

ECONOMIC DEVELOPMENT AND INFRASTRUCTURE COMMITTEE

Inquiry into Mandatory Ethanol and Biofuels Targets in Victoria

Melbourne — 27 August 2007

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Witnesses

Mr E. Tamburrini, Director, Powertrain Engineering, GM Holden and

Mr P. Batish, Director, Saab Australia and New Zealand, General Motors Asia Pacific Holden.

**Necessary corrections to be notified to
executive officer of Committee**

The CHAIR — Welcome to the public hearings of the Economic Development and Infrastructure Committee Inquiry into Mandatory Ethanol and Biofuels Targets in Victoria. All evidence taken at this hearing is protected by parliamentary privilege. Comments you make outside the hearing are not afforded such privilege. Could I ask you each to state your name, the organisation you represent, your position within that organisation and your business address.

Mr TAMBURRINI — My name is Ernie Tamburrini. I am the Director of Powertrain Engineering for GMAP (General Motors Asia Pacific) Holden. The address is 191 Salmon Street, Port Melbourne.

Mr BATISH — I am Parveen Batish. I also work for General Motors. My title is Director of Saab Australia and New Zealand. The address is 191 Salmon Street, Port Melbourne.

Mr TAMBURRINI — Good afternoon, ladies and gentlemen, and thank you for the opportunity to participate in the discussion today. I am joined by my colleague Parveen Batish, who is the director of premium brands for Australia and New Zealand. Parveen will later be discussing Saab's views on ethanol as an alternative fuel.

GM Holden has provided the Committee with a detailed submission, which I believe you should have. I will present a brief overview of our perspectives on ethanol and biofuels in the context of a broader suite of solutions that are required to support the transition to a future that is less dependent on petroleum-based products. General Motors believes the key to future success will be in finding multiple ways to displace the use of petroleum in our vehicles and is pursuing energy diversity on several fronts. Concurrently GM Holden's alternative propulsion strategy is a three-term plan to bridge the current state of petrol dependence to a future free from petroleum and vehicle emissions, which we like to refer to as the 'hydrogen economy'.

I will start with the first or near-term activities, beginning with petrol, which is our current affair. These include variable valve timing, spark ignition direct injection, active fuel management, regulated voltage control and electric power steering, just to name a few. Each of these is an example of the technology being applied within the GM family that helps to improve the overall fuel economy today. Also we have LPG and compressed natural gas. These are near-term initiatives also and include the increased use of readily available alternative fuels such as LPG. When it comes to ever cleaner hydrocarbons we may see an expanded role for natural gas, which is used either as an engine fuel directly or perhaps as a feedstock for other gas-to-liquid alternatives.

Discussing diesels, GM also considers the increased use of diesel engines as a near-term initiative. Since diesel is an existing technology, it can offer up to 20 to 30 per cent fuel economy improvement compared to equivalent petrol engines. Today's diesel engines, in addition to offering improved efficiency, are cleaner, quieter and in almost every instance offer better performance than earlier generations of diesels. Importantly the implementation of low-sulfur fuel has been the key trigger for the introduction of a new generation of diesel passenger vehicles and helps to explain the increased level of diesel launch activity in the Australian market that has been witnessed recently. One of our examples is the 1.9-litre turbo diesel Astra.

Looking at renewable biofuels, Australia has a burgeoning biofuel industry that includes production of both biodiesel and ethanol. These fuels are currently used as blending agents, in effect extending the use of the fuels to which they are added. Ethanol: the volume production of ethanol fuel is only emerging within Australia, yet Holden sees great promise. Currently in Australia ethanol is blended with unleaded petrol in concentrations as high as 10 per cent — which we commonly refer to as E10. Holden supports efforts to educate consumers so that they can make informed choices regarding E10 fuel, and we were the first to label both domestic and imported vehicles regarding acceptability of E10 across our vehicle range.

When it comes to concentrations of ethanol above 10 per cent, GM has a great deal of experience, especially in Brazil, USA and Sweden, and we have learnt that well-coordinated policy activities are required to support the implementation of high concentration of ethanol fuels, and that includes the fuel infrastructure, consumer education and also the vehicle technology and availability. The current rate of ethanol availability in Australia would suggest that the transition to a high concentration of ethanol fuels is not imminent, and to see what is possible we could look at Brazil and the United States. In Brazil they have excelled in developing ethanol derived from sugarcane, while in the US ethanol has been made mainly from corn. Brazil's ethanol industry commenced in the late 1970s, and today ethanol production from sugarcane is very strong. GM supports the industry by offering many popular vehicles that offer FlexPower — the ability to run on combinations up to 100 per cent ethanol. In North America

GM currently offers a number of FlexFuel vehicles, models equipped to run on E85, with a target to reach 50 per cent by 2012.

Holden is exporting vehicles to Brazil that have specific modifications to allow them to run on E24. These include unique engine calibrations and fuel system components with more robust materials that differentiate these vehicles from those that Holden sell here in the Australian market. With biodiesel, GM Holden also recognises the potential environmental benefits of biodiesel. Holden's general position is in line with the worldwide fuel charter that views fatty acid methyl esters (FAME) as acceptable when blended with conventional diesel fuels up to 5 per cent. We refer to this as B5. To date Holden has limited direct experience using, or testing the use of, biodiesel in its products. Blends higher than B5 require more research to be undertaken and may require adaptation of fuel to avoid fuel system component and engine performance problems. As such it seems a target no higher than B5 could be contemplated at this time.

Then we look at say the second or mid-term activities, and given the time restrictions today, I will only briefly touch on these. You can obviously refer to our detailed submission for further information. GM Holden's mid-term activities include consideration of hybrid electric vehicles for the Australian market. In terms of hybrids, General Motors has been developing a range of hybrid technologies that combine electric power with traditional combustion engines to significantly reduce fuel consumption. The most recent — you may have read about it — and arguably the most exciting development is GM's concept Chevrolet Volt. The Chevrolet Volt, for most daily commutes, could nearly eliminate going to the petrol station and greatly reduces exhaust emissions. The Chevrolet Volt is designed to be powered by GM's next generation electric propulsion system, which we term E-flex. The E-flex system can be configured to produce electricity from mechanical propulsion — from petrol, ethanol or biodiesel. The Volt uses a large, high-energy battery pack and a small, 1-litre turbo petrol engine to generate the electricity on board. The sort of range we are looking at with the Volt is 40 miles as the target.

The Australian experience: in Australia we face the challenge of being a relatively small player in the global automotive industry. Our opportunity is to locally adapt the powerful resources of developers, of our parents in the States. So in our view it will be some time before hybrid technology becomes a volume proposition in Australia. Hybrid electric powertrains are truly again changing technology. However, they will remain a significant cost challenge for some time, and this needs to be weighed against other available technologies, such as clean diesels, which offer similar fuel economy improvements compared to strong hybrids.

Looking at the longer term activities, hydrogen fuel cells and the hydrogen economy, globally the long-term strategy of General Motors is to prepare for a future where hydrogen fuel-cell powered vehicles will ultimately replace today's internal combustion powertrains. Fuel cells combine hydrogen and oxygen to produce electric energy that can be harnessed to propel a vehicle, with water being the only by-product. GM is investing hundreds of millions of dollars in fuel-cell research, with facilities established in both the US and Europe.

Recently GM announced that more than 100 Chevrolet Equinox fuel-cell vehicles would be replaced with North American customers as part of a deployment plan dubbed Project Driveway. Designed to gain comprehensive learnings on all aspects of customer experience, Project Driveway constitutes the first meaningful market test of fuel-cell vehicles anywhere to date. In many ways it may be more difficult to overcome the infrastructure challenge than the technical challenges of the vehicles themselves. GM has recently partnered with Shell to establish the first hydrogen refuelling station in New York City, and high-profile demonstration projects such as these are crucial to the eventual commercialisation of hydrogen as a transport fuel.

In conclusion, GM is committed to continuing to develop and support the implementation of technologies that we believe will significantly reduce oil consumption and CO₂ emissions. As noted today, GM's alternative propulsion strategies provide multiple solutions to a future less dependent on petrol, recognising that the alternatives do not come without some compromise. We firmly believe there is no single solution, and it is entirely likely that many of these technologies will coexist in the marketplace, hence our broad approach.

Fortunately for Australia, GM Holden can leverage the wealth of GM and that global experience and broad technical capability when the opportunities do arise. I was fortunate just to have returned from a week in the United States, where the annual powertrain leadership get together and all the future technologies were actually demonstrated and we had the opportunity also to drive some of the products. In regard to alternative fuels such as ethanol and biodiesel, it is our view that targets must be considered in the context of the availability of these vehicle technologies required to support the use of these fuels, the associated infrastructure development and consumer

demand for such fuels, and as such it will be important for government to continue to work with all stakeholders in determining the best approach for the future. Thank you, ladies and gentlemen, for your kind attention. I would like now to welcome my colleague Parveen Batish to share more with you about some of the exciting initiatives being worked on.

Mr BATISH — I guess the initial question is why are we considering a mandated target for alternative fuels. The answer lies somewhere between rising petrol prices and climate change issues. We are convinced that biofuels are probably the best near-term alternative to oil today. Why? Because, first of all, it is renewable — I think we all understand that — and it reduces CO₂. On the vehicles that we have — I will talk a little more about that in a moment — it can reduce CO₂ emissions by up to 80 per cent, depending on how the ethanol is actually produced. And really the technology is available today.

In fact we have a car on sale as we speak that is a truly flex-fuel vehicle. It can run on any mixture of normal petrol that you can buy at the bowser today, or alternatively up to E85 ethanol mixture. The engine management system basically picks up the mix of fuels you are putting in, so even if you have a mixture of E50, it will recognise it and change the car alternatively. There are some changes to the car that are required, such as a plastic petrol tank and some valves and seals, because the compounds that go into ethanol are a little bit more corrosive than normal petrol, so it cannot come into contact with metal when it is stored. Really all it requires is the engine management changes, and that is available today. As I mentioned, we have these cars on sale and ready to deliver today.

In fact ethanol is probably the fastest growing alternative fuel in the world today. We have seen new countries like the UK, Ireland and Germany, just to name a few European countries, that have begun to sell E85 as an alternative fuel around the world. If you look at where ethanol is produced, as Ernie mentioned, we have the three largest producers, which are the USA, Brazil and Sweden. In fact Brazil meets nearly all its domestic road transport needs and is by far the largest supplier across the world. They used locally grown sugar cane and the prices are even lower than for gasoline, without any subsidy from the government. In the US, output has doubled in the past four years. They have gone from around 67 billion to 107 billion gallons annual capacity just from biomass and, as Ernie mentioned, from corn. In fact they could support blends of up to E60 or E70 or directly replace half the current 140 billion gallons of gasoline that is consumed annually in the USA.

You may have heard already from the suppliers in Australia. There are probably three main suppliers in Australia. One is the Manildra Group, who are based near Nowra in New South Wales. They have a current capacity to produce around 100 million litres, but they could increase that greatly in the next 6 to 12 months if they so wished. They produce ethanol from the processing of wheat and other grains. We also have the CSR group, who are hopefully about to take the first three ethanol-powered cars in the country. They use C molasses, which is a low-value by-product of crystal sugar. They are based near Mackay in Queensland. They currently have a capacity to produce around 55 million litres. Then we get to a much smaller operation, which is the Rocky Point Distillery, based near Norwell on the Gold Coast. It produces around 16 million litres from C molasses. Some other refineries are coming on. One is the Dalby Bio-Refinery in Queensland, which will be operational this year. A further two are planned, but they will not actually produce ethanol until 2008.

We feel that the capacity to produce ethanol to drive, certainly E5 and E10, is pretty much there, and we would like to see a move further, towards E80, E85. Really it has to be a combination between manufacturers — which we are, because we actually have the cars — the petrol companies, the ethanol producers and, I guess, the government. I will just give you an example of how governments in other countries, for example, in Europe, have actually helped to grow E85 as an alternative fuel. In Ireland, if you buy a Saab biopower, which is what we call our E85-compatible cars, you actually get €6000 tax benefit from the government. In Sweden ethanol is part of a strategy to stop dependency on oil for road transport by 2020. At the moment E85 accounts for around 2.5 per cent of fuel for road transport. They have also offered huge tax incentives and free parking — basically, if you drive an ethanol-powered car, you do not have to pay for any parking. In Stockholm they have something called a congestion charge, which thankfully we do not suffer from here at the moment. Again if you drive a biopower car you do not pay any congestion charge in Stockholm. In fact government agencies have been targeted with a figure of 50 per cent of their car fleets to be run with eco-friendly vehicles.

As a result of these changes, the Saab biopower car is the best-selling alternative-fuel car in Sweden. It has been outselling hybrids by 10 to 1 in Sweden. The European Union, as part of the EEC, has also introduced buses which run on complete bioethanol, with no mixture at all. That is a European Union study that is going on in Stockholm also. Now more than 25 per cent of all the filling stations in Sweden have the capacity to sell E85. That has come

from an extremely low base back in 2002. So they have had that expansion in a short time. Part of that has been the result of the government arm twisting the petrol companies to ensure that they were able to sell it. So you can see that there is a real combination of having the product, having the fuel and also incentives for people to actually buy the car. In fact the latest directive of the European Union on energy taxation, which came into effect in January 2004, has asked for a reduced taxation or a complete exemption for biofuels in pure or low blends. They have a target of around 5.75 per cent penetration by the year 2010. France, literally at the beginning of this year started the discussion on ethanol, and cars are now available, not just from Saab but also from other manufacturers. They have set themselves a target of 500 filling stations by the end of this year.

We believe ethanol is a key part of our future. In fact Saab unveiled a truly biopower hybrid car last year, which was the first fossil-free fuel car available. It is a hybrid that runs on 100 per cent ethanol. That is just a concept car at the moment, but we believe that in the very near future it could come into production. As I have mentioned more than once, we feel that collaboration is the key. It is kind of the chicken and the egg — who comes first? We have come first. We have a car that is available. In fact, we have the potential to use biopower across all of range next year if there is a requirement to do that in Australia. We would like to see similar incentives for biofuels as for LPG. There is no reason why that should not be available. We would like you or somebody to consider tax concessions such as you get in Sweden and legislative changes to allow the sale of E85 to the public, because I believe that currently you cannot actually sell it to the public, even though there are some manufacturers that have the capability to sell it. Our message would be that we would like to see the debate go even further. We have introduced a vehicle; now what we really need is the fuel to be able to put into that vehicle.

The CHAIR — Thank you very much. Given that you have both mentioned the size of the Australian market compared to the international market, what do you think is the most efficient way to reduce the environmental impact of the Australian vehicle fleet, given our percentage within the world car vehicle sales and fuel consumption area? My point is that we may need something specific to Australia that is quite distinct from Sweden or the US. What would your recommendations be to drop the environmental impact in Australia of the fuel?

Mr TAMBURRINI — Diesels are gaining in popularity, and that is certainly one avenue, as I mentioned in my presentation. The other is obviously to increase the availability of ethanol content.

Mr BATISH — I mentioned that we are the only manufacturer that has cars in this country at the moment with E85 capability, but we are not the only one that produces cars with E85 capability. Other manufacturers are ready to hit the market. They have already done so in Europe. What they need is some encouragement to bring those vehicles over. We have taken the first step. We have decided to do that. You could say that it is a marketing ploy, but that is what we have decided to do. There are some other areas that we are also reducing to ensure that we try to be as CO₂ neutral as possible. I will not name them today, but there are other manufacturers that have E85 capabilities and could bring cars here in the very near future. That is why we are pushing to have E85 on the table as the debating issue.

The CHAIR — In what you have been talking about so far regarding the environmental impact of our vehicle fleet, you have spent a lot of time on biodiesel. You have also spent a bit of time on ethanol. In your presentation you did not say very much about compressed natural gas. Do you want to make any comment in that regard?

Mr TAMBURRINI — Our focus has been mainly on LPG here in Australia. CNG has its own technicalities to be dealt with.

Mr THORNLEY — I am keen to understand the economics a little more. What sort of additional cost is involved for the consumer for a finished vehicle that is E85 or otherwise flex-fuel versus one that is just a traditional gasoline vehicle? What sort of capital cost difference is there?

Mr TAMBURRINI — I cannot give specifics. As I said, we do produce a vehicle for the Brazilian market that is E24 capable. Obviously fuel hoses and fuel delivery systems need improved corrosion protection. That gives you E24. In terms of having the E85 capability, as Parveen mentioned before, we already have the fuel tanks in plastic, but then you need a sensor to be able to distinguish what level of concentration you have in the fuel tank. I do not want to give a definite figure, but you are looking at tens of dollars.

Mr BATISH — Shall I deal with it?

Mr TAMBURRINI — Maybe you do that one.

Mr BATISH — The production vehicle that we have for sale is priced at \$1500 more than the normal petrol car. That is literally the cost of the changes that we have to make. So there are no additional costs; it is just the tanks, the fuel lines et cetera, left to be changed. That is it.

Mr THORNLEY — Are those underlying components more expensive? Or is it just the fact that the mass-scale manufacturer uses the alternative component, so the scale question is what drives it.

Mr BATISH — It is probably the latter.

Mr THORNLEY — Although for a flex-fuel vehicle presumably there is an additional component?

Mr TAMBURRINI — An additional component?

Mr THORNLEY — In the fuel sensing?

Mr TAMBURRINI — As well as improved materials.

Mr THORNLEY — Yes.

Mr TAMBURRINI — So you are driving more cost.

Mr THORNLEY — Okay. From a consumer's economic standpoint then, is there a break-even calculation in terms of, if some of these vehicles have improved fuel efficiency and/or lower fuel costs? How would the consumer be likely to make that break-even decision if they were a rational economic agent?

Mr BATISH — I will go back to the two issues of prices and climate change. If you look at ethanol, it is actually less efficient than petrol so you need to use more fuel. However, if you look at the price — —

Mr THORNLEY — In terms of energy per volume?

Mr BATISH — In terms of energy produced, yes, absolutely. When you look at other governments that have introduced it and where it has been successful, it is because there has been a subsidy to reduce the price of ethanol in order to be able to put petrol in basically. But what you do get, like I mentioned, is the 80 per cent reduction in the CO₂ gases, depending on how the ethanol is produced. It is kind of a two-pronged attack, really. We cannot do anything with the fuel prices, although if you look at the cost of, I think E5 or E10, it is around 3 to 10 cents cheaper than normal petrol. If you apply the same economy to E85, it will be cheaper to run.

Mr THORNLEY — But the economics of the ethanol are presumably dependent on fuel stock costs, so they move relatively independently of oil prices?

Mr TAMBURRINI — I think I read recently — I cannot remember which day it was — that one of the oil companies has struck a deal on ethanol to increase the percentage concentration, and it is going to charge 3 cents less per litre as a result of the offset for the fuel economy.

Mr THORNLEY — But it sounds as though if you produced all your vehicles as flex-fuel vehicles you would anticipate that the cost differential would be pretty modest?

Mr BATISH — Effectively, yes. I mean if you bought a car today you would pay \$1500 more. Currently you would have to put in normal fuel, normal petrol. So I guess the argument is that you would not recover that \$1500 over the period of the car. If E85 was available, and you could fill it from day one, yes, you would. I do not know what the calculation would be in terms of when you would recover it, but yes, you would at some point.

Mr CRISP — Mr Thornley has gone to most of the places that I would have liked to go. What is playing in my mind is that government purchases are a significant contributor to the new car fleet and the age of the Australian fleet. My mind is toying with the idea that government specifying a flex-fuel purchase is a way to introduce these vehicles into a fleet. You have answered those questions.

The CHAIR — In relation to our terms of reference specifically, do you have those in front of you?

Mr BATISH — Yes, I have them here.

The CHAIR — If you were running down those and writing a report — perhaps I will not put that on you; you are not writing the report — what would you be saying in relation to the merits or otherwise of a mandated target for alternative fuels, including biofuels and ethanol? Would you think it would be a wise path to go down to implement a mandated target, and if not, why not? You do not have to answer these questions, I am just posing them.

Mr TAMBURRINI — If I look at global trends, that is certainly the way they are going, and as I mentioned, in North America the big three — that is Chrysler, GM and Ford — have basically agreed to targets of 50 per cent of their vehicles produced by 2012. Obviously there seems to be a global trend to do the right thing by the environment — to reduce greenhouse gases — and that is what I would be recommending.

The CHAIR — Right. You can make a comment if you want to, but I am not necessarily asking you about our terms of reference 2. I want to go to no. 3, which is to report on the measures required by government to facilitate an alternative fuels industry in Victoria for transport and non-transport applications. From your business experience what are the kinds of things that people are saying to you that government — state or federal — should be doing?

Mr BATISH — If I just give you one example, we have been talking to a fuel company about putting in E85 tanks, but you have to think that basically what it will have to do is to get some real estate where they are not going to get a return for a long time because you would have to get lots of cars. Therefore, we are always faced with this chicken and egg argument; what comes first? I guess what we could do is to give the same kinds of subsidies to petrol companies that they have given in Sweden to put — whether it is E10 or E85 — into their tanks.

The CHAIR — Just to get off the recommendation, why do you want E85 rather than E10?

Mr BATISH — Because it is greener. If you are serious about climate change, then you really need to go to E85. It is renewable. It will stop our dependency on oil, which leads to higher oil prices et cetera. If we look at what is happening with climate change around the world, that surely has to be the top priority. I know prices are effective for businesses and for people running their vehicles, but we have to go one step further than that. We have a drought here. That has not just come about overnight; it has been over a period of time. You hear about climate changes all the time around the world. You hear about the polar icecaps reducing in size. If we are truly serious about making those changes we need to reduce the amount of CO₂ we pump into the atmosphere. All we ever do with petrol and gas is take the CO₂ that is trapped in the ground and release it into the atmosphere. What we are talking about with E85 is 85 per cent of that fuel where you actually recycle the CO₂, which will mean your petrol will last longer. Instead of 2030 or whatever the time frame is for petrol running out, it is going to last that much longer, and it will be greener. That is why we would like E85.

Mr THORNLEY — I am really curious about whether if we had to choose between focusing on an E5 or an E10 mandate versus focusing on the necessary regulatory changes to enable an effective E85 market to be established — if you had to choose between those two — you would advocate us moving directly to E85, or do you see a mandated E5 or E10 regime as one of the likely preconditions to getting to a more successful E85 market?

Mr BATISH — What will make the biggest impact on the climate right now would be E10; there is no doubt about that, because not everybody is able to sell cars and it will be a much quicker thing to do. Most cars are capable of running on E10 up to a certain age. Should we stop there? No. We should go further; we should go to E85. As I mentioned before, there are some manufacturers who have the capability — or who have the engines — to run on E85.

Mr THORNLEY — Does it help the E85 cause to mandate E10? If the government has to beat up on service stations to put in one fuel tank or the other, it seems to me there is a potential conflict between going for an E10 mandate versus going for an E85-sort of establishment play.

Mr BATISH — Speaking from Saab's point of view I would say E85.

Mr THORNLEY — Does General Motors have a view on that?

Mr TAMBURRINI — I think you would have a challenge with the infrastructure to support an E85 in the near term. It is possibly more of a stepped E10 followed by an E85.

Mr THORNLEY — I guess what I am trying to get to — I am sorry, Chair, to keep going — is whether the E10 really gets us any closer to an E85 outcome or whether it means you burn a whole lot of political capital trying to get the E10 and it does not necessarily advance the E85 cause.

Mr BATISH — Again speaking from experience, I have spoken in Queensland on the same platform as Mr Beattie and BP, which was the first manufacturer in Queensland to go to E10, and the guy from BP basically said there is no money to go any further, so I guess that is a question that you will be faced with too.

The CHAIR — One piece of evidence that has been repeated often here is that we would have difficulty getting much further than E5, let alone E10; E85 is just light years away as far as the Australian market is concerned. That is what we have been told, because of the lack of product to produce it.

Mr BATISH — Lack of product to produce it as in terms of ethanol?

The CHAIR — Yes.

Mr BATISH — There is certainly more capacity. I think with ethanol what you are finding is that the technology is there currently and, in terms of producing more ethanol, the technology is advancing as we speak. I think you will find in some comments with regard to cellulosic ethanol, which basically means that you can get far more efficient in terms of producing ethanol, and also if you look at GM products, and I do not mean General Motors now, I am talking about modified genes et cetera, you can get higher yields of plant matter, which basically means that the capacity to produce additional ethanol is there, if not in the very near future, and I think when we are talking about near term and, as Ernie mentioned, our long-term prospect for General Motors is really to go forwards. If you look at the short term and the mid-term, what is available as real alternative fuel, as in now, has got to be ethanol, and I think the capacity is there to produce more.

Mr THORNLEY — I am just wondering from a General Motors point of view, are there any policy imperatives that would help create a greater level of export market for your EA, for your flex-fuel engine manufacturer here, either by improving the scale of the domestic market or potential for that, or other things that we can do that improve the potential for further exports of those engines?

Mr TAMBURRINI — We will obviously do what is necessary for the various markets we are exporting into, and in that respect we will be doing work for North American vehicles in the future and certainly E85 is in the equation.

Dr KOOPS — Ernie, do you mind if I ask: for the E24 engine that you are exporting to Brazil, is there a sensor required for that vehicle?

Mr TAMBURRINI — No.

Dr KOOPS — Would you be able to give us a rough estimate of the price premium for those extra components?

Mr TAMBURRINI — I really do not have access to the figures. It is in the tens of dollars.

Dr KOOPS — Tens of dollars?

Mr TAMBURRINI — Tens of dollars.

The CHAIR — Thank you very much for that very comprehensive information session. Speaking for the others, we have found that has been very helpful judging by the questions that have been asked. We will be sending you a copy of the transcript within about a fortnight.

Mr BATISH — Thank you very much.

Witnesses withdrew.