

**THE PARLIAMENTARY STANDING COMMITTEE OF ENVIRONMENT,
RESOURCES AND DEVELOPMENT MET AT HENTY HOUSE, LAUNCESTON ON
TUESDAY 9 OCTOBER 2007**

INQUIRY INTO ALTERNATIVE FUELS

Mr MICHAEL SCOTT WAS CALLED, MADE THE STATUTORY DECLARATION
AND WAS EXAMINED.

CHAIR (Mr Hall) - Welcome Mike and take a seat. You are the first cab off the rank for these hearings.

You will notice that we have a 30-minute time slot for you, so I will give you an opportunity to speak to your submission.

Mr SCOTT - This is essentially what I would like to talk to. It is pretty much a distillation of the previous submissions on what I really want to talk about this morning, which is the use of wood as a basis for biofuels manufacture.

CHAIR - You go your hardest and then I will open it up to members to ask you some questions.

Mr SCOTT - I will just run through some of the graphical material in that document because that is probably the best demonstration of what I am trying to talk about. It comes down to where the market in the future is going in terms of looking at biofuels as a replacement for fossil fuels.

The automotive field is my background. I worked for the local company here, ACL, on the design side. I have worked very closely with all the designers of major motor manufacturers on their engine side on the mainland - that is where my business is. Accordingly, I have kept a watching brief on what is happening with engines, what is happening with power train technology and where it is going in the future. That clicked in to some of the major moves that are going on in the world at the moment.

If you look on page 4 you will see a graph which distils a lot of the information that is coming out of various parts of the automotive market. There are a lot of lines there, but it is probably easier just to look at the top two. The top one is basically an averaging of a lot of the forecasts of where the fleet sales are going in the future - that is between 2000 and 2050. There is a steep movement between 2010 and 2020 and that is really associated with the middle classes coming up in places such as India and China, who are starting to buy in big time into increasing fleet sales.

The second line is what are called HED fuels, which are high-energy density fuels. Most vehicles, particularly cars, need a fuel that can be easily contained in a tank that contains enough energy to drive that vehicle a considerable distance. We use petrol and diesel at the moment because they are very convenient. There will be an ongoing need for fuels of that kind for a very long time into the future. The only thing that will threaten that is

the fuel cell powered by hydrogen, but at the moment there is no way of containing hydrogen dense enough to really power a vehicle a sufficient distance. So people are using high-energy density fuel and then converting that on board into hydrogen. That is the way they are looking at it. So those fuels will still be needed for a long time into the future.

CHAIR - Sorry, that was the second one, Mike, was it?

Mr SCOTT - That is the second line.

I have this on a power point system and I can send that through later if you would like to see the diagrams in much more clarity.

Despite all the changes in power train technology that have been looked at in the next few years, there still will be a prolonged need for these high-energy density fuels.

Figure 2 on the next page is taken from the Biofuels Taskforce report that was submitted to the Prime Minister in 2005. That looked at the two most promising types of biofuels that will be looked at in the future - ethanol and biodiesel. Biodiesel is almost a straight replacement for diesel as we know it in our vehicles. Ethanol is a mix that can take the place of unleaded petrol. Both of those show dramatic increases. The year 2005 was the cusp for these products where we changed from a world that was uncertain about global warming to one where it is now certain. We are seeing the political will behind it and therefore there is a huge, if you like, tsunami growing behind these sorts of products for the future.

In that report they were looking very much at other types of raw feedstock for these products. Ethanol would have been from sugar cane, maize and the like; biodiesel from used cooking oil, tallow - other products like that - and not from wood. In the last two years everyone has stood back and asked how much fuel we actually use. In Australia we use 50 000 megalitres a year, the equivalent of about 30 million tonnes of fossil fuel, which is huge. When you look at the availability of those crops you realise that they are nowhere near capable of meeting even a substantial amount of that demand. If we are seriously going to a carbon-free future, we have to look at a resource that is much more capable of getting a significant portion of that.

Mr GREEN - Not even broadacre canola for example?

Mr SCOTT - Again, a lot of those are substitutes for current farming. We are already seeing in the US and Mexico a huge hike in the tortilla price, as they call it. We have almost had tortilla riots in Mexico due to the fact that corn prices have gone up dramatically in the United States, purely because of the amount of ethanol that is now being made from maize and they are still only scratching the surface of the demand. So that is why people are looking further afield to what other feedstocks we can use for making these biofuels.

As is noted in the first conclusion in the Prime Minister's Biofuels Taskforce report, they really said they could not judge much where we go on ethanol until we understand what is happening with the lignocellulose process, which is the use of wood products. That is where everyone is starting to look and where all the research has been done in the last

two years and, as we know, there is a lot of research and there is a huge amount of money being poured into this now.

On page 6 is a review of the US department of energy and their opinion on where their fuels are coming from in the future. They are particularly interested in ethanol because their passenger vehicle fleet is almost exclusively petrol - or gasoline to them. That market is essentially being met at the moment by easy-to-grow crops - we mentioned canola, maize and sugar cane - and that little dotted line at the bottom represents the capacity they think they are going to get from those feedstocks. Basically it is not supplying anything like their needs into the future. They are committed now to technologies that will convert cellulose materials and there you see two blocks showing that conversion between 2010 and 2025, which will go up. That is where they are putting their money - conversion of cellulose materials, predominantly forest products.

Page 7 shows the two best candidates in terms of technology that everyone is looking at and researching into - hydrolysis and fermentation. We have pretty good fermentation in this valley; it is not exactly a foreign technology to us. That produces ethanol so that is very similar to the technology that is being used in the United States. We need the extra step - hydrolysis - which basically breaks down the cellulose material in sugars that then can be fermented. Gasification takes biomass and basically heats it up without any air and breaks it down into very basic gases, such as hydrogen and carbon monoxide. They use a process called the Fischer Tropsch method which was invented back in the 1930s and which recombines those gases into longer molecules such as diesels. It is almost like a refinery. You end up with a spread of organic molecules much like comes out of the refinery for crude oil.

Those are the two technologies that are getting all the money at the moment. The Fischer Tropsch method is used in Europe because in their vehicle fleet last year more than 70 per cent of new passenger vehicles were diesel. Ethanol is used very much in the United States because their passenger fleet is based on petrol. These are very promising technologies - they are not new, but just new to this application. It is just a matter of re-engineering to be able to break down wood and turn it into fuel.

I will summarise the conclusion given by the Biofuels Taskforce in 2005 because it is quite interesting. Assuming that the long-term exchange rate is 65 cents to the US dollar, which is now way out of date, the long-term world price of West Texas intermediate crude would need to average \$US42-\$US47 a barrel - it is now at \$80 - in 2004 dollars for new ethanol producers to be viable post-2015. With assistance - that is the current legislative assistance given to biofuels - the price would need to be above \$US25-\$US30 a barrel. We are two-and-a-half times that, and with the penalties on the exchange rate, we are way over this target already based on the per-barrel price of crude oil. For biodiesel producers it would require an oil price of \$52-\$62 without assistance or \$35-\$45 with assistance and that assistance does not include any benefit from carbon taxes, carbon credits or greenhouse benefits.

Those were from easy-to-convert materials into ethanol so that is based on sugar cane, but for biodiesels it was based on used cooking oil and tallow. The used cooking oil and tallow retail at around \$150-\$450 a tonne so it is very expensive feedstock and that is priced into that.

The most interesting graphs I found were the ones on page 8, which relate to the sensitivity study done by ABARE for the Biofuels Taskforce. This takes the cost of West Texas intermediate crude against the threshold price or the cost of production of these two fuels and the lines are based on the competitiveness of that fuel against those two markers and also the exchange rate. The two light grey lines are probably the most interesting because they are basically the ones without assistance. If you look at the cost of manufacturing ethanol without assistance - the two exchange rates are 65 cents and 75 cents so basically we are now in a slightly lower line - and extrapolate them out to the current US dollars per barrel, which is \$80, you will see that the ABARE figures, cost of production, which the two black dotted lines, are already well exceeded. Much later figures from the International Energy Authority, that is February of this year, based purely on wood product so that is the cost of converting wood into fuel show a much bigger band but we are still over those as well. So already they are talking of a viable process.

On the IAEA figures, I should note, that it costs an awful lot more to convert softwood than hardwood into ethanol because you need an extra hydrolysis process - I am not absolutely sure what that means but I think it has something to do with the resins in softwood. These were European figures based predominantly on softwood. Also they were based on a \$60 a tonne feedstock price because that is the current timber cost in Europe. On the second one, again, we see the biodiesel becoming a very viable process under these figures. I haven't done other lines to account for the exchange rate because all the competing products with biofuels would have the same penalty associated with exporting.

Mr GREEN - So a tonne of woodchips gives you?

Mr SCOTT - About 300-350 litres and it is about the same efficiency on both of them. A rough figuring you can do is if you take one tonne of wood, it gives you, say, 300 litres at your lower level of ethanol. A factory gate price would be about 50 cents, so that is \$150 per tonne input. If we keep it in Tasmania and it retails at the petrol station for \$1.20 - you can do the maths - it is a heck of a lot of value adding.

Mr GREEN - Can you give me an idea of what the size or the scale of the plant would be?

Mr SCOTT - That is still very much on the drawing board but elsewhere these plants are actually quite small. However, they have a lot of them because you don't need a big plant to produce this - you do not need this huge scale of mass - anyone can do it. It is actually referenced in a study which was done by the National University of Science and Technology in Norway where they asked themselves exactly the same question: can we replace our import fuel with biofuels? They have a lot of forest there and they did a survey of the current plants that exist around the world. I have some figures here - it might take me a bit of time to work through them - but at the moment plants are talking about a few million litres a year, so it is still a pilot scale.

But they are building plants that are dealing with a few hundred thousand tonnes a year so it bands up. A tonne is about 1 200 litres so 200 000 tonnes becomes 200 million litres, something of that order.

Mr GREEN - Do they use the residues from the process to generate heat?

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Mr SCOTT - What they are doing is rather than using it to process heat is actually making other products from it. If you take that bit of wood and treat it like a cup of oil, which is essentially what they are trying to do here, you end up with what they call a biorefinery concept because you take it, you refine it and you produce all these chemicals. Now some of the fractions you take off as fuel, some of the fractions you take off as plastics, adhesives - all these other kind of products - and indeed there are motor manufacturers on the mainland who are already using wood-based plastics to replace the plastic trim in their prototype vehicles.

The reason for doing that is what they call the end-of-life vehicles legislation in Europe, which requires the vehicle manufacturer to basically pay up front the cost of dismantling and disposing of the vehicle at the end of its life. That is pushing them towards making cars to disassemble, no hazardous materials and what materials cannot be recycled have to be biodegradable. That is a huge push towards wood-based plastics.

So there is another industry on the side making these very high value-added products. To give you an idea of the scale of that product, in the US last year the value of all these other fractions coming out of the standard oil refinery was just short of \$400 billion, which is exactly the same amount as the value of the fuel that came out of those refineries. The fuel took up over 80 per cent of the product so that small extra percentage has a dramatically higher return on the value.

A lot of the work now going forward is on how do you take these raw materials, and biomass could be anything. In Europe it is the whole tree; they cut down the tree, they cut the trimming, bundle the trimmings and the trunk goes and the trimmings go in as well. As long as it is a woody mass it can be converted.

Mr GREEN - You have obviously visited some of these places?

Mr SCOTT - No, I have not visited them but I have obviously looked at them. I am basically acting as a rapporteur from the documentation that is out there at the moment. Some good references are from the IAEA. They have some fairly significant teams working on this and how they can use these European forests to get these products because they see this as the only answer for them to reduce their carbon dioxide footprint - to start using renewables. There are no real renewable sources that have quite the capacity of plantation timber.

CHAIR - You were saying that hardwood was better than softwood and that it worked better, but does plantation timber work better than, say, native? Is there a difference there?

Mr SCOTT - Only that it is easier to handle. Any woody mass can be used but the problem is that the costing is very different. In Europe certainly they are only talking about plantation because they are seeing a great benefit in having their native forest just as carbon sinks. The cost then is a very different cost from using plantation, whereas plantation is fully renewable. It gets all the benefits from that renewable tag in terms of market acceptance and benefits in tax concessions they get for it. Basically everyone is looking at plantation because we have to be able to grow this material as we use it. If you do it any other way the equation does not work; it has to be fully renewable. We are looking at 50 to 60 years in the future. We have to be growing at the same rate as we use

it and be fully renewable to get the benefits of all this legislation, benefits for the community as well so that we are sustainable. If Tasmania were to say, 'This is the way we wanted to go', a big 'if', then in 10 years or so there is a very great potential that we could be actually making all our fuel. I say 'technically available fuel' because we will at best be using an 85 per cent mix of ethanol with unleaded petrol, but we could be making more diesel. One could actually stand up and say that Tasmanians therefore would have potentially the smallest environmental footprint of any developed State in the world. It would be a heck of a claim but because we already have hydro and we have a lot of wind power that environmental footprint would be very, very small indeed. We could be a leader in this.

I think I have pretty much covered everything that was needed in there.

CHAIR - That was a mass of information in a short time, I have to say.

Mr SCOTT - I realised I had to get through it. It is all there.

CHAIR - It is very good.

Mr SCOTT - I am always contactable to come in on this. I am just acting as a rapporteur. I am very much an independent on this. I have nothing to gain except that this was an exercise in curiosity for me. The more I looked into it the more I, frankly, got quite excited about it, quite passionate, because I think there really is something here. The key to it is forests and the access to them. That raw material is what this is predicated on and what it could be built on, and in Europe this is the only raw material to take us forward.

Mr McKIM - You have spoken in your submission about the two most promising methods for converting wood to ethanol or biodiesel and later on you spoke about some interesting plants around the world. Do they use either of those two methods?

Mr SCOTT - Yes.

Mr McKIM - So they are completely proven in terms of their capacity to operate in the market?

Mr SCOTT - The technology is proven. The scaling up is still being done. There are scaling-up plants being built, ethanol in the United States based on cellulose. It is extraordinary to me because I am used to fermenting my own wine, which takes weeks, but they are talking about wood to ethanol in seven minutes. It is a phenomenal throughput.

Mr McKIM - That is through the fermentation process.

Mr SCOTT - That is through the fermentation process. They ferment at a very, very low concentration but they can still get it to ferment that quickly. They are talking about a lot of specialised bugs in terms of the enzymes and the yeast that they use. There is a lot of research going into those to optimise them. There is going to be continuous improvement on this for the next 20 or 30 years. They really are very serious about it. In the United States the Department of Energy is talking about replacing 25 per cent of their oil usage, so plastics as well, with renewables, and that really has to come from wood.

When you think of the quantities involved you start seeing just how much wood is needed - and it is huge. That is the real issue; it is the scale of the problem and our complete addiction to oil and the volume therefore of renewable material we need to come anywhere near to chipping away at that.

CHAIR - Is anything being done here in Australia that you are aware of?

Mr SCOTT - Not on wood-based, as far as I know. It is mainly on the short-rotation crop. There are a few proposals out there that still sit on the shelf but that is mainly short-rotation crop. What everyone is seeing is perhaps we need to go beyond that because it really isn't an answer in a dry continent such as Australia. There are thoughts of using woody weeds, such as spikey acacia in places like Queensland, but nothing more than just thoughts.

Mr BEST - It is very interesting listening to you. It certainly is an exciting prospect and initiative. I was just reading about the 2.2 vehicle fleet adaptability. I know that there was a move, maybe a year-and-a-half to two years ago in Queensland, to increase ethanol in unleaded fuel. That was met with some pretty unhappy customers. Ethanol is something that hasn't been exploited to its full potential. You mention that there might need to be conversions; that would be more than likely the case?

Mr SCOTT - Basically, the FCAI is saying that pretty much every vehicle built after 1986 is capable of accepting E10 - which is 10 per cent ethanol blend. What happened in Queensland was that there were some fuel suppliers who slipped in a lot more.

Mr BEST - So it was over 10 per cent?

Mr SCOTT - Yes, it was over 10 per cent and people were seeing problems with their fuelling system.

Mr BEST - It runs hotter, doesn't it?

Mr SCOTT - Timing is a little issue but it is mainly the fuelling system because ethanol is hygroscopic, it absorbs moisture, therefore you get rusting problems if you don't have the proper pipework and the like. It does burn hotter so you have to adjust the timing very slightly. All the vehicle manufacturers in Australia also produce vehicles that are up to fully-flex standard elsewhere in the world - they can accept over 85 per cent ethanol. So the technology is there, the engines are there, they are just sold in other parts of the world - particularly in the USA and Brazil. In fact in Brazil most of the vehicles are now E95, which means you can go up to 100 per cent ethanol.

Mr BEST - So it is the timing and some of the pipework, so a different sort of material, I suppose?

Mr SCOTT - It is basically a materials issue. You can convert any of the modern cars in Australia. In the US it would be around \$200 a vehicle, but you void the warranty.

Mr BEST - To go to a straight ethanol fuel, that is a pretty radical move; you would end up with a racing car, I suppose, wouldn't you? It's not something you do to a domestic vehicle?

Mr SCOTT - It is radical. That would take a phased introduction. Anything that runs an internal combustion engine based on petrol can run on ethanol. It just requires some of these conversion issues.

Mr GREEN - They effectively do it in Brazil.

Mr SCOTT - They do it in Brazil. They have fully-flex vehicles. They call it E95, but basically they run 100 per cent.

Mr BEST - Is there any difference in safety? I understand you can't see ethanol flame.

Mr SCOTT - There are issues like vapour pressure. We all know the issues that happened about 10 years ago with people having to breathe fumes as they are filling their vehicles - that is a vapour pressure. Ethanol has a slightly higher vapour pressure so you get more of it.

Mr BEST - So a different set-up?

Mr SCOTT - Potentially a different set-up. The Biofuels Taskforce reports that it is a consideration, but they've done research in Sydney and say that it wasn't that much of a problem and that they would get by with it. The motor manufacturers are the ones who are going to have to come on board and start using the technology they use elsewhere in the world and putting it into vehicles here. That would not take much of an incentive. The technology is there; certainly all the models, apart from the Falcon that we make here, are fully-flex elsewhere in the world.

Mr BEST - And 100 per cent diesel replacement perhaps?

Mr SCOTT - Yes. They are using it up to 20 per cent in Europe already but it runs fine. In fact both the ethanol and the diesel are rated as slightly better in terms of emissions. It is slightly worse with the nitrous oxides but on all the other nasties they are actually better.

Mr BEST - Finally, what would it cost to build a plant?

Mr SCOTT - It is in there. If we were to look at supplying one hundred per cent of Tasmania's fuel needs - and this is very hypothetical - it would be in the order of \$800 million to \$1.5 billion.

Mr BEST - Right. And would that make your 300 litres per tonne of woodchip?

Mr SCOTT - Roughly.

Mr BEST - Which you could do in seven minutes perhaps?

Mr SCOTT - That is what this pilot in the US is claiming. But it is only a claim at this stage.

CHAIR - Michael, thank you very much. That was very interesting. It may well be that the committee will get back to you with some further questions or comments. I thank you very much for coming in and giving us that deliberation. It is much appreciated.

THE WITNESS WITHDREW.

Mr FRASER KIRKPATRICK, POWERCO, TASMANIA WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

CHAIR (Mr Hall) - Fraser, we have your submission and we will give you the opportunity to speak to that and then our members can ask you some questions.

Mr KIRKPATRICK - First of all I would like to thank the Chairman and the committee for giving me the opportunity to support and clarify some of the presentation. I will give you a little bit of background about myself that might add to the submission that has been made to the committee. I started at Powerco in 2003 when I first came to Tasmania. Prior to that I was a Duke Energy international employee working on the Tasmanian project, getting that commercially over the line. My background as a power engineer has certainly helped in other aspects.

Regarding some of the submissions that you have seen over the table, obviously there was an earlier study done by Duke which we put in place back in 2002, I think it was. We have also provided our own submission to this committee. Today what I would not mind doing is closing a bit of a loop, I suppose, to say that our interest as Powerco has somewhat extended to the State over the last few months. Obviously our parent, Babcock and Brown, have taken a significant further step in their investment in the gas industry in Tasmania by purchasing the rights to the Tasmanian gas pipeline. That being the case, I suppose that in respect to the previous Alinta presentations you have had, Powerco can equally represent those. Certainly I'm aware of those, so I can answer questions on those submissions too. I am pretty sure that Simon in a forwarded e-mail said the same thing to you recently as well.

Over the past 12 or 18 months since we started to take more of an active interest in the remote networks - obviously we have been fairly heavily involved in getting our distribution networks and so forth operational and getting a number of key customers on board and consuming natural gas - is it has only been, I suppose, in the past nine months that there has been some significant development. At the time of the submission that Powerco put in place the LNG and CNG markets were in their infancy, so I would like to try to add some support to what has happened since that date.

Natural gas offers two opportunities for alternative fuels. Obviously natural gas as a source by itself can be compressed into a compressed format, and if you want to then further compress it, you liquefy it and it turns into LNG which people are quite well aware is being exported off our markets. A fully unregulated price throughout Australia, as far as a guaranteed price is concerned, is basically setting the market. I don't know where that LNG will go into the future but certainly that's an attractive option with gas because if you can take forward long-term hedge contracts without any type of material business risk to taxes, and so forth, it may come into the future; certainly any type of indexing done by an international body.

The CNG and LNG fleets are materially quite different, and certainly in Tasmania that is no different. CNG tends to satisfy the small-haul fleets, the small horsepower engines. As such, a lot of those businesses inherently are the small businesses willing to take long-term capital investment in CNG. To them that is problematic. It is less so with LNG which has the large potential for savings for long-haul transport. Those inherently are the large businesses which are more simple and more realistic to get off the ground

because you are able to sign long-term contractual agreements with large businesses as opposed to small businesses. So they are two different markets, but interposed they are still a natural gas product.

Tasmania is a very attractive place to look at alternative fuels, full stop, no matter what alternative you choose. I suppose geographically it is because of the size, location and its transport routes. They are fairly short, fairly transparent, and there are good, long-haul ones there, too, so they do suit a mixture of fuels in Tasmania. I think some of the developments in the market now would probably indicate that CNG has taken quite a market hold internationally. In fact, as submission reported, there are a significant number of international players now out there selling to government agencies.

There are large refuelling depots; Peru, Russia, China and all those places now are putting significant investment into CNG. Basically, there will be a lot of those in the future primarily because they don't have natural gas sitting on their doorsteps so they need to transport it in some format and they don't have reserves of fuel. I think in Australia CNG's hold has been in the bus market, the metro market and small-haul vehicles. Certainly the developments of the past nine months have been that every metropolitan fleet in Australia presently uses CNG. Brisbane took a 30 per cent incremental investment in their capital for CNG. They might be taking more buses on. So are Western Australia, which to me is some indication that someone is saying there's a clear merit in natural gas.

CHAIR - Melbourne?

Mr KIRKPATRICK - Melbourne Metro has some CNG but to a lesser extent because of the trams. Trams get their power from electricity and electricity gets it from gas fuelling stations, so interestingly enough, it still comes from inherently the same sort of source. When that comes off the market, I suppose the next level would be a natural gas alternative.

Mr GUTWEIN - What's the percentage of CNG vehicles as part of the Metro fleet in Melbourne? Do you know?

Mr KIRKPATRICK - The Metro fleet in Melbourne would probably be the least of all the fleets, primarily because of the trams and trains. I could not give you those numbers. I can chase those ones down and let you know. That is not a problem.

CHAIR - Brisbane, probably the most.

Mr KIRKPATRICK - Brisbane, Sydney, Canberra. Canberra you can compare with Tasmania - about 250 buses, same regional-type routes and more than half their fleet with natural gas. They are going further and are putting in another refilling station. I suppose in business models, the model can always fail or not through taking specific business-related viewpoints and therefore positioning that business case to a particular risk profile. You take that profile and its merits. In Tasmania, Metro in my view needs to take a harder risk profile, and that would be my recommendation.

CHAIR - You talk about LNG for longer distance transport - log trucks, milk tankers and that sort of thing here in Tasmania. What is the down side in terms of storage tanks on the vehicles?

Mr KIRKPATRICK - With the CNG market the loss of haulage capacity is insignificant because primarily the CNG market is for small-haul vehicles, so just make small-haul vehicles potentially a bit larger or make its fuel tank a bit longer. You do not need material tare weight. However on LNG you potentially lose tare weight because they are potentially longer haul vehicles. CNG being for shorter haul you do not need to have 800 litres of fuel; you do not need to have that requirement of fuel. Capacity-wise you find that LNG does take up some tare haulage weight on a truck, as opposed to CNG.

CHAIR - So where do they mount those tanks?

Mr KIRKPATRICK - Directly behind the back of them.

Mr GREEN - With compressed natural gas, the issue seems to me the capital cost associated with the establishment of the compressor itself.

Mr KIRKPATRICK - And getting enough business strength behind that type of case.

Mr GREEN - What is the corporate view with respect to assistance in that process if you are to sell the product?

Mr KIRKPATRICK - The problems that develop in the market are that if you restrict its usage to a limited number then that is the limited number who will do it. If you put in refuelling stations in a number of places, as some companies do, they will sit there and skim the market. What is the benefit for Tasmania - your consumers are still going to have to pay the same price. There will not be a deliverable advantage to the community via small-scale alternative fuellers. You need to take a larger scale alternative-fuel picture to get the benefit from the mass to enable the price to drop.

CHAIR - How many filler stations are in Canberra at the moment?

Mr KIRKPATRICK - There are about four public refuelling stations in Canberra, owned by the Metro, but they are looking to enable those for trucking fleets, but that is inherent with the retail risk. In other words, you had better make sure there is transparency in who sells the gas otherwise you find that the end party who owns it will take that margin up.

CHAIR - So those four are underpinned by Metro at the moment. How many private vehicles or commercial vans or anything else use it?

Mr KIRKPATRICK - The numbers are very few.

CHAIR - That is to do with the cost of conversion?

Mr KIRKPATRICK - It is to do with developing the business model. A little of that comes to whether they will be available for CNG.

Mr GREEN - That is really what is going to get round to, being able to grow the market. What is the corporate view about it?

Mr KIRKPATRICK - CNG vehicles are updated all the time. Isuzu are the leader for vehicles in Australia, they have quite a few hundred in Australia, so when they introduce a new model that new model then needs to be introduced to the Australian market. Isuzu stopped making the old model so when a new model comes in it needs to get approved by the Australian regulatory authorities for emission standards and a number of issues. So they need to underpin the minimum purchase of around about 40 vehicles to cover that threshold for them to say, 'I am now going to open the Australian market to those vehicles'. We are saying, 'I think we've got those 40 vehicles, or around there, or we can put pressure on even in Tasmania to get those 40 vehicles on board', but it means that there needs to be some type of commitment from a number of parties. That is, I suppose, what today we are trying to put on the table and flesh out. There are a number of smaller parties but there are some things that I believe the State and the municipal governments can do to put pressure on.

CHAIR - Most of those small vehicles at the moment are retro-fitted?

Mr KIRKPATRICK - No, fully 100 per cent. The old days of converting vehicles are going primarily because you cannot get the environmental European standard out of your vehicle - the emission standard recognised by the Government - so you do not get your credits. The credits are what makes a best business case.

CHAIR - Which manufacturers are doing it?

Mr KIRKPATRICK - Isuzu are primarily leading in the market. Compair, I believe, are making a presentation tomorrow. They know Isuzu very well so you could technically ask them questions about that.

CHAIR - What about the small vehicle market?

Mr KIRKPATRICK - Any vehicle that you would like; it is just a matter of getting that number. Honda, Ford, Chrysler - all those companies make vehicles. As soon as you get that threshold of vehicles they will be introduced into the Australian market. Once again, that is a threshold of about 40. Melbourne City Council have taken on 200.

Mr GREEN - It is always chicken and egg, isn't it? People could go out and buy the vehicles but then they would need the compressor. What we need to do is strategically work out where we place some filler stations.

Mr KIRKPATRICK - That is part of the recommendation. I am not so bold as to say, 'Here is a paper to tell you how to do it'. Part of my recommendation is that there would need to be a formalised group with some set achievable goals and boundaries, and at the end of the day in principle agreeing about some capital investment. I think the group is in favour of CNG or LNG being the fuel and they can look forward to supporting a business model. The CNG is a proven market. It is a matter of getting over the line. Most councils could do it quite easily if they get pushed to do it, I suppose. They will make a material saving for one year and it gets taken off their balance sheet in the next year; it is just taken for granted. So where is their enthusiasm and involvement? Where is the

ongoing enthusiasm? The ongoing saving must be there and that is fine. That is banked for the first year and it is exciting, and in the second year it is business as usual.

Mr McKIM - I wanted to ask you about Metro's conclusion that the use of CNG becomes for them commercially attractive if the fuel price is above about \$1.40 a litre. Later in their submission they say this, and I quote from page 6:

'It is acknowledged that Powerco, using the same spreadsheet and basic assumptions, have reached a more optimistic view of the attractiveness of CNGs for bus fuel.'

Are you able to tell us what that view is? Did you come to a figure in relation to what the price of diesel would have to be before CNG becomes commercially attractive to Metro?

Mr KIRKPATRICK - A business model inherently has a significant number of inputs. To take any rash statement, like the price of fuel being inherently the reason, is a matter such that if I pushed that fuel limit to a certain number I could make any business case fall. I would definitely say that the business model for any introduction of CNG hinges on the rigour and enthusiasm in taking the fleet on board. ACT last year took on eight buses and had their own refuelling station. If you take on one bus a year over a 20-year period then I am sure that the early initial infrastructure cost, borne as a dual-loss charge, just kills it.

Mr McKIM - Yes, they have covered that in relation to how large the start-up would be, in terms of fleet numbers, but they have said that using the same spread sheet and basic assumptions Powerco have reached a more optimistic view of the attractiveness of CNG as a bus fuel. Did that more optimistic view - and I acknowledge they are Metro's words - include an analysis by Powerco of what the price of diesel would have to hit before CNG became viable for Metro?

Mr KIRKPATRICK - It is certainly a question you could ask Treasury.

Mr McKIM - Yes, Metro are coming in so I will ask them as well.

Mr KIRKPATRICK - Once again, it is the boldness of your investment depending upon whether you want to invest in infrastructure or a third party wants to. That is potentially one reason for a business case so far. The cost of capital for my business is obviously a certain number and for Treasury it is a certain number as well. However, there is how you then capitalise that equipment and your depreciation rates. A lot of inputs to a business model make it fail and I dare say that, in taking on the CNG approach to bus companies, they have all had to say, 'We know that it doesn't work if you take two buses each year and then inherently do it', because, as Mr Green was saying, you are up for a large inherent capital infrastructure cost at that first point in time.

Mr McKIM - In terms of a compression facility?

Mr KIRKPATRICK - In terms of a compression facility and so forth. Powerco, I believe in any sense, bent over backwards to try to make the model work. It is a small gigajoule number that the buses are going to use so as far as where we address it as our business is

concerned, it just started to work its way down to the point where it was too hard to push - let it go.

CHAIR - What is your current capex required or estimated to put a filling station into Hobart, for example?

Mr KIRKPATRICK - The facility that Metro are talking about was in the vicinity of about \$1 million to \$1.2 million because that is the requirement for the high levels of refuelling that they require. It depends upon how quickly you want to fill your petrol tank. The bus wants to fill in four minutes; I am quite happy to fill in five. My tank is one-tenth the size so I might choose a refuelling station near my home.

CHAIR - If you talk about expanding CNG use by vehicles in Tasmania, Tasmania being a decentralised State conceivably you would probably need three refilling stations. Have you thought about that at all?

Mr KIRKPATRICK - Probably four would be logical. Launceston, Hobart, Burnie and Devonport would be the logical centres.

CHAIR - Right.

Mr KIRKPATRICK - Then hopefully that would be used as a business model for Metro as well as some other business which may come over the line.

Mr GREEN - Just to follow on from that, you talked about a domestic-type customer. What would be the capital cost of a compressor, say, in your garage these days?

Mr KIRKPATRICK - Green Star produce a compressor station for about \$1 500 now but the question is who is going to service that car?

Mr GREEN - Yes, that is the problem.

Mr KIRKPATRICK - That is where the merits of the mass come on board. Powerco's fleet is 15 cars. They will change them all tomorrow. How many fleet vehicles does the Government potentially have that could be converted?

CHAIR - So, just to get this straight, the process is we can bring in natural gas, compressors on site - that is the way it works?

Mr KIRKPATRICK - Yes.

CHAIR - How does LNG work? What is the process there?

Mr KIRKPATRICK - LNG has gone down an interesting path in Australia. Firstly, in Tasmania it has gone down two paths, and I think it is about to go down one. You may have seen as part of the Regional Forestry Agreement that the Government gave some money to the Tasmanian Forest Industry Development Program.

Mr McKIM - There are so many slush funds in forestry, you lose track of all of them.

Mr KIRKPATRICK - There you go, but there is a one that I do like and that one has, in principle, provided to underpin the funding of a group of log truckers, and it is public news. Obviously the Gunns project inherently has the potential for ensuring long-term sustainability of a foundation customer for their transport fleet too and that is something that Powerco has been working on with Gunns through the pulp mill project.

Obviously now it is going down the path where it is looking as though it may be successful, we are looking to combine with the LNG refuellers and put in a significant, large refuelling station in Tasmania which would be owner-operated by Babcock and Brown.

Mr GREEN - This is really what I was trying to get at before.

Mr KIRKPATRICK - But that will meet the requirements of a heavy fuel market - the large truckers. Underpinning that would be eight customers.

CHAIR - All the stuff that we are exporting off the North West Shelf at the moment goes in the form of LNG to China, doesn't it?

Mr KIRKPATRICK - That's right.

CHAIR - So it is brought in out of the Arafura Sea and then liquefied onshore.

Mr KIRKPATRICK - It is liquefied close to shore to remove itself for taxation purposes.

CHAIR - With our gas we are totally reliant on that Longford field in Victoria, are we?

Mr KIRKPATRICK - Victoria have their own LNG plant, which they have had to double the size of now because they have trucks and businesses that want to run on LNG now that that technology is being developed. They used that LNG plant in Dandenong, which is off the gas network, for bolstering the transmission pipeline pressures and capacities - so they use it as a buffer. It was put in there by a State government many years ago and underpinned by State Government - similar to Basslink, if you like; like a mini Basslink. If the network ever goes down, such as the Longford compressor station and so forth, they have a 1 200-tonne tank of LNG. I wouldn't say Tasmania will do the same thing but building an LNG facility is no different; it is just a matter of capacity and size. The principle of producing LNG is that you get about one-thirty-sixth of CNG, which is only one-twelfth of natural gas, so you are getting it down to about one-sixtieth of the volumetric capacity, which is why there are two of those tanks, rather than one diesel tank.

I believe the LNG business case has far more standing on its merits because it has foundation customers. It has large customers who are willing to take more of a long-term business risk. Already they are taking a significant long-term business risk with the price escalations of diesel in their contracts.

Mr GREEN - Is there much to the conversion, say, of a vehicle running on liquid?

Mr KIRKPATRICK - The present LNG technology that we are looking to adopt would be the new technology, which is a direct-injection technology of LNG, and principally you

fire the engine on diesel. It will run fine on diesel but it runs on 100 per cent LNG, natural gas. So once it is fired up and warm, it goes on natural gas 100 per cent; it doesn't turn back to diesel. Principally it can run on diesel but the problem that people had before was that they were trying to tune an engine to run on diesel and LNG without having the foresight to say, 'Why are you doing this?' It is a reserve backup system; it is like having a backup to a backup. You have to take one course, and that course now is fully dedicated LNG trucks.

CHAIR - What is the additional capital cost to convert or to buy an off-the-shelf, dedicated LNG engine? How long does it take to recover that cost in terms of lower fuel or energy costs?

Mr KIRKPATRICK - The Cummins Westport engine is in its sixth month of trial, so I don't know if they have delivered a price. In the US there is a marginal difference between the price of an LNG truck and a conventional diesel truck because they have mass. They produce every LNG vehicle in one day in the US for the whole year. It is still a pretty significant number. I think 220 000 trucks run on LNG in the states at the moment, so it is a big number but it is a very small number in the realm of things. In Tasmania it is the same. We might offer a trucking fleet of 500 or 600 long-haul trucks. We would suggest that if they have not turned the MPV corner after the second year, there is something wrong.

CHAIR - As well as lower emissions or different emissions?

Mr KIRKPATRICK - Lower emissions; long-term stable price. I have pages of benefits of gas as compared to conventional diesels. My point to this committee is that the LNG users believe it will encourage itself through those foundation customers - the CNG market where there is a significant amount of benefit to the general community because the general community basically pays for that buffer, while everyone doesn't want to remove themselves off conventional diesel products.

Mr McKIM - Why is Metro looking at CNG and not LNG?

Mr KIRKPATRICK - Because there is no LNG plant in Tassie.

Mr McKIM - Okay, but in the hypothetical situation that LNG did become available through the mechanisms you were talking about earlier would LNG be more attractive to Metro than, say, CNG?

Mr KIRKPATRICK - We would bring LNG to the Metro bus fleet then we would put it through devaporisation to turn it back to CNG so a section of the plant could make compressed liquefied natural gas. However, minimally we are talking probably 18 to 20 months from now until potentially we will have an LNG plant running. So that is still two years savings and two years of business why it does not get done.

Mr GREEN - This might be a dumb question -

Mr KIRKPATRICK - There is never a dumb question to me.

Mr GREEN - but if you have a centralised compressor are there vessels to carry compressed natural gas?

Mr KIRKPATRICK - That is probably one of the other advantages. I put a dot point on some of these market developments and recommendations and I can leave this with you and you can read and I can add more. Certainly the electricity prices are going to send the natural gas market to a lot of different and far reaching places - there are no two ways about it. They are already doing it in the Northern Territory; they are running compressed natural gas trucks out because augmented electricity is getting out of control. LNG offers that same opportunity to reduce augmentation costs. I think everyone has had their say about the 18 per cent power rise increases it but it did not surprise us because we saw the level of investment taking place in augmentation because the State has not taken a view to how you remotely provide power. Every other State has.

Mr GREEN - But that aspect is regulated.

Mr KIRKPATRICK - I don't doubt it is regulated but if network augmentation can be offset through investment in gas infrastructure - CNG and LNG - then obviously that would be the option to take. I do not think that there has necessarily been due process but the due business case model has been reviewed to understand whether that augmentation should have taken place or whether they should have just built themselves a CNG plant and transported it. That is one thing that the alternative fuels will stop. They reduce the need to augment which, once again, fundamentally is the main reason why 35 per cent electricity costs are through the networks - that is where the proportion of transmission and distribution charges are. It is the same with our business, it is no different, and that is why we went down the path of change.

Mr GUTWEIN - Where is the fuel cell technology at the moment?

Mr KIRKPATRICK - Powerco has an international licence in Australia through Ceramic Fuel Cells Limited in the US for the development of this fuel cell market. It is not going very far or very fast.

Mr McKIM - Are you talking about fuel cells generically or gas fuel cells?

Mr KIRKPATRICK - Recovery of hydrogen through fuel cells is a very slow process because of the membrane technology and so forth. I don't claim to be an expert but I have been to the site and I have seen how they make them all so I can understand how it is done through solar, as well as through gas. The gas way is far easier and that is still some time off being developed. The solar technique, other than simple battery cell replacement, is still a way off in trying to find a fundamental storage urn for all that energy from the sun while gas is not available. That is the tough part.

Mr GREEN - Isn't there a situation though where a wind turbine generates electricity and that electricity is used to crack the cells which produce the fuel -

Mr KIRKPATRICK - To put back into the battery?

Mr GREEN - No, I thought to run a compression engine? We are talking about on Cape Barren Island.

Mr KIRKPATRICK - It is exactly the same grant program that the Government has gone with to look at that very process of using wind turbines to then use battery storage banks. They use those battery storage banks at night and gain that through the renewal of credit system.

Mr GREEN - No, I had the understanding that it was actually going to produce a hydrogen fuel.

Mr KIRKPATRICK - It does.

Mr GREEN - As opposed to what is happening on King Island where you have those huge battery banks - can anyone think of the name of that technology?

Mr KIRKPATRICK - I can't.

Mr GREEN - The one on Cape Barren Island is talking about using that energy to actually crack the hydrogen cells to produce fuel which would take over from the diesel generator that is operating there. You would store that fuel, as opposed to diesel.

Mr KIRKPATRICK - You need a hydrogen storage sink of some form and that is where everyone is finding the technology difficult - finding how to generate that storage capacity when the sun doesn't shine and the wind doesn't blow and the gas isn't on either.

Mr GREEN - Yes, then it runs on diesel. That was the way that I understood it.

Mr KIRKPATRICK - Quite simply if the LNG plant grew some legs in Tasmania I would certainly think about coming back to this committee and saying that you should be looking to the islands to transport the LNG to get rid of your diesel unit.

Mr GREEN - Yes.

Mr KIRKPATRICK - Wind is on and having that secondary source has already shown conversion to diesel. So certainly one of the recommendations that I would make is that if this LNG does grow some legs, and I am confident on that point, certainly the islands would be the obvious foundation customer to potentially ensure the capacity of this LNG plant. Once the capacity is gone, it is gone. Add on another 2 tonnes everyday. One of the things that I have seen recently in a couple of tenders that we put out - obviously trying to create a little bit of competitive pressure in the market - is the introduction of terms in contracts that, if alternative fuels were chosen, there would be a direction from the principal to the contractor to move in that direction. I would be recommending to the Government that in their tenders they should seriously look at putting an attraction or a means of attraction for companies to help vital transport services to look at alternative fuels.

Mr McKIM - Even though the Government is not doing it itself?

Mr KIRKPATRICK - And that is how it stymies. That is how it turns over. Most of the States are looking to introduce - or have introduced - credit systems based on greenhouse, although not with transport. That is sign of the times to come. Obviously

the Tasmanian Government needs to consider where they stand on a mandatory credit system with energy, because if you look at the energy market transport presently represents between 30-40 per cent of total energy. Electrical energy is a big chunk of that and transport is a big part of it. In relation to using your own product which is generated in Australia, the balance of trade figures talk for themselves but more importantly from a green perspective they also reduce the requirement for transport - LNG and CNG do not have trucks and tankers.

Mr GREEN - You are obviously a lobbyist. I wonder what the fossil fuel industry is having to say about all that as well.

Mr KIRKPATRICK - The fossil fuel debate I think got handed a very heavy hit last Friday in the *Financial Review*. I have a copy here if you want to read it. It is a very interesting article that basically accepts that the Government tried to release in their budgetary papers their forward feeling toward the way they are going to deal with biodiesel. It seems a significant threat to industry and they are going to tax it straight up.

Mr GREEN - That's interesting.

Mr KIRKPATRICK - Some of the things that have actually happened recently have been the LNG and LPG conversions token. That was bit one-sided and we would certainly like to see that someone is lobbying to ensure that, as far as offering people an alternative, it is not only LPG that attracts the Government's future conversion moneys. LPG is just as dangerous as diesel when it comes to price. I see it all the time, we buy it ourselves.

CHAIR - Yes. So is it as much of a big deal to convert, say, and LPG cab in Melbourne to a CNG model? What has to happen?

Mr KIRKPATRICK - You just buy dedicated CNG vehicles.

CHAIR - Okay, so you don't do a conversion job.

Mr KIRKPATRICK - No. The Government started off the alternative fuels conversion program a number of years ago, and I think they've found since then that the success with conversions has been nowhere near as vehicles that are purely dedicated to the actual service. The conversion program is still running - and we even tried it through Metro through the grants program. That is principally one thing you should ask them - their bold view on the grants program. I am pretty bold with grants because I think you get them if you push hard enough, but I don't know whether Metro took the same view as to how they would benefit from the alternative fuels conversion program.

CHAIR - So if LPG costs are still significantly higher here than what they are -

Mr KIRKPATRICK - It's still comparable with diesel, there were index prices.

CHAIR - Sorry?

Mr KIRKPATRICK - They are fully indexed prices: the same guy who owns the oil fuel owns the LPG fuel. When you look at comparing the price at the bowser, 60 cents to

\$1.20, you have to remember that LPG only has three-fifths, or so, of the energy of unleaded petrols. So you need to put that price comparison in place, and then when diesel guys are getting their off-road rebate of 36 cents, LPG doesn't make sense.

Mr GREEN - I think there will be issues in the future with respect to carbon, particularly at the fields with venting carbon. They are going to need sequestration, particularly in the North West Shelf, if they can come up with the technology to put it back in the hole.

Mr KIRKPATRICK - One thing I didn't talk about in the paper because I hadn't done a lot of development, was in regard to agriculture. This is a bit of a pointed one. The Department of Economic Development have completed their CEA study, Controlled Environment Agriculture study, which actually identifies Tasmania and three or four regions as being the most economic and operationally efficient areas to be involved in the large greenhouses and growing capsicums, and so forth. Tomatoes make up 70 per cent of the actual greenhouse market in the world.

In developing the CNG natural gas markets, obviously that is inherently an advantage to the agriculture industry because of course they can reuse the energy of natural gas twice over. They can use it to generate power, for instance, then they can use the off gases to heat the actual hothouse. They get a double kick and they also get a greenhouse credit out of that, too, so they get a third kick out of it.

Some of those businesses potentially have looked at CNG, or LNG, and said if it was there to use, great, if it means they get a \$1 million on it as a greenhouse operator. I am not so certain that it is a matter of that bold business view, but certainly there are some definite benefits as a sidestream to CNG and LNG for the agriculture industry, in particular the greenhouse area. That study is available now, I think it is a public document. I have seen lots of them in the public already, so I assume it's a public document from DED. So that's the CEA study's two reports, 2006 and 2007.

Obviously, that then inherently comes hand in hand with this augmentation issue. These hothouses tend to be in the middle of nowhere, they tend to be connected to electrical networks. If they potentially had CNG network, then they wouldn't require the augmentation and hopefully that would reduce and offset some of the capital expenditure.

CHAIR - Anything else, Fraser? Thank you very much for your presentation -

Mr KIRKPATRICK - These are a couple of copies of my notes just to say where the present market is going and some of those recommendations.

CHAIR - Thank you very much for your time and eventually we will get a report out.

Mr KIRKPATRICK - What is the process now?

CHAIR - We've got a lot of submissions to take in a verbal and written form. Then the committee takes account of all those and we eventually draw some conclusions and put some recommendations to government.

Mr KIRKPATRICK - Are there time lines?

CHAIR - We have two other references on at the moment, but we will try to get them done as expeditiously as we can. I note that one of the Victorian parliamentary committees just did one. As you know, it is a moving feast, there are things happening in every country all round the world at a hundred miles an hour with all this stuff. It is pretty interesting actually.

Mr KIRKPATRICK - Thank you very much for your time.

THE WITNESS WITHDREW.

Mr RUSSELL ATHOL REID, GENERAL MANAGER, OPTION ONE, WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

CHAIR (Mr Hall) - We have your submission, so I would ask you to comment on that and then members will ask questions.

Mr REID - My submission really is about compressed natural gas as opposed to natural gas overall. I have made a short comment there about liquefied natural gas - LNG - and I am sure everyone knows the jargon these days.

CHAIR - Could explain about Option One? Is it your company, Russell?

Mr REID - Option One is a company that is owned by Powerco Australia Holdings Ltd, which itself is held by Babcock & Brown. Powerco Australia Holdings also owns Powerco Tasmania, which is the reticulation distribution company. We are, I suppose, sister companies; we are in the same camp.

The LNG is really a technology for large vehicles or long-hauls on pretty continuous circuit trips, returning to a point where they can refuel. The reason for that is that liquefied natural gas is kept at a very low temperature and to maintain the temperature a small amount is evaporated off constantly. The latent heat of vaporisation keeps the temperature of the rest of the gas down and therefore keeps it in a liquid state. Whether on a ship, a truck or a train you can take off a small proportion of that evaporated gas and use that as the fuel. Effectively that is how that works. That is suitable for long hauls.

As part of the Gunns pulp mill proposal, there is most likely going to be an LNG plant there. That will provide fuel to replace the diesel that is currently used for the log trucks and any other service trucks that are coming regularly to the site. That in itself will virtually halve the cost of fuel for the transport for those vehicles and also reduce greenhouse gas by something in the order of 20 per cent. There are other people who no doubt will tell you about that. That is a commercially viable operation that is demonstrated in a number of cases around Australia already. I don't think there is a lot that would affect this committee, as I understand it, in that it will just a commercial decision to go ahead. I don't think they will be seeking any funding or material support from the Government, just regulatory support no doubt.

Compressed natural gas - the CNG - is what I would like to speak mostly about. Compressed natural gas, because it is only compressed and doesn't need to be retained at a low temperature, can remain in that state as long as necessary, in a similar way to LPG. Unlike LPG, it is still in a gaseous state and therefore it takes up a larger volume for the same amount of energy compared with LPGA. It is not suitable for all activities, but it is particularly suitable for bus or light truck fleets that are working within a metropolitan area or an area where they can be refuelled on a regular basis. The range is about 200-250 kilometres. They are normally fitted to vehicles of that sort, so that means for most of those purposes it is daily use and they refill at night.

Currently, I think all other capital cities have CNG bus fleets. That is assisted by the fact that they mostly convert about 200 buses, which fits the size of the compressor station that is needed, so all that technology is there. No doubt you have read plenty of reports

about all of that. Outside Tasmania that provides us with a base load or a base situation to use CNG. In Tasmania, because of our size, we don't have that same opportunity. Having spoken, for example, to Metro, which would likely be a key player in any CNG development, they buy about eight or 10 new buses a year. If they were looking at just that replacement program, and using a compressor of the size that they in other capital cities, obviously it would be 20 years before they had that number and therefore it makes the economics of the project less attractive. It is sustainable in the long term and it is a good long-term solution, but there is that problem of getting up to sufficient load to cut the cost of it and preserve the station in the short term.

CNG has also been trialled by a number of councils around Australia. As I say, the best-documented one that I have found is the Gosford Council, but there are a number of councils in Adelaide and Perth also using CNG vehicles. They obviously do not use such a big compressor. The major cost of compressor stations and refuelling stations is that for a bus fleet you would need to have a compressor to compress the gas, store it in high-pressure containers so that you can get a fast fill for the bus or the vehicle and you don't have to wait there for two hours while it is pumping it up, or half an hour, whatever it might take. So the storage facility is the significant part of the cost in any facility like that.

A council on the other hand probably only have vehicles working one shift and so a smaller compressor and a smaller storage facility - the one in Gosford cost them about \$140 000, including the storage. What that means is that they would schedule their vehicles to come in and be refuelled over a day or over a shift. It would not be quite as fast in the filling process but as long as they can schedule that, it gives them substantial savings.

So as I have said, based on their findings, they had a 20 per cent operational saving and that is against the New South Wales subsidised diesel price, which I believe when they did the trial was about 80 cents a litre. So it would be a higher saving against a normal unsubsidised price. That 20 per cent operational saving also included in it their lost productivity from the down time when they are refuelling and so on. As far as can I understand, that figure is a net saving taking in all those factors.

There is 18 per cent greenhouse gas reduction as against diesel, which is significant, and if we are looking at converting across Australia, that would be a significant reduction, equivalent to about the increase for 20 years in the normal growth of fuel. So it would effectively reduce our greenhouse gas emissions from transport back to where it was 20 years ago.

There is also a 93 per cent reduction in particulates and that is particularly significant in metropolitan areas and particularly in the Launceston area where there is a smoke problem and fuel particulates from vehicles that contributes something in the order of 10 per cent of the total particulate load, so there is an opportunity to have some benefit in that regard as well.

CHAIR - Russell, when comparing it to diesel, at the moment there are a lot of new-age, as they call them, cleaner diesels, low sulphur-type products on the market now. Is that 93 per cent of those or are you talking about a standard diesel mix?

Mr REID - As I understand it, the particulates will not be improved by the new diesels. The low-sulphur diesels certainly take the sulphur out. I do not know that they reduce the particulates. I cannot comment further on that, but it is my understanding that the particulates are still there anyway.

The other interesting thing was that it reduced the noise pollution by six decibels and that council, particularly, thought that was a significant benefit to their employees as well as the general public.

Moving on to what we are doing in Tasmania, Cripps Nubake in Hobart has been trialling one bread delivery truck for 12 months. They found that they had a 49 per cent fuel cost reduction. They were using a small compressor that was supplied by Compair to refuel the truck as they went. So they did not really have storage facilities, it was just to trial the costs and the running parameters of the truck. So that 49 per cent does not include the cost of the compressor and so on.

Mr HARRISS - Who is Compair?

Mr REID - Compair is an international company that makes compressors for a whole range of motors. They were running a trial at Glenorchy. Just to follow on from that, and I do not know whether they have made any submissions or not, they are at a stage where they would like to go ahead and fully implement CNG for all their vehicles but they have still got the capital cost of setting up a compressor station and they would like to share that cost maybe with the Glenorchy council and somehow reduce the capital costs involved in setting up.

Mr GREEN - What about Option One?

Mr REID - We might like to do it as well but again for us it still would not be a very good investment if we were not getting full utilisation of the plant.

Mr GREEN - Except that you would be selling your gas.

Mr REID - Yes, that is right. We are certainly interested in looking at options. And I have said later on that we would be interested in looking at joint facilities or shared facilities but it really has to stack up as a business.

Mr GREEN - It always seems to be the same argument, though; it is always the chicken and the egg. We need to break the ice somehow.

Mr REID - That is exactly right. I am working solidly on that. I have made an assessment of all the councils' needs around the State, or all the ones that are on the network, and a number of businesses. We have talked to a number of businesses, and looking at that, there are significant savings that can be achieved for all those people as long as we can get that shared facility.

Mr GREEN - On a lease type of arrangement or something.

Mr REID - Sorry?

Mr GREEN - If you put the compressor in on a lease back.

Mr REID - There are all those possibilities but it is still a matter of trying to get enough volume to start with.

Mr GUTWEIN - How many vehicles do the northern councils run? What are their fleet sizes? Sorry for diverting you.

Mr REID - No, I can give you a fair idea.

Mr GUTWEIN - The ones covered by Northern Tasmania Development, Burnie.

Mr REID - Unfortunately most of those are not on the network. Launceston, Northern Midlands, Meander Valley and George Town potentially. There are probably about 40 to 50 light trucks and a similar number of cars. And we have not looked at earthmoving equipment and all that sort of thing yet. If you could get all those together you would have enough to make it start to look viable. But obviously George Town people do not want to drive to Launceston to get gas and vice versa.

Mr GREEN - You talked about quick refilling at, say, a bus depot because you have compressed your gas into a retained cylinder. Is there anyway that you can actually transport that cylinder?

Mr REID - Yes, certainly you can and that is one of the opportunities; if there was a compressor station that could be taken to remote sites as well. So that might be another opportunity once we get a large compressor station in there. For example, there is some talk of putting a remote network out at the Launceston Airport. If you had that, you could take cylinders out there to provide CNG into that network.

Mr GUTWEIN - What is the estimate of the capital required to establish a compressor station?

Mr REID - A compressor station for a 200-bus fleet, which is one that I can talk about because it is written up, is in the order of \$1.2 million, but the associated facilities to go with that, storage facilities and setting it up, is about the same.

Mr GUTWEIN - About \$2.5 million all up.

Mr REID - About \$2.8 million was the figure that we used.

CHAIR - Yes, what you have in your notes there.

Mr REID - That is to give you a properly set up site that can store all the gas that is being compressed.

Mr GREEN - It seems like a lot of money but if you asked them what they are spending on that new service station out there at the airport it is probably the same.

Mr REID - That is right. It is a lot of money if you have not got it and it is not much if you have. It is really just a matter of how much you want to spend to get to the result.

Mr GUTWEIN - With this capital cost of the compressor, \$2.8 million, what is the additional \$150 000 council fee?

Mr REID - The \$150 000 is for a small plant, the size for Gosford. That is what Gosford's cost. That is a plant that would be similar for Launceston council, Hobart council, Glenorchy council -

CHAIR - They just plug in and fill up overnight on that?

Mr REID - There would be some storage of course but they would not be able to fast-fill them, like a bus fleet needs to be.

Mr GREEN - I wonder why? It seems strange to me because a compressor is a compressor. You can compress air within a few moments and you have a vessel on the side that gives you that capacity then to drain that air off at that pressure. I wonder why it takes so long to compress gas?

Mr REID - If you are talking about compressed air for tyres or something -

Mr GREEN - Or industrial plants. Compressors run all the pneumatically operated cylinders et cetera in a great big paper mill that I worked in. You have these compressors operating there and you have that air coming out at 80 PSI or whatever all of the time. I used to work on them.

Mr REID - Eighty PSI is about 20 kilopascals, I think, or something like that. We are talking here about 30 000. It is the same process but it is a very much higher pressure.

Mr GREEN - It just seems to me that they always talk about it being overnight but if it goes in, say, a positive displacement air compressor, one big cylinder and then smaller and smaller, and it comes out at 30 000 PSI or whatever, then it is easy to do. It must be something to do with heat generation or something like that.

Mr REID - There is the volume that you need to compress down to a very small volume, and then once you bleed that off into the truck storage you have to have enough pressure, so you are equalising the pressures at a high enough pressure to get the storage.

Mr BEST - Do you need two stages or just one stage?

Mr REID - No, multi-stage.

Mr BEST - That is what I was thinking. You would probably go to 10 000, then 20 000 or something like that?

Mr REID - It basically compresses up and then recycles around and compresses up again.

Mr BEST - Right, I understand what you mean.

Mr REID - Multi-stage rather than something that is just online where you have maybe two stages from atmospheric pressure up to what you want. This will rotate it around until it gets up to the pressure.

Mr GUTWEIN - With overnight filling, one of the northern councils might invest \$150 000 in a compressor station, so when you say it will fill overnight is that to fill a vehicle or fill a fleet?

Mr REID - You can put a network in. What they had at Gosford was six trucks, so you would have a manifold with six outlets. You plug them all in, let them go and overnight they are filled, whereas if you are running a bus fleet or trucking fleet you want to bring your truck in and for it to take five or 10 minutes, about the same time it takes to fill with diesel. So you have to have a big storage of compressed gas to be able to do that. That is why the cost is so much higher than just the compressor cost, because you have to have that amount of storage.

You could install that storage capacity progressively, so you could cut down that second \$1.4 million by doing it within the first part and then double the capacity to get the other 400 000. I think that is roughly the way it goes.

CHAIR - Russell, you talk about a 50 per cent fuel-cost savings, or it might have been even more.

Mr REID - No, 50 per cent.

CHAIR - As we know with governments of all colours and persuasions, if things are going pretty well they like to slap an excise or two around the place; that could possibly happen and that could obviously mitigate that figure to some degree. What have you heard in the industry as to what might happen with Federal Government policies and excises?

Mr REID - Both sides have given a figure on that. There is no excise, I believe, until 2010 and then it is put on at 1 per cent a year or something after that.

CHAIR - With the current policy?

Mr REID - Yes, current policy. That can always change, you are right, but there is certainly a tax incentive there. It then becomes a balance. You are the people who know what the people want in terms of cost against what they want in terms of outcomes.

CHAIR - In terms of saving with a dedicated CNG engine, is there much more in the way of maintenance or down time or servicing costs compared to a conventional petrol or diesel engine?

Mr REID - The report from Gosford about their small vehicles is that their servicing costs are less, basically because it is a cleaner fuel. I do not know that I have seen anything specifically about that in terms of bus fleets, but I am sure if there had been a problem at least it would have been mentioned. I can't remember whether I have seen anything to say there is an advantage.

CHAIR - Have there been any safety issues with, say, a rupture of a tank? They are pretty volatile.

Mr REID - It is the same as LPG; if it goes off it really goes off. In fact natural gas is less dangerous than LPG because the critical mix of air and gas to get an explosive mixture is only about 5 per cent whereas for LPG it is about 25 per cent, so there is a much lower threshold for an explosive mixture with natural gas.

The other thing is that natural gas, whether it be for this use or any other use, dissipates because it is lighter than air. If there is a leak it doesn't pool. We often hear about LPG explosions because if an LPG pipe leaks, being heavier than air it will collect in basements of buildings or on the floor, so when the fridge is turned on it explodes, whereas with natural gas being lighter than air, it just dissipates through the natural ventilation.

CHAIR - What countries around the world have really embraced CNG in terms of smaller vehicles, private vehicles, riding on the back of a larger public fleet.

Mr REID - China is certainly going very much that way and producing cars for CNG. Switzerland and a couple of the other European countries have a reasonable number.

CHAIR - Brazil.

Mr REID - Brazil is the big one at the moment - it is the biggest one - and it really depends on where their fuel comes from. Brazil has natural gas and not so much oil. Europe now is getting natural gas from Russia so it has plenty of access to natural gas and China is importing CNG, and Japan also. Isuzu have been making CNG vehicles for 10 years now in Japan.

CHAIR - If I do recall, in India they have a three-wheeled vehicle and they all run on CNG now.

Mr McKIM - Rickshaws is the word you are looking for.

Mr REID - They might be running on natural gas too.

Laughter.

Mr GREEN - They run on the methane gas.

CHAIR - Yes, that is right.

Mr REID - I guess the proposal I have there is that option one is that we would be more than happy to enter into a partnership with local government and State government. We have already put a proposal to the Federal Government in conjunction with Metro and the Launceston City Council - when I say in conjunction with them, we have put a proposal forward which those people have not committed to as yet but they have indicated that they are interested - to establish a plant in Launceston. There seems to be interest here and there is also the air quality issue which makes it an interesting or a valuable site to -

Mr McKIM - Are you talking about a CNG plant?

Mr REID - Yes. So if we could establish enough load there, we have some other businesses are also interested in that. Metro have studied CNG, as you are aware. Their board has not become thrilled with CNG, let's say, and it is largely I think based on the fact that they have looked at the other capital city-type Metro model and they have their big capital cost up front and they say they do not have a capital budget to do that sort of thing.

I guess what we would like to see is the Government saying, 'Okay, you're a business enterprise that we own, we support you spending that money. We'll make that capital available'. The repayments are only about fours years or something so it is not an unreasonable capital investment. It is just that they are not in a position to spend that much capital in their current budget at the moment.

CHAIR - What about people like Linfox who cart all the milk around the place? Is conversion to LNG a possibility or are you just focusing on CNG?

Mr REID - I am just looking at the CNG. The LNG plant is a lot more expensive. To get scale, you are talking \$20 million to set up a plant. That is proven and there are people who are going to do that. Gunns will do that because they have enough demand - whether Gunns do it or someone else does it for them, but it will be done in association with the pulp mill because it provides a focus and then, once it is established, people go into Bell Bay, for example, and use it as well. I don't think there's a real issue with that getting up and going because there is enough concentrated demand at Bell Bay for that sort of thing to happen, whereas for CNG for the metropolitan-type uses there is just not enough concentrated demand under one person's control.

Mr GREEN - Did I hear you correctly when you said that China imports CNG?

Mr REID - LNG.

Mr GREEN - Yes, I thought -

Mr REID - I probably said CNG, sorry. If you are importing LNG it's just a matter of evaporating it off to make CNG.

Mr GREEN - I understand that, but I just thought that you said -

Mr REID - I probably did say that, but I was wrong. It was quite amazing, I was in Singapore three or four weeks ago, and you can see the LNG tankers going past from Australia to China and Japan through the straits there - one every 20 minutes. It's amazing.

CHAIR - Is there anything else you'd like to finish up with, Russell?

Mr REID - I have a recommendation there that the Tasmanian Government's - I suppose that's who I'm talking to; or the Tasmanian Parliament, let's say - own enterprises and local government join together to look at ways that we can establish a shared facility. Option One would certainly be involved in that process and help facilitate it.

CHAIR - What's the reaction you've had? You've been talking to DED no doubt as well.

Mr REID - I have been talking to DED. There are some people there who are keen, but it has been with them for too long and they have people that have moved on past it. Really, I have been talking mostly at this stage, apart from private enterprise, to the officer level of local government to say that we've got our ducks lined up before we talk to the councillors and elected members. I think they obviously have to make the decision in the end.

To a certain extent, in the whole list of things that a council's got to do or a government's got to do, saving half your fuel costs is probably not a huge priority, although it's an attractive one. Councils have other focuses than governments, but combine it with the environmental side of reducing greenhouse gases and other emissions, it then becomes more of a political issue, I guess, which the officers are probably not so worried about but the elected members are.

I want to get the nuts and bolts of it and the cost side of it sorted out before we take it on from there. We are doing that independently, but any support that we can get from any of you people or from the Government or the more people we can make aware of it, the better off we are. I think hopefully Tasmania will be better off as a result as well.

CHAIR - Thank you very much.

THE WITNESS WITHDREW

Mr LYNDON O'NEIL WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

CHAIR (Mr Hall) - We have a submission from you, Lyndon. I note you are from Ulverstone, a fine part of the State. You obviously have your own business there.

Mr O'NEIL - I do.

CHAIR - Would you like to expand on that and tell us what you are about?

Mr O'NEIL - My business consists of a couple of areas. One that I have been in for 18 years now is purely a service station property where we pump juice. That is nearly a bit of a close with different things that are going on down that way. The main side of the business that I have more interest in is automotive repairs - LPG conversions. Recently I have been looking at developing alternative means of using LPG and now natural gas mainly in the transport sector. There is obviously a lot of information and technologies that we can use in the natural gas area, and other areas too, but my knowledge is more in the transport sector - trucks, passenger vehicles. There are a few ideas around and the technology is around also to even look at rail. Rail, I think, is probably a bit of a classic for the State as far as natural gas goes, purely because of where it runs. Geographically it is pretty close to the pipeline in a number of areas.

CHAIR - So you are doing after-market conversions?

Mr O'NEIL - At the moment we are doing after-market conversions. We are also a State distributor for a number of components such as LPG tanks. We have got into the wholesaling market in the last couple of years in that area. Also, to do with what we are talking about today, natural gas components as well. There is much or more available in the natural gas area as there has been in the LPG area, purely because countries such as Europe, which is a classic for natural gas, have really taken it by the scruff and developed some pretty good equipment - right down to the motor vehicles and passenger vehicles. There is as much available product-wise for those as there is or has been for LPG.

CHAIR - Could you, for example, get an off-the-shelf Commodore at the moment and convert it to CNG? Is that possible?

Mr O'NEIL - Absolutely.

CHAIR - So there are no effects on warranty? Are there any issues there at all?

Mr O'NEIL - New vehicle manufacturers tend to back out of warranties pretty quickly. As soon as you do something as major as even changing the mudflaps. As far as LPG conversions at the moment are concerned, with the boom that we have had in the last 18 months, especially with the incentive, insurance companies have got on the bandwagon and now you can purchase a warranty equivalent to a new car warranty which covers the driveline and the engine - the power train. The cost of that sort of warranty is about \$100 and they will honour it, as long as it is a fault proven to be through the use of the gas.

Other than that, the manufacturers really have a hard time in not honouring other areas of warranty other than the engine.

Emissions-wise, even LPG is far ahead of pretty much any of the straight petrol-available vehicles now. Emissions-wise, in the conversion industry we now have guidelines that have to be followed for anything that has been manufactured after 2005. As of 2005, any vehicle that we have gone to convert has needed what is called an 'emissions-approved kit' - this is retro-fitting vehicles. An emissions-approved kit is a gas conversion kit that has been designed for a specific model. In doing that, what we have to do is gear up a car - say, a late model Ford Falcon - with the equipment and then submit it to an emissions-testing laboratory, which at the moment is in Sydney. From there, the vehicle is tested and either approved or not approved that it meets the required emissions standards.

CHAIR - Is that LPG and CNG?

Mr O'NEIL - At the moment primarily LPG, specifically for Victoria and Tasmania. I know CNG is becoming available in States and has been available for some time. I think there is a council or a shire in Western Australia that has tackled CNG as a bit of a project. They have converted a number of council trucks and vehicles and also installed their own refilling equipment. They have been doing a trial, which has been quite successful.

With these emissions-approved kits the same laws apply for CNG and the same testing applies. The laboratory can handle the CNG as well. Those kits that we were talking about are only able to be fitted on that specific model. So getting back to the emission side of it, once the vehicle - even, say, a 2007 Falcon - is converted from petrol to dual fuel, emission-wise it then far exceeds by incredible amounts the production level as the vehicle was manufactured.

Natural gas is the far cleaner fuel than LPG. Natural gas is basically a methane-style of the gas - it is natural. It has been produced over years and years of being buried in the ground and basically it is a by-product of oil.

The main by-products of the combustion of natural gas are water, some carbon dioxide and heat, of course - but mainly water. LPG is much similar although LPG does have some other by-products - nitrous oxide et cetera. If an LPG vehicle is driving down the road or sitting idle you will tend to notice a lot of water coming out of the tail pipe. It is purely a by-product of combustion.

Mr BEST - Obviously you have been primarily involved with natural gas, but do you have any knowledge of ethanol? Do you know of anywhere in the world where they are turning to ethanol as a means of fuel?

Mr O'NEIL - Up until the pipeline in Tasmania, ethanol, I think, was probably our best alternative due to the fact that we have some pretty major farming lands that are not being used at the moment. Ethanol is produced from basically starch crops or starch produce. Ethanol unfortunately tends to use more energy to produce it than it provides once it is produced in terms of greenhouse emissions, whereas natural gas is there already.

Mr BEST - Can you get kits to turn vehicles into users of ethanol-based fuel?

Mr O'NEIL - Ethanol needs to be blended with other fuels to make a biofuel - other fossil fuels. Ethanol is similar to metho, or that style of thing, and absorbs a lot of water, it is water based. Obviously ethanol is about now and it is in every drop of fuel we buy, whether it is advertised or not, they are allowed to blend 5 per cent at the factory, and even the distributor cannot tell you if it has it in there or not. Once they go over 5 per cent they get up into E10 and E10 has issues at the moment, mainly with storage and blending of the fuel. As ethanol has different characteristics to the petroleum, the blending can tend to dissipate or settle out of the fuel and if it is not blended properly initially, then there are problems.

Having talked about ethanol and producing ethanol from produce there are some pretty exciting technologies available right now to produce hydrogen from the same stuff. They call it biomass production of hydrogen and it is another emission-free process. They are getting a lot of hydrogen from that.

Firstly, as an introductory and environmentally-specific matter, one in three people suffer from emission-related health issues. Global warming is now the catchphrase and this is affecting all of us. The planet is suffering like never before from excessive use of resource to feed our excessive human natures. Production of toxic emissions is suddenly becoming the demise, not only of nations but also of our fragile home. Addressing these issues has effected a major change of focus recently on the speedy inception of still greater emission reduction techniques.

Until recently LPG has been an important yet costly alternative transport fuel. Today Tasmania has the opportunity to move towards decreasing our environmental footprint. The use of fossil fuels has not only given us industrialisation but it has now become the major contributor in global warming, war and health. Until now LPG has been widely available as an alternative fuel source. Impeding factors, such as transport costs, oil companies and taxes, have made it relatively uneconomical for Tasmanians. Tasmania now has a delivery system which has the potential to supply an economical green alternative with a multitude of possibilities for industry, transport and the private sector. We now have a lifeline, and you could call it our natural gas pipeline. Although the product is still at its infancy regarding availability, each home, as it comes on line, can benefit pretty much immediately. In the transport sector natural gas is now available at many homes an businesses statewide; statewide might be an exaggeration but at least it is getting out there. We also have the ability to refuel our vehicles at home. There are a couple of photos there of some units that you can install at home.

Mr GUTWEIN - Are they CNG compressors?

Mr O'NEIL - Yes, CNG compressors. Honda have released the Civic as a natural gas vehicle - dual fuel. Although that is a small tank it will give you a range of about 160 kilometres on an overnight fill.

Mr GREEN - Where is that photo taken?

Mr O'NEIL - That is pulled off the net, off the Honda site on alternative fuels.

Mr GREEN - I see.

Mr BEST - What sort of decibels do the little compressors put out?

Mr O'NEIL - They are pretty much a silent compressor. The compressors themselves are quite small, probably equivalent to the size of a jug and that maybe an exaggeration. So therefore they are housed in a soundproof container and are pretty much silent.

Mr BEST - They obviously don't use much electricity for their job.

Mr O'NEIL - They use very little electricity to drive them. I have possibly got in there a specification sheet on the units themselves. They are readily available now. There are only two manufacturers of those units - a company in America and an Asian company, it might be Korean, that is very hard to talk to.

CHAIR - What was the range again?

Mr O'NEIL - For a small vehicle, and you are talking dual fuel, it is about 160 kilometres.

CHAIR - There is a tank in the back similar to an LPG tank so you are obviously losing boot space.

Mr O'NEIL - Yes, losing boot space, pretty much the same as LPG tanks. The tanks they are now manufacturing are of a composite design, which means they are using products such as carbon fibre and some pretty good polymers now rather than steel. In the past LNG used a cylinder similar to your oxyacetylene cylinder - a very bulky cylinder.

CHAIR - For the CNG bus it is not such an issue because they have a pod on the roof, don't they?

Mr O'NEIL - In the roof, or build them into the floors or build them into the whole structure of the bus. Trucks also are pretty easy. You can set a manifold of tanks on the side of the truck in place of their existing diesel tank, and in that way create about the same kilometres in travel. We are talking about 160 kilometres for that one because you can probably relate it to putting an LPG tank in a small car - you only get low kilometres. It is all to do with boot space. You could get a 90-litre tank in a Falcon boot and you could probably get 500 kilometres out of tank like that. Dual fuel would be the way to go for Tasmania until infrastructure is set up to have some refuelling stations, which could happen quite easily. If you were to travel from Ulverstone to Hobart you are not going to get back on a full tank of CNG; you would need to have dual fuels so that you could flick it over. Having said that, you would probably only need to drive it for 100 to 150 kilometres on petrol, so you have done your trip pretty much on natural gas.

Mr BEST - The compressor you describe, what would that cost roughly?

Mr O'NEIL - I have actually talked to guys that make them in America and to purchase them at a decent rate initially we would need to buy 60 units. The cost in American dollars, I think, was about \$2 500 for each unit. In Canada their government gives them a grant for their conversion as well as for their refuelling. They set them up at home and they also subsidise their gas usage at the house.

Mr BEST - Do they use the fuel to start the vehicle up and then turn over to gas?

Mr O'NEIL - On a dual-fuel system that can happen.

Mr BEST - Or you can have it purely run off gas?

Mr O'NEIL - Yes, especially with the later model vehicles. LPG and CNG gas conversions in general have gone ahead in leaps and bounds in the last couple of years. We now inject the gas rather than suck it through a ring; it is actually squirted in under pressure. In the LPG we are actually getting increases in performance and economy doing it that way and still having the same or better emission results. LPG actually is a higher octane fuel than petrol. It is just in a gaseous form when it enters so you need to get it in there quickly or have more of it. That is all available. That is a simple bowser that can be fitted at perhaps a taxi depot so they can fill it up a bit quicker. They have manifold storage tanks and their compressor would be running possibly continually, just topping up the storage tank so that the taxi would pull in and fill up.

Mr GUTWEIN - What sort of time frame to fill up?

Mr O'NEIL - A taxi would perhaps take 15 minutes, depending of the dispenser or the amount of dispensers, the amount of holding tanks and the storage that they have between fills. It is all relative to how quickly they can build the storage back up. CNG, being compressed, is quicker filling, or more quickly obtainable, compared to LNG. LNG is in a liquid state so cryogenics are involved to get it to a liquid. Liquid is good for long-haul transport and perhaps the mainland would be looking at liquid, more so than compressed, if they are doing an east coast run. In Tasmania, say from Burnie to Hobart, CNG would be fine, depending on how much they want to carry in area rather than volume. Liquid is compressed air. I cannot quote you the figure but it is a liquid rather than a gas and has a fair bit more contained in the same area.

Mr GUTWEIN - To get a simple idea of the volume associated with the tank, my vehicle has a 65-litre fuel tank I get around 10 kilometres a litre from it - about 600km a tank - what size CNG tank would I need?

Mr O'NEIL - Equivalent?

Mr GUTWEIN - Yes.

Mr O'NEIL - The equivalent is about 1.2; you could probably work that out as -

Mr GUTWEIN - So a 1.2 conversion is it?

Mr O'NEIL - Yes, roughly.

Mr GUTWEIN - So I would need about a 75-litre tank. What sort of kilometres would I get out of that?

Mr O'NEIL - In a late model vehicle you would work on about 85 per cent of your petrol mileage.

Mr GUTWEIN - Okay, so roughly with a 20 per cent larger tank I would be covering roughly the same distance?

Mr O'NEIL - Yes. And the beauty of the dual fuel option is that if you run out it reverts to petrol to get home.

Mr GUTWEIN - The cost per litre or volume of CNG?

Mr O'NEIL - I don't know. I have not looked at that side of it. I have thought about it and I have looked for it but I don't think they have the strategy in place to meter it in that way if you know what I mean. I think they sell it rather as a dual or as an energy unit?

Mr McKIM - Currently? How, for example, Powerco sell it? I am not sure. We should have asked. We can get it; we can ask them.

Mr O'NEIL - That is what we need to know. We need to get it down to a litre value rather than an energy value.

Mr GREEN - They were saying there was a 50 per cent reduction in cost, so if a litre of diesel costs you \$1.40 it must be 70 cents.

Mr BEST - That's right, it was 50 per cent.

Mr O'NEIL - So they are talking 50 per cent over diesel, are they? That's the comparison?

Mr BEST - I don't know if he said diesel but he said cost would be smaller than diesel.

Mr O'NEIL - It would nice if it was LPG, wouldn't it? It probably ought to be, I don't know.

In my own area I personally have not really worried too much about the costs of this. I guess it is something that needs to happen anyway and maybe the companies or the people who are involved in the costing side of it need to stand up and address the question as to why it is that price.

Mr BEST - Would you look at setting something up yourself? Get a little compressor -

Mr O'NEIL - Yes, definitely.

Mr BEST - Is that why you would be in a better position then?

Mr O'NEIL - Yes, definitely.

I would like to see a town that has gas available or nearby go down the same track as this West Australian council we talked about and perhaps get an exercise going where we can convert the council vehicles to start with -

Mr GUTWEIN - To run a pilot municipality?

Mr O'NEIL - Yes, run a pilot somewhere and analyse it over a 12-month period. Obviously we would have records of costs and all that. Emission-wise it is all pretty well documented anyway so you know what is happening there before you start.

Ulverstone would be a good town for that, I think. I live there and Ulverstone could do with gas as much as Devonport. In saying that, they have Simplot, which I really think should be switching on to it as well. Simplot switching on to it would be enough reason for them to continue it into the town. You have the Leven River and the pipeline crosses the Leven River and then crosses the Gawler River as well. I think you could lay a pipe down the river. I would really look at putting one in. Personally, I think it has to happen.

Mr BEST - Obviously you wouldn't be able to get the unit reduction cost going on a single pump.

Mr O'NEIL - No, absolutely. At a residential level we now have the ability to refuel and the availability of the refuelling units has enabled residents in other countries, Canada in particular, to enjoy this for many years already. OEM or vehicle manufacturers are all producing a range of new vehicles now - and the truck and bus side of it, too.

CHAIR - Would you expect a Holden, Ford or a Toyota to put out a dedicated vehicle - if the infrastructure was spread around - rather than doing after-market conversions?

Mr O'NEIL - Absolutely. They're already putting out LPG/gas and you can buy that.

CHAIR - How much technology is involved in that - the difference between a petrol engine and, say, a CNG engine? Can you explain that in a few words?

Mr O'NEIL - As in a dual-fuel to a straight?

CHAIR - Yes, or just a dedicated CNG - not a dual-fuel, just a -

Mr O'NEIL - A dedicated CNG compared to a dual-fuel. The main implication with gas is that it goes from a liquid to a gas - we are talking LPG here - through a latent exchange of heat. For the liquid to become a vapour where it can be used or combusted easily, it needs some heat. In Tassie, in colder climates, that becomes more of an issue on first-time start-ups of a morning. You can have icing problems: if you jump in the car, hit the key and drive off straight away, the low amount of heat that is in the cooling system is quickly absorbed, you can have icing problems and the vehicle will stop. That is overcome simply by starting the car and letting it sit there for two or three minutes before you drive away. CNG would be similar but probably not as prone to that, being that it is not in a liquid state. It still requires heat to keep it into that vapour. Technology has come a long way. They have got around all these little hiccups. To be honest, retrofitting cars now that are about 10 years old is a bit of a headache. It is far easier now to convert a late-model vehicle that is fuel-injected and a lot more successful. There are very few hiccups.

For a manufacturer to put out a dedicated vehicle, they would look at quantity so it is going to be down the track, although they are available. It may even be just a matter of importing vehicles from these places where they are already available - Europe, America

and places like that. GM has them and obviously they will bring them into Australia once they are up and running. Trucks and buses are pretty well easily available because they are on order; they are imported on order.

We have available the option of retro-fitting and converting current transport or investing in new natural gas vehicles similar to LPG, diesel and petrol. Don't forget that diesel runs very well on natural gas, more so than LPG. Diesel engines can be converted to straight natural gas and run okay, and built solely for natural gas as well. So on the heavy transport level, if we have a trucking company that installs their own dispensing units at their depots, we have forklifts which can also be fuelled up on site.

There are different types of filling stations. There is a time-fill station. It is obviously a bus company where they park their buses in a row and they have a structure over the top with a pipe going down so that they can fill each bus overnight so they are all full. Then you have a fast-fill station, which involves a bit more technology or a bit more equipment, where they store it and then refuel. That is all available and being used. Those are the basics of it and it is all proven and available today.

Natural gas can be utilised in many cost- and emission-friendly ways, processing, power generation included. Tasmania also has a unique opportunity to not only consume the product but also to supplement it by the injection of natural gases back into the pipeline. We talked about some technologies that are available right now. These gases are produced using breakthrough technologies designed to produce hydrogen from biomasses such as grasses, cane, hemp, spuds, grains, fruits et cetera. Anything with a high starch content are easily used within a catalyst-style hydrogen reformer to produce emission-free hydrogen. Once again, that process produces heat and water as well. That is the only by-product of it.

Mr GREEN - You pump that back into the natural gas pipeline?

Mr O'NEIL - You pump that back into the natural gas pipeline. It has happened. It is not a new idea. This is happening now in places where natural gas is used.

Mr GREEN - What I meant is that it combines with the natural gas and becomes what?

Mr O'NEIL - It is just a higher-grade natural gas. I am pretty sure the figure was 50 per cent. You can add up to 50 per cent pure hydrogen to the natural gas and it will still run through your appliances, your gas cookers and things at home. Once you get over the 50 per cent it then is not easily used for appliances but it does become a better heat source.

Mr GUTWEIN - If you have a rocket in the shed it is handy.

Laughter.

Mr O'NEIL - Absolutely. It is being done now. There is some really interesting stuff out there and another by-product of that process we just talked about is using starches to produce hydrogen. They are using not just starches but they are using sewage as well now. The sewage is methane, of course, and they are actually breaking it right down and coming up with a lot of hydrogen. There are figures of something like 25 acres of this

style of production; a 25-acre coverage would produce enough hydrogen for they did say all of Australia but I do not know. It depends how much you use, I suppose.

Another by-product is called bigasse which is the name of a fibre which remains after the biomass is broken down and countries are using that as a pulp for the manufacture of paper.

Tasmania is well suited for the distribution required to deliver piped gas to every community. Gas lines are pretty much like a backbone in Tassie. There is a biomass hydrogen production unit there and the electricity they are using to power it is from the wind generators. They are setting them up in the middle of nowhere and pump all their waste into it and collect the hydrogen and stick it back in the tanks or back in the pipeline. It is totally possible.

Mr GREEN - They just put water in it?

Mr O'NEIL - They put water in it. What they actually do is they use a biomass, say spuds or spud waste, you can skim it off the spuds if you want to use that, put it in the tank and then they add a certain amount of water, mix it all up and there are 13 enzymes that they add to it. It is an enzymatic reaction which happens pretty much instantaneously. Pretty much the whole biomass is broken down and produces pure hydrogen and heat, and water, or water is what is split to get the hydrogen and the oxygen split off through that.

Mr McKIM - So it is a kind of cracking process?

Mr O'NEIL - It's a cracking process, but it's green. It uses enzymes rather than whatever else they want to use.

Mr GREEN - Electricity.

Mr O'NEIL - Yes, electricity.

Mr McKIM - You obviously need some.

Mr O'NEIL - The electricity is there that does the cracking which speeds it up. That is pretty much it, just that it's possible to produce electricity at home commercially through the use of generators as a zero emission fuel service. They have a fuel service now you can sit on the side of your house and stick natural gas in there and end up with power, water and heat, and that's it, and they're quiet.

Mr GUTWEIN - Very good.

CHAIR - Thank you very much for coming in, Leonard. We appreciate your time and your putting your submission in.

THE WITNESS WITHDREW.