business, with particular relevance in the energy field. I will address that in a bit more detail later.

I will give a quick summary of my position and the issues that I am advocating and then I will go through it in more detail. From my point of view, I see biodiesel has a lot of potential because it is being used right now for local product and it can be extended. Compressed natural gas has a lot of potential because we spend some billion dollars in the infrastructure so why not use it. Hydrogen has some possibility but it is slightly out there. My key submission is that I think we should be encouraging and implementing demonstration programs in biodiesel and compressed natural gas, and hydrogen if you want a bit of good PR.

I am a professional chemical engineer and I have worked in oil, gas, electricity, petrochemicals and food processing so I have a very diverse perception of the world, but to me it is all the same - it is all stuff going through pipes and being burnt, heated up or cooled down. While it might appear diverse, I see it as having a lot of common themes. I worked for the Hydro for nearly 20 years, but for the last 10 years I have been working as an independent consulting engineer doing design and project manufacturing of industrial processing equipment. You can see some of the projects in my submission.

The key issue is that the petroleum industry that I have worked in in the oil and gas fields and petrochemicals is highly efficient and effective on a global and a local basis. I am not here to compete with or knock the petroleum industry. It is very powerful and significant, except there are no oil wells in Tasmania, albeit some people might believe it is worth drilling for them. The other is that it emits carbon dioxide and this is really the issue which is becoming of obvious significance. It was significant to me 35 years ago when I studied air pollution control engineering in the United States, so I tend to have a longer-term view of these issues.

CHAIR - What percentage of petroleum do we import at the moment?

Mr FOX - Into Tasmania?

CHAIR - No, into Australia.

Mr FOX - I cannot tell you the details; I am not aware of the current -

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CHAIR - We might produce something like about 10 per cent.

Mr FOX - I can't tell you; I'm not an expert on that. I would have to refer to ABARE statistics on that. I can profess to be probably the only commercial supplier of hydrogen-powered internal combustion engine vehicles in Australia. Some years ago I designed and supplied, under a performance contract to the Hydro, a hydrogen go-kart because they thought hydrogen was a good idea. We wanted to convince our management that it would drive a vehicle and would not blow up. I designed and built them a hydrogen-powered go-kart. I converted an existing go-kart on a specific contract for the Hydro and, as a consequence, the university hydrogen laboratory received Hydro funding and financing. I also get involved in high-value products - coffee, \$30 a kilogram - I manufacture coffee-roasting machines and I have them all up and down the east coast of Australia. Why bother with bio-diesel at \$1 a kilogram? It is a waste of time economically, but I am doing it because I think it is a good idea and that is why I am here.

Mr BEST - How did the Hydro go-kart end up?

Mr FOX - It went fine. It raced at the go-kart track and at the showgrounds. We had a Hydro social club evening and they were racing it.

Mr BEST - How long ago was that?

Mr FOX - Five years - 2001 or thereabouts. It was very successful; it is in the showroom on the first floor of the Hydro if you want to have a look at it.

Mr BEST - Yes, sure.

Mr FOX - They will not let you fire it up in the showroom though. The key thing about that particular project was, to me it was a straightforward clinical engineering exercise. Someone gave the money; I built them a hydrogen go-kart. Hydrogen is not rocket science. Most of the projects I get involved with are not rocket science, they are economically driven.

Mr BEST - Was it very expensive to build the go-kart?

Mr FOX - The go-kart cost \$3 500, delivered on the back of a truck from Queensland. The little gold engine management computer that they put on racing cars, and I converted the engine to fuel injection, cost \$3 500 also. So the cost of the engine management computer was the equivalent price to the go-kart. The hydrogen equipment cost a few thousand dollars. The total manufacturing price of that was \$10 000. I charged them \$50 000 because there was a pile of standards this high to meet to prove that it would not blow up, but the conversion cost - if you want a hydrogen-powered car give me an order and I will supply you with one. The technology is quite straightforward. It will not go very far because the tank is too big but that is another issue so it is fairly straightforward technology.

Mr BEST - Thank you.

Mr FOX - One of my current projects a continuous biofuel refinery. I have a pilot plant working and I am looking at building another two parts. I am an engineer, I am driven by the economics of it. At the margins biofuel is economic now and it is supplying literally dozens of vehicles in Tasmania.

Mr GUTWEIN - What volume of biofuel are we making in Tasmania? Presuming by biofuel you are talking biodiesel?

Mr FOX - Yes, biodiesel. That particular plant has probably put through 5 000 or 10 000 litres just on the basis of a pilot plant. I am guessing because the biofuel industry is in people's back sheds but it is very effective, very cost effective on the back shed basis. I am trying to do it on a professional basis but if you had a couple of hundred vehicles in Tasmania you can work it out from there what the usage is.

CHAIR - Do you have the raw materials for that?

Mr FOX - The raw materials? I can get delivered to my front door probably 50 tonnes a week of tallow from existing abattoirs. Rob Henry could deliver you x thousand tonnes of material and I am discussing in detail with him supplying a refinery for his requirements.

Mr GUTWEIN - We had a look at Rob Henry's set-up last week.

Mr FOX - Okay that is good. That gives you a very indication of the potential of the raw materials. There is more raw material available from the abattoirs than there is from Rob Henry's operations but they are complementary. So the raw material in the short term is not the issue, the market is not the issue; it is putting the two together at a scale which is economic for Tasmania. You can float a public company and get \$100 million and build a biodiesel plant, you can buy the technology from Germany, plonk it down there and it does not make money. So, uneconomically driven, I am an engineer and I provide equipment which is adequate and it does not necessarily mean gold plated; you have to make something which is appropriate for the market. That is where knowing what the Tasmanian scale is is very important.

Looking at the wider issue of transport fuels, the issues of multiple use of vehicles having to go and pick up the kids and take them to school and therefore you cannot use public transport is very significant because if the kids could ride their bikes to school you would not need to go and take them to soccer after because they would ride there themselves. I think in terms of the alternative fuels we must look at a wider basis. In Holland, 99 per cent of the transport is by bike and by investing in bike tracks in fact you would reduce the congestion on the Southern Outlet because the kids could ride to school instead of being driven by mum or dad on the way to work.

There are technological issues, water supply delivery, tank trucks, the infrastructure. The cost of LPG in Tasmania is higher than on the mainland because it has to be delivered in a tank by ship, whereas on the mainland it is delivered by a pipe which is why LPG on the mainland is cheaper. The infrastructure issues on supply and delivery of commodities has a very significant impact. Looking specifically at the alternative fuels that I see, from an engineering perspective, as being technically and economically viable

in Tasmania there is compressed natural gas. If we spend a billion dollars putting it in, we might as well use it for the cost of a compressor station.

Twenty years ago, my father in Auckland, New Zealand drove around in a CNG car because the infrastructure was there. However, it fell out of favour because the liquid fuel lobby, which is very strong, powerful and effective, lobbied to convert the natural gas into liquid petrol. They spent another billion dollars on a gas-to-petrol plant and made the gas cars uneconomic. If you have the compressed natural gas or the gas available, it is worth giving serious consideration -

CHAIR - Sorry, so are they using LNG in New Zealand now?

Mr FOX - No, in New Zealand they use compressed natural gas, exactly as in the pipeline gas and compressed it. About 15 to 20 years ago, they put in a gas-to-methanol-to-petrol plant, so they converted gas and made it into synthetic petrol. The only trouble with that technology is that it is only 50 per cent efficient. Half the gas that goes in goes out as hot air and the other half comes out as petrol. It is very inefficient and they just about run out of gas.

CHAIR - Is that something they have done in other parts of the world or was it more a New Zealand-type -

Mr FOX - The technology has been around a long time and it has been recognised as being an inefficient technology. If you really need it, you do it. In New Zealand they thought that they needed to do it but they misread the wind, I suppose, at the time when the effective cost was \$120 a barrel. It was a few years ago that they made the decision.

It might seem somewhat facetious but usually if you can put in bike paths then you can reduce the capital costs of the roads and the fuels that are required to drive your vehicles. But biodiesel, again, is the major potential other alternative fuel. Alcohol, as an induced fuel, has a lot of potential because existing petrol vehicles can use it in varying blends. Alcohol can be produced in Tasmania from Tasmanian raw materials and that is wood waste - woodchips and sawdust.

Mr GUTWEIN - How far advanced is that? We heard evidence about this last week and when we were overseas just recently there was quite a bit of discussion about turning wood into ethanol.

Mr FOX - Yes. There are two processes, one is enzymatic - you compost the sawdust slightly and ferment it. The other way is you mix it with sulphuric acid and it hydrolyses and you can ferment the acidified woodchips, directly.

We happen to have about 100 000 tonnes a year of sulphuric acid produced about five kilometres from here so we are in a unique situation here in Tasmania. We have bulk supplies of cellulose - woodchips and vines, we have bulk supplies of sulphuric acid so if we could put in a sulphuric acid hydrolysing plant that produces alcohol from woodchips that might not necessarily be used elsewhere. Their technology is very well proven.

CHAIR - Yes. So you think that should be high on the list of priorities as something to really look at?

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Mr FOX - Yes. If you have spent a billion dollars on a pulp mill and the wood waste is all going to go to the pulp mill, it is not worth spending big bucks on turning it into petrol or into alcohol. But, at the margins, there are hundreds of thousands of tonnes of wood waste - sawdust - which is available and could be converted to alcohol as with many biodiesel options.

Mr GUTWEIN - From the point of view of conversions, I am trying to get some idea of quantity. From a tonne of wood waste you would produce roughly how much?

Mr FOX - I cannot remember the precise figure but a tonne of wood waste is probably going to give you 100 or 200 litres of alcohol. It is not a lot.

Mr GREEN - I am told 300 litres.

Mr FOX - Okay, 300 litres. This depends on the process, the efficiency and the economics, and all of these things which are absolutely crucial. The more capital, the more efficiency but a cheap and nasty plant, is messy. But I am not, in the first instance, advocating that because it can be done but biodiesel is here right now and with CNG, the gas is here right now. Certainly alcohol is worth considering. Believe it or not we have a hydrogen-fired power station in Tasmania that produces about 10 megawatts of electricity. Hydrogen is not rocket science. This hydrogen-fired power station is TEMCO. The TEMCO smelter has a power station that burns about 50 megawatts of hydrogen and carbon monoxide which is produced by the by-product from the smelting furnaces. If you are keen, you could clean that hydrogen up, compress and bottle it and drive a car on it. In effect, that hydrogen is produced by using electricity metallurgical coke and woodchips which is converted to hydrogen.

There are more efficient ways of making hydrogen. One is with two wires and a glass of water and hydrogen bubbles off one wire and oxygen off the other. That is very practical and can be done right now. It is a matter of cost. For a demonstration, like on the go-cart level or a sports car for the Minister for Energy, it is a very feasible proposition. But if you are generating electricity by burning natural gas, there is no point in making hydrogen to run your car. You may as well take the natural gas and put it straight in your CNG tank and drive down the road. It is twice as efficient. It does not sound as good.

On the issue of comparing fuels, hydrogen is the best and greatest fuel that was ever invented at 120 megajoules per kilogram. However, a kilogram of hydrogen would only just fit in this end of the room. You can compress it. A hydrogen tank this size on the go-cart would hold the equivalent of a cup of petrol. You can drive that go-cart for 40 minutes on a tank of hydrogen, as you could on a cup of petrol. That is the problem with hydrogen. It is a great fuel and engines love it. It just produces water, but you need a tank to hold it.

At the other end, wet wood has an energy value of about 10 megajoules per kilogram. It is a great industrial fuel and there are a lot of industrial sites using sawdust, including every sawmill, McCains and many of the abattoirs, except Longford Abattoir. There the Government paid them to convert to gas to use this infrastructure when, in fact, they had a perfectly good wood-fired furnace running their plant. Wood is already used as an

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industrial feedstock for non-wood based industries. Going to producing alcohol would be a quite straightforward step.

Biodiesel and diesel are basically the same thing. I think we have dealt with those issue. One of the sources is wood and crop oil and those are the -

Mr BEST - I do not know a lot about chemistry, but the tank for hydrogen is the problem because of the size, I suppose.

Mr FOX - Yes.

Mr BEST - The weight of it, though, is not a big deal because hydrogen is lighter than air, isn't it?

Mr FOX - Yes. However, a tank this big on a go-cart or this big on a car holds 100 grams of hydrogen. That is the problem. The tank weighs, probably, 10 kilograms, to hold the 100 grams of hydrogen. That is the problem.

Mr BEST - So the future in hydrogen is to be able to make it as you go or something? I am getting off the subject a bit.

Mr FOX - No, that is highly relevant. I would convert my car to hydrogen, if I could convince my other company director to pay for it.

Mr BEST - I see. It is that expensive?

Mr FOX - So, that is the only problem and it is quite straightforward. It would plug into the wall. It would have a three-pin plug. It would take 15 amps and it would go into a box the size of small washing machine in the back of the garage. There would be a hose going into the car, it would fill up overnight and I would drive off in the morning. If you want one, give me the order or you can go to Honda.

Mr BEST - But I think you are saying it is not efficient, though.

Mr FOX - It is not cost-effective or environmentally effective if use coal to produce the electricity to produce the hydrogen or if you use gas to produce electricity to produce hydrogen.

Mr GREEN - What about a wind turbine on top of your car?

Mr FOX - A great idea, excellent. More wind turbines and I will get a hydrogen-powered car.

Ms THORP - I believe they have been referred to as parrot blenders?

Mr FOX - I do not want to get into debates about chopping up orange-breasted parrots.

Mr BEST - Now we are really getting off the subject. You have that on *Hansard* now.

Ms THORP - I did not call them that. I said they have been referred to as such.

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Mr HARRISS - Before you go off the subject of hydrogen, before this committee started, we were discussing recent developments with regard storage of hydrogens. There is, as I understand from the television only last week, an development with regards storage which means that rather than a big tank -

Mr FOX - The technology for hydrogen storage is improving. You can get more hydrogen into a smaller tank than you could ten years ago. The Australian Antarctic Division has carbon fibre-wound tanks which are very light and will go in the boot of a car. They are about the size of an LPG tank and will probably double the storage capacity of the steel tank. So the technology is improving.

Mr BEST - Do you think perhaps hydrogen might be what they call second generation of fuel options? It does not seem to be quite there yet.

Mr FOX - It is here right now.

Mr BEST - But we have to get it to a point where it is competitive.

Mr FOX - As with many technological issues, the technology is well proven but, in the current circumstances, not economic. You must also look at the wider costs, such as greenhouse gas and environmental issues, military action to make sure you can still get the oil well and all these sorts of issues. In terms of energy cost, to run your car on hydroelectric energy from a plug in the wall is actually economic now. The cost of the electricity to produce the hydrogen to run your car is the same as petrol at a \$1 a litre or thereabouts. Fuel-wise it is economic now, the only problem is the capital costs because they are not being produced by the millions and you need the electricity source.

Mr HARRISS - If the electricity source is from a renewable process, hydro or wind -

Mr FOX - Yes, you have a completely renewable vehicle. It is nirvana for those who want renewable vehicles. The problem is the capital cost. You could have a solar panel on the roof of the house and generate electricity to run your car. This is very technologically practical.

Ms THORP - Wouldn't it be wonderful if we were doing that?

Mr FOX - In my submission I advocate that that should be promoted by either the State or Federal government at a demonstration level, not from the point of view of subsidising it. The hydrogen go-cart was a good demonstration. I suggest that it might be worth coming up with a red sports car running on hydrogen as the next level of demonstration. I offered to drive it.

Mr GREEN - Originally they were going to have postie bikes, weren't they?

Mr FOX - Well that is right. I offered to convert them. It is relatively straight forward. I do not know if you are getting letters delivered by the UTas post bike yet. I am not actually advocating hydrogen right now but it is a good idea in terms of keeping the technology alive.

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By oil sources you almost know more than I do having been to Rob Henry's place. You might recognise the general conceptual layout here. This is basically Rob Henry's Macquarie Oil site and I am discussing in significant detail what the unit will be to meet Rob's requirements. The issue is risk, both technical risk and commercial risk which we are trying to resolve at the moment. Will it work to his satisfaction; will he make money from it; will I make money from it? These are basic commercial exercises.

If you are interested in the chemistry, this is not really of relevance but it is of interest. This is a oil molecule, or fat molecule. Typically you will have three of these long chains coming off this basic glycerol molecule here. That is glycerine and this is the long-chain carbon. That could be oil, a classic diesel oil molecule except when it comes with vegetable oil it has glycerine glued to it and probably three other of these coming off here. The biodiesel production process is converting this triglyceride to a single carbon chain. The reaction splits off that glycerol and you are left with basically a diesel oil molecule. The key thing about that is that because it is a smaller molecule, it does not get tied up with all the others and it is less viscous so it is runny diesel oil or runny vegetable oil. So that is actually some of Rob Henry's poppy seed oil that is run through the my refinery and the only change really from an observable point of view is that it is less viscous and that is necessary for spraying into the diesel engine.

Ms THORP - So that is the point of breaking up the triglycerides?

Mr FOX - That is the only reason for doing it, exactly; it is to make the molecules smaller. Classically in oil refineries that is done by heat. You heat it up and then they all sort of fly apart and then you join them back together again but this is a bit more precise. It is done chemically. You get this glycerine by-product. The plant we are quoting for, Rob Henry's, actually burns that as a fuel to run the process.

Ms THORP - Is that to overcome the difficulty of things like tallow becoming too viscous?

Mr FOX - Well one of the problems with tallow is that those molecules are a bit longer and as a consequence, at about 17 degrees they start to get knotted up with each other and it starts to gel. Pure tallow works just fine in the Northern Territory, tallow biodiesel, but in Tasmania you have to warm your tank up a bit. The other option is you blend it with a bit of normal diesel or you blend it with a bit of this stuff here and hence, I am looking at two plants - one located at an abattoir and one located at Rob Henry's place and we blend the two to produce 100 per cent biodiesel which suits Tasmania's climate.

Mr GUTWEIN - That 100 per cent, do you envisage that would go to market as a blend with ordinary diesel?

Mr GREEN - Low sulphur.

Mr FOX - It is low sulphur. It has advantages to add to existing biodiesel. If there is a price premium to sell it as a blending product to upgrade existing petroleum biodiesel then that is worth doing but there is also a market premium of 100 per cent renewable so given the relatively small scale in the context of the petroleum industry, I am looking at the top end - 100 per cent biodiesel - where people want 100 per cent renewable fuel. If you are selling it as a blend then the scale of your marketing operation increases in proportion to the blend you are actually -

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Ms THORP - I do not think this is a fair analogy but this is reminding me of conversations 20 years ago about organic food and the argument there saying it is too expensive to grow organics but people made a choice to buy organic food for other reasons until it reached the point where the organic industry, if you like, is viable in its own right.

Mr FOX - However from the point of view of a pragmatic engineer who has to finance these plants, there is a long way between warm and fuzzy feelings and the shelling out of cash so one has to follow the actual economic trends as much as the warm feelings trend.

Mr HARRISS - James, on the matter of biodiesels I have no idea, I have done no research, but I had mentioned to me a few weeks ago that there is a company in Melbourne called Green Diesel. Are you aware of them?

Mr FOX - There are a number of companies.

Mr HARRISS - To just pursue that a little bit, I understood that the injection rate of the diesel is a much, much higher compression rate, more pounds per square inch or whatever than the diesel engines to which we have become accustomed, and therefore as a result of all of that process the emissions are way down in terms of impact on the environment.

Mr FOX - The diesel engine technology is advancing just as petrol engine technology gets advanced so the conventional injectors just goes one shot of diesel. The modern electronic ones actually have multiple shots so there are all sorts of technological issues but they do not specifically relate to biodiesel, they relate more to the engine, and generally this stuff is a direct replacement for all practical purposes with conventional diesel.

Mr BEST - You make the biofuel. Is there any chance you can make engine oil, like lubricant oil?

Mr FOX - Yes.

Mr BEST - Or is it too light? To get away from fossil oil.

Mr FOX - Vegetable oils are used as components of lubricating oil stocks but lubricating oils are extremely complex and they are a blend of all sorts of things.

Mr BEST - You could be interested at some stage but you can only do so many things at once.

Mr FOX - That is right. The short answer is no, I am not. However raw oil suppliers such as Rob Henry will be looking at this very carefully.

Mr BEST - I suppose you have to get the viscosity right and all those sorts of things?

Mr FOX - The number one issue with engine oil and fuel oil and diesel is in fact the viscosity - that is the number one issue. All of this fancy chemistry with manufacturing by biodiesel, the only reason to do it is to reduce the viscosity.

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Mr BEST - So what viscosity do you need for burning to get through the fuel line?

Mr FOX - The key thing is when you spray it, you have a fine spray and burn. If it is too thick, it comes out as big lumps, it does not burn, it comes out as black smoke out of the exhaust. So that is what it is all about. There is a lot of chemistry.

Mr BEST - Yes, thank you. It is achievable with engine oil as well - but it is a different process.

Mr FOX - Yes, a different process to achieve a different product.

Mr BEST - More expensive.

Mr FOX - I cannot make any comment on that. This is a block diagram of the process. The key thing is on the right-hand side you have pure biodiesel, you are feeding in raw oil from the left-hand side, and you are adding up the top there, methanol - methanol or ethanol is the key additive to the vegetable oil to produce the chemical reaction, so in the first place you need vegetable oil or tallow, and methanol or ethanol, and the alcohol produced from biomass has a lot of potential if it is used to convert the oil as well, but at the moment we just buy methanol in industrial chemical supplies from Queensland. For between 10 and 20 per cent of the diesel oil produced, the volume required of methanol is 10 per cent.

That is just a block diagram, and the key thing, as with all process, is that you have to have instrumentation and control - you do not want to put some product of a dubious quality in your petrol tank, or worse to sell it to someone else and put it in someone else's petrol tank. So quality control is, in fact, the most expensive single issue of the refinement.

So the two parts we are looking at are one in the abattoir and the other at Rob Henry's, and the crucial issue is pre-processing, removing impurities - you would have seen that at Macquarie Oil - then the technology we use is continuous processing. It is not batched, so it goes through as a continuing process and runs automatically, 24 hours a day if need be, as does the usual petroleum oil refinery. We burn the waste products and no waste is produced. The final product is polished to automotive standard.

Coming back to my summary, it is my recommendation from an engineer's perspective that we should use the existing infrastructure of CNG and it has the benefits, potentially the economic running costs, you negotiate a good price on the gas - it is here, it is relatively straightforward, it is well-proven technology, similar to biodiesel, the raw material is here, but it needs promotion to overcome the initial marketing issues and the initial supply chain development. That is why I advocate relatively small numbers to promote the development of the supply chain, not necessarily to saturate the market with a subsidised produce, or to develop any new technology; it is merely to develop existing supply chains to connect up Rob Henry with the diesel refinery with Metro. That is relatively small scale, except it could quite potentially supply all of Metro.

CHAIR - James, you mentioned earlier that you could buy an off-the-shelf biodiesel set-up from Germany for \$100 million. It would not work economically because of economies of scale here in Tasmania, is that simply the reason?

Mr FOX - Yes, at the moment tallow from Tasmania gets trucked to the mainland to be turned into biodiesel, so that is the sort of issue.

CHAIR - Who is doing that?

Mr FOX - Well, there is Australian Renewable Fuels, there are several plants around, so it is a matter of getting the scale of project correct.

CHAIR - If you got that plant up - we are talking hypothetically here - one at the abattoir and one at Rob Henry's, what percentage of the Tasmanian market could you supply?

Mr FOX - Not a large percentage because anywhere between 1 and 5 per cent from my point of view would be a large project. I have not taken it from the point of view of looking at - I am not trying to compete with the oil industry; it is not worth even thinking about. I am looking at what can be done economically with the raw materials that are here and the market here. The real answer to that is I could sell all I could produce; the question is how much can I produce. At least 50 tonnes or 60 tonnes a day of tallow is available from the abattoirs and there is Rob Henry's operation and those are the major sources of raw material. The diesel oil used in Tasmania would soak up all of it. What that is as a percentage of the total I hope is small because then there is no market reaction problem.

CHAIR - Do you think there ought to be more of a national approach to all of this?

Mr FOX - There is a national approach.

CHAIR - There is?

Mr FOX - There have been the excise tax issues, the rebates which some people do or do not agree with as the magnitude of those effective subsidies. I am an engineer and I try not to get deflected by what may be short-term government subsidies and so I tend to ignore subsidies or government intervention and try to do it purely on an economic basis, usually at some marginal market circumstance where there is waste product and a small demand for the product. But from a national point of view the real issue is long-term or even short-term security of supply. If we do not have options organised so that if there is a hiccup for whatever reason then we are likely to be very severely embarrassed, as we have been in the past.

CHAIR - In Europe, for example, is biodiesel a big industry?

Mr FOX - Yes.

CHAIR - They provide significant percentages?

Mr FOX - The biodiesel industry in Germany particularly is very strong and that is why I say it is quite straightforward to ring up and order a \$100 million plant from Germany but have you \$100 million to spare and can you supply it and so on and the answer is no.

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Even on the mainland the plants that have been put in on that scale are not doing spectacularly well. So I am looking purely at a relatively small scale of Tasmanian content.

CHAIR - Thank you.

Mr BEST - Obviously your focus is on biofuel, diesel. Earlier we heard from the RACT that for all private passenger vehicles ethanol and the E10 mix. They were saying that it is really yet to eventuate much in Tasmania. Is that an option somewhere down the track for you to look at something like that?

Mr FOX - Ethanol is a very practical proposition. The only trouble is I am a relatively small operator and I cannot hop on my horse and ride in all directions at once.

Mr BEST - No, that is right.

Mr FOX - If I get several biodiesel plants up and running the next one will be an alcohol plant, but if you give me an order for an alcohol plant I will suddenly trans-focus.

Mr BEST - Sure.

Mr FOX - It is purely economically driven.

Mr BEST - We also heard from Metro from whom we are to get some more detail about their trialling that has to be commercial-in-confidence. They did say publicly to the committee that they felt I think the future was in hybrid internal combustion engines with electric motors.

CHAIR - And biodiesel.

Mr BEST - They did mention biodiesel but I think they thought that hybrid was a long-term but biodiesel may be as the next step, perhaps above CNG. It is hard for you to comment just as it is hard for us. We have not seen their figures. Are there any thoughts about any of those things?

Mr FOX - Yes, my observations are that even it is hybrid it would still be running on diesel probably or CNG. It could be basically a hybrid vehicle where you have an engine generator and a battery I think it is. You have an engine generator - whether the fuel is CNG or diesel it does not make any difference. What that does is increase the efficiency. It means when you are going down hill you are charging your battery up or when you are braking you charge the battery up and when you take off you are using the battery again. So, that will reduce the total usage but it does not change the fuel. You still need an energy source.

Mr BEST - Finally, if you had any recommendation or policy comments that you would like to make to the committee, what would that be do you think? I heard you say that you are aiming at what you do. You do not look to hang your hat on something to hopefully help that; you want to stand alone and I think that is very noble and I respect that position. Would you have any comments to the committee, perhaps, about policy or direction?

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Mr FOX - My comments are really summarised by my recommendations and that is, any action is better than no action. If that action is reasonable it is a best guess and you are going to make mistakes, so make cheap mistakes. If you said we are going to convert half a dozen buses to CNG and we are going to run another half a dozen on biodiesel, then you are going to see the benefits or the disadvantages of those decisions and it will provide results now.

Mr BEST - Is it better to explore options, to sit down and say we do not know which way to go with this? Two things -

Mr FOX - Exactly. I am advocating to provide options for future action by exploring those options which are not unreasonable and in fact might even be economic and I would suggest they are economic. But until you try it out I cannot say so. I am an ultra-conservative engineer. I like to make cheap mistakes.

Mr BEST - Thank you.

Mr FOX - I also suggest in my final recommendation that in order to test out hydrogen you should get a red hydrogen-powered sports car for use by some important government officer.

Mr BEST - I saw that. Who makes those? You will make us one?

Mr FOX - Or BMW or a Toyota, anyone. But again, it is the development of the supply chain. An electric hydrogen generator in the parliamentary garage that refuels the car, then the number plate, hydrogen, on the bottom. It would be rather good I think.

Ms THORP - It would capture people's imagination?

Mr FOX - Exactly, that is right. You might have to test it out first for several months.

Ms THORP - Absolutely, and me second.

CHAIR - Thank you very much, Mr Fox, that was a very interesting discussion and delivery and we thank you very much for the variety of options that you put before the committee. It is terrific.

Mr FOX - Thank you. It has been a real pleasure to have your ears.

THE WITNESS WITHDREW.

Mr BRUCE THOMPSON, MANAGING DIRECTOR, ADVANCED FUELS TECHNOLOGY PTY LTD, WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

CHAIR (Mr Hall) – Welcome, Bruce. We have your submission number 21. Do you want to run through the program with us?

Mr THOMPSON - What I hope to do this morning is give you an overview on our company and what we are doing at the moment. Advanced Fuels Technology is part of our group. We are also involved in LPG. Our company started in 1977, Advanced Fuels started in 1996.

CHAIR - Are you local or based on the mainland?

Mr THOMPSON - We are based on Melbourne at this stage. We have branches in Adelaide and Perth but the head office is in Melbourne. We are actually divided into two sections, LPG which basically imports, manufactures and distributes LPG equipment and also installs LPG equipment right throughout Australia. The CNG/LNG side of our business imports, manufactures and primarily installs both CNG and LNG, mainly to heavy vehicles.

We have standing contracts with Caterpillar and Cummins whereby we install systems for those particular engines, mainly for heavy vehicles. As you can see from this, that is our CNG workshop and that in Melbourne and this is our one in Perth where we are doing some of the large road trains for Mitchell's Transport. We have a contract with them to do about 90 trucks by next April with possibly another 30 thereafter. There are another 40 for Clean Heat and about 10 for Sands Fridge Lines in Perth.

Mr BEST - Are they all CNG?

Mr THOMPSON - They are LNG trucks. There are some CNGs for Sands as well. In Melbourne, we have done about 40-odd LNG trucks for Murray Goulburn. For Boral, in Sydney we have done cement agitators which I will speak about in a minute. These are just some of them.

At the moment we feel that most of the major players - Toll Holdings, Sargents, all the major players on the east coast - are getting a couple of trucks converted at this stage, both to CNG and to LNG. They are testing the water, trying it, seeing how the system works and what have you. Murray Goulburn, which we have been converting for about four years, have gone through a teething process with it. There have been all sorts of issues which have not necessarily been truck issues.

Mr BEST - It is a milk company, is it?

Mr THOMPSON - Murray Goulburn is the milk company, Devondale Cream and powdered milk. They have a 60 000 litre LNG refueller on site at Koroit, in Gippsland near Warrnambool. There have been issues with delivery temperatures of fuel, pressures of fuel, fuel composition - we are not allowed to say fuel quality, it is fuel composition. They have all been ironed out. The same is the case in Western Australia. We have found that when we are running road trains with four trailers, they are pulling upwards of

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210 tonnes in 50 degree ambient temperature. The under-bonnet temperatures are creating superhot charges into the engine and we have ended up designing and manufacturing a secondary inter-cooler which super-chills the air going into the engine to get better efficiency, better fuel economy.

Mr GUTWEIN - Are they LNGs or CNGs?

Mr THOMPSON - They are LNG, at this stage. That has only raised it head in Western Australia where the temperatures are high. We do not experience that problem in Melbourne and certainly it would not be experienced in Tasmania.

We do a bit of work overseas as well, in Indonesia, Thailand, Singapore, Malaysia. In Indonesia we did some primary work but they have run out of money so the whole thing is on hold. In Thailand we have done a couple of BMTA, which is the Bangkok Mass Transit Authority, buses by converting those to CNG. We started off with a Toyota Hino engine and did all the engine development in Melbourne in conjunction with Cummins Engines which were very helpful with our engine development as was the Melbourne University. We actually converted a diesel engine to a spark-ignited, dedicated natural gas engine. They have running around Bangkok for about 18 months now and are quite okay.

In Singapore we did a little 4-litre Mazda. Once again we converted it from dedicated diesel to dedicated compressed natural gas for the Public Utilities Board and that has been running round for three years or more. The big problem in Singapore is they do not have refuelling facilities. They only have a facility on Sentosa Island and you need special clearances to get to it because of its chemicals. This just creates problems. They are about to change all that. When they do the Public Utilities Board will move in and they are going to start on all sorts of engines including one that we have done for Petronas in Malaysia, in Kuala Lumpur. It is a 320-horsepower turbo inter-cooled Volvo engine which is used a lot for refuse collection, here in Tasmania as well. We went across to dedicated gas on that. It was a pretty sophisticated system that we designed, which was sequential multi-point gas injection with coil over spark, and electronic control gas. Those engines come into our workshop as euro 1 and go out very close to euro 3

CHAIR - Is nearly all your business in retro-fits at this stage? We have had evidence that there are dedicated manufacturers.

Mr THOMPSON - Currently there are three OEMs, original equipment manufactured systems, that are available on the market for Caterpillar. We do the C12 and C15 engines, which is the 425 and 500 horsepower engines. They have a clean-air power system designed in America, and we install that on the vehicles. They become dual-fuel vehicles which start and idle on diesel. As these vehicles start to accelerate they electronically substitute gas and will step up to about 95 per cent gas substitution on those engines.

There is an 8.3 litre dedicated Cummins engine, which we do on the Boral trucks, and these are refuse trucks or cement agitators. They come out as a dedicated gas engine from Cummins with full factory warranty. The Caterpillar warranties are 1 million

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kilometre warranties that Caterpillar covers with the conversion that we do. We do not carry the warranty.

CHAIR - What sort of additional capital cost would that OEM engine be over, say a straight diesel?

Mr THOMPSON - If we do them in a single LNG tank configuration, it is around the \$50 000 - \$53 000 mark. That is what we are primarily putting on Murray Goulburn trucks. They recover this cost within about 15 months, which is substantial. Murray Goulburn have committed to the balance of their 157 vehicles, as they come up for replacement, will come to us. We get all the new vehicles straight from Kenworth in Melbourne into our factory where we do the conversion. They then go to William Adams, the Caterpillar dealer, which does the final pre-delivery checks, registers the vehicles and hands them over to the customer with a 1 million kilometre warranty.

Cummins traditionally offer a 250 000 mile warranty with their 8.3 litre engines, which is equivalent to about 423 000 kilometres. I think they give the same warranty with a gas engine as they do with a diesel engine. Cummins have also just released a new engine specifically for the Australian market, which is, once again, a dual fuel engine, a Cummins Westport. Four trucks have been done, all done in our workshop. Westport wanted to do them but realised the implications and asked us to do it. The last truck only left our workshop last week.

They work on a slightly different principle to Caterpillar, whereby we take the diesel injector out and put a new injector in which injects both gas and diesel at the same time. Those trucks are 485 horsepower and 550 horsepower, which makes them the biggest trucks on the road in Australia today.

CHAIR - The 15 month recovery time is impressive depending, I suppose, on excises and what may happen down the truck?

Mr THOMPSON - It is also dependent on mileage. These trucks are doing 300 000 - 400 000 kilometres a year, which really helps a lot. You must bear in mind that these trucks are not getting full substitution because they are B-doubles that go to dairy farms to pick up milk, so for a lot of times they are idling or running just above idle while they are running the pumps.

Mrs THORP - That is when they are using diesel?

Mr THOMPSON - That is when they are using a higher percentage of diesel than they would on gas.

Mr GREEN - I think Isuzu has a compressed natural gas model.

Mr THOMPSON - That is right, they have an NPR, every one of which has been through our workshop because they have to be 'Australianised'. To start off, the cylinders did not comply with Australian Standards when they came in and also the filler lines had to be modified, not much but they all had to be done. The same was true for Mercedes when they brought a Sprinter van in as a demonstration. Scania also offers a natural gas

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version of their engine. ACTION Buses in Canberra are running all Scania's, the same as they are doing in Brisbane at the moment.

Mr GREEN - That might have been the one that came here from the ACT.

Mr THOMPSON - That is right. That was a Scania which was a dedicated vehicle, and this is something that could be done to all engines here.

CHAIR - Where are the LNG tanks on the milk tankers, located?

Mr THOMPSON - They are where the diesel tank was. We still need a diesel tank.

CHAIR - Is there much difference in size?

Mr THOMPSON - No, there is not a lot. The LNG tank comes in primarily three sizes all in US gallons. They are 72, 119 or 150 US gallons, the latter being a 600 litre cylinder. They are all basically the same size. They are about six feet long, about 24 inches in diameter and they are a giant thermos flask. They are a double-skinned stainless steel cylinder that has a vacuum and insulation between the two skins.

We pull the liquid out of the cylinder. It then goes into a heat exchanger which is hooked up to the coolant system on the vehicles so we have engine coolant running through it. It warms the gas from minus 169 degrees Celsius which is extremely cold, it is colder than liquid nitrogen. This is warmed and turned it into a gas. It expands roughly 600 times by volume.

From there it goes through a regulator, a filter, a lock-off and then it is electronically injected into the engine, the same as a diesel injector does. On the dual-fuel setups you have a row of diesel injectors and on the manifold a row of gas injectors. There is a computer that talks to the diesel computer works out the load condition, engine RPM number et cetera - and it takes into account about 34 different parameters and from that information whether it will hold back on the diesel injector and insert gas to Euro 3 emissions. The Cummins engines are Euro 4 certified at least and some are a Euro 5 at this stage.

Getting back to our company we sit on Standards Australia. I sit on LPG, CNG and LNG Standards and in Australia. My partner in the business sits on the Compression Standards in Australia. We are a registered training organisation so we conduct courses in both LPG and CNG and ultimately LNG. The LNG code has not come out yet, it is not due out for about another six or eight months so there is a bit of an issue in converting trucks to LNG when there is no standard for it. We are using the American standard at the moment but we have written -

Mr GREEN - Is this the emission standard you are talking about?

Mr THOMPSON - No, installation standard. The installation standard also encompasses emissions. We have written the standard. It then goes out for public comment. On 3 November we will be back in Sydney to discuss the public comments. Once we have ironed those things out and refined them it then goes to print so we can expect it by possibly June of next year. The LNG standard will be attached to the CNG standard

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which is AS 2739. AS2746 is the workshop code so we have a code covering tools, how the workshop is supposed to be set up and all that sort of thing as far as signs, fire extinguishers, safe handling of gas, decanting and the installation standard that covers physical installation of both CNG and LNG in vehicles.

We are on the international Natural Gas Vehicle Council, the National Society of Professional Engineers, VACC and the Australian Natural Gas Vehicle Council. These are some of the trucks that we have done. These are CNG, trucks where we have put cylinders on the side. That has four cylinders underneath the side. It has a Caterpillar C-12. It is in Boral livery there, but there are two of those operating in Sydney for Safeways at the moment. They have repainted them and operate them there.

This is one of the Mitchell trucks that we have done in Western Australia and the two LNG cylinders are mounted behind the cabin there. In some cases we will put another two cylinders, one on either side, for the trucks operating between Perth and Karratha. That gives you an idea of the LNG cylinders mounted on a gantry behind the cabin.

One of Ron Finemore's truck's - the cylinder goes along the side, another cylinder along the side of Murray Goulburn's B-double there. Sorry about that one, I do not know anything about that. Five brand-new ACOs with the 8.3 litre dedicated gas engine was installed on that. We installed four lightweight carbon fibre cylinders and we made a cabin behind there. The truck was delivered to us from Dandenong to our site as a cab chassis. We installed the cylinders. We started the vehicle for the first time in its life because they cannot even start them without having gas on them, because they come off the line. From there the five of them were transported to Sydney. They put the agitator barrel on the back of it and they are absolutely delighted with those, the way they are operating at the moment.

This is another system on the Isuzus. There is a company in Western Australia called AEC, Advanced Engine Components, and they have done three different size Isuzu trucks from about the four litre through to about the eight tonners and they are dedicated CNG. The CNG bottles are on the side. Once again, another one of the trucks we did in Western Australia. This is at the other little factory, the NPR Isuzu truck that is available in Australia.

Some of the OEM buses that we do, these are Brisbane buses. They came out from Scania as a chassis and engine configuration and they have a pack of CNG cylinders which they put on the chassis rails. The body is built in Brisbane and we were charged with the task. They were carrying 1 100 litres of gas on the roof of the buses and they had a three minutes, 16 seconds window to fill those 1 100 litres, otherwise they could not get the 300 buses through the refuelling in time. We designed the fuel system for it and we have it down to about three minutes, 12 seconds; we can take 1 100 litres on board for these things.

There are various other buses that we have done. This is a bus of the Bangkok Mass Transit Authority that we did in Thailand, that little Mazda that we did with the cylinders mounted up behind the cabin.

This is the Patronis trucks with a bank of cylinders behind the cabin and on the side. They went everywhere because they had these little 70 litre cylinders and they had thousands of them.

Ms THORP - They wanted to use them?

Mr THOMPSON - We wanted to use them up, so we ended up with about 16 cylinders on this stupid thing. But anyway, they are doing 9 000 kilometres a week and have been doing it now for about seven or eight months without a hiccup.

Mr GREEN - What do they cart?

Mr THOMPSON - All kind of stuff. I am really not sure. They carry everything from mining stuff, and that is just one truck that we have. But hook up all different trailers. Sometimes they are carting coal and all these things and other times they are carrying liquids. This is the actual engine on the dyno. As I say, 320 horsepower, so it is a reasonable-sized engine on it.

Mr GUTWEIN - Bruce, just back on to the previous slide, was it the OEM bus, did you say, in Brisbane?

Mr THOMPSON - Yes.

Mr GUTWEIN - What is the cost associated with taking a bus like that and fitting it as you do?

Mr THOMPSON - Those ones came out from Sweden as a gas engine. If you wanted to retrofit that we would have to sit down and do some sums. What Scania would do is literally get hold of a diesel engine, they would decompress it by shaving off the top of the pistons to lower the compression ratio, then they use a very simple Inco system, which is available off the rack, and put that on it and away you go. I would have to sit down and have a real close look at that and do some sums but I do not think it would be very expensive, apart from literally tearing the motor apart and rebuilding it again. If you had engines that were due for a rebuild - they were coming with, say, a million kilometres on the clock and that is when they are due to go - I think that would be the ideal time to turn and seriously look at going across to dedicated gasometers.

They have changed in the latest of the Scania's because we have a contract - in Western Australia they have ordered 72 articulated buses and our job is on those. Once again, they will come in as a chassis with the engine on it and our job is really to do all the piping and all the flexible link and all that sort of stuff. We will be taking the cylinders which will be mounted on the roof, we will be taking gas from there, through a flexible line to the back section which has the engine and that will be our job on those 72, and also to Australianise it because what they do in Sweden does not comply with Australian standards, but the cylinders do. It is not much of a job but it is still a job for 72 of them. It is a nice job.

With regard to the cost of doing it I would have to sit down and nut it out and certainly come back to you as to what it would cost but I do not think it would be too bad.

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Mr BEST - In relation to the Murray Goulburn, did that extend from the milk producer to farms? What I am saying is, liquid natural gas is what you are looking at there with the transport of the milk tankers, were there any options there considered for the farms themselves? How they could springboard off the back? I suppose you cannot run a tractor on -

Mr THOMPSON - The inquiries we get from the fishing industry, from earthmoving equipment to people who have ferries - Brisbane Ferry Services and what have you - the inquiries we have include rail which is the other thing as well. Rail would be ideally suited to LNG of even CNG.

Mr BEST - Could it be applied on a dairy farm? for tractors and things because I know diesel is very expensive.

Mr THOMPSON - It is mainly the cost. The LNG cylinder is worth about \$16 000 on its own.

Mr BEST - To put that on a farm?

Mr THOMPSON - And it is going to be expensive to start with. The way how -

Mr BEST - Sorry to interrupt you, and I know you are going to explain a bit more and I do not want to cut in front of you - so it is not possible then to do an industry deal? I am thinking of, for example, we have Lactos on the north-west coast and Fonterra. If you were going to do some sort of deal is it not possible to include everyone perhaps so it works out cheaper?

Mr THOMPSON - The problem with LNG is you either use it or lose it. As it warms up it builds up pressure inside the cylinder itself and once it gets to about 130 PSI the safety valve opens. It can take up to three weeks for that to occur, depending on what the charge is in the cylinder at the time and the temperature. All they have to do with a truck, if it is off the road for any period of time, is literally just start it and let it idle - well above idle. It will actually pick up vapour off the top of the cylinder first and then, as the pressure drops, it will then start picking up liquid. It is the way the cylinder works. So all they do when they start it is run the vehicle at reasonably high RPM and it will use up the pressure in the cylinder, drop the pressure and then 20 minutes later you can turn that off and everything is right again for another week or so before it warms up again.

If you were to put it on a farm, once again, it is a use it or lose it situation so if the pressure starts building up too much it is just going to vent to atmosphere.

Mr BEST - So it is not maybe an application there.

Mr THOMPSON - Not at this stage, not until technology catches up a little bit and it is catching up on a day-by-day basis - it seriously is.

Mr BEST - We have had a submission and we have some discussion with Metro Tasmania - I am not sure how familiar you might be with the Metro.

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Mr THOMPSON - We were down here talking to Metro about four or five years ago - you can keep going.

Mr BEST - One question I meant to ask Metro was who did they partner with with the CNG. Do you know that?

Mr THOMPSON - It would have been with Gary Woodhead from Compair - the compressor manufacturers.

Mr BEST - Right.

Mr THOMPSON - When we spoke to Metro last time, and I can understand their reasons, they were buying diesel that cheap that in order to turn around and invest in any other technology - why bother - that was the attitude, 'Why bother, we are quite happy the way it is at the moment, we are subsidised with our diesel price'. There is no physical gain for Metro to turn around and convert trucks to any other fuel apart from diesel.

Mr BEST - It is interesting you say that because they didn't appear that enthusiastic to me. I know they are flat-out trying to run a bus service but they didn't seem that enthusiastic about alternative fuel.

Mr THOMPSON - Melbourne and Tasmania are the only bus services in Australia that do not run natural gas vehicles.

Mr BEST - Right.

Mr THOMPSON - Adelaide runs 137, Perth -

Mr GREEN - I thought you'd been telling us that Melbourne ran -

CHAIR - Melbourne don't, I think, because of the tram system. They have very few gas buses as well, is that the case?

Mr THOMPSON - Bell Street Bus Co had 16 and they were taken over by Dysons. Because Dysons have so many other buses they turned around and said, 'That's it, we're not interested in 16 buses, pull it all out', and that was it and they converted them all back to diesel. Benders Bus Services down at Geelong, once old Norm passed on, everything went back to diesel. They can't be bothered with it.

The issues are in that they get subsidies from the Government so there is no incentive for them to turn around and convert. If they run diesel, they get so much concession back from the Government to turn around and run. They are allowed to charge a passenger so much per given section and then after that the Government picks up the tab so if it is costing them \$2 a section to run and they charge a customer, say, 60 cents, they get a \$1.40 from the Government if they run on diesel. If it runs on gas, it will only cost them a dollar a section, therefore the Government only gives them 40 cents so what difference does it make? It is a no-win situation as far as the bus lines are concerned. They are just not interested.

CHAIR - This is just Victoria we are talking about?

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Mr THOMPSON - This is just Victoria. That is how it works there.

CHAIR - Yes.

Mr THOMPSON - They are all government-run buses. Sydney has 600 natural gas buses, Brisbane has 300 with another 300 on order, all dedicated to natural gas. Sydney is using Mercedes, Brisbane is using Scania and that sort of thing, in Adelaide I do not know and Perth has been running natural gas buses for 20 years or more.

Mr BEST - Mr Chair, if I could continue my line of investigation. This would probably be commercial in confidence so I don't expect you to say too much on *Hansard* here but in relation to Metro, you have obviously prepared an appraisal of what you might be able to deliver for them with CNG?

Mr THOMPSON - We had initial talks with them. A group of us came down to talk to them about both refuelling. Obviously Compair was involved in that. We spoke to them initially without going into details as to whether they were interested in going natural gas and we got a clear message they were not interested. We actually spoke to the refuse guys down here as well and they pricked their ears up, Redline pricked their ears up, the taxi companies pricked their ears up and turned around and said yes, let us put something together. Nothing ever really eventuated. We walked out with our tails between our legs, but that was four year ago.

Mr BEST - But you have to have refuelling, I suppose, and that is a bit of an issue.

Mr THOMPSON - You did not have gas at that stage. We were going to ship gas down in bulk from Melbourne but now that you have got it piped down it is possibly a different story.

Mr BEST - Can I just ask then about Powerco, who are a main line distributor.

Mr THOMPSON - They are the distributor of the gas.

Mr BEST - Yes, distributor, reticulation. I am not trying to play one off against the other but I am trying to get to the bottom of this. You have put up a fairly comprehensive list of experience that you have had right across Australia - buses, forklifts, different configurations of the milk industry - do you think Powerco are in a position where they could really do a proper appraisal of CNG if Metro went to them and said this is our budget, this is where we are at? Not putting anyone down, given your experience you would probably be more aware of certain things and how you can make something more viable. Is that fair comment?

Mr THOMPSON - I will give you some idea. We are also into compression at well. We have distributor agreements with Kwon Sang, which is a Korean compressor company - I will get further into this later on. What we can do is do a package deal for these companies. We can go into Metro, or someone like the refuse company down here. I am just trying to -

Mr HARRIS - Veolia.

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Mr BEST - That was Colex, now Veolia.

Mr THOMPSON - We can go into Colex, for argument's sake - leave Metro right out of it - and say if you have six trucks we can convert those to compressed natural gas. We can supply you with a fixed contract price for five years. So we will do a deal with Powerco and we will turn round and buy gas off them and we will have that as a fixed contract price. We will turn round and supply a compressor, we will supply maintenance for that compressor because they are being supplied all the time, and then we will go back to Colex and say for x amount per diesel litre equivalent, this is what you are going to be paying for the next five years. They love that because diesel prices are going to be like this. Well we know they are going to continue like that. Metro, Colex, anyone you like, we can go in with a fixed price total deal as far as the fuel supply side of things is concerned and then turn around and come back.

Mr BEST - That is now possible. From what I gather, you said it was some time ago when you were here and the gas was not quite rolled out. It's available now.

Mr THOMPSON - Well gas is available now, which is great.

Mr BEST - There is nothing stopping you from doing that now, or would you need someone from government to -

Mr THOMPSON - Nothing. As I say, we spent a lot of time down here years ago trying to extol the virtues of gas. But gas was not available and it was a hard sell at that stage because it had to be shipped down from Victoria. It's a different story now.

We have a national deal with Hyster and also Fork Nissan. We do some for Adapt-A-Lift and some for Crown where we convert those from LPG to CNG and once again we can offer compression, refuellers and what have you for those as well. We get those in as batches as they arrive into Victoria.

We have done various cars. This is in my partner's territory, which is running natural gas as a dual fuel. Mercedes offer a dual fuel natural gas vehicle. It might be okay. All the parliamentarians might like to have one of those. It is an E class.

Ms THORP - I wish.

Mr THOMPSON - They actually do about 7 000 kilometres on a tank.

Ms Thorp - How much?

Mr THOMPSON - Oh, sorry, 700 kilometres on a tank load of petrol and natural gas and have about five CNG cylinders in the back of them - fabulous. This is actually our LPG workshop where we have dyno facilities and five-gas analysers.

This one we did for Victorian Health. It was a little Toyota Corolla with a CNG cylinder in the back of it, running a dual fuel system. Some of the cylinders - these are all CNG cylinders - there are four different types of CNG cylinders. Type one is all steel, so it is like an oxygen or an acetylene bottle, very heavy, very strong. Type two is this, which is

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a steel cylinder with fibreglass wrapping. They reduce the wall thickness so it reduces the weight. Then they go into the type three, which is not mentioned there, and then to type four, which is all composite - type three and type four are all composite carbon-fibre wrapped, and they do a bit of fibreglass wrapping over the outside to protect the carbon fibre.

Type one, 100 litres is worth about \$800 - a 100 litre type three and type four is about \$2 500 to \$3 000, so they are quite expensive, but they are ultra light - they are only about 30 kilos or something, so you trade weight off for price.

We have a couple of packs which we supply to sites that may have problems with their compressors to keep their vehicles running. This is a trailer pack, and so is this one, where we will just run it out to them and they can just plug off it and just keep their vehicles running while their compressor is being fixed.

I mentioned before that we run training courses for CNG, LNG and also LPG courses, which are approved by, or accepted by the AAFRB, which is the Automotive Alternative Fuels Registration Board in Victoria, and every State has its own registering authority. But those courses are accepted right throughout Australia through Automotive Training Australia. We also run those courses overseas, so when we do conversions we back those up with both workshop training and driver training as well, so the drivers are well aware of the safety requirements, what to do in the case of a mishap, if they are involved in an accident, what they have to do and this sort of stuff, and daily checks.

This is a little fuel maker - there are actually two of them side by side. That is designed as an overnight refueller, but if you pack them together with a storage pack you can actually run with those two - you could possibly run anything up to about four or five forklifts or a couple of trucks, or something like that, and they just work in tandem.

This is a fuel unit. This has just been released on the market and it supersedes this little bloke. It is designed to fit in your garage at home and actually refuel your car of a night-time while you are there. These were originally about \$8 000, and these are going on the market for about \$2 500, so it makes them a lot cheaper.

Stepping up, this is on a skid, like on a pallet set-up where you have the compressors, you have storage and you have a dispenser, so you can actually pick these up and move them around from side to side - pretty easy to move around.

Mr GREEN - How quick would that refuel, say, a bus?

Mr THOMPSON - This one here? It is possibly stretching it a little bit for a bus, but if you only had maybe a couple of buses it would refuel that - those bottles are around about 260 MPa - it would refuel a bus in maybe four or five minutes, something like that, depending on how much storage you have on the bus, if you have about 800 litres on the bus. With the buses we work on not so much how many miles they are doing, but their duty cycle. Normally a bus will start and run for 10 hours between each shift, so we turn around and say, okay we will work out engine size, we will work out how long it is likely to be on its duty cycle, and how many kilometres it does, and then turn around and put the number of cylinders, either underneath if we want to go to steel cylinders, or if we want to go to lightweight we will put them on the roof and go from there. We can cut

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the roof and put a pod on the top and then put a fibreglass cover over the lot so it looks nice and neat. Sometimes we might have to pull the skin off and just reinforce the roof a little, but all those sorts of things are available.

CHAIR - Are there any issues running, say, a CNG-powered Metro bus around the steep terrain in Hobart compared to the flat terrain of Canberra?

Mr THOMPSON - What about Sydney? It is pretty steep around Sydney and they don't have any problems. It is under pressure; it is not like fuel where it slops around all over the place.

CHAIR - What about performance for LNG compared with a B-double milk tanker? Is there any problem with performance?

Mr THOMPSON - We electronically de-tune the engines. The C-15 goes out as a 525 hp; we de-tune it to 500 hp but it ends up with 1 850 newton metres of torque, which is the same as it has on diesel. Diesel is 88 octane; petrol is about 92 to 96 or 98 octane; LPG is about 110 octane; natural gas - the natural compressed or LNG - with about a 95 to 98 methane content, which is what it is on the east coast. It is around about 130 octane, so you get more bang for your buck, but you use a bit more - you use 10 to 20 per cent, depending on the efficiency of the engine. If you are using an old clunker, as we did in India where we converted 900 buses to natural gas in New Delhi - that was about three or four years ago - those things are using about 20 per cent more gas because the engine was about 40 or 50 years old. If we are working on some of the later model engines, they are far more efficient in the engine capacity. These compressors are the big fellows - there are a couple of those side by side that are doing 600 buses, to give you some idea. You are talking big bucks with those, and that is another one out of England where they run a bank of cylinders.

I will go on to fast-fill stations and give you a very simple overview as to what happens. The gas supply comes in obviously through a meter - that is a blow-down tank or a reserve tank. It goes through a little compressor that compresses the gas; that in turn goes into storage and it is in banks of three, so you can have maybe 12 bottles in three banks. I will come back to that. That set-up is what you see inside those cabinets. It then goes down to a dispenser and you refuel your truck from there. As far as the emissions are concerned - and this might be of some interest to you - this is the diesel emissions, LPG and CNG, to give you some comparison as to what your emissions out of the natural gas are likely to be.

CHAIR - Is that diesel Euro 5, are you getting up there?

Mr THOMPSON - When we are talking 50 ppm. That is not ultra-low sulphur diesel, that is just low-sulphur diesel.

Mr GREEN - That's different to what we were shown before.

Mr THOMPSON - Then they start talking about urea because all the latest vehicles either have to have after-treatment by way of catalytic converters - a catalytic converter is about \$7 000, or else they are running urea as an after-treatment. Urea is an additive to improve the emissions.

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Ms THORP - As in uric acid?

Mr THOMPSON - Yes.

Ms THORP - If you don't mind going back one step, if I am reading that correctly, the carbon monoxide in LPG is really high?

Mr THOMPSON - Yes. It is not that good.

Mr GREEN - We were shown a slide recently - it was effectively a bus and it said that the new Euro X standard bus that came out would provide this in terms of -

Mr THOMPSON- Yes, all the Euro 5s. Those are the ones that are working after treatment. They are also ultra low on sulphur diesels which are five parts per million.

Mr GREEN - The example was that you weight that against gas. What is the advantage from an environmental point of view there?

Mr THOMPSON- Everyone is going to push their own barrow.

Mr GREEN - They said it was negligible, nothing.

Mr THOMPSON - Look the latest diesels are Euro 5 compliant, but then the issue is where you are going to get your diesel from. The only place that can produce it in Australia is in Brisbane, to start off with. It is the only ultra low sulphur diesel refinery in Australia and that comes at a cost. It is not cheap.

To be honest, I am going to push my barrow and the diesel guys are going to push their barrow. There are two trade-offs. If I go to Caterpillar and say their diesels are dirty they will cut my throat because diesels can be cleaned. There is no problem but it comes at a cost, like everything else.

Mr HARRISS - That slide you have up is an interesting one in terms of your presentation. Is that something you can provide to Sue?

Mr THOMPSON - Absolutely.

Mr HARRISS - We may decide to include that in the report in terms of your evidence.

Mr THOMPSON - Yes, sure, absolutely.

Mr HARRISS - Is that all right?

Mr THOMPSON - Yes, not a problem.

Getting back to a gas site, because they put their cylinders in banks of three they go through what they call a priority panel. If you pull all these bottles into the site, and if they are all charged up to 260 MPa which is 3600 psi, and you are only going to fill the cylinders to 200 bar or 3000 psi you obviously have a pressure difference. In such a

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case, they pump it out through the dispenser but it picks up the first three banks - the first bank first - through this priority panel and whacks that in. Once the pressure starts to drop in the first bank it then switches to the second bank and then ultimately to the third bank. The whole idea of a priority panel is to turn around and refuel as quickly as possible.

Mr GREEN - So you do not empty the cylinders, you just take it off -

Mr THOMPSON - You do not empty them. All you are doing is equalising the pressure between the vehicle and the storage bank. When the compressor kicks in it comes back and fills up the first bank and goes from there to give a fast refuel. That is as far as we go. I was on a bit of a promo for us.

As far as cars are concerned, the requirements under the standards are that if a vehicle is converted to alternative fuels, whether it is LPG or CNG, it has to be equal to or better than running on its existing fuel. That means when we convert a vehicle to run on alternative fuel - LPG or CNG - we have to have it certified that it meets the current emission requirements. Through our companies we convert them to LPG and CNG. There are no testing facilities in Victoria so we have to take the vehicle to the RTA in Sydney, put it over their dyno where they do an emission check up for us. Once it passes they issue a certificate and that enables us to sell a system for that vehicle.

This week we are putting six vehicles through emission testing in Sydney. We convert them and transport them up. They include the latest Camry, the latest Falcon - both six-cylinder and V8 - and those types of vehicle. We are doing all the common vehicles.

Ms THORP - If you want to get in Tasmania you would need to do Suburus.

Mr THOMPSON - Suburus?

Ms THORP - This is Suburu city here.

Mr THOMPSON - Suburu city, is it?

Ms THORP - Every second car you look at.

Mr THOMPSON - There is a range of vehicles that can be converted, from forklifts to cars to light commercials to heavy vehicles. We even spoke to Websters in the early days. Websters were quite keen.

Mr GREEN - You would be speaking to Gunns, wouldn't you?

Mr THOMPSON - Well actually we have a contract to do, I think 20. There is an LNG plant going into Launceston, do you know about that one?

CHAIR - We do.

Mr GREEN - Very exciting.

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Mr THOMPSON - These guys believe that they can do the conversion in Tasmania. I do not know where they got that idea from, but anyway.

Mr GREEN - We can do anything in Tasmania.

Mr THOMPSON - You can and we sell down here to -

Ms THORP - We are not saying how well, though.

Mr THOMPSON - No, you do a good job here because all the latest conversions to LPG have to have approved systems. We sell to guys both in Hobart and Launceston to do the conversions. I believe there are about 20 trucks to be converted as part of that LNG program. The government - I do not know whether it was State or Federal - gave them \$5 million.

Mr GREEN - It was Federal.

Mr THOMPSON - Good on them. It is better out of their pocket than yours. Apparently they gave them \$5 million so it is a definite goer but all those trucks will have to come across to Melbourne for a conversion in our shop.

CHAIR - Aren't they talking about buying dedicated, off-the-shelf LNG?

Mr THOMPSON - No.

CHAIR - They are not?

Mr THOMPSON - There is no dedicated LNG off-the-shelf.

CHAIR - Is that right?

Mr THOMPSON - They are Caterpillar engines. They are all C12s or 425 horsepower and they have been told by William Adams that they will not be done in Tasmania. They have to come back to Melbourne and be converted and then they will come back here because there is a bit involved in it. But that is terrific, at least you have LNG here, and Gunns I will leave alone. I should be asking you questions because I have a place at Rosevears.

Mr GREEN - You are in good shape mate, don't worry.

CHAIR - Thank you very much, Bruce. There are no other questions from members. That was a very interesting discussion.

Mr THOMPSON - I tried not to get too technical.

CHAIR - You did not get too technical.

THE WITNESS WITHDREW.

**ENVIRONMENT, RESOURCES AND DEVELOPMENT - INQUIRY INTO 40
ALTERNATIVE FUELS, HOBART 15/10/07 (THOMPSON)**

Mr RUSSELL SCOULAR, GOVERNMENT AFFAIRS MANAGER, FORD MOTOR COMPANY OF AUSTRALIA WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

CHAIR (Mr Hall) - Welcome, Russell, and thank you for your submission which is frightfully important. After Bathurst are you fairly happy?

Mr SCOULAR - It was a very fine result, can I say.

Laughter.

CHAIR - I thought you might say that.

Thanks for your submission. I would invite you to speak to that if you would like.

Mr SCOULAR – Sure. I would like to make a few opening comments and I will be very happy to take any questions that you may have. Thank you for the invitation to appear before you today. It is much appreciated. We hope we can add a little bit of value to obviously what is a very comprehensive review by members of the committee.

Firstly, a bit of information about the company I represent. Ford Australia is a significant vehicle designer, engineer and manufacturer of vehicles. We produce more than 100 000 vehicles annually and directly employ some 5 000 people at Geelong and Broadmeadows in Victoria, including more than 1 000 vehicle designers and engineers.

For your information we sold nearly 2 000 vehicles in Tasmania in 2006, including nearly 1 100 of our locally manufactured Falcon and Territory vehicles. We are also one of Australia's largest private sector research and development investors with annual expenditures on local and global programs now running at more than \$170 million. A significant amount of this expenditure is for future vehicle environmental and safety initiatives. Over the years we have worked to establish a leadership position in our approach towards alternative fuels and enhanced environmental performance with our vehicles. This can be illustrated in a number of ways.

Firstly, we have significantly reduced the fuel consumption of our petrol vehicles in recent years. We were also, for example, the first local manufacturer to develop and introduce a single fuel LPG vehicle. This significantly reduced the cost to motorists of choosing this readily available alternative fuel in that they no longer needed to pay for an after market dual-fuel conversion. We have now sold more than 60 000 Ford Falcon vehicles with dedicated LPG fuel systems since we introduced this vehicle in 1999. We have also supported the introduction of the E10 petrol fuels and sought to remove marketplace confusion with a series of consumer education initiatives including web site information, owner handbook information and fuel filler cap labelling on our locally manufacturer vehicles. All our petrol vehicles are capable of operating on this ethanol-blended fuel.

We at Ford Australia are also in the process of adding to the clean diesel momentum surrounding passenger cars in Australia. We have just launched a diesel variant to the Ford Focus and are also in the process of launching diesel variants of the new Ford

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Mondeo. Diesel, with its lower CO₂ emission than petrol, has been used extensively by automotive manufacturers in Europe to address the challenges of climate change. For example, some 60 per cent of all new cars currently sold in Europe have diesel engines.

In line with our earlier submission to this committee we would like to again emphasise our view that any initiatives proposed with regard to alternative fuels are best taken from a national perspective and with a strong marketplace emphasis. We should not seek to pick out individual fuels or technologies on a localised basis at the expense of a broader and more inclusive national approach.

Tasmania, for example, can make a valuable contribution to the national debate on alternative fuels. It can assist in playing an important partnership role with State and Commonwealth governments and industry and by seeking to facilitate appropriate change but, with respect, what it cannot really do individually or on its own is to attempt to seek to act in isolation. I would make the same comment to any other State government or State committee in Australia. I am not making that as peculiarly for Tasmania.

Tasmania represents, of course, an important new vehicle market. It is, however, an extremely small one with some 20 000 new vehicle sales annually in a national industry of approximately 1 million vehicle sales. A similar scale issue also confronts the Australian automotive manufacturing industry. We make 400 000 cars a year in a global industry of some 70 million units.

In summary, we believe it important that a national approach is taken in Australia towards the development of an appropriate alternative fuel strategy. We also believe such a strategy should be a broad portfolio-type approach without specific emphasis on individual fuels or technologies and that it should be market driven. This reflects the fact that Australia is largely a technology taker in automotive powertrain development.

Furthermore, the diversity of our automotive industry and our automotive market with some 25 different brands, 350 models from 25 source countries, makes it extremely complex and difficult to adopt a single fuel or single technology approach in our marketplace. By adopting our suggested approach, we strongly believe that Australia can achieve more, sooner and at a lower cost.

I will be happy to take any questions.

CHAIR - Thank you very much. I did notice that you talked about LPG which, in Tasmania is pretty problematic, simply because of the cost. It is far more expensive to buy a cylinder LPG in Tasmania than it is in Victoria.

Mr SCOULAR - I am broadly aware of that issue. My apologies, I gave a bad example.

CHAIR - That is all right. You also mentioned that you thought that CNG for lighter motor vehicles is not really an option.

Mr SCOULAR - Yes. I was talking in the context of passenger cars and light commercial vehicles, smaller pick-up truck and light delivery vans.

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CHAIR - Because of the distribution issue at this stage?

Mr SCOULAR - Largely the distribution issue. There is also the size of the fuel tank required to give a comparable travelling range to that which can be obtained with diesel or petrol. Those are the main issues.

CHAIR - Okay.

Mr SCOULAR - A number of years ago, as a company, we had quite a close look at CNG and built a number of Falcon wagons to be available with it, primarily targeted toward the local government marketplace. Regrettably, on the one hand there was a lot of enthusiasm for us to do that, but when it came to the availability of the vehicles there were not many order books readily available.

Mr GUTWEIN - You make the point in your written submission, that distribution is obviously a key in having sufficient outlets for having alternative fuels available at sufficient outlets. You make the point regarding diesel and the growth in diesel. If CNG is not an option and LPG is only an option for the larger, heavier vehicles, what do you see as being probably the most appropriate biofuel, if I can call it that, option?

Mr SCOULAR - I believe the most appropriate initial biofuel approach for Australia to take is to focus very strongly on E10 blends of fuels. The reason I say that is twofold. One, virtually all cars currently on sale in the Australian marketplace and an increasing share of older vehicles in our marketplace can correctly run on that fuel. Two, that fuel could largely be distributed through the existing infrastructure of the petroleum industry and service stations. It is an opportunity tap into, fairly quickly and at a low cost, to have a biofuel provided with large marketplace opportunity at modest cost.

Mr GUTWEIN - We recently were in Brazil on another matter but we noted that in their petrol stations they were providing multiple choices of fuels, including ethanol, ethanol blend mixes. I think, LNG was available as well and I think some CNG and biodiesel. From a car manufacturer's perspective, the rapid growth in alternative fuels overseas, what has predominantly driven that compared to the Australian marketplace?

Mr SCOULAR - It really varies from market to market and each market is very different. For example, you mentioned Brazil. I think the Brazillian history with biofuels and alternative fuels goes back to the early 1970s and almost what we would refer to as probably the first oil shock, in that the Brazillian economy largely went broke. They saw an opportunity, given their very extensive agricultural production of sugar cane, to go down an ethanol route and went down that route very strongly. If you look at the United States, for example, it has focused in some particular areas quite strongly on higher levels than E10 blends of biofuels. There are pockets of what they call E85 flexifuel vehicles but, interestingly, they are very narrowly located, almost in the corn growing or midwest belt of the US. I think some recent statistics that I saw show that there are some 170 000 service stations in the Unites States. There are something like 700 pumps of E85 blended fuel so you cannot even do the journey from the east to the west journey.

Sweden, in more recent times, has sought to look at biofuels but it is very hard to take, if you like, a global approach and say that everyone is going down the same road. A small number of different economies have sought to go in different directions and that can

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make it very hard for an industry in a country like Australia which has such a diversity of automotive product sources. On the one hand it can make it very hard for us to pick something and say, 'That is the way the globe is going'. On the other hand, it can give us a strength in that it gives us an opportunity, where appropriate, to cherry-pick appropriate technologies for better opportunities or circumstances.

CHAIR - You are talking about 60 per cent of all new car sales in Europe being diesel now?

Mr SCOULAR - Correct.

CHAIR - Do you see that trend coming here?

Mr SCOULAR - Yes, it is coming off a considerably lower base but we have seen a rapid increase in clean diesel passenger cars in the last two to three years. If you go back to 2005, about 7 000 diesel passenger cars were sold. Last year the number was about 13 000 to 14 000 and this year I think it will be just under 30 000 diesels.

That has come about for a variety of reasons. One is new fuel standards that were introduced with far lower sulphur content and the diesel fuels enabled some of the higher technology diesel-fuelled vehicles from Europe to come into our marketplace. I think consumers are very quickly cottoning onto the opportunities and benefits that can come with that fuel. It is an educative thing because, currently if you go to many service stations, the diesel pump is in the truck lane. There is a perception, as it were, that diesel fuel is very much a 'smoky truck stop' fuel, if I can use that description. That is changing and rapidly but it will take some time for that type of perception to change.

CHAIR - Is it your perception, or have you any hard evidence to suggest, that those clean diesels - the Euro 5s - in terms of emissions are on a par with, say, a CNG motor? Can you answer that one?

Mr SCOULAR - I would have to take that on notice but I think, certainly, if you are looking at it against a petrol engine and against what you could do in terms of the amenity of the vehicle you are talking about, I think clean diesel would be demonstrably superior to CNG.

CHAIR - Okay.

Mr SCOULAR - Personally, I would love to drive a clean diesel-type vehicle and I would look very closely. I don't know, whether I would look as closely at a CNG-type vehicle.

CHAIR - Yes. Your main model, of course, being a power Perspective, did you say that you are looking at that down the track or is that a trade secret at this stage - diesel and the Falcons?

Mr SCOULAR - I can tell you that we have launched a diesel Focus. We are in the process of launching a diesel Mondeo and I can't really tell you what we may do with Falcon. What I can say with Falcon is that in July we made an announcement that from 2010 we were going to import a V6 petrol engine for that vehicle. The introduction of a V6 configuration front-end for the vehicle and a petrol engine probably makes an alternative

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fuel scenario more likely than it would have been had we persisted with our in-line straight six engine.

Mr HARRISS - Russell, what are the main inhibitors to moving past the E10, in higher levels of ethanol mix?

Mr SCoulAR - In terms of higher levels of ethanol mix there are modifications that would be required to a vehicle's fuel system, emission systems in a vehicle. What we are saying is E10, at a blend level, is very much in its infancy and we believe there is a lot of opportunity to tap into that to grow a significant biofuels market before we even start thinking beyond that level.

In a sense, and I think I made the comment in my submission, 10 per cent of a lot - if you are looking to go the litreage of a fuel - is a lot more than 30 per cent of a smaller number.

Mr GUTWEIN - What about warranties on Ford vehicles, at E10 level?

Mr SCoulAR - At E10 level they are fine.

Mr GUTWEIN - At what level would you void your warranty, with a richer blend?

Mr SCoulAR - I suppose the issue at the moment, in part, is that under the national fuel quality standards they allow for blending with ethanol of up to 10 per cent.

Mr GUTWEIN - Up to 10 per cent.

Mr SCoulAR - Correct. So I presume that if someone sought to blend at 20 or 30 per cent then legally and technically, under the Fuel Quality Standards Act or the relevant regulations, that would not be petrol.

Ms THORP - It sounds like biodiesel for cars and compressed natural gas for big trucks.

Mr SCoulAR - We certainly see compressed natural gas as being a significant opportunity for larger vehicles whether they be heavy trucks or buses and that type of vehicle. The reason we say that, in part, is that there is a lot more dense space in those vehicles where you can put a larger tank. Secondly, many of those vehicles, buses for example, do largely depot-to-depot running so it is easier for them to tap into a refuelling installation than it is for drivers of smaller passenger cars who look for a close service station that we may drive past or wherever the closest Shop -A-Docket place happens to be.

Mr GUTWEIN - Russell, Ford is a global company. Having lived in Europe for a period of time a number of years ago, Australia and a lot of areas tend to lag somewhat, perhaps the States on some issues and certainly Europe on other issues. From a global perspective, from Ford, where is the market heading?

Mr SCoulAR - Let me make one observation first. I think the lag factors that we may have seen in Australia with regard to overseas trends or developments have been significantly narrowed in more recent times. There are still some lag factors but I do not think that they are necessarily as pronounced as they may have been some years ago. We have a

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very open market and vehicles and technologies that are launched in other markets quickly find their way into the Australian marketplace.

As regards what the Ford Motor Company is doing around the world, it has deliberately sought to adopt a very broad portfolio approach to various technologies. It does not believe that there is silver bullet in the short to medium term that is going to take us to a promised land or that type of thing. It certainly does believe that in the medium to long term the likely fuel and the likely technology will be down the road of fuel cell, or hydrogen fuel cell technologies. That is some considerable period of time away. In the short to medium term the corporation strongly believes that the best approach to take is a portfolio approach so we are making incremental and consistent gains. We are not trying to back one horse over a variety of others, we are just keeping our options open.

Mr GUTWEIN - In Australia, I think you said around 100 000 Ford vehicles are sold annually.

Mr SCOULAR - The overall market is about 1 million units a year.

Mr GUTWEIN - So Ford vehicles are around 100 000. What is the number of diesel vehicles sold?

Mr SCOULAR - Of 1 million, or 970 000 sold by the industry last year, about 15 000 were diesel passenger cars. Of course, on top of those - and I do not have the number with me today - would be the light truck and commercial vehicles which have a strong diesel bias. I would imagine that diesel vehicles would be in the order of about 100 000 or just over.

Mr Gutwein - That's about 10 per cent of the market then.

Mr SCOULAR - Yes, if you take in the light trucks and delivery pick-up vehicles and that type of thing.

Mr GUTWEIN - And obviously with exponential growth now in the passenger vehicles.

Mr SCOULAR - Correct.

Mr GUTWEIN - What would be the percentage of, say, diesel passenger vehicles in Europe?

Mr SCOULAR - For passenger it is about 60 per cent of the new vehicle market today. They have historically very aggressively sought to use diesel technology to meet various CO₂ commitments. They have been aided in a number of ways to do that. Primarily, a number of the key European governments have been particularly benevolent towards diesel technology when it comes to taxation issues.

Ms THORP - When you say 'diesel', you mean biodiesel?

Mr SCOULAR - No, not necessarily.

Ms THORP - Just straight diesel?

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Mr SCOULAR - Petroleum diesel.

Ms THORP - Without any of the new fuels coming on board, there is still that option because every service station has a diesel pump?

Mr SCOULAR - Correct. Historically, from Australian motorists' perspective, we did not really tap into those technological developments in Europe because our fuel standards were out of kilter with the European standards. Our sulphur content in the fuel was a lot higher than it was in the European markets. In a sense we were almost locked out. Now that our fuel standards are more closely aligned with the various global standards we can tap into those technologies as well, and are doing so. I suppose my submission to you is that there are a lot of tremendous diesel-based technologies that have been used in Europe that are very contemporary technologies. We are tapping into them as an industry, off a low base, but I think there is quite a lot of opportunity there.

Ms THORP - Would I be right in thinking that if a car runs on diesel and the option into the future is as the percentage of biodiesel grew in terms of availability, depending on the way the car was built and the Australian standards, you would gradually increase the percentage of biodiesel mixed with regular diesel? Is that how it works?

Mr SCOULAR - I don't think it is quite as simple as that. I am not a technical engineer, but one of the issues I am aware of with biodiesel and some of the technologies that are being used with petroleum, is that diesel gets back to the injector systems in the engine and the fact that they can not as smoothly digest the biodiesel.

CHAIR - Some of those new Euro 5 diesels that are produced, such as Peugeots that are amongst that 60 per cent mix, are any of those running on biodiesel at this stage or do they void their warranty by doing so?

Mr SCOULAR - I think some are certainly capable of and are running on biodiesel but I don't think necessarily one would say that they all are. Generally speaking, the relevant fuel quality standards make a recommendation or a guideline of what is known as 'B5', which is a 5 per cent blend of biodiesel within the fuel.

Ms THORP - What is that standard based on, to the best of your knowledge?

Mr SCOULAR - It is a technical standard. I think the Department of Environment in Canberra has coordinating responsibility for the Australian Standard. It is based on a number of global standards as well. I know that they are working on - and I am not sure whether they have completed the work - the development on a biodiesel standard for Australia. If you go back a number of years, until only quite recently Australia did not even have a standard as such for petrol. It developed a petrol standard, a diesel standard, it has worked on an LPG standard and it is working, as I understand it, on a biodiesel standard.

Ms THORP - There would be some commercial interests, I imagine, who would like to see that 5 per cent kept down there?

Mr SCOULAR - I don't think it is ever a commercial interest.

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Ms THORP - What about the oil companies?

Mr SCOULAR - I don't know, I can't speak for the oil companies. If I look at it from my company's perspective, we are in the personal transportation business and we will go where the market is. I would have thought that, what we call today the oil companies are probably in the energy business and they will go where they believe there is a business opportunity. Probably at the moment they see it in petroleum. I do not know where they may sit in the future.

Mr HARRISS - Just in terms of me trying to focus on the main thrust of your company's position, from your submission my conclusion then is that E10 on a national basis is the main thrust of where your company is coming from in terms of alternative fuels. Given that you have already well advanced with production of motor vehicles for LPG in the company the next level for you is a high focus on E10?

Mr SCOULAR - E10 - I think clean diesel certainly has a significant opportunity for growth in the Australian marketplace on a national basis. I think natural gas has a role to play but I think that is best directed towards heavier vehicles and larger vehicles. The key message that I would like on behalf of Ford to give the committee today is that I think there are significant opportunities in the Australia marketplace on a relatively short time frame at a relatively low cost to pursue a smorgasbord approach, if you like, to a number of these types of fuels that I am talking about. In doing so I certainly think that there are some good and healthy environmental and economic gains to be had.

Mr HARRISS - Thanks.

Mr GUTWEIN - I would like to know whether you gave the Geelong plant a couple of days off after the Grand Final?

Mr SCOULAR - No, no I think they were all very happy, they waited 40-odd years for such a result and professionally, may they repeat it next year. Personally, may they wait another 40 years.

Laughter.

CHAIR - You are on *Hansard*. It will probably cost you your job today.

Thank you very much, Russell, you have certainly given us food for thought.

Mr SCOULAR - Thank you very much. I look forward to reading your report.

CHAIR -As you say, the smorgasbord approach from yourself and the Ford Motor Company.

Mr SCOULAR - Thank you.

THE WITNESS WITHDREW.

**ENVIRONMENT, RESOURCES AND DEVELOPMENT - INQUIRY INTO 48
ALTERNATIVE FUELS, HOBART 15/10/07 (SCOULAR)**

Mr TOBY MEREDITH, DIRECTOR, CHELSEA GAS, AND **Mr PHIL WESLAKE**, INDUSTRY DEVELOPMENT MANAGER, AUSTRALIAN LIQUID PETROLEUM GAS ASSOCIATION, WERE CALLED, MADE THE STATUTORY DECLARATION AND WERE EXAMINED.

CHAIR – Welcome, gentlemen.

Mr MEREDITH - I thought I would start and I am only going to speak for a couple of minutes. The reason I would like to give the bulk of the presentation to Phil Weslake is that his position is Industry Development Manger for LPG Australia, which is the peak industry body which is supported by the likes of BHP, Santos, all the big oil companies.

CHAIR - He speaks Australian too.

Mr MEREDITH - He speaks Australian and without flattering him too much, I would say his knowledge of LPG in Australia would be up there amongst anyone's in the whole country.

I will give you a brief run-down on Tasmania. There are a lot of alternative fuels being talked about and around. There is one that has been delivering for 30 years and that is LPG. At the moment we have over 50 sites already in Tasmania, scattered around. Most of the sites are in the four main centres. There are also LPG sites in rural areas. There is Smithton, Westbury, Sassafras, Scottsdale is about to be built by Origin Energy, St Helens, Epping Forest, Bicheno, Sorell, Huonville, New Norfolk and Strahan are just some of the places where the public can buy LPG. So there is a network situation. We are already there. You can travel right around the State and buy gas.

There is also considerable investment from Origin Energy which owns two seaboard terminals in Devonport and Hobart. The suppliers into the State are Origin, United, Petroleum, Clean Heat and Supergas. We have a competitive market here and if we can get more volume, it will have the benefit of driving prices down.

Phil Weslake will talk to you about the other State Government incentives that other States have already implemented to promote LPG and alternative fuels. If we can get the State Government to use LPG, we are going to be building a load that will benefit all areas of Tasmania because if we have more sites, particularly in rural areas, it makes it viable then for a gas truck to deliver, and once that gas truck is delivering to a town it will benefit the rural community because we can have a cylinder-filling station and we can have other ancillary benefits, once the gas truck goes out there. It makes it more available to communities.

It is a proven product that has been used in Australia for over 30 years. It is Australian and it is not imported. Australia is becoming more and more dependent on oil and we have 50 years' supply of LPG. It is also cleaner than petrol and diesel and if people are interested about a reduction in greenhouse gases, this is a product that can immediately have an effect by just going to the manufacturers and, for instance saying, the police will now run on LPG instead of petrol, you will have a big effect on our greenhouse gas emissions. I am going to hand you over to Phil now and he will give you a small presentation.

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Mr WESLAKE - Thanks, Toby. What I have is just a brief presentation that I gave recently at an Australasian Fleet Managers Association event and it captures the overall impact on a vehicle on the environment and the benefits of LPG and then just gives a few little extra facts and figures about LPG in Australia and some of the other benefits as well. So I will just try to quickly run through this and hopefully there will be things of interest for you and I am happy to take any question afterwards.

In terms of autogas, Australia is in fact a significant player in the world market and this looks at autogas consumption in thousands of tonnes. At the moment about 1.2 million tonnes of autogas is used in Australia to power vehicles. At a rough approximation, a tonne is about 2 000 litres, so this is a significant amount of LPG. Australia ranks at number 6 in the world in terms of the actual usage of LPG. You will notice that South Korea has around 1.8 million LPG vehicles running around at the moment, so that is a significant autogas market, as are some of the other European countries.

On a per capita basis, we are number 2 in the world, so there is quite an interest from overseas countries, especially Asia Pacific, in what Australia has done with its autogas market and where it is heading. Certainly, there are some opportunities for Australian businesses that are involved in the autogas market to get some entry into some of the Asia Pacific countries as a result of our effective autogas penetration.

In looking at the environmental side of things, and this committee is obviously looking at the environmental aspect of vehicles, there are a number of environmental impacts on transport fuels. These are pollutants, particulates, greenhouse gas emissions, air toxics, and then there are whole-of-life issues with operating a vehicle, for fleets or privately-owned vehicles. I will run through what those mean in terms of pollutants out of vehicles.

If you have issues with asthma, bronchial complaints, complaints with eyes and their irritants, the noxious emissions will affect you. This is more of an issue for the cities, not regional areas. Hobart obviously is regarded as a small city where I have come from - I come from Sydney, where we have some issues with pollutants there. At the end of the day for LPG, and for all vehicles it is not only greenhouse gas we are talking about, it is pollutants coming out of tailpipes as well.

Particulates is another issue, and there are some recent studies showing that particle emissions are being linked with being a multiplier. This means these emissions have an exponential increased effect on asthma - or the incidence of asthma, the incidence of bronchial complaints. Also, it has been linked to increased incidence of tumours and heart attacks. Work done by the University of New South Wales contains information that shows the impact of particles on human health. They are two important issues that we need to also look at in terms of what comes out of a vehicle when it is being driven.

There are obviously greenhouse gas emissions, the flavour of the moment with climate change. There are air toxics - these are things like formaldehyde and benzines which are cancer causing - also coming out of the tailpipes of vehicles. Obviously the whole-of-life cost of producing, running, disposing of a vehicle then have some climate change implications as well.

Looking at autogas, and some studies have been done in Europe where they have been able to compare directly similar types of vehicles using petrol, LPG and autogas. Those studies show that autogas has lower pollutants, autogas has the lowest particle emissions. Autogas in terms of a greenhouse gas from tailpipes and also on a lifecycle is equivalent to diesel, so has the same benefits as a diesel engine. Also LPG is lower than unleaded petrol. Some of the latest research from Europe suggests that of all the alternative fuels, potentially LPG might have the lowest cost in terms of abatement. That is an interesting work. We have not really digested a lot of it yet, but there is some interesting work there.

This is a brief chart capturing those things we have just talked about, and looking at all the various fuels. It was prepared for the association a couple of years ago, and used petrol as a baseline, looking at all the other alternative fuels, including low sulphur and ultralow sulphur diesel. It compared all the various pollutants and particulates, as well as lifecycle and greenhouse, air toxics, but also looking at things like whether there is available the on-board storage and also Australian reserves.

Ms THORP - Where does carbon monoxide fit in there?

Mr WESLAKE - With the gaseous pollutants which are carbon monoxide, hydrocarbons and oxides of nitrogen.

Ms THORP - I thought LPG was pretty high in carbon monoxide.

Mr WESLAKE - Not necessarily. It depends on the vehicle using it and the type of LPG system on that vehicle and how they are mated. This was based on a study from Europe so, as I said, I was comparing like vehicles with like. They had the three vehicle options available so you could do direct comparisons with the vehicles and this was the outcome of the research. It showed that of all the alternative fuels at the time, LPG essentially got a tick which meant it was better across all those various categories. Obviously crosses or double-crosses are worse. There were some issues with infrastructure and availability of things like natural gas and the LNG, and some with ethanol, biodiesel. There are some question marks there - some of those have actually turned into ticks recently. We think biodiesel certainly has some potential, as well. Hydrogen, whilst it has a lot of ticks in all the gaseous side of things, there are still some question marks there in terms of how you get it to the marketplace and deliver it safely.

So, essentially, at the time LPG looked to be the most promising in terms of all of those criteria.

CHAIR - Yes, just comparing one with vehicle storage.

Mr WESLAKE - Yes.

CHAIR - A CNG tank is obviously bigger than an LPG tank, is that what you are saying?

Mr WESLAKE - It is heavier and will not give you as much range. It doesn't necessarily have to be heavier but usually they are heavier. Range-wise, for example, a Commodore on LPG might travel 400 to 450 kilometres on a tank. Using the same size tank of natural gas, will get you about 150 to 200 kilometres so there is the issue with on-board storage. It is certainly a limited range, which is why it is more suited to heavier vehicles

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where you have the room to put larger tanks and extra tanks so you can bring your range up.

I have this one to showcase recent developments in Europe. This looks at some of the vehicle manufacturers that have either OEM, LPG options or approved options or allow their vehicle to be retro-fitted with an LPG option.

At the moment Ford do a factory LPG option and I understand the last speaker might have mentioned that. Also Holden and Mitsubishi have what they call an approved retro-fit option for their vehicles - the 380 and the Commodore. Around the world now there is certainly a lot more interest in LPG, a lot more development around LPG options and these are just some of the manufacturers that offer an LPG option in the European marketplace. At this stage none of these manufacturers that are currently in Australia offer anything here but who knows where that might head in the future.

I have a graph depicting a national average, so it tends to be a bit skewed to mainland pricing, over the last 22 years of LPG pricing versus unleaded petrol pricing. We can see back in 1984 the national average was around about 25 to 26 cents a litres for LPG; the national average was 48 to 50 cents a litre. It has come a long way since then and certainly in 2006 it was a lot higher. But looking at the two and comparing them, the increase in LPG has been about 105 per cent but unleaded petrol has been about 168 per cent. There has been more of an increase in petrol pricing than there has in LPG pricing over the long term.

This chart looks at the growth in the LPG industry in terms of conversions. Back in 2004 about 31 000 conversions were done nationally, across Australia, and that grew to about 42 000 in 2005 and really shot up significantly in 2006. Of course, at the tail end of 2006 we had a Federal government initiative and that really helped to spur things along. That chart goes to the end of July and so far it stands at about 67 000 for the seven months. We expect that to be somewhere up around 100 000 conversions nationally for LPG autogas vehicles. There has been quite a significant increase in growth over the time and a lot of that is on the back of high petrol prices and what that is doing to the consumer's hip pocket and so that certainly has been the catalyst in getting them to think about how do I change, how do I fork out less money for a petrol vehicle.

Mr GUTWEIN - What is the current Federal Government incentive to change over?

Mr WESLAKE - \$2 000 for a conversion and \$1 000 for a factory-fitted LPG vehicle like the Ford option, and it is only available for a private motorist.

That is a snapshot of the grant. In the first 12 months there was \$140 million and 70 000 vehicles converted to LPG. Most of those were a retrofit option; only about 1 per cent of that number were factory vehicles and Tasmania is about 0.78 per cent, but that is still a reasonably significant number of vehicles; it is still several hundred.

Mr GUTWEIN - How many vehicles is that?

Mr WESLAKE - At latest count the numbers I saw we were up around the 700 private motorists so that is not too bad.

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CHAIR - That would also reflect the much higher price of LPG here than in other States? You are about to tell us about that, no doubt, and why that is.

Mr WESLAKE - I can answer that now but you might look at New South Wales. New South Wales has similar pricing to Victoria. It has a bigger population, a bigger vehicle population and yet its take-up rate is not the same as Victoria. Victoria is unique, you might say, in that it has the highest penetration of LPG users, it has the highest penetration of LPG outlets. In terms of users, it shows there 45 per cent, and it reflects that 45 per cent of the LPG autogas into Australia is sold into Victoria. One-third of the autogas outlets are in Victoria and therefore you have lots of vehicles, lots of outlets, lots of volumes of LPG, lots of competition and therefore that has an impact on retail pricing.

If you look at Tasmania by comparison, you have lower volumes, you have lower base of vehicles and that has an impact then on competition, it has an impact on site-operating costs because you have a lower volume but you still have a fixed-site cost for operating and maintenance and you have to recoup that across a lower number of litres of LPG so therefore you have a higher cost there in two respects. So you have the competition that drives it down. It does not happen in Tassie; there is competition in Tassie but, as I said, there is a lower volume and less competition than in Victoria. Victoria in fact has the lowest LPG price of anywhere in Australia. New South Wales prices by comparison are typically about 10 cents a litre dearer in terms of their LPG.

I know there is a bit of comparison between what happens in Tassie and what happens in Melbourne but it might be better to in fact compare to maybe South Australia or to New South Wales because that is more reflective of the lower volume base and more reflective of what happens in Tassie. As I said, Victoria is unique and it already has an established market and therefore it has lower pricing and Toby alluded to that before. If the volume can be built that will increase the competition, that will increase the volume per site and therefore reduce the cost per litre.

Mr MEREDITH - There is one other thing. In Victoria they have a place called Hastings Point where BHP unloads its gas and what happens is they line up the big supersized trucks and they fill up at Hastings Point and they go on a bus run and they deliver and they might finish in Adelaide or they will finish in metro Melbourne and then they have to go back to Hastings Point so it is the most efficient system you can possibly get. Here, we have to ship it from Melbourne in small ships and put it in a storage terminal and then transfer it again into a truck before it is delivered. The other alternative is that United put their tankers in Melbourne, fill up from Melbourne and put it on the ships into Burnie and then they have to drive from Burnie. So that piece of water -

Mr WESLAKE - Adds an additional freight component and cost.

Mr MEREDITH - If there was a bridge over Bass Strait we could be enjoying the same price as Melbourne almost but it is just the shipping and terminals that give us nightmares in terms of cost.

CHAIR - So comparatively speaking, if you have a tank full of LPG on board versus a tank full of, say, premium petrol or whatever, how do the economics stack up?

Mr WESLAKE - A typical LPG vehicle will use about 30 per cent more to go the same distance as petrol so if you are talking about 70 cents a litre you add 30 per cent onto that so really an equivalent is 91 cents a litre compared to what you are paying, \$1.20 to \$1.30 for petrol.

CHAIR - I see.

Mr WESLAKE - These obviously are important for fleets and what is happening - and this is data from the mainland - actually a dual-fuel vehicle on the mainland can achieve a \$3 000 to \$4 000 improved resale value than its equivalent petrol vehicle and this is what they are seeing from some of the South Australian Government auctions. The Red Book also puts a \$2 000 premium on an LPG vehicle presently, so it is important for fleets but it is also important for business users as well if they are going to sell a vehicle to know that if they have to put \$2 000 towards getting LPG upfront then at the end of the life of the vehicle they can put it back into the market for \$2 000 return.

A little bit on Australia and LPG in Australia. There are a couple of charts on supply and demand for LPG. We actually get a lot of our LPG from what we call naturally occurring sources. Now that is on the back of natural gas that is brought out of oil and gas fields and then the LPGs, propanes and butanes are extracted out of the natural gas and that happens Bass Strait, Cooper Basin, South Australia, and the North West Shelf and a little bit out of Surat Basin in Queensland as well but the LPG is extracted out of the natural gas and about 80 per cent of our LPG in Australia comes from that source. The remainder is the process of crude oil where they are processing crude oil and they are getting their petrols, their diesels, their lubricants and they get their LPGs out as well and in fact the LPGs come out first as part of the processing so they are the first things to come off so to actually get petrol and diesel they need to first make the LPGs.

There is a little bit of import and that is mainly on the east coast and mainly into Queensland. There is a bigger demand in Queensland for propane and it is a little bit short on supply of propane and, believe it not, it is cheaper to import it than it is to ship it around from the North West Shelf, which is their other supply, and that is because they want to ship two products, they want to ship propane and butane whereas the market only wants to buy the propane so there is a penalty for actually buying only propane out of that and it is actually cheaper to import it.

But overall, just looking at the other side, our auto gas use for 2006 is 1.15 million tonnes of auto gas. The traditional market, which is essentially everything else - so that is your household use of LPG for heating, cooking and hot water, it is your barbecues, your patio heaters, it is commercial use of LPG for burners, it is used in propellants in pressure pack cans. The remainder is about a third of the business and 1.4 million tonnes of LPG is still being exported mostly into China, some into Japan and some into Korea and being sold at parity pricing. There are all these rumours around about 7 cents per litre. Well that is just not true, it does not happen. It is sold for whatever it is sold for here.

So we have 1.4 million tonnes, roughly about 2.8 billion litres of LPG and that is bigger than the current usage so effectively you could double the auto gas consumption in Australia and still be an exporter of LPG.

Looking at the global situation, this is a chart prepared by Purvin & Gertz, who are consultants in energy around the world and their outlook on LPG surpluses out to 2012 looks very good - 12 million tonnes of surplus out to 2012 per annum. Next year is a bumper year of about 20 million tonnes so there is plenty of LPG around globally. This is just as a comparison on crude oil and spare capacity and this is the additional OPEC production that is available. We are currently running at about two million barrels a day of extra production. That is just one large mega refinery so a hurricane in the Gulf or whatever is enough to trigger a balance supply situation which means in some areas you could have a shortage because of how it all pans out. That is obviously forecasts running out for the next few years at that sort of tight capacity until extra production comes on. That obviously has a bearing on where petrol prices and oil prices might go in the future.

By comparison, Australia has some significant other production on line or coming on line in the next few years. Bass Strait, the Yolla Field is already under production producing an additional 65 000 tonnes per annum of LPG. It is what they call landlock production so the pipeline comes in, they are looking for the natural gas, they are extracting the LPG. They do not have a lot of storage there so it is going into trucks and being placed into the local marketplace.

The same with the Ottway field, which is due to come on stream later this year - another 125 000 tonnes per annum of LPG. Later in 2008 a lot of the work is already done for the fifth LNG train, so again we are looking for natural gas. We have some LPGs out of that. Overall over the next few years we will be adding an extra half a million tonnes of LPG supply into the Australian marketplace.

This is just a little snapshot of somewhere where you could get more information on LPG Autogas and its use - this is the association's little promotional web site at lpgautogas.com.au. It has a lot of information there where you can find out about the various sites and what options are available for various vehicles so I commend that to you if you have an opportunity to look through that site.

That covers my bit of spruiking. I am happy to take any questions if you have any further ones.

Ms THORP - If I am understanding you correctly, your position is that there is a market here in Tasmania for LPG that is not being exploited?

Mr WESLAKE - Yes.

Ms THORP - That we produce enough in the country to double that which is being used by Autogas anyway but it needs some sort of an impetus to make sure that enough is being used to make sure the supply network is big enough?

Mr WESLAKE - Yes. What we are suggesting is that there is an opportunity for LPG to be used here in Tasmania. At the moment there is a Federal Government subsidy but obviously due to pricing issues here in Tasmania at the moment it may not be as attractive as what it would be on the mainland.

There are other States that have boosted Federal subsidy. The West Australian Government have in fact an additional \$1 000 subsidy available so a private motorist in

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Western Australia can get a \$3 000 benefit for converting their LPG vehicle. The ACT Government have a discount on registration - they offer a 20 per cent discount on registration for a privately registered vehicle as an additional incentive to use LPG. They may be a couple of options that might be considered by the Tasmanian Government in terms of offering a little additional incentive to get motorists across the line which then will have an impact on boosting the volumes and therefore have an impact on the costings of LPG.

Mr GUTWEIN - From your perspective, what would be a dot point summary of the benefits of LPG versus CNG and LNG?

Mr WESLAKE - Probably that little chart that I put up before might be interesting, if I can find it quickly.

Ms THORP - How do you make LPG? Is it naturally occurring?

Mr WESLAKE - LPG is propane and butane, so they are hydrocarbons. They occur naturally along with natural gas in oil and gas reservoirs so the gases are pulled out and then the LPGs are extracted out of that and they just use a fractionation process so they are changing temperatures and LPG comes off then as a liquid.

Ms THORP - From natural gas.

Mr WESLAKE - Out of the natural gas. Then it is part of, if you like, the chemical process within the refinery so they are taking crude oil as the feed stock and then they are processing that and they are getting the ethanes and the propanes and the butanes and all the other molecules out of that. You get methane out of that as well. So you get some natural gas out of that process. They are all part of that hydrocarbon family of fuels.

In terms of CNG, if you look at the pollutants and you look at the particles, the emissions of greenhouse, the air toxins, it is very similar to LPG. The downsides with natural gas are the availability and on-board storage. Sure, we have plenty of reserves of LPG and we have plenty of reserves of natural gas. The forecast reserve of natural gas is 75 years. LPGs associated with that are a little bit less. They are the forecasts at the present time.

Mr GUTWEIN - What about cost between LPG and CNG?

Mr WESLAKE - Price per litre equivalent?

Mr GUTWEIN - Yes.

Mr WESLAKE - We did have a look at that about 18 months ago and at the time LPG was coming out at about 45 cents per litre and natural gas was coming out at about 35 to 40 cents a litre. So it was slightly cheaper. That was factoring in all the additional up-front costs and everything. So basically, it still ended up about a 5 cent saving between the two fuels. The downside for natural gas was infrastructure and it still is a downside.

Ms THORP - We saw a graph earlier on today by someone who was not pushing the LPG barrow, that showed the carbon monoxide levels. That is why I asked that question

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before. There was another one of these graphs that showed the naughties and the goods that come out of the different fuels and it was really high on carbon monoxide. It was right up there.

Mr WESLAKE - Is that on conventional sequential -

Ms THORP - It was not clarified. But seeing it, it was concerning.

Mr WESLAKE - With all those vehicles that I put up, the OEM options available overseas and where Australia is heading to as well with its technology, we are talking about sequential vapour gas injection systems. So, the systems that are used are every bit as good as the conventional petrol systems that are on the vehicles and producing similar performance outcomes to what you would expect on petrol, in terms of performance of the vehicle - so, drivability, emissions performance and fuel consumption. You still have that penalty and that is to do with the energy content of the fuel. There is less energy in LPG, so you still have that penalty. But in terms of its performance, those systems are way better than the systems that might have been used 20 years ago, which were very simple carburettor-type gas installations.

Ms THORP - So you do not think the carbon monoxide is an issue any longer?

Mr WESLAKE - No.

Ms THORP - Thanks.

Mr MEREDITH - If someone is trying to promote natural gas as a viable transport fuel, there are something like 20 to 25 natural gas filling sites in the heart of Australia. The reason for that is, in blunt terms, it does not cut the mustard and those have been subsidised by 50 per cent to get those built. There are 3 200 LPG sites and they have all been done without a cent of government money. If you have a bakery or the Zinc Works or something like that, the natural gas is fantastic, but as a fuel for transport, natural gas just does not cut the mustard. The evidence is there in why isn't there 3 000 natural gas filling stations in Australia and why don't manufacturers make natural gas, but they do make LPG.

Mr WESLAKE - As I said earlier, it seems to be more suited to heavier vehicles, again, because of the range, where you can put the extra storage on board. But again, a lot of those are really depot-bound type vehicles. So they are putting a refuelling infrastructure at a central depot where all the trucks come back to refill. That works. In terms of smaller vehicles, because you do not get the range, I think - the private motorists or even fleets - we are seeing, with the association, and with the Australasian Fleet Managers Association, they are suggesting that the fleets are not looking at natural gas either.

CHAIR - What is the percentage ratio between dedicated straight LPG, dual LPG and petrol. Most cabs in Melbourne, for example, are duals, aren't they?

Mr MEREDITH - No, they are straight.

Mr WESLAKE - A lot of LPG installations, and I am talking conversions, are done as dual fuel so you have the original petrol car and they add an LPG fuel system. Both systems are there - with a flick of switch, you can change between the two.

Most first-timers prefer to have dual fuel because they are worried about not being able to get LPG somewhere they want to go. Typically, what tends to happen then is when they find that they can get it everywhere they tend not to use the petrol fuel system and they neglect to service the petrol fuel system. Eventually it becomes a gas only car anyway because they haven't looked after the petrol fuel system.

I would say the majority of vehicles are in fact dual fuels. We have some other options coming through now from Ford. They have a gas only vehicle, which is doing well and hopefully Ford can give you some figures on their sales. I don't have those figures.

CHAIR - What about performance between the two?

Mr WESLAKE - On a dual fuel versus a gas line?

CHAIR - No, just a gas one compared to a petrol engine.

Mr WESLAKE - As I said, with the latest LPG injection systems the performance is marginal between the two. We are talking two or three kilowatts of difference in performance.

CHAIR - And the economy was 30 per cent better?

Mr WESLAKE - It was 30 per cent more LPG used to go the same distance as you would use in petrol.

Ms THORP - Back to this graph again, if I might, the tailpipe emissions on diesel there - if I am reading this correctly -

Mr WESLAKE - Yes.

Ms THORP - they are better than petrol - on the diesels?

Mr WESLAKE - No, a cross is worse and tick is better. Greenhouse gas, yes, is better and both on tailpipe and life cycle.

Ms THORP - But on gaseous pollutants and particulates, it is worse.

Mr WESLAKE - Diesel, has very much higher NOx emissions and also particle emissions are very much higher. In fact some of the research from Europe shows that an LPG vehicle has particle emissions 120 times less than an equivalent diesel vehicle.

Ms THORP - So that suggests that with the big push to diesel to cut down greenhouse gases, one thing might be better but another thing is getting worse.

Mr WESLAKE - There is still a question mark about particle emissions. I know there is a lot of talk at the moment about clean diesel where they are running particle filters but

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there are different sizes of particles. It is the ultra-fine particles - the little ones that get right down inside your lungs and take all the carcinogens with them - that do the damage. There is still not enough evidence to say that the particle traps and filters are taking out all those small particles. They might be removing 90 per cent, or whatever they are claiming, of particles but a lot of the time they take the larger and not the smaller particles and it is the smaller ones that do the damage.

Ms THORP - You said also that since this graph was drawn up, the biodiesel question mark, some have been replaced by ticks?

Mr WESLAKE - In terms of the gaseous pollutants and life cycle, there is a better understanding now in the work here of how biodiesel might be made and therefore the greenhouse impact. Some more studies have been done on the pollutants and the impact of those. I think they have actually turned into a tick at this stage.

Mr MEREDITH - If any of you would like a ride, I have a gas-only Falcon outside. If you go for a drive in it, you won't notice the difference - it is the same as a petrol one.

CHAIR - Supplied by Ford?

Mr MEREDITH - Yes, it is the Ford gas-only Falcon.

Ms THORP - Are we going to get copies of these?

Mr WESLAKE - We are happy to provide a copy of that, yes.

Ms THORP - Thank you.

CHAIR - Any further questions?

Mr GREEN - That was very interesting, thank you.

CHAIR - Yes, it was, thank you.

Mr MEREDITH - Thank you for your time.

Mr WESLAKE - Thank you very much.

THE WITNESSES WITHDREW.