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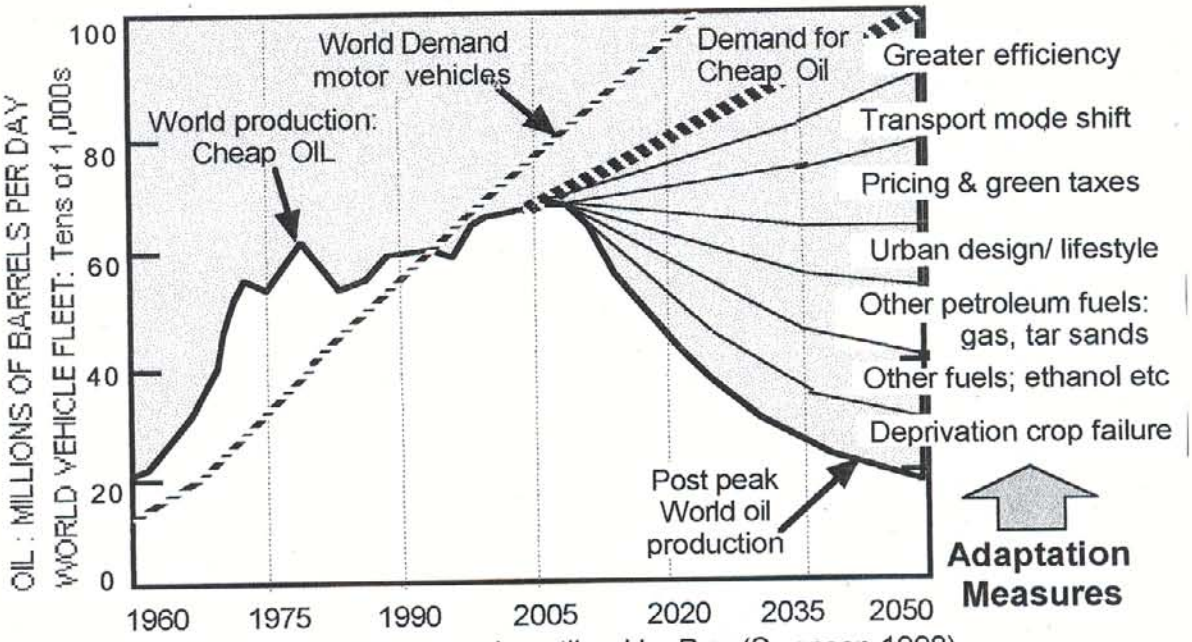

Source: Post peak scenario outlined by Ron (Swenson 1998)
Motor vehicle demand added by Alan Parker June 2004

THE END OF AUSTRALIAN SUBURBIA

By Alan A. Parker 13-7-04

Introduction

Judged by the flawed perceptions of overseas organisations, who use rampant consumerism and car dependence as a measure of success, Melbourne and Sydney are regularly ranked as two of the world's most livable cities. Meanwhile those who use the more objective measure of a city's ecological footprint (www.RedefiningProgress.Org) know that Australia's cities are ecologically unsustainable now and are rapidly becoming more so.

Alan Parker

No one denies the attractions of Australia's coastal cities, but governmen failure to see their defects, of high per capita oil and water consumption; greenhouse gas emissions and vulnerability to any disruption in oil supplies is a threat to their survival. Indeed, there is sound research showing that oil depletion is a risk management problem of global proportions that will initially greatly increase the cost of oil,

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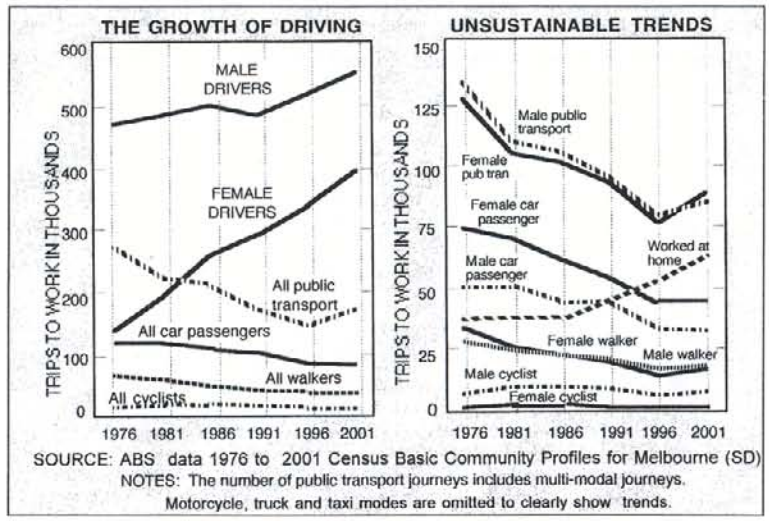
in few years reduce its availability and inevitably create economic chaos as oil dependent industries collapse all over the world and destroy urban economies. The 2001 Census reveals that the majority of Australians grow up, work, breed and die in car dependent outer suburbs and when cheap oil is no longer available householders in these areas will suffer the most hardship.



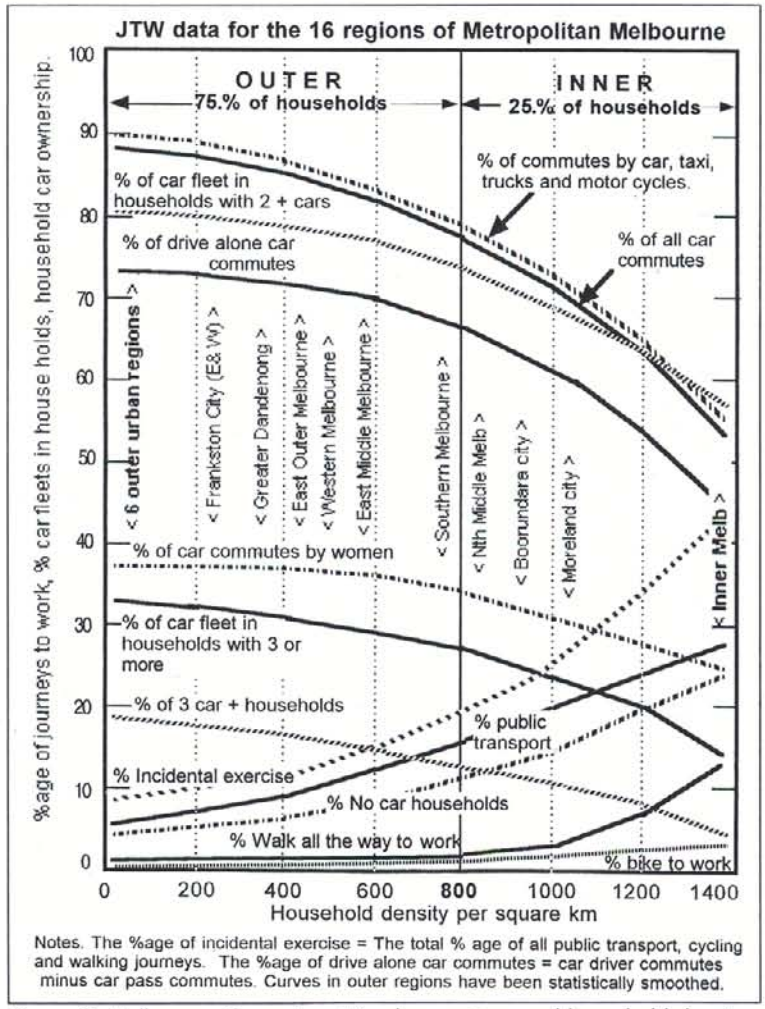
SOURCE: ABS data 1976 to 2001 Census Basic Community Profiles for Melbourne (SD)
NOTES: The number of public transport journeys includes multi-modal journeys.
Motorcycle, truck and taxi modes are omitted to clearly show trends.

Figure 1. Melbourne journey to work ABS Census 1976 to 2001.

Current research of the peaking of world oil production and the interaction of greenhouse warming, water availability/quality, salinity and soil loss/damage are are briefly summarised and referenced. These serious global problems have negative synergies when they interact and worsen within the same time frame as the long decline in world oil production. It is argued that this presents the greatest threat to world food production ever in human history. The bubble of oil dependent economic globalisation will burst because without cheap oil the current patterns of trade, travel and consumption cannot be maintained. This would ensure the destruction of a 100 years of progress in improving public health and welfare. This being so it is argued that it would be prudent to view oil depletion as a addiction problem of the developed nations that has both a cause and a cure. It is a chronic problem of addiction well beyond prevention and its impact on world food production is life threatening.

In the developing nations a billion or more deaths from starvation are likely. After 2010, the middle classes could be reduced to poverty. In the cities there will be food rationing but the poor may become desperate with inevitable food riots and the breakdown of law and order. Beyond the current oil wars in Iraq and Afghanistan more wars are likely in the struggle to gain control of remaining oil reserves. Perhaps there will be an unrestrained outbreak of global warfare with the risk of numerous 'limited' nuclear wars. This is why it is important for health professionals to see the implications of oil depletion and the failure of the 26 developed nations of the world to take the necessary adaptation measures described here. Will Australians have a decline in social welfare services across the board, hyper inflation to decimate superannuation, mass unemployment and a breakdown in the supply of medical services that decreases the average lifespan? That question needs to be addressed.

Looking at the big picture, oil dependence at the very least is as big a threat to public health as smoking or unsafe sex, or a new or a deadly strain of influenza. So far the WHO has focussed on the growth in road accidents due to car dependence in the developing world. That focus is correct but fails completely to recognise the far greater greater threat to human welfare from oil dependence in transport and agriculture and nearly every aspect of the way we live today. Consider the technologically obvious: the only cure for chronic oil addiction is too conserve the last of the cheap oil to build the infrastructure needed to exploit renewable energy resources so as to too make the transition to from the age of oil to the solar age. The adaptions measures required to do that are briefly considered.



Notes. The %age of incidental exercise = The total % age of all public transport, cycling and walking journeys. The %age of drive alone car commutes = car driver commutes minus car pass commutes. Curves in outer regions have been statistically smoothed.

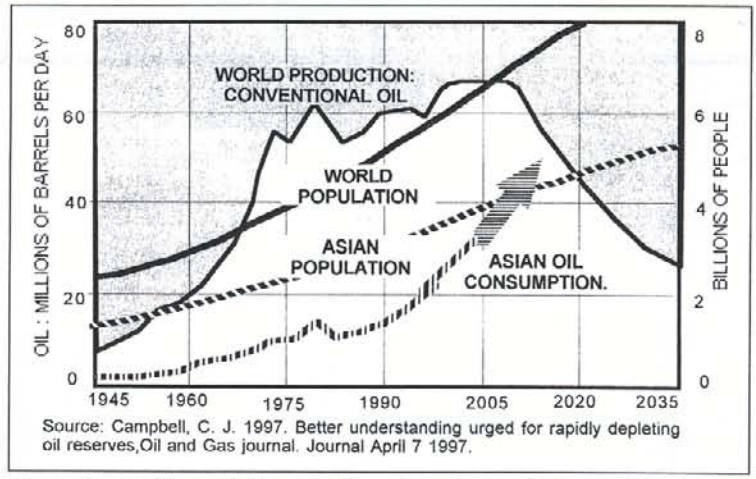
Figure 2. Melbourne Commutes: 16 urban regions and household density.

To be realistic our disease vector is the Australian Commonwealth which has been committed to ecologically unsustainable development, since the 1960s and, despite all the rhetoric, will fund a lot more unsustainable infrastructure by 2010. The car dependent lifestyles of Australians will become even more unsustainable. The Commonwealth will fail to "green' the Australian tax system in such a way as to make the polluter pay. and encourage the use of renewable energy. It will not eliminate the current tax and pricing incentives to own and over-use bigger cars and the per capita use of petrol will continue to increase.

The white paper, Saving Australia's Energy Future released on the 15th June 2004 assumes that centuries-old dirty fossil fuels such as oil and coal, should not, and will not give way anytime soon to solar, wind or tidal power.

The white paper assumes that there will be no problems with global or indigenous oil supplies for the next 30 years (SESSWIG 2004) and totally ignores the evidence that it will be major problem within a decade.

In transport the increase in the average fuel consumption of cars in litres per 100 kms from 2000 to 2010 is a clear enough indicator of unsustainable trends.(Foran and Poldy 2002) Without a Australian national energy conservation and security policy as they have had for many years in Japan and the Netherlands, effective measures to cope with the peaking and then decline of world oil production, will never be introduced.



Source: Campbell, C. J. 1997. Better understanding urged for rapidly depleting oil reserves,Oil and Gas journal. Journal April 7 1997.

Figure 3. World population growth and depletion of cheap oil reserves.

Commuting to work in a typical capital city

The growing dependence on an oil dependent transport system will inevitably destroy the urban economy but it will begin within the outer suburbs were most households are totally dependent on cars. Those who live in the car dependent outer urban communities and the provincial cities will suffer considerable hardship because 90% of their journeys to work are by car, truck or motorcycle and there is no easy way of continuing to do that without cheap oil. To illustrate this national problem Melbourne is used as a case study because what has happened there in the last 30 years is typical of what has happened in all Australian capital cities.

In metropolitan Melbourne 80% commutes were made by car. If we add the 2% of commutes made by truck, van, LCV's and motorcycles, 82% of commutes were by motor vehicles. Walking and cycling combined only accounted for 3.9% all (Parker 2003) journeys to work in 2001. Cycling has stayed around 1% in the last 25 years. Most commuter destinations are now beyond walking distance so walking declined from 6.3% in 1976 to 2.9% in 2001.

However within Melbourne and other cities there is large difference in the travel behaviour between the outer and inner suburbs. The data for Melbourne's 16 statistical regions (figure2) show the overall trends plotted against household density per sq. km. for the percentage of commutes: walking, cycling, public transport, single occupant cars, female car drivers and incidental exercise. The Census Data shows that most of the multiple car owning oil dependent households are in the sprawling outer suburbs, with between 20 and 800 households per square kilometre, where 75% of Melbournian's reside. In outer urban areas 80% of households own 2 or more cars. Around 85% of those who are employed commute by car and are responsible for 85% of the distance travelled by all Melbourne commuters (VicRoads 2003) and for 70% of the drive alone car commutes in metropolitan Melbourne. 78% the car fleet resides in households with 2 or more cars. Walking, cycling and public transport account for only 13% of all commutes.

The End of the Age of Cheap Oil: 2008 to 2020

One day we shall be forced to learn to live without cheap oil, also known as conventional oil. Before that day arrives we will have to learn to live with the world oil supply not satisfying world demand for oil, which was 80 million barrels a day in 2003. Demand for oil is growing at the rate of 3.0% per year but that cannot go on for much longer because the oil discovered is not sufficient to meet demand. (Wood and Mackenzie 2004) (Skrebowski 2004)(Sarnsan Bakhtiari 2004). Around 2008 Australia will be vulnerable to increasing costs of imported oil and it is likely, without new oil discoveries in deep water, that far less oil will produced in Australia (Geoscience Australia 2004)

Since the mid-1990s the average value of oil discoveries has fallen and discoveries from new fields have replaced only 40% of production. In Saudi Arabia, which has the largest oil reserves, they have not stopped drilling for oil since 1938 but now discover much less. Of the first 60 wells drilled that produced oil from 1938 to 1969 Aramco found 300 Gb with 24 fields. Of the last 60 wells drilled that produced oil from 1978 to 2003 Saudi Aramco found only 13 Gb with 50 fields. This reduction in the amount of oil discovered and the much smaller oilfields discovered was inevitable. Oil is a finite resource, the more oil that is found the less oil that remains to be found (Laherrere 2004).

The impact of increasing oil consumption and population in Asia is shown of figure 3. Perhaps the best example of what is occurring is China. China, which exported oil as late as 1992, has become a net importer. By 2003 Chinese oil consumption was growing by over 10% per year and reached 5.4 million barrels per day. China is now the world's second largest oil consumer after the US, which is consuming 20 million barrels per day. China will have to import more oil to fuel its runaway economic boom which will generate a demand for oil of 14 million barrels a day by 2010.

Around 2008, when the worldwide demand for oil outstrips the global capacity to produce oil production, "the big rollover" as it known will have begun. This is the point at which world oil production goes over the top of a bell shaped curve known in the oil business as the Hubbert curve named after King Hubbert. Hubbert is the Geologist who pioneered the science of predicting the peaking of oil fields in the 1960s and the peaking of mainland US oil production. At first nobody believed him but when mainland US oil production peaked in 1976 his years of dedicated research were recognised. (Deffeyes 2003) Hubbert's techniques have been further refined and by 2003 Hubbert curves had been plotted by researchers for all the 95 countries that have or can produce significant volumes of oil. It is known that 52 of these countries, including the US, are already well past their peak (greater than 5 years). Another 16, including the UK, Norway, Australia, and China, are at peak or will reach it soon. The remainder will peak within 25 years (Wood and Mackenzie 2004)(Douglas-Westwood Ltd 2004).

The May 2003 Association for the Study of Peak Oil Conference held in Paris

evidenced a growing consensus on the reality of oil depletion. (Deffeyes 2003) Overall there emerged a scenario of world oil depletion of 5-10% per year, a recognition that oil reserves had been deliberately overestimated by the oil industry and that there are unlikely to be more major significant reserves to be found. Most delegates agreed that nearly all of the private multi-national and national oil and gas companies on this planet have over estimated their gas and oil reserves to maximise either private company share values or to attract overseas investment into their national economies (Simmons 2004).

The negative synergies of environmental problems and oil depletion

Greenhouse warming, water availability/quality, salinity and soil loss/damage are all serious global problems. Sadly, their synergetic interaction worldwide will be far more devastating to human welfare and world food production because they will get worse within the same time frame as a long decline in world oil production (Bright 1999). The synergetic interaction of oil depletion and these other environmental problems in Australia is likely to be the greatest threat to food production since Federation (Flannery 2004).

A lot is known about environmental problems in isolation but there is great uncertainty about how they will interact with one another, and how increasing costs of oil will constrain efforts to deal with these problems. The worst-case scenario is that, without an internationally agreed oil conservation program, it is likely that a billion or so people will be reduced to unemployment and poverty between 2010 and 2020. This may well happen and if it does. the economic sectors that will most likely collapse first will be:

> *"Aviation and agriculture due to high prices of jet fuel and nitrogen fertilisers made from gas and oil. (Cochet 2004). A little later road and rail passenger and freight transport, tourism, the petrochemical industry and the car industry will be working part time and will finally go under in a depression as severe as that of the 1930's". (Cochet 2004).*

We know what will happen to ports through which exports and imports come and go, because for a short period during the oil crisis in 1973 the Dutch Port of Rotterdam had no oil. There was no bunker oil for the ships, no diesel for the trucks and trains that distributed the cargo, and no petrol for people to get to work.

Between 2015 and 2035 it will perhaps get much worse because rising oil prices will not only have collapsed the developed industrial economies but those of the developing world as well. Die-off from starvation and a mass unemployment will reduce greenhouse gas emissions in the most inequitable and barbaric way unless the nations of the world mobilise their people and industries to create the green products and processes to conserve oil and produce food without massive inputs of gas and oil.

World grain production will drop by 2008

The human population increased from 2.2 billion in 1938 to 6.3 billion in 2003 over 65 years. This was the greatest increase in world history and it was only made possible by access to cheap oil. Cheap oil production increased from 2.5 billion barrels of oil in 1938 to 26 billion barrels in 2003.

As oil production went up, so did food production and the world's population (see Figure 4). It made possible the green revolution which introduced new strains of higher yielding crops, or crops that could be planted more than once a year but needed more and cheaper fertiliser made from oil and gas.

In 1938 world production of fertiliser (nitrogen) was 3 million tonnes; by 2003 it was 90 million tonnes and without cheap oil more land would be needed for food production which is not available in many countries. Cheap oil powers farm machinery such as tractors, refrigerated food storage systems, trucks to take the food to market and ships to export it. Most pesticides are petroleum (oil) based. The world's fleet of tractors, cars trucks and buses increased from around 15 million in 1938 to 800 million today. Commercial fertilisers are ammonia based and produced from oil and gas. Had cheap oil not been available mass starvation would have happened in many countries in the 1990s as predicted (Ehrlich 1970.)

The U.S. food system consumes ten times more energy than it produces in food energy. This is one of the most unsustainable agricultural systems in the world, even if it has been highly profitable. 1,500 litres of oil are expended each year to feed each American. US Agricultural energy consumption is broken down as follows:

- 31% for the manufacture of inorganic fertiliser (excluding feedstock);
- 35% for the operation of field machinery and for transportation;
- 13% for irrigation; and
- 1% for raising livestock (Pfeiffer 2003)

World cereal crop production has been shrinking on a per capita basis since 1984 and world tonnage of grain production and grain reserves have been dropping since 1999 and will be depleted at around the same time that oil shortages kick in. These cereal grains are stockpiled in thousands of silos with consumption taken out at the bottom and new grain poured in at the top. Every year since 1999, the level of grain in the silo gets a little lower and by 2008 it will be entirely empty. By 2008 grain will then be consumed almost as quick as it is produced and for the poor nations of the world they will be left with empty silo's, because grain distribution is not, nor will be homogeneous or equitably distributed.

Starvation will drastically reduce the world population growth by 2028

Assuming adequate food production the population of the world has been predicted to grow by 1.2% per year from 6.3 billion in 2003 to 8 billion by 2028; or 1.7 billion more mouths to feed in 25 years. This is due to a growth rate of around 70 million people per year to 2028. Without an internationally agreed oil conservation program world food production will decline from around 2008 and a billion people could starve to death by 2028. This is likely to happen for the following reasons:

1) Oil to power-assist labour intensive agriculture in the developing world will not be affordable: This will happen when wealthy OECD countries buy all the high cost oil to keep their car dependent transport systems going, and for their oil intensive agricultural practices. Depriving the poor countries of the oil needed for small tractors and agricultural machinery, fertiliser production, and the storage and transport of food. (Simms 2004)

2) Oil for the mitigation of the worldwide depletion or destruction of soil is not affordable. Cheap oil is needed to combat enhanced desertification; salinization of the fresh water supply along the coastal areas due to sea level rises; and enhanced erosion of arable land. Due to desertification 8,800 square kilometres of formerly productive land each year and 25 billion tons of top soil will have been lost globally each year, due to misuse or overuse of the land. Arable farmland has been shrinking by over 1% every year, as an ever larger proportion of the worlds population live in cities built on what was formerly productive farmland.

As with oil we are depleting the soil at a much faster rate than it is being rejuvenated. Soils long-term value as a renewable resource that will hold water and produce food, fuel, and fibre has been ignored by free market and totalitarian regimes for over 200 years (CFAN 2003).

3) Water for agriculture in most parts of the world is being used up. Cutbacks in grain harvests will be occurring in many countries due to the ongoing depletion of aquifers and oil fields occurring in the same time frame. Aquifers are being depleted in scores of countries, including China, India, the US, and Australia which collectively account more than half of the world grain harvest. Because it takes a thousand tons of water to produce a ton of grain, fresh water, its acquisition and delivery is already a problem in many countries and will become critical for many more in the next decade. Water scarcity, once a local issue, is now crossing national boundaries. Some of the world's major rivers are being dammed in one country thus depriving countries of water down stream who may then choose to go war to gain access to water (Pearce 2004)(Brown 2003).

4) Climate change warms the earth and the oceans and depletes or destroys more land. Violent cyclones due to warming of sea water will move hundreds of kms towards the poles. Floods, drought, cyclones, tornadoes and violent storm surges will increase in frequency and intensity destroying more crops, plantations, terrace agricultural and other irrigation systems that have taken decades to establish and be productive. In low lying land and on pacific islands sea level rises will, in the longer term poison productive farmland with salt. The interaction of hunger, the drying up or pollution of fresh water and sea-level rise in vulnerable low lying areas in the developing world could produce up to 800 million refugees. (Brown 2003)

5) Climate change warms the earth spreading tropical diseases over more habited areas. In this century, these will be enhanced by the diffusion of respiratory disease as the world warms. It has been predicted that around 600 million more people will die. In Australia airborne vectors carrying malaria and Japanese encephalitis will head south into productive farming areas. By 2028 climate change will bring more severe droughts to southern Australia. Australian grain production will be reduced to a level that will still feed Australians but will reduce grain exports to other countries that feed 50 million.

Oil dependence is a serious threat to Australian national security

Over the last forty years Australia has become addicted to cheap oil, especially for transport which uses almost 80% of Australia's petroleum, 55% of road transport fuel is petrol, 39% diesel and 6% is LPG. Australia has low oil prospectivity. Fields yet to be discovered are likely to be of small to medium size and to be 300 metres or more below the sea. Barry Jones, Executive Director of the Australian Petroleum Production and Exploration Association, said that ..."the place where you are going to find a really big discovery is in deep water. The most likely new areas in south-east Australia are off the Tasmanian coast" (Trounson 2004).

What he refers to as "really big" in an Australia context is a medium sized discovery by world standards. The decline of Australia's oil production has been documented by Geoscience Australia, the Federal Government's geological survey organisation, which has shown that at the 2003 rate of consumption remaining economic reserves will only last 11.3 years (Geoscience 2004). This is why the Federal Government has pledged in the 2004 budget to contribute $1.50 for every $1 spent on exploration for new oil fields 400 metres or more below sea level. The estimated cost to the Budget is $17 million which indicates that the Federal Government believes that there is a minor problem requiring only a token funding gesture.

The bad advice the Federal Government gets from some of its own agencies is that there is enough oil in the world barrel for another 30 years (SESSWG 2004). This bad advice is reflected in the transport budget which provides an extra $1.9 billion for road funding over the next three years. The Census Data and the latest research on oil depletion suggest that it would be prudent to reduce current levels of oil dependence. Australia is not self sufficient in oil and its economy would still be at risk even if more offshore oil were to be found. High levels of car and oil dependence are potentially very serious threats to Australian national security for two reasons:

1. According to the Australian Petroleum Production & Exploration Association by 2010 Australian oil production will cover only half of the country's needs and will cost between $3 billion and $12 billion at today's prices. It is more likely to be at or near the $12 billion mark if significantly more oil is not found in deep water (Trounson 2004).

2. In the unlikely event that major oil fields are found in deep water, providing enough oil for self sufficiency for the next 30 years with some left over to export, there would still be a serious threat to Australian National security. The risk of the world economy and global food production imploding as a consequence of world oil depletion is very high and that would bring the Australian economy down with it. The Federal government, is getting bad advice from the intelligence services and the Australian Transport Council. They fail to understand that there is no practical alternative to cheap oil in the few years that we have to adjust to growing oil scarcity. A hydrogen economy cannot be created in time.

The timetable laid out by the Bush administration's $1.2 billion hydrogen economy policy statements is not credible. The "hydrogen economy" is no the quick fix to oil depletion. On the contrary, a 2004 report from the US National Academies of Science concluded that "under the best case scenario the hydrogen transition will do little to cut oil imports or greenhouse gas emissions during the next 25 years." Tha conclusion is supported by many other people with expertise (Bossel & Eliasson 200)(Forest 2003)(Roberts 2004)(Wald 2004)

Of the 26 developed nations in the world facing the same problem Australia given current policies will be one of the worst equipped to survive despite being the richest nation on earth in terms of unexploited renewable energy resources. Perhaps by 2010 cost of everything will rise and a terminal economic decline into an economic depression comparable to the 1930s will have begun, perhaps it may start a few year later. That only postpones the inevitable because the 26 developed nations of the world have no plans to replace oil with renewable sources of energy in the transport sector. Even the use of renewable energy to produce electricity has declined from 11% in 1971 to 7% in 2001. World energy trends reveal that without real commitment and substantial subsidies renewable energy resources will never replace fossil fuels.(Hogan and Cohen 2004)

National Adaptation Measures Required to Reduce Oil Demand

Getting the developed nations to seriously reduce their consumption of cheap oil by increasing their use of renewable energy sources would be the most complex task ever attempted in human history. One possible means of

adaptation to oil depletion is shown on Figure 4 which shows the wide range of measures that would nearly reduce the demand for oil to match the supply. The author (Swenson 1998) realised that deprivation and crop failure had to be shown as an adaptation measure because there was not enough time to do what needs to be done. Six years later there is even less time and perhaps there will need to be even more pain.

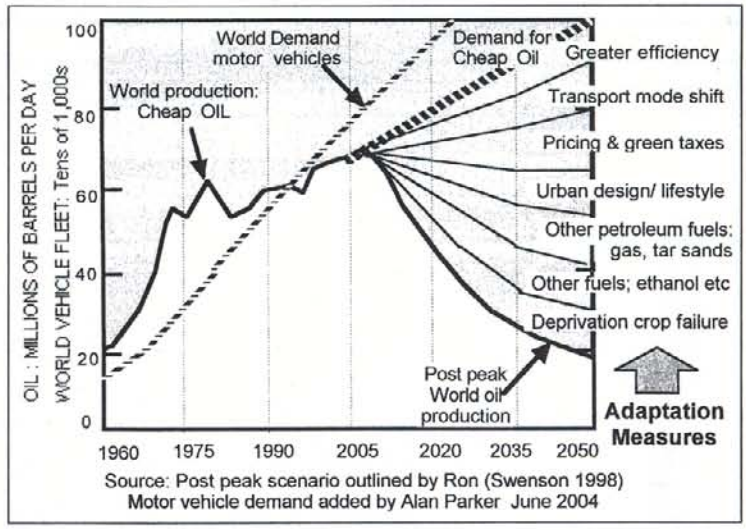


Figure 4. Current world trends in the demand for oil and motor vehicles with possible oil conservation measures to adapt to post peak oil production.

The adaptation measures shown on Figure 4 for the major oil consumers of the world apply to Australia with the exception of deprivation and crop failure which, given Australia's enormous renewable energy and agricultural resources, can be ignored.

The adaption measures of transport mode shift and urban design and lifestyle are the areas to which local government can make a significant contribution but this will need the Commonwealth to introduce pricing and green taxes to encourage greater efficiency and the use of other fuels; ethanol and methane. This needs to be done within the context a national Energy security plan which is agreed to by the states.

The most important role of the State Government is to lobby the Commonwealth for it to do its part, while it encourages greater fuel efficiency in own jurisdiction. It needs to provide the necessary funding for public transport and bikeway networks to enable local government to achieve to achieve transport mode shift and "urban design and lifestyle"changes.

This article is focused on the adaptation measures, particularly transport mode shift and for more appropriate urban design/lifestyle to accommodate population growth in the capital cities. To implement these changes across the transport sector it will need pricing and green taxes and more fuel efficiency. It will also need transitional fuels particularly gas in the first ten years of a 30 years transition period from the "age of oil" to the "solar age". All these adaption measures if done together will have beneficial synergetic effects.

National energy security plan needed to implement the adaptation measures

It would by prudent for the Commonwealth to have an energy security policy as they have had in Japan since the since the 1974 oil crisis. This reduced Japan's oil dependence in the transport sector by creating the finest rail system in the world for urban commuting and intercity transportation. It is sustainable because it is reliant on hydro electric sources. (Hook, 1994). Of all the OECD countries only Japan and the Netherlands have significant oil and gas conservation programs which have been in place since the 1990s. (Parker 2001 A)

The Netherlands National Environment and Policy Plan has greatly increased the fuel efficiency of the Dutch car fleet and constrained car use by many measures including the "greening" of the Dutch tax system. There are long lead times to make significant changes even for countries with the best intentions. Japan took 30 years and the Dutch took 14 years to increase public transport use, increase bicycle use to 25% of all commutes and make the Dutch car fleet more fuel efficient with 40 % less fuel consumption per vehicle than in Australia (Parker 2001).

The Dutch Bicycle Master Plan was very successful in maintaining high levels of bicycle use for both recreation and as a means of transport and the policy of restricting car parking in inner urban areas encouraged the use of public transport and cycling. (Welleman, 1999)

Conclusions and Recommendations

Oil dependence, is perhaps, the most dangerous threat to Australian national security since Federation. There is research showing that oil depletion is a risk management problem of global proportions that will initially greatly increase the cost of oil and then reduce its availability and create economic chaos. The is a need to conserve oil reserves which will also reduce greenhouse gas emissions. It would be prudent for the Commonwealth and state governments to have an national energy security plan to implement necessary counter measures and give them a level of priority that reflects the serious risk to national security and the economic viability of the outer urban areas. The financial barriers to changing travel behaviour can be removed by "Greening" the Commonwealth tax system to provide incentives for more sustainable transport behaviour and constraints to unsustainable car use.

It is concluded that commuting trends are unsustainable and that congestion and excessive oil consumption due to car dependence is not caused by the minority of commuters who share cars, use public transport, ride a bike, walk to work or work at home. It is recommended that the state governments rework urban planning strategies; with the objective of reducing per capita oil consumption while maintaining the quality of life. The State Governments must change the Transport Acts to redefine main road departments roles in reducing the demand for more roads, encouraging walking, cycling and public transport and enabling bicycles to substitute for short drive alone car trips.

State governments must work with local government to prepare studies showing how to make the urban fabric more permeable for walkers and cyclists., so as to provide safer and more convenient access to nearby destinations and an enhanced public transport system.

The promotion of the use of imported electric bicycles (Parker 2004) is recommended and in the longer term for these electric bicycles to recharge their batteries from roof mounted solar electric panels or solar electric roof tiles that are made in Australia. Change the current State legislation to allow Victorians to buy the safest electric bicycles on the world market.
The cost of congestion in Metropolitan Melbourne, Sydney and Brisbane is primarily caused by car dependent commuters who use a vehicle designed to carry three or four people to drive alone to work. Furthermore, most of

these unsustainable commutes originate from the sprawling outer suburbs with between 20 and 800 households per square kilometre; where around three quarters of all residents live. In 80% of these households there 2 or more cars and around 85% of the employed household occupants commute by car and are responsible for around 85% of the distance travelled by all capital city commuters.

It is recommended that the state government and local government introduce behavioural change programs (Travel Smart) which target the following specific commuter behaviours which can be measured and evaluated by local government every five years using the Census data:

1. Reduction in drive alone car commutes by women,

2. Reduction in drive alone car commutes by men,

3. Increased use of public transport,

4. Increase in walk and bicycle commutes all the way to work,

5. Increased intermodal access to the public transport system,

6. Reduced household car ownership via car-pooling, informal car sharing or the development of car clubs.

It is recommended that the state government and local government work together to plan new trunk and express bus routes on outer urban main roads and that priority be given to buses using these roads so that they can replace a large proportion of long urban car journeys. Use the ergonomic advantage of cycling over walking to increase the catchment area of these new routes and by providing safe access routes and theft and vandal proof bicycle parking at bus stops. (Parker 2002) Use Commonwealth funding for secure bicycle parking in the 2005/6 year for the above.

Local and state governments need to remove the barriers to non-motorised travel created by ultra low density housing schemes and gated communities by not approving this kind of development in the first place. The above recommendations, when coupled with planning controls to constrain and contain low density urban development within fixed boundaries and consolidating existing outer urban areas, and urban infill developments, should should make it easier to reverse the growth of car/oil dependence and make public transport more effective.

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