

Peak Oil and Australia; Probable impacts and possible options

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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

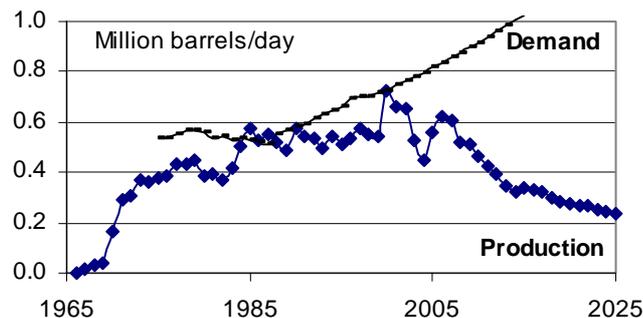


Figure 1. Australian crude oil and condensate production and demand, and forecasts [Geoscience Australia, 2006].

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

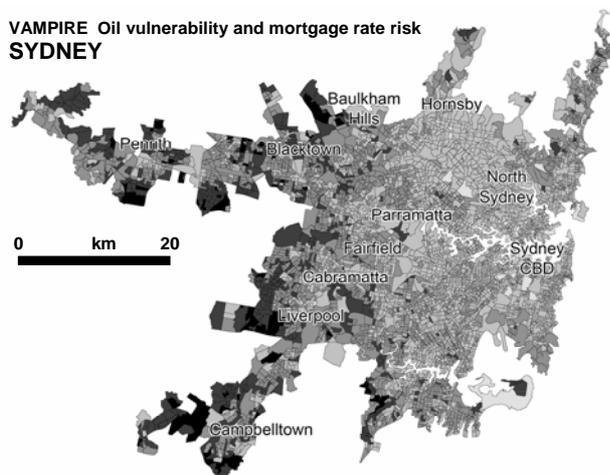


Figure 3. Oil vulnerability and mortgage rate risk index for Sydney (Dodson and Sipe, 2006)

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 solu-

tions. Some options could be implemented quickly (for example tax changes and rationing), but many will require a very long time and much capital investment.

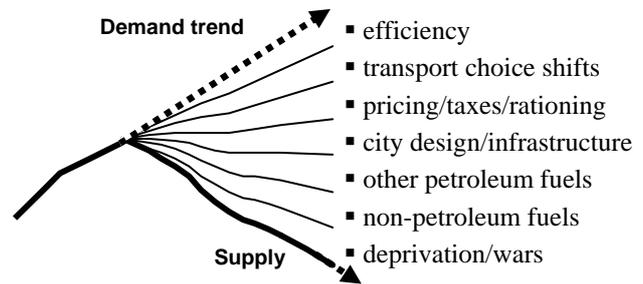


Figure.2. Post-Peak scenarios, bridging the gulf between demand trend and forecast supply .

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 policies" 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).

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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 technologi-

Further Reading Participatory Democracy

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cally 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.

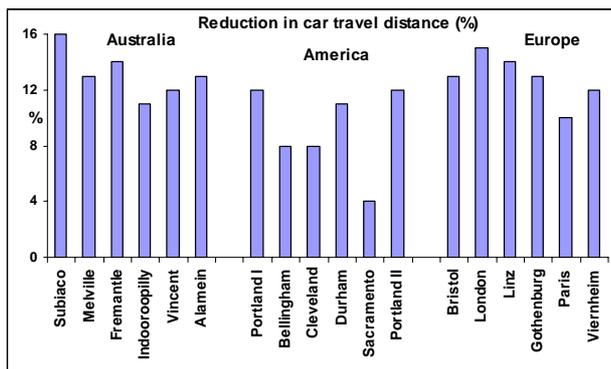


Figure 4. Car travel reduction from Individualised Marketing programmes in cities on three continents.

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.