

THE CAR IN ITS SECOND CENTURY

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This paper reviews the possible future of the motor car as it moves into the second century of its use. The world pattern of car use is examined first and consideration is given to this future. Then, the pattern of use in Australia is reviewed and it is argued that the trends of the last forty years cannot be sustained. To this end, a new strategy for urban transport is proposed for Australia.

Global car use

Despite the rapid growth in the post-war period, globally, car ownership is still limited to a minority of people. Table 1 shows ownership, in cars per 1000 people, for a range of countries for the year 1987. Overall in the western industrialised countries (the OECD group), the average in 1987 was 384. In East Europe it was 66, and for the rest of the world a mere 12 cars per 1000 persons. Income differences are the most obvious explanation for these variations in car ownership; overall, ownership correlates roughly with per capita income. The exceptions are East Europe and China, where levels are well below those in countries with comparable standards of living. Until recently, private ownership of cars was prohibited in China, while transport policies in East Europe, have traditionally favoured public over private transport.

Another reason for variation between countries with similar income levels is income distribution. In the OECD countries, ownership levels are increased by more equitable income distributions compared with the Third World, since this allows many lower income households to afford

a vehicle. In poor countries, the position is reversed; ownership levels are higher when wealth is concentrated. If all households had the same income, none could afford a car. Brazil is a good example of economic inequality and relatively high car ownership, and its government has further encouraged the sales of its locally produced cars both by making available low interest loans to intending buyers and by subsidising the production costs of alcohol fuels (Altshuler, 1984). Low income countries are more typical of today's world than wealthy countries like Australia, since in 1987 the global average per capita GDP was only about \$3200 (1987 \$US). On this basis, it may be argued that it is only global inequality in income distribution that allows car ownership to exist at all. And this inequality is increasing; in 1965, the 50% of world population living in the poorest countries had about 8% of the global product but only 5% in 1987 (World Bank, 1989).

**Table 1: Car ownership per 1000 population,
selected countries, 1987**

Country	Cars / 1000 persons	Country	Cars / 1000 persons
U.S.A.	555	Brazil	62
W. Germany	470	Mexico	61
Australia	440	U.S.S.R.	45
France	393	S. Korea	19
UK	355	Nigeria	7
Japan	239	Indonesia	5
E. Germany	207	India	2
Saudi Arabia	146	China	<1

Source: MVMA, 1989

How will car ownership patterns change in the future? In the short term at least, there will be further additions to the present figure of 400 million cars, with dramatic changes in some countries. In East Europe,

big increases in ownership seem probable, given the recent changes there. For example, the great difference in ownership levels between East and West Germany, shown in the table, is likely to be narrowed. The USSR had very low ownership levels, only manufacturing around 1.3 million cars annually. A shift in policy could have a big impact on world car numbers, given the large population of the countries formerly comprising the Soviet Union.

The other region where car ownership can be expected to increase rapidly is East Asia, especially in those countries, such as Taiwan and South Korea, with a combination of high economic growth rates and recently introduced car manufacturing industries. An extreme example is South Korea, where total vehicle production climbed from under 200,000 in 1984 to 1.5 million in 1990. Major investment projects have been initiated which could increase total vehicle production capacity to 3.4 million by 1993. Some 80% of the vehicles produced are cars. And over the four years to 1990, domestic sales of cars increased 450% (Anon, 1990). Local car manufacture has also started in China and, given its vast population and rising income inequality, the car fleet could grow to 10 million by the year 2000. Japan is the world's leading car manufacturer, with high income levels. It is lack of space, especially in large cities, that explains its relatively low car ownership. Half of its car production is exported. Only if Japan embarks on a massive highway construction programme – a move encouraged by its major trading partners – will it be able to absorb its production.

However, the world overall can never achieve the per capita car ownership levels found in Australia. If it did, the car fleet would number 2500 million, with China alone having over 500 million cars. There are several reasons why a fleet of this size cannot be sustained, even if they could be afforded. Oil reserves would very soon be exhausted. But well before the oil was used up, the total fossil fuel energy consumption would have dramatically altered the earth's atmospheric chemistry, with escalating problems from greenhouse warming, acid precipitation and regional air pollution.

If fossil fuel depletion and environmental problems are a problem, what about renewable fuels? For example, liquid fuels produced from

biomass (such as alcohol from sugarcane) can potentially overcome both the limited resource base of petroleum and the greenhouse problem. But even without massive biomass plantations, the world is already failing to produce enough food. Lester Brown has pointed out that per capita grain production worldwide has been falling since 1984. Brazil, which developed a large-scale fuel alcohol industry, had to import several billion dollars of food annually to replace that pushed out by the sugar cane fuel plantations. One hectare of land can feed five people, but only grows enough fuel for one car (Brown, 1985 and 1990). Further, the F.A.O. has forecast that by the year 2000, some three billion people in poor countries will either be living in areas deficient in fuelwood, or harvesting it in an unsustainable manner (WCED, 1987). For them, fuelwood for cooking has priority over liquid fuels for transport. Given the deteriorating world food position, any country which has spare agricultural land (Australia?) should use it for food production, not fuels. Optimists will argue that hydrogen-fuelled or electric-powered vehicles (with the electricity needed for producing hydrogen or charging batteries itself coming from non-fossil fuel sources such as wind or photovoltaics) are possibilities. More will be said about these options later; here we merely note the very high cost of the resulting fuels, which rules them out for most of the world.

Not only is a fully motorised world impossible, but even the modest increases likely in the short term over much of the Third World are problematic. For very poor countries, such as China, India or the nations of tropical Africa, ownership levels will always be so small that declines in public transport patronage - the problem in wealthier countries - will be marginal. The real threat is to non-motorised travel - walking and cycling - which are presently the main means of getting around. For example, in tropical Africa, probably 85% of all personal travel is by non-motorised means, mainly walking. Yet resources are directed into improving vehicular travel, which exacts a further heavy penalty in terms of traffic accidents: the majority of victims are pedestrians (Moriarty and Beed, 1989).

In China, cycling is the dominant travel method: there are about 250 bicycles for every 1000 persons. Cycling occupies the same position as car travel does in the West. Yet, there are ominous signs that planners

wish to restrict bicycles in the large urban centres. They claim that bicycles interfere with the motorised traffic flow. The argument is formally about speeding up the movement of trucks and buses, but the end result will be the disenfranchisement of the majority of the people for the private vehicle travel requirements of a tiny but politically important minority.

Car travel, then, has never been and will never be an option for the majority of the world's citizens. But is it an option for the future for the existing highly motorised countries? If, as we suspect, mounting environmental problems typified by greenhouse warming lead to the question of international equity becoming of major concern, car ownership will not escape scrutiny. The remainder of this paper examines the question of the future of private transport from an Australian viewpoint.

Private Travel in Australia: Problems of Success

Superficially, private travel's position in Australia has never looked stronger. Nearly 90% of Australian households have access to a vehicle, and over 95% of all land vehicular travel is by car. Even in the large cities, public transport's share averages less than 10% (Moriarty and Beed, 1990). Ownership levels, and travel by car, continue to climb. This surge in car ownership and use really only started in the late 1940s, following almost two decades of stagnation in private travel brought on by depression and war halting the first surge in ownership that occurred in the 1920s.

A number of forces encouraged this phenomenal post-war growth. In 1948, the first Holdens, hailed as the Australian car, were produced, with strong support from the federal government. Wages also rose steadily, enabling more people to afford the new vehicles. In the large cities, a combination of increased incomes, declining household size and large additions to the population from migration resulted in a steady decline in inner urban populations and greatly increased outer urban settlement. Not only were public transport services infrequent in these outer suburbs, but traffic congestion was never the problem it is near the

city centre, as these outer suburbs could be designed from scratch around car based travel. Car ownership rates have always been higher in the outer suburbs than in inner suburbs.

Other factors favoured private travel. Petrol prices, in real terms, fell continuously, and even today are lower than in 1950. Also, especially in the early post-war decades, official attitudes towards traffic noise, air pollution and traffic accidents were remarkably relaxed. In marked contrast to its early years, the car industry now had a strong ally in governments.

Yet, even granted the car's present entrenched position, we doubt that the trends of the last four decades can continue beyond this century. There are some important differences between Australia and the other OECD countries. Our car ownership is, as already shown, higher than the OECD average, yet average per capita income here is about 20% lower than for the OECD overall. Australia also uses a much higher proportion of its total oil consumption for transport than do the countries of Western Europe or Japan. This makes it much more difficult to cut oil consumption by switching to other fuels, should the need arise.

Yet Australia's oil reserves are rapidly running out. By early next century, if present oil demand trends continue, we will move from near net self-sufficiency of recent years to importing about two-thirds of our oil. Moreover, at present usage rates, even global oil reserves will be exhausted in a few decades (AIP, 1990). There are also problems of security of supply from the Persian Gulf, where the greater part of the world's reserves are located. And assuming a reliable supply, could Australia afford it? The country has a chronic balance of payments problem. The current account deficit, itself increasingly the result of interest and profit repatriation, is presently being offset by capital inflows, which will further exacerbate the current account deficit in years to come.

A simple calculation illustrates the magnitude of the problem. Suppose that around the year 2000, the oil price in 1991 Australian dollars is \$40 per barrel, and we have to import annually 200 million barrels, the approximate value indicated by present trends. The oil import bill

would be \$8 billion, compared to our present total exports of around \$50 billion. That would raise the current account deficit by some 40-50%. The actual figure could be higher or lower, depending on the international price, the exchange rate, and the success of oil exploration here.

A second problem for transport arises from its large contribution to greenhouse warming. The industrial nations are responsible for most of the cumulative greenhouse emissions to date, as well as for the greater part of present annual releases. To a large extent, the industrial nations have created the problem. If climatic changes are to be minimised, or at least the rate of change held to tolerable limits, deep cuts in annual trace gas emissions will be needed. If any increases in emissions are to be allowed in poor countries - and food production is inevitably a major contributor to greenhouse warming - it follows that disproportionate reductions will be needed in the richer countries. Until recently, the perennial traffic-related problems of air and noise pollution, traffic accidents and congestion were only of local significance. But the two problems discussed above, especially greenhouse warming, have given our transport system global significance. If, as scientists believe, CO₂ emissions need to be halved, it does not seem possible to continue our high energy travel patterns and allow for increased Third World production and consumption.

The time frame for the greenhouse problem coincides with that for local oil depletion: both problems need to be tackled simultaneously. The two problems also interact: if emissions are to be reduced globally, our mineral exports, particularly of coal, would suffer, leaving us in an even worse position to pay for oil imports. An obvious solution is to reduce our oil consumption. If we do this, both problems can be solved together: cutting transport greenhouse emissions can lessen our dependence on costly oil imports.

There are several approaches possible for reducing transport oil consumption. One is to improve the fuel economy of transport vehicles. However, although the fuel economy of the vehicle fleet has significantly improved over the last decade or so, total transport fuel consumption has also increased. For road vehicles the increase was

over 30% from 1979 to 1988. In a growth economy, increased travel soon overwhelms (and may even be encouraged by) fuel savings from better fuel economy.

Alternative fuels, if based on coal or gas, will also be of little help. Synthetic liquid fuels from coal, apart from being very expensive, will increase greenhouse gas emissions. Natural gas based fuels, such as methanol, can only be a temporary solution, given the limited resource base, and in any case may exacerbate the greenhouse problem because methane is an effective greenhouse gas. We have already discussed the problems with using biomass for liquid fuels. Of the many obstacles to hydrogen or electric - powered vehicles, the most important are the long lead times needed for development and implementation, motorist resistance because of inconvenient refuelling, and fuel costs several times the existing level.

The most fundamental approach to reducing oil use is to decrease vehicular transport itself. Given the limited scope and effectiveness for the other means - increasing fuel economy and alternative fuels - travel reductions must be the major policy emphasis.

Past experience suggests that the government will wait until the last possible moment before acting. Given the limited time horizon of elected governments, "business-as-usual" always seems like the best policy. But the Australian Labor Government has already stated it will reduce greenhouse emissions by 20% (based on 1988 figures) by the year 2005. Policy measures could take the form of large tax increases on motoring which could be implemented rapidly. They might take the form of increased taxes on large cars and a "carbon tax" on fuels. The latter is a consumption tax which would have similar regressive implications to John Hewson's GST. Such policies may also be attractive to government as a revenue measure. However, we should recognise the radical implications of a carbon tax: for the first time, the "external" costs of car travel (and fossil fuel burning in general) would be seriously addressed, and would be an official acknowledgment of market failure. Yet, increased distributional inequities would inevitably result. In attempting to decrease greenhouse gas emissions in rich countries through these policies, lower income groups would bear the

main burden. Carbon taxes increase petrol prices, and for large reductions in petrol use, massive price rises would be needed. Most of the 50% of households below the median household income in Australia own a car. Yet according to household income surveys, this group, representing about 42% of the total population, had their share of total income reduced from 25% to 23% between 1976 and 1984 (ABS, 1978 and 1986). They are having enough problems coping without having to pay out a lot more for motoring.

A New Strategy for Australian Urban Transport

The time has evidently come for Australian urban transport policy to be thought out afresh. We have sought to show that the seemingly impregnable position of private car travel is resting on increasingly insecure foundations. Fundamental changes in the transport system look inevitable over the next decade, given the twin crises of oil depletion and greenhouse warming. In addition to these more global problems are concerns at the more local level, such as increasing intrusion of traffic into residential areas and construction of new inner city arterial roads. There is also increasing awareness of the health effects of vehicular urban air pollution. Finally, traffic casualties, both fatalities and injuries, must be addressed.

What is needed is a strategy that can tackle all these problems together. Only sharp cuts in transport, especially car travel, can do this. One method that is often proposed is land-use planning. Urban restructuring, it is argued, can reduce the need for travel - and thus actual travel. It is known, for example, that cities with higher population densities than ours have both lower per capita travel and transport energy use (Newman and Kenworthy, 1989). Further, the typical resident of the more densely populated inner suburbs of Sydney and Melbourne travels only a fraction of the typical outer suburban resident. Increasing population density, especially nearer the centre, seems an effective way of reducing travel. But since the average life of buildings is 50-100 years, major changes would take many decades, even if the intense opposition to such major density increases could be overcome.

Recognising this difficulty, an alternative proposal is to decentralise jobs and other activities to the suburbs, where people increasingly live. Indeed, our recent research has demonstrated that in Australian cities, workplaces, retail sales, educational places and other services are becoming spatially more evenly distributed, not less. That is, the opportunity for suburban residents to work, shop, study and recreate locally has actually increased over the past four or five decades. However per capita vehicular travel, far from decreasing, has trebled over this period! Clearly, merely providing the potential for travel reductions, does not, of itself, bring them forth. The main reason for this anomaly is that suburbanisation may reduce the need for travel, but in cities with rising personal incomes it vastly increases the convenience and speed of vehicular travel. Densely populated European cities today have low personal travel levels because they offer a natural restraint on car travel, thus enabling their potential for low vehicular travel to be realised.

So neither "technical fixes" - increased vehicle fuel efficiency and switching to lower or zero carbon fuels - nor land use planning offer much help with the immediate task of reducing vehicular travel. In brief, there are no painless methods for reducing transport-derived greenhouse gases or oil consumption. The only other effective strategy for reducing travel is by large increases in its cost. The problem here is to devise a strategy which is equitable, and, as far as possible, provides all Australians with access to needed activities at prices they can afford.

Basic to the strategy is the recognition that, for motorists, total travel costs have two components: the monetary costs of car ownership and operation, and non-monetary costs, mainly travel time. Compared with wealthier motorists, those on lower incomes are typically more concerned about saving money than time. After all, incomes are uneven, but everyone gets 24 hours each day. Given Australia's oil reserves and trade position, it is probably inevitable that some further petrol price increases occur, but there exist a range of policies for increasing the non-monetary component of travel costs. Further, these policies can be used to address the other traffic related problems.

An equitable and effective strategy will probably require large cuts in travel speeds - perhaps by half. Such a move would also allow higher traffic priority to be given to street public transport, pedestrians and cyclists. Such a change would greatly reduce car travel because the existing potential for travel reduction that suburbanisation makes possible could finally be realised. Slower cars would allow the road accident problem to be effectively tackled, not least by changing the psychological image of car travel. Further, reducing peak speeds for existing vehicles would be far more effective in reducing fuel use and emissions than penalising owners (usually low-income) of older cars, because the fuel used in overcoming air drag would be decreased by lower speeds.

It might appear that outer suburban workers (often low income) would now face horrendous travel times by this strategy. It would indeed be true if motorists tried to maintain existing travel patterns. But the reverse situation suggests this is unlikely. In Melbourne, for example, travel speeds in the mid-1960s averaged only 22km/hr, and average personal travel time 38 minutes/day. By 1986, the average travel speed had increased to 31km/hr, but travel time, paradoxically, had also increased, to 60 minutes/day. (Increasing city size cannot explain the result since the smaller state capitals today have similar daily travel times to Sydney and Melbourne) (INTSTAT, 1988). Travel patterns, it appears, are increasingly socially determined, so the strategy must be to change the rules governing private travel decisions.

The number of car parking places in the centres and inner suburbs of our large cities could also be cut dramatically. Since public transport serves these areas best, such parking restrictions would encourage more public transport use, particularly for its less well patronised evening and weekend services to and from the city centres. This would result in less air pollution and traffic intrusion in the inner suburbs, and an end to further inner area arterial road building. Finally, the present tax privileges given to company cars could be withdrawn: although this would increase the monetary costs of travel for the affected group, it would be a step towards greater equity.

The end result of the strategy would be reduced (and slower) car travel, with the more equitable public transport and non-motorised travel becoming relatively more important. Of course, these changes cannot be expected to be popular with either the motoring public or the various road transport interest groups, such as the car industry. But if greenhouse emissions are to be greatly reduced, passenger travel cannot be exempted. As noted earlier, the growth of private travel was checked for two decades by depression and war after its initial surge in the 1920s. Then as now, we may have little choice but to reduce car travel, in which case industry groups may have no alternative but to save what they can. Given that there is still uncertainty about the consequences of emission increases, the private travel industry is likely to oppose increased restrictions. On the other hand, public attitudes towards reduced travel may be more positive if people perceive that local traffic-related problems can be tackled along with problems of more global importance. Popular acceptance would be further helped by a policy which is more egalitarian, such as increasing travel time, than one which relies exclusively on money cost increases.

Conclusion

A combination of resource and environmental constraints ensures that the level of affluence in the wealthier countries, including car ownership levels, cannot be reproduced for humanity as a whole. The greenhouse problem, more than any other of the serious environmental problems we face, has demonstrated that the fortunes of all nations are inter-linked. What happens in the Third World, particularly large industrialising countries such as China, India and Brazil, now vitally affects us, since greenhouse warming or ozone depletion can only be minimised with their co-operation. Inevitably, food production and the satisfaction of other basic needs will soon take precedence over other less urgent claims for carbon dioxide and other greenhouse gas emission quotas.

It is in this context that the future of car ownership in Australia must be viewed. There already exist lists ranking countries according to carbon

dioxide released by deforestation, with the clear implication that being near the top of the list with Brazil is not a good thing. Such lists might well be supplemented by tables ranking car ownership limits, such as the one given in this paper. We predict that motor car ownership will soon become a symbol of frivolous if not callous, consumption in a world struggling to provide even minimum living conditions for its increasing population.

Opposition to the car's increasing dominance in Australia has taken the form of resistance to rail closures and to freeway construction. Resistance to car travel itself has been largely absent: activists still drive to anti-freeway protest meetings. And such opposition has done little to change basic public attitudes, since car ownership and travel continue to increase. However, over the next decade, the emerging oil depletion and greenhouse problems, when added to the perennial traffic-related problems of city living, seem likely to require fundamental changes in attitudes towards private travel. The increasing economic, environmental and ethical problems will interact with an increasing awareness that much vehicular travel can be easily foregone. Our present travel levels may come to be seen as not very clever. Can our long attachment to the car survive this?

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