



Sustainable Transport Coalition

www.STCwa.org.au

08-9420 7268

c/o Conservation Council of WA,
2 Delhi St, West Perth WA 6005

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Energy Efficiency Inquiry : Productivity Commission

Locked Bag 2

Collins Street East Melbourne 8003

email: energy@pc.gov.au

An Energy Efficiency Inquiry does not satisfactorily address Oil Depletion

The Energy Efficiency Inquiry is very timely, and Productivity Commission is to be complemented on initiating an initial look at our energy problems. .

However, we feel there are two major structural faults in the Energy Efficiency Inquiry.

One serious problem is that it encompasses two distinct types of energy. One type is stationary energy; that is reticulated gas and electricity and the energy sources to make it. The second and quite separate form of energy is liquid fuels for transport. It would be much more productive indeed to inquire separately into the issues of stationary energy and the looming problems of liquid fuel for transport .

The second structural fault is that the current inquiry does not address Australia's very serious and growing oil vulnerability. Transport energy efficiency is just a very small subset of the whole issue of liquid fuel for transport

We recommend there should be, as a matter of urgency, a Productivity Commission Inquiry into "The Uncertain Future of Liquid Fuels for Transport", separate from the current Energy Efficiency Inquiry

There are two reasons for urging this separation. One is the quite different structures and requirements of stationary and transport energy. The second is that energy sources for electricity are almost entirely indigenous, whereas we already import most of the oil for our transport fuels (while exporting other types of oil). Rapidly declining Australian domestic oil production is going to make the nation even more dependent on imported oil, and this will be at a time when very reliable forecasts predict that global oil production will be beginning begin its final decline in the near to medium term.

The tsunami of oil depletion may well be bearing down on us very fast, but we are lying heedless, basking in the sun of our temporary ignorance of our oil vulnerability. We need an oil-shock warning system now, and we need to prepare well before a flood of oil shock problems hit us, possibly all at once.

WA's Planning and Infrastructure Minister, Alannah MacTiernan said about global oil depletion "Already growth in demand for oil is probably outstripping growth in supply, but production itself is likely to peak, maybe as early as 2006. But more conventionally 2010 – 2015.

In opening the Sustainable Transport Coalition's "Oil: Living with Less" conference in Perth in August 2004 she also said *"It is also certain that the cost of preparing too early is nowhere near the cost of not being ready on time"*.

A major part of the essential preparation is to have a fully informed market and a well informed community, both conversant with the high probability of problems (short-term, medium term and long-term) from our increasing oil vulnerability. A coordinated well resourced briefing program about the growing risks of oil shortages is an essential first step, at national, state and local levels.

1: Global oil depletion

There is now very good evidence that global oil production will start its final decline soon, perhaps within a couple of years, or perhaps within some 10 years or so.

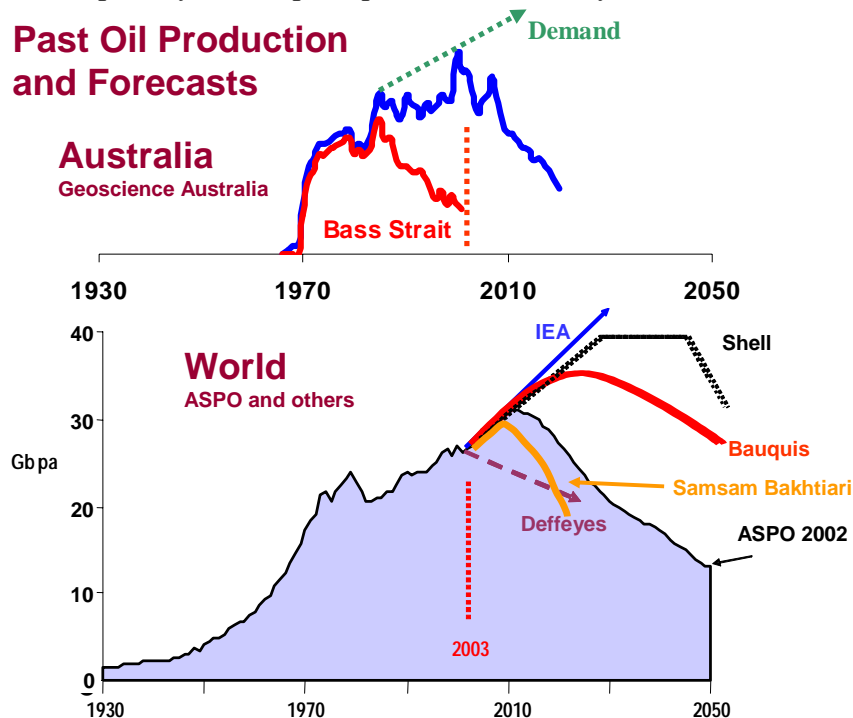


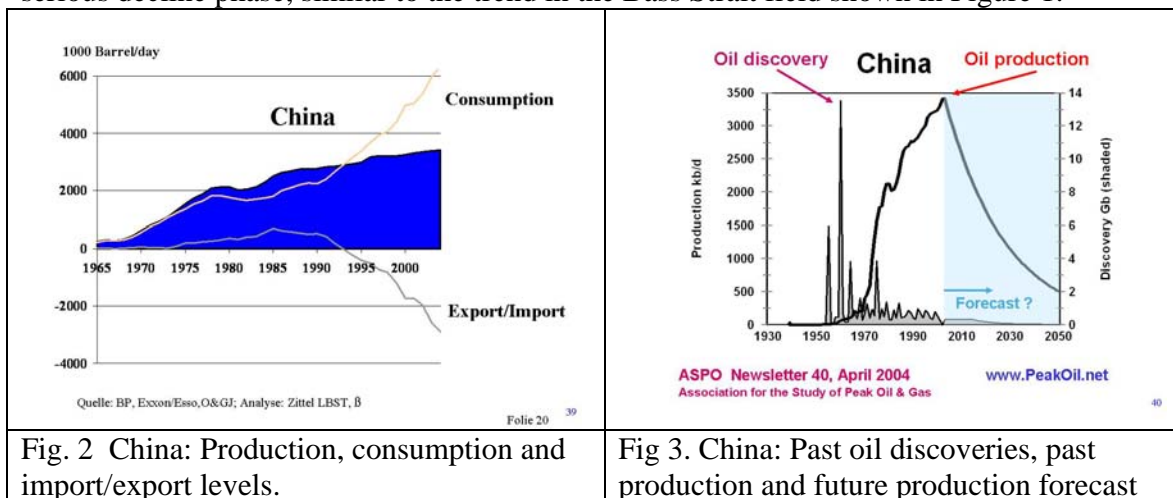
Figure 1: Australia's vulnerability to oil depletion is shown in these diagrams of past Australian and world oil production and future decline predictions.

The omission of this substantial additional risk factor biases the Energy Efficiency Inquiry towards an unwarranted business-as-usual "no-worries" tenor. The probability of looming global oil production decline is not raised in the Issues Paper.

Global decline (coupled with Australia's steeply declining domestic oil production) raises the probability of liquid fuel shortages occurring to a very substantial level. Within Governments, the media or the community, there seems to be not the sense of urgency which is required by the worrying global assessments.

Data for China's future consumption trends and production decline forecasts are provided to illustrate that it is far from likely that Australia will be able to import all the oil required for our current consumption trends on a global market with greatly increasing demand, and probably

decreasing production. China's only supergiant oilfield, Daqing, discovered in 1959, is now in a serious decline phase, similar to the trend in the Bass Strait field shown in Figure 1.



As another example, it is reported that the UK has in July reverted from an oil exporter to a net oil importer, due to the decline trends in the North Sea oil province.

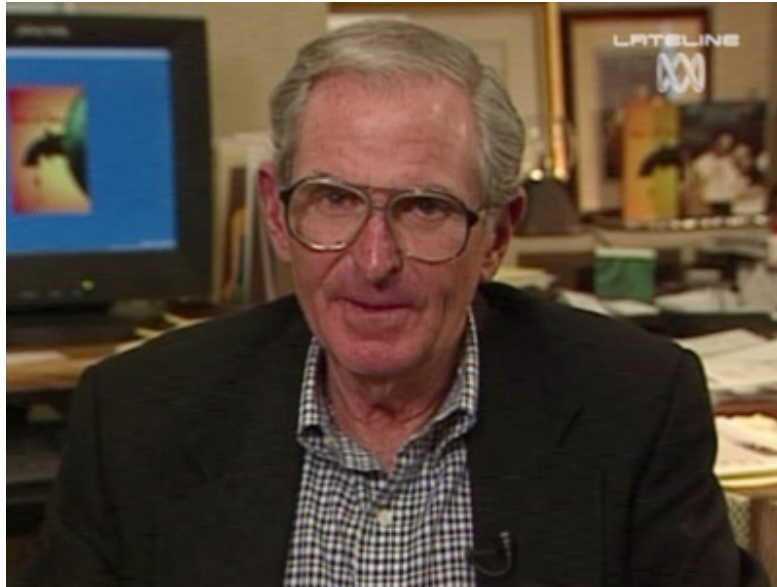
[See <http://news.bbc.co.uk/2/hi/business/3641566.stm>].

Indonesia's first month as a net importer was April 2004. This is due in part to increasing domestic oil consumption as well as decreasing production.

ABC TV Lateline recently carried a story on oil depletion, 22/11/2004, and the related news item below. Prof David Goodstein of Caltech is coming to Perth for a University Of Western Australia Extension day-long seminar on oil depletion, Jan 17th 2005. Also shorter interviews with Colin Campbell and Matthew Simmons.

Dr Goodstein is just one of many authoritative scientists warning about oil depletion and the risks of complacency.

The news item and links to the video of the complete interview is at <http://www.abc.net.au/news/newsitems/200411/s1252968.htm>



David Goodstein, professor of physics at the California Institute of Technology

Finite fuels threaten life as we know it

If predictions are correct, no future generation will forget 2005 - the year the world began eating into the second half of its oil reserves. Or, as Professor David Goodstein of the California Institute of Technology argues, the beginning of the end of the civilisation as we know it.

In his latest book, *Out of Gas - The End of the Age of Oil*, Professor Goodstein argues that all fossil fuels are finite, and so are our current lifestyles.

"Everybody has come to imagine that the flow of oil is like the rivers that flow from the mountains to the sea," Colin Campbell, of the Oil Depletion Analysis Centre, said. "It's just perceived to be a natural part of the world we live in."

But according to the Hubbard's peak theory, discoveries of fossil fuel reserves have already peaked. "The historical peak in oil discovery worldwide occurred around 1960, discoveries have been declining ever since," Professor Goodstein said.

"The historic peak and natural gas discoveries occurred in the 1970s and so the maximum for natural gas production probably is only 10 years or so behind that for oil." He says estimates of how much fuel Earth has in reserve are unrealistic.

"We seem to make hundreds to thousands of years estimates at the present rate of extraction but that's completely unrealistic because we use twice as much energy now from oil as we do for coal," Professor Goodstein said.

"If you're going to mine coal to substitute for the oil you have to mine it much faster, the conversion process is inefficient, the world's population is increasing.

"The poorer parts of the world want to be more like us and use more energy and finally... we will be in trouble with coal not when we mine the last tonne, but when we reach the peak production which is about the halfway point." We may not know when we have passed that halfway point. "We can't know for sure," Professor Goodstein said.

"I've always thought that we will know that the peak has occurred when Saudi Arabia maxes out, when it reaches its peak in production. "The Saudis claim they will be able to increase their production by a million barrels a day in a relatively short period of time. "That promise has not yet been kept. We don't know whether it's true."

Rubbery figures

Professor Goodstein says that the history of proved oil reserves show how hard it is to quantify how much is left. "The proved reserves of oil in the OPEC organisation of petroleum exporting countries, increased by 300 to 400 billion barrels in the late 1980s," he said. "There were no important discoveries of oil during that period.

"What happened instead was that OPEC changed its quota system how much oil each country could pump based on in part its claimed reserves and the claimed reserves just appeared out of nowhere by magic.

"So half the world's proved reserves may be an illusion and the information we're given is so undependable we really just can't say."

"I've always thought that we will know that the peak has occurred when Saudi Arabia maxes out..."

[Professor Goodstein says putting a timeline on the impending energy crisis is not easy. "We will probably have an oil crisis reasonably soon," he said. "It may have already begun.](#)

"We are much too close to the situation to know for sure. The information we're given is much too undependable for us to know for sure." But he makes no apologies for being alarmist. "It's meant to alarm people, to wake people up," he said.

"There are other fossil fuels that can be made a substitute for oil, at a price.

"So we might be able to muddle on for a while, though a much more likely scenario is that we will have resource wars and other terrible things happening." He says even if coal is substituted for oil, the solution will only be temporary. "If we do all that, for one thing we will do an unpredictable amount of damage to our climate, and for another thing it's my guess that we would start running out of coal," he said.

"Let us say we would reach the point where we're depleting the resource faster than we can develop new sources probably in the this century."

"..a much more likely scenario is that we will have resource wars and other terrible things happening."

Professor Goodstein says it has to be accepted that all fossil fuels are finite.

"The people who would like to believe that the Hubbard's peak is further away than some of us fear, believe that we may make great discoveries in the deep oceans and the Antarctic... and central and northern Siberia and so on," he said. "I think they're grasping at straws.

"Two-thirds of the world's oil reserves are in the Middle East the Persian Gulf. "That's 10 times as much as Africa, 10 times as much as the Middle East, 10 times as much as in the former Soviet Union. "There are no other important players in the game."

Reluctance

Professor Goodstein recognises the challenge that is making politicians around the world confront these looming power problems.

"We went through a presidential election in the US in which neither party mentioned anything having to do with this problem, which I think is the most important problem of our era," he said. "Politicians do not want to touch this subject.

"Any politician who tells Americans that they'll have to give up their SUVs has committed political suicide. "But it does seem to me that a courageous and visionary politician could say to us, 'By burning fossil fuels we're putting ourselves at the mercy of some very nasty and unstable parts of the world and we're also endangering the climate of our planet.

'For the sake of our children and grandchildren we simply must learn to kick the fossil fuel habit.'"

Can engineers and scientists help people kick the habit? "I'm hopeful, not confident," Professor Goodstein said.

--adapted from an interview on ABC TV's Lateline.

Related Links [Running out of oil](#)

[Oil is a finite resource, and there is great debate about exactly how much black gold remains. Yet a growing number of industry experts now think we will very quickly reach the milestone 'peak' of oil supply. This would mean the world is then eating into the second half of all available oil reserves. Though there would still be plenty of oil left, if the peak theory is right we are now on the road to running out.](#)

2. The effects of information about oil depletion being withheld from the community

The failure of governments to discuss the risks of global oil depletion withholds information from the community, individuals, companies and organisations. For instance the Federal Government's "*Securing Australia's Energy Future*" entirely fails to discuss oil depletion and presents only the extreme-optimist International Energy Agency scenario, without mention of the wealth of other conflicting evidence. The failure to provide information on global oil forecasts means that the "market force" approach of the discussion paper is invalid, as it assumes an

informed market. This is clearly not the case. People, organisations and businesses do not have reliable information on the current risk factors, so they can not make intelligent informed preparations. It is crucial that effective warnings be given continually to Australians about the likely level of our growing oil vulnerability. This is an essential first step, and the revered market forces seem capable only of providing advertisements promoting fuel-inefficient 4WDs.

3. Precautions needed prior to shortages of liquid fuels for transport

There is a great deal which can be done to reduce Australia's oil vulnerability, before the oil-shortages, shocks or liquid-fuel emergencies hit us. There are failures of governments at all levels. The Federal Government's refusal to provide hypothecated funding for sustainable transport modes like cycleways and public transport is most short-sighted. It is particularly important that the issue of minimising oil vulnerability be tackled seriously and urgently at all levels in the community. The business as usual automobile dependence strategies will cost us very dearly in future unless there are substantial changes soon.

In WA, Individualised Marketing has been shown to reduce car-kms travelled by 13% (in a sample of 158,000 people). WA's TravelSmart, if introduced nationwide, would substantially reduce our oil dependence.

There is a wide range of oil consumption reduction measures outlined by Denniss (2003), in Robinson (2002) and (2003) and by the Sustainable Transport Coalition (2004). A crucial first step would to review and remove the inequitable perverse subsidies which fund and encourage excessive private motor vehicle use in our cities and towns.

"Perverse policies, that is policies which actually reduce the sustainability and efficiency of the transport sector, continue to be implemented, and continue to receive the support of various levels of government in Australia". (Denniss (2003))

These range from Federal, State and local government encouragements for car use, to the inequity of major supermarket chains offering big discounts to heavy fuel users funded by profits on the groceries bought by everyone.

The Sustainable Transport Coalition would be happy to provide more information about oil depletion, and the effects it may well have in the short or medium term on the Australian economy.

Yours sincerely,

Bruce Robinson

2 Barsden St, Cottesloe WA 6011 08-9384-7409

The Sustainable Transport Coalition is a broad community-based group, with members from transport organisations, local governments and individuals. Considerable further information is available on our website, www.STCwa.org.au, including our "Oil: Living with Less" policy document.

Appendix I: "Oil depletion: the crucial factor in transport planning"

Australasian Transport Research Forum Paper, September 2004

Appendix II: "Oil Living with Less" Policy, Sustainable Transport Coalition

Appendix I



27th Australasian Transport Research Forum, Adelaide, 29 September – 1 October 2004

Paper title: **Oil depletion: the crucial factor in transport planning**

Author(s) name(s): Bruce Robinson and Sam Powrie

Organisation(s): Sustainable Transport Coalition
 Bicycle Institute of South Australia

Contact details:

Postal address: 2 Barsden St, Cottesloe WA 6011

Telephone: 08-9834-7409

email: BruceRobinsonSTC@Hotmail.com

Abstract (200 words):

As a result of steeply declining domestic oil production and forecasts of dwindling world supplies, Australia is very vulnerable to temporary and permanent oil shocks in the short, medium and long term. Transport planning priorities (both large scale planning and road design) must be changed dramatically to minimise the impacts of the coming oil shortages. The current reluctance of decision-makers even to consider oil depletion will rank high on the list of missed opportunities and 'intelligence failures'. There is a great deal that can be done to prepare for the likelihood of future oil shocks and hence to ameliorate the effects when (or if) they hit us. Current transport infrastructure projects, with only a few exceptions, are planned without any consideration for the effects on our oil dependence. A much more precautionary approach should be adopted now to reduce our vulnerability when oil supplies become limited, as appears to be almost certain within the service lifetime of most transport infrastructure projects. Many of the policy options to reduce fuel usage will in addition lead to healthier, happier and more equitable communities and improve local and global pollution levels. They will also require substantial changes in the way that transport is viewed by planners, engineers, politicians and the general public.

Introduction

Perhaps the most compelling (but still largely unrecognised) evidence of the lack of even short-term transport sustainability in Australia is our very serious dependence on rapidly declining petroleum sources. Petroleum is currently essential for agriculture and most facets of Australia's community life and economic systems as well as for transport. Most transport decision-makers have assumed, wrongly, that medium and short-term supplies are assured. There is rapidly mounting evidence from the oil industry itself that this complacency about future oil supplies may well be very misplaced, for example Akehurst (2002).

Almost 80% of Australia's petroleum use is in transport. 55% of road transport fuel is petrol, 39% diesel and 6% is LPG, and Australia uses about 45,000 megalitres of petroleum each year.

Compared to other regions, Australia has a good level of understanding of practical demand management strategies (especially from successful and long-standing water conservation measures). This knowledge coupled with our existing still unallocated reserves of natural gas provides an encouraging opportunity for us both to forecast and to weather the coming oil shortage storms better than many other regions. It is particularly important that the issues are tackled seriously and urgently by decision-makers.

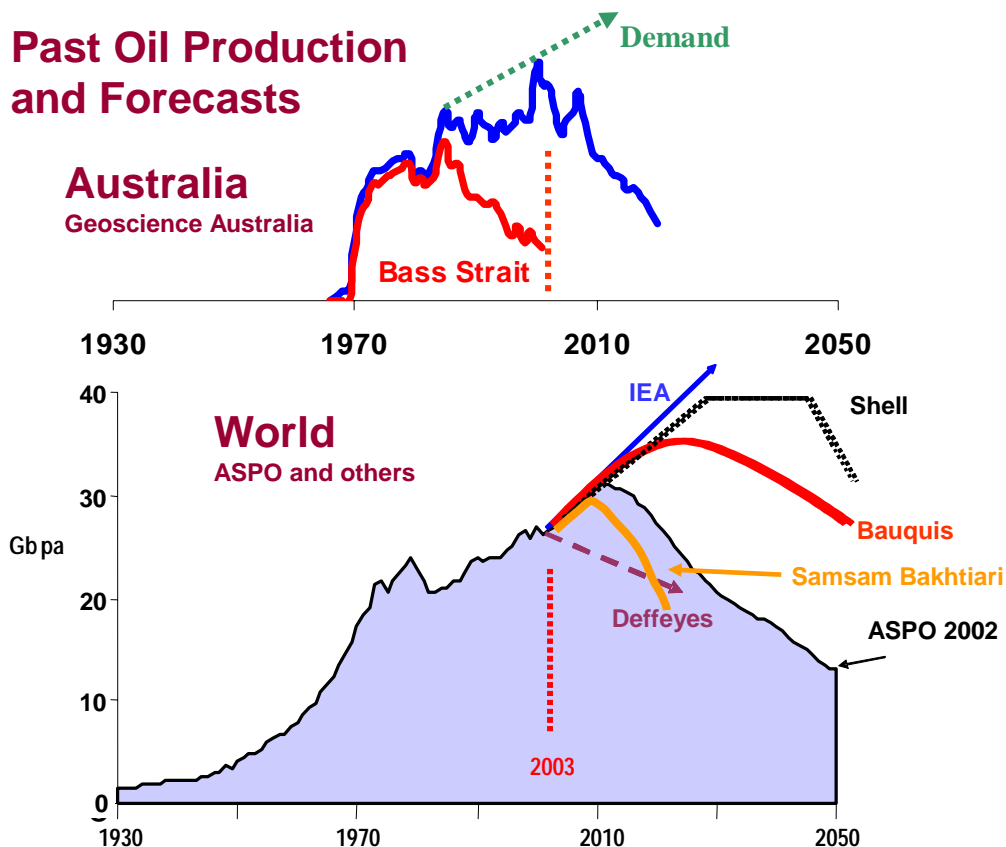


Figure 1: Australia's vulnerability to oil depletion is shown in these diagrams of past Australian and world oil production and future decline predictions. (Australian data and forecasts from APPEA (2004). Global predictions after Bauquis (2004). IEA is the International Energy Agency; ASPO is the Association for the Study of Peak Oil & Gas. A majority of estimates of the peak of world oil production cluster between the present and 2020 (Andrews and Udall (2003))

Australian oil production decline

Australia has been shielded from past oil shocks by our domestic oil production from Bass Strait. Hence, as a nation we have not learnt as much about oil conservation and transport planning as European countries, especially the Netherlands which radically changed its transport planning policy to reduce its oil dependence after the 1973 oil crisis.

However, Bass Strait production has been declining since 1985 and until now other fields have filled the production gap. Reliable recent predictions by Geoscience Australia and Woodside indicate that Australia's oil and condensate production will fall substantially in the next decade (Akehurst (2002), APPEA (2004)).

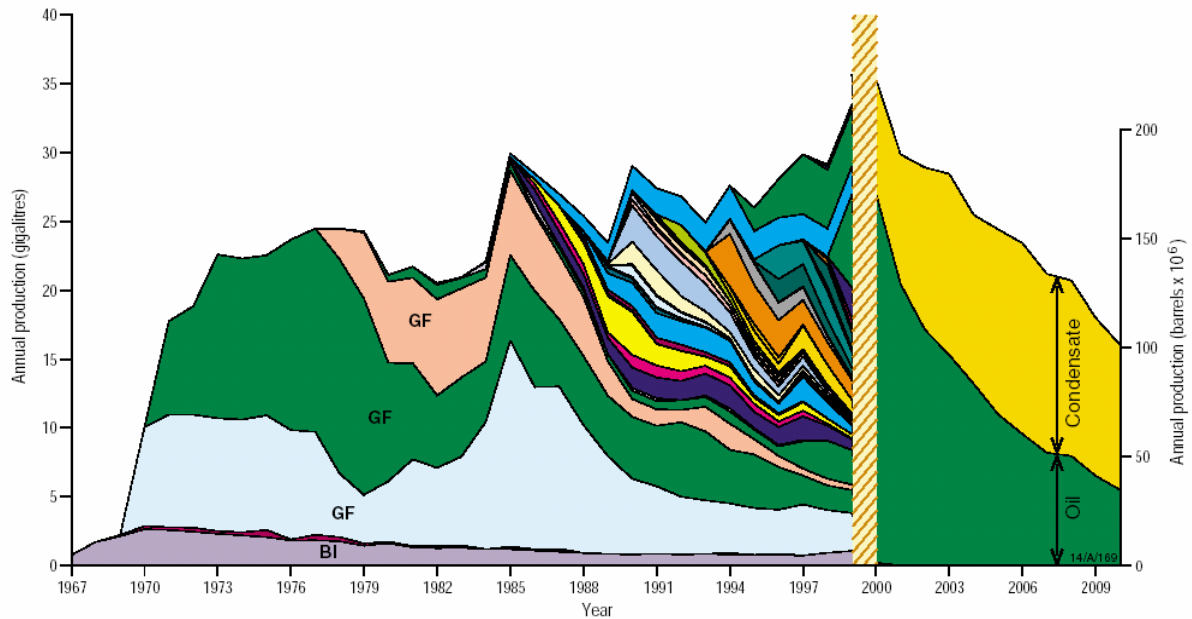


Figure 2. Oil and condensate production profiles of individual Australian fields, and the forecast cumulative production at 50% probability derived from industry data, Powell (2001), Akehurst (2002). BI denotes Barrow Island; GF denotes giant Gippsland Basin Fields.

The dominance of a few large fields, shown in Figure 2, is typical of oil regions. The giant fields are normally found first. An increasing discovery rate of usually progressively smaller fields is needed to keep production relatively constant as the giant fields decline. Then inability to keep finding adequate volumes in ever-smaller fields leads to an overall decline. Australia is now using three times as much oil as is being discovered, and this will lead to the forecast production decline as shown in the graph (Akehurst (2002)).

Australia's rapid domestic oil production decline is taking place not long before it is predicted that the overall world oil production will also commence to decline. As a result, Australia is becoming increasingly vulnerable to serious oil shortages, in the short term (within a year), in the medium term (within 5 years) and in the long term (within one or at most two decades). Self-sufficiency is expected to decline from an average of 80-90% over the past decade to about 20% by 2020 (APPEA (2004))

World oil production decline predictions

A world-renowned US Geological Survey petroleum geologist, Les Magoon, visited Australia in November 2001 as the Distinguished Visiting Lecturer of the Petroleum Exploration Society of Australia. He gave talks around Australia entitled "Are We Running Out of Oil". As reported (Australian Energy News (2001), Magoon (2001)), he describes the "Big Rollover" as the change from the current world oil buyers'-market to a world sellers'-market when global production starts to decline. Various forecasts have put the "Big Rollover" date at sometime around 2003, 2007, 2010 or by 2020 (Andrews and Udall (2003)). "At BP, our best estimate of when global oil shortages will begin to bite deeply is between 20 and 40 years", Greg Bourne, Regional President of BP Australasia, told the 5th Energy in WA conference in Perth in March 2003.

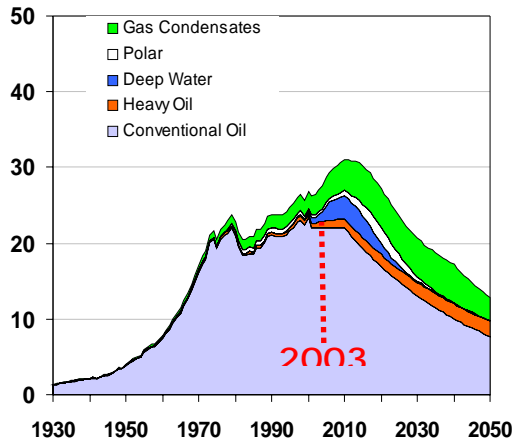


Figure 3a: Current forecast of future world oil production, including non-conventional oil. (ASPO (2002)). Scale is in gigabarrels of oil-equivalent per year. The peak of the curve is the "Big Rollover"

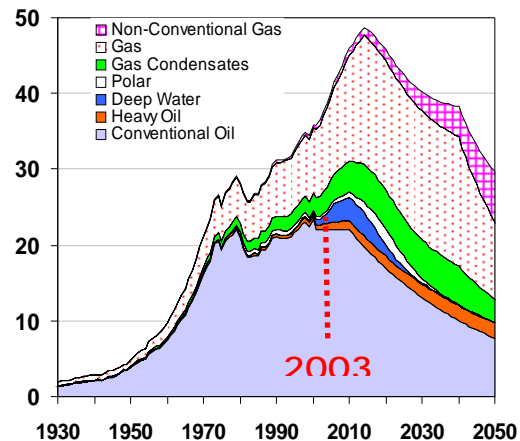


Figure 3b: Current forecast of future world oil and gas production, (ASPO (2002)). The inclusion of gas does not change the shape of the global hydrocarbon depletion curve substantially.

Prof. Pierre-René Bauquis of the French Institute of Petroleum told a combined meeting of the Society of Petroleum Engineers and the Petroleum Exploration Society of Australia in Perth that he expected global oil production to start its terminal decline in about 16 years (Bauquis (2004)). He does not see any significant renewable energy substitutes for petroleum over the next 20-50 years. He was also dismissive of hydrogen as a transport energy carrier and foresaw the use of nuclear energy to help manufacture synthetic hydrocarbon fuels

As can be seen in Figure 1, there are some considerably more optimistic forecasts of future oil supplies. The most optimistic ones are driven by economic and political perspectives, rather than by geology and engineering constraints, for example see Lynch (2002). There are very considerable grounds on which to doubt the forecasts published by the International Energy Agency. The IEA takes without question the oil reserve data provided by all the national governments. Many of these estimates are clearly misleading as they either increase dramatically without any matching exploration success, or they remain constant for years in spite of substantial production which must reduce the actual oil reserves. Conflicting definitions and national and political priorities make the IEA figures as dubious, for example, as similar audited and glowing accounts of the financial strength of HIH and Enron just before their catastrophic corporate crashes.

Shell has recently revised its "proven reserves" downward by 23%, showing that oil-company reserve claims are subject to uncertainties and mistakes. The scope for analogous errors and misrepresentation at the national level is very substantial. Mexico has twice halved its

claimed reserves since the mid 1990s. Recent presentations by Matthew Simmons (Simmons (2004), (2004a)) cast considerable doubt on the reliability of the claimed Saudi oil reserve figures. Similar doubts about OPEC's overall reserves are also raised by Salameh (2004). In the case of Saudi Arabia, any substantial errors in reported reserve estimates are of very serious global significance. There is of course the complementary but lower probability that some reserves may have been understated, but most concern has been expressed about over-optimism.

International Workshops on Oil Depletion

Annual International Workshops on Oil Depletion are held in Europe by the Association for the Study of Peak Oil and Gas, ASPO. The most recent, and by far the largest and most prominent, was hosted in Berlin by the German Geological Survey, BGR in May 2004. Unfortunately, there has been no attendance at all from anyone from Australia professionally involved in transport, government or the oil industry. However, the Sustainable Transport Coalition has been represented at all three held so far. Papers and presentations are available at www.PeakOil.net. Oil depletion experts from the US, Europe, Russia and the Middle East gather to discuss the growing body of evidence that world oil production will reach a peak then decline relatively sharply within a decade or at most two. At the first workshop APSO also released the first edition of its "Statistical Review of World Oil and Gas", a nation-by-nation evaluation of reserves and production rates, based on the most reliable technical data available. The ASPO data differ substantially from those published in oil trade journals and by the IEA which have very serious commercial and political biases and inconsistencies. Evaluation of non-conventional oil is now included in the current predictions shown in Figure 3a. Non-conventional oil includes heavy oil (which needs to be heated to flow adequately), oil from deep water (>500 metres) and from polar regions and condensates from natural gas. These sources will in part offset the rate of decline of conventional oil after the "Big Rollover"

Presenters at the International Oil Depletion Workshops included Matthew Simmons, a prominent energy-sector investment banker from Houston who advises President Bush.

Simmons said, "I have studied the depletion issue intensely for too long now to have any remaining doubts as to the severity of the issue. But I am still amazed at the limited knowledge that exists, even in the U.S. or within our major oil and gas company's senior management about this topic and its dire consequences", (Simmons (2002))

"Most serious scientists worry that the world oil supplies will peak [and then decline]. Peaking of oil can not be predicted accurately, but the event will occur. Peaking turns out to only be clear through a 'rear-view mirror'. By then, an alternative or solution is too late. My analysis leads me to worry that peaking is at hand, not years away. If I am right, the unforeseen consequences are devastating. The facts are too serious to ignore."
(Simmons (2003))

Dr Samsam Bakhtiari, of the National Iranian Oil Company, provided a pessimistic view of future oil supply decline and of its effects: -

"Seen from a Middle Eastern perspective, the present global oil situation can be summarised within five major and inescapable trends:

- *The world's super giant and giant oil fields are dying off;*
- *There are no more major frontier regions left to explore besides the earth's poles;*
- *Production of non-conventional crude oil has been initiated at great costs --- in Venezuela's Orinoco belt, Canada's Athabasca tar sands and ultra-deep waters;*
- *Even OPEC's oil production has its limits;*

- *No major primary energy rival can possibly take over from oil and gas in the medium term.*

Adding up these five trends, one can envision a global oil crunch at the horizon --- most probably within the present decade....."

"...It would take a number of miracles to thwart such a rational scenario. Now, a single miracle is always a possibility, but a series of simultaneous miracles is not --- for there are limits even to God Almighty's mercifulness". (Samsam Bakhtiari, 2002)

Samsam Bakhtiari has also since published simulations of the World Oil Production Capacity (Wocap) model which suggest that global oil production will peak at a point near 81 million barrels per day well before the end of the decade, likely by 2006-07 (Samsam Bakhtiari (2004)). Dr Samsam Bakhtiari visited Australia recently, presenting seminars in four cities. He also briefed the WA Cabinet about oil depletion risks on August 9th 2004.

A paper in December 2002 by Exxon Mobil Vice President, Harry J. Longwell (Longwell (2002)) contains the world oil discovery decline curve (Figure 4) which agrees well with those published in Aleklett and Campbell (2002). Declining past oil and gas discovery success rates foreshadow future production decline rates, and acknowledgment of this by a major oil company is very significant. There is an often-overlooked truism that oil production can only follow oil discoveries. Longwell also showed a peak of global gas discovery in about 1970 with a sharp decline in natural gas discovery rates since then.

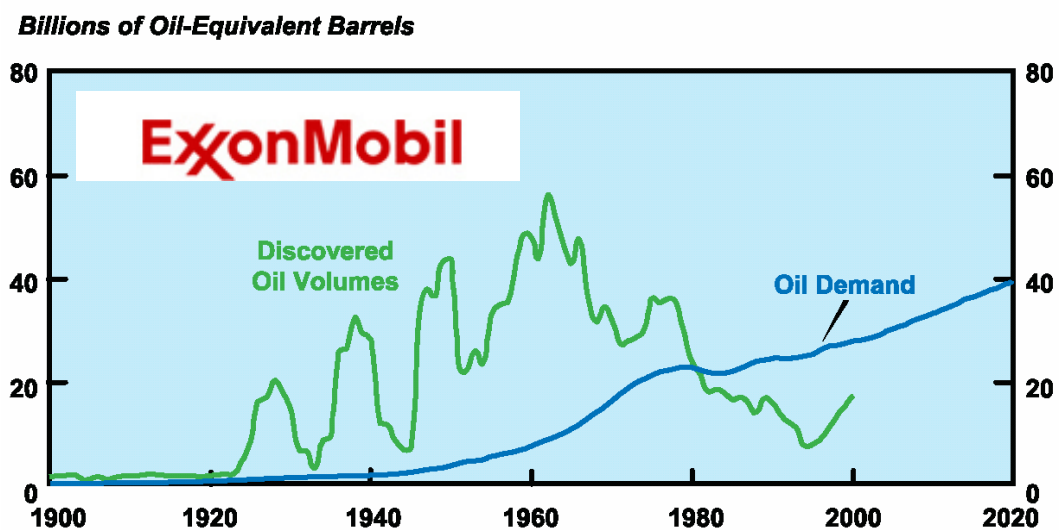


Figure 4: World oil discovery rates have been declining since the early 1960s as now acknowledged by Exxon Mobil. (Longwell, (2002))

More recently, there has been an increasing level of coverage of oil depletion issues in the scientific and general media. Some examples follow.

New Scientist ran a cover story (2nd August 2003). "Crisis looms – When demand for oil outstrips supply"

"... we could be in for a big shock: we are going to run out of cheap oil. That's not oil per se, but we're approaching the point when global demand for oil will outstrip supply. It is not clear when we will reach this tipping point. The economists say we have about 35 years before oil production peaks, while geologists think we have only a decade. At present the geologists' argument is in the ascendant, having won the backing of some investment banks and oil consultants."

Oil & Gas Journal editorial (18th August 2003)

“...can a peak in production be anything other than imminent? That question breeds others. How rapidly will production decline after the peak?”

The Guardian (2nd December 2003) - "Bottom of the barrel – The world is running out of oil - so why do politicians refuse to talk about it?"

“Every generation has its taboo, and ours is this: that the resource upon which our lives have been built is running out. We don't talk about it because we cannot imagine it. This is a civilisation in denial.”

Richard Miller, BP Exploration UK, wrote in a letter to the Oil & Gas Journal (12th January 2004) sharply refuting a statement from an extreme economic optimist (Maugeri, O&GJ, Dec 15th 2003) who had claimed *“.. just as the Stone Age did not end because of the scarcity of stones, the Oil Age will not end because of the scarcity of oil. Rather oil will inevitably be surpassed in convenience by a new source of energy in the future”*.

Miller stated *“This is the classical economist's view: something will turn up, when the price of oil is high enough, because something always does. But there isn't anything conceivable that could replace conventional oil, in the same quantities or energy densities, at any meaningful price. We can't mine the oil sands in sufficient quantity because there isn't enough water to process them. We can't grow bio-fuels because there would be no land left to grow food. Solar, hydro, wind, and geothermal don't yield enough energy, hydrogen (from water) takes more energy to make than it can yield, and nuclear fission and fusion are presently off most political agenda. The oil consumed directly and indirectly by the average American is equivalent to the work output of 135 slaves, unfed, unclothed, unhoused, and paid \$2 a day between them. When oil gets too expensive, surviving Americans will still obtain energy from alternative sources, but in much smaller amounts and at much higher prices. Westerners will have to live with only a handful of slaves.*

Christian Science Monitor, 29th January 2004 “Has Global Oil Production Peaked?”,.

The question now making the rounds in energy circles: Has production already peaked?

West Australian, March 10th 2004 "End looms for the days of cheap oil"

"Oil companies are now raising their doubts. They voice it softly, but clearly they are starting to feel if they don't raise any doubts, the public will be hostile to them".

This well-researched long article was taken from an international newswire service. The fact that the West Australian was probably the only newspaper in Australia which ran the story may illustrate the reality of the community taboo against discussing oil depletion.

As production outside the Persian Gulf declines, the balance of oil power will shift more and more towards OPEC and the Middle East. Substantial short-term disruptions, for instance from a revolution in Saudi Arabia (Bauquis (2004)) and large market-force pressures in the medium-term are quite possible. The permanent decline phase will start once the Middle East production starts falling as forecast, possibly in about 2010 or so. Physical constraints in addition to market forces and geopolitical factors will then limit oil availability. Rising world demand, for instance from China and India, will add enormous pressures to the oil market. The past oil shocks have been predicted to be mere ripples compared to the changes which will probably occur in the next decade or two.

These reliable forecasts of declining domestic production and uncertain world supplies indicate that Australia is very vulnerable to "Oil Shocks" in the short term (2 months), medium term (2 years) and long term (within 1-2 decades).

The declines in Australian and world oil availability are likely to be much faster than any alternatives can be brought on stream in significant volume and much faster than the necessary structural and efficiency improvements can be made, unless extraordinary measures are taken very soon.

Preparation for probable oil shocks

There is a great deal that can be done to prepare for the likelihood of future oil shocks and hence to ameliorate the effects when (or if) they hit us. Many possible precautions will be "no-regrets" options already justified on equity, environment, health, social or economic grounds. Australia's existing reserves of uncommitted natural gas coupled with local understanding of demand management (especially in water use efficiency and TravelSmart individualised marketing) provide an encouraging opportunity for the nation to both forecast and to weather the coming storms better than many other regions. It is particularly important that the issues be tackled seriously and urgently at all levels in the community. WA Planning and Infrastructure Minister, Alannah MacTiernan (2004) said, in opening the "Oil: Living with Less" conference *"It is also certain that the cost of preparing too early is nowhere near the cost of not being ready on time."*

Communication about potential solutions and their limitations

It will be crucially important that there be open and informed discussion about oil depletion. Broad consideration of the various strategies for reducing our oil vulnerability; especially their limitations and the input energy needed, the time required and the costs needed to implement them are essential precursors to effective decision-making.

Contrary to many common predictions, it is highly unlikely there will ever be a single "Magic Bullet" panacea for our oil vulnerability. A major aim should be to reduce our very high levels of automobile dependency. Some of the possible oil-use reduction and replacement strategies are outlined in Figure 5.

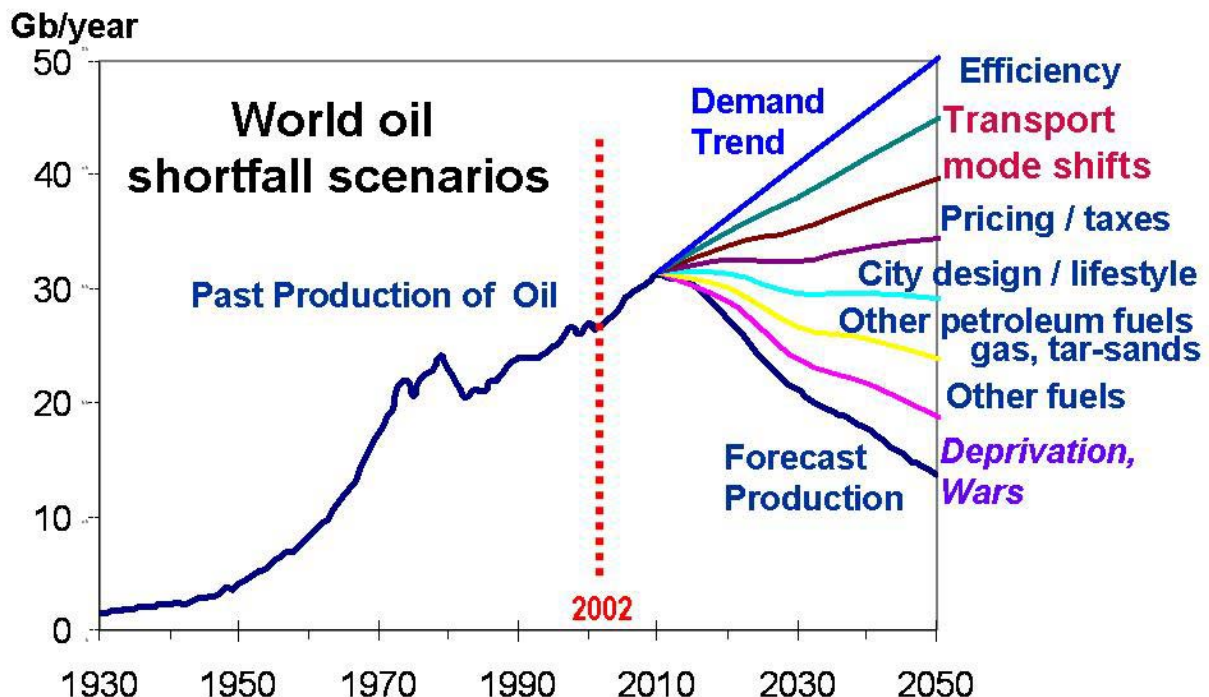


Figure 5. An adaptation of the scenario outlined by Swenson (1998) of the various mechanisms of bridging the coming gulf between growing current world demand for oil and the forecast decline in the production of conventional oil (Robinson (2002)).

Travel mode shifts: Individualised Marketing

Very substantial changes have already been triggered in existing urban travel patterns when people are given personalised information about the travel choices available to them. Empowering people in this way has resulted in sustained decreases of 8% to 19% in car-kms travelled. The oil saved by these voluntary travel pattern changes is very significant, and shows that reducing car-travel demand is more cost-effective than exploring for more oil.

Australia leads the world in the application of Individualised Marketing to make very significant reductions in car travel rates. Programmes have been completed or are underway in several states. WA has the most extensive record with a number of very successful and well documented programmes. The average reduction in car-kms travelled in the completed WA projects is 13% at a benefit:cost ratio of 30:1, far higher than those of most transport projects. Similar results have been obtained in Europe and the US, (Robinson (2004), Socialdata (2004)).

The TravelSmart Individualised Marketing programmes in WA have covered suburbs with some 158,000 people to date, and have resulted in the annual saving of some 115 million car-kms, or 11 million litres of petrol (John (2004), MacTiernan (2004)). Extrapolated to Australia's urban population, this would equate to about a thousand megalitres of oil saved each year. Globally, this level of travel reduction and mode shift would save each year oil amounting roughly to the annual production of Iraq, as an example.

Alternative Fuels

All alternative fuels to replace petrol and diesel have severe constraints to their introduction. Enormous volumes are required to replace a sizeable proportion of our current liquid fuel usage, and the timescale for their provision in these volumes is very short. For instance, diverting Australia's entire wheat crop to produce ethanol would replace less than 10% of our oil usage. Hydrogen is an energy carrier, not an energy source. It requires large amounts of energy for its manufacture and for its distribution. For the foreseeable future, the vast bulk of the world's hydrogen will continue to be made from oil and gas. The 'Hydrogen Economy' may well turn out to be just a pipe-dream like fusion power. Concentration on hydrogen diverts attention and resources from practical and immediate fuel conservation options. The most likely alternative for our current cheap plentiful oil will also be oil, but much more expensive and less plentiful oil.

Technological changes

It will be very risky indeed to rely on unproven technologies becoming available on such enormous scales within a decade or so, which is the timeframe likely to be required if the Big Rollover forecasts are accurate. There are around 14 million motor vehicles in Australia, and at only \$25,000 each, a fleet replacement exercise to change them to other technologies or other fuels would need the outlay of \$350,000 million, which would be diverted from other community and Government needs. Currently half the registered motor vehicles are more than ten years old, and 20% more than 20 years old. Normal fleet changeover rates are actually very slow. Half of today's new cars will still be on the roads in 20 years (BTRE (2002))

For instance, it has taken Australia almost two decades since 1985 to switch from leaded to unleaded petrol (Figure 6), a very much simpler technological change indeed than a conversion to fuel-cell cars, for instance. This change was mandatory for all new cars purchased from 1st January 1986.

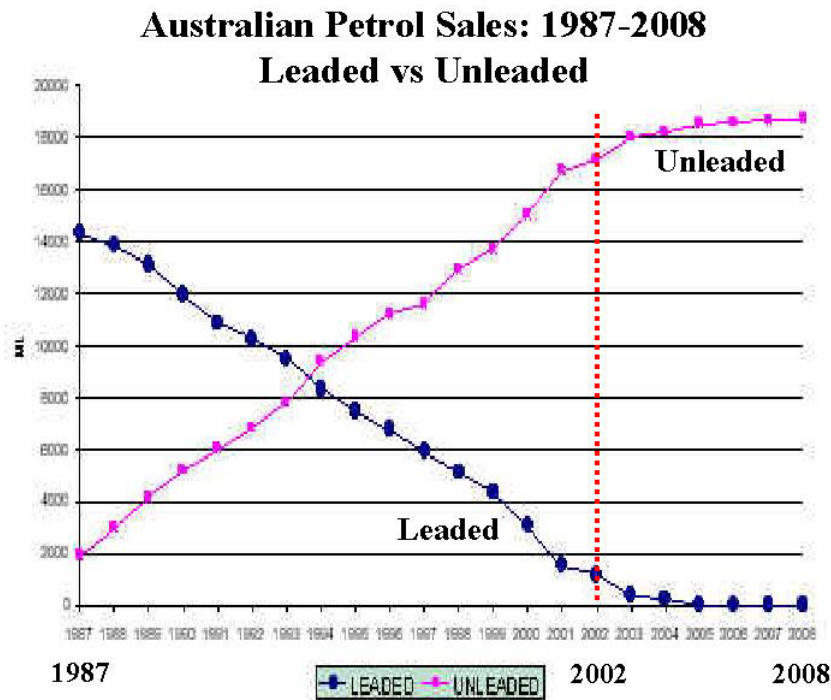


Figure 6. Example of the inevitably slow rate of introduction of new technology into Australia's vehicle fleet. Unleaded and leaded (or LRP) petrol sales, Australia, from 1987 and extrapolated to 2008, (Australian Institute of Petroleum at www.aip.com.au), following mandatory introduction of emission-control engines in new cars in 1986. The introduction of hybrid vehicles and fuel cells is likely to be much slower as the technological differences are much greater.

Suggested Oil Dependence Reduction Measures

Australia is very wasteful of energy in general, and of petroleum fuels in particular, and there are a great many measures which can reduce this wastage while either improving or not diminishing our quality of life. Changes to the built environment can substantially improve transport energy efficiency if our automobile-dependent perspective is cast aside. Sadly, all too many planners and transport decision-makers give an impression of having a windscreen-shaped view of the world. There is great scope for simple and cost-effective steps to make our cities and towns far less automobile dependent and much friendlier and more efficient for walking and bicycle transport.

In its submission to the COAG Energy Markets review, BP recommended :-

"Achieve a step change in energy efficiency – BP knows from its own experience that significant cost savings are available through greater energy efficiency. Better energy efficiency is the “low hanging fruit” of the energy challenge.” (BP (2002))

There is a wide range of oil consumption reduction measures outlined by Denniss (2003), in Robinson (2002) and (2003) and by the Sustainable Transport Coalition (2004). A crucial first step would be to review and remove the inequitable perverse subsidies which fund and encourage excessive private motor vehicle use in our cities and towns.

"Perverse policies, that is policies which actually reduce the sustainability and efficiency of the transport sector, continue to be implemented, and continue to receive the support of various levels of government in Australia". (Denniss (2003))

These include 10% Federal tariff subsidies to fuel-inefficient urban 4WD vehicles; FBT regimes which reward heavy car use and penalise modest usage; and the GST which increased the price of public transport while leaving that of petrol unchanged. There are massive

Federal funds to build freeways, but no specific allocation at all to build cycleways. State Governments have high fixed "vehicle ownership" charges rather than "vehicle use" charges (especially for third party injury insurance). These mean that those frugal with car use are forced to subsidise the profligate users. Local Government ratepayers are forced to pay more for planning and engineering staff who live long distances away (because of high company car package costs) than they do for local staff who are of more value to residents because of their better local knowledge. The provision of salary-packaged vehicles mean that most decision-makers do not pay directly for their petrol and hence tend to have an automobile-dominated outlook. Even supermarket chains like Coles and Woolworths now force shoppers who use cars only rarely to subsidise the gas-guzzlers due to the inequitable petrol discount schemes, funded by increased supermarket food prices.

Like BP, the authors recommend starting with the low-hanging fruit, of simple good engineering and urban planning to end the addiction to continual expansion of facilities for motor vehicles. For example, the overall disjointed and low standard facilities for pedestrians and bicycle transport users are an indictment of past and current planning and engineering practices throughout Australia.

Transport researchers must look now towards evaluating the oil shortage scenarios outlined, so there is much more information on which to base the crucial decisions which must be made soon. The current National Oil Supply Emergency Committee rationing plans are just one minor example. These need a rigorous review and a much broader community input to make them far more equitable and suitable for long-lasting shortages. Making decisions by default, using the current business-as-usual forecasts will prove extremely costly to nations, communities and individuals.

There is enormous scope for economic gains and for the avoidance of serious losses if the community, the professions and governments can turn away from car-dominated thinking. Transport planners who take notice of the oil storms now appearing on the radar screens will be far better equipped to help the community survive the large changes that are very likely to sweep through Australia in the near future.

Acknowledgment

The authors would like to express special appreciation to Brian Fleay for his pioneering interest in oil depletion (eg Fleay (1995) (1998)). This paper is derived in part from the background paper prepared for the WA State Sustainability Strategy (Robinson, (2002)). The efforts and encouragement of Prof Peter Newman in this area amongst others should be recognised. Inspiration and assistance from members of the Sustainable Transport Coalition is also gratefully acknowledged.

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Appendix II



Sustainable Transport Coalition

www.STCwa.org.au

61-8-9420-7268

c/o Conservation Council of WA,
2 Delhi St, West Perth WA 6005

Policy Adopted February 2004

"Oil: Living with Less" Policy

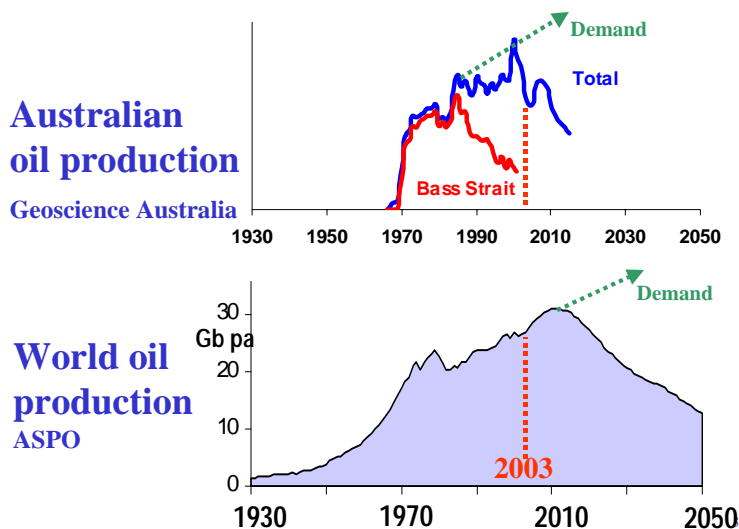
WA's transport system faces an oil-shortage crisis, probably within a decade or at most two. Oil is a non-renewable resource and is being depleted rapidly by Australia's and the world's profligate use of dwindling reserves.

Failure to take urgent substantial action to reduce our oil dependence will leave us exposed to very serious economic and social risks in the next few years. We owe it to future generations to heed the warning signs now showing clearly on the radar screens. A proactive, precautionary approach is critical.

Many of the policy options to reduce fuel usage will also lead to healthier, happier and more equitable communities and improve local and global pollution levels.

Background

Australian domestic oil production is already declining and global oil production is forecast to begin its terminal decline soon, probably within a decade.



Dubbed 'The Big Rollover', the forecast switch to an economy in which demand for oil outstrips supply is well documented and is becoming widely accepted, by oil companies, geologists and government advisors around the world. "At BP, our best estimate of when global oil shortages will begin to bite deeply is between 20 and 40 years", Greg Bourne,

Regional President of BP Australasia, told the 5th Energy in WA conference in Perth in March 2003.

Other authoritative forecasts are much less optimistic than BP's, predicting that the final decline in world oil production rates may start within 5-10 years, or indeed that it may have already started.

Matthew Simmons, a prominent Houston-based energy-industry investment banker and advisor to President Bush, addressed the International Workshop on Oil Depletion at the French Institute of Petroleum near Paris in May 2003. (www.PeakOil.net).

"Most serious scientists worry that the world oil supplies will peak [and then decline]. Peaking of oil can not be predicted accurately, but the event will occur. Peaking turns out to only be clear through a 'rear-view mirror'. By then, an alternative or solution is too late. My analysis leads me to worry that peaking is at hand, not years away. If I am right, the unforeseen consequences are devastating. The facts are too serious to ignore."

New Scientist ran a cover story (2nd August 2003). "**Crisis looms – When demand for oil outstrips supply**"

"... we could be in for a big shock: we are going to run out of cheap oil. That's not oil per se, but we're approaching the point when global demand for oil will outstrip supply. It is not clear when we will reach this tipping point. The economists say we have about 35 years before oil production peaks, while geologists think we have only a decade. At present the geologists' argument is in the ascendant, having won the backing of some investment banks and oil consultants."

Oil & Gas Journal editorial (18th August 2003)

*"...can a peak in production be anything other than imminent? That question breeds others. **How rapidly will production decline after the peak?**"*

The Guardian (2nd December 2003) "**Bottom of the barrel – The world is running out of oil - so why do politicians refuse to talk about it?**"

"Every generation has its taboo, and ours is this: that the resource upon which our lives have been built is running out. We don't talk about it because we cannot imagine it. This is a civilisation in denial."

The terminal decline of Australia's oil production has been documented by Geoscience Australia, the Federal Government geological survey organisation, and the Australian Petroleum Production and Exploration Association. While Australia has been largely self-sufficient in net oil usage, current forecasts suggest we may be forced to import 60% to 70% of our needs in ten years. This will be within a very competitive international market, with declining global production and rapidly increasing demand from China and India. Many nations that are currently oil exporters, like the UK and Indonesia, will be importing within the next few years as production from their domestic oil-fields decline steadily.

Almost 80% of Australia's petroleum use is in transport (APPEA, 2002). 55% of road transport fuel is petrol, 39% diesel and 6% is LPG (www.AIP.com.au).

Substantial alternatives to our current cheap and abundant petrol and diesel transport fuels are unlikely. It is not possible for Australia to produce biofuels in sufficient quantity to replace petroleum as the prime transport fuel. If all of Australia's current wheat production were converted to ethanol, it would provide less than 10% of our fuel needs. Most biofuels still require a lot of petroleum for their production, refining and distribution as well as the diversion of land from food production. Hydrogen is an energy carrier, not an energy source. It requires large amounts of energy for its manufacture and distribution. For the foreseeable future, the vast bulk of the world's hydrogen will continue to be made from petroleum sources. The 'Hydrogen Economy' may well turn out to be just a pipe-dream like

fusion power. Concentration on hydrogen diverts attention and resources from practical and immediate fuel conservation options.

The best way for us to survive is to change, now, our expectations, infrastructure and transport habits to encourage less oil-hungry modes.

.....

Policy

Policies to tackle the problems of oil depletion should be based firstly on an open acknowledgement of the magnitude and urgency of the issue, and secondly on rapid implementation of existing proven strategies to reduce oil usage and the demand for automotive transport.

Government, business and the community should act now to reduce transport energy demand and shift to gas and renewable, less polluting energy sources.

The Sustainable Transport Coalition advocates these priorities for change:

- Charging the real costs of transport and oil, including the lost opportunity costs for future generations of our profligate use of short-lived resources.
- Reducing car use and freight transport, including allocating 20% of all urban road funding towards safe efficient transport facilities for cyclists and pedestrians.
- Making vehicles more efficient, especially greatly improving fuel efficiency for the passenger vehicle fleet.
- Developing and using alternative fuels that provide practical and sustainable energy for transport.
- Reforming transport and energy policy to provide a framework for the shift away from oil and car dependence.

(1) Charge the real costs of transport and oil

Motorised transport users do not pay the real costs of travel; many costs are imposed on the community e.g. health effects and disruption of communities. Many transport costs are fixed (e.g. vehicle registration and insurance) or too low (e.g. fuel prices compared with many other nations) and so distort the market. This mismatch results in social and economic costs for the community and a strain on public funds. In addition there are many perverse subsidies that work against an equitable sustainable transport system, e.g. \$940 million pa subsidies to company cars¹.

The costs of depriving future generations of vital petroleum are not included in current pricing or policies. We are stealing resources from our grandchildren with no assurance that there will ever be any replacement for the oil they will need for fertilisers, plastics and transport.

Incorporating costs more fully in what transport users pay, e.g. through fuel prices, road user charges or other means, would send a stronger signal to influence travel behaviour, better reflect the real costs, and provide funds for sustainable transport infrastructure and for demand management.

Recommendations:

¹ Denniss, R. 2003 "Implementing policies to increase the sustainability of transport in Australia" Paper to Western Australia Beyond Oil conference, 21 February 2003. see www.STCwa.org.au

1.1 Incrementally increase excise on petrol and diesel to European levels to reduce demand and to provide funds for health, environmental and sustainable transport programs. A significant share of revenue should be hypothecated to a sustainable transport fund for travel demand management and green mode infrastructure. The need for compensation for low-income earners should be addressed, but not in the form of fuel subsidies.

1.2 Abolish vehicle ownership charges and replace with a total pay-as-you-go vehicle use charge. Replacement of fixed charges was recommended by the RAC in 1979² Motor vehicle registration funds and third party vehicle insurance costs should be recouped entirely from fuel taxes, as congestion, road damage and crash injuries all depend on the level of use of the vehicle. A car left at home by someone walking or riding to work should not be taxed while standing still. It is not using road space or fuel, or injuring anyone while in the garage. Mass and distance based charges should apply to commercial vehicles, especially long distance heavy haulage trucks.

A national no-fault road injury compensation scheme would be far more equitable and effective than the various separate state-based third party schemes. This could also be far more easily funded from an increase in Federal fuel excise duty

1.3 Remove taxation measures that encourage motor vehicle use and the purchase of four-wheel drives and other high fuel-consumption vehicles over more efficient vehicles. This should include fringe benefits tax reform to cease the serious subsidisation of private car use, end incentives for high mileages and to treat travel alternatives equitably. The 10% import duty concession on four-wheel drives should be abolished. Provide graded stamp-duty fees to encourage the purchase of highly efficient vehicles and discourage the purchase of inefficient models, both new and secondhand.

1.4 Introduce 'driver fault' legislation to make drivers prove no-fault when in collision with pedestrians and cyclists, as applies in some European countries

(2) Reduce car use and freight transport to conserve petroleum

Many urban passenger trips made by car could be transferred to modes that generate fewer impacts and more benefits i.e. walking, bicycles and public transport. This mode shift would mean more physical activity and therefore far better population health, lower energy use (even renewable, for walking and cycling) and fewer emissions.

Changes can be made in freight transport, by changing mode split (e.g. more freight on rail), logistics (e.g. using available container and truck capacity better and reducing fuel-inefficient "just-in-time" practices) and location (e.g. localising production and consumption and eliminating attenuated trips when alternatives are available).

Integrating land use and transport will be an important strategy to reduce travel demand, including mixed use urban villages on public transport networks, enhancing pedestrian and cycle access within neighbourhoods and across cities and locating commercial and industrial activities according to accessibility requirements.

Speed limits should be reduced. Lower urban vehicle speeds improve urban amenity and quality of life and encourage walking and cycling. High vehicle speeds are alienating and disruptive, as well as being exceptionally dangerous.

Recommendations:

2.1 Broaden the scope of AusLink, the Federal Government's national land transport plan, to include urban passenger transport, walking and bicycle transport and to give high priority to transport

² RAC 1979 Submission to the Energy Advisory Council "Energy Use in Transport"

energy efficiency, especially the implications of oil decline, in setting priorities and assessing funding bids.

2.2 Increase State and Federal government funding for the TravelSmart initiative to extend this effective household-based travel behaviour change program throughout Perth and to all regional centres.

2.3 Give greater priority to walking and cycling in transport and land use planning and transport funding. Complete the Perth Bicycle Network and the rail-line cyclepaths from Perth to Armadale, Midland and Fremantle. Plan and construct bicycle networks for all regional centres and country towns. Auditing neighbourhood access to enhance travel by these modes and applying a Liveable Neighbourhood design code will be a good start. The STC policies “Walking” and “Bicycle Transport” provide more detailed recommendations. See www.STCwa.org.au.

2.4 Update the Metropolitan Transport Strategy to provide a framework for transport planning and investment. It should strongly support infrastructure, services and planning that favours public transport, cycling and walking for personal travel and rail for bulk freight transport. The mode share targets set in 1995 should be enhanced not watered down.

2.5 Include an urban growth boundary, development location policy and targets for residential density increases in the Greater Perth strategy to halt urban sprawl and better integrate land use and transport.

2.6 Establish an integrated transport funding process for WA. This should ensure transport funding advances strategic aims and is allocated on the basis of regional transport plans and inter-modal, triple bottom line project appraisal.

2.7 Review and act to address taxation measures that bias modal preferences towards car commuting. This should include reforms to fringe benefits tax (see 1.3) and encouragement of employer provision of public transport fares and bicycle transport expenses and cashing out of car and parking options.

2.8 Reduce urban and rural road speed limits. This will substantially improve road safety as well as reducing fuel consumption. WA's 110 kmh rural speed limit should be brought into line with the 100 kmh standard in most of Australia. Urban arterial speed limits should be reduced to 50 kmh and residential street limits to 40 kmh, to follow successful examples in Australia and overseas. Speed limits past schools should drop to 25 kmh as used in South Australia.

(3) Making vehicles more efficient

The net energy efficiency of the Australian car fleet has changed little over the last three decades³. The increase in four wheel drive vehicles in the passenger fleet (larger and less efficient) has countered the effect of improved fuel efficiency in smaller cars as has increased 'road load' due to auxiliary power requirements⁴. Vehicle design should enhance efficiency, including reduced weight, improved engine technology to enhance fuel economy and provide more appropriate, less ostentatious urban passenger vehicles.

Recommendations:

3.1 Make stringent energy efficiency requirements, including fuel economy and 'road load' measures, part of Australian Design Rules for all classes of motor vehicle.

3.2 Require all motor vehicle advertisements and road tests to include the Australian Standard fuel consumption figures, so consumers may make an informed choice.

³ Moriarty, P. 2000 *Transport and the Environment* Tela 6 Australian Conservation Foundation, Melbourne.

⁴ Road load covers vehicle weight, rolling resistance of tyres and air resistance, which affect vehicle fuel economy (see Moriarty op cit).

3.3 Tie government assistance to the domestic automotive manufacturing industry to achieving greater energy efficiency and environmental performance in motor vehicles made in Australia.

3.4 Governments should lead by example by developing and implementing fleet purchasing and management policies that require use of energy efficient vehicles and alternative fuels as the first preference. Federal, State and local governments should reduce their passenger car fleets by 5% pa and provide staff with attractive alternatives to a salary packaged or home garaged corporate car. Staff in transport and urban planning authorities should be encouraged to avoid company car packages and to travel by other modes to reduce real and perceived bias towards automobile dependence.

(4) Develop and use alternative fuels

Many alternative transport energy sources have been suggested. In the short term, LPG and CNG can be substituted for petrol and diesel, and Australia's natural gas reserves give the nation a competitive advantage in starting the transition away from oil.

Biofuels and hydrogen generated from renewable energy sources should be considered as potential transport fuels. However, hydrogen generated from fossil fuel or biofuels that provide less energy than is needed to grow them are not sustainable options. Research and development for alternative transport fuels is important. A mixture of energy sources as well as demand reduction and increases in efficiency will be needed to fill the gap caused by dwindling oil availability.

Recommendations:

4.1 Encourage the use of LPG, CNG and LNG in the motor vehicle fleet. This should include preferencing gas for government fleets, providing financial incentives for vehicle conversions, or purchase of dedicated gas vehicles and financial support for provision or conversion of fuel storage and distribution infrastructure.

4.2 Ensure government-industry agreements for resource projects consider domestic supply (stationary and transport) requirements and support the development of downstream processing in environmentally appropriate locations. Pricing in long-term contracts and royalty agreements should fully include the probability of significant and sudden price rises for oil and gas.

4.3 Encourage research and development of alternative transport energy technologies, including hydrogen fuel cells, electricity and biofuels where these are based on renewable sources and deliver net energy output.

4.4 Develop a rigorous transport energy research framework that sets out an assessment process for allocation of funding support and accreditation of green transport energy sources. Whole-of-lifecycle analysis should be used to assess the energy balance and greenhouse gas emissions of transport energy alternatives.

(5) Reform transport and energy policy

Oil vulnerability is a significant issue yet it attracts little discussion in policy circles or the media. Greater awareness of the issue is needed, informed by research into its implications for Australia and the consequences of continued inaction.

We urgently need a national energy policy that will make our transport system far more energy efficient and less oil dependent. The Federal Government has a significant influence on transport energy use through taxation, regulatory powers and funding. However leadership is needed from Governments at all levels. The State Government should follow through on its lead in transport energy

by implementing an effective Transport Energy Strategy for WA⁵. Local Governments must also implement infrastructure policies that minimise automobile and oil dependence.

Recommendations:

- 5.1 Initiate a national inquiry into the implications of declining domestic oil production and peaking global oil production, and the priorities for reform that will promote sustainability in the transport sector. This should include scenario modelling to assess the consequences of oil shortages, higher oil prices and transport energy alternatives.
- 5.2 Review and publish oil supply and price scenarios to inform debate about the economic and social implications of inaction.
- 5.3 Develop a national transport energy policy to guide action including taxation and industry assistance reforms, vehicle design standards, vehicle purchasing (see 3.3) and transport planning.
- 5.4 Implement an effective Transport Energy Strategy for WA. Priorities for action should include the government fleet, community awareness and behavioural change, green transport investment and land use planning.
- 5.5 Encourage local government participation in the Cities for Climate Protection Program and support reforms in vehicle fleet management to favour demand management, alternative fuels and energy efficiency.

⁵ The WA Minister for Planning and Infrastructure appointed a Transport Energy Strategy Committee in January 2003. It will report in early 2004 with recommendations for action.

⁶ Further references to issues raised in this paper can be found at the Association for the Study of Peak Oil & Gas website at www.PeakOil.net and at our website at www.STCwa.org.au, especially in our “Walking” and “Bicycle Transport” policies, the proceedings of the WA Beyond Oil? conference of February 2003, and the supporting paper on Oil Depletion.