1. INTRODUCTION

Transport planning is, or at least should be, an exercise in decision-making (Truelove, 1992). While the ultimate decision-makers are elected politicians, decisions are made on the basis of information supplied by professional transport planners. This paper is about the extent to which such information enables a genuine choice to be made between alternative courses of action. The idea of planning as a choice between alternative options or policies can be traced to the 'systems approach' to transport and land-use planning developed in the 1960s, but was reinforced in the 1970s with the introduction of environmental impact assessment. This paper considers the extent to which evaluation of alternatives forms part of the practice of transport planning in Australia, by considering recent major projects in Canberra, Brisbane, Sydney and Melbourne.

2. TRANSPORT PLANNING AND THE SYSTEMS APPROACH

Modern transport planning techniques were developed by social scientists in the 1950s. Key figures were the sociologists Mitchell and Rapkin, whose 1954 book *Urban Traffic: A Function of Land Use* expressed in its title the essential idea, namely that future traffic flows could be described mathematically as 'functions' of future land-use and demography. A sociologist colleague of Mitchell & Rapkin, J. D. Carroll Jr, was the first to use these insights for planning, in the pioneering *Detroit Metropolitan Area Transportation Study 1955* and the *Chicago Area Transportation Study 1956*. The techniques pioneered in the studies were rapidly exported by firms of US engineering consultants such as Wilbur Smith & Associates, De Leuw Cather & Co and Alan M. Voorhees & Associates.

The 'first-generation' transport models employed strong analogies with the natural sciences, most obviously in the 'gravity model' used for estimating trip patterns between different parts of the system. Initially, mode choice was analysed in similar fashion, modelled as a function of attributes like density and vehicle ownership. In the 1970s, these 'social physics' models were superseded by 'econometric' models which employed 'behavioural' methods to estimate mode choice based on the actual features of the different transport modes: access time, fares, in-vehicle time and so on (Pas 1990).

A possibly more significant advance was the development, in the 1960s, of models that sought to replace the static, one-way land use/transport relationship of the 1950s models, with a more complex two-way interaction. Cities would be modelled as evolving systems, and transport planning would merge with land-use planning in a new 'systems approach' based on the emerging science of cybernetics (Hall 2002, pp. 359-363).

The essence of the systems approach, as outlined by its early exponents, was the ability to compare and evaluate alternative 'packages' of transport and land use policies against pre-determined goals and objectives (McLoughlin 1969). This compared with the earlier approach of simply evaluating different transport (generally road) responses to a predetermined land use pattern.

By the end of the 1960s, it appeared that the systems approach heralded a new era of scientific transport and land use planning; but a decade later, the promise had largely

evaporated. Most transport planners had reverted to the 'first generation' traffic models of the 1950s, while land-use planners had largely abandoned quantitative analysis.

Peter Hall (2002) argues the change was due to two main causes. Firstly, it proved much more difficult than had been imagined to 'put the city into a computer' – there were simply too many variables, unknowns and unknowables. In the absence of workable new techniques, transport planners continued using the old ones they had learned from the US consultants. Secondly, social and political changes in the late 1960s and early 1970s produced a drastic loss of confidence among land use planners in 'technocratic' solutions.

While some of the claims made for the systems approach in the late 1960s were, on reflection, overblown, the basic idea that planning is primarily about choosing between alternatives, rather than simply extrapolating the status-quo, remains sound. In fact, the demand for genuine alternative policies was a key plank of the social movements of the 1960s.

3. ENVIRONMENTAL IMPACT ASSESSMENT

A critical element of the 'revolt' of the 1960s was the emergence of the environment movement. Many of the earliest environmental battles, particularly in the United States, were over freeways. An early victory for environmentalists came with the US *National Environmental Policy Act of 1969*, which required Environmental Impact Assessment (EIA) for any Federal government action likely to have a significant effect on the environment (Thomas 2001, pp. 100-2). Since virtually all major road projects in the USA are at least partially Federally-funded, this has ensured that EIA is a standard part of highway planning throughout the country.

The US legislation was the model for EIA regimes which have been introduced in Australia and New Zealand since the 1970s. There are three major differences between the Australian approach to EIA and that in the US. Firstly, the Australian systems usually have less detailed rules about procedure. Secondly, Australian governments have the discretion to wholly or partly exempt projects from EIA. Finally, the Australian systems generally offer limited opportunities for legal challenges to agencies' compliance with EIA. The result has been very little enforcement by the courts of EIA requirements in Australia, in contrast with the US, where a substantial body of case law has evolved as courts enforce compliance with the NEPA and equivalent state-level legislation. Interestingly, highway projects have been the most common subject of litigation.

From the beginning, EIA shared one important feature with the systems approach, namely an emphasis on evaluating alternative courses of action. The original US legislation required that an Environmental Impact Statement (EIS) outline and assess "alternatives to the proposed action" (NEPA, sec. 102 (C) (iii)), an expression that has found its way into most Australian legislation (e.g. the Commonwealth *Environment Protection and Biodiversity Conservation Regulations 2000*, Schedule 3, Part 1, Clause 6). A number of US highway projects have been stopped by court action because environmental assessments prepared for them did not satisfy this requirement.

The US court decisions have also established that examining route options for a proposed highway will not, in general, satisfy the 'alternatives' requirement. Public transport improvements, alone or in conjunction with other measures such as demand management and more modest road upgrades, must also be examined, even if doing so would be inconsistent with current policies. As one US decision noted:

> The fact that there is no plan or funding for mass transit... is not a justification for the defendants' conduct [in refusing to consider it]; rather, this is the very problem which the plaintiffs seek to remedy (*Manchester Environmental Coalition v Stockton, 1981*).

Internationally, a similar position is endorsed by the United Nations Environment Programme's EIA Training Resource Manual (UN, 1997), which offers a number of examples of alternatives, including "activity alternatives (e.g. providing public transport rather than increasing road capacity)". The leading Australian EIA textbook states:

> For example, if the proposal is construction of a road, the alternatives could reasonably be expected to include the broad transport alternatives, such as rail transport and demand management (to reduce the need for more road space) (Thomas 2001, p. 188).

A similar position is reflected in the Policy on Travel Demand Management in Urban Areas adopted by the Australian Institution of Engineers:

> Infrastructure improvements will continue to play a key part in the development of urban transport systems. However, travel demand management measures should always be considered and evaluated, either as an alternative, or as part of an integrated package, prior to the introduction of major infrastructure or improvement works (IEA 1996).

4. PRACTICE

The position seems to be clear: full and rigorous evaluation of non-road alternatives should be standard practice in the planning of major road projects in Australia. This has not, however, been the case in practice. Public transport and demand management policies tend to be either ignored completely or dismissed summarily.

This attitude can be traced back to the earliest US transport planning studies. The Detroit Metropolitan Area Transportation Study of 1955 was devoted exclusively to freeway planning, and simply noted, without comment, the decline of public transport (Mees 2000, p. 42). The Chicago Area Transportation Study 1956 did discuss the possibility of public transport offering an alternative to new roads, only to summarily dismiss it on the basis that "the conditions of land use and density... are the major determinants of the travel market. If demand is constrained by these factors, it is unlikely that changes in supply will have any great impact on the number of users" (cited in Mees 2000, p. 40). Interestingly, this view, which anticipates the 'density' focus of later commentators such as Newman & Kenworthy (1999), was based on a faulty analysis of the data (Mees 2000, pp. 146-8).

Of course, the position has changed in the US since the 1950s, due to the influence of the systems approach and EIA, together with the availability of 'behavioural' travel models that can be used to assess mode choice under different policy regimes. The following section of this paper examined the position in four Australian cities.

5. CANBERRA

Canberra has been cited as a model of 'systems approach' style transport planning principally because of the process that led to the adoption of the now-famous 'Y-Plan' to guide urban development (e.g. Black 1981). A study conducted in 1967 by Alan M. Voorhees & Associates assessed the transport consequences of a series of alternative land-use plans before settling on a Y-shaped linear urban form characterised by a high level of employment decentralisation. This led to the plan *Tomorrow's Canberra*, which was released by the National Capital Development Commission in 1970.

This process has not, however, prevented public controversy over freeway projects. Construction of the Molonglo Freeway along the north shore of Lake Burley Griffin in 1977 was greeted by sustained public protests (Black 1981, p. 220), while ACT local politics has been dominated by controversy over another proposed freeway, the Gungahlin Drive Extension (GDE), for the last decade. The GDE, like the Molonglo Freeway, dates back to the 1967 plan, and was confirmed when this plan was reviewed in 1984. At no point in the planning process for this road have alternatives ever been seriously considered.

The 1967 study did not, in fact, conform to the requirements of the systems approach, because the 'alternatives' considered were confined to land use issues. The study evaluated four alternative structures for Canberra, but:

> a single highway network was developed to test all of the alternate land use plans... It is felt that in view of the broad scope and scale of this study, this procedure did not bias the results in any way (Voorhees 1967, p. 13).

The Canberra planning process provides a textbook example of the kind of planning Brian McLoughlin advised <u>against</u> in his monograph which launched the systems approach:

> If one of the goals is to discover the optimum 'mix' of public and private transport facilities these 'mixes' must vary between alternatives... Far too many plans have been derived from the study of physical-form alternatives – e.g. 'satellite towns', 'linear growth' [etc]. Of course it is true that in so doing, different dispositions of jobs, population, shopping and recreation areas will have been studied, together with different transport systems. But it does not necessarily follow that they will have been studied in the best way since there may be little or no variation in one or more of these as between a number of physical forms (McLoughlin 1969, pp. 233-4).

Despite this, subsequent planning studies in Canberra have not departed from the pattern. *Metropolitan Canberra*, the NCDC's 1984 review and updating of the Y-plan, points out that the 1967 plan "was influenced by... planning techniques which were

popular amongst engineers and town planners in the 1960s [and] reflected the clear acceptance of the private car as the principal mode of transport for all trips, particularly the journey-to-work" (NCDC, 1984, iii). But the NCDC concludes that its "preferred metropolitan strategy is that which retains the basic principles and structure of the Y-plan" (p. 172).

Continuing with the 1967 plan was justified by comparison with an alternative 'concentrated plan', which focussed more employment in and around the city centre, but retained the assumption that travel would be dominated by the car. Naturally, this resulted in the need for more roads, thus apparently justifying the preferred 'dispersed' plan, with its more modest road network. No serious attempt was made to consider alternative scenarios based around more balanced transport patterns, as advocated by commentators like McLoughlin (see above).

The failure to consider alternatives is curious in light of the fact that the NCDC had itself commissioned consultants in 1975 to consider alternative transport policies. The consultants' report (Pak-Poy et al 1977) was not mentioned at all in the 1984 Y-plan revision report, or in subsequent transport planning documents (see below). The commissioning of the report had followed the adoption in 1974 of a new NCDC transport policy, which promoted demand management as an alternative to new infrastructure. The policy stated that "unnecessary use of the private car for commuting purposes will be discouraged" and proposed that roads be designed to accommodate off-peak, rather than peak, demands (Pak-Poy et al 1977, pp. 4-5).

The main demand management measures considered by the consultants were public transport improvements, pricing of car parking and allowing traffic congestion to accumulate. The overall effects of the demand management package were evaluated using a behavioural transport model in which demand and mode share were sensitive to changes in these factors. This contrasts with the 1967 modelling exercise, which did not take into account the effect of pricing or congestion on mode share. Table 1 presents a summary of the findings. Although the validity of the model inputs (and therefore the outputs) can be debated, the results nevertheless provided evidence that a change in policy away from total car dominance was practicable. But this possibility was not acted on, and by 1984 the Pak-Poy report had ceased to form part of the discussion of transport planning in Canberra.

The 1984 NCDC report argued that: "In the absence of a political or economic event which may influence the availability of fuel for private vehicles, there is generally little possibility of an 'across the board' increase in mode split." (NCDC 1984, p. 133) The NCDC conceded the possibility that there may be an increase in public transport's share of travel to Civic, Woden and "possibly in Belconnen" and evaluated "the effect of an (unlikely) increase in mode split to these centres, from the existing 15-18 per cent to 30 per cent" (p. 133). The NCDC argued that this was the upper bound of likely mode splits on the basis of a comparison with the CBD of Perth, "which has a population about four times that of Canberra and a much more concentrated central area" (p. 137; also p. 149).

Table 1. Mode splits with and without Travel Demand Management (TDM)

Destination	Mode share without TDM (%)			Mode share with TDM (%)		
	Bus	Car driver	Car passenger	Bus	Car driver	Car passenger
CBD (Civic)	16	69	14	48	41	11
Belconnen	17	69	15	41	46	14
Woden	16	69	15	39	49	13
Canberra total	14	71	15	33	57	10

Source: Pak-Poy et al 1977, tables 5.21-5.25. Figures are estimates for 1982.

What the authors of the 1984 report inexplicably omitted to mention was that the NCDC had been in possession of modelling results for some six years which indicated that a much higher mode split may have been possible. The only hint as to possible reasons for rejection of this advice is the hardly-surprising report that proposals floated in 1980 "to constrain the levels of car parking at major employment and retail nodes and increase the provision of public transport services, drew strong adverse comment from motorists using long-stay parking at existing major nodes" (NCDC 1984, p. 191).

The new NCDC transport policy adopted in the 1970s also appeared to have vanished by the time the 1984 report was released. Road-building was justified by the need to "resolve" the "problem" that "some of the major roads are experiencing congestion for a short time during the peak periods of travel" (NCDC 1984, p. 83). There was no mention of allowing congestion in peak period, charging for car parking or other measures to moderate the use of cars for commuting.

And so, when the time came in 1997 for an environmental assessment of the Gungahlin Drive Extension (then called the John Dedman Parkway), the consultants responsible for the assessment refused to permit the consideration of alternatives to building the road, reducing the exercise to the selection of a route. Predictably, it degenerated rapidly into a competition among residents and conservationists to shift the project into one another's back yards.

The consultants cursorily dismissed the prospect of alternative transport policies, arguing that "the scale of the [road] is sensitive to the level of public transport usage but for the highly unlikely combination of 30% public transport usage and a car occupancy rate of 1.25, at least three lanes can be justified" (Maunsell 1997, p. 71; emphasis added). As in 1984, the consultants did not model the effects of alternative policies[1], or even inform the community that the only modelling assessment conducted of such policies had concluded that they could provide a viable alternative to new road-building.

5. BRISBANE

[1] In contrast with the 1977 study, the evaluation used a 'first generation' model that was not capable of assessing policies designed to alter mode choice.

Transport planning politics have been at least as controversial in Brisbane as in Canberra. The most notable example is the unexpected defeat of the Goss Labor government in 1995, over a road proposal officially called the Eastern Corridor, but immortalised in popular memory as the 'koala freeway'. The transport minister of the time told the press after the election defeat that "The Government had looked for an alternative to the tollway, but all the figures on estimated future traffic showed it was the responsible decision to make" (*Australian*, 17 July 1995).

As it turned out, the government's advisers did not look very hard for an alternative. In particular, public transport and demand management were not evaluated: "The transport model used... calculated the number of person trips generated by the land use, estimated the proportions by private vehicle or public transport and forecast future traffic assignments on possible future road network options" (Rankine Hill et al 1992, p. 10). Following the defeat of the Goss government, the freeway was abandoned and the existing Pacific Highway widened instead: no testing of non-road alternatives was performed as part of this process either.

Another result of the change of government in Queensland was the development of the 1997 Integrated Regional Transport Plan for South East Queensland, a joint project of the State and the Brisbane City Council (Queensland Government, 1997). This plan proposed improving public transport's share of the travel market as part of a demand management strategy to moderate the growth in private car travel. A doubling of the mode share, from 8.5% of passenger-km to 17%, was proposed for the City of Brisbane (p. 19).

But the very next year, the BCC released an Impact Assessment Statement for the proposed City Valley Bypass road which, far from evaluating non-road alternatives, assumed that public transport's mode share would not increase at all (Connell Wagner 1998). The statement did not evaluate the effects of meeting the mode share target in the Integrated Regional Transport Plan for SE Qld, which would have substantially reduced traffic levels in the inner city region served by the Bypass. The evaluation would not have been difficult, since the model employed in the IAS had been developed by the firm Veitch Lister Consulting for the express purposed of modelling mode shift (see discussion of Melbourne, below).

6. SYDNEY

The most comprehensive environmental assessment conducted for a transport infrastructure project in Sydney has been that carried out for the Western Sydney Orbital. The EIS, released in 2000, runs to 17 large volumes, but does not contain any evaluation of alternatives. This was said to be because the need for the road had been established in an earlier study. But as the Director General of Planning's report on the EIS notes, this study simply compared different routes for the proposed highway link, and did not evaluate alternative transport policy measures at all:

> In 1993, the *Liverpool to Hornsby Highway Strategy Study* (Maunsell-DJA 1993a and 1993b) was undertaken. It examined the adopting or upgrading of an existing route, a new route in an existing road reservation and the development of a completely new road corridor between Liverpool and Hornsby. The outcome was

> to endorse a road-based option with public transport capabilities (Planning NSW, 2002).

Dee (2002) concludes that the Western Sydney Orbital EIS was an exercise in "project justification" rather than "impact assessment."

7. MELBOURNE

As in Sydney, the most comprehensive EES carried out for a new road project in Melbourne is for an orbital route, in this case the Scoresby Freeway (rechristened the Mitcham-Frankston Freeway in 2002). The 12 volume Scoresby Transport Corridor Environment Effects Statement (EES) exhibits one critical difference from its Sydney counterpart: it does contain a discussion, and even some evaluation, of alternative transport policies.

This was a response to the study's terms of reference, which sought to break with past practice:

> The EES will not take the form of an assessment of a transport proposal to which the Government is committed. Rather it will be an independent assessment which will provide a range of transport options and supportive land use opportunities for consideration by government... sets of integrated options will include combinations of demand management measures; ... broad public transport improvements within the corridor... and complementary land use development (SKM 1998, Appendix A).

The study began by developing a long list of possible alternative policies for refinement to a short-list for detailed testing. The basic choice was between "a scenario strongly favouring public transport... combined with measures to contain the growth of private car travel"; "a scenario strongly favouring private transport" or "balanced" scenarios in which both modes were upgraded (SKM 1998, p. 7-10). Each of these transport scenarios was to be paired with a complementary land-use scenario (p. 7-32).

The scenarios were given a preliminary assessment using a simplified model in which mode shares were assumed, rather than calculated. Testing and calculation would come in the second phase using a new model developed by Brisbane-based Veitch-Lister Consulting for the express purpose of assessing mode shift (p. 7-32). The results of the preliminary testing surprised everyone (including this writer!). Each one percentage point increase in public transport mode share reduced total annual road costs by $165 million, while the 22% mode share assumed in the "public transport" package generated annual benefits of $2.2. billion (p. 7-34). By comparison, the Scoresby Freeway generated benefits of only $190 million (p. 7-35).

The conclusion from this stage of the evaluation was that development of at least part of the Scoresby Freeway should be evaluated in more detail, as should "significant public transport upgrades." The latter could be combined with an "urban villages" based land use scenario to provide an "integrated scenario" (p. 7-37).

Then comes a surprise: only three pages later in the report, the reader is informed that

the 'public transport' option would not in fact be tested further, because "this study is considering integrated packages of road, public transport and landuse measures" (p. 7-40). No explanation is offered for the changed understanding of the meaning of integration, from the original notion of integrating transport measures with complementary land-use policies, to "an integrated approach, whereby both road network developments and public transport enhancements were considered" (p. 8-1).

So the Veitch-Lister model was used to compare building the Scoresby Freeway with the 'do nothing' option and building part of the freeway. Unsurprisingly, the full freeway produced the highest benefit-cost ratio – along with the poorest environmental performance.

8. DISCUSSION AND CONCLUSION

None of the Australian road projects discussed above would have survived a court challenge under US environmental law, because none involved any genuine comparison of the preferred project with alternative options. In two cases, Canberra and Melbourne, this occurred despite the planning agencies being in possession of information suggesting that non-road alternatives may have outperformed the preferred project.

Professor Rodger Eade, chair of the Victorian government- appointed panel which reviewed the Scoresby EES, defends the failure on the basis that "broad policy issues such as the respective roles of the car and public transport... should not be fought out on a corridor by corridor basis. They should be subjected to analysis and environmental assessment at the metropolitan or state level ahead of the identification and assessment of particular projects" (Eade 2000, p. 523). Doubtless this should indeed be the case, but the Canberra experience shows that Australian transport planners appear to be just as reluctant to compare real alternatives at the metropolitan scale as they are at the level of the project. Eade seems to suggest that if such a broader assessment has not occurred at the metropolitan scale, the deficiency cannot be corrected in the assessment of particular projects, a view that (as noted above) US courts have rejected.

Dee's alternative explanation is more persuasive. Because EIA is triggered by the development of proposals which agencies wish to see proceed, the process "can easily be manipulated towards project justification rather than impact assessment" (Dee 2000, p. 447). This is particularly the case for major road projects, which frequently come from plans prepared decades ago and supported by transport agencies for generations. For example, Davison (2003) outlines the way Melbourne's road planning agencies refused to accept the legitimacy of the Victorian government's 1973 decision to cancel many planned freeways, and worked surrepetitiously to have the projects reinstated (chapter 8).

In the absence of US-style litigation, the only way in which Australian practice is likely to change is through the combined efforts of professional bodies and educators. One important measure would be to introduce rigorous training in environmental impact assessment in transport and urban planning courses.

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