

Senate Rural and Regional Affairs
and Transport Committee

INQUIRY INTO AUSTRALIA'S FUTURE OIL SUPPLY
AND ALTERNATIVE TRANSPORT FUELS

SUPPLEMENTARY SUBMISSION
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This supplementary submission will clarify issues discussed in my main submission, add new information, and comment on submissions made by others, where relevant. I will stress the VITAL importance of the need for democratic participation processes as outlined in the Introduction to my submission. The Section numbering below reflects that used in my original submission.

1. INTRODUCTION

Ride the Whirlpool

"I have seized on the metaphor of the boat in the whirlpool to emphasise the point that the chaos into which we are moving is a natural thing, far more natural than linear stability and order. We ride the whirlpool in many forms in nature, and we evolve personally and socially to do so. The individuals and organisations that will be successful in this will be the ones that unleash the creative genius of their people. This is the essence of modern leadership."

Lieutenant General Dr John Sanderson, AC ex-Governor of Western Australia
on his choice of name for the book of his speeches while Governor, UWA Press 2005.

The paragraph below on participatory democracy is from my submission with additional comment added in italics.

.... **"This approach has been successfully used** in Western Australia by the Department of Planning and Infrastructure on the initiative of the Minister, Alannah MacTiernan, to progress a range of complex planning and transport issues, including ones where there are many conflicting interests. The following principles apply:"

- Government must genuinely listen to divergent voices. *The complexity of the issues, their interactive nature, and the many conflicting interests of stakeholders means that "top down" management approaches will not work. No person or group can possibly foresee desirable solutions, except in a very general way. These solutions can only emerge from structured participatory processes involving all stakeholders. The role of leaders is to ensure that such informed processes happen, and to respect the outcome.*
- Stakeholders are to listen to others in the same way. *All stakeholders must respect the concerns and interests of others. **Emerging solutions must be just, fair and equitable** to ensure that everyone remains committed to them.*
- Governments must ensure the engagement is reflective of the community—that the aspirations of special interest groups are calibrated against a broad cross section of the community. *For example, in the "Dialogue with the City" process in Perth in 2003 over 60 per cent of participants were selected at random from the electoral roll. Nearly 1400 people were involved.*
- Governments to be open with the process of engagement and with its sharing of information. *Building and sustaining trust.*
- Governments to be genuinely committed to embracing the outcomes of the process. *People and stakeholders will only trust governments to lead if this is the case.*
- Establish continuous feedback links with participants to ensure the broader community stays engaged. *As above, the process needs to be a continuing one to provide feedback and resolve new issues as they emerge, and to reinforce commitment.*
- Leadership must reflect and implement these principles. *See the reference above to Lt General John Sanderson.*

Road Trains and residents

The conflict between residents and freight road trains traveling in urban areas is an acute one in Western Australia. The Dept. of Planning and Infrastructure organised four one-day workshops based on the above principles in mid-2001. I attended the last one in Geraldton, conducted as follows:

- *70 residents and trucking people attended grouped at 10 tables each with a facilitator and a mix of both parties. There was an overall facilitator. The workshop had available the outcomes of the earlier workshops.*
- *Both parties presented their cases, with further background information provided by the Dept. and others. Each table discussed the presentations.*
- *The outcomes of the other workshops were discussed, commented on and added to.*
- *After morning tea the road train people on each table were asked to argue the residents case and vice versa. The facilitators were asked to ensure they really did so. Outcomes reported to the meeting.*
- *Further papers and discussion with the focus shifting to solutions to the conflicts.*
- *Before afternoon tea the Dept. said it expected freight to double by 2020. Each table was asked to discuss what it would be like in 2020 on a "business-as-usual" scenario compared to the change scenarios that were emerging. ALL TABLES CONCLUDED THAT CHANGE HAD TO OCCUR. NO PERSON DISAGREED.*

Subsequent works are underway to resolve the conflicts with continuing dialogue along these lines to resolve emerging issues—the Dept. of Planning and Infrastructure's submission (No. 172) gives a brief outline of some. The petroleum fuels and alternative fuels for transport were not an issue in these early workshops.

4. IS WORLD OIL PRODUCTION ABOUT TO PEAK?

No new comment to add. We are almost certainly at the end of cheap oil. The many complex interactions and responses to tight supply and associated high prices means we face possibly a decade or more of transition to an era when oil production will clearly be declining. The situation in Iraq continues to deteriorate. The fragile situation there poses a high risk of supply disruption.

Media reports say China's oil imports have surged this year compared to last years low increase after 30 per cent plus increases in 2003 and 2004 (Australian Financial Review 16/3/06 p.26). The government capped fuel prices last year to unprofitable levels for refineries and sales were limited that led to fuel shortages. The caps have been lifted suggesting China will again boost world consumption this year.

5. WORLD NATURAL GAS

Very few submissions have recognised the deteriorating gas supply situation in North America and Europe, especially in the UK (my Appendix 3). Together these regions consume 46 per cent of world gas. North America has consumed some 80 per cent of its discovered natural gas. Only an exceptionally mild winter prevented a heavy call on natural gas this year. The UK has also consumed 80 per cent and Europe should do so by the end of the decade. The cold European winter has thrown these supply constraints and their politics sharply into focus. Natural gas is a significant fuel for electric power and winter heating. The global significance of these gas declines is equal to that of the oil supply situation due to the role of natural gas in electric power and as a heating fuel. There is less uncertainty attached to these natural gas forecasts than there is for oil supply.

This has created a boom in LNG infrastructure provision. About one-third of the natural gas input is consumed in liquefying the gas to LNG, transporting it and re-gasifying it at the consumer end. A relatively high proportion of the energy goes into producing the end product that reduces the net

energy left for performing useful work. This gas supply crisis is pushing up gas prices in parallel with oil.

6. AUSTRALIAN OIL AND GAS

My submission is not in significant conflict with Geoscience Australia's (No. 127) on projections for future oil and gas production. GSA cautiously discusses the profiles of discovery and production with limited reference to the debate on "peak oil" occurring in the industry and elsewhere, but are aware of it. As a federal government agency it has to walk a fine line to avoid upsetting the Government and the industry.

But GSA's focus on expensive exploration in deep water offshore sends a clear message on the "end of cheap oil". Relatively small oil discoveries in Australia can have a significant short-term local impact on supply in contrast to the global supply scene. We can expect occasional short supply "spikes". The Carnarvon Basin, Australia's major hydrocarbon basin is gas prone due to the depth of the source rocks where the high temperatures and pressures convert any oil into natural gas (See Campbell's submission from ASPO Ireland, No.10). Is this also the case in other Australian basins?

The Australian Bureau of Agricultural and Resource Economics (ABARE) submission (No. 166) is little more than an exposition of their standard annual projections of fossil fuel supply and consumption growth to 2030. There is discussion on the current tight supply situation attributed to lack of investment in exploration and development from the mid-1980s due to low oil prices. ABARE assumes that current high oil prices will lead to increased investment followed by new discovery and supply development as well as alternatives such as biofuels. There is no mention of the debate raging in the petroleum industry on the future of oil supply in both the world and Australia, but they must be aware of it. ABARE's viewpoint is based on those of economists who do not understand the central role that energy plays in economics. They do not have the most basic understanding of the concept of net energy and its significance.

7. PETROLEUM AND TRANSPORT FUELS

My dissertation in this section further highlights the deficiencies in ABARE's approach from an energy perspective. My appendices 1, 4 and 5 are also relevant. Many submissions, particularly in the biofuels group, raise the issue of 'net energy' and attempt assessments. There are inconsistencies due to a lack of rigor in analyses. There is also a dearth of information on the embodied energy of goods and services and of the net energy yields of primary and secondary energy sources. Such information is VITAL for sound long-term decisions to be made on economic policy.

Often analyses of net energy yield and embodied energy omit important components such as the direct and indirect financial and government services (e.g. research, education, health, marketing to name a few). The embodied energy of these is more than most people think. You could add the police and military. Such omissions are the principal source of the inconsistencies.

*The fossil fuel input to biofuels is significant, especially for ethanol, both on-farm (e.g. wheat, corn and sugar) and in converting a 8-10 per cent solution of ethanol after fermentation to anhydrous ethanol. The ASPO-Australia Biofuels submission (No. 24) is the most relevant here. It is misleading to describe biofuels as 'renewable'. Proponents are responding (including in some submissions) by incorporating all farm 'waste' into the fermentation process, **in effect scraping paddocks bare. Straw, stalks and cane are not waste.** Its return to the soil is vital to restore nutrients and to maintain the organic structure of soil to sustain the rich invertebrate fauna and microorganisms that are essential to sustain fertile soils. Incorporating these wastes into biofuels must be seen as a cost, not a benefit.*

It is essential that the Committee recommend the necessity for such net energy analyses and the need for consistent and rigorous standards, particularly for biofuels and the consequences for soil fertility.

In 1917 there was a Royal Commission on the Mallee Belt and Esperance Lands in Western Australia. It was investigating issues related to opening up these lands for farming in what we now know as the wheatbelt. A prominent witness was John Patterson, Professor of Agriculture at the University of W.A. He warned the Commissioners that most of the land was too salty for profitable farming. Other witnesses supported his position. However, the Commissioners in their Report responded by saying, "... having given the question close consideration strongly urges that scientific prejudice against our mallee lands be not permitted to stand in the way of their being opened up" (The Salinity Crisis, Beresford, Bekle, Phillips and Mulcock, University of WA Press 2001, p.49).

It is important that the Committee learns the lessons from history and approach the issue of alternative fuels and their justification with a sufficiently rigorous approach.

8. INDUSTRIAL AGRICULTURE—THE FOOD CHAIN

A balanced and equitable approach to reducing petroleum dependence on the food chain requires the information from embodied energy studies on the Australian food chain that includes imports and exports as well as our role in feeding those parts of the world currently with an absolute dependence on food imports. The information obtained can provide the basis for stakeholder participatory democracy approaches as described in Section 1 to chart the way forward. A long transition to sustainability is inevitable that must be matched to the declining availability and quality of petroleum fuels, with first priority to food supply.

Australia produces food to feed about 80 million people—three quarters is exported. The world's population is increasing by a similar number every year.

9. ROAD AND RAIL TRANSPORT

"The path from one failed road strategy to another is a straight line"

This part of my submission is the least satisfactory and the subjects are also the most complex and are of major importance. The problems arising from car dependence, poor public transport and access to jobs in our outer urban areas has been highlighted by submissions from local authorities and the NSW Council of Social Services (No. 19, 43, 56, 62, 89, 97, 99, 103, 124, 157, 158, 165). Similar problems would exist in regional Australia. There is also a chronic imbalance between rail and road freight transport, highlighted by submission No. 131 from the Australian Truck Association and those from rail interests (e.g. No. 169 Pacific National) and in considerable detail by Prof. Phillip Laird, University of Wollongong (No. 140).

For urban areas a central problem is that federal taxes (fuel excise) provide most road fund—a subsidy—and borrowed funds (state government) fund rail and public transport. This has occurred in a political climate where borrowing by governments has been frowned upon. The federal government has almost entirely withdrawn from funding public transport. There are many other defects in the tax and charges systems and imbalances between federal and state tax and finance systems that enhance the biases against public transport. These are referred to in many submissions.

The history and drama of both these urban and freight issues and the dismal failures of governments to respond are well described in the submission by Phillip Laird referred to above and in the book "Back on Track" by Laird, Newman, Bachels and Kenworthy, UNSW Press 2001. I will now refer below to some of the key conclusions of Laird et al.

a) Studies of cities throughout history show that people are prepared to spend about an hour a day traveling to and from work. Hence cities are an “hour wide”. Claims, in this context, that freeways and tollways “save time” are not credible. There is positive feedback, traffic grows to saturate the new capacity with people still commuting for an hour a day (pp. 134-138). Traffic and congestion increases, distances traveled are longer.

Recommendation: The Committee should recommend disallowing saving of commuters time as a benefit in cost-benefit studies for urban road works.

The new mayor of Brisbane was elected two years ago on a policy for a \$4 billion program for four road tunnels in Brisbane justified on the basis of commuters saving time (Australian Financial Review, “Tunnels worth the toll: mayor”, 14/3/06. p. 8). Multi billion dollars spent on road tunnels and tollways in Sydney since the mid-1990s have led to gridlock—traffic congestion from 7.30 AM to 6.30 PM.

Fuel savings and emission reductions cannot be anticipated from freeing up congestion if extra road capacity is the mechanism.

b) Linear policy approaches have led to these predicaments: These linear approaches are described below (p.134 Laird et al.):

- Building roads is merely to ease congestion; it does not create increases in car use. Indeed, easing traffic congestion can help to save fuel and reduce emissions.
- Land use patterns, the physical form of cities, especially the density of development, does not have much impact on transport patterns,
- Public transport needs to be efficient, so reducing services will save money and enable reinvestment to occur.
- Increasing the speed and efficiency of traffic has no impact on cycling and walking modes.
- There is little you can do to get people out of their cars; thus traffic levels will rise inevitably.

These five approaches were examined by Laird et al by assessing data from 49 international cities to derive land use, transport, economic and environmental indicators to evaluate transport and land use interactions. Using this approach feedback from these linear policy decisions were identified that seemed to be increasing car use and reducing the sustainability of our cities. The model for developing such a systems approach is set out in Appendix E (p. 215). This complexity arising from interactions and feedback rules out linear “top down” decision processes on urban land use and transport, with the latter requiring a multi-modal approach. Only a “bottom up” participative democracy approach with supportive “top down” leadership can cope with such complexity, where solutions emerge from the process, as outlined in my Section 1 and above. This leads to the following conclusions:

Recommendation: There should be no ‘road funds’ just transport funds, The need for flexibility, balance and local accountability to government argues against a process that picks winners before evaluation. Weighing up which alternatives are the most effective cannot be done from Canberra.

Recommendation: The federal government should not assign transport funds to projects. They should just ensure a process of regional planning has occurred to determine how best transport priorities should be assigned to their transport funds.

Recommendation: State governments should abolish the planning powers, guaranteed funding and direct access of their road agencies to ministers. These agencies should become road-building agencies only under the direction of broader departments such as transport or infrastructure.

Recommendation: Transport funding should be assigned only after a process of planning has occurred in cities and regions based on a full analysis of all options. These options should be based on both technical analysis and proper consideration by planning bodies in cities and regions that are democratic (involving elected officials) and involve customer stakeholder-oriented groups, as outlined in Section 1 of my submission.

The Dept. of Planning and Infrastructure in WA is moving in this direction, submission 172.

Freight traffic

My submission referred to the growing road deficit where road costs and external costs associated with road use greatly exceed the revenue paid by road users, quoting Laird et al. in their book "Back on Track". Of particular concern has been the neglect of the generally more energy efficient rail freight in favour of road freight and the failure of road freight to fully pay the costs of heavy vehicle damage to roads. These problems are described at length in Prof. Phillip Laird's submission (140) and in Appendix D in Laird et al. An outline is given below.

The cost of maintaining an arterial road constructed and paved to reasonable standards depends mainly on the road pavement wear and tear that is quantified by using the concept of an Equivalent Standard Axle Loading (ESAL) **where road pavement usage is related to the fourth power of the axle loading**. These lead to comparisons of the damage fully laden trucks cause to roads compared to a car, as tabulated below. GVM is Gross Vehicle Mass for trucks.

<u>Truck type</u>	<u>X cars</u>	<u>Comment</u>
Six-axle articulated truck	~10,000	38 tonne GVM
Six axle articulated truck	~15,000	GVM lifted to 42.5 tonne in NSW 1987/88
Fully laden B-double	~20,000	
Road trains have even higher ratios.		

The charges on truck operation are federal fuel excise and state vehicle charges and do not anywhere near cover the cost of damage to roads, a situation that gets worse the heavier the truck and the longer the distance it travels, viz. B-doubles and road trains. Among government agencies there is broad agreement on a combination of fuel excise and mass-distance charges to recover road costs. The latter is related to the axle load and distance traveled. Within this framework there are many secondary inequities discussed by Laird in his submission and that need addressing. New Zealand has such a mass-distance charging system.

There have been numerous attempts by governments since 1980 to introduce mass-distance charging in Australia. All have been fiercely resisted and defeated by the truck lobby, the latest last month (Australian Financial Review, "Flattened by a raring juggernaut", 28/3/06, p. 59). The Australian Truck Association's submission (No. 131) reflects this impasse—and also clearly outlines the reasons why. The reform proposals disregarded the dramatic economic consequences for the trucking industry—mostly small businesses. Also the proposals were not integrated with a reform and rebuilding agenda for rail freight to take over from trucks. The principal rail deficiencies are on the Brisbane, Sydney and Melbourne routes. A stark example of the failings of "top down" linear straight-line thinking in trying to solve such complex inter-connected issues..

Recommendation: Revisit a combination of fuel excise plus mass-distance charging for trucks to cover the cost of road damage together with concurrent rehabilitation of the rail freight system. The participatory democracy approach outlined in Section 1 of my submission should be used, and as pioneered by the Dept. of Planning and Infrastructure in WA. The following broad principles should apply.

- Initially priority should be given to areas where there is already rail and road; the eastern seaboard to Adelaide, Sydney-Perth, southwest Western Australia and rail to Darwin.
- Priority for upgrading of rail track and rolling stock rather than new road works. There are a few low-cost investment options to relieve critical rail bottlenecks that should have high priority.
- Primary consideration must be given to fair, just and equitable outcomes for the road freight industry, including alternative employment. Without this success cannot be achieved.
- There is a substantial and growing road freight industry (road trains etc) to the northwest of Western Australia where there are no existing north-south railways. The option for diverting road freight to coastal shipping needs exploration in this context. There must be massive destruction of roads taking place in WA.
- Freight demand management needs to be an integral part of the project. To progressively end the "carting of coal to Newcastle" in favour of greater local self-sufficiency agendas.
- Road and rail freight needs integrating through strategically located "modal interchange hubs".

There is much more that could be said. But the above outline defines the core principles. Nearly all others issues represent an aspect of the above where similar principles would apply.

10. CHINA AND INDIA

My submission dealt with the conflicts between urban/industrial and associated infrastructure development and its adverse impact on China's grain production. One factor was growing water shortages in North China where groundwater is being mined to irrigate wheat (water extraction exceeds aquifer recharge from rain) and farmers are in competition with cities for the water. Grain consumption has exceeded production this decade and stocks are declining in China and worldwide.

New Scientist reports growing water shortages in India (Fred Pearce, "The Parched Planet", New Scientist, 25/2/06, p. 32). Since the early 1990s more than 21 million Indian farmers have tapped underground reserves to water their fields. There are no reliable statistics on how much water is being pumped and the International Water Management Institute funded by the World Bank recently estimated that about 250 cubic km of water are abstracted for irrigation each year. That is about 100 cubic km more than the rain puts back. Water tables are falling. This has all exploded in the last decade since the arrival in India of cheap pumps. Millions of people face a waterless, foodless future.

In these circumstances there is little scope for the diversion of significant quantities of grain to yield biofuels for transport.

11. GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

11.1 Asia Pacific Partnership on Clean Development and Climate (APPCDC)

The six-nation APPCDC held its first meeting in January 2006 to discuss its response to global climate change. My submission was highly critical of the report for the meeting by the Australian Bureau of Agricultural and Resource Economics (ABARE) on projected energy consumption to 2050 by the six nations. These included business-as-usual projections and reductions through demand management. ABARE failed to mention the debate on 'peak oil' AT ALL. The table below is a reduced version of Table 18 in my submission, showing actual oil consumption for the six APPCDC countries in 2001 and that projected for 2050 under demand management scenarios.

ABARE Oil Consumption Projections 2050
ASIA PACIFIC PARTNERSHIP ON CLEAN DEVLEOPMENT AND CLIMATE

	Oil 2001	Oil 2050
	M.bls/day	M.bls/d
Australia	0.75	1.6
China	5.0	19.6
India	2.3	11.5
Japan	5.4	4.3
S. Korea	2.2	3.5
USA	19.6	28
Total	35.3	68.5
World	76.3	~140

There is a fourfold increase for China and a 40 per cent increase for the USA in 2050. The Association for the Study of Peak Oil and Gas projects oil production of 35 million barrels per day in 2050, one quarter of ABARE's. The China University of Petroleum in Beijing has made a submission to the Senate Inquiry (No. 21). Its conclusions on Chinese oil and gas are summarised below.

- *High economic growth generates high growth in oil and gas consumption, likely to continue.*
- *Imports of oil are increasing rapidly and are about to begin with natural gas.*
- *The main oilfields in east China are in decline—at a mature age of exploration.*
- *New oil fields in west China and offshore are barely able to offset this decline*
- *Gas supply is better from middle and west China.*
- *Exploration difficulty and costs are increasing.*
- *China is increasing its interest in overseas exploration and involvement and is experiencing great difficulty and is concerned about the risk factors.*
- *Imports of oil and gas will both increase by 2020 in absolute and relative terms.*
- *Automobile and petrochemicals industries are pillars of Chinese industry.*

Solutions to the growing oil and gas shortfall are seen as:

- *Innovations in geology, exploration and development.*
- *Imports from overseas.*
- *Gas hydrates—very doubtful on energy input and cost grounds.*
- *Conservation and demand management.*

The paper queries the thrust in China for car use at the expense of bicycles and public transport, quoting from a presentation given to the Petroleum University by Bruce Robinson from Western Australia in October 2004. Subsequently a speaker from the Petroleum University presented a paper to the 4th ASPO Conference in Lisbon in May 2005. China is becoming involved in ASPO's deliberations.

ABARE's paper to the inaugural APPCDC meeting implies additional world oil supply in 2050 above ASPO's estimate equivalent to at least another four Middle East's. Chinese consumption would be equivalent to a new Middle East and that of the USA by 1.4 Middle East's. US oil production will virtually have ceased by 2050, also likely for Chinese production.