Microbiogen

Committee Secretary
Senate Rural and Regional Affairs and Transport Committee
Department of the Senate
Parliament House
Canberra ACT 2600
Australia

Emailed (rrat.sen@aph.gov.au)

24th February 2006

Dear Secretary

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

Please find below our submission to the Senate Inquiry into Australia's future oil supply.

We are a fully Australian owned private company developing renewable fuel technology.

A. PROJECTIONS OF OIL PRODUCTION AND DEMAND IN AUSTRALIA AND GLOBALLY AND THE IMPLICATIONS FOR AVAILABILITY AND PRICING OF TRANSPORT FUELS IN AUSTRALIA

Australia consumes 770,000 barrels of oil per day, representing 52% of energy consumption in Australia, and nearly 100% of transport energy (Australian Institute of Petroleum).

According to the official report by the Department of Industry, Tourism and Resources, entitled 'Oil and Gas Resources of Australia 2003', our oil production is past its peak, and will keep declining into the future. This is shown in the following graph taken from that report.

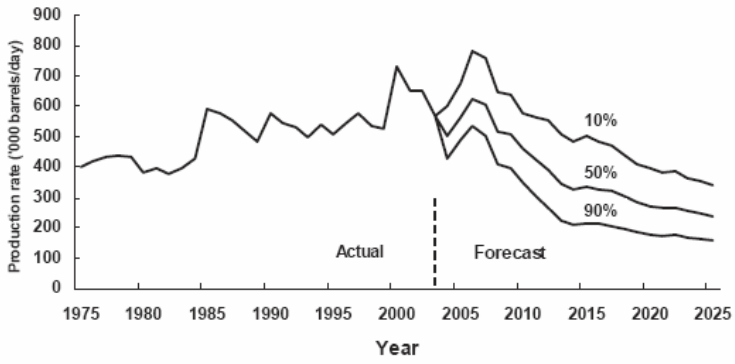

Figure 7.1 Australia's annual production of crude oil and condensate 1975–2003 and forecast annual production at 90%, 50% and 10% cumulative probability 2004–2025

Oil and Gas Resources of Australia 2003 93

Outside the Middle East, nearly all countries appear to be facing the same challenge of declining oil production. Even in the Middle East, major fields, such as the Burghan field appear to have recently entered into decline. As a result many experts consider that a world wide peak in oil production is imminent. For example a recent paper (Energy Policy 34 (2006) 515–531) entitled 'Have we run out of oil yet? Oil peaking analysis from an optimist's perspective", by David L. Greene, Janet L. Hopson and Jia Li from the Oak Ridge National Laboratory, National Transportation Research Center, University of Tennessee, 2360 Cherahala Boulevard, Knoxville, TN 37932, USA states:

'(There is) a high probability that production of conventional oil from outside of the Middle East region will peak, or that the rate of increase of production will become highly constrained before 2025. If world consumption of hydrocarbon fuels is to continue growing, massive development of unconventional resources will be required. While there are grounds for pessimism and optimism, it is certainly not too soon for extensive, detailed analysis of transitions to alternative energy sources.'

Given the scale of the petroleum industry, it is essential that alternative fuels infrastructure is established well before any peak in world oil production. A report sponsored by the US Department of Energy on the subject of a "Peak Oil Crisis" said that 'Three main scenarios were envisioned, involving mitigation action taken 10 and 20 years prior to peak oil, and action taken once it peaks. It showed that acting 20 years in advance would possibly avoid a liquid fuels shortfall, while action 10 years before would leave a decade of shortfall, and acting after the peak would see a minimum two decades where a liquid fuel deficit would cause significant global issues'.

B. POTENTIAL OF NEW SOURCES OF OIL AND ALTERNATIVE TRANSPORT FUELS TO MEET A SIGNIFICANT SHARE OF AUSTRALIA'S FUEL DEMANDS, TAKING INTO ACCOUNT TECHNOLOGICAL DEVELOPMENTS AND ENVIRONMENTAL AND ECONOMIC COSTS

1) Potential new sources of oil

Australia has had an active oil exploration program since at least the early 1960's when the Bass Strait oil reserves were found. According to Geoscience Australia's 2003 report, petroleum exploration expenditure incurred in 2003 was $755,711,000 of which $140,500,000 was onshore and $615,211,000 was offshore. This level of expenditure suggests that exploration of oil reserves in Australia is fairly mature, and that despite investment on this large scale, oil provinces of the size that would be required to significantly reverse the decline in traditional oil production are not likely to be found.

2) Alternative fuels for transport

Alternatives to oil are required so that the transport sector can remain viable if oil becomes more expensive or scarce or both. As a result many alternatives are being considered in two broad groups. Non-renewable transport fuels include Liquefied Natural Gas (LNG), oil from coal, and potentially hydrogen made from non-renewable sources such as natural gas or hydrolysis using non-renewable sources such as nuclear or coal fired power stations. Renewable transport fuels potentially include, bio-ethanol, bio-diesel, bio-gas, and hydrogen generated from renewable energy sources.

3) Quantity and technology status

Non-renewable transport fuels such as LNG suffer from the same problems as petroleum fuels - they are finite in quantity, and contribute to the greenhouse effect. The technology for hydrogen as a fuel is not well developed, and requires the use of energy from another source to be produced. Our current transport fleet cannot run on hydrogen as an alternative to oil. Major investment would be required to convert the current fleet to the use of hydrogen, and the technology is not yet mature.

The greatest opportunity for renewable fuels to directly replace oil comes from bio-ethanol and bio-diesel. Both fuels can be used to extend current oil supplies by blending into petroleum products, and both fuels could be used to run transport in the absence of any oil.

Although bio-diesel and biogas have proven utility as alternative transport fuels, neither of these can be produced in sufficient quantities to significantly replace the 750,000 barrels of oil used per day in Australia.

Bio-ethanol has proven application in Brazil and North America as a fuel, both as a mix with petroleum and as a pure transport fuel. Flex-fuel cars are available in

Brazil and the USA that can run on mixtures ranging from 0% to 85% ethanol, and dedicated cars in Brazil can run on 100% ethanol. Hence the technology is already tried and tested for using ethanol as an alternative to oil. No modifications are required to run a car on fuel containing less than 10% ethanol blends, and only minor modifications are required to use blends with higher ethanol contents. Hence only a relatively minor investment would be required to convert the current fleet to the use of ethanol as a fuel.

In the world context ethanol is predominantly produced from sources such as molasses and corn. Use of these substrates for fuel will compete with the use of these substrates for food applications. In the case of corn in the USA, it is estimated that 15% of the corn crop is now being used to produce ethanol. It is clear therefore that for ethanol to significantly replace petroleum as a transport fuel, it will need to be produced from sources other than food crops. Fortunately, sufficient ethanol could be produced from lignocellulose.

4) Lignocellulose

Lignocellulose is waste plant material. It is produced in large quantities by agriculture, horticulture and forestry. For example, the sugar industry alone produces sufficient quantities of lignocellulose (bagasse) to produce enough ethanol to replace at least 10% of the Australia's oil consumption. There are currently no commercial plants producing lignocellulosic ethanol and this industry needs to be developed. The two challenges to commercialization of the lignocellulose to ethanol industry are being overcome and suggest the industry will be viable with 2- 3 years.

The first challenge is the breakdown of lignocellulose into its component sugars. Previously this could not be achieved economically using either chemical or enzymatic means. However, in the past three years, large scale investment (~US$40 million) by the US government in collaboration with enzyme companies such as Novozymes and Genencor has led to a thirty-fold decrease in the costs of enzyme technology. The current estimate by Novozymes of 30 c/gallon (~8c/L) has brought the cost of enzymes into an economic range.

The second challenge is the development of organisms capable of efficiently fermenting all the sugars present into ethanol. Our company has developed the world's first non-GM organisms that can use all the sugars in lignocellulosics.

We are now developing an integrated process for the complete and economic conversion of lignocellulose (such as sugar cane bagasse) into ethanol and valuable by-products. This is a world's first development and opens the way to have a viable lignocellulose to ethanol industry in Australia within two years. This provides Australia with the potential of being a net exporter of fuel ethanol technology rather than relying on technology imported from other countries.

C. FLOW-ON ECONOMIC AND SOCIAL IMPACTS IN AUSTRALIA FROM CONTINUING RISES IN THE PRICE OF TRANSPORT FUEL AND POTENTIAL REDUCTIONS IN OIL SUPPLY

The likely decreasing availability of oil and resulting increase in prices will have many economic and social impacts. Previous brief oil shocks in the 1970's and 1980's led to inflation, and economic recession. If oil supply peaks, oil prices and supply for Australia will remain under pressure indefinitely with the potential of long term economic damage, unless alternative fuels can be produced at reasonable prices. Brazil reacted to threats of high oil price and low security of oil supply in the 1970's by moving to ethanol as a transport fuel and is estimated to have saved billions of dollars in oil imports. By contrast Australia's production of alternative transport fuels is immature and this makes us extremely vulnerable to world supplies and prices. It will have considerable negative impact on our balance of trade within the next few years.

In addition, the long term reliance on fossil fuels will lead to climate change due to carbon dioxide build up in the atmosphere. Significant climate change is likely to have major impacts on both the economy and society.

The development of a viable lignocellulose to ethanol industry will help ameliorate the effects of any decline in oil supply and reduce greenhouse gas emissions. Furthermore, development of renewable fuels industries in Australia can have major positive impacts on rural economies. For example, the fuel ethanol industry in the USA already adds at least US$15 billion direct to the rural economy by providing value-adding opportunities for farmers, new jobs, increased spending power in rural communities etc.

D. OPTIONS FOR REDUCING AUSTRALIA'S TRANSPORT FOSSIL FUEL DEMANDS.

There are no quick or easy solutions. Improved public transport, higher efficiency of cars, carbon taxes, carbon trading, and implementation of renewable transport fuels such as bio-ethanol, bio-diesel and bio-gas represent some of the strategies that can help to reduce reliance on fossil-based transport fuels.

There needs to be a concerted effort by governments and industrialists to work in-concert to bring technologies for new alternative transport fuels to fruition. There needs to be political support to do this, as is happening in the USA with President Bush's recent announcement on renewable energy supplies. Countries in the EU and others such as Canada, China, Thailand and India are also investing heavily in renewable transport fuels. Without a similar program, Australia will be left behind and become increasingly vulnerable to economic and social impacts in a world where countries are vying for dwindling oil supplies.

Yours sincerely,

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