Submission to Senate Inquiry into Australia's future oil supply and alternative transport fuels

Ben Rose, Feb 2006.

This submission related briefly to point 1-3 and more specifically to point 4 of the inquiry's terms of reference:

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

This submission asserts that improving transport fuel efficiency is the area which has most potential for immediate implementation at least cost, and that , with the current cheap energy prices little is being done to raise awareness of the need to increase fuel efficiency of transport. Furthermore, little will be done until an education campaign is conducted and fiscal incentives are legislated.

It explains that fuel use could easily be halved without affecting production or personal mobility. Reduction of fossil fuel use for transport is essential for two pressing reasons:

- to reduce greenhouse gas emissions – this is the most serious issue and ultimately crucial to the survival of human civilization.
- economic security risks issues associated with oil shortages, rising prices and lack of alternative fuel production capability (ie. liquid fuels from biomass).

Point 1.
Projections of oil production and demand in Australia and globally are well documented on the Internet. The best source is the Association for Peak Oil, which has produced a graph that shows oil production 'peaking' (ie. rate of extraction declining, with increasing demand and prices rising) between now and 2010 and gas peaking before 2040. To use the free market argument to wait until prices force change will leave us with a dangerously inefficient vehicle fleet, making us vulnerable to economic disruption when this situation inevitably arises, which may well be sudden.

Point 2.
New sources of fossil fuel oil are unlikely to contribute to Australia's fuel demands (refer to point 1 above). Alternative 'renewable' fuels do offer considerable scope, although it must be noted that the best production options are only likely to reduce greenhouse gas emissions to 30- 40 % of emissions from oil. Some fossil fuels use in incurred in their production, primarily for the smelting of metals to produce the machinery required, and in the short term oil will be used to fuel some production and transport processes.

With respect to the various biomass fuel options, it is essential that the Senate Committee obtain reliable estimates of the potential for production from the various sources. 'Back of the envelope ballpark' estimates are given below but accurate figures should be obtained from the State Departments of Agriculture.

Much has been made recently of ethanol from sugar cane of corn and also bio-diesel from oil seeds. However, these sources can only constitute a small part of supplies (up to about 5 %). The huge area of prime agricultural land that would be required for them to contribute a major portion of fuel requirements simply is not available. The best arable agricultural land could only yield 2 tonnes per hectare of oilseeds from which less than 1 tonne per ha could be extracted and this would only be sustainable on, say a 3 year rotation, less than 300 L per ha per year of bio-diesel could be produced from this source. Alcohol from corn would be at best three times this figure Clearly the high quality country that would be required to grow these crops is already used for higher value food crops for local consumption and export. A 'back of the envelope' calculation shows that Australia's current cropped area of 19 million ha would have to be almost doubled to run our transport fleet on bio-diesel, which is clearly impossible as much of the currently cropped area is already too marginal for oilseed production so land of the required capability simply isn't available. *Note: That is not to say that a few percent of our need not be sourced from waste vegetable oils*

Alcohol (methanol or ethanol) from wood is by far the most promising option and 'state of the art' pilot plants are needed in every State to perfect technology to utilise the best option woods available. Wood such as *E. globulus* and *P .radiata* grown in plantations in high rainfall (>700mm) steep country currently only useful for grazing, can easily produce in the order of 15 – 30 tonnes of biomass per hectare per year from which 5,000- 10,000 litres per ha per year of alcohol should be extractable on a sustainable basis. Species such as oil mallee *Eucalyptus*, *Casuarina* and *Grevillea* sp have been shown by Dept CALM in WA to have sustainable wood production potential (albeit in the range 1-5 tonnes per ha per year) in the 300 – 500 mm rainfall wheat belt areas. (See press release, Appendix). Such wood production from local species has the added benefit of being sustainable in terms of reducing soil loss, being 'drought proof, lowering saline water tables and providing 'greenhouse sinks'. Oil mallees are already being grown in belts the WA wheatbelt to feed a pilot charcoal-eucalyptus oil- electricity generation co-production plant near Narrogin. As yet there is no pilot plant to produce ethanol form wood in WA. However, the Carter Holt MDF plant at Oberon NSW produces formaldehyde resin from alcohol and their process may be a good starting point for investigation.

Researchers at Curtin University in WA have produced estimates as summarized in the following article:

Point 3

I do not consider myself qualified to comment specifically on the economic effects of rising fuel prices, except to say that an inefficient transport fleet and system will obviously make us more vulnerable to sudden rises in fuel prices. Fuel inefficient transport means that expenditure on fuels is a relatively larger portion of production costs and household expenditure than with fuel efficient transport. Put simply, the best insurance against high fuel prices is efficient transport. Many fuel efficiencies can be achieved at little or no financial cost and many will produce actual savings.

Point 4
Options for reducing Australia's fuel demands, specifically by increasing fuel efficiency, is the main point of this submission:

The myth of 'free energy' and zero pollution from hydrogen fuel
The Committee must be aware that hydrogen is an energy carrier not an energy provider. Current and most foreseeable sources of hydrogen are directly from fossil fuels or by electrolysis of water using fossil fuel powered electricity. When the emissions from hydrogen production are considered, it emits at least as much greenhouse gas as the burning of fossil fuels such as oil or gas. The only way that it becomes pollution free is if it is generated directly by photovoltaic or photochemical processes using the sun as the energy source of from wind or hydroelectric power. These sources are likely to remain too expensive or limited to provide the large volumes of transport fuels required although they do have great potential form stationary power generation
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Curbing jet aircraft emissions
ABS omits overseas air travel in its greenhouse gas emissions publications but does include domestic aviation (about 2.5% of fuel use). Overseas air travel by Australians, (which is mainly for holidays and other non-essential purposes) would constitute at least 3 times as much fuel use as domestic aviation. It is essential for the Senate Committee to obtain accurate figures for aviation turbine fuel use and GHG emissions including overseas travel.

Jet aircraft fuel is taxed less than 2% throughout the world. Tax on aircraft fuel must increase worldwide if the waste and greenhouse pollution from this source is to be reduced. The Committee should address aircraft fuel use and identify an international forum in which to negotiate increased taxes to curb unnecessary jet travel

It is generally accepted that fuels for aircraft must be liquid. Natural gas and hydrogen powered craft have been tested but the extra weight of the pressurized tanks adds many problems including reduced payloads. Alcohol fuels are likely to provide the best renewable fuels option

The need to reduce private car use and air travel
Reducing fuel wastage in the use of large, over-powered vehicles for commuting with driver only or one passenger and in non-essential overseas travel and are essential issues that will have to be tackled by Govt regulations. Low road fuel taxes of 38c per L plus

10% GST (one of the lowest in the world after the US and Canada) and negligible taxes of about 2% on aviation fuels globally 10 % are the main reason that fuel is habitually wasted. Increasing taxes on aviation fuels is essential to provide incentives to reduce air travel and make aircraft more efficient and lower their emissions of nitrous oxides. Any additional fuel taxes should be made revenue neutral by proportional income tax reductions such as increasing the tax free threshold for income taxes.

Obviously all of these measures would have huge political obstacles to overcome, as very few people want higher fuel prices. Hence it is essential to initiate public education, awareness raising and debate on the issue. This is the role of Government in the same way as road safety and anti- smoking campaigns have been successfully conducted. How many people are aware of the seriousness of global warming, how much their different consumption and travel habits contribute to it? How many are aware of what tax is paid on aviation turbine fuel, the contribution of jet aircraft trips and car usage to global warming? How many are aware of how much fuel they use in a year, or for a trip to Europe or the US? How many are aware of more efficient, less polluting travel and transport alternatives? All of these things need to become common knowledge so that people can see that higher fuel prices, carbon tax on fuels are necessary, along with alternative fuels and better public transport systems, to reduce fossil fuel usage.

Need for awareness raising and education

In general, the level of awareness is currently quite low, as it has long been assumed that 'bigger, more, faster and more comfortable are better' in relation to transport and that there are no 'down sides'. There is no 'official public consensus' on the seriousness of global warming for the public to respond to when the US and Australian Governments fly in the face of global scientific consensus and refuse to take legislative action

It is clear that the necessary changes in consumer travel habits will not occur if it is left up to free market mechanisms, as the only education the populace currently have on TV are the marketing ads for jet holidays and new high powered cars. The situation is the same as cigarette advertising in the 1960-70's – the main message was consume more tobacco and this was the opposite of the 'smoking harms your health' message that people needed to know. The answer was to ban advertising and raise taxes on cigarettes – similar tactics will be required for high powered cars ad jet holidays – these are a major hazard to the health of the planet. This message needs to get out through the main media – TV and newspapers. This may seem as radical now as anti-smoking was in the 60's, but it has to happen in order for the necessary changes to happen .The sooner it starts and the more professionally it is done easier the inevitable reductions will be, but one thing is certain- public education and awareness raising has to be the first step in changing negative consumer habits.

An adult awareness raising campaign and school curricular materials on global warming, 'peak oil' and the need for energy efficiency and using alternative energy sources needs to be introduced as a matter of first priority.

Need for incentives for more fuel efficient cars

Most of Australia's car fleet is grossly under-used and inefficient, for example most people commute to work in medium to large cars with fuel efficiency < 11 L/100 km. Cheap reliable, efficient small cars are available on the market. For example I have a 1L capacity car that weighs about 700 kg (compared for 1500 kg for an average Australian car) that uses less than 6L/100 km (I have just finished a 10,000 trip from Perth to Sydney and SE Australia and this vehicle travelled easily at the speed limits and returned less that 6 L/100 km, fully loaded with two adults and camping gear). Using an average Australian car I would have used at least 500 L more fuel for this trip alone!
Incentives that are needed to encourage efficient personal transport are, in order of effectiveness and priority:

- At least a doubling of the fuel tax at the pump (revenue neutral), bringing Australia in line with most European countries. (Fed Govt)
- With the revenue raised, aim to halve public transport fares – this way buses and trains will be used near to capacity which they are not a present. Explain this strategy in public awareness campaigns. (Fed and State Govts)
- Greatly increase license fees on large and or overpowered vehicles. (At least a trebling of current license fees with no increase on the current fees for small efficient vehicles. (State and Fed Govts)
- 'Buy back' program for old inefficient vehicles – guarantee say $3000 for old 'guzzlers' to be scrapped if they are replaced by small fuel efficient models (say better than 6L/100 km).(Fed Govt)
- Increase bicycle lanes and facilities in cities making it safe and viable to ride to work. Melbourne and Perth and making significant steps in this direction; Sydney is abysmal in this regard. It simply isn't safe to ride on the vehicle clogged streets there.
- Introduce traffic congestion reduction measures in the big cities by charging motorists in the urban areas and introducing free inner city transit buses or trams. (State and Local Govts). Look at the vehicle charging systems in London and Edinborough. I travelled twice from Bondi to City a distance of 7 km by bus and it took over 55 minutes each time – travel in this city is becoming unworkable and urgent measures are required.

All of these measures work and are used in other countries. The only reason they are not introduced in Australia is lack of public awareness and lack of political will by governments. Firstly a Govt run public awareness campaign must be run.

Self-audit of energy and emissions as an awareness raising tool

I have produced an energy and emissions calculator (attached, with an audit for a typical Australian family) in which transport and other energy consumption figures can be entered to do quick audit estimates and compare options. The background paper clearly outlines how about 50% of Australia's energy and emissions are from domestic sources. ABS states that over 70% of our oil consumption is for motor cars. The Paper shows that about half of average domestic GHG emissions and more than half of domestic energy use are from personal transport – car and air travel.

I am more than happy to make this tool and the educational materials available for any Government education and awareness programs.

Energy audit of industry.

As a professional I have been conducted a Level 1 energy audit of a large mine using about $12 million worth of energy per year. Viable short term projects to save at least 18% of the energy used were identified, mainly in the transport of ores and concentrates, and even greater reductions were possible by major projects to change the method of mining. It is generally accepted that around 20 % savings can be made by most industries, for example piping slurries or using conveyors can be at least 4 times more energy efficient than trucking.
The new Energy Efficiency Initiative with Mandatory Energy Efficiency Audits is laudable but is in danger of being hijacked by industries pushing for loopholes. There is no requirement for action to improve energy efficiency to achieve industry best practice and establish industry benchmarks under the current legislation (which is soon to be or recently has been made law) and this is an essential next step in legislation.

Appendix

Press release re alcohol fuels

Mallee: blitzing biofuels

Friday, February 10, 2006
Francine Pennington

NEW research shows a Western Australian native plant produces the most energy efficient biofuel compared with the more traditional crops corn, canola and mustard seed.

The oil mallee - the good oil for biodiesel?

Speaking at the Bioenergy and Biofuels in WA conference earlier today, Curtin University's Dr Hongwei Wu said the oil mallee tree "blitzed" the competitors during an energy ratio test of biofuel production.

The mallee tree can provide 3159 litres of ethanol per hectare, compared with corn at 3110 litres per hectare, Wu said.

Mustard seed produced 606 litres of biodiesel per hectare, with canola at 438 litres.

Mallee can produce 41.7 times more energy than is used in its cultivation, providing a substantially higher return on energy investment than corn, canola and mustard, which have energy ratios ranging between 5.6 and 10.

"Based on this analysis, the mallee-to-ethanol scenario looks like being the most promising out of all the crops," Wu said.

He said another advantage of the mallee-ethanol model is the adoption of an "alley farming" concept, in which trees only cover 10% of the total farming land, leaving most of the land available for other crops.

In comparison, productivity from the other crops required 100% ground coverage.

Researchers from Monash University in Melbourne are already investigating how to convert the mallee tree into a fuel.

Project leader Dr Damon Honnery said mallee wood could be super-heated to produce a vapour that could then be condensed into liquid to run diesel engines.

Honnery said the oil was not yet suitable for car engines as the filtering systems were too fine, and it had only been used in a test engine, but he believed appropriate refining process could be developed within the next 10 years.

Planting these trees could also help Australia's soil salinity problem as their complex root system reduced water table problems, according to Honnery.

"The fuel is almost greenhouse neutral, so we get three benefits – we can help solve salinity, we can help to solve and reduce greenhouse gas emissions from transport, and we get to produce a fuel as well," he said.