COMMITTEE SECRETARY
SENATE RURAL AND REGIONAL AFFAIRS AND TRANSPORT COMMITTEE
PARLIAMENT HOUSE
CANBERRA ACT 2600

INQUIRY INTO AUSTRALIA'S FUTURE OIL SUPPLY AND ALTERNATIVE TRANSPORT FUELS – RESIDential Environments (RESIDE) study team submission

INTRODUCTION

Oil depletion has become an issue of increasing significance in recent years. There is growing understanding among policy-makers that oil supplies are finite and that output cannot be increased then maintained for a sustained period of time. Nevertheless, policy and funding is yet to fully reflect this truism. More comprehensive efforts to control demand for oil and prioritise sustainable transport modes are necessary.

Australia is heavily reliant on fossil fuels. One of the greatest consumers of oil is the transport sector. We have designed many of our cities in such a way to make motorised travel the only real transport solution for many trips. Moreover, Federal government transport funding has long prioritised Australia's motor vehicle fleet at the expense of alternative modes such as public transport, walking and bicycling (Laird, 2001).

Road users are heavily subsidized by the Federal government. Laird and Newman (2001) calculate that the road deficit amounts to around $8 billion per annum. If the costs of congestion are included, this figure is much higher. There is a lack of understanding amongst members of the public as to exactly what the real cost of motor vehicle use really is. This is evidenced when behaviour at the 'petrol pump' is considered. There are frequently public outcries when fuel prices rise. With increasing evidence that global supply of oil has peaked or, at least will soon peak, though global demand continues to rise, it is likely that prices at the pump will rise accordingly. Given the unwillingness of the public to pay more for their travel, it is imperative that steps be taken now to encourage sustainable travel behaviour. A particularly important alternative mode is bicycling.

Bicycling is an important, though underappreciated mode. It can provide significant health benefits, is easily accessible to many people and does not use fossil fuels. There is an urgent need to reconsider urban planning and transport priorities to ensure the value of cycling as a travel mode is recognised. As fuel prices escalate over the forthcoming decades there will be an increasing reliance on more sustainable modes, such as the bicycle.

THE ISSUE

In 2003, global demand for oil equated to 80 million barrels a day and was growing at a rate of 3% per year (Parker, 2005). The burden on producers has pushed crude oil prices higher, especially over recent years. Key reasons for the price hike include efforts by some countries to stockpile oil to buffer against future price rises and fuel shortages, and a huge growth in demand from the Chinese, who have a rapidly developing economy and transport sector. China is now the 2nd largest global oil consumer after the US (Douglas-Westwood, 2004).

The supply problem

Saudi Arabia, the world's largest produce of oil, has operated as swing supplier of oil for many years. Should the Saudi oil pump be stopped, there is firm reason to believe that world would be plunged into crisis. The world oil shock of 1973 which was characterized by large, sudden increases in the price of oil was a direct result of a Saudi-led curtailing of production. Though the actual volume of oil shipped to global markets was reduced by a small percentage, the mere *threat* of reduced supply instigated panic, particularly on the heavily oil-dependent societies in the West (Simmons, 2005).

Simmons (2005) argues that by the late 1990s, almost all members of the Oil Producing Economic Community (OPEC) had reached peak sustainable output. This is in the face of continually rising global demand, fueled in

part, by growth in the transport sectors of emerging countries, such as China. Moreover, the bulk of oil supply comes from a limited number of aging giant and super-giant middle-eastern fields. Worryingly for consumers (and the shareholders of oil companies), Simmons reports that no new fields of any significance have been discovered in the last three decades.

There are a number of challenges facing oil production. They include geo-politics (remembering the oil shock of 1973), a lack of new discoveries and the limited ability of producers to maintain or even increase flows from the small number of high-output fields. Mature fields lose pressure, requiring injections of water to literally 'force' oil reserves out of the ground. Water mixes with oil and creates gas caps, which in turn need to be separated from the crude. Moreover, quite simply, mature fields have been drained of the crude that is 'easy to get at', making remaining reserves increasingly difficult to draw from.

Fleay (1995) argues that the peak in oil production has been reached. Other researchers have argued that the peak will be reached by 2020, followed by decline (Campbell & Laherrère, 1998; Campbell, 2003). It appears that oil futures depend upon who is writing the report. Indeed, some commentators with vested interests in the oil industry argue that production will not be in crisis in the foreseeable future (Abdoolakhan, 2005). The most reliable evidence, however, points to current levels of production not being sustainable, much less increased production being viable for more than a short time (see Simmons, 2005).

The issues for Australia

Parker (2005: p66) argues that "Australia has become addicted to cheap oil, especially for transport, which uses almost 80% of Australia's petroleum". He notes that at 2003 rates of consumption, Australia's remaining economic reserves will only last around 11 years.

Australia has high per capita energy consumption, relative to other countries. Low urban densities and car dependence contribute to high per capita CO_2 emissions (Buxton, 2001). Clearly, there are serious issues associated with car dependence aside from energy consumption and oil depletion, such as pollution and adverse effects on health and safety (Woodward, Hales & Hill, 2002; Kenworthy & Laube, 2005).

Put simply, car dependence in Australia is not reconcilable, especially over the longer term, with decreasing stocks of oil and increased fuel prices. Private vehicles are the least energy efficient and most ecologically damaging mode of travel. Active modes are the most and least, respectively (Rees, 2003). Essentially, there is much more potential to reduce energy use through mode shift than through making combustion engines more efficient, though this may be a temporary strategy with limited uses.

Our cities need to be urgently redesigned to be much friendlier for sustainable modes of travel, particularly bicycling. It is tragic that there has not been more foresight when planning for when the oil 'tap' ceases to flow as freely, as there has been in some countries, such as Sweden, Japan, The Netherlands and Switzerland (Parker, 2005). More energy efficient urban systems will come about when more planning criteria require more compact development and focus shifts from planning for a more efficient road traffic system to the promotion of alternative modes (Kenworthy, 1986).

The evidence for the design approach to reducing car dependence and energy consumption is startling. Distance from the Central Business District (CBD) has been found to be a very significant factor in determining transport energy use (Mogridge, 1985; Newman and Kenworthy, 1999). After subjecting international data to multiple regression analysis, density has been found to be the dominant explanatory variable for the level of transport energy use (Newman and Kenworthy, 2001). Other researchers have had similar findings (Owens, 1986).

In Perth, distance from the CBD is correlated with an increase in transport energy use, less land-use mix, fewer job opportunities per hectare and much lower development densities, corresponding to a severe dependence on cars amongst the citizenry (Newman, Kenworthy and Lyons, 1985; Kenworthy, 1986). Conversely, the relative concentration of jobs and services in the central city means that those who live closer to the CBD make shorter trips (Kenworthy, 1986). Furthermore, Masnavi (2001) notes that mixing of land uses increases accessibility and hence the viability of active modes, such cycling. This leads to decreased energy usage and lower vehicle

emissions and the additional benefits that active mode use can bring. These benefits are discussed in the next section.

Adam and Fleming (2005) argue that the desirability of communities, such as Transit-Oriented Developments (TODs), that are based on principles such as raising densities, increasing land-use mix, improving connectivity, providing quality infrastructure for active mode users and a high quality public transport service, and calming streets, will increase as fuel becomes scarcer. Community structures which offer easy non-vehicle access to services/facilities and/or easy access to public transport will become highly sought after. We need to therefore make the design of such communities a high priority.

AN ALTERNATIVE – ACTIVE MODES, ESPECIALLY BICYCLES

As we have discussed, to encourage active mode use, we need to fundamentally rethink how we design our cities. An activity-friendly environment may be defined as "a place that makes it easy to make the choice to be physically active, through planned exercise or routine daily activity" (Active Living Research, 2004: p1). Our cities need to be designed to encourage both utilitarian and leisure trips active modes. There are many reasons for this, but especially because the health benefits of regular walking and cycling cannot be underestimated (Mason, 2000).

A mix of land uses provides nearby locations for active mode users (Hanson and Schwab, 1987; Frank and Pivo, 1994; Cervero, 1996; Frank, 2000; Masnavi, 2001; Powell et.al., 2003). A study in Missouri found that levels of activity are positively correlated with increases in access and opportunity (Brownson et.al., 2000). Similarly, a UK study found that mixed use areas are more convenient and attractive for walkers, relative to areas with segregated zoning.

If people are making a higher percentage of their trips by cycle, rather than by car, or in the very least, are driving shorter distances than they would be if they lived in an area with segregated zoning, the transport energy usage of the local population will be lower (Beatley, 2004). By implication, pollution from vehicles will also be less (Masnavi, 2001). This bodes well for the general transport sustainability of a mixed-use locality, relative to one which is conventionally designed.

The origins of segregated zoning practices can be found in peoples' desire to separate themselves from noxious land-uses. In the late 1800s and early 1900s, this was an understandable wish, given it was the heyday of polluting and poorly regulated industry. In the present day, the importance of industry is much less as is the idea of business being a 'noxious neighbour'. Separation from noxious industry should thus no longer be a strong barrier to mixing of land-uses (Newman and Kenworthy, 1999).

Population density is likewise frequently found to have a positive association with active mode use (Cervero and Radisch, 1996; Ross and Dunning, 1997). In relatively dense and mixed-use environments, bicycling becomes more attractive as trip distances need not be so far (Neels et.al., 1977; Kenworthy, 1986). This accentuates the point that active transport modes of transport quickly become unattractive to most people as distance increases (Naess and Sandberg, 1996; Naess, 2005). This is because both more time and exertion is needed to cover greater distances (Forward, 2003).

Grided street patterns are ideal for active transport, as they make neighbourhoods more permeable (Pickrell, 1998; National Heart Foundation of Australia, 2004; McIndoe, 2005). In contrast, curvilinear streets and culs-de-sac decrease permeability and hence decrease the attractiveness of using active modes. The former are often found in the traditional core of cities and the latter in more recently developed suburbs (Cervero, 2000).

Other researchers, however, suggest that connectivity needs to be part of an urban design package, where safety and quality are co-requisites (see Frank and Engelke, 2001; Frank et.al., 2003). We must design our urban spaces from the bottom up. Quality must be observable at all scales.

Quality environments are not just supportive of active mode use for utilitarian purposes. They also support

leisure activities. If people have quality nearby leisure destinations to travel to, such as multi-use parks, they tend to get more physical activity (Active Living Research, 2004). Intuitively, quality design increases opportunities for more people to walk or cycle more often. One measure that the city of Copenhagen, Denmark has employed was in 1995, 4,000 publicly-owned bicycles were made available for people to use in the central city. The bicycles cost nothing for members of the public to 'hire', provided they are returned (Newman et.al., 1997). The city continues to look to increase the number of bicycles it provides.

An additional measure is providing dedicated cycle-ways, which are in some way separated from other traffic. These give cyclists discernable routes and add to safety. Research from North America has found the closer people live to dedicated cycle-ways, for example, the more likely they are to use it (Troped et.al., 2001).

Bicyclists are important contributors to safety in neighbourhoods. This is because they serve to keep 'eyes on the street', thereby maintaining passive surveillance. Again, it is vital that planners to rethink the form of our cities, particularly suburban areas, to enhance quality and safety of place.

Safety of the individual is also a pressing issue in many cities, not least of all Perth. There are relatively few dedicated bicycleways in the city, leaving cyclists to battle with on-road traffic in many areas. As many of Perth's roads have been engineered to increase traffic speeds, the cyclist is an extremely vulnerable road user. Solutions to increase the safety and visibility of cyclists is to develop painted cycle lanes and separate bicyclists from traffic through the use of landscaping and bollards (Newman et.al., 1997).

In other cities, where roadways are engineered to be shared spaces and the primary focus is not on traffic speed, the cyclist is much less vulnerable (Wittink, 2003). Not only do drivers have more time to react to cyclists because they are driving slower, but the very definition of the road as shared space (with policy supporting this definition) increases the visibility of cyclists. Copenhagen is a good example of where the safety of the individual cyclist is much more of a planning priority than traditionally has been the case in Perth and elsewhere in Australia. Cyclists must not be the only people responsible for the safety of cyclists. It is imperative that the state is, too.

A sustainable mode that benefits health

Many researchers have identified associations between insufficient physical activity and a variety of chronic diseases (see Kohl III et.al., 1992; Wannamethee and Shaper, 1999; Lee and Paffenberger, 2000; Kaufmann, 2002; Frumkin et.al., 2004). Such diseases include type 2 diabetes, poor mental health, cardiovascular disease and overweight/obesity.

One key form of physical activity that has the potential to be increased is utilitarian travel by active modes. Bicycling has particular potential, as it is an easily accessible means for people to engage in *vigorous* physical activity. When people forsake private vehicles in preference of bicycles, this in turn can lead to a significant increase in the amount of physical activity people undertake. Furthermore, there is increased potential for people to 'meet on the street' and casually interact, thereby increasing social capital and decreasing feelings of isolation among community members (Putnam, 2000; Cavill, 2003). This is particularly important in low density areas, which are characteristic of many Australian urban areas, as there tends to be less frequent opportunities to interact with others on a casual basis (see Allen, 1980; Kenworthy, 1994).

RECOMMENDATIONS

- First, that cycling be recognized in Federal government policy as a sustainable mode of transport which needs to be promoted as a viable, economical and healthy option for short and medium length trips for all Australians. Second, infrastructure for cycling needs to be given funding priority, particularly in urban areas that are presently most dependent on car transport. Funding must also be given to cyclist education and promotion strategies

- Funding for roads and motor vehicle transport should cease to be provided on a 'predict and provide'

basis. Importantly, funding for new projects should be sharply curtailed. Rather, funding should be channeled into alternative modes and related infrastructure, in part to relieve the burden on Australians, as oil supply becomes scarcer.

- That the methods for assessing transport proposals be redesigned to place more emphasis on the need for infrastructure to be much more friendly for active mode users (such as walkers and bicyclists) and suited to the operation of quality public transport services.

- Urban design principles should be incorporated into state, territory and local government development requirements which encourage cycling, as well as walking and public transport use. Such principles, including increased development densities, mixing of compatible land-uses and traffic-calmed streets should be imperatives for developments to be approved.

- Current concessions for 4WDs and Fringe Benefit Tax must be abolished. Instead, charges should be introduced relative to the engine capacity of vehicles.

- Warrant of Fitness tests should become compulsory for all registered motor vehicles, on a six-monthly basis. This will ensure that vehicles are better maintained and consequently, have better fuel efficiency.

REFERENCES

Abdoolakhan Z. (2005) Viability of Alternative Fuels and New Technology Vehicles, paper presented to the Planning and Transport REsearch Centre (PATREC), Perth, Western Australia

Active Living Research, Designing for Active Recreation, January 2004, available: http://www.activelivingresearch.org/downloads/recreation.pdf, (accessed: 04-05-2005)

Adam W. and Fleming D. (2005) 'Effective bus-based transit oriented development', paper presented at the Transit Oriented Development (TOD) conference, Making It Happen, 6-8 July, Fremantle, Western Australia

Allen I. (1980) 'The ideology of dense neighbourhood redevelopment: cultural diversity and transcendent community experience', in Urban Affairs Quarterly, 15(4), pp409-428

Beatley T. (2004) Native to Nowhere: sustaining home and community in a global age, Washington DC: Island Press

Brownson R., Housemann R., Brown D., Jackson-Thompson J., King A., Malone B. and Sallis J. (2000) 'Promoting physical activity in rural communities: walking trail access, use and effects', in American Journal of Preventative Medicine, 18(3), pp235-241

Buxton M. (2001) 'Energy, transport and urban form in Australia' in Williams K., Burton E. and Jenks M. (eds.) Achieving Sustainable Urban Form, London: Spon Press, pp54-63

Campbell C. (2003) The Essence of Oil and Gas Depletion, Essex: Multi-Science Publishing Ltd.

Campbell C. and Laherrère J. (1998) 'The end of cheap oil', in Scientific American, March, pp78-83

Cavill N. (2003) 'The potential of non-motorised transport for promoting health', in Tolley R. (ed.) Sustainable Transport: planning for walking and cycling in urban environments, Abington, Cambridge: Woodhead Publishing Ltd., pp144-158

Cervero R. (1996) 'Mixed land uses and commuting: evidence from the American housing survey', in Transport Research A, 30(5), pp361-377

Cervero R. and Radisch C. (1996) ‘Travel choices in pedestrian versus automobile orientated neighbourhoods’, in Transport Policy, 3, pp127-141

Douglas-Westwood (2004) The World Oil Supply Report 2003-2050, Canterbury (UK): Douglas-Westwood

Fleay B. (1995) The Decline of the Age of Oil, Sydney: Pluto Press

Forward S. (2003) ‘Attitudes to walking and cycling’, in Tolley R. (ed.) Sustainable Transport: planning for walking and cycling in urban environments, Abington, Cambridge: Woodhead Publishing Ltd., pp210-223

Frank L. (2000) ‘Land use and transport interaction: implications on public health and quality of life’, in Journal of Planning Education and Research, 20, pp6-22

Frank L. and Engelke P. (2001) ‘The built environment and human activity patterns: exploring the impacts of urban form on public health’, in Journal of Planning Literature, 16(2), pp202-218

Frank L., Engelke P. and Schmid T. (2003) Health and Community Design: the impact of the built environment on physical activity, Washington DC: Island Press

Frank L. and Pivo G. (1994) ‘Impacts of mixed use and density on utilization of three modes of travel: single-occupant vehicle, transit and walking’, in Transportation Research Record, 1466, pp44-52

Frumkin H., Frank L. and Jackson R. (2004) Urban Sprawl and Public Health: designing, planning and building for healthy communities, Washington DC: Island Press

Hanson S. and Schwab M. (1987) ‘Accessibility and intra-urban travel’, in Environment and Planning A, 19, pp735-748

Kaufmann F. (2002) ‘Type 2 diabetes mellitus in children and youth: a new epidemic’, in Journal of Pediatric Endocrinology and Metabolism, 15(suppl. 2), pp737-744

Kenworthy J. (1986) Driving Cycles, Urban Form and Transport Energy, thesis presented for the degree of Doctor of Philosophy, Murdoch University, Western Australia

Kenworthy J. (1994) Better Cities for Families: an international review of urban planning, urban design and transport strategies for more liveable cities, keynote address to the Cities and Families Conference, November 7-8 1994, The Regent of Melbourne Hotel, Melbourne

Kenworthy J. and Laube F. (2005) ‘An international comparative perspective on sustainable transport in European cities’, in European Spatial Research and Policy, 12(1), pp11-50

Kohl III H., Gordon N., Villegas J. and Blair S. (1992) ‘Cardiorespiratory fitness, glycemic status and mortality risk in men’, in Diabetes Care, 15, pp184-192

Laird P. (2001) ‘The political problem: the road lobby’, in Laird P., Newman P., Bachels M. and Kenworthy J. (eds.) Back on Track: rethinking transport policy in Australia and New Zealand, Sydney: UNSW Press

Lee I. and Paffenberger Jnr. R. (2000) ‘Associations of light, moderate and vigorous intensity physical activity with longevity. The Harvard Alumni health study’, in Journal of Epidemiology, 151, pp293-299

Masnavi M. (2001) ‘The new millennium and the new urban paradigm: the compact city in practice’, in Williams K., Burton E. and Jenks M. (eds.) Achieving Sustainable Urban Form, London: Spon Press, pp64-73
Mason C. (2000) ‘Transport and health: en route to a healthier Australia’, in Medical Journal of Australia, 172, pp230-232

Mogridge M. (1985) 'Transport, land use and energy interaction', in Urban Studies, 22(6), pp481-492

Naess P. (2005) 'Residential location affects travel behaviour – but how and why? The case of Copenhagen metropolitan area', in Progress in Planning, 63, pp167-257

Naess P. and Sandberg S. (1996) 'Workplace location, modal split and energy use for commuting trips', in Urban Studies, 33, pp557-580

Neels K., Cheslow M., Kirby R. and Peterson G. (1977) An Empirical Investigation of the Effects of Land Use on Urban Travel, working paper 5049-17-1, Washington DC: The Urban Institute, 83pp

Newman P. and Kenworthy J. (2001) 'Sustainable urban form: the big picture', in Williams K., Burton E. and Jenks M. (eds.) Achieving Sustainable Urban Form, London: Spon Press

Newman P., Kenworthy J. and Lyons T. (1985) 'Transport energy use in the Perth metropolitan region: some urban policy implications', in Urban Policy and Research, 3(2), pp4-15

Newman P., Kenworthy J., Schewer J., Beirad L., Hartelius-Jensen M., Broberg S., Larsen A., Poelkow B., Hansen B., Søndergaard B., Møller C., Sun M., Holm D., Witt G., Winslaw L. and Jensen M. (1997) 'Car-free Copenhagen': perspectives and ideas for reducing car dependence in Copenhagen, Department of Urban Design, Copenhagen and ISTP, Perth

Owens S. (1986) Energy, Planning and Urban Form, London: Pion

Parker A. (2005) 'The end of suburbia: what happens when all the cheap oil is gone and what are the health implications?', in Health Promotion Journal of Australia, 16(1), pp61-68

Powell K., Martin L. and Chowdhury P. (2003) 'Places to walk: convenience and regular physical activity', in American Journal of Public Health, 93, pp1519-1521

Putnam R. (2000) Bowling Alone: the collapse and revival of American community, New York: Simon and Schuster

Rees W. (2003) 'Ecological footprints and urban transportation', in Tolley R. (ed.) Sustainable Transport: planning for walking and cycling in urban environments, Abington, Cambridge: Woodhead Publishing Ltd., pp3-19

Ross C. and Dunning A. (1997) Land Use Transportation Interaction: an examination of the 1995 NPTS data, Atlanta: USDOT, Federal Highway Administration, available http://npts.ornl.gov/npts/1995/Doc/landuse3.pdf (accessed: 17-06-2005)

Simmons M. (2005) Twilight in the Desert: the coming Saudi oil shock and the world economy, Hoboken, New Jersey: John Wiley and Sons

Troped P., Saunders R., Pate R., Reininger B., Ureda J. and Thompson S. (2001) 'Associations between self-reported and objective physical environment factors and use of a community rail-trail', in Preventative Medicine, 32(2), pp191-200

Wannamethee S. and Shaper A. (1999) 'Physical activity and the prevention of stroke', in Journal of Cardiovascular Risk, 6(4), pp213-216

Wittink R. (2003) 'Planning for cycling supports road safety', in Tolley R. (ed.) Sustainable Transport: planning for walking and cycling in urban environments, Abington, Cambridge: Woodhead Publishing Ltd., pp172-188

Woodward A., Hales S. and Hill S. (2002) ‘The motor car and public health: are we exhausting the environment?’, in Medical Journal of Australia, 177(11/12), pp592-593