ASPO-Australia

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Main Submission

Senate inquiry into the investment of Commonwealth and State funds in public passenger transport infrastructure and services 27th February 2009

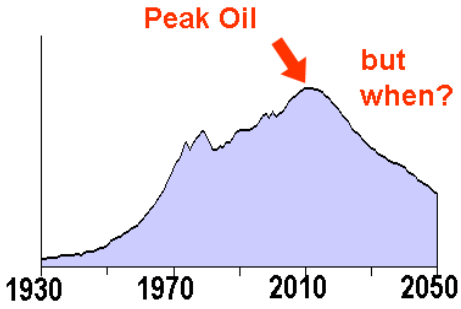
Preparing for the Oil Crunch. An evidence-based approach

"Anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist." Kenneth Boulding, quoted in Deffeyes "Beyond Oil"

Summary:

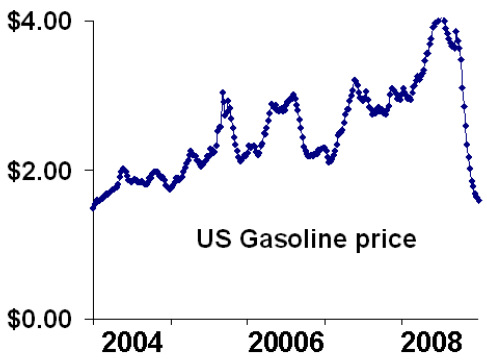
Public transport planning must start with a vivid appreciation of the urgency of preparing for short-term and long-term oil shocks.

Peak Oil (the time when the rate of oil production worldwide starts its inevitable decline) is forecast to occur sometime around 2012 (+/-5 years).



Is the current financial crunch a foreshock of the coming peak oil earthquake?

Oil prices rose steadily, then sharply, from $40 to $145 in four years. The first financial fall-out was the exposure of debt in US sub-prime mortgages based primarily in highly car-dependent urban areas. Rising gasoline prices made it impossible for many to pay mortgages. Non-recourse financing meant that people in many vulnerable areas walked away from their homes without carrying the debt with them (people can't do this in Australia).



The US banks had loaned excessively on belief that car-based growth would always continue. The rise in gasoline price from $1.50/gallon to $4/gallon tipped the balance and probably triggered the world financial crisis.

Oil Vulnerability Assessment and Risk Management Planning

We need to collect and analyse the evidence on which to base future policies to reduce our oil vulnerability across all sectors. All too often, analogous to concerns that were expressed about sub-prime financial practices, peak oil questions are brushed aside or marginalised by economic and transport organisations like ABARE and BITRE

Public transport planning must start with a vivid appreciation of the urgency of preparing for short-term and long-term oil shocks.

Community awareness and community engagement with the risks of Peak Oil will be a prerequisite for effective public transport infrastructure funding. Currently, nearly everyone appears to be under the delusion that the rate of global oil supply will continue to grow along with traffic volumes and car numbers. This is very unlikely, but it is "conventional wisdom" If people believe they are likely to need public transport to replace many car trips in future as fuel shortages bite, they will support the massive expenditure needed.

Australia should follow Margaret Thatcher's example when she put Britain on a fuel tax escalator, raising fuel prices gradually. Our fuel taxes should be progressively raised at least to European levels to provide an unambiguous warning that the days of cheap petrol are over, and also to provide badly needed funds which could be hypothecated to health system improvements and to fund major public transport and cycling infrastructure initiatives. Subsidies for fuel use in Queensland should be incrementally withdrawn and allocated to more pressing needs.

Brisconnections 7km $3.4 billion tunnel to Brisbane Airport is an extreme example of the enormous financial risk from current transport policies. It is the based on unrealistic "forecasts" of ever-increasing airline and car traffic. **A useful public transport system should have been built with that money instead of gambling it all on a "sub-prime" toll-road investment.**

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Oil reached $145/barrel last year before falling sharply as a result of the financial crunch. How long before it rises again and reaches $200 or $300? We don't know, but Peak Oil will probably arrive soon; when world oil production starts its geologically-determined decline while demand continues to rise. CSIRO's Future Fuel Forum economic modelling has a scenario of $8/litre by 2018. We should prepare well in advance in case petrol does get this short and this expensive.

Like hurricanes, volcanoes and tsunamis, Peak Oil is a natural event we can not prevent. It is slower (in our terms) but still very fast in a historical time-frame. We need to prepare well in advance and to learn to live with the consequences. The world's giant oilfields are starting their decline now. Bass Strait started its decline in 1985 and is now producing only a tiny fraction of its peak yield.

We should be preparing for sudden oil shocks, bigger than the 1973 and 1979 oil crises. A revolution in Saudi Arabia or a war over Iran, for instance, would cause a dramatic oil crisis and we are completely unprepared. An effective and equitable tradeable fuel allocation system must be implemented so it is available to ration petrol and diesel in the event of a liquid fuel emergency.

We should also be preparing for Peak Oil which is starting now, according to the EnergyWatch report from a German think-tank and others. Perhaps it will not come till 2010 or 2012, or perhaps later. We will not be fully ready for Peak Oil whenever it comes, but the more wisely we prepare in advance, the better the outcomes will be. *"Forewarned is forearmed"* as the old saying recommends. General awareness of the risks to individuals, businesses and communities is at a very low level. Community awareness programmes should be implemented urgently. We prepare for bushfire, cyclones, droughts and even terrorist attacks. There should be effective oil shortage plans at Federal, State and local levels drawn up after extensive consultation with the community and business.

"Peak Exports" will come sooner, as oil producing nations use more of their own oil domestically. As one example, Indonesia has changed from an oil-exporting country to an oil importer, and has left OPEC. This is in part due to declining production and in part due to rising domestic consumption. Petrol is 2c/litre in Venezuela and circa 10c/litre in Iran and Libya. As a result oil usage is rising sharply in producing countries that subsidise petrol very heavily. This leaves less

available to export to the open market on which Australia depends. Our domestic production is forecast to continue its decline and we will be increasingly exposed to competing for exported oil.

Alternatives like oil-from-coal and gas-to-liquids are not likely to be available in the volumes needed. Hirsch, Bezdek and Wendling (2005) outlined the economic and time constraints needed to produce enough oil from coal or gas to match global oil-field decline rates. Shortages of coal and natural gas (and emission concerns) are likely to constrain their widespread use as transport fuels. Hydrogen, electric cars and other "technological fixes" are also possible in very small volume, but they can not possibly replace our existing oil-powered car fleet in any significant time scale, even if the technological problems were overcome. The costs of replacing even half of Australia's car fleet with another technology are astronomical

Less oil will mean less traffic, friendlier healthier neighbourhoods, a sharply lower road toll, more kids enjoying walking and riding to school, less obesity and also less airport noise, for instance. **But there will also be serious problems,** especially for those with car-dependent lives. Things will be much better if we all think and act in advance of the oil crunch.

Even those not so dependent on cars will face challenges. Let's say a quarter of those now travelling by car will want to change to public transport. This would mean three or four times as many people trying to catch every bus or train. This is just not possible with existing public transport capacity in our cities. It will take an enormous decades-long crash programme to improve our public transport to the level which would accommodate even 25% of all the trips now taken in cars.

Federal and State fuel emergency planning is currently both inequitable and completely inadequate to deal with any serious oil shock. If there are fuel shortages and petrol rationing, then it will also be necessary to ration public transport access too. The elderly, the sick, and mothers with young children should get priority. Those healthy enough to walk a few kms or to ride a bicycle 15 kms should not be allocated scarce public transport places.

We all need to assess and reduce our oil vulnerability. How, for instance, will key staff get to work for night-shifts in intensive care units in hospitals? How will Meals-on-Wheels be able to continue? What is an essential service? And what are the lower priorities for scarce fuel?

The US had no serious plans about how to handle a big hurricane hitting New Orleans. The world saw the "*She'll be right"* approach of the US Federal, State and local governments fail the people of New Orleans. Similarly, there was no planning at all to prevent the current US and world financial crunch. As a result an enormous amount of money now being spent trying to retrieve the situation. It would have been far cheaper and far better to have taken significant steps in advance to foresee and minimise the credit crunch.

Will Australian governments learn from the financial crisis and reduce, in advance, our nation's oil vulnerability and have well-considered countermeasures already implemented in case they are needed.? Sadly, probably not on current trends. We can no longer assume that business will be as usual, but decision-makers are still planning by looking in the rear-vision mirror.

The economists will say "Market forces will fix it", but they were powerless against both Hurricane Katrina and the financial meltdown. Oil production is already declining sharply in many regions, including the US, the North Sea, Australia and Mexico. This is geology telling us we can not produce more and more oil every year.
The super-giant fields we depend on are declining and we should be preparing now for oil shortages.

"Fresh sources of oil equivalent to the output of four Saudi Arabias will have to be found simply to maintain present levels of supply by 2030, one of the world's leading energy experts has said.

Fatih Birol, chief economist of the International Energy Agency (IEA), the developed world's energy watchdog, told The Times that the depletion of existing oilfields meant that vast new investments would be required to satisfy the demand for oil." (November 2008)

The IEA ***"estimates that the average production-weighted observed decline rate worldwide is currently 6.7% pa for fields that have passed their production peak. In our Reference Case, this increases to 8.6% in 2030. The current figure is derived from our analysis of production at 800 fields, including all 54 super-giants (< 5 Gbbl) in production today". ..***

Exploration is now finding less and less every year, mostly in smaller and smaller fields. Dr Roger Bezdek, in his Australian presentations, including one at Parliament House said *"Economists are better at finding oil on paper than geologists are at finding it in the ground"*. In evidence to the Senate Inquiry into Australia's future oil supplies, then ABARE director, Dr Brian Fisher, used the old saying *"If the price of eggs is high enough, even the roosters will start to lay."*. Sadly, ABARE (and many economists) seem to know little more about petroleum geology than they do about avian reproduction biology.

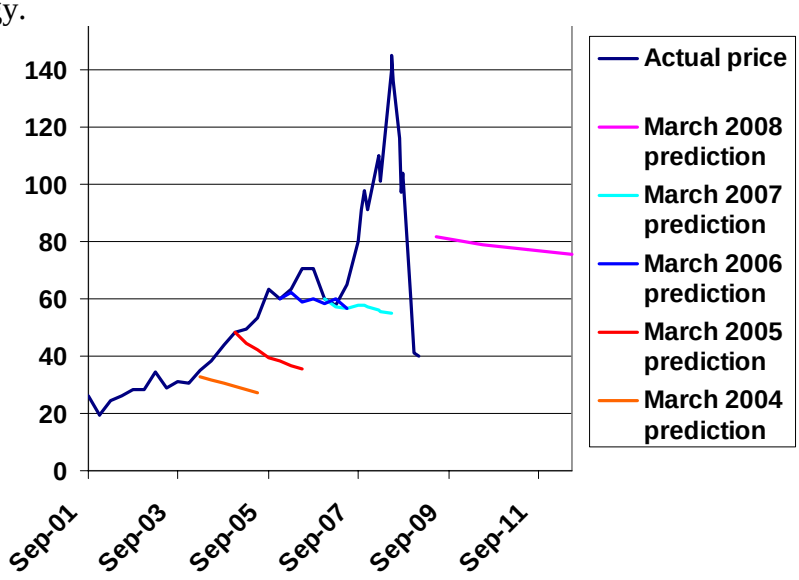

Fig. 1: ABARE's oil price forecasts have been consistently off the mark

We need to reduce sharply the oil vulnerability of our cities and rural areas. Investing in public transport and cycleways will prove much better in the long run than pouring our money into more roads only justified on the fallacy that there will always be more and more petrol available for more and more car travel. Superannuation funds and investors pouring money into toll-road tunnels are already finding that these investments are very very dubious (Bad Connections, SMH/The Age, (24/2/2009) http://business.theage.com.au/business/bad-connections-20090224-8ggl.html

These funds could be building public transport infrastructure and reducing our oil vulnerability, instead of increasing it (at the expense of the investors who are already losing money, and will lose much much more when oil shortages arrive).

There are innumerable options for Peak Oil mitigation and adaptation. Many are "*No-Regrets*" alternatives; things we should be doing now. Many need to be started 20 years before Peak Oil arrives. We all need to start planning and acting now, as a matter of urgency, both for sudden fuel shortages, say of 30% for 6 months and for the permanent shortages which will happen when Peak Oil arrives

Public transport planning must start with a vivid appreciation of the urgency of preparing for short-term and long-term oil shocks.

Appendix 1:

The Crash, Peak Oil and Resilient Cities

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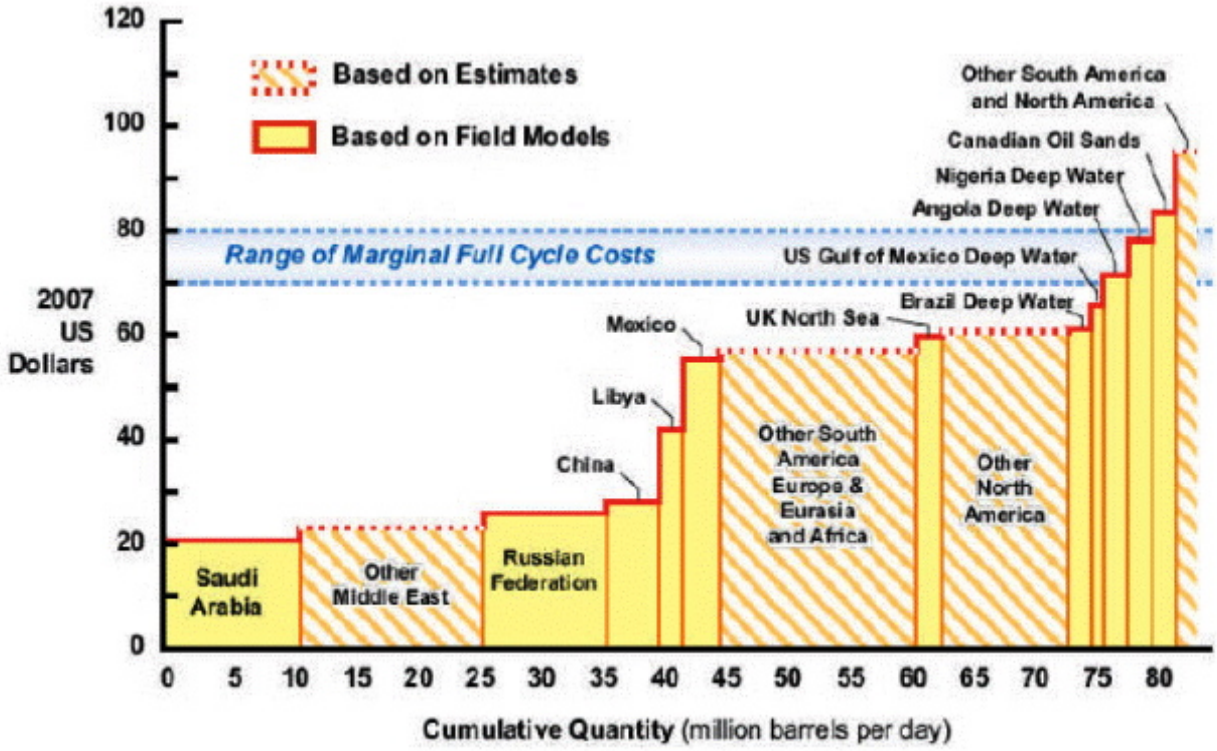
How did the crash happen? Over-inflating the economic balloon with debt that was vulnerable to rises in oil price. What do we do about it? Use non-oil-based projects and approaches to generate economic growth or else we are going to make things worse. In detail....

- Peak oil theorists have been squabbling about when the geological peak will happen but in economic terms it happened in 2005 when the production of conventional oil (cheap oil which can be produced under about $65/bbl) peaked. The five mega Major oil companies peaked in their oil production in 2005 and have gone down since.
- The price of oil was then based on the marginal production from unconventional oil (deep water, remote and dirty oil like shale).
- Oil rapidly increased in price from $40 to $140 between 2005 and July 2008.
- The first financial fall-out was the exposure of debt in sub-prime mortgages based primarily in highly car dependent urban areas. Tripling of fuel prices made it impossible to pay mortgages. Non-recourse financing meant that people in many vulnerable areas walked away from their homes without carrying the debt with them (can't do this in Australia).
- All global debt began to be pulled into the crash as the vulnerability to oil underlies just about everything. As Colin Campbell predicted in 2005:

  "...the banks lent more than they have based on confidence that the resulting expansion was sufficient collateral for today's debt. But unrecognised was that this expansion was not just money it was good old cheap energy... We face this monumental kind of weakness of our entire banking and financial sector." Peak Oil Newsletter 53, May 2005.
- Imploding debt spread around the world as the debt-based economic balloon began deflating. The assumption of cheap oil now lay in tatters and challenged the ability of any bank to be able to repay its debt.
- How far will this go? US debt alone is over $110 trillion (world annual GDP is $66 trillion)... which represents $386,000 per person. Even 30% of this being vulnerable would suggest that the crash could go a lot further.
- With the economic balloon deflating rapidly the oil price has dropped even more rapidly to less than $40 (in early December, 2008). What kind of price is going to result is now of much debate – see http://www.theoildrum.com/node/4846
- The oil price crash means that most higher price oil alternatives are now being dropped or moth-balled. The figure below shows that in production costs alone oil over $40 a barrel is much more likely than oil under $40 a barrel. The deep water and dirty oil (shale) options are all over $100 as are most biofuel projects without their subsidies.

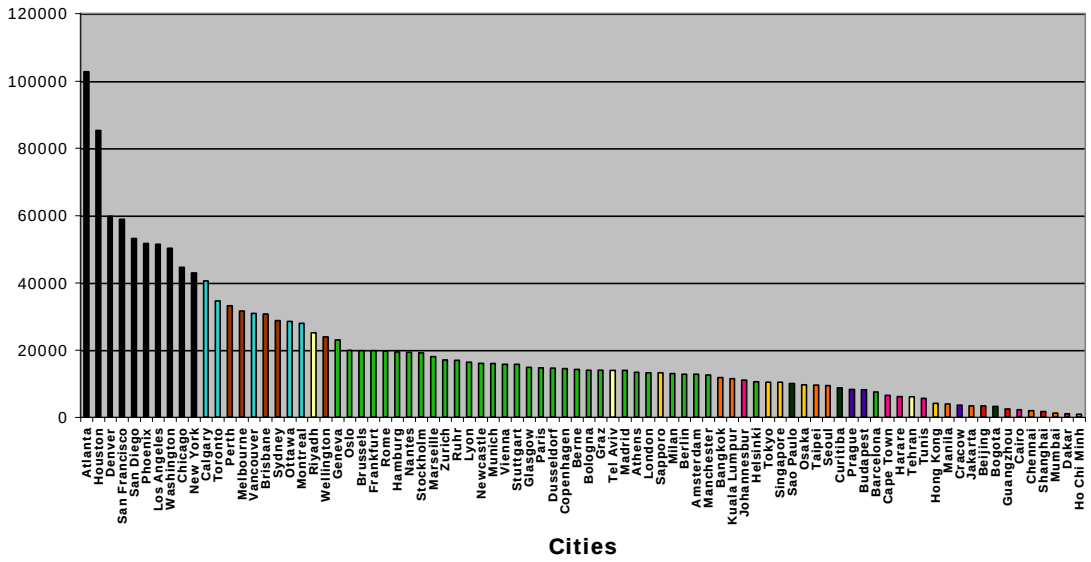


Source: CERA
http://www.horizonoil.com.au/Press%20Releases/2008/November/HZN%20Chairmans%20address%20and%20presentation.pdf

- The marginal cost of oil production is thus around the $70 to $80/bbl mark so the price could be expected to hover around there until demand pushes it into the more expensive options. As long as oil markets and financial markets return to something like a sane process.
- What is very clear is that **no further economic expansion can occur based around oil prices that are less than $40 a barrel** which was the assumption of most in the financial community until recently. Projects with debt based around that assumption remain vulnerable. This includes a swathe of suburban and peri urban developments as well as many toll road projects.
- A similar analysis can be made based around climate change. Lack of confidence in any fossil fuel-based growth has seeped into all financial markets since the work of Nicholas Stern and Ross Garnaut demonstrated the importance of early action over climate change. Climate change governance will now progressively push the price of carbon up, making suspect those projects already debt financed using assumptions of cheap carbon.
- The economy of cities everywhere are thus vulnerable to oil. However some cities are much more vulnerable than others as shown in the figure below based on data we collect on global cities.
  i. These data are for city regions in 1995 and include all the gasoline and diesel for private passenger travel.[i] They show:
- US cities dominate in their oil consumption and car use with a significant difference between Atlanta at 103 GJ/person, Houston 75 GJ/person and New York at 44GJ/person. (Note: 1 GJ of fuel equals 28.8 litres of gasoline equivalent or 7.8 gallons).
- Australian, Canadian and New Zealand cities follow this with 30 to 40 GJ/person.
- All European cities use less than 20 GJ/person and reach as low as 12 GJ/person in Helsinki and 8 GJ/person in Barcelona; Eastern European cities are even lower between 5 and 10 GJ/person with Cracow lowest at 2GJ/person.
- Wealthy Asian cities (Sapporo, Taipei, Tokyo, Osaka, Seoul, Hong Kong and Singapore) are also extremely low with 5 to 10 GJ/person.

- Cities in developing countries are scattered throughout this array but apart from Riyadh and Tel Aviv are less than 8 GJ/person and mostly are less than a few GJ/person.
- The developing cities to the right of the graph (Jakarta, Beijing, Bogota, Guangzhou, Cairo, Chennai, Shanghai, Mumbai, Dakar and Ho Chi Minh City) are hardly measurable on the same scale as those to the left of the graph.

Private Passenger Transport Energy Use per Person, 1995



- Vulnerable cities such as those in North America and Australia need to respond to the crash in much more dramatic ways than those cities where gasoline and diesel are only a small part of their economies.
- All attempts at expansion of their economies based on further use of oil will cause serious impacts on their future ability to adapt. This particularly applies to new high capacity road systems.
- **How can oil-vulnerable cities create an economy that reduces their oil use and creates a more resilient future?** In our new book 'Resilient Cities: Responding to Peak Oil and Climate Change' (Newman, Beatley and Boyer, Island Press) we set out a range of technological, land use and governance options based on experience of where these are beginning to be demonstrated. Simply put....
- **Electrified transit.** This means high capacity electric Metros and Suburban Rail (heavy rail) with their associated dense centres or Transit Oriented Developments. It also means plug-in electric buses (already quite common in some cities) and electric light rail with their associated local corridors of denser linear development.
- **Electrified vehicles.** This means plug-in electric vehicles (and plug-in hybrids) which together with a range of smaller electric vehicles like scooters, gophers and golf carts, are associated with more dispersed land uses. The key value in these plug-in vehicles is that they enable renewable energy to be 100% of a city's grid through providing a storage mechanism (they are likely therefore to be part of the transport systems in denser parts of the city as well, though supplementary). We call this **Renewable Transport**. See www.sustainability.curtin.edu.au/publications.
- Electrified rail and the associated denser land uses will be cheaper and more resilient than the road-based dispersed kind of development as we have shown in a number of

publications, including a recent assessment of the costs of urban development for Parsons Brinckerhoff (www.sustainability.curtin.edu.au/publications). However most cities have a combination of these land use types and although dispersed land uses will be more vulnerable they cannot be abandoned - some extremely dispersed parts of cities may need to be.

- Ruralising cities based around local food production is unlikely to occur as cities will still need to be cities providing a range of opportunities not available in rural areas. However cities can incorporate greater local food production as in Cuba though they will remain primarily urban and not rural in function. Ruralised land uses in peri urban areas that are highly car dependent are likely to die first.
- Plans to rebuild local economies will need to factor in how to reduce car use and create more walkable and bikeable local areas. Green buildings and green industries will not create green cities unless they are based around electric renewable transport or non motorised transport.
- It is time to refill the economic balloon based around these innovations, not try to reinflate the old oil-based urban development paradigm.

1 Data are from Kenworthy J and Laube F (2001) The Millennium Cities Database for Sustainable Transport., UITP, Brussels, which was a study of 100 cities (16 were incomplete) and 27 parameters using highly controlled processes to ensure comparability of data. See also Kenworthy J., Laube F., Newman P., Barter P., Raad T., Poboon C. and Guia B. (1999). An International Sourcebook of Automobile Dependence in Cities, 1960-1990. Boulder: University Press of Colorado.

Appendix 2

Peak Oil and Australia; Probable impacts and possible options

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(Invited paper presented at the International Conference held by the Japanese Society of Exploration Geophysicists, Kyoto, November 2006)

ABSTRACT

Peak Oil is when the rate of global oil production starts its final decline, from the current trends of increasing yearly production.. A growing number of estimates of the date of Peak Oil cluster around 2010-2015 (ASPO-Australia, 2006). The impact of Peak Oil on Australia is likely to be very severe, unless substantial mitigation and adaptation policies are implemented urgently. Many available options will have significant social and economic benefits as well as reducing oil dependence. Peak Oil countermeasures can be simultaneously both mitigation and adaptation strategies, unlike most climate change options which are normally either one or the other. The likelihood of significant Government action before an oil depletion crisis, however, is currently very low.

Hirsch et al., 2005, outlined for the US DOE the requirements to start countermeasures 20 years before the peak of global oil production. This is in line with the Noah analogy presented at the first ASPO workshop (Bakhtiari, 2002). It is best to finish building the ark before the flood. Western Australia's Minister for Planning and Infrastructure, Hon. Alannah MacTiernan, said in 2004 *"It is also certain that the cost of preparing too early is nowhere near the cost of not being ready on time."*

Australians are largely urbanised with 66% of the population living in sprawling cities along the south and east coast. The rural and remote parts of the country are very sparsely populated, and are highly dependent on oil for transport. The countermeasures suggested here for Australia could be applicable in many other countries, both those with largely urbanised populations and those with large land areas and long transport distances.

KEY WORDS: Peak Oil, impact, mitigation, adaptation, tradeable gasoline rights.

AUSTRALIA'S OIL PRODUCTION

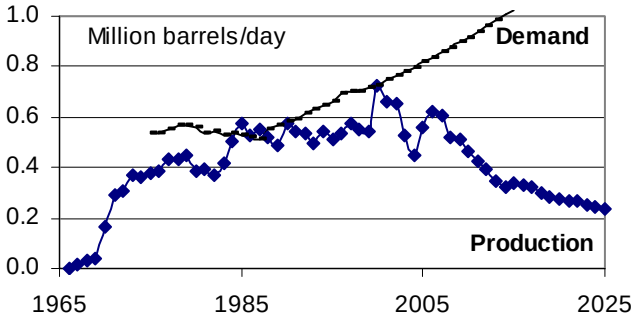

Figure 1. Australian crude oil and condensate production and demand ,and forecasts [Geoscience Australia, 2006].

Australia's domestic oil and condensate production became significant in 1967, reached a peak in 2000, and is now into a clear post-peak decline phase.

OIL CONSUMPTION AND TRANSPORT

Australia has 20 million people and there are 13.2 million motor vehicles, each travelling on average 15,300 kilometres annually. Petrol taxes are the lowest in the OECD outside North America. About 75% of Australia's petroleum liquids use is in transport, mostly in road transport (60%) and aviation (10%).

Australia uses about 0.80 million barrels of oil products each day, just over half as much oil per capita as does the United States. Australia is still about 50% net self-sufficient in oil, but our imports are currently about 85% of daily usage, and balanced by high exports. This high import dependence makes us vulnerable to short-term international supply shortages, particularly as Australia does not maintain a strategic petroleum reserve.

Recent Government reports summarised Australia's petroleum use. The Energy White Paper (2004) is not forthright about declining future domestic oil supplies and completely avoids mention of global oil depletion. It may come to be regarded as a significant "intelligence failure". The 2004 review of the Liquid Fuel Emergency Act concentrates on short to medium term supply disruptions and our responsibilities under IEA agreements. The Australian Senate has been inquiring into Australia's future oil supplies and alternative fuels; ASPO-Australia and its working groups have made about a dozen separate submissions (ASPO-Australia, 2006). Our main recommendations were for behavioural programmes to reduce our oil vulnerability rather than the technological and alternative fuel options normally proposed . An interim report has been released and the final Senate report is due in late November 2006.

Australia is extremely "automobile-dependent" (Newman and Kenworthy, 1999) . Our cities and transport-intensive economy have been shaped by cheap and abundant oil. There are innumerable policies which heavily subsidise car use, the domestic car industry and road freight, and which penalise users of more sustainable transport modes. Subsidised freight transport centralises production at the expense of local industries. Some of these "perverse policies" are outlined by Denniss (2003). . Even our supermarkets offer petrol discounts so that those without cars are forced to subsidise heavy fuel users through increased food prices.

A system which is optimised to do one thing really well is not a resilient system. Our transport and planning systems are optimised for road transport at the expense of other modes that are not oil dependent or that are more oil efficient. This increases our vulnerability to oil shocks as it limits the options for switching at least some of the transport task to other transport modes. A more diverse transport and urban infrastructure is inherently more resilient, not only to oil shocks but to other problems which may arise.

Dodson and Sipe, 2006, provided maps of an oil vulnerability index in Australian cities (see Fig. 3). This shows that low-income people living in outer suburbs will be very hard hit by rising fuel prices and the probable inflation and interest-rate rises which are likely to follow. Those in well-off suburbs mostly have shorter travel distances, more public transport options and as well more financial flexibility. Many services, like hospitals, are also available much closer in the inner suburbs

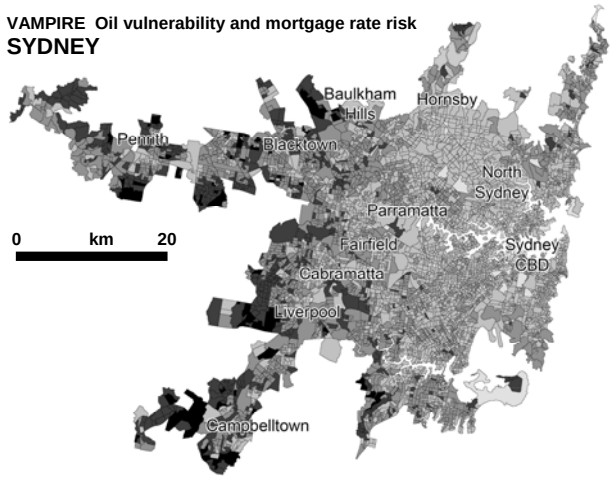

Figure 3. Oil vulnerability and mortgage rate risk index for Sydney (Dodson and Sipe, 2006)

Australia is a dry continent and its soils are generally nutrient deficient. Climate change already appears to be reducing rainfall significantly in southwest and eastern Australia leading to major problems for both agriculture and cities. Agriculture in Australia is dependent on increasing fertiliser inputs, mechanised farming and long distance transport. It is following overseas trends becoming a way of using land to convert petroleum into food. Encouraged by cheap oil and fertiliser, these practices have depopulated many rural communities. Australian farmers will be faced with re-inventing their industry including returning to using natural nitrogen fixation with legumes and returning to less chemical-intensive methods for weed and pest management.

MITIGATION AND ADAPTATION OPTIONS

Post-Peak Options

A simplified diagrammatic scenario, Fig. 2, shows how the growing gulf between current oil demand trends and forecast supply might be accommodated (Robinson and Powrie, 2004). It is important to realise that there can be no single panacea, but there will be many partial solutions. Some options could be implemented quickly (for example tax changes and rationing), but many will require a very long time and much capital investment.

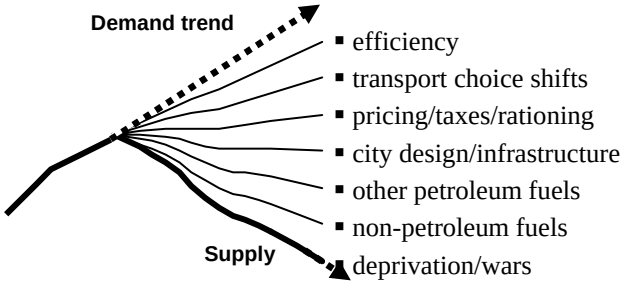

Figure.2. Post-Peak scenarios, bridging the gulf between demand trend and forecast supply .

Some unusual strategies used successfully in Perth are included here as examples of what could be achieved to reduce oil consumption.

Public discussion and debate

Australian Governments at all levels have been reluctant even to mention the taboo topic of our oil vulnerability. The Western Australian Government leads marginally, with oil vulnerability discussed in its 2003 State Sustainability Strategy and its Cabinet briefed by Dr Samsam Bakhtiari in 2004. However, even in WA there has been little done to discuss publicly the risks of oil depletion. USGS geologist Les Magoon (2000) suggests correctly that the first thing to do is to "*Talk about it, talk about it. You can't solve a problem until you know you have one.*"

A substantial Government communication programme is needed to make the community aware of approaching oil depletion and its impacts before action can be implemented to reduce our oil vulnerability. Participatory democracy strategies like public forums will be essential to engage the community. These can empower people and businesses to work for the greater common good and find equitable ways to make the difficult changes needed. Such forums are being successfully used in Western Australia to help solve complex issues in transport and planning, MacTiernan (2005).

> *"Community engagement is critical in the successful development of acceptable policies and decisions in government, the private sector and the community. We know it can be done much better. In Western Australia we have taken a leading role in exploring innovations in community engagement, with 21st Century Town Meetings (Dialogues), Deliberative Surveys, Citizens' Juries, Multi Criteria Analysis Conferences and Consensus Forums".*

These techniques will be essential tools in changing

attitudes to our oil vulnerability, and expanding the range of options in urban planning, transport usage choices and in community accessibility and mobility.

Once the community is aware of the risks of oil vulnerability, governments must lead with policies and countermeasures to minimise future impacts, providing the framework for crucial individual, community and corporate initiatives. Then stakeholders can actively consider possible oil shortages when buying a house or a car, starting or expanding a business or restructuring neighbourhoods.

Rational Pricing Structure: The Water Analogy

Water has long been recognised as scarce in many parts of Australia. Severe droughts, perhaps resulting from Climate Change have recently affected most Australian cities.

Perth, like other cities, has a rational pricing structure for household water use. A basic household water allowance is relatively cheap, and increasing consumption above that is on a sliding scale where the higher the water use, the more the cost per kilolitre. Watering gardens with sprinklers is also restricted to two days per week in the morning or evening. These sensible water conservation measures are now well accepted by the community.

Similarly, when the community fully understands the risks of Peak Oil and its possible impacts, an analogous incremental fuel pricing system and usage restrictions would also be accepted, as was fuel rationing during and after World War II. Tradeable Gasoline Rights as also suggested in June 2006 by Harvard economist, Martin Feldstein offer one option for a more equitable and efficient way of reducing fuel consumption (see Appendix I)

Individualised Marketing Demand Management

A significant proportion of Perth has seen successful cheap travel demand management (TDM) implemented, reducing car-kilometres by 13% on average. These Individualised Marketing programmes, (within a broader TravelSmart framework) are being used in other Australian cities and around the world with benefit-cost ratios of 30:1(see Appendix II for details)

Empowering individuals to change oil-intensive travel habits is a *"no-regrets"* option, already justified on health, social and economic grounds. Globally, TDM could save at least 5-10% of transport oil consumption.

Government Policy and Action Possibilities

A list of some possible actions is provided to show the wide range of options available to ameliorate the impacts of oil depletion, often while enhancing long-term community wellbeing and sustainability

Governments should :-

1: Issue repeated credible warnings that oil shortages are approaching us and advise the community openly of the various estimates of the timing and the probable impacts of peak oil.

2. Engage the community, through participatory democracy, to create practical, equitable options and countermeasures, and to select preferred steps. Many perceived "options" like the so-called "hydrogen economy" are most unlikely to be realistic until long after oil shortages impact and should be identified as such.

3. Dismantle the many "perverse polices" that subsidise heavy car use and excessive freight transport. Examine all subsidies, taxes and charges to weed out those that encourage car-dependency.

4. Instigate policies, taxes and pricing regimes that encourage frugal use of fuel, and disadvantage profligate users. A fuel tax escalator such as that introduced by the UK Thatcher Government in 1988 is a proven example. Australian fuel taxes should be incrementally raised to European levels to reduce usage. This would also provide funds for instance for general expenditure on police and security, income tax cuts, health and education as well as for the needed sustainable transport infrastructure.

5: One novel policy would be to set up a Smartcard personal fuel allocation system. This would provide a modern adaptable mechanism for handling short-term oil shocks, similar to those of 1973 and 1979 and as well for encouraging people to reduce their fuel usage. Each person would receive an allocation of an amount of fuel sufficient for modest car travel at a base price. Increasing amounts of fuel would be available at an increasing tax-rate per litre. In addition, those who are able to avoid using their entire allocation would be encouraged to trade the unused rights on an open electronic market.

6. Recognise the psychological and social dimensions of automobile dependence as well as the physical aspects, and implement the cheaper people-oriented solutions as well as technologically based alternatives. Focus on the social benefits of reduced transport use.

7. Implement nationwide "individualised marketing" travel demand management campaigns for both urban and rural regions.

8. Divert infrastructure funding to less oil-dependent urban structure and transport options. Rail, cyclepaths and public transport will be far better investments than more urban roads and airports.

9. Priority access to remaining oil and gas supplies must be provided for food production and distribution and other essential services. People working in priority jobs

where public transport is impractical, like night-shifts at hospitals, and crucial infrastructure roles should receive special consideration.

Remote indigenous communities will have special needs. Practical, flexible priority fuel allocation mechanisms can utilise the electronic Smartcard system.

10. Review the oil vulnerability of every industry and community sector and how each may reduce their risks and recognise opportunities arising from Peak Oil. Offices of Oil Vulnerability should be set up at all levels of government to provide expertise and to assist in oil vulnerability risk assessment and risk management in organisations and regions. ASPO-Australia is developing strategies for evaluating these risks and opportunities (Robinson, 2006).

11. Promote through the United Nations a Kyoto-like protocol to allocate equitably the declining global oil production among nations. For instance, an international tradeable sliding scale allocation mechanism is one hypothetical option towards which we could aim. Every nation would ideally be entitled to a base per-capita amount of oil at a modest cost. Increasing amounts per capita would be available at increasingly higher costs to encourage conservation. Nations which use less than their base allowance can trade the excess to their more profligate or wealthy neighbours. This provides a significant incentive for demand reduction and conservation everywhere. This is an international equivalent of our suggested Smartcard tradeable gasoline rights system . Global oil allocation procedures are at present based solely on price, so rich nations get the bulk of the oil and the poor countries get very little. Another undesirable but quite possible future allocation mechanism is the real threat of resource wars over the remaining oil.

CONCLUSION

Many of the policy options to reduce fuel usage and the impact of oil depletion on Australia will also lead to healthier, happier and more equitable communities and improve local and global pollution levels. Failure to take action now will lead to severe future economic and social impacts on Australia. Similar broad choices will face most nations in various forms, so there is a lot to be gained from international collaboration.

Priorities for facing Peak Oil wisely should be:-
1: Community awareness and engagement (highest priority),
2: Frugality,
3: Efficiency and
4: Alternative fuel options (lowest priority).

ACKNOWLEDGEMENTS

The authors thank Helen Grey-Smith of Socialdata Australia for assistance and for data from individualised marketing programmes, and also Colin Ashton-Graham of the WA Department for Planning and Infrastructure. They also thank James Ward and Phil Hart of ASPO-Australia for their on-going assistance

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APPENDIX I
Smartcard Sliding-Scale Fuel Pricing and Tradeable Allocation Mechanisms

Increasingly high fuel prices (either from taxation or from global markets) will have very serious economic and social impacts on many in Australia, however loud and long the advance warnings may have been.

A flexible equitable and transparent mechanism for allocating increasingly scarce fuel will be essential to avoid a market forces crisis where only the wealthy can afford fuel.

A mechanism will also be needed for equitable allocation of fuel for essential services, like "Meals on Wheels" and similar support services to elderly and disabled people still in their own homes, essential staff working night-shifts at major hospitals, Flying Doctor and other health services, food production and distribution, and so on. Allocations to lower priority areas, like essential trades for emergency repairs, will also need to be made. In the event of shortages, non-productive and counter-productive fuel uses should receive very low priority.

"Smartcard" technology, using existing petrol station credit-card hardware systems, could provide a technologically practical mechanism of adopting the sliding scale pricing system now used for other essential commodities, especially water.

Designs of a multi-level tradeable rights rationing system should be developed and evaluated. The system should aim to provide every person with a basic personal allowance of fuel, for a relatively modest price (e.g. the normal or pre-emergency price), and successive increments of allocated fuel at increasing taxation levels. Allowance can be made so those living in country towns or areas poorly served by public transport receive a larger base allowance than those living in a fashionable inner-city suburb close to a train station, for instance.

Prof Martin Feldstein is a conservative economist from Harvard University, who was Ronald Reagan's chief economic adviser. He recommended Tradeable Gasoline

Rights on purely economic grounds (Feldstein 2006).

> *"In short, a system of tradeable gasoline rights would be better than either higher taxes or tougher new car regulations. That a majority of households could benefit from the TGR system while all households would have an increased incentive to economize on gasoline is both an economic and a political advantage. It would be an efficient way to reduce gasoline usage that Congress could actually pass."*

APPENDIX II

Travel Demand Reduction with Individualised Marketing

There is a simple, fast and cost-effective way to reduce the demand for personal car trips and hence fuel usage, without placing restrictions on people's mobility or their lifestyle. Voluntary travel behaviour change programmes activate large potentials for mode change, often on the same scale as transport system measures. These programmes can be implemented on a large scale within six months.

In the 1980s, the German firm Socialdata, first introduced Individualised Marketing (IndiMark®) in Europe to promote the use of public transport as an alternative to everyday car trips. This programme has now extended to include all transport alternatives such as cycling and walking, and has now reached nearly two million people in Australia, the United States, Canada and the United Kingdom (see Fig. 4). In the northern suburbs of Brisbane (Australia), the world's largest, single project is currently reaching nearly 190,000 people in a period of seven months.

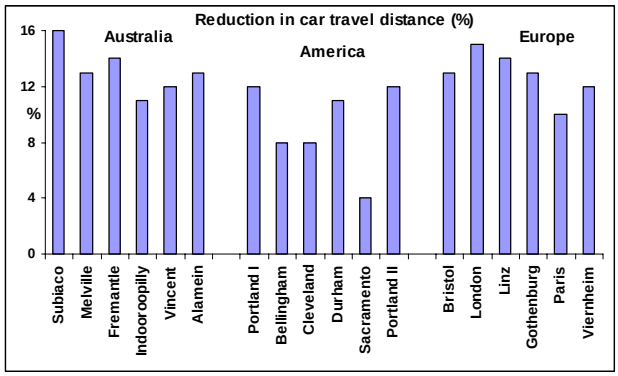


Figure 4. Car travel reduction from Individualised Marketing programmes in cities on three continents.

IndiMark® dialogues with individual households over a number of stages to inform and motivate people about public transport, walking and cycling options in their local area. People can then consider and review their travel behaviour in their own lifestyle context. Those who are interested in changing are supported and encouraged, but the choice is always left to the individual.

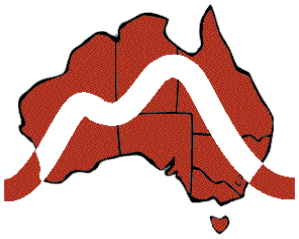
In Western Australia, where Individualised Marketing was first implemented in the TravelSmart Households programme, there has been a saving of around 140 million car kilometres per annum in projects undertaken so far, involving about 250,000 people. In round figures, this represents a saving of some 14 million litres of petrol each year.

Relative reductions of vehicle kilometres travelled by private car use are in the range of 7 to 17 %.

These results have been achieved by many people making small changes.

Key Principles of Individualised Marketing

- Individualised Marketing achieves results within the existing infrastructure and level of services. Everyone makes car trips that cannot be switched to an alternative mode, but most *could* change some journeys using existing transport infrastructure or services.
- Many people are 'locked into' high levels of car use because of inadequate information on the alternatives available, or knowledge of how to use them.
- People are more likely to change their travel behaviour if they receive personalised, local and up-to-date information on request rather than having to find and filter information from a range of sources.
- Direct contact is essential to motivate people to think more effectively about their daily travel and to identify their individual needs for information and support.
- Individuals receive ongoing practical support and encouragement in multiple contacts over a period of time instead of a "one off" event.
- The project emphasises the positive benefits to reducing car use. Based on positive approach rather than imposing solutions on people; shows benefits for individuals, society, environment, economics and health.
- Misperceptions about public transport, walking and cycling are best tackled by personal experience in using these modes, resulting in more positive attitudes.
- A significant reduction in overall car kilometres travelled can be achieved through relatively small changes in personal travel behaviour (rather than lifestyle changes).
- Changes occur in off-peak, as well as in peak periods.
- A direct, non-commercial dialogue is more effective in building a relationship of impartiality and mutual trust.
- It fosters partnerships/intersectoral support. For example: bus companies, small businesses, councils, government and local businesses.



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Main Submission

Senate inquiry into Australia's future oil supplies March 2006

ASPO-Australia is a national body dedicated to the study of the impacts of Peak Oil on Australia and to the necessary risk assessment and risk management of our oil vulnerability. It is a nationwide network of people with a professional interest in the impacts of Peak Oil, and in options for mitigation and adaptation, in a wide variety of fields. Our working-group structure (Appendix 1) is intended to allow professionals to focus on specific parts of the overall impact scenarios, and to make use of their relevant expertise in these areas.

There is a high probability of global Peak Oil occurring soon, before 2010 or 2015.

Peak Oil is one term for the inevitable change from the current rising trend of world oil production to the final decline trend as oil fields age.

The flow-on economic and social impacts in Australia from Peak Oil are likely to be very serious, UNLESS we make serious and courageous decisions to take the obvious sensible precautions very soon.

ASPO-Australia recommends four main options which together are capable of halving Australia's transport fuel usage. All are behavioural options. These four would then lead to a plethora of important but relatively minor changes, including technological options, which in total can make the substantial reductions in demand that we will require before Peak Oil strikes. All are aimed at minimising our automobile dependence. They are:

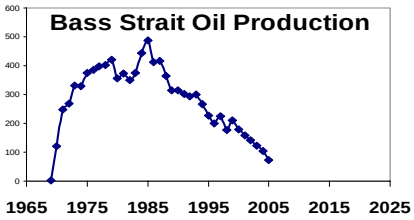
Community engagement: empowering people to understand the Peak Oil concept and to help decide the best options for us all before we face future oil shortages.

Individualised marketing: a proven, rapid and low cost strategy, offering individual households the information needed to consider options of reducing automobile travel. 13% reduction in car-kms has been achieved in large programs in Australia. It can also be used as well for minimisation of demand for water and electricity and perhaps to be adapted to alert people to Peak Oil probabilities and risks.

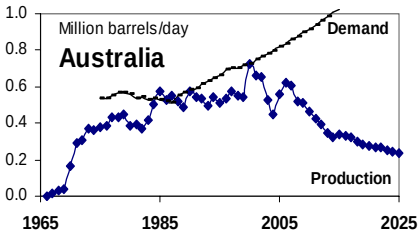
Fuel Tax Escalator: Increasing fuel taxes smoothly and incrementally to UK levels (following Margaret Thatcher's 1988 example) would provide a clear signal that we must value fuel much more than we do now. "Unthinkable" measures such as this are essential given the magnitude of the near term risks posed by Peak Oil. Fuel tax increases would provide funds for schools, hospitals, and for sustainable transport infrastructure. The impacts could, for instance, be ameliorated by abolishing fixed vehicle-ownership charges (licence and third party charges) and by lowering income taxes.

Smartcard flexible tradable fuel allocation and pricing mechanism: Providing a basic safety-net ration for modest usage, and extra fuel at an increasing taxation rate for those who want to use more than average. Unused allocations can be traded to reward those with ingenious ways of reducing fuel usage.

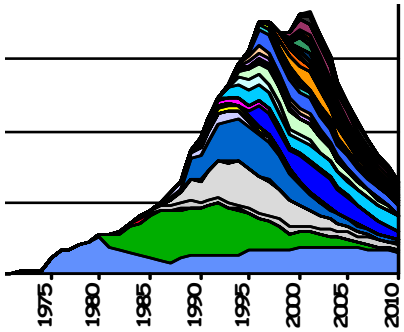
Australian and global oil production forecasts



Australia's Bass Strait province started production in 1970, reached its peak in 1985 and has declined steadily ever since. This is typical of trends in all oilfields, and eventually of global oil production.



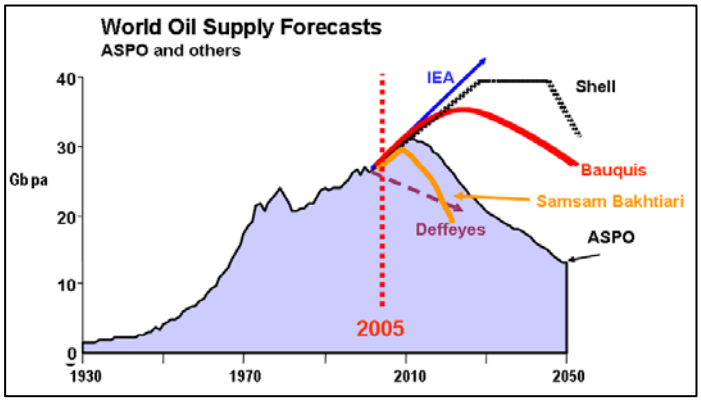
Australia's overall oil production peaked in 2000 and is declining. Geoscience Australia's 50% probability forecasts (in the graph in the right) show a continual steep decline, while our consumption trend is steeply upwards . The probability of new Australian discoveries even meeting our past peak production is very low indeed.



North Sea oil province production, for instance, peaked in 1999 (UK), and 2001 (Norway) and has been falling sharply since. The Norwegian field-by-field graph (right) shows that big fields are found first. As they finally decline, smaller fields replace them. When the decline rate of existing the bigger fields exceeds the rate of replacement with ever smaller fields overall production drops irreversibly. This will also happen globally.

Excluding deepwater oilfields, output from 54 of the 65 largest oil-producing countries in the world is in decline. Global oil production is still rising. However, there are no reliable audited reserve and field by field production data available globally. This means it is not possible for more than uncertain probabilistic estimates to be made of when global production will begin its decline. Serious questions, about the veracity of the official Saudi reserve figures for instance, make the uncertainties higher than many assume.

There are many forecasts of the date of Peak Oil. A straw poll conducted by Eric Streitberg, (ARC Energy managing director) during a key-note speech at Australia's premium oil industry conference, APPEA, in 2005 showed that about a third of the oil professionals in the audience agreed that Peak Oil was here, or very close, about a third disagreed, and another third were undecided. This is very different from the extreme confidence shown in many government and financial circles.



We can express the chances as rough probabilities:-

Peak Oil timing probability estimates

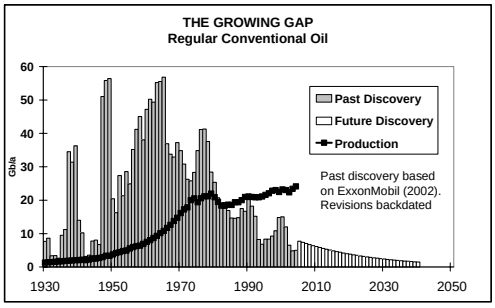
before 2008	**10%**
before the end of the next Federal parliamentary term	**30%**
before 2010 to 2015	**50%**
after 2020	**10%**

Price Scenarios

When global peak oil occurs, oil shortages, many-fold price rises and possible international and national oil rationing are all plausible scenarios which should be considered seriously in any planning for the future.

Future oil discoveries and new sources of oil

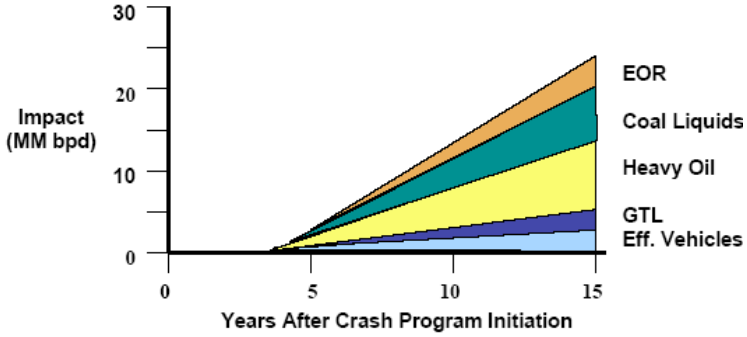
The annual volume of oil discovered globally has been falling steadily since the 1960s (see the graph from Dr Campbell's submission). Australia is also showing declining discovery rates. The probability that these long-established trends will reverse is very low. The yet-to-be discovered oil fields are most unlikely to be able to do more than make the post-peak decline curve less steep.



Alternative transport fuels

The recent study for US DOE (Hirsch et al, 2005) (graph below) shows that even with (unlikely) massive crash programs, there will be lead times of decades needed before synthetic crude oil, from coal, or gas or tar-sands can be produced in volumes sufficient to make a serious impact on declining conventional oil production. These measures need to have been started 20 years before the peak to avoid serious shortfalls.

Physical limits, especially dwindling natural gas supplies, are very likely to limit Canadian tar-sand syncrude production below Hirsch's estimates (Aleklett, 2006)



Biofuels: Increasing the production of biofuels also has similar physical limits (for instance the lack availability of arable land not devoted to food and the environmental limits of clearing tropical forests for palm oil plantations). More detail is provided in the ASPO-Australia biofuels working group submission.

Hydrogen: Hydrogen gas is an energy carrier, not an energy source, and it requires a very large energy input for its manufacture. The most common route for hydrogen production is from natural gas (methane) to provide both the hydrogen atoms and the energy for its production. *"The Hype about Hydrogen"* (Joseph Romm, 2004, Island Press) is an objective summary by a former US DOE program manager. The likelihood of the hydrogen economy playing any role in delaying peak oil is very low indeed, <1%. Hirsch omitted hydrogen as a technology which might counteract oil production decline, as fuel cells are not currently available in mass-production. A University of Warwick study estimated Britain would need 100 nuclear power plants for electricity to make hydrogen to replace its existing transport fuel use. This is a magnitude of investment and timeframe that puts glib statements about hydrogen for transport into perspective. The UK uses 2.5 times as much oil as Australia does, so we would need some 40 nuclear plants to make the hydrogen for our transport from electricity. Hydrogen is not a practical transport fuel and certainly not panacea. It is increasingly unlikely that hydrogen will be used for transport in any significant way, especially if battery and light vehicle technology continue to improve substantially. We can predict that far more people-kms will continue to be travelled in Australia by bicycle than by hydrogen vehicle for the foreseeable future.

Natural gas: For Australia, natural gas is the most obvious alternative fuel for transport purposes. Already a proportion of the urban bus fleet runs on natural gas in diesel engines. However, Australia only has some 1.4% of the world's known reserves of natural gas, and our gas extraction rate is growing rapidly. Our natural gas reserves will be depleted relatively quickly, leaving very little for future generations. Our gas is not a "Magic Pudding" that can be consumed continually

while it miraculously regenerates itself. However, many assume that Australia's natural gas can cater for all of the planned and predicted demands such as

- electricity generation
- large-scale LNG export
- replacing oil as a transport fuel,
- manufacture of urea fertiliser and
- for other industrial and domestic uses

It is not physically possible to use our limited natural gas resources for long periods for all these options simultaneously, while at the same time leaving a legacy for future generations. Certainly, history is likely to view the large-scale export of our natural gas at very low prices as a critical national mistake. We could use the gas for our transport needs for the next 50 years (at current usage rates), but only if we halted exports and stopped generating electricity from natural gas.

The flow-on economic and social impacts in Australia

The flow-on economic and social impacts in Australia from Peak Oil are likely to be very serious, **unless** we make serious and courageous decisions to take the obvious sensible precautions very soon.

ASPO-Australia knows of a number of hopeful scenarios; where impacts are predicted and minimised, opportunities grasped and the oil vulnerability of different industry and community sectors is assessed; while mitigation and adaptation strategies are implemented in time and the necessary adjustments and safety nets are provided equitably to minimise adverse consequences.

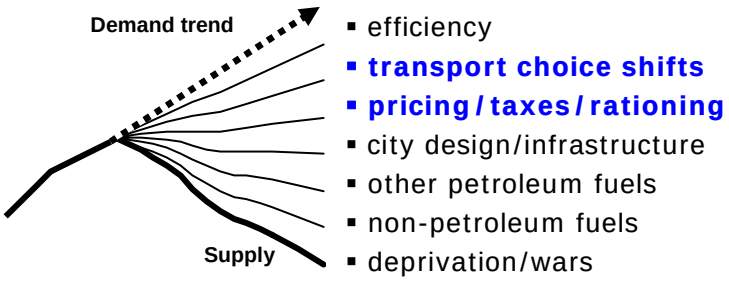
These positive scenarios will require an informed and engaged community, and thoughtful and forward-looking decision-makers and community leaders. We outline below recognised strategies which could help these necessary conditions arise.

The probability of the positive scenarios coming to pass is low on current trends, but the Australian community can rise to the occasion and we do have the power to reduce both the probabilities and the magnitudes of the negative aspects of Peak Oil and to take advantage of the many opportunities which will arise in the Peak Oil future.

There are many relatively recent examples of substantial positive changes in community attitudes and behaviour to unhealthy and inequitable past practices. These include smoking in the workplace, drink driving, attitudes to gender and racial equity, and to many environmental matters. There is a high probability that the community would change its attitudes to fuel usage and its behaviour if people understand the serious risks and costs involved in continuing our current trends.

Options for reducing Australia's transport fuel demands

There are many options for reducing substantially our transport fuel usage. The probability of a smooth demand reduction trend is low, but it is well within the control of the Australian community. This is in sharp contrast with the supply side of the equation, which is almost entirely dominated by global and geological factors completely outside Australia's control.



This scenario illustrates that there will be no "magic bullet" to replace cheap abundant oil. Many measures together can help bridge the growing gap between current demand trends and forecast supply decline. Many attractive options (like more efficient cars) are inevitably slow to take effect and not particularly significant overall. We concentrate on the two areas highlighted, which can be the fastest acting of available options.

President Bush recently acknowledged *"..we have a serious problem: America is addicted to oil, which is often imported from unstable parts of the world"*. ASPO-Australia agrees with the President about the US and recognises Australia is almost as addicted to oil and automobiles as the US. Australia uses a total of over 6 litres of oil per person per day, while the US uses10 litres/person/day. Energy dependence is discussed from a psychiatric viewpoint by Spencer, 1990 in Appendix 2.

However, we strongly disagree with President Bush that the main hope is in technology. We are certain that our major chance lies in a sea-change in community recognition of the probability and the magnitude of Peak Oil, and subsequently in attitudes and policies after the risks of Peak Oil become widely accepted.

Certainly technology will play a part, but it will be far too slow, and relatively insignificant in magnitude to be effective in meeting the challenges of an early Peak Oil (as outlined in the Hirsch report to the US DOE). Even if crash programs are funded, they need to be started 10-20 years before peak. The chance of such crash programs being underway well before Peak Oil is quite low, as are the chances of them being able to halt the decline in supply after peak oil.

ASPO-Australia is also very sceptical of the other panacea often suggested; the power of the market. "Demand destruction" is a US term indicating the raw power of market forces. A recent news article was entitled *"Demand Destruction: But who will be destroyed?"* This illustrates the risks and inequity of relying on fuel usage reduction by market forces alone. [See the ASPO-Australia Social Services Sector working group submission for some of the probable problems if the market is the final arbiter]

In summary, ASPO-Australia recommends four main options which together are capable of halving Australia's transport fuel usage. All are behavioural options. These four could then lead to a plethora of important but relatively minor changes, including technological options, which in total can make the substantial reductions in demand that we will need to have achieved when Peak Oil strikes. All are aimed at minimising our automobile dependence (or "addiction" to use President Bush's term). They are:

- **Community engagement**
- **Individualised marketing**
- **Fuel tax escalator**
- **Smartcard flexible tradable fuel allocation and pricing mechanism**

1: Community engagement:
It is crucial that Australians comprehend the probabilities and risks of Peak Oil and that we are empowered to suggest, consider and evaluate all possible options. Experience in WA shows a number of successful examples where community engagement can lead to solutions to substantial transport and planning problems being both found and accepted. The necessary tough political decisions can not be made without an informed and supportive community.

> *Community engagement is critical in the successful development of acceptable policies and decisions in government, the private sector and the community. We know it can be done much better. In Western Australia we have taken a leading role in exploring innovations in community engagement, with 21st Century Town Meetings (Dialogues), Deliberative Surveys, Citizens' Juries, Multi Criteria Analysis Conferences and Consensus Forums.*

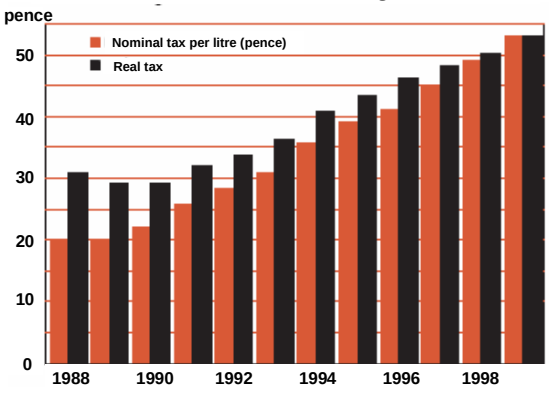
Details are available on the website of the WA Department of Planning and Infrastructure at
http://www.dpi.wa.gov.au/communityengagement/727.asp
http://www.dpi.wa.gov.au/cityplanning/1208.asp
These techniques will be essential tools in changing attitudes to our oil vulnerability, and expanding the range of options in urban planning, transport usage choices and in community accessibility and mobility.

Without very substantial changes to reduce our oil usage, we are at very considerable risk. Attitudinal changes are a vital precursor before decision-makers can change policies to implement oil vulnerability risk management strategies, many of which are contrary to current community views (based as they are on the myths of cheap and unlimited resources continuing well into the future)

2: Individualised marketing
Empowering people to make informed transport mode and trip choices has been proven to make substantial sustained reductions (10-13%) in car-kms driven, in large-scale programmes in Perth, Melbourne and Redlands (outer Brisbane). (Robinson, 2004, Socialdata 2004 and http://www.dpi.wa.gov.au/travelsmart/1637.asp)
Individual households are contacted by phone. If interested, they are provided with practical information about their travel mode choices to empower them to change travel habits. A timetable specific to the nearest bus-stop is one example. Australian TravelSmart programs often include individualised marketing as a major plank. Individualised marketing has been shown to have a very high benefit-cost ratio (30:1) and to be able to be implemented rapidly. The resultant travel behaviour changes are shown to be sustained over a period of a year or two at least. This technique, also widely used overseas, can also be used to help people make decisions to reduce water and electricity use, and may be synergically more powerful if used as an overall sustainability enhancement tool. Individualised marketing is a very powerful tool at our disposal to tackle the challenges of Peak Oil. It might also be further modified to improve awareness of Peak Oil.

3: Fuel tax escalator
Margaret Thatcher's greatest legacy to Britain may be her implementation of the fuel tax escalator in 1988. This has made Britain far less oil-vulnerable than it would have been without the community knowledge that fuel taxes will rise slowly and manageably but substantially. To minimise our risks of serious Peak Oil impacts, it is essential that Australia follows Mrs Thatcher's lead and sets the nation on a fuel tax escalator. Clearly this first requires the community to understand the need for such a controversial move.

The UK Fuel Tax Escalator Margaret Thatcher



Australian fuel taxes should be raised to European levels on a fuel tax escalator

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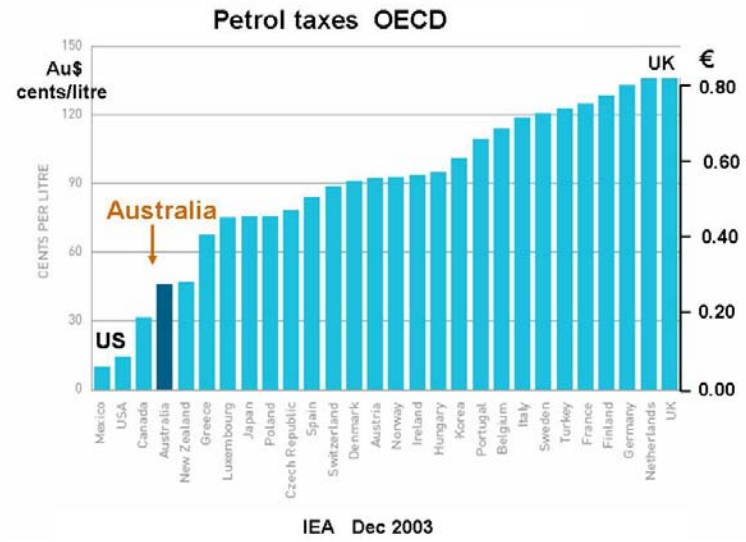
Currently Australian fuel taxes are very low by world standards, and there is an expanding range of fuel uses which are exempt from fuel excise.



The Economist, 30th April 2005 said ***"“Add in the geopolitical costs of oil and the case for raising petrol taxes, especially in America, becomes overwhelming".*** The same applies to Australia

Increasing Australian fuel taxes to UK levels would achieve a number of essential aims simultaneously.
(a). It would provide a clear unequivocal warning that transport fuel prices are going to rise steadily in future, so individuals and businesses can plan well ahead for the changes.
(b). It would provide the resources essential to improve our schools and hospitals and as well to fund sustainable transport infrastructure like light-rail and bicycle networks in our cities. It could also provide funds for income tax relief.
(c). It would avoid many of the problems which will occur if we just wait passively for world oil shortages to dictate the timing and magnitude of fuel price rises. If we leave fuel taxes constant (or reduce them), global oil prices will result in us exporting enormous amounts of money to pay for our oil imports. Raising the price of fuels with taxes allows the extra money to stay in Australia and allows a smoother transition from cheap to expensive fuel. It also provides the funds for us to build the defences against the serious problems Peak Oil will bring and provide the safety nets for those hard-hit by fuel shortages.

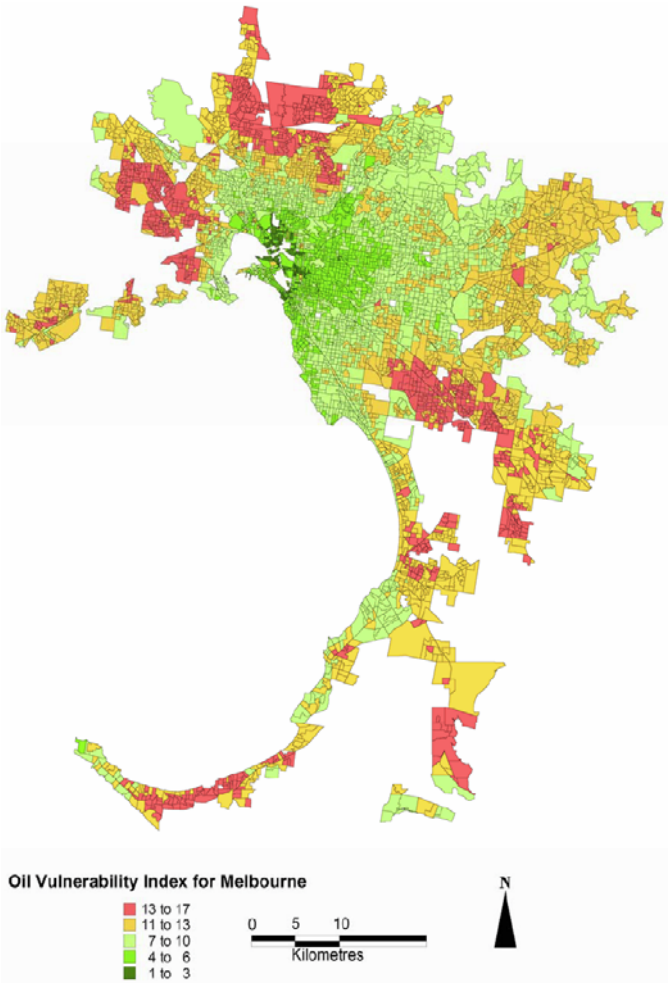
4: Smartcard sliding scale fuel pricing and tradable allocation mechanisms

Increasingly high fuel prices (either from taxation or from global markets) will have very serious economic and social impacts on many in Australia, however loud and long the advance warnings have been.

A flexible equitable and transparent mechanism for allocating increasingly scarce fuel will be essential to avoid a market forces crisis where only the wealthy can afford fuel. The Griffith University study (Dodson and Sipe, 2005) provided maps of an oil vulnerability index in Australian cities (below).

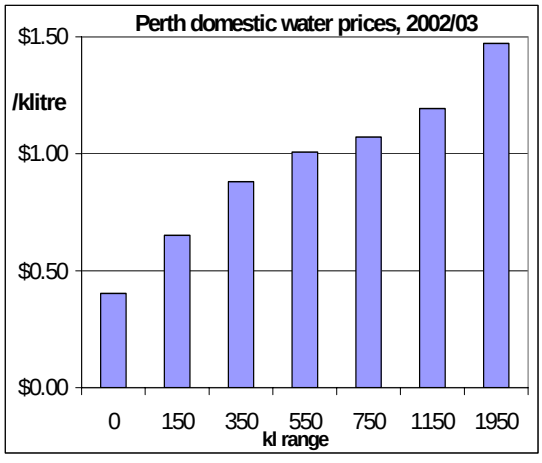
Low-income people living in outer suburbs will be very hard hit by sharply rising fuel prices while those in leafy well-off suburbs mostly have shorter travel distances, more public transport options and services like hospitals available closer, as well as more financial options.

A mechanism will also be needed for equitable allocation of fuel for essential services, like Meals on Wheels, staff working night-shifts at major hospitals, Flying Doctor services, food production and distribution, health services, and so on. Allocations to lower priority areas, like essential trades for emergency repairs, will also need to be made. In the event of shortages, non-productive and counter-productive fuel uses, should receive very low priority.



Smartcard technology, using existing petrol station credit-card systems or perhaps either the Medicare card or the proposed personal identity card, could provide a technologically practical mechanism of adopting the sliding scale pricing system now used for other essential commodities, especially water. Designs of a multi-level tradable rights rationing system should be developed and evaluated. The system should aim to provide every person with a basic personal allowance of fuel, for a relatively modest price (eg the normal or pre-emergency price), and successive increments of allocated fuel at increasing taxation levels. Allowance can be made so those living in country towns or areas poorly served by public transport receive a larger base allowance than those living in a fashionable inner-city suburb close to a train station, for instance.

This would expand upon the model of domestic water pricing used in Western Australia and elsewhere, where a modest household allowance is provided at a low price and those households that use more are charged increasingly more per kilolitre (see diagram at right).



A graded-price tradable rationing system means those who are frugal with their fuel usage can then electronically trade unused entitlements to businesses and people who need more. This offers a substantial financial incentive for innovation in fuel-saving strategies, like car-sharing, using bicycle transport or just in rational trip planning.

The current emergency rationing systems nominally in place in Australia are based on a per-vehicle allowance, or odds-and-evens number plate rationing. This means those owning the most cars get the most fuel. This is firstly grossly inequitable, and secondly it merely encourages people to buy more cars so they have a greater fuel allowance. This is not a rational way to deal with ongoing long-term shortages or a sudden fuel emergency. Both these scenarios have a substantial probability of coming to pass, and existing planning is seriously inadequate.

Like the Fuel Tax Escalator, of which the Smartcard system could form an important subset, any increased fuel tax revenue could be devoted to improving public services like health and public transport, and in covering the increased costs in other areas hit by transport problems at Peak Oil. It

should be used to fund the removal of fixed vehicle-ownership costs, such as third party insurance, and to implement, on the New Zealand model, a universal no-fault injury compensation scheme. This would be substantially more equitable than the current third party insurance systems and avoid the current cross-subsidies from frugal vehicle owners to those who travel far greater distances than average (and hence are more likely to be involved in a crash in which someone else is injured).

The allocation of fuel for business purposes would have to be investigated closely. "Business" use of cars would have to be very closely controlled if scarce fuel were to be allocated at the base rate. Encouragement of untrammelled pseudo-business use, as done by the current Fringe Benefits Tax, would have to be reversed. There will no doubt be practical and equitable mechanisms for allocating priority to different business types on the basis of their importance in the event of shortages. Providing fuel to luxury businesses should receive low priority if fuel is very scarce.

Other options for reducing Australia's transport fuel demand.
There are innumerable other options, some of which are mentioned in the submissions from ASPO-Australia specific sector working groups. It is not practical to list more than just a few here

These options include

- dramatically expanding provision of infrastructure for sustainable transport modes, like public transport, bicycle and low-powered vehicle transport (electric scooters/gophers and intelligent power-assisted bicycles), and of course walking as a transport mode. (see ASPO-Australia Active Transport working group submission, and those from other cycling advocate groups)
- the removal of the "perverse policies", especially the FBT, which subsidise heavy car usage [Denniss, 2003], and
- discouragement or prohibition of the supermarket fuel discounts where the grocery bills of the battlers and those frugal with fuel use subsidise the big 4WDs with 150 litre tanks. [Subsidies of $100 million per annum, have been estimated for the fuel discount schemes from each major supermarket chain]

Urban planning and transport planning clearly can encourage or moderate our automobile addiction. Building a freeway or tollway creates more vehicle travel. *"Build it and they will come"* is one well-known road planning adage describing induced traffic, and there is good evidence that the reverse is true, closing roads can cause traffic levels overall to decrease. (see Urban Transport and Planning working group submission)

Oil vulnerability risk assessment and risk management
Clearly, methodology has not yet been developed for considering Peak Oil probabilities, the assessment of risks and the opportunities likely to arise. Experience is also lacking in the rational evaluation of the various mitigation and adaptation strategies. It is essential that we all, especially Governments, urgently start the process of outlining and refining the probable scenarios which may well arise from global Peak Oil occurring within the next five or ten years, as seems quite likely.

ASPO-Australia is very keen to expand its network of professionals interested in the field and to collaborate with departments, business and industry to help define and control the uncertain future that Peak Oil is likely to bring, probably soon.

Conclusions

WA's Minister for Planning and Infrastructure, Hon. Alannah MacTiernan, has said about Peak Oil in speeches:
"Production itself is likely to peak, maybe as early as 2006, but more conventionally 2010 – 2015"

"It is also certain that the cost of preparing too early is nowhere near the cost of not being ready on time."

Peter Maas, in the New York Times, in an article about Peak Oil (21st August 2005) said ***"When a crisis comes -- whether in a year or 2 or 10 -- it will be all the more painful because we will have done little or nothing to prepare for it"***. This article appeared, coincidentally, a week before Hurricane Katrina hit New Orleans and found the US quite unprepared for an event which had long been known as a possibility.

Certainly, preparing well in advance for Peak Oil is a very prudent strategy. Many of the possibilities are "No Regrets" options (those that are already justified on social, environmental, health or economic grounds). ASPO-Australia urges the Senate to take very seriously the probability of Peak Oil, and the need for us to take substantial precautions in case the "Early Peak" forecasts turn out to be correct. Sadly, it is very probable that Australia will not be fully prepared, whenever Peak Oil comes. However, there is a chance that we may be, if the Senate inquiry is the start of an on-going process of Peak Oil awareness and action.

Oil Vulnerability Task Forces: As a starting point, ASPO-Australia recommends that Oil Vulnerability Task Forces should be established at all levels of Government and by all individual Government departments, industry sectors, individual businesses and corporations and local communities to review possible impacts of Peak Oil, and the available mitigation and adaption options. These task forces should complement the work already being done by the Queensland Government task force headed by ASPO-Australia patron, Andrew MacNamara, MP. ASPO-Australia would be very happy to collaborate in task forces within the limits of our resources. The multi-level approach is needed, as the impacts and strategies of Peak Oil are likely to be quite different within different levels and sectors of industry, society and the economy. There are innumerable opportunities at every scale for people to minimise risks and take advantage of the opportunities which forewarning of Peak Oil will bring.

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See also www.Socialdata.de

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Appendices

Appendix 1:
Information sheet about ASPO-Australia and its working group structure
(A number of the ASPO-Australia working groups have made separate submissions to the Senate inquiry).

Appendix 2:
"The Energy Dependence Syndrome" John Spencer, 1990, Dept of Psychiatry and Behavioural Science, SCGH, Search 21(8), 251-254, December 1990, ANZAAS

Appendix 3:
"Impact of Oil Depletion on Australia", Robinson, B.W., Fleay, B.J.and Mayo, S.C., (2005) ASPO Fourth International Workshop on Oil Depletion, Lisbon 2005.

Appendix 4:
"**Oil depletion: the crucial factor in transport planning",** Robinson, B.W and Powrie, S. (2004) , Australasian Transport Research Forum, Adelaide, October 2004.