5. ECONOMIC MERIT OF THE MAXIMUM TECHNOLOGY SCENARIO

There is no point in pursuing with the technical fix described in Chapter 4, unless it can be shown that Australians will be better off overall from the technology proposed, as well as being in a position to obtain fuel savings.

An evaluation of this question was undertaken, which is described in the following Sections.

5.1 EVALUATION FRAMEWORK

Any broad based evaluation should address the points of view of the public, Commonwealth and State Governments and the automotive industry. The relevant issues concern national welfare including microeconomic efficiency, macroeconomic concerns and the effects on the industry.

5.1.1 The Players

The classification of government, industry and public is perhaps coarse, but adequate given the requirements of the Brief. Subsequently, others may wish to distinguish political and bureaucratic arms within Government; Plan Producers, importers and component manufacturers within the industry; and various community groups, such as environmental groups, unions, large and small firms, communities which rely on the automotive industry for their economic support, and so on.

5.1.2 Evaluation Criteria

Similarly, it was not the intention to try to address the detail of all possible concerns from the point of view of all the players. That is too ambitious. Rather, the Study identified criteria at two levels:

- six evaluation "factors", each of which address the following broad areas of concern - engineering, energy management , environmental, socio-economic, macroeconomic and financial;
- within each factor, specific evaluation "elements" were identified to assist the focus of quantitative estimation and qualitative judgement (WP6, Table 6.1).

Not all of these are relevant to decisionmaking, because they may apply equally to the "steady as she goes" and a "do something" scenario. The following discusses the entry of the various factors and elements into the evaluation of the Maximum Technology Scenario.

5.1.3 Focus of the Evaluation

The selection of "available and applicable" technical options for the MTS made it unnecessary to specifically consider engineering feasibility and availability during the process of policy analysis. If a subsequent analysis wished, for example, to explore other unproven technologies now seen in prototype or concept cars only, it would be necessary to focus on those

technologies only, as well as production volume and cost.

The technical options were also chosen with an eye to an ability to recover the production cost from subsequent fuel savings. This issue is quantified in aggregate in later Sections.

Matters relating to fuel quality and the energy cost of production are also not at issue under the MTS, as the same technology is applied to both the Product Plan and the MTS, and differences would be negligible. This may not be the case if certain advanced materials were envisaged in the MTS under a subsequent analysis. This also applies to most environmental concerns except the volume of fuel used (and hence greenhouse gases emitted). Similarly for safety issues, which were accommodated under the assumption that Australia will adopt safety and emission standards similar to those in the US 1994 proposal, at about year 2000.

In delivering the MTS, Plan Producers will need to import a range of componentry. However, Australian automotive manufacturers are steadily increasing their exports, e.g. in aluminium components which are a useful input to clean and fuel efficient vehicles. It is considered that provided the manufacturing climate is appropriate, any likely marginal increase to imports could be accommodated by adjusting the level of exports as technology advances under the PMV Plan.

Also, measures to implement the MTS are not likely to have a large impact on employment because as the planning period proceeds, production lines will become more and more automated, irrespective of whether the Product Plan or the MTS is pursued. Changes to volume if available would impact employment positively, although this has not been quantified. The increases to employment would not be as great as increases in volume however, because of economies of scale.

The price of vehicles is influenced by two factors: the economic environment including the tariff structure, and the costs of new technology. As discussed in Section 2.1.3, total new car registrations were predicted on the basis of tariff policy under the PMV plan and expected devaluation of the currency. Technology costs were calculated and treated explicitly as part of the process of predicting sales mix discussed in Section 5.2.2.

The evaluation therefore focussed on the national social welfare tradeoffs between technology cost and fuel savings, protection of Government revenue and the impact on consumers. These were analysed in detail and the results appear in the following Sections.

The calculations assumed that a given fuel consumption saving as measured according to AS 2877-1986 translates to the same fuel consumption saving if a vehicle is driven on the road.

For all economic assessments, costs and benefits were discounted to 1988. A 10 percent real discount rate was used, on the basis that the automotive industry operates at the risky end of the

commercial spectrum. Constant 1988 prices were used.

The forecast of new passenger vehicle registrations for the period 1988-2005 shown in Figure 2.2 provided a control over the mix of vehicles estimated by the model discussed in the next Section. The life of vehicles sold in each year varies somewhat, but fall in the range 25 to 30 years.

In consultation with the DPIE and the AIP, fuel prices were forecast (in constant 1988 dollars) to rise from 49.0 cents/litre in 1988 to 62.2 cents/litre in 2005.

5.2 ASSESSING BENEFITS TO CONSUMERS

A key tool used for the economic assessment was an econometric model prepared by the Institute of Transport Studies (ITS). This was used to predict:

- the market share (sales mix) of each class of car which would arise under the forecast sales volume, the technology included in the MTS and some given policy environment;
- the benefits to consumers which would arise under the combinations tested.

The motivation for measuring benefits is similar to the approach used in standard cost-benefit analysis. That is, the benefits derived from some change to technology or policy are a function of the differences between consumer utilities before and after the change.

WP7 (Appdx.C) includes a detailed technical description of the ITS model. Supplementary calculations were performed where possible to provide a control or second opinion on estimates of other economic indicators.

5.2.1 What are the Sources of Consumer Surplus?

Benefit to consumers, or "consumer surplus", was defined as the excess of the amount car buyers would be willing to pay for the satisfaction (or utility) gained from acquisition and use of cars, over the amount they actually pay.

In a simple text-book analysis, the consumer's surplus is measured according to the effect of a price change under a linear demand curve (Williams:1978). It is also appealing to assume that the capital value of future saving represents an increase in consumer surplus of a new car, which in turn is associated with tradeoffs between fuel economy and the price of the car.

However, these simple approaches do not suffice in the context where there are nine classes of vehicles and where the changes being considered would result in a significant amount of demand shifting from one class to another.

Consumer satisfaction arises from a whole range of tangible services and intangible feelings associated with the car's attributes and how it performs in service, both now and as expected in the future.

These include the benefits arising from travel, or travel by the most efficient mode (including fuel savings or other technical enhancements), an improved level of service arising from vehicle attributes such as interior volume; the flexibility of the car for towing, carriage of garden rubbish, and so on; the feeling of elegance or status arising from colour, presentation and options; the comfort delivered by air conditioning, plush seating and power steering; and the ability to overtake large trucks in 'tight' situations, which also allows the driver to 'save time'.

Clearly fuel efficiency is an important contributor to consumer satisfaction, because it minimises the costs of travel. However, market research results indicate that new car buyers do not necessarily weight fuel efficiency highly during their purchase decisions.

Interior volume is more important because it provides space for passengers or goods, and especially a contingency in case of infrequent uses. Examples of these include holiday travel, occasional carriage of social or business groups, and carrying of unusual loads (like taking the TV to be repaired, or samples to a customer). This contingency appears to be highly valued.

In concept, it is assumed that a consumer can rank alternative product offerings according to the satisfaction, or utility provided. The ranking not only takes account of the price paid for the vehicle and the fuel savings it might deliver, but also the non pecuniary benefits discussed above. To appreciate the ranking process, one must think in terms of a generalised "price"; i.e. the consumer subjectively weights product features and expectations along with money payments and chooses the vehicle with the lowest composite "price" (Cardell and Dunbar 1980, p.424).

It is important to note that the estimates of the changes in consumer surplus (discussed below) arise, in the main, from consumers switching between new models as technology provides more attractive attributes. However, fuel saving contributes to consumer surplus in a small way.

This low impact of fuel efficiency on consumer choice is also indicated by the very low (0.091) estimates of fuel efficiency with respect to fuel price reported by several researchers in Hensher and Young (1991,p.39).

5.2.2 Modelling Consumer Surplus

There are great difficulties in measuring utility, but attempts must be made if Government decisions on policy matters (especially such important matters as fuel economy) are to take the national welfare into account.

Mapping the effects is an extremely complex task which is accomplished through the ITS model as discussed further in WP7, Appendix C. It prepared estimates of consumer choice of sales mix and the consumer surplus obtained from an analysis of attributes of cars present in the Australian fleet; household, ownership and usage characteristics obtained in consumer surveys; the unit

costs of new technology and vehicle operation (including taxes) and vehicle retail prices (including taxes).

Specifically, estimates of consumer surplus arise from a change in the weight, price and fuel efficiency of new cars sold in Australia between 1988 and 2005. This took into account the predicted changes in the vehicle class mix, and flow through effects from vehicle choice into vehicle use.

Positive changes to consumer surplus arise from increases to the class mix selected (larger cars have greater interior volume), fuel efficiency (the impact of brake specific fuel consumption on fuel costs) and weight reductions (lighter materials feed back into interior volume and fuel efficiency). Car price increases (due to technology improvements) or fuel price increases (due to crude oil prices or additional excise) impact negatively on consumer surplus estimates.

It is to be noted that other factors change over time, e.g. household income, fuel price, rear volume of small/medium vehicles, unit operating costs, incidence of private/business-registered vehicles etc. Some attributes are highly correlated with weight, and implicitly bear on the calculation.

The model was calibrated on the basis of a survey of Sydney households in 1985, which included both privately owned and company cars. The survey obtained information not only about the cars themselves, but also who owned them and why, and how they were used on a daily basis.

Because nearly 90 percent of Australians live in cities or country towns, the data was considered to be sufficiently representative to apply the model parameters to all Australia.

Nominally, survey information can be modelled by a number of straightforward mathematical techniques, but these were not considered to be adequate for this Study. One difficulty was that the sources of consumer satisfaction are so dispersed; another is that consumers commonly cannot properly articulate their reasons for choice in a survey situation; a third is that researchers have to frame their questions before they get any answers, hence the framework may not be ideal. Yet the advice must be prepared in the light of the data that can be gathered.

To circumvent any problems in survey technique, the mathematical construct assumed that survey respondents know explicitly or implicitly why a particular choice was made, but the data does not include a number of unobserved factors or items which must be taken into account.

The technique involved making some assumptions about the mathematical distribution of these unobserved (or random) factors. In econometric language, it was assumed that the unobserved component of the utility expression was distributed extreme value Type I, and the choice model thus takes a multinomial logit form. This aspect is very technical and the theoretical underpinning is discussed further in WP7, Appdx.C.

Suffice to say here that the survey data was used to obtain an estimate of the probability that a representative consumer would choose the particular make/model which offers the highest utility, under a given set of product offerings and personal circumstances. These probabilities were extended to orient the model construct to vehicle classes.

5.2.3 Interpreting the Estimate of Consumer Surplus

The ITS model was used in conjunction with other procedures to estimate, for target years 1995, 2000 and 2005, changes to the sales mix of cars and the consumer surplus, due to the Maximum Technology Scenario. The Product Plan was the basis for comparison. The utility of cars already on the road was assumed unchanged in respect of technology, except that reduced numbers of pre 1988 vehicles was taken into account as these were replaced.

Column 2 of Table 5.1 lists the number of vehicles expected to be sold in each target year. Columns 3 through 5 and 6 through 8 respectively summarise two alternative interpretations of consumer surplus obtained by owners.

TABLE 5.1: NOMINAL AND DISCOUNTED CONSUMER SURPLUS BY YEAR

Target Year	Vehicles Sold	Nominal Consumer Surplus			Discounted Consumer Surplus		
		New	Used	Subtotal	New	Used	Subtotal
1988	410473	0	0	0	0	0	0
1995	463681	1152	-410	742	383	-181	202
2000	496010	1168	-480	688	388	-211	177
2005	497935	1597	-510	1087	531	-225	306

An issue of great importance in the calculation of changes in consumer surplus is the underlying behavioural rule implicit in a potential vehicles purchaser's choice process leading to the selection of a new vehicle. There are two extreme positions:

(i) a "Nominal" estimate of consumer surplus, in which an individual evaluates all attributes in a way that reflects the value of those attributes to the individual throughout the period in which the vehicle is likely to be held by that individual. Due account must be taken of the expected residual value after this period. In this situation one would assume that the future stream of consumers' surplus is capitalised in the year in which the car is purchased. That is, the individual has already undertaken subjective discounting in the process of arriving at a choice decision.

(ii) a "Discounted" estimate, in which an individual evaluates all attributes in a way that reflects what is affordable at the time of purchase without giving any significant

weighting to the manner in which the attributes provide benefit throughout the period the vehicle is planned to be held. In this situation some "lateral" discounting is required to accommodate the assumption that the individual has not undertaken any subjective discounting at the time of purchase.

Referring to Table 5.1, the nominal estimate is represented by the results opposite each target year in Columns 3 through 5, and the discounted estimate by the results in Columns 6 through 8.

Subject to the process of lateral discounting, both estimates represent the aggregate of annual gains in consumer surplus obtained by all owners, year by year, throughout the remaining life of each car built according to MTS specifications; less similar benefits which would have been received if the vehicle had been built according to Product Plan specifications. These include all sources of benefit from the Maximum Technology Scenario such as fuel savings, improved technology, lighter vehicles and consequent benefits, and so on.

Note that improvements to new vehicles under the Maximum Technology Scenario produce changes to the consumer surplus obtained by owners of both new and used vehicles. Although the technology applies only to new vehicles, there is a flow through effect to used vehicles, over and above the normal depreciation due to age and wear which would be expected under the Product Plan scenario. This is because the Maximum Technology Scenario represents a rate of improvement in vehicle technology not previously experienced in Australia.

Referring again to Table 5.1, the nominal interpretation summarises, in Columns 3 through 5, the aggregate amounts of consumer surplus obtained from:

- the number of new vehicles sold in each target year, as listed in Column 2 of the Table;
- for used vehicles, to the total number of vehicles on register in that target year, excepting those vehicles which are registered for the first time in the target year. For example, the total vehicles on register at year 2005 is estimated to be 10.3 million vehicles.

Similar interpretation is placed on the discounted figures in Columns 6 through 8.

Considering the nominal estimate of consumer surplus for new vehicles sold in 1995, an aggregate consumer surplus of $1152m was estimated to accrue from 463681 vehicles. This represents a unit gain of $2484 per vehicle, which is not an excessive expectation for a buyer who pays the 1995 average price of $24,200. Perhaps this is the basis for Green and Liu's (1988) acceptance of the nominal estimates as their preferred interpretation.

To obtain the discounted consumer surplus shown in Columns 6 through 8 of Table 5.1, the nominal consumer surplus for each target year shown in Columns 3 through 5 was assumed to be distributed uniformly across the remaining life of the vehicle and discounted to the target year. The remaining life was assumed

to be 28 years for new vehicles and 19 years for used vehicles, which estimates are consistent with the fleet age structure.

The ITS and senior economists on the Steering Committee tended to favour the nominal interpretation, while accepting the possible validity of the discounted interpretation. The latter was preferred by some members who considered the nominal amounts to be surprisingly large, especially when they were compared with other relevant aggregates such as changes to sales tax, fuel tax, and so on.

An intermediate interpretation might be one in which vehicle attributes are viewed in a manner which involves a mixture of discounted and undiscounted assessment. In particular, an assumption along these lines might be that consumer's inability to undertake subjective discounting (lack of information etc) as reflected in the random utility maximisation assumption underlying the econometric model system results in the domination of "what is affordable" at time of purchase with limited appreciation of the profile of benefits over time.

The literature on how individuals evaluate vehicle attributes through time at the time of purchase is controversial. The issues are not well understood. Given this situation, the Steering Committee decided that the Study should report both interpretations, and allow the reader to select within the continuum of possibilities.

The model predicts that while consumers of new vehicles will gain significantly from the benefits of technology change in each year of the planning period, owners of existing vehicles will receive disbenefits over and above normal depreciation due to age and wear. This is because the accelerated technology change would also accelerate the obsolescence of vehicles already owned. Note however, that these unit amounts are small; e.g. for year 2005, and using the nominal interpretation, the loss of consumer surplus of $510m is distributed over 10.3 million vehicles, or about $50 per vehicle.

A comparison of the estimated consumer surplus (whether nominal or discounted) in the various target years shows that the magnitude does not change greatly between year 1995 and year 2000. This is because at 1995, the bulk of benefit arises initially from fuel efficiency due to reprogramming engine management systems, so the benefits are gained at minimal cost. Between years 1995 and 2000, additional fuel efficiency is achieved, but technology costs rise at the same time. This causes a flattening off of the rate of gain. By 2005, the efficiencies and other sources of consumer surplus cause the rate of gain to increase faster than the technology costs, bringing an increase of 35 percent in consumer surplus in the last 5 years (from $1168m to $1597m).

A Qualification: Implications of Changes in Consumer Preferences

Estimates of changes to consumer surplus in any year are subject to the prevailing consumer preferences, which are prone to change

as preferences evolve from generation to generation. Thus 2005 consumer preferences may produce a different change to consumer surplus from the MTS than in say, 1995. As indicated above, the consumer preferences on which this Study is based were measured during the mid 1980s.

Previous studies of fuel economy in the US have resulted in controversy over the magnitude of estimated changes in consumer surplus. The only caveat one can apply is that changes in preferences over time are likely to reduce the magnitudes where the outcome affects the overall quality of new products.

The extent of such reductions is essentially a value judgement to be made by an individual forecaster. Others have suggested discounting the estimates made by the Study on the basis that if policy were to induce downsizing of the fleet, people would get used to the new smaller vehicles and gain more utility than they might from an equivalent size vehicle today.

This comment may reflect the commentator's unstated preference for compulsory downsizing, while the modelling suggests that the MTS would lead to a slight upsizing and positive changes to consumer surplus. Under the MTS, it is clear that the reverse argument would hold. People would get used to new larger cars and gain less utility than they might from an equivalent size car today.

However, this Study has provided correct evidence based on the accepted approaches used to derive measures of consumer benefit. Those accepted approaches include the practice of holding measured factors such as consumer preferences constant and as measured, for the whole planning period.

In support of the position taken, it is pointed out that the last twenty years have shown that the automotive industry can make cars more fuel efficient over time without giving up essential features of comfort, interior volume, etc. The Product Plan predicts that there are technical grounds to believe that these progressive improvements will continue through to 2005. Those models are likely to contain the full current range of size, comfort, performance and other features, but with noticeable reductions in weight.

Depending on the evidence available, it may be possible to adjust the parameter estimate for vehicle weight in the model, and thereby reduce the estimated change in consumer surplus.

However, the Study has no basis for determining an alternative set of future consumer preferences and particularly a preference for lower levels of service. It is true that alternative techniques have been tried (such as stated preference techniques) but these are beyond the Terms of Reference and the resources available.

It may be in Australia's interest to undertake a follow-up household survey and model recalibration over the next year or two.

Conclusion

Although the model used for estimating the future sales mix and consumer benefits under the MTS is not perfect, it does represent the current state of knowledge in this field. The Study was satisfied that the estimates were sufficiently robust for decisionmaking, but a major concern was to contain the analysis within the limits of calibration imposed by Australian survey data.

The Study would argue that the estimates quoted in the following Sections are reasonable and the best which can be provided in Australia at this time.

Techniques are available to extend the limits of the model using stated preference techniques. However, the Study did not offer opportunity for such work but it may be needed in the future if Australia is to pursue a fuel economy policy which responds to the Government's Interim Target on Greenhouse.

5.3 ECONOMIC IMPLICATIONS OF THE MAXIMUM TECHNOLOGY SCENARIO

The National Social Welfare was taken as the principal measure of economic merit arising from the Maximum Technology Scenario. Changes to national social welfare arise from changes to consumer surplus as discussed above, less additional investments made by industry to enable accelerated technology development and subject to variations in sales tax, fuel tax and import tariffs which flow from changes to sales volume of vehicles, fuel efficiency and proportion of imported vehicles and components.

In addition, estimates of fuel saving and changes to retail prices due to technology improvements were considered separately, to gain an appreciation of whether the Maximum Technology Scenario would of itself deliver the Government's Interim Planning Target on Greenhouse, and whether the impact on retail prices would be so great as to engender consumer resistance.

Table 5.2 summarises the estimated effect on national social welfare, resulting from the changes to consumer surplus, accelerated investment and variations in government revenue. Continuing the mode of reporting established by Table 5.1, parts A and B of the Table 5.2 respectively summarise the nominal and discounted estimates of changes to consumer surplus. The various columns of both parts are discussed below.

Volumes of Vehicles Sold

Referring to the Table, the volumes of vehicles sold in each target year (1995, 2000, 2005) are listed, and are the same under each interpretation. Volumes rise from 410,473 in 1988 to 497,935 in 2005. The change in upward trend at 1994 is not significant, and arises from expected fluctuations in exchange rate interacting with removal of tariff barriers under the PMV Plan.

Changes to Consumer Surplus

The results shown in Columns 3 through 5 of Table 5.2A reproduce the nominal estimates of consumer surplus in Columns 3 through 5 of Table 5.1.

TABLE 5.2: ESTIMATED INCREASES TO NATIONAL WELFARE ARISING FROM THE MAXIMUM TECHNOLOGY SCENARIO

A: NOMINAL ESTIMATE ($ million)

Target Year	Estimated Volume	Change in Consumer Surplus New	Used	Subtot	Accelerated Investment Programme	Revenue Change Sales Tax	Fuel Tariff	Sub Total	National Social Welfare
1988	410473	0	0	0		0	0	0	
1994	466746	987	-351	636		-2	-29	-27	
1995	463681	1152	-410	742		-2	-34	-32	
2000	496010	1168	-480	688		22	-99	-71	
2005	497935	1597	-510	1087		14	-204	-180	
NPV (1988)				3959	-200			-325	3434

B: DISCOUNTED ESTIMATE ($ million)

Target Year	Estimated Volume	Change in Consumer Surplus New	Used	Subtot	Accelerated Investment Programme	Revenue Change Sales Tax	Fuel Tariff	Sub Total	National Social Welfare
1988	410473	0	0	0		0	0	0	
1994	466746	328	-155	173		-2	-29	-27	
1995	463681	383	-181	202		-2	-34	-32	
2000	496010	388	-211	177		22	-99	-71	
2005	497935	531	-225	306		14	-204	-180	
NPV (1988)				1070	-200			-325	545

Note: Totals may not add due to rounding.

The final row in each part A and B of Table 5.2 includes an estimate of the net present value of consumer surplus changes at 1988. To obtain this, the target year estimates were linearly interpolated from zero in 1988, and discounted to that year at a discount rate of 10 percent.

Table 5.2A suggests that the net present value of the nominal consumer surplus arising from a fuel economy policy which delivers the Maximum Technology Scenario, after taking account of losses accrued by owners of existing vehicles, would be $3959m., while the net present value of the discounted consumer surplus shown in Table 5.2B is estimated at $1070m.

From the point of view of policy formulation, both provide an encouraging finding. It indicates that consumers would get value for money spent on the types of vehicles envisaged under the MTS.

Accelerated Capital Programme

Plan Producers are routinely involved in ongoing capital investment which will ultimately deliver the technology improvements implied by the FCAI forecast and the Product Plan scenario.

Relative to the Product Plan, the Maximum Technology Scenario represents early introduction of technical options and an accelerated investment programme. This means that, compared with the Product Plan, the Maximum Technology Scenario will require industry to bring forward some capital programmes.

The accelerated investment programme required to bring the MTS about is not included within the ITS model, but is one of the costs involved in a fuel economy policy. It therefore should be accounted alongside the improvements to consumer surplus.

Table 5.3 summarises the estimated additional investment required to be expended by all Plan Producers (collectively) between year 1995 and 2005 to deliver the Maximum Technology Scenario at 2005.

TABLE 5.3: ESTIMATED PLAN PRODUCERS' AUSTRALIAN INVESTMENT REQUIREMENT BY TECHNOLOGY TYPE

Technology	Plan Producers Involved	Capital Reqt. ($m)
Front Wheel Drive	2	350
Weight Reduction	5	390
Drag Reduction	5	140
Four Valve Engines	2	370
5 Speed Automatic	1	100
Variable Valve Timing	2	370
TOTAL		1720

These amounts were estimated after discussions with the industry, and represent the additional cost of land and buildings, plant and equipment, tooling and labour expended on capital items. They take account of the fact that Australia will continue to import a range of components, including the modified 2-stroke engines included in the Maximum Technology Scenario.

On the basis of the relative penetration of technical options discussed in Chapter 4, it was estimated that the normal investment programmes would be brought forward by five years. It was concluded that the net present value in 1988 of bringing forward this capital expenditure would be about $200m in 1988 dollars. This figure appears in Column 6 of Table 5.2.

This amount reduces the estimated net present value of nominal consumer surplus shown in Column 5 of Table 5.2A, resulting in a progressive total of ($3959m-$200m=) $3759m. Similarly, the NPV of discounted consumer surplus is ($1070m-$200m=) $870m.

Both estimates overstate the national social welfare gain. This is because some part of the consumer saving is an overall

reduction to Government revenue due to the net effect of changes to sales tax, import tariff and fuel tax collections.

To obtain the estimated changes to national social welfare, these redistributions were estimated as discussed below and listed in Columns 7 through 10 of Table 5.2.

Changes to Sales Taxes and Tariffs

Information required for the estimation of changes to Government revenue gained from tariffs and sales taxes applied to technology was obtained from discussions with industry and Government sources. It was assumed that:

- the retail markup of new vehicles is around 30 percent of retail price. Thus the wholesale price including tariffs and sales tax was assumed to be 70 percent of retail price;
- about 25 percent of value is subject to tariff;
- sales taxes are 20 percent on all vehicles, with an additional 10 percent on upper luxury class vehicles.

On this basis, the sales tax differential between the Product Plan and the Maximum Technology Scenario was estimated for each target year, as follows:

	Estimated Sales Tax ($m)		
Year	PP	MTS	Diff.
1995	1583	1581	-2
2000	1692	1714	22
2005	1711	1725	14

These results show that sales tax collections will increase steadily with growth in sales volume and increased cost of technology (applies to both the Product Plan and the Maximum Technology Scenario) over the planning period, but that the sales tax changes due to the Maximum Technology Scenario itself are small.

The tariff changes were calculated on components only, and changes were negligible in 1995, $5.8m in year 2000 and $8.5m in 2005.

These results appear in Columns 7 and 9 of Table 5.2.

Changes to Government Fuel Tax Revenue

Changes to Government revenue due to the fuel taxation vary with fuel savings, and were calculated on the basis of 1988 fuel prices and tax rates obtained after consultation with ABARE and the AIP. Fuel savings arise because cars built under the MTS will be more fuel efficient than those built under the Product Plan. Other factors affecting fuel savings include the market share of new fuel efficient vehicles entering the fleet, the number of years each vehicle is on the road, achieved on-road fuel consumption and annual distance travelled.

The estimate of fuel savings per vehicle arising from the Maximum

Technology Scenario assumed that:

- any car purchased during the planning period operated for the full period;
- the average annual distance travelled per vehicle varied around 15,000 km/year;
- the on road fuel savings for each vehicle per km is equal to the difference in new vehicle fuel consumption estimate for relevant class, between the MTS and the Product Plan.

Fuel savings estimates under these assumptions are conservative (low) because new vehicles travel much further per year than old ones. If the estimate were prepared taking account of year by year changes to distance travelled, higher fuel savings would be brought forward in the calculation. This would lead to losses of fuel excise in earlier years than shown in Table 5.2.

When a new car is sold, it causes fuel savings not only in that year, but also for every year thereafter. But to estimate the total fuel saving in each target year, it was necessary to count the savings not only of vehicles sold in that year, but in all years since 1988, but prior to the target year.

The fuel savings in each target year were multiplied by the resource prices and fuel tax rates to produce the following estimates for each target year:

Target Year	Fuel Saving (ML)	Resource Saving ($m)	Taxation Loss ($m)
1995	131.3	39.4	33.8
2000	365.4	115.3	98.8
2005	708.7	237.3	203.5

The total loss of Government revenue due to excise in each target year was rounded and appears in Column 8 of Table 5.2.

5.4 THE MAXIMUM TECHNOLOGY SCENARIO - AN EVALUATIVE REVIEW

The following places the estimates reported in Section 5.3 in the context of an overall evaluation of the MTS. This assessment does not consider whether Government needs to encourage manufacturers to bring this technology vision into practice. That issue is raised in a later Chapter.

5.4.1 Feasibility of Implementation

The Maximum Technology Scenario was selected on the basis that the technical options identified are, with the exception of the modified 2-stroke engine, already available and in production somewhere in the world. It is therefore reasonable to expect that no Plan Producer will have difficulty introducing them to the level of penetration stated in Chapter 3, by 2005.

All of these technical options are considered to be applicable to cars sold in Australia; indeed, some of those options are already appearing in vehicles sold in Australia in 1991.

Thus the Maximum Technology Scenario is feasible, and represents an approximation to international best practice at 2005. But it predicates a change to existing production plans which do not currently envisage such deep penetration of technical options during the planning period.

5.4.2 Impact on Plan Producers

In order to accelerate penetration of technology, Plan Producers will have to accelerate capital programmes beyond 1995, and this was shown in Section 5.3 to cost an additional $1720m over a 10 year period to 2005. The net present value at 1988 of the additional outlays would be in the order of $200m in 1988 dollars.

Some manufacturers may argue that they should not depart from their normal product development programmes because they design to their market, and cars need to be uniquely 'Australian'. Section 2.2.2 expresses severe reservations about this position, and it was concluded that there are many overseas models which would do very well in Australian conditions, and be more fuel efficient than those sold here.

The Maximum Technology Scenario is not expected to engender a significant change in the size of the new car market. It will however, change the mix of vehicles sold.

A big advantage for Plan Producers is that, provided Government policies do not dictate otherwise, the Maximum Technology Scenario is not expected to continue the rapid downsizing which occurred between 1988 and 1990.

Rather, the market share of medium and upper medium classes (which are the forte of Plan Producers) would increase by about three percent during the period, which represents additional volume in these classes of the order of 15,000 units annually in the latter years.

Because the MTS maintains the share of new medium and upper medium cars likely to be sold during the planning period, it will maximise the opportunity for Plan Producers to survive in the increasingly difficult trading environment which they will encounter. Their main problems arise from lack of volume and Government intervention of various kinds, including taxes, charges and industrial legislation. Intervention in this industry is deeper than in most other industries in Australia.

Plan Producers are better positioned to make medium and upper medium class vehicles than small ones, and the MTS represents an opportunity for them to concentrate on reduction of drag coefficient, fuel efficient engines, plus transmissions and accessories technology rather than a crude across-the-board reduction in weight and cross sectional area. They have an opportunity to become more skillful in the process.

Also, Australia's vehicle assembly industry will be encouraged, which maximises the opportunities for component manufacturers.

5.4.3 Fuel Economy Available from Technology

The Maximum Technology Scenario would deliver an NAFC of 6.35 l/100km in 2005, or 6.54 l/100km if US 1994 safety and emission standards were introduced in 2000. This former figure represents a little more than a 30 percent fall over the 1988 NAFC, and a 20 percent fall over the current prediction made by the FCAI.

FAFC may take longer to respond depending on choices in the second hand market, because scrappage rates are so low and because larger vehicles seem to last longer than smaller ones. Depending on trends in annual travel per vehicle, and car ownership outcomes, FAFC may be down to around 9.0 l/100km by 2005, or about 24 percent below the 1988 FAFC estimate of 11.8 litres/100km.

By 2005, annual fuel savings will be only about 700 megalitres less than the expected use under the Product Plan of about 15,000 megalitres. Again, this is because of the slow penetration of new vehicles into the fleet, which takes about 28 years to be replaced.

Thus the Maximum Technology Scenario will not by itself deliver the Government's Interim Planning Target on Greenhouse emissions, which requires a 20 percent reduction in fuel use and greenhouse emissions by 2005.

However, the gains are significant, as the net present value at 1988 of annual fuel savings referred to in Section 5.3.1 is $437m.

5.4.4 Impact on Consumers

Consumers will receive real fuel savings, plus substantial qualitative and quantitative benefits through the medium and upper medium class cars which feature good interior volume as well as fuel economy. They will probably be prepared to pay more rather than move to smaller and less utilitarian vehicles.

Because the MTS uses a deeper penetration of new technology compared with the Product Plan, there will be marginal price rises due to the more expensive piece costs.

Increases to retail prices were estimated in 1988 constant dollars and include sales tax and tariff penalties under the PMV Plan, but assuming a continuation of the 15 percent tariff beyond 2000 to 2005. Information was obtained from the US and Australian industries, bearing in mind that some components would be imported, and locally produced components would be made behind a tariff barrier.

Retail prices were estimated by vehicle class to include amortisation of capital, but not the cost of bringing capital programmes forward, which was treated separately as discussed in Section 5.3. For the Product Plan and the MTS at each target year, the estimates were based on the penetration into each vehicle class in that year (WP3:Tables 2.4, 2.5)

The increase in turnover of new car sales as a result of differential price rises under the Maximum Technology Scenario was estimated to rise from zero in 1988 to $227m. in 2005. Average vehicle price rises at each target year are also shown:

Year	Additional Retail Value of Technology ($m)	Number of Cars Sold	Av. Retail Price Rise ($/veh)
1988	Nil	410,473	Nil
1995	0.3	463,681	Neg.
2000	154.7	496,010	310
2005	227.0	497,935	456

These represent real price rises of the order of one percent on average, although the marginal cost rises to about three percent for luxury vehicles. Although this is significant, the research suggests that income effects are small and consumers will regard the product features of vehicles built to the MTS as value for money.

Ford and Holden cars are likely to be at the upper end of this range, with the other Plan Producers about mid-range. Particularly, introducing front wheel drive into upper medium Australian cars such as Commodore and Falcon may not be a painless exercise.

Whether these rises will be noticeable during the planning period depends largely on whether Government is successful in controlling inflation. Certainly, they would not be noticed among the broad environment of cost increases which has been typical of the Australian economy during the last 50 years.

The net present value of piece costs, including normal allowance for research and development in Australia as necessary, land and buildings, materials and labour, will be about $309m.

5.4.5 Impact on National Social Welfare

Table 5.2 summarised the estimated costs and benefits of the Maximum Technology Scenario over the Product Plan, and concluded that the net present value of benefits and costs of a fuel economy policy which can deliver the Maximum Technology Scenario lies in the range $545m. to $3434m. in 1988 dollars, depending on how the reader interprets the nominal and discounted estimates of consumer surplus.

5.4.6 Impact on Government Revenue

The impact on Government revenue is assessed on the basis of existing tax rates. The MTS will bring about a steady fall in Government revenue from sales tax, tariffs and fuel tax, with fuel savings being the greatest contributor. The net present value of lost revenue is estimated to be $325m in 1988 dollars, as listed in Table 5.2.

It is to be expected that Governments will wish to consider the revenue losses in a budgetary context.

5.5 CONCLUSION

The evidence produced by the Study so far shows that if implemented, the Maximum Technology Scenario would not only produce substantial fuel efficiencies among new cars sold in Australia, but it would also benefit Plan Producers, car users and add substantially to national social welfare.

Note however, that the net present value of fuel savings of $437m attributed to the MTS will not pay for the costs of technology, which have an estimated net present value of $200m. for accelerated investment and $309m. for piece costs.

Nonetheless, the benefits to consumers arising from a fuel economy policy which relies on technological enhancement are so great that they cannot be ignored, and make it worth while for Governments to pursue ways to achieve the Maximum Technology Scenario.

In fact, one would have to wonder why the technological advances are not introduced on the basis of their own merits. To understand this, NELA would look at the cult of the Australian automobile, and the outlook for the industry, which was discussed in Chapter 2. There is a great lack of awareness of fuel economy benefits and a fear of failure in the marketplace which locks everyone into the status quo.

There may be a real opportunity for Government to show the leadership necessary to break the cycle. The PMV Plan is positive, but does not specifically address this issue.

The question then remains, what should the Government do to encourage consumer and industry participation in a vigorous fuel economy programme?

Before exploring this question in Chapters 6 and 7, attention is again drawn to the magnitude of the gains to consumer surplus arising from the MTS.

It is NELA's opinion that the issue of consumer surplus is central to the public policy arguments surrounding motor fuel conservation. In particular, the evidence suggests that Australians would be better off if the search for fuel economy were pursued through technology rather than under other regulatory or taxation approaches which might be attempted.

6. A FRAMEWORK FOR POLICY BASED IMPROVEMENTS TO FUEL ECONOMY

It is not possible within the space and resources available to consider all the possible policy instruments which might be applied towards improving fuel economy in passenger vehicles sold in Australia.

However, the Brief specified a number of policy instruments which Governments might use to bring about improved fuel economy of cars sold in Australia. These include vehicle labelling; variable sales tax; treatment of cars in the context of company taxation including the Fringe Benefits Tax (FBT); annual charges such as registration fees; fuel taxation; and mandatory fuel economy standards. The Brief and the Steering Committee allowed some licence on how these instruments were to be defined.

The following develops the framework in which the specified policy instruments were analysed, and which led (in Chapter 7) to a package of actions which might seem to offer achievable improvements to fuel economy.

However, it is not the purpose to make specific recommendations on matters of policy. Rather, the following Sections and Chapter 7 provide a discussion which may assist others to do that. As they do, additional information can be expected to arise which might bring forth an even better alternative.

6.1 THE DIMENSIONS OF GOOD POLICY

The foregoing Chapters indicate conclusively that there are substantial benefits available from pursuing fuel economy through a technical fix. During the Study, the question most frequently asked by others was how to encourage or coerce manufacturers to introduce the most fuel efficient technology available into cars sold in Australia, within one or two years of it becoming available in production cars overseas.

6.1.1 What Not To Do

There is in fact, no way that any government can <u>force</u> the global manufacturers to introduce their technology into any given country, including Australia. The US CAFE regulation illustrates the perversities which can arise under ill conceived government command, even though a technical solution is being sought.

Similarly, Government can expect to have difficulty if it attempts to legislate design, production or distribution strategies. Not only have such attempts failed in many areas, but they often require economic concessions to keep the subject industry viable. The PMV Plan is one example of such concessions, but one can consider many public utilities in this context.

6.1.2 Articulation of Policy

It is clear that at the outset, Government will have to articulate the nature, scope and content of any fuel economy policy, especially when the evidence documented elsewhere in this

report and the WPs indicate that fuel economy is not high on the agenda of consumers or manufacturers.

This will have to include the aims and justification of any policy, the administrative order which will be used in implementation, the policy instruments which are to provide the leverage for community action and the compliance mechanisms which are to be used.

6.1.3 Key Issues to be Addressed

There are a wide range of issues which bear on the desirability or otherwise of particular policy options and outcomes. The Study context and objectives suggest that the principal ones include fuel consumption of new passenger cars sold in Australia (which correlates with Greenhouse emissions) and impact on the automotive industry.

The investigations outlined in previous Chapters indicated that there are five complementary issues which new policies need to address:

(a) Section 2.2 suggests that there are no particular Australian consumer requirements (towing, etc) and/or road conditions (e.g. two lane roads, unsealed, no cold weather, etc.) that warrant cars sold in Australia being tuned to deliver fuel consumption lower than that of equivalent vehicles sold overseas;

(b) Section 3.4.4 suggests that the systems for measuring fuel consumption for individual make/models sold in Australia are less than understandable to car buyers, and may even be misleading. They also require sophisticated interpretation before they can be used to indicate whether cars sold here are as fuel efficient as those sold overseas;

(c) manufacturers respond to messages from their customers, and those messages place little or no imperative on fuel economy. Section 2.2 suggests that, at present, there is no reason for them to design cars and programme management systems to deliver greater fuel economy, and ways need to be found to change their motivations towards the most fuel efficient technology available and applicable here (the international best practice "issue");

(d) even if that motivation can be found, available and applicable new technology will not deliver fuel economy targets much below 6.5 litres/100km, if Australia introduces US 1994 safety and emission standards around year 2000. If it is decided that lower targets are required to be met, then ways are needed to keep the costs to all Australians manageable;

(e) simply legislating for lower fuel economy as attempted in the US is not likely to be any more effective in Australia than in the US, and may have a lot more negative effects because the industry is much more fragile here. This is due to the small market, the structure of costs it faces and the fact of overseas ownership which could revert to importing at any time.

Other important background is the conclusion of Section 2.2.2 that there are sufficient similarities between Australian and overseas conditions for specifications of cars used overseas to be applicable to Australian roads and passenger task requirements.

The evidence of Section 3.4 combined with the review of the discussed in the Section 2.2 also led to the conclusion that consumers need to be able to appraise their own fuel economy if they are to value it, and that the existing test procedures are not good enough for this.

Further, they are not good enough for proper public scrutiny of fuel economy policy which seeks to deliver any NAFC target below 8.0litres/100km by 2005.

6.1.4 A Public Awareness Campaign is Needed

Following initial Government announcement, one major prerequisite to the success of any legislative or taxation instruments is seen to be a campaign to raise public awareness of the need for fuel efficient vehicles, what steps are to be taken to encourage greater fuel economy among product offerings, and why buyers should favour fuel efficient products.

Section 2.2 discussed the relatively low values placed on fuel economy by new car buyers, pointed out that the images used in advertising new cars are inappropriate from a fuel economy point of view, and suggested that automotive manufacturers are not particularly concerned about fuel economy, because their customers are really asking them to deliver other attributes.

It was pointed out that many economic constructs surrounding the motoring experience are wrong, and that the images and symbols of new cars placed before the buying public appeal to motoring delights which are at best counterproductive to fuel economy and at worst unsafe.

A prerequisite to improving fuel economy in Australia is public education and information programmes which effect necessary changes to the public culture. The evidence recounted in Section 2.2 and in the WPs suggests that it will be necessary to transform cultural meanings that go back more than fifty years.

Summarising, a publicity campaign needs to change:

1. Inadequate constructs of the economic environment. The campaign should argue that:
   - it is incorrect to assume that fuel surpluses are secure. Although fuel is one of the lowest costs of the motoring experience, it should be more highly valued;
   - although the 'Australian' automotive industry is in fact owned by global manufacturers, it should be supported by Australians because of its potential contribution to the economy and to individuals' livelihood;
   - companies which buy cars as part of the salary packages of senior managers should make them contribute to the cost of private use just as do private drivers;

- there is no longer any need to build 'Australian' cars for rough and unsealed roads, because the road system is quite adequate for cars made anywhere in the world. Hence, cars built in Australia should be to international specification;

2. those symbols and media relating to fuel efficiency (i.e. test results, the Guide, etc), which are not particularly appropriate to the Australian condition or are not understandable by the average consumer who is faced with a fuel economy policy. Concerns about the existing test procedures, which are the only symbols currently available, are expressed in Section 3.1.1;
3. the motoring myths and icons which currently occupy the world of motoring, viz: auto racing; the bush workhorse; luxury, elegance, urbanity; the 'Australian' car. Rather, Australians should be taught to value clean and fuel efficient cars, international best practice in new fuel economy technology, optimal fuel efficiency within class and that excessive speed and acceleration is wasteful.

In addition, a public awareness programme should emphasise the environmental appeal of improved local air quality and lowered risk of climate change due to reduced Greenhouse emissions. This agenda was not present when the Australian automotive culture was developed.

It is clear is that Government moves to change buying practices will not be successful unless the public is first convinced that it is in their interests to reduce fuel consumption. Similarly, manufacturers must be convinced that their customers place a high priority on clean and fuel efficient cars.

Without cultural change, any further regulation or taxation, however meritorious, to improve fuel economy runs a risk of counterproductive political backlash. It is too easy for commercial interests to use their advertising budgets to counter attempts to change attitudes in the public interest. Recall the difficulties which arose in the fight to control smoking.

It is not possible to overstate the importance to fuel economy, of a public education and information programme of the scale of the *'Life. Be in It.'; 'Quit'* or *'Drink. Drive. Bloody Idiot.'* campaigns. Such a programme is seen as prerequisite to policy intervention.

Such education programmes must target and influence buyers' attitudes as they are formed, i.e. perhaps two months before sale. This suggests that media advertising is an essential element of the programme.

These programmes must then be reinforced by policy instruments which deliver sensible and consistent price signals to consumers. In addition, Government must lead by example.

6.1.5 A Package of Actions

Turning to the actual legal and taxation instruments required, three issues become obvious:

- there are a wide range of existing instruments which have to be taken into account before one adds on new ones;
- the market characteristics of private and company buyers are so different that a single new instrument is unlikely to be successful;
- if new policy instruments are applied, they should enhance and implement opportunities for those with expertise to deliver a technical solution to the desired fuel economy level, without introducing perversities or unintended consequences which counter Australia's wider interests.

The Study therefore sought to outline a package of actions which focus on the policy instruments listed in the Brief, but take account of the existing framework of legislation, taxation and administrative order; the value systems of Australians and particularly those community sectors impacted by policy changes.

6.1.6 Use the Carrot Before the Stick

In designing any policy package, recall that this Study has shown that essentially, implementing the Maximum Technology Scenario is in the interests of manufacturers and consumers alike, and the main problem is to create price and other signals which make this clear. This would be a major change to the current car marketing environment.

Probably, all that is needed is for the package to provide one or more avenues towards a marketplace that makes the purchase of fuel efficiency cars an attractive and logical decision. Such an appeal to market forces is the direction taken by the PMV Plan, which has had a measure of success in its objectives, albeit with a modicum of complaint.

The package should also place consumers in a position to rationally choose among product offerings such that they properly weight fuel economy against competing vehicle attributes.

If adequate information and appropriate price signals are delivered to consumers, further market intervention may not be necessary, and indeed it might be possible to remove some existing intervention.

However, if this is not effective in the intermediate term, then it may be desirable at that stage to introduce more stringent measures (such as a 'gas guzzler' tax or mandatory fuel consumption standards), but in a more sensible and constructive way than appears to be the case in some overseas countries.

6.1.7 Conclusion

It was concluded that if Government wished to construct a effective fuel economy policy, it would need to show great leadership and could not succeed without providing necessary encouragement to manufacturers and buyers.

To create a framework of policy based incentives to fuel economy, Government would first have to clearly articulate the scope and content of new policy, provide an public awareness campaign which

influences public and manufacturer attitudes, and then identify a package of legal or taxation actions which build on the technological opportunity identified in previous Chapters.

In designing such a framework, Government should consider:

- the existing and available regulatory system which affects manufacturing, distribution, ownership and use of cars;
- the attitudes already created by these activities, the key issues relevant to the players and the objective of fuel economy policy; and
- the spectrum of economic and social criteria which make the difference about which specific policy instruments are likely to be most effective in changing existing market signals;
- keeping stringent and potentially risky instruments in reserve.

6.2 EXISTING AND AVAILABLE POLICIES

Table 6.1 lists a range of policy instruments which are in place already, or might be considered as possible ways to reduce fuel consumption of both new cars and cars on the road, through direct manipulation of passenger car manufacture, distribution, ownership and use. Fewer than ten of these are in place somewhere in Australia, but all or nearly all are in place somewhere in the world.

The candidate instruments specified by the Brief are highlighted in the Table, subject to some modifications. The relative merits of these instruments are signified, and discussed further in Section 6.4.

The listing of Table 6.1 does not purport to be exhaustive (and probably could never be): e.g. it excludes transport system and land use options such as building new road infrastructure, influencing modal share to car travel or reorganising the distribution of places of residence and employment over the longer term. It also does not mention a Carbon Tax, which was understood to be topical in Government circles during the Study. It is inappropriate to consider this very large issue in a study whose main focus is motor vehicle technology, and it is outside the Terms of Reference anyway. It is also the subject of detailed investigations in a number of Commonwealth Departments.

However, the Table can be used as a partial checklist or reminder, against which others can check the completeness of their considerations.

A review of the Table reinforces the point that the motor car is ubiquitous throughout society, that there is very extensive Government intervention already, and that there may be scope for this to be modified in favour of improved fuel economy, without affecting the overall revenues to Government.

TABLE 6.1: SIGNIFICANCE (1) OF POLICY INSTRUMENTS BY FACTOR AND INSTRUMENT

Policy Instrument Type/Name	Brief Reqt	Resp. (2)	Affect	Impact on: Minorities	Welfare	Revenue	NAFC	FAFC
Affecting Manufacturing								
Mandatory Fuel Economy Std	**Yes**	**C/w**	**o**	**o**	**---**	**o**	**++**	**o**
Mandatory Emissions Std	No	C/w	o	o	+	o	--	-
Tradeable Emission Rights	No	C/w	o	o	o	+	+	+
Fuel Economy Subsidies	No	C/w	o	o	o	-	+	+
Variable Sales Tax	**Yes**	**C/w**	**o**	**o**	**o**	**+**	**++**	**+**
- Gas Guzzler Tax	**No**	**C/w**	**-**	**-**	**o**	**+**	**o**	**+**
Export Credits for F/economy	No	C/w	o	o	o	-	+	o
Tariff								
- New Vehicles	No	C/w	-	o	o	+	+	+
- Components	No	C/w	--	-	o	+	o	+
Investment Allowances	No	C/w	-	o	o	-	+	o
Physical programmes (e.g. training assist)	No	Any	-	+	o	-	+	o
Affecting Distribution								
Information Programmes	**Yes**	**C/w**	**+**	**+**	**+**	**-**	**+**	**+**
Value Added Tax	No	C/w	o	o	o	+	+	o
Affecting Ownership								
Annual Charges								
- Registration	**Yes**	**State**	**-**	**o**	**o**	**+**	**+**	**o**
Annual Credits	No	State	+	+	o	-	+	+
Taxation Deductions: Companies								
- No Depreciation	**Yes**	**C/w**	**o**	**o**	**o**	**+**	**+**	**+**
- No Expenses	**No**	**C/w**	**o**	**o**	**o**	**+**	**+**	**++**
- Raise FBT	**Yes**	**C/w**	**o**	**o**	**o**	**+**	**o**	**o**
Taxation Deductions - Sole Traders								
- No Depreciation	No	C/w	+	-	o	-	+	+
- No Expenses	No	C/w	+	-	o	-	+	+
Affecting Use								
Fuel Taxes								
- Excise	**Yes**	**C/w**	**-**	**--**	**o**	**+**	**+**	**+++**
- Business Franchise Fee	**Yes**	**State**	**-**	**--**	**o**	**+**	**+**	**+++**
Motor Vehicle Inspections	No	State	--	-	-	-	o	+
Usage Controls								
- Odd/Even Days	No	State	---	-	--	o	o	+++
- Speed limits	No	State	--	o	+	o	o	+
- Traffic flow controls	No	State	-	o	o	o	o	+
Usage Charges								
- Metered Vehicles	No	State	--	-	o	+	o	+++
- Tolls		State	-	o	o	+	o	+
- Parking Charges		State	--	o	o	+	o	++
Driver Qualification	No	State	---	o	--	-	o	+
Driver Training	No	State	--	o	+	-	o	+

Note: 1. +,o,- symbols represent positive, neutral of negative impact.
2. C/w, State means Commonwealth or State legislation applies.

If the analysis of policy instruments listed in the Brief provides appropriate results, it may even be possible to reduce existing levels of taxation and regulation, to allow market forces to promote the desired technology fix. Reducing regulation would free up the marketplace to reduce pressures on the players as well.

In the subsequent analysis, the impact of some instruments is highly correlated and therefore can be treated concurrently; e.g. the assessment need not address both fuel economy and CO_2 emissions.

6.3 DESIGNING OUT PERVERSITY

An important factor in the design of any programme of regulatory reform is to assess the risk of unintended consequences (i.e. perverse outcomes) and what approach is most likely to preempt that risk.

By way of example, the international experience documented in Sections 3.4 and 3.5 indicates that fuel economy regulation has a history of ineffectiveness and perverse outcomes. CAFE regulation is one of the worst examples, and that experience could easily be transported to Australia unless careful consideration is given to the design of any additional policy instruments.

Experience with design of regulation teaches that the easiest way to avoid perverse outcomes is to keep the language simple, the objectives worthy, the penalties equitable and the rules contained within a minimum number of jurisdictions.

Policy instruments are likely to be robust and acceptable if they:

- o use the pricing mechanism. There are several reasons for this. They:
  - work best in a market environment and might be designed to reinforce manufacturers' competitiveness, whereas if the CAFE outcome is to be a guide, command-and-control instruments could have the reverse effect;
  - might be extended into tradable rights and so parallel export credits under the PMV Plan;
  - provide opportunity for equity effects to be offset by targeting the disadvantaged with mitigating programmes financed by revenues generated.

  Also, the alternative (mandatory fuel consumption standards) operates as a variable tax/subsidy on large and small cars (Kleit:1990,p.155), so one might as well apply a tax anyway;
- o facilitate Commonwealth rather than State action. There are two issues here. Firstly, the regulatory burden on Australians and the industry will be minimised if only one jurisdiction is involved and further, the time to negotiate agreement among all States is commonly a deterrent to implementation of policy, however meritorious. Secondly, most prospective intervention will need to be applied uniformly across Australia (though this does not deny the need for regional adjustments in some cases);
- o do not affect actions by constituents (voters, individuals),

but target corporations' activities;

- o minimise impact on welfare. Because government taxes and charges are transfer payments, they provide scope for offsets to inequities such as disproportionate costs to minorities (i.e. be careful of distributional effects);
- o preserve the revenue. Instruments which do not raise revenue (neglecting fines) have administrative and enforcement costs which have a negative impact on the revenue;
- o have a high impact on greenhouse gases. In this regard, the Study will not explicitly calculate greenhouse emissions, but rely on fuel consumption as a proxy. Hence an impact on NAFC, or more particularly FAFC, is relevant to this criterion.

6.4 A PREFERRED RANKING OF POLICY INSTRUMENTS

For developing a policy package, it was necessary to rank the policy instruments specified by the Brief. The criteria identified in Section 5.1.2 and 6.3 were used in conjunction to rank the most reliable and effective ones at the top, and those most prone to perversity at the bottom. Thus the instruments were prioritised for use in a possible future fuel economy programme.

The process was neither straightforward nor simply stated, but the following outlines how the possible package(s) summarised in Chapter 7 was developed.

Initially, the reference to vehicle labelling included in the Brief was extended to include a full public awareness and education programme as discussed in Section 6.1.2 et seq. Similarly, the reference to variable sales tax was taken to include all kinds of changes to the sales tax on new motor vehicles, including elimination of the wholesale sales tax or replacing it with a retail tax (which is not now imposed in Australia but is widespread in other countries).

For each instrument listed in the Brief, the direction of generalised benefit or cost was considered, according to the criteria discussed under Section 5.1.2. By bearing in mind which group(s) is likely to bear the impact, an opinion was formed about who will gain from non compliance and whether such gains are sufficiently large to motivate them to circumvent policy.

Referring to Table 6.1, the direction of positive, neutral or negative benefit is indicated for each policy instrument by a "+", "o" or "-" respectively, when viewed from the perspective of that group. The number of pluses and minuses included in the Table is an indicator of the degree of benefit or cost, based on the qualitative assessment of the Consultant.

By way of example, consider the assessment of a variable sales tax shown in the Table. The voting constituency, minorities and welfare recipients are largely unaffected because only a few people buy new cars. Reductions to the sales tax on fuel efficient vehicles (or increases on gas guzzlers) will bias the rate of penetration of new vehicles into the fleet in favour of the fuel efficient ones, and hence have a positive effect on NAFC and FAFC. Revenue outcomes are easily controlled which is also a

positive effect.

To some extent, the basis for the award to each instrument is evident from information provided in earlier Sections. In other cases, the evidence emerges from analyses reported below and in Chapter 7.

The indicator of ranking was obtained by simply summing the "pluses" and "minuses" shown in Table 6.1. The elementary nature of this method is recognised, but it does facilitate simple discussion of the issues and some insight into the underpinning of the ranking.

Of the instruments identified, public education programmes were awarded four "pluses" net. The case in favour of an public education programme is clear, as described in Section 6.1.4. However, there are two other reasons:

- in a situation like Australia's where there is substantial scope for information programmes to raise the awareness of the public about fuel economy, it was considered that benefits would accrue early in the programme;
- there are no adverse effects, or alternatively such effects are benign.

Policies which change the sales tax were awarded four pluses because, if applied at the level of vehicle purchase, they can be made to be very powerful and direct; because they are sufficiently flexible to use across-the-board and/or specifically within a vehicle class; because they impact on minorities and the poor only through the used car market (which dilutes severity) and because the quantities of Government revenue generated are relatively easily controlled.

Policies to change company tax provisions were awarded 3 to 4 pluses net. Complete abolition of company tax deductions would be very effective in producing downsizing, which is the essential task for lowering the average fuel consumption in company cars. However, complete abolition would be expected to engender severe criticism from the commercial community, probably greater than was experienced when business entertainment was abolished.

Fuel taxation changes, including changes to the Business Franchise Fee, were awarded two pluses. Fuel taxes are a very powerful tool in controlling fuel economy, and are a significant generator of Government revenue, but they can have substantial distributional impacts and political costs.

Changes to Fringe Benefits Tax arrangements, and Annual Registration Charges were each given one plus net. For these annual charges, the modelling described in Section 5.2 indicated that they had the least impact of all the costs applicable to the ownership and operation of a motor car.

This is because they are small relative to other costs of operation. Very large annual imposts would be needed to have any significant impact on vehicle purchase decisions, perhaps of the order of three times existing annual registration fees and insurance premiums. However, such large imposts could not be

tested within the limits of the models. Their relatively low ranking is based largely on their ineffectiveness.

Mandatory Fuel Consumption Standards was the only instrument to be awarded a net minus. This is because fuel consumption standards operating alone have been shown by both overseas and Australian experience to be ineffective after a short time, and if made mandatory can produce substantial perversities, as shown by the US experience.

On this basis, it was concluded that where a fuel economy programme might need to apply one or more of the policy instruments listed in the Brief, it should consider them in the following order:

1. Public awareness programmes (including vehicle labelling).
1. Changes to the Sales Tax regime;
3. Changes to company income tax arrangements.
4. Fuel Taxation (i.e. Excise and Business Franchise Fee);
5. Fringe Benefits Tax and Annual Registration Charges;
6. Mandatory Fuel Consumption Standards.

The gap in the ranking is deliberate to allow for ties.

6.5 PROCESS OF POLICY ANALYSIS

In analysing candidate legislative or taxation actions as reported in Chapter 7, it was necessary to make certain assumptions about the motoring environment, and the characteristics of the technologies being applied, and to conduct the analyses by way of comparisons involving the Product Plan, the Maximum Technology Scenario and existing on-road vehicles.

6.5.1 Assumptions

As a point of departure, it was considered sensible to design intervention on the basis that the Maximum Technology Scenario was shown in Chapter 5 to be meritorious on all counts: it provides a large increase to national social welfare, a significant saving in fuel, it will increase sales of those models which are the strength of Plan Producers (which protects Australian jobs); and the retail price increases are marginal, which means it will not impact greatly on consumer incomes.

Public education programmes were believed to be justified on the basis that they enable consumers to make a rational purchase decision, by providing information about the benefits of fuel economy; in other words, the price and quality signals delivered by the marketplace accord with resource costs, and the programmes themselves do not impact on sales volume or class mix.

Also, the proportion of vehicles sold into businesses and Government were assumed to be managed according to the following rules:

(a) only new or nearly all new vehicles are acquired;
(b) vehicles are replaced after four years in service (the replaced ones being sold to private buyers in the used car market;
(c) all upper luxury and luxury cars are sold for management use

(i.e the top echelon);

(d) vehicles sold for use by other management and household businesses are treated identically;

(e) the determinants of choice of vehicle bought for management or household use are similar to those for private buyers of luxury and upper medium cars;

(f) fleet vehicles (i.e. car pools, etc.) are managed separately from management and household vehicles. Subject to a control over mix of small to upper medium classes, the determinant of choice is NPV of total cost to the original buyer over a four year period.

In respect to (e), note that employees have considerable influence over the choice of car issued to them as part of a salary package. Although costs are met by the company, they are notionally offset against salary package and, provided the end user stays within set limits, company accountants are not necessarily asked to comment on value for money. Status in the firm and personal preferences are much more important.

Other economic assumptions were outlined in Section 5.1.3.

Recall that commercial vehicle derivatives were excluded from the Brief. Thus the analysis took no account of possible substitution of commercial vehicle derivatives for passenger cars during the planning period, although Australia may see growth in market share of these before 2005, as people buy cars for specialist rather than utilitarian purposes.

6.5.2 Comparisons for Policy Analysis

Subject to the limitations of available data and the range of validity of the ITS models, the aim was to evaluate the economic implications of policy instruments in the context that they should encourage manufacturers to deliver vehicles which conform to the Maximum Technology Scenario.

The analyses addressed the mix of attributes identified for the Product Plan and Maximum Technology Scenarios, and compared the former with a combination of maximum technology and sales or fuel tax policy. In this way, the tests provide estimates of the sales mix which would occur, and the change to national social welfare, government revenue, fuel savings, etc., under a combination of technology and policy option.

Where policies were being examined to induce fuel economy improvements beyond those achievable via technology, the MTS was tested with and without the policy, which isolates technology as the main source of benefit which should be delivered as a priority over other measures which seek to promote fuel economy.

For these comparisons, changes to national social welfare is driven by the same factors as discussed under Chapter 5.

6.6 ECONOMIC MERIT OF SELECTED POLICIES

Referring to Section 6.4, the preferred ranking placed variations to the sales tax, company tax and fuel tax among the top four of

the policy instruments set down by the Brief.

Ideally, all of these would be analysed via the ITS model, but this was not possible in the case of company tax options due to data limitations about the factors affecting choice of company cars. Indeed, similar constraints apply to analyses of changes to Fringe Benefits Tax, Annual Registration Charges and Mandatory Fuel Consumption Standards.

This Section reports the results of analyses of sales tax and fuel tax options, using the ITS model to estimate sales mix and consumer surplus, as discussed in Chapter 5. The following discussion parallels that of Section 5.4.

Two major analyses were undertaken:
- o eliminating the 20 percent wholesale sales tax; and then
- o raising the fuel tax to replace all of the revenue lost as a result of eliminating the sales tax.

A number of other analyses were undertaken to test other possible policy mixes; these are discussed in detail in WP7 Appdx.C, and referred to in Chapter 7.

These major analyses illustrate the limit of benefit achievable from what might be called 'positive' Government intervention i.e. new laws which promote a technical fix, reduce the totality of regulation (as measured by the number of tax transactions) and cause price signals to approach resource costs.

For example, eliminating the 20 percent wholesale sales tax would reduce:
- o the price of new cars and thus increasing sales volume;
- o the price of used cars thus increasing scrappage rates;
- o Government revenue.

It is believed that such measures would tend to maximise the number of clean and fuel efficient vehicles entering the fleet before 2005, without mandating old vehicles off the road. They would also improve the competitive position of Plan Producers compared with importers (because the Maximum Technology Scenario favours medium to upper medium class vehicles) and reduce fuel used by cars already on the road.

These tests assumed that upper luxury vehicles would continue to attract an additional wholesale sales tax of 10 percent, as currently applies.

Sales Tax and fuel tax changes were assumed to commence from target year 1995. Thus between 1988 and 1994 inclusive, the analyses assumed that the economic effects would be identical to those discussed under Table 5.2, which assumed no policy changes.

Increase in Sales Volume

For the first two tests, elasticity estimates were used together with the outlook for tariffs under the PMV Plan and an assumed drop in the value of the Australian dollar to $US0.75 by 1995, to obtain an alternative estimate of new car sales for the period

1995-2005. The method used was identical with that used to produce the estimates for the Product Plan as described under Section 2.1.3, except that removing the sales tax was assumed to flow through to retail prices.

Eliminating the 20 percent sales tax was estimated to cause volume to rise to nearly 558,000 units in 2005, compared with about 498,000 if the 20 percent sales tax were retained. Estimates for other target years are shown in the Tables below.

Increase in Scrappage Rates

The current scrappage rates are in the range 3.5 to 4 percent per year, which implies that the life of cars on Australian roads is around 28 years, and the average age of the existing fleet was shown to be around 9 years.

The literature shows that the demand for new passenger cars has an elasticity with respect to price around -0.6, and the elasticity of scrappage with respect to new car price is -0.66 (WP6,Appendix B).

For both analyses, the reduction in new car prices due to elimination of the sales tax was used to estimate an increase in scrappage of older cars of about 1 percent to 4.7 percent.

6.6.1 Test: Eliminate the 20 Percent Sales Tax

Table 6.2 summarises the contributions made to national social welfare by a policy which achieves the Maximum Technology Scenario and eliminates the 20 percent sales tax, as compared with a continuation of existing sales taxes and Product Plan technology.

The factors contributing to welfare are the same as those identified under Table 5.2, but a comparison of the Tables shows that all factors except the cost of an accelerated investment programme and the import tariffs are estimated to change significantly with change of policy.

Changes to Consumer Surplus

The discussion is similiar to that of Section 5.3. Tables 6.2A and 6.2B summarise the nominal and discounted estimates of the changes to consumer surplus, i.e. Table 6.2A assumes that consumers notionally take account of future benefits at time of purchase, whereas Table 6.2B assumes that budgetary factors are much more important at time of purchase and benefits taken in future years should be discounted.

Referring to Table 6.2A, the nominal consumer surplus jumps from $987m in 1994 to $2290m in 1995, due to the one off elimination of the 20 percent sales tax on new cars. It then rises steadily with technology improvement to a value of $3195m, or $5726 per vehicle, in 2005.

TABLE 6.2: ESTIMATED NATIONAL SOCIAL WELFARE ($m) OF THE MAXIMUM TECHNOLOGY SCENARIO AFTER ELIMINATING THE 20 PERCENT SALES TAX

A: NOMINAL ESTIMATE ($ million)

Target Year	Estimated Volume	Change in Consumer Surplus New	Used	Subtot	Accelerated Investment Programme	Revenue Change Sales Tax	Fuel Tariff	Sub Total	National Social Welfare
1988	410473	0	0	0		0	0	0	
1994	466746	987	-351	636		-2	-27	0	-29
1995	519521	2290	-2006	284		-1363	-41	0	-1404
2000	555744	2741	-480	2261		-1458	-154	6	-1606
2005	557901	3195	-510	2685		-1490	-321	9	-1802
NPV (1988)		10957	-3000	7956	-200	-4765	-538	14	-5288	2468

B: DISCOUNTED ESTIMATE ($ million)

Target Year	Estimated Volume	Change in Consumer Surplus New	Used	Subtot	Accelerated Investment Programme	Revenue Change Sales Tax	Fuel Tariff	Sub Total	National Social Welfare
1988	410473	0	0	0		0	0	0	
1994	466746	328	-155	173		-2	-29	0	-31
1995	519521	761	-883	-122		-1363	-41	0	-1404
2000	555744	911	-211	700		-1458	-154	6	-1606
2005	557901	1062	-225	837		-1490	-321	9	-1802
NPV (1988)		3642	-1344	2298	-200	-4765	-538	14	-5288	-3190

Note: Totals may not add due to rounding.

This per vehicle estimate is nearly eighty percent higher than the estimate of $3207 per vehicle for the same year under the Product Plan. Note that the aggregate increase for all new vehicles of $1598m is greater than the aggregate fall in sales tax collections of $1490m, which indicates that as far as new vehicles are concerned, there is a synergy between technology enhancement and fall in price.

Thus consumers of new motor vehicles benefit more from elimination of the sales tax than the monetary value of the sales tax collections.

However, the fall in retail prices due to elimination of sales tax causes a one off across-the-board fall in used car prices, which appears in the Table 6.2 A as a sharp rise in consumer losses to owners of used cars, amounting to $2006m in 1995. After that date, the annual losses to used car owners are due to technology change under the Maximum Technology Scenario only.

Overall, the present value of the increase to nominal consumer surplus for both new and used car owners due to a combination of the Maximum Technology Scenario and eliminating the 20 percent sales tax was estimated to be $7956 million in 1988.

Referring to Table 6.2B, similar comments apply to the discounted consumer surplus. There, the overall change was estimated to have

a present value Of $2298m. in 1988.

Accelerated Capital Programme

The net present value of bringing forward industry development programmes is discussed under Section 5.3.

Changes to the Sales Tax

As shown by Table 6.2, there are marginal changes to sales tax arising from changes to the sales mix for the period to 1994. These are the same as discussed under Section 5.4.

In 1995 and beyond, elimination of the 20 percent sales tax gives rise to large losses to Government revenue, being $1363m in 1995 and rising to $1490m in 2005 as sales volume rises in addition to further changes in sales mix.

Changes to Fuel Tax Collections

Fuel tax collections fall with changes in fuel use due to the more efficient cars which are sold under the Maximum Technology Scenario. Fuel use falls despite the increase in the sales volume and the rebound effect of people driving more as cars become more fuel efficient.

The analysis indicates a steady fall in fuel tax collections throughout the planning period, reaching $321m in 2005.

Overall Effect on the Revenue

Thus a policy of eliminating the 20 percent sales tax gives rise to a large and progressive fall in Government revenue throughout the planning period, to $1802m in 2005. This would undoubtedly be of concern to Governments, and ways may need to be found to make such a policy revenue neutral.

Changes to National Social Welfare

Referring to Table 6.2A, the overall change to national social welfare is estimated as the present value at 1988 of estimated increases to nominal consumer surplus ($7956m) taken over new and used vehicles, less cost of accelerated investment ($200m) and the loss of revenue which otherwise would be spent by Governments ($5288m).

Thus the net present value of increases to national social welfare was estimated at $2468m.

A comparison between Tables 6.2A and 6.2B reveals the relative importance of the interpretation of changes to consumer surplus. Under the nominal assumption, Table 6.2A shows the gain in national social welfare to be $2468m; however, the discounted interpretation estimated by Table 6.2B turns this positive result into a substantial loss of $3190m.

There is no evidence available to resolve this question, but it is not unlikely that some observers will take one view and others

will take the other. Thus the 'right' answer (if one exists) may lie somewhere intermediate between the two extreme positions.

6.6.2 Compensating Sales Tax Revenue Losses With a Fuel Tax

Table 6.3 provides an overview of the contributions made to national social welfare by a policy which eliminates the 20 percent sales tax and compensates all revenue losses with a fuel tax increase. The analysis parallels that discussed under Table 6.2 above.

TABLE 6.3: ESTIMATED NATIONAL SOCIAL WELFARE ($m) OF THE MAXIMUM TECHNOLOGY SCENARIO AFTER ELIMINATING THE 20 PERCENT SALES TAX AND COMPENSATING WITH A FUEL TAX

A: NOMINAL ESTIMATE ($ million)

		Change in Consumer Surplus			Accelerated Investment	Revenue Change				National Social
Target Year	Estimated Volume	New	Used	Subtot	Programme	Sales Tax	Fuel Tariff	Sub	Total	Welfare
1988	410473	0	0	0		0	0	0	0	
1994	466746	987	-351	636		-2	-27	0	-29	
1995	519521	173	-4993	-4820		-1390	1369	0	-29	
2000	555744	2741	-480	2261		-1494	1568	6	80	
2005	557901	3195	-510	2685		-1523	1624	9	110	
NPV (1988)		9969	-4394	5575	-200	-4882	4952	14	85	5460

B: DISCOUNTED ESTIMATE ($ million)

1988	410473	0	0	0		0	0	0	0	
1994	466746	328	-155	173		-2	-29	0	-31	
1995	519521	58	-2198	-2141		-1390	1369	0	-29	
2000	555744	911	-211	700		-1494	1568	6	80	
2005	557901	1062	-225	837		-1523	1624	9	110	
NPV (1988)		3313	-1957	1356	-200	-4882	4952	14	85	1241

Note: Totals may not add due to rounding.

Again, Table 6.3 includes two parts which provide the alternative view of the changes to consumer surplus. Changes to revenue are not affected by this alternative view.

The discussion relates to a rise in the fuel tax in 1995 and beyond ranging between 12 and 18 cents per litre. Further details about how this range balances the loss of revenue due to elimination of the sales tax in that year, are given below.

Changes to Consumer Surplus

Table 6.3A shows that the nominal consumer surplus for new vehicles rises steadily to $987m in 1994, before accounting for losses to used vehicle owners, and the distributional effects of

sales and fuel tax changes.

The 1995 sales and fuel tax increases have very significant but opposing effects on consumer surplus attributed to new vehicles. Although the sales tax would tend to increase consumer surplus as discussed under Table 6.2 in Section 6.6.1, the rise in the fuel tax causes buyers to switch to smaller models whose attributes bring lower consumer benefits per vehicle.

The result is illustrated by comparing Column 3 and Tables 6.2A and 6.3A. There, the consumer surplus estimates are the same except for 1995, the year in which the sales and fuel taxes are imposed. Thus instead of a consumer surplus gain of $2290 m in year 1995 as shown in Table 6.2A, the fuel tax causes the consumer surplus gain to be only $173 m as shown in Table 6.3A.

Thus the gains to new car buyers brought about by the Maximum Technology Scenario plus a fall in sales tax are almost completely wiped out by the adverse effects on consumers which arise from increases to the fuel tax.

The nominal consumer surplus gain of $173m in 1995 represents $333 per vehicle or only a 1.4 percent benefit when compared with purchase price.

However in later years, buyers project the higher fuel price into their decisions, and the only factor causing change to consumer surplus in 1996 and later years is technology change under the new tax regime. Thus for years 1996 to 2005, estimates of consumer surplus for new cars in Table 6.3 are similar to those discussed under Table 6.2 in Section 6.6.1.

Referring to the changes to nominal consumer surplus for used vehicles listed in Table 6.3A, there is again a large one off fall in consumer surplus occurs in 1995: here, the drop in secondhand car prices due to the elimination of sales tax, and the rise in fuel tax, reinforce one another to have a very deleterious effect on the welfare of used car owners in that year.

Table 6.3A shows that technology changes alone cause the fall of $351m at 1994, but in 1995 these tax changes are estimated to cause a fall in surplus of $4993m. After 1995, consumers' expectations are for high fuel taxes and normal rates of depreciation in used car prices, so the only changes to consumer surplus associated with used car owners are due to the flow through of the Maximum Technology Scenario, as discussed in Sections 5.3 and 6.6.1. Thus losses of nominal consumer surplus to used car owners in target years 2000 and 2005 are estimated at $480m and $510m respectively.

The overall RISE in nominal consumer surplus to both new and used car owners due to a combination of the Maximum Technology Scenario, eliminating the 20 percent sales tax and imposing a fuel tax was estimated in Table 6.3A to have a present value of $5575 million in 1988.

Similarly, Table 6.3B estimates the discounted consumer surplus

to produce an overall gain of $1356 million.

Accelerated Capital Programme

The net present value of bringing forward programmes by industry is discussed under Section 5.3.

Changes to the Sales Tax

The calculation for the figures in Table 6.3 parallels that discussed under Section 6.6.1, the numerical differences between Tables 6.2 and 6.3 being accounted for by marginal changes to sales mix after 1994.

In 1995 and beyond, elimination of the 20 percent sales tax in combination with a rise in the fuel tax gives rise to lower sales tax collections than if the fuel tax is not levied - refer Section 6.6.1 for those estimates. Table 6.3 shows the fall to be $1398m in 1995 increasing to $1523m in 2005.

Changes to Fuel Tax Collections

Additional fuel taxes in the order of 0.25 cents/litre are required between 1988 and 1994, to compensate for fuel tax losses due to increased fuel efficiency in those years. After 1994, it is necessary to compensate for reduced fuel tax collections due to fuel efficiency, reduced sales tax collections and in addition, for a fall in fuel use due to increased fuel prices caused by the tax rise.

To achieve this revenue neutrality, it was estimated that fuel prices would have to rise annually from 12.8 cents/litre in 1995 to 18.6 cents per litre in 2005. This estimate was based on the sales mix obtained by the econometric modelling, statistics about vehicle use described elsewhere and fuel efficiencies discussed in Chapter 4.

It was assumed that difference in fuel efficiencies under the Product Plan and the Maximum Technology Scenarios for on road use were the same as the difference in fuel efficiencies estimated for purposes of calculating NAFC.

An elasticity of vehicle use with respect to fuel price of -0.26 given by Hensher and Young (1990,p.39) was used to take account of the fall in fuel use due to the tax rise.

As shown by Table 6.3, annual increases to fuel tax were estimated in the range $1369 million in 1995 to $1624 million in 2005.

6.7 CONCLUSION

On the basis that the MTS will provide a major contribution to fuel economy, and benefits to all Australians, and there is a need for Government intervention to bring it to fruition, a framework for policy formulation was developed and various tests of policy instruments were carried out.

Delivering the Maximum Technology Scenario calls for Government leadership and creation of a climate which provides the necessary encouragement to consumers to buy fuel efficient vehicles, and incentives to manufacturers to build and sell them.

The passenger car marketplace is already burdened with a plethora of regulations and taxation instruments, and if Governments pursue a fuel economy policy, it is likely that it will be regarded as just one more bureaucratic intervention in the automotive industry and more penalties on the already overburdened motorist. Achieving compliance will require a more sophisticated approach than crudely adding more legislation.

In addition to cleverly designed taxes and charges, it will be essential for Government to clearly articulate any new policy, and to bring fuel economy forward on the agenda of those who buy and manufacture passenger cars. Thus it is necessary for any policy framework to include a campaign which influences public and manufacturer attitudes, as well as supplementary administrative measures and taxation or regulatory instruments.

In designing a policy framework, Government should:

- clearly establish the objectives of its fuel economy policy in specific terms which are meaningful to manufacturers, distributors and users;
- look to achieving these objectives through the application of technology rather than by coercive modifications to the existing regulatory and taxation system governing manufacturing, distribution, ownership and use of passenger cars, bearing in mind that this system might be simplified during the process;
- operate on public attitudes already established in the marketplace, by addressing the key issues relevant to users and manufacturers; as well as the spectrum of economic and social criteria which make the difference about which specific policy instruments are likely to be most effective in changing existing market signals;
- keep stringent and potentially risky policy instruments in reserve.

If Governments wish to encourage accelerated fuel efficient technology, and to apply one or more of the candidate policy instruments listed in the Brief, they should first rank them according to criteria of relevance to consumers, manufacturers, Government departments and the public. A suggested ranking was provided which takes these criteria into account and which minimises the risk of unintended consequences.

In welfare terms, it appears possible to generate synergy between technical devices and supportive sales tax regimes, provided that government tax collections can be kept neutral. National social welfare was found to be higher under a regime which eliminates the 20 percent sales tax and compensates for loss of revenue by raising fuel tax collections.

The assumptions and comparisons used in reaching these conclusions were stated, and a discussion about possible ways to structure a suitable policy is included in Chapter 7.

7. TOWARDS A FUEL ECONOMY POLICY

This Chapter extends the results of previous Chapters into one perspective of the available administrative actions, services, legislation and taxation instruments which might deliver fuel economy among new passenger vehicles sold in Australia.

The discussion addresses the policy (taxation and legislative) instruments listed in the Brief, focussing on those which were considered on balance to be most likely to be effective. The other instruments were considered, but not in as much depth.

It considers administrative support mechanisms such as testing programmes, etc., which are prerequisite to effective policies. However, the discussion does not assume that the policy instruments listed in the Brief are necessarily the only ones which might be used.

7.1 AN APPROACH TO POLICY SELECTION

Recounting the story so far, Chapters 1 through 6 demonstrated the merits of the Maximum Technology Scenario, and raised the question of why it does not come about as a matter of course, without specific intervention by the Government. The answer to this question is believed to lie in the culture of the Australian automotive industry, and the low value placed on fuel economy by consumers.

Summarising the evidence from previous Chapters, it was found that:

- there is a great deal of competition among car manufacturers and there are over 300 models available in Australia;
- new car buyers are about evenly divided between private individuals on the one hand and Government/commercial buyers on the other;
- manufacturers tend to compete on the basis of attributes such as interior volume, price, style/luxury, power. Fuel economy is not an important determinant of consumer choice and does not feature highly in passenger car marketing strategies;
- price is a dominant factor of consumer choice for only about 5 percent of cars sold. Only Government/commercial fleet managers, who are responsible for car pool fleets, regard price as dominant;
- price affects sales of both new and second hand cars. A one percent increase in new car prices results in about 0.6 percent fall in aggregate sales volume and about 0.66 percent fall in aggregate scrappage rates;
- Plan Producers have not in recent years been able to maintain their share of the Australian market. Buyers have favoured smaller, more fuel efficient imports. At the same time, many models sold in Australia are 10 to 15 percent less fuel efficient than equivalent cars sold overseas;
- the technical devices mooted for the Maximum Technology Scenario not only lead to a major reduction in fuel use, but also they have the capability to shift the mix of vehicles sold more towards those classes of vehicles which are manufactured by Plan Producers;

- also, the evidence suggests that buyers would value these more fuel efficient cars and would pay the technology costs;
- in addition, enhanced technology will lead to positive changes to national social welfare which can be further increased by careful selection of market based policy instruments.

When considering what Governments can do to encourage or coerce buyers and manufacturers into transactions which lead to fuel efficient outcomes, it is a seductive proposition that all that has to be done is to legislate for fuel economy.

However, the Australian market is too small to enforce special technology requirements. The Australian Design Rules are progressively being modified towards the international standards being delivered by manufacturers' global marketing strategies. These are oriented to the very large overseas markets which already demand clean and fuel efficient vehicles, and Australia can assume that fuel efficient technology will appear in vehicles sold here.

However, Australia does need to intervene to the extent that internationally competitive technology is made to appear in Australia within say two years of it appearing in vehicles sold overseas.

In considering possible policy instruments for use in Australia, the most convincing overseas evidence suggests that market based instruments such as taxes and charges will be more effective than command and control instruments such as the US CAFE regulation.

CAFE is the only example in the world of a command and control instrument being used to try to coerce technology improvement in motor vehicles. Very serious perversities arose and these are entirely transportable to Australia. The Consultant's view is that command and control instruments should be adopted as à last resort only.

Turning to specific courses of action which Governments might take, the Consultant believes it is of primary importance to raise consumer perceptions about, and values of, fuel efficiency.

This approach needs to be considered alongside the conclusions of Chapter 6. There, the candidate policy instruments listed in the Brief were ranked according to criteria of importance to buyers, manufacturers, Government agencies and the general public. The Consultant's preferred ordering was:

1. Public awareness programmes (including vehicle labelling).
1. Changes to the Sales Tax regime;
3. Changes to company income tax arrangements.
4. Fuel taxation (i.e. Excise and Business Franchise Fee);
5. Fringe Benefits Tax and Annual Registration Charges;
6. Mandatory Fuel Consumption Standards.

This represents a clear preference for the use of marketing techniques and market based policy instruments over command and control instruments. It is believed that this would produce efficient outcomes with minimal risk of unintended consequences.

However it is not the only possible ranking.

Market research suggests that the time to raise awareness of fuel efficiency is some months before the customer enters into his/her buying programme. Thus if it decides to mount a fuel economy policy, Government should, as soon as possible, introduce countervailing public awareness programmes which promote the idea of fuel economy among manufacturers' advertising of luxury, style and power attributes of passenger cars. All these latter programmes counter fuel economy objectives.

The NELA judgement is that a public awareness programme of the magnitude of the *'Life. Be in It.'; 'Quit'* or *'Drink. Drive. Bloody Idiot.'* campaigns, should be mounted and that it could, of itself, achieve fuel consumption targets down to 7.5 litres/100km by 2005.

Even for lower targets, the Consultant would argue that such a campaign is essential to give public credibility to the idea of fuel economy, and that taxation or regulatory instruments could be counterproductive without such credibility. Further, taxation and regulatory instruments should operate only within a framework of targets enunciated by the campaign.

However, some observers had difficulty accepting this view. Despite the achievements of similar campaigns, they considered that marketing techniques would not achieve NAFC outcomes below the Product Plan, and especially would not meet the Government's Interim Planning Target on Greenhouse Emissions.

There was however, agreement that Government must clearly, firmly and very publicly articulate its fuel consumption goals in terms of targets, timing and the mechanisms to be employed. Industry and consumers alike must be told exactly where Australia is going on fuel economy and why.

For fuel consumption targets below 7.5 litres/100km, it is recognised that Government will have to introduce taxation or regulatory instruments. Price signals must reinforce Government pronouncements if buyers are to give priority to fuel economy, and manufacturers' are to deliver product offerings as clean and fuel efficient as vehicles sold overseas.

It was also agreed that even under the most favourable policy package, technology will not deliver a NAFC much below 6.5 litres/100km. For that, taxation and regulatory policies will have to go beyond encouragement of technology into coercion of vehicle downsizing.

Accordingly, the Steering Committee decided that the findings would be presented in terms of two main sub-programmes:

1. A **Technology Delivery Programme** which creates a positive encouragement for consumers and manufacturers to purchase and buy fuel efficient cars. It relies on market based instruments to deliver improved technology, increase the market attractiveness of fuel efficient vehicles and increase the cost of purchase and operation of those with

lower fuel efficiency.

2. A **Prescriptive Fuel Consumption Programme** which provides a more aggressive and interventionist approach that would be available as a backup if necessary to the Technology Delivery Programme, or if Fuel Consumption Targets were set below 6.5km/litre. It imposes stringent financial penalties on those cars which have high fuel consumption, irrespective of class, and supplements those penalties where necessary with command and control instruments.

It could be argued that a third subprogramme should be mooted, viz. encouraging people to use their vehicles in an efficient way, but that would be beyond the Terms of Reference.

The aggressiveness with which Governments might apply one or a combination of the two subprogrammes depends on the Fuel Consumption Targets chosen, and progress achieved in the early years. Choice of Targets is left to others, who would undoubtedly consider matters beyond those included in this Study.

Before discussing the two subprogrammes and the public awareness package in detail, it is worth repeating that no fuel economy policy will be very successful unless the above programmes are complemented by a **Fuel Economy Policy Support Programme** which includes a strong and carefully oriented public awareness campaign to promote values of fuel economy among consumers, and provide them with the means to readily identify and compare the fuel economy attributes of product offerings.

Before discussing these programmes, the relevance of fuel pricing policies should be placed in perspective.

The fuel tax system provides a way to neutralise changes to Government tax collections caused by instruments which vary sales or other taxes. Several issues make one consider use of the fuel tax for this purpose as a first preference:

- a fuel tax will raise the perceptions of fuel cost in the perceived cost of motoring, thus encouraging new car buyers to weight fuel efficiency more highly in purchase decisions, and encouraging manufacturers to deliver the Maximum Technology Scenario;
- a fuel tax will impact directly on the use of both new and existing cars, thus making an additional contribution to fuel conservation;
- there are other benefits associated from reductions in car use, such as reduction of urban traffic congestion, which have a second order effect on fuel conservation and travel efficiency;
- a fuel tax also feeds back into choice of car size, and at the levels considered in this discussion, would induce perhaps one percent more mini/small vehicles to be purchased than under a policy which had no sales tax component, This would be in addition to the savings arising from the MTS;
- Australian fuel prices are among the lowest in OECD countries, and there seems to be no reason why they should be set below the median of prices in the OECD (would mean a rise in the order of 50 cents/litre);

- the realities of budget negotiation are such that Treasuries will initially look for compensating revenue in the same economic sector as the revenue losses occur;
- both the fuel excise and the sales tax are already used as instruments which raise general revenue (although some of the fuel tax is undoubtedly seen as a charge on road use).

Massive increases in fuel prices will have a marginal effect only on new car fuel economy over and above the other instruments considered. But fuel pricing can have a very significant impact on total fleet fuel consumption by reducing the demand for fuel. These two effects need to be considered as separate issues when considering the relative merit of the candidate policy instruments listed in the Brief.

7.2 TECHNOLOGY DELIVERY PROGRAMME

Subject to Government announcements and achievements under a Fuel Economy Policy Support Programme discussed under Section 7.4, the Technology Delivery Programme is relevant to Fuel Consumption Targets down to 6.5 litres/100km.

7.2.1 Objectives

The aim of the Technology Delivery Programme is to put in place a system of taxation incentives and penalties which will promote maximum technology among consumer and manufacturer attitudes.

It should make the price signals delivered by the market to manufacturers, buyers and users of cars consistent with fuel economy goals and, in terms of the technological vision put forth by this Report, cause manufacturers to improve cars sold in Australia in line with the Maximum Technology Scenario.

Thus the Technology Delivery Programme supports Plan Producers who make the most fuel efficient cars, and penalises those who don't by making it difficult for them to maintain market share. If companies persist in buying large and fuel inefficient cars, it will prove very expensive for them.

Fuel consumption targets set under the Technology Delivery Programme would cause NAFC to fall towards 6.5 litres/100km, even if new safety and emission standards are introduced in year 2000.

7.3.2 Scope

Essentially, the Technology Delivery Programme involves:

(a) eliminating the 20 percent sales tax as discussed under Section 6.6.1. This will maximise the number of clean and fuel efficient vehicles entering the fleet by increasing new car sales volume and the number of old cars scrapped;

(b) introducing a 'Fee-Bate' system of wholesale or retail taxes to encourage individuals and companies to choose the more fuel efficient product offerings. This consists of a revenue neutral variable tax which operates to reduce retail prices of the more clean and fuel efficient offerings, and increases retail prices of the remainder;

(c) eliminating or reducing company income tax deductions to

induce a substantial increase in the operating cost of company owned cars, including those operated by managements, and so discourage company buyers from choosing such large cars;

(d) compensating for reduced sales tax collections and enhancing the synergy between technology and policy as discussed under Section 6.6.2.

Taxation instruments of type (b) are needed because buyers tend to incorporate fuel efficiency in their choice of vehicle class. Once that decision is made, fuel economy hardly features in the decision process. Thus Governments need to include ways to raise buyers' perceptions of fuel efficiency among product offerings within each given class structure.

Such instruments may also be suitable (instead of command and control instruments governing speed or power) for penalising the more powerful vehicles and to keep acceleration performance at 1990 levels. This would encourage technology advances to be taken in fuel economy rather than upsizing or more power, as discussed in Chapter 3.

Note that taxation instruments need to address the class definitions as well as the rate structure.

The Technology Delivery Programme is not designed to reduce NAFC beyond the limits of technology; rather, it applies pressure for continuing technological improvement, and envisages a steady increase to Fee-Bate penalties if the response is not sufficiently rapid.

This also provides flexibility for the pressure to be increased or decreased from time to time as new information comes to hand about available and applicable technologies.

The Technology Delivery Programme interacts closely with the Fuel Energy Policy Support Programme discussed under Section 7.5.

7.2.3 Eliminate the 20 Percent Sales Tax

The application, structure and welfare implications of this option are discussed under Section 6.6.1. The 20 percent wholesale sales tax would be removed in year 1995, although the 10 percent residual on cars exceeding $45,000 would be retained. In practice, this maintains the existing price differential between the upper luxury class (and some sports cars), and all other cars.

Feasibility of Implementation

The manufacturing feasibility of this proposal is almost identical with that of delivering the MTS with sales tax still in place. If anything, the additional volume justifies, from the national viewpoint, spending the $200m (in 1988 dollars) to bring forward industry development programmes even more than if the sales tax were continued.

Modifying the PMV Plan to increase the rate of tariff reduction

was briefly considered as a way increase volume even more, but this was rejected. Manufacturers are just coming to grips with the Government's March Industry Statement, and it was not considered wise to impose another tariff change at such short notice. Also, it may not be politically or internationally expedient for Government to be seen to change its tariff policy too frequently.

Impact on Plan Producers

By 2005, this policy would result in a 12 percent increase in annual sales volume to an estimated 557,901 vehicles, which is significant for Plan Producers and Australian component manufacturers because it allows them greater scope to exploit economies of scale, which would enhance their position in respect to being able to cover export markets.

Compared with the Product Plan and the Maximum Technology Scenario under a taxed situation, eliminating the sales tax results in increases in the sales component of upper medium and medium classes. This would restrict opportunity for imports to compete with Plan Producers, because imported vehicles tend to be in the smaller classes.

Fuel Economy Consequences

The increased number of fuel efficient vehicles sold under this policy cause a change in fuel use of around 1.1 billion litres in 2005, or about 8 percent below the Product Plan projection. However, the savings on 1988 fuel use is estimated to be less than half of one percent, which is not a significant figure. These estimates assume adoption of US1994 safety and emission standards in year 2000.

NAFC at 2005 increases from 6.35 l/100km in the base case to 6.42 l/100km, and annual fuel resource savings are as follows:

Target Year	Fuel Resource Sav ($m)
1988	0.0
1995	48.1
2000	179.8
2005	374.4
NPV(1988)	588.8

These net fuel savings will pay for the technology (piece) costs shown below, and the additional investment required to bring capital programmes forward.

Impact on Consumers

Although this policy was estimated to result in a slight upwards movement in the sales mix of vehicles sold, and higher new car volumes, the aggregate increase in retail prices due to

additional technology costs is only 4 percent, compared with a taxed situation.

This suggests that income effects will be small, and consumers will face (after tax is removed) a net fall in technology costs, and be willing to pay price rises after the one off fall in 1995.

Target Year	Technology. Resource Cost ($m)
1988	0.0
1995	0.3
2000	134.1
2005	199.7
NPV(1988)	321.9

Impact on National Social Welfare

These impacts are discussed in detail in Section 6.6.1.

The slight upward movement in the sales mix, combined with the increased volume, results in a substantial increase to consumers surplus, but at a cost to Government revenue.

Comparing Table 6.2 with Table 5.2, a policy to eliminate the 20 percent sales tax would about double the consumer surplus arising from the Maximum Technology Scenario, which is worth while if it is not countered by the losses to Government revenues.

As discussed in Section 6.6.1, the losses to Government revenue are so great that there is a net fall in welfare compared with the taxed situation, the relative magnitude of the fall being greater or less depending on whether the nominal or the discounted interpretation of consumer surplus is accepted.

In this situation, it is necessary to consider ways to redress the fall in welfare by introducing alternative measures. As discussed in Section 7.1, the favoured way to do this is by increasing fuel tax collections to compensate. Refer Section 7.2.6. However, Section 7.2.5 indicates that eliminating company tax deductions would also produce the required revenue.

Before addressing questions of revenue neutrality however, consideration is given to ways to encourage choice of fuel efficient cars within each class of products on offer.

7.2.4 A Proposed Fee-Bate System

To focus buyers' attention on fuel economy of particular vehicles within a class, a fee-bate system similar the Californian "Drive +" scheme was considered.

Fuel Consumption Targets prescribed by Governments provide the basis for the scheme; these could be varied on a year by year basis. Targets might be prescribed as discussed in Section 7.5.

It would also be mandatory for a supplier to list fuel consumption for each model in the Guide, and attach a mandatory vehicle label to each product offered. Comments about possible conditions for the Guide and labels are also provided under Section 7.4.

The vehicle specific fuel consumption would then be compared with a Fuel Consumption Target relevant to the make/model being purchased.

Thus each buyer will have the necessary system of benchmarks and comparative information needed to weight fuel consumption into the purchase decision.

A scale of tax penalties would then be established, so that a buyer pays more or less money depending on whether the certified fuel consumption of the vehicle is higher or lower than the Fuel Consumption Target.

The tax penalties would need to be of a magnitude which ranks with sales discounting budgets, which are typically around 15 percent of retail price. It is important not to place a salesman in a position where a fuel conscious buyer can be deterred from making a fuel efficient purchase, by a one-off discount offered on the shop floor.

For example, consider a medium class car costing $22,000 and with certified fuel consumption of 7.21 litres/100km in year 2000. The highest fuel consumption of all cars offered in the class might be 7.68 litres/100km. The penalty for buying that car might well be of the order of $3000. Cars with intermediate levels of fuel consumption would attract intermediate penalties.

Alternatively, penalties might be calculated on the basis of compensating for the value of additional fuel consumed by the car throughout its life. In our example, the additional fuel would cost about $30 per year and assuming a 25 year life, the penalty would be struck equal to the net present value of this cost (at say 10 percent), or about $270.

The tax would be collected by the manufacturer or distributor; perhaps the latter would be preferable as it is more likely to be presented to the end user as a penalty to be avoided (by buying a more fuel efficient car). It is envisaged that the collector would receive a credit for sales of vehicles with a fuel consumption below the Fuel Consumption Target, and that these credits would be tradable against penalties incurred on vehicles which did not meet the target.

This provides an opportunity for a manufacturer or distributor who cannot make or obtain vehicles which meet the target to buy credits from those who can. This would be a powerful incentive to build fuel efficient vehicles, especially if the penalties are large, as is suggested.

Note that it is not necessary (though possibly desirable) for the 20 percent wholesale sales tax to be eliminated under this system. It is however, envisaged that the scale of tax margins

would vary around the Target so that revenue neutrality is obtained.

Careful consideration would have to be given to the form of the tax. There would be some merit in using a retail tax rather than the wholesale sales tax. However, this has political implications in today's climate and is not discussed further.

If it were decided to eliminate the wholesale sales tax, this would free manufacturers and distributors of all except luxury cars from the wearisome sales tax administration. In itself, that would be an incentive to sell only those cars which did not attract the 10 percent tax on luxury vehicles.

Fee-Bate incentives and penalties could be applied at the retail level through the Business Franchise legislation, as currently applies to fuel. However, this tax is currently imposed by the States, which is not of concern to this Study, but may be of concern to Governments.

7.2.5 Increase Cost of Company Cars

Companies buy a little over half of all passenger cars, and fuel economy goals would be served if they could be encouraged or coerced into small to medium cars, rather than the upper medium to luxury cars which make up the bulk of company purchases. Government purchases should also adhere to any approved policy.

There is no survey data available which can define the factors affecting the choice of company cars, although limited information from salary surveys provides some insights.

It was found that all except 10 percent of company cars which are fleet vehicles, and a few high status cars given to very senior executives, are driven by employees whose FBT liability is taken into account during salary negotiations, and whose preferences are heavily weighted into company vehicle choices. On the assumption that very senior executives and fleet vehicles represent less than 30 percent of all company vehicles (and less than 15 percent of all new cars purchased), it was considered sufficiently accurate for Study purposes to regard purchasing criteria for company cars as being similar to those for privately owned vehicles.

In other words, it was considered that:

- the instruments discussed under Sections 7.2.3 and 7.2.4 would encourage fuel efficiency among company cars;
- the price impacts of those instruments would be sheltered by the tax deductibility of company cars;
- Governments may wish to go further because of the shelter.

Before addressing ways in which Governments might seek to induce downsizing of company cars, it is desirable to qualify the findings. For the reasons given above, it is believed that assessment of overall policy directions on new vehicle fuel economy would not be invalidated by a lack of knowledge about fleet and status vehicles. However, the available data is not directly applicable and should be interpreted for this purpose

with caution. Household responses may not in fact reflect the responses of companies.

Downsizing the company fleet is a difficult proposition given the demonstrated preference among companies for medium and upper medium classes, and the fact that users do not pay the costs of fuel directly.

Changes to company income tax deductions, depreciation schedules and Fringe Benefits Tax arrangements on company cars are all in the nature of changes to annual imposts. As discussed under Section 6.4, annual charges are likely to be ineffective unless they are very large.

At present, the annual cost of ownership and operation of company cars is fully tax deductible, although FBT is not. Abolition of company tax deductions represents an increase in annual cost by a factor of 100/61, i.e. about 64 percent or around $6,600 per year before tax, on a Commodore/Falcon type car. This is sufficiently large to engender a change in vehicle choice.

Abolition of company tax on cars would make the tax treatment similar to that on business entertainment, or to that in the US, where management vehicles get much less sympathetic treatment than is the case in Australia.

The question remains as to the magnitude of the change induced. Estimating this is not straightforward under current data limitations.

The assessment of the propensity of companies to downsize considered the marginal cost of company ownership and employee private use over its period of ownership, which was assumed to be about four years.

There are two reasons for choosing four years as the relevant period. Firstly, most companies trade in a vehicle in three to four years. Secondly, it is indicative of the period a manager might expect to stay with a company, or at least in the same position. Note that many companies (especially small business) associate management cars with the individual, not the position in the company.

Three types of data are required for estimation, none of which are readily available. They are:

- the arc elasticity of class share among company cars, with respect to the annual cost of ownership as perceived after tax; and
- the class mix which is sold to companies;
- the actual operating costs of company cars taking into account fuel discounts received, the proportion of fuel reimbursement required for private use, and other matters relating to company cost structures.

Although they cannot provide arc elasticities, the ITS models provide estimated elasticities of vehicles/household with respect to vehicle price. Elasticities relevant to 2 car and 3+ car households, which are the ones which contain most company cars,

may provide some insights.

Alternatively, advice could be drawn from Schou (1981). But again, there are reservations:

- the class definitions are different from those used by this Study;
- the estimates are old, and relate to the period before FBT and reductions of company tax rates to 39 percent (occurred in the mid 1980s);
- the difference in magnitude of arc elasticities for an annual tax penalty versus a loss of tax deductions is surprising, although Shou's comment (1981,p.355) that a "...disparity in responses to direct versus indirect tax is not uncommon.." would be supported by qualitative evidence from this Study.

It was considered that the effect of changing company tax deductibility on cars would be most relevant in respect to the effect on the upper medium and medium class shares. The larger class shares are already small and companies are thought to own few mini or small class vehicles.

Based on a review of the above research results, arc elasticity for upper medium class share with respect to 100 percent tax deductibility could be chosen in the range -.20 to -.05. It was decided to use an average figure of -0.13.

It was judged that the proportion of upper medium class cars sold to companies is about 60 percent. Thus abolishing company income tax deductions would cause an approximate 8 percent fall in new upper medium class cars in the company fleet.

Remembering that companies buy about half of all new cars, it was concluded that eliminating company income tax deductions on cars would cause the 1988 upper medium class share to fall from about 34 percent to perhaps 30 percent.

Such an estimate would have to be treated with a great deal of caution, as the assumptions on which it is based have insufficient research support. However, it indicates what NELA believes to be an upper limit on downsizing due to abolition of company income tax deductions.

It is to be noted that abolition of company income tax deductions on cars would represent a gain to the revenue of around $2.3 billion which greatly exceeds the loss of revenue arising from elimination of the 20 percent sales tax discussed under Section 7.2.3.

Provided companies continue to purchase cars for use by employees (and they may not), FBT revenue would not be affected. FBT is nominally a tax on employee use of a company owned vehicle (although in practice companies often pay it), and is not tax deductible in the hands of either the company or the employee.

If Government wished to maintain revenue neutrality within the sector, it would need to form a view about the impact on FBT, which would require surveys.

If that impact is small, Government might consider reducing the company income tax rate. If it did not want to be so severe, it could allow income tax deductions for small and mini class vehicles only. There are many possibilities, but their consideration requires inputs external to this Study.

It is recognised that the political, financial and economic implications of abolishing company tax deductions for company cars are very significant. However, the analysis described above strongly suggests that actions of this severity are required if they are to affect company purchase decisions sufficiently to induce large downsizing of company cars.

7.2.6 Compensating for Loss of Government Revenue

If the 20 percent wholesale sales tax were removed (but retaining the 10 percent residual on cars exceeding $45,000 as before), there are two options for raising compensating revenue:

- a fuel tax increase;
- using the revenue from eliminating tax deductions on company cars.

This Section focuses on a fuel tax increase from 12 cents/litre in 1995 to 18 cents/litre in 2005. Eliminating company tax deductions is discussed under Section 7.2.5.

The application, structure and welfare implications of compensating reductions in sales tax collections with rises in the fuel tax were discussed under Section 6.6.2.

Feasibility of Implementation

If year by year neutrality is required, the change to fuel excise would have to vary each year, which may prove politically difficult. There are a number of reasons for this, which were discussed under Section 6.6.2.

Otherwise, the feasibility of implementation, including the impact on Plan Producers, is commensurate with the uncompensated sales tax elimination policy discussed under Section 7.2.3.

Fuel Economy Consequences

Annual fuel savings under this policy rise to 1.77 billion litres at 2005, which represents a 14 percent drop on fuel use under the Product Plan in that year but only an 8 percent drop on fuel use in 1988. These estimates assume adoption of US1994 safety and emission standards in year 2000.

The net present value of fuel savings in resource dollars is estimated to be $1185.3m, as shown below. This is about 2 times the fuel saving that would occur if no tax compensation were attempted.

These fuel savings more than pay for the cost of technology, including acceleration of capital programmes.

Target Year	Fuel Resource Sav ($m)
1988	0
1995	109.8
2000	317.7
2005	593.4
NPV	1185.3

Impact on Consumers

Again, retail prices of technology improvements do not change significantly. Resource savings are as follows:

Target Year	Technology Resource Cost ($m)
1988	0.0
1995	0.2
2000	131.5
2005	196.9
NPV	316.5

Some downsizing is predicted compared with the case where fuel tax is not raised, but not as much as the base case discussed in Chapter 5, where the 20 percent sales tax was assumed to be in place.

Impact on National Social Welfare

Compared with the uncompensated sales tax policy discussed under Section 7.2.3, Section 6.6.2 shows that there is a vary large increase in consumer surplus, which carries through to net social welfare because the revenue effects are made neutral.

Removal of the sales tax results in about a 50 percent gain in consumer surplus for buyers of new cars (and their successors in the used car market), which is only partially offset by losses to users of existing vehicles arising from the rise in fuel prices and the marginal downsizing. The breakdown between new and used vehicle users is shown in Table 6.2.

7.3 PRESCRIBED FUEL CONSUMPTION PROGRAMME

This Section describes an approach to delivering Fuel Consumption Targets downward beyond 6.5 litres/100km, or which might be considered if the responses to the Technology Delivery Programme are not sufficient.

7.3.1 Objectives

The aim of the Prescribed Fuel Consumption Programme is to engender downsizing of new vehicles:

(a) as a fallback strategy in case the Technology Delivery Programme does not deliver the prescribed Targets sufficiently quickly; and/or

(b) if Government decides to seek targets below those achievable through technology (taken here to be 6.5 litres/100km by 2005).

7.3.2 Scope

Three options were considered to be most likely to be effective:

- a severe sales tax on the larger classes (or "Gas Guzzler" Tax);
- a substantial rise in the fuel tax; and/or
- mandatory fuel consumption standards.

These would deliver Fuel Consumption Targets downward towards 5.0 litres/100km. However, as these approach 5.0 litres/100km, the proportion of small and mini vehicles starts to dominate the sales mix, and for a target of 5.0 litres/100km, would effectively consist of mini and small classes only.

Such an extreme result may have to be achieved by legislation.

7.3.3 "Gas Guzzler" Tax

The "Gas Guzzler" Tax is a severe wholesale sales tax or a retail tax which is applied selectively on certain classes of cars which are not fuel efficient. It is seen to be a penalty tax which would operate very similarly to the luxury car tax which was imposed in Australia during 1990, and which virtually stopped the sale of luxury cars. The luxury tax was also said to have caused significant falls in Government revenue, and engendered the strong political reaction which led to its abolition in 1991.

"Gas guzzler" taxes have been levied in the US since 1978. They impose a penalty tax on all new vehicles that cannot meet a fuel consumption target of 10.41/100km. Ledbetter (1991) claims that they have played a strong role in reducing US fuel economy between 1983 and 1986.

Gas guzzler taxes have positive features because they apply:

- to new cars only, so low income people are largely unaffected;
- directly at the point of sale, so they affect the purchasing decision directly (elasticity -0.6).

It is very difficult to make judgements about the levels of taxes required in Australia to achieve the significant downsizing required to achieve Fuel Consumption Targets below 6.0 litres/100km. The magnitude of taxes required to achieve such changes is arguably beyond the range of validity of any models which can be built on the existing data bases.

However, the Study investigated several sales tax regimes using

the models discussed in Section 5.2.2, which would deliver targets around 6.0 litres/100km. This assumes that the MTS would be delivered before such severe taxes would be contemplated. Thus the comparisons addressed the MTS only, before and after application of this more stringent policy, but assuming that the 20 percent sales tax would be retained.

The most promising approach involved substantial increases in the retail price of new vehicles in the upper medium, luxury and upper luxury classes.

The modelling indicated that an 80 percent increase in the retail price of these classes would force downsizing to an NAFC around 6 litres/100km, before safety and emissions controls penalties were applied. This postulates a massive reduction in the class share for upper medium vehicles (from 34.4 percent to 9.7 percent), with over 80 percent of buyers moving into medium and small classes. Mini class, however, only attracted 7.3 percent of sales, and luxury and upper luxury combined would command only one half one percent of sales.

This result is reminiscent of outcomes under the luxury car tax during 1990.

The low proportion of sales in the mini class indicates that the test pattern is too heavily weighted to the upper classes.

The mix would have a major impact on certain Plan Producers, and the positive (discounted) consumer benefits arising from the MTS would fall by $152m to $375m in 2005. Although the analysis did not take account of falls in volume arising from such a regime, the experience of the luxury car tax imposed in 1990 suggests that people who use large cars may choose to keep their old cars rather than buy new ones.

It is probable that a better balance of tax across vehicle classes may produce the target fuel consumption with lower adverse effects. For example, a tax subsidy could be given to mini classes which would increase sales above 7 percent. However, further analysis was not attempted, as the aim was to identify a mechanism for consideration by others in the context of broader issues, rather than to find a recommended solution.

If the Technology Delivery Programme were successful, it may not be necessary to impose such draconian levels of sales tax to achieve targets around 6.0 litres/100km. Clearly, it would be better to introduce the public education programmes, eliminate the sales tax, set fuel consumption targets, establish a fee-bate scheme and monitor its performance before resorting to such severe penalty systems.

7.3.4 *Fuel Taxation*

Fuel taxation acts to increase the perceived cost of motoring, thus reducing travel and fuel use. In the process, it generates revenue both for general purposes and to meet road construction, maintenance and management costs.

An indication of the effectiveness of the fuel tax in achieving low levels of fuel consumption was obtained by a comparison which applied a 50 cents tax increase to fuel prices (in 1988 constant prices).

This additional fuel tax represents an 80 percent increase in fuel price in year 2005, which would bring fuel prices slightly above the 1988 OECD average. It approximates to a 175 percent rise in the taxation component of fuel.

This test can be construed as extending the econometric model beyond its limits, but it indicates enough directions to be worth reporting.

The results indicated that an additional fuel tax in the order of 50 cents/litre (in 1988 prices) would induce some downsizing of the fleet: e.g. mini/small classes would increase their share by about 7 percent in 1988 to 33.5 percent. In 2005 under the MTS, mini/small vehicles would increase by about 4 percent, which indicates the lower value placed on fuel savings as vehicles become more efficient.

It was estimated that NAFC in year 2005 would fall to 6.27 litres/100km under the MTS without additional safety and emissions controls, or only 0.07 litres/100km less than if no additional tax were applied. This suggests that the fuel tax can be used to drive NAFC lower than anticipated under the MTS, but not much.

Impacts on FAFC were estimated to be much greater, because fuel taxes operate on all road users. In 2005, the 50 cent rise was estimated by the econometric modelling to produce an 18 percent fall in fuel used, which is a little more than the result implied by a vehicle use elasticity of -0.26 quoted by Hensher and Young (1990).

Thus the fuel tax is a useful instrument for conserving fuel beyond the levels attainable by the MTS. Subject to the above qualifications, it was estimated that if a 50 cent fuel tax was used in conjunction with the MTS, an overall saving slightly in excess of one third would be anticipated in year 2005.

Further, the estimated year 2005 fuel use of about 10 billion litres is only 77 percent of the year 1988 fuel use of about 13 billion litres. This suggests that it may be possible to use the fuel tax to deliver the Government's Interim Target on Greenhouse by combining a technology improvement programme together with a programme to raise fuel prices slightly beyond the OECD average.

Discussions during the Study indicated that many observers, especially professionals, would see the fuel tax as an effective way to achieve fuel conservation goals, because it operates directly on all fuel users. Discussions with manufacturers indicates that they would not be too concerned about fuel conservation policies which use the fuel tax as an instrument, although rises of this order of magnitude were not discussed. The downsizing associated with the policy would favour importers somewhat, over Plan Producers.

Clearly, Governments would enjoy substantial revenue increments from these levels of taxation increase, and under the MTS the fuel tax take would, in 2005, rise in the order of $4 billion.

The econometric modelling suggests that consumers, especially users of older cars, would be very severely impacted by a rise of 50 cents/litre, with losses of discounted consumer surplus estimated at $61 billion in 1995.

Clearly this would never be offset by the rise in fuel tax collections, indicating a net reduction in national social welfare.

The estimates of extreme losses are almost certainly associated with losses in utility arising as expenditure on the fuel tax bites into the disposable income of households. Higher fuel prices affect all forms of private and commercial travel opportunity and would be felt throughout the economy. Second round effects could also be very significant.

The very large numerical values associated with the estimates of consumer surplus, when compared with estimates in previous Sections, indicate that the model may have been taken beyond its limits. This could have occurred because the survey respondents would have no experience of such high fuel prices. There is no way to resolve this problem except via collection of new data using different techniques. This was not possible within the time and resource available to the Study.

However, despite the need for careful interpretation, it does appear that under substantial rises to the fuel tax, extreme losses of consumer surplus and national social welfare are in prospect. This is the position taken by the Administration in the US, which remains implacably opposed to higher fuel taxes, despite its concern to achieve higher fuel economy.

A partial focussing of adverse impacts may be associated with people who live on the fringe of urban areas, particularly low income workers and the transport disadvantaged. Higher fuel prices are commonly thought to bear most heavily on these groups, because on the fringes public transport systems are poor and many travel long distances across suburbs to jobs. These people are unlikely to receive any of the partially offsetting benefits of reductions to the sales tax, because the cars they buy tend to be second hand.

However, there may be positive effects on urban congestion costs, which are considered only implicitly in the modelling process.

Although the $4 billion additional Government revenue offers some opportunity for Government to target assistance which provides specific assistance to losers under such a policy, indications are that the amounts are not sufficient to fully compensate them.

Given that much of the fuel savings need to be in cities where short trips and cold starts exacerbate problems of fuel economy, there would seem to be advantages in applying such rises through the Business Franchise Fee rather than the Commonwealth excise.

As discussed in Section 2.2.4, The Business Franchise Fee is levied by most States at the retail outlet, and thus provides scope for regional differentiation of the rates. It may be useful for large increases in the fuel tax to be imposed mostly on urban areas (where 70 percent of fuel is expended) as a device to manage urban traffic congestion. Also cities provide the greatest scope for spending the additional revenue on alternative travel modes so as to minimise overall disadvantage to consumers.

7.3.5 Mandatory Fuel Consumption Standards

Although one must be careful of drawing too many parallels with the results obtained in the US or other countries, the evidence provided at Section 3.5.2 indicates that mandatory fuel consumption standards have potential for significant perversities which would be transportable to Australia.

Under mandatory standards, achieving low fuel consumption targets is theoretically a matter of progressively applying lower and lower Fuel Consumption Targets by class until the required target is met.

However, the real question is what happens in case of a failure to meet the standard. In the US, manufacturers have variously opted to pay fines, play games around the rules, and involve themselves in political action to have the standards lifted. Some have left the industry or, like Rolls Royce, not sold enough vehicles to qualify as a major manufacturer.

In the end, the decision to comply or not rests with the industry rather than the Government, and the real question is what is the cost of compliance. Because of this, some argue that mandatory standards operate as a complicated tax, so Governments might as well use a tax.

When this result was viewed in the context of the perverse outcomes in the US, it was concluded that Australia should introduce mandatory standards as a last resort only.

However, it is possible that Governments might wish to impose mandatory fuel consumption standards anyway. Although a great deal of work would be required to design them for Australia, the following Sections indicate one possible approach.

Establishing Mandatory Standards

The steps appear to include:

- establish within Government, subject to consultation of the industry, the aims of the programme and the evidence that the goals cannot be achieved by less costly and restrictive instruments;
- establish the Constitutional mechanism under which the policy would be implemented;
- establish the structure of the standard and the tolerances of measurement to be allowed;
- establish the necessary test facilities and ensure that they and other enforcement mechanisms can be resourced;
- establish the relationship between the standard and other

instruments especially the ADRs and the PMV Plan;
- o consider what to do about commercial vehicle derivatives;
- o consider the nature of and scope of sanctions;
- o consider the nature of and scope of credits and debits, and how these relate to export credits under the PMV Plan;
- o consider the nature, type and resources required for supplementary policies especially information programmes including vehicle labelling.

Some advice about these and allied matters is available in earlier Sections and in the WPs, or could be obtained in subsequent discussions among agencies and with the industry. However, there are still many questions to be answered, some of which need a policy input not available at the time of writing.

Possible Structures

There are at least two variations to consider:
(a) operate on the corporate average fuel consumption of each manufacturer, and require that manufacturer to meet a mandated NAFC Target for each given year;
(b) mandate Class Specific or Utility Related Fuel Consumption Targets and require manufacturers to meet the Target for each class (if appropriate) and year.

The elements of both are:
- o a stringent and reliable testing programme;
- o a system of fuel consumption targets;
- o a system of penalties for non-compliance.

Aspects of each element have appeared in previous Sections, and need not be repeated here, except perhaps to reiterate that any fuel consumption policy should try to maximise the contribution available from technology.

Possible Penalty Levels

It is understood that under the US CAFE regulation, penalties were determined on the basis of the amount of additional fuel expended during the life of a vehicle, if it fails to meet the mandatory target. There, the margin between certified fuel consumption and target is used to calculate the penalty, After converting the method to be applicable to litres/100km instead of MPG, the penalty would be calculated as:

$$\text{Penalty (\$)} = \frac{\$15000}{(\text{target})^2} \times (\text{margin over target})$$

These are considered in the US to be severe penalties, for example if a typical upper medium class Australian vehicle exceeded its target by say 0.3 litres per 100km, the penalty (on a US basis) would be in the order of $60 per vehicle.

Penalties calculated on a basis of fuel saved over vehicle life under Australian conditions would be higher (up to $300), because vehicle life and fuel prices are higher here.

Commentary

It should be noted that mandatory corporate targets are in place in the US, and a voluntary system of class specific targets is in place in Japan. The merits of these are discussed in Chapter 3, but remember that the latter would need some supplementary mechanism to contain class drift.

Nominally, there is no reason why the estimates of future fuel consumption under the MTS could not be used as fuel economy targets. However, the comments of Section 7.4.4 about setting Fuel Consumption Targets are relevant.

Governments and their bureaucracies may tend to favour mandatory standards because of perceptions of certainty in outcome; however, the US experience shows that such perceptions are false.

From the point of view of manufacturers, mandatory fuel economy standards require a stringent and expensive administration which is charged back against their operations. Probably, the cost of the bureaucracy is their least concern. More important is the cost of verification including elaborate and expensive documentation as applies to the US emission control certification process. Manufacturers regard such processes as diverting otherwise creative people from real design and development work, into the disheartening and boring task of battling bureaucratic supervision and designing complicated but unproductive ways to circumvent the law.

From the point of view of the community, mandatory fuel consumption standards restrict freedom of choice, insofar that consumers must buy what they perceive as an underpowered vehicle of the 'right' size (which they then drive more aggressively). Alternatively, they trade off power against other attributes (say by buying a commercial vehicle derivative).

The flow through of these choices into the second hand market is unpredictable with the data available to this Study, but is nonetheless important to policy formulation.

There is no reliable mechanism for estimating the loss of consumer surplus due to mandatory fuel consumption standards. In particular, the results of the models discussed under Section 5.2 can not be adapted to an assessment of the impact of mandatory fuel consumption standards on consumers, because the respondents were not asked about such matters, and have no implied knowledge because no similar system applies in Australia. It is not appropriate to impute the estimates of change to consumer surplus given under Section 7.3.4 to this option.

However, NELA would argue that mandatory fuel consumption standards would be likely to withdraw much of the benefit of new technology, which allows manufacturers to meet the standard in the first place.

Mandatory fuel consumption standards which sought to deliver 5.0 l/100km would normally require all except mini and small class cars to be removed from the market. The losses to consumers

associated with this prospect would be very high indeed, and the political costs could be significant.

In summary, mandatory fuel consumption standards can be effective in part, but they have two types of problem: losses to consumer surplus and large administrative problems similar to those which occur in all centralised planning systems.

Administration requires too much information, becomes too bureaucratic and depends too much on the blunt tool of prosecution. The several weaknesses leave the way open for inefficiency and sometimes corruption (Ayres:1990).

In a fuel economy policy, Australia should turn to mandatory fuel consumption standards only as a last resort.

This is not to say that there is no place for occasional use of command and control instruments, but the evidence obtained in this Study would suggest that a more efficient and innovative approach can be found through the use of the tax system, appropriate use of marketable credits and a reliable testing and information system in which the private sector is involved.

7.4 FUEL ECONOMY POLICY SUPPORT PROGRAMME

The Fuel Economy Support Programme is seen to be prerequisite to both the Technology Delivery Programme and the Prescribed Fuel Consumption Programme. It is **necessary but not sufficient** for any fuel economy policy which seeks Fuel Consumption Targets below 8.0 litres/100km.

7.4.1 Objectives

The aim is to articulate Government policies relating to fuel economy, and deliver the administrative arrangements and services required for any future government policy on fuel economy in passenger cars.

7.4.2 Scope

The Fuel Economy Support Programme would:

- undertake a lengthy public awareness campaign including media advertising to describe the elements of policy in a coherent and understandable way, and convince the public and manufacturers that Government policies on fuel economy are necessary and desirable;
- disseminate relevant information about how consumers might achieve fuel efficient outcomes, including compilation and issue of the Guide;
- prescribe achievable Fuel Consumption Targets and related regulations;
- prescribe useful procedures for vehicle testing including provision of test infrastructure if considered necessary;
- establish fuel consumption certification procedures including mandatory vehicle labelling.

7.4.3 Public Awareness Campaign

The aim is to educate consumers and manufacturers about the imperatives for a fuel economy policy, to change consumers' attitudes towards valuing fuel economy against other vehicle attributes and hence to impact on manufacturers' market shares.

The public awareness campaign should:
- o provide the vehicle for initial announcement(s) by Government;
- o present the goals, objectives and targets of fuel economy policy such that they are credible against other public policy, the fuel supply environment, other emission policies including the Government's Interim Planning Target on Greenhouse;
- o disseminate reliable information for buyers to rate fuel economy equally or higher than other vehicle attributes, and in that context to make a fully informed purchase decision;
- o include sufficient budget for media advertising, preparation and distribution of literature, vehicle labelling and like actions.

For such a programme to be heard in the cacophony of media advertising delivered by others (including car manufacturers and distributors), especial attention must be given to the mode of operation, targeting, communication strategy and budget.

Mode of Operation

The public awareness programme can be made to work by:
1. exposing potential car buyers to necessary and sufficient information to enable them to incorporate fuel efficiency into their decision process;
2. motivating car buyers to change their preferences towards the appropriate class of vehicle, and towards clean and fuel efficient alternatives among product offerings;
3. influencing product design, manufacture and marketing strategies. This further shifts the average of the products sold in the desired direction, as manufacturers improve product efficiency in their fight for market share.

Evidence to provide credibility to the programme is included in Chapters 1 through 4, and in the WPs.

A public awareness programme supported by market based instruments would operate on the demand side of the purchase transaction, and leave supply initiatives with the industry as far as is reasonable. This would allow fuel consumption reductions to evolve without prejudice to industry morale, while still applying pressure to achieve fuel economy goals.

By manipulating their market share among the 300 or more models on offer, it should be possible to convince manufacturers that the market demands clean and fuel efficient products; as these visions appear in showrooms and manufacturers' advertising, and feeds back into the range of products available, a culture of fuel economy will evolve that makes the policy self sustaining.

One can see such outcomes in the growing consumer resistance to smoking.

This is not to say that we would wish to label the automotive industry as a "nuisance" industry in the same way that society has labelled cigarette smoking, asbestos, noxious chemicals, and so on. Rather, cars are a major benefit to the Australian way of life, and provide employment for large numbers of people, albeit they produce emissions and cause road congestion. In addition, concerns about Greenhouse, climate change and even fuel shortfalls are a fact of life and will arise during the planning period to justify a fuel economy policy.

But a successful information programme will need to operate through all modes, so that individual behaviour and manufacturer response are mutually reinforcing.

At this stage of policy implementation, precipitous decisions which impose stringent new regulations, controls, penalties, etc., or lead to acrimonious debates (such as those which currently surround CAFE legislation in the US) should be avoided at all costs.

Targeting an Information Programme

Contrary to frequently cited assumptions, buyers rarely make a purchase decision on the basis of comprehensive information and predictable criteria. Rather, they collect what seems to them an adequate amount of information, which includes not only factual material such as might be available in the Guide, but also opinions from peers, advertising and salesmen, which is then evaluated subjectively. Once a decision has been made for whatever reason, supporting arguments are found to rationalise the decision ex poste.

The elements of a programme are built around the following issues:

- it must be pitched at a target group(s), be relevant to purchasing power in the marketplace and to creating opinion leaders;
- it must be technically credible. That is, it must be believable;
- it must be targeted to key points in the decision process and provide a path for positive, constructive and practical action in response to the message. It must be practical;
- the communication strategy must penetrate into the target group(s) (it must be heard) and not be too complex for any group (i.e. it must be understandable);
- it must relate to an issue that is significant to the target group or, alternatively, convince the target group of its significance for them. It must be relevant;
- it must also provide a simple rationale for the action, so that the purchaser can justify his or her purchase decision to others in their peer groups. That is, it must be defensible.

It is not necessarily easy to motivate target groups through the money savings available from fuel efficient vehicles. Other

criteria are important, especially interior volume. To understand this, one must first recognise that new car buyers are about evenly divided between companies and individuals.

For individuals, price is the leading determinant of choice, with interior volume second. For companies, volume and status are important, and price element much less so. There are three reasons for this. Firstly, individuals who choose vehicles on behalf of companies are not using their own money, so the motivation to save is lower. Secondly, marginal company tax rates are less than marginal private rates for most employees relevant to this discussion, so there is a propensity to leverage expenditure by using the company structure. Thirdly, companies commonly negotiate significant discounts on fuel which shelters those costs even more than for individuals.

Thus price is a key determinant for perhaps only one third of all purchases, while size is important for all. The public awareness programme must raise the issue of fuel economy beyond the decisions about vehicle size (which dilutes its impact), into selection of particular fuel efficient models within a vehicle class. In addition, the issue must be taken to decisions made by all types of buyers.

Communication Strategy

The communication strategy must present strong and consistent arguments that establish and reinforce the importance of fuel efficiency, and demonstrate that simple choices made in the purchase process do make a difference.

It is not difficult, for example, to identify which Plan Producer is the market leader on fuel economy criteria. The public awareness campaign should highlight this information in advertising.

The inclusion of fuel consumption information in advertising has two advantages: not only is it associated with a large volume of information which reaches the purchaser early in the decisionmaking process, but also it ranks fuel efficiency alongside other attributes in the overall image of desirability of ownership delivered by the message.

Messages given out as part of the programme must be relevant to the cultural and economic environment; e.g. in recessionary times, value for money might be a useful theme; during the Gulf War, fuel security would have been more relevant.

Vehicle fuel efficiency may be unconsciously associated with other purchase factors, both positive and negative, which may influence the significance of the message. For example, some fleet managers associate small (fuel efficient) cars with high maintenance costs and short life; some buyers perceive tradeoffs between fuel efficiency and power, size and safety. Such concepts need to be managed in favour of fuel efficient cars.

Peer pressure, and choices made by business and Government are also significant. If Governments encourage the public to buy

clean and fuel efficient vehicles, their purchases should provide an example. Manufacturers will react if a message changes buyer preference between makes and models. Some may well react to a fuel economy programme with heavy advertising of other features such as size or power, criticism of the validity of the message, price discounting, and so on. Alternatively, if a manufacturer sees potential market gains, it may try to build on the fuel efficiency message.

Ultimately, the message must publicise and clarify the actions necessary for a buyer to choose a fuel efficient vehicle, including how that action relates to others being taken by governments and business to reduce fuel consumption.

It seems unlikely that any single media channel could achieve this. A range of channels including Government announcements, testing programmes, the Guide, brochures and like material, advertising and vehicle labelling all have a part to play.

Within such a framework, policy instruments discussed under the Technology Improvement Programme and the Prescribed Fuel Consumption Programme complete a sensible and acceptable framework for a fuel economy policy.

Budget

It is to be noted that public awareness programmes are expensive. There is a critical mass for advertising and supporting action which, if not met with appropriate budgets, the investment will not succeed. In that case, government would be better served directing the funds to another area.

Based on the smoking and drink driving precedents referred to in Section 6.1.4, budgets not less than $5 million annually can be regarded as a minimum, but consideration should be given to perhaps $15 million annually for the first three years.

It is important that Government persist with the programme for sufficient time that the public can see that fuel economy is a serious business and not just another kneejerk reaction.

Given the dimensions of the restructuring task being imposed on the industry by recent changes to the PMV Plan, the need to change the public culture on fuel economy, and the penalties associated with new safety and emission standards around year 2000, it is considered that this level of expenditure should continue in real terms to 2005 as a minimum.

It is possible that the need to commit relatively large levels of public funds to advertising campaigns, in a climate of stringent Government funding, is one reason why some Government observers are reluctant to accept the efficacy of a public awareness campaign. However, it is suggested that ways could be found for the necessary funds to be raised from the industry; e.g. by hypothecating a fraction of one cent/litre from the fuel excise.

7.4.4 Prescribing Fuel Consumption Targets

Although they may have the information to make the necessary choices, people need a target to aim at. This is the case irrespective of whether Fuel Consumption Targets are made mandatory or voluntary.

Prescribed Fuel Consumption Targets are most effectively presented within the public awareness campaign, where they could be appreciated alongside other information about Australia's fuel consumption performance, what Government is doing about it and what individuals can do to help. This approach is the essence of other energy economy programmes, and public health and road safety programmes as well.

Basis for Setting Fuel Consumption Targets

Fuel consumption forecasts by class listed for the MTS in Chapter 4 provide a responsible basis for setting Targets. The levels of fuel consumption included therein will not be easy to meet, but if Australia is to improve towards international best practice, there is no reason why they should not be used.

The details of target setting within a class would have to be considered in some detail in the year prior to the required Target, because it would have to be addressed in the context of the then current performance of manufacturers. Recall that at present, less than half Plan Producers and importers appear to be distributing vehicles which are as fuel efficient as equivalent vehicles sold overseas. The targets would have to be set with such facts in mind.

Doubtless there will be considerable discussion and negotiation with the automotive industry.

Structure of Targets

However, before deciding on an appropriate Targets through to 2005, Governments might profitably consider the way such targets should be defined. This Study used dimensions of litres/100km by vehicle class, but alternatives are available.

In NELA's opinion, the class definitions currently used in Australia are entirely inadequate for administering a fuel economy policy, and especially for setting fuel consumption targets which are intended to be used in a taxation or mandatory context.

This concern was foreshadowed in Section 2.1.2, where it was reported that the available data prevents a sensible yet precise definition of vehicle classes. Better reporting from manufacturers about model descriptions and sales mixes would be required (especially in respect to types of transmissions sold) to correct this.

In the opinion of the Consultant, there are two issues to be addressed:

- official Fuel Consumption Targets should not be set on a class basis. A continuous distribution across all vehicle models would be preferred;
- Targets should be set in terms of level of service or like parameter which is meaningful to consumer choice.

These matters are discussed in turn.

Category definitions in any context always give rise to perversions at the boundary. In the context of fuel economy policy, the issue is particularly important.

The MTS will produce a sales mix which is slightly upsized from that which existed in 1988. This imbues additional consumer benefits on car buyers, which flows on to all Australians through the used car market.

However, it is important that the target sales mix be not exceeded. The MTS will deliver a NAFC of 6.5.litres/100km (or 6.0 litres/100km under certain circumstances) if and only if the sales mix does not upsize beyond this level.

Steps are needed to discourage or prevent manufacturers and customers from slowly upsizing their fleets as fuel efficiency increases and the cost of vehicle operation falls. Overseas experience reveals the propensity for manufacturers who are having difficulty in meeting a class Target to simply change specification so that the vehicle is sold into the next class.

Desirably, a continuous distribution of Fuel Consumption Targets will be devised in terms of some descriptor of consumer utility. Then, it would be possible to design a sliding scale of tax rates or penalties which is higher on those vehicles with higher fuel consumption.

It would be better if official Targets were defined as a continuous function with fuel consumption set against some measure of level of service, which was itself a continuous function across all vehicle classes.

The weight and power basis of definition, which is the obvious option, does not operate on attributes which are of most utility to the consumer, such as interior volume.

There is a great deal of work still to be done before a sensible approach such as this can be implemented. However, some useful directions are emerging:

- a proposal exists in the EEC for limits which are defined as a continuous function of fuel consumption (and/or CO_2 emissions) and vehicle weight. This avoids the boundary problems which would arise under a category based system, but it is evident that vehicles which deliver essentially the same level of service to a consumer can have different weights. Perversities can also arise in the case of sports classes, as they have high power and low weight and hence can perform very well under test drive cycle but still have a high on road fuel consumption;
- a proposal exists in the US for limits to be defined as a function of interior volume (McNutt & Patterson:1986). This

was developed because that analyst believes that interior volume is highly correlated with level of service.

This Study has confirmed that in Australia, weight is highly correlated with a range of vehicle attributes which are attractive to consumers, including interior volume. As manufacturers use more lightweight materials, it is not unlikely that more appropriate indicators will be established.

Current considerations of the definition and merits of volume weighted fuel consumption standards in the US should be monitored, as the results may be useful to setting Fuel Consumption Targets for Australia. Devising an appropriate structure for Australia may require an update of the data base used for this Study.

There is no simple modelling system which allows detailed analysis of the economics of alternative Target structures, especially at this stage in the consideration of fuel economy policy. Feedback on the possibilities and ranges of intervention desired by Government would assist structuring such analyses at a later date. For refined calculations, some further data collection and review of the models discussed in Section 5.2 may be required.

It is important that this issue be pursued, as poor Target structures could be counterproductive for the whole fuel economy policy. Note that Targets will be required for commercial vehicle derivatives, and would apply equally to cars supplied by Plan Producers and importers.

Targets in Relation to Penalties

It is to be noted that where Fuel Consumption Targets are intended for use in a taxation or regulatory context, they need to be correlated with the procedures used for setting tax penalties or fines for non compliance. In this context, the aim of the penalty is to reduce the standard deviation of fuel consumption of cars of equivalent level of service (whatever indicator is used), and to bring the mean of all cars' fuel consumption towards the set Target (which one would presume to reflect international best practice).

It is desirable for penalties to be set in relation to the price of the car, so that price and level of service are taken into account should a customer choose a vehicle which does not deliver fuel efficiency at the required level of service.

Presenting Targets to Consumers

Targets should be placed before the public whenever possible in such a way that they promote competition between manufacturers.

For example, the Guide could be a powerful medium if the information were presented to highlight those cars which cannot meet target. This could be easily achieved by including the official Target in the front of the Guide and then reporting cars in two categories, those which meet the Target and those which do

not. Within these categories, cars might be listed in increasing order of fuel consumption, so that the competitive issue is brought before potential buyers.
Before the 1991 Guide was issued, prospective buyers had to search through the 300+ entries for the car with the lowest fuel consumption. This is a tedious business, especially when the weighted average fuel consumption is not listed for any entry.

Similarly, regulations covering vehicle labelling might clearly state whether the subject vehicle meets the target for its assumed level of service.

7.4.5 Prescribing Vehicle Testing Procedures

Any fuel economy programme must have credible, reliable and applicable benchmarks, which means that buyers of new cars and users of on road cars must have access to reliable estimates of what fuel consumption they can expect from their vehicle.

Part of any cultural change is a requirement for members of the lay public to be able to verify for themselves, the fuel economy of individual vehicles, and to understand what needs to be done to an particular vehicle to achieve optimal fuel economy. Without this, individuals simply cannot participate in the programme.

This requires:
1. Simple and understandable test procedures for new vehicles. While AS2877-1986 is a common basis for international testing of new vehicles, and is used both by manufacturers and State EPA testing stations, its interpretation to the lay community is not straightforward and requires explanation;
2. Procedures which are clearly applicable to Australian conditions, yet facilitate international comparisons. AS2877-1986 is essentially equivalent to US test procedures, which are different from ECE or Japan. These differences have never been rationalised and consideration by the Australian Standards Association might be in order. It is to be noted that the city/highway weighting is 55/45, whereas in Australia the transport task and fuel use is closer to a 70/30 ratio;
3. Strict application of test procedures including making fuel consumption testing the primary purpose of the tests. At present, the primary purpose is measurement of emissions, and some test facilities, including the State test facilities, do not strictly adhere to certain requirements of AS2877-1986, which are essential for fuel consumption testing;
4. Public scrutiny of all test results, and public certification of the fuel consumption of particular models. This is not available within the FCAI voluntary Uniform Code of Practice on Furnishing Fuel Consumption Data, or the Australian Fuel Consumption Guide for New Car Buyers;
5. Techniques for lay checking of fuel consumption performance. For new vehicles, this at least includes vehicle labelling to identify the fuel economy performance of each vehicle against class targets. For second hand vehicles either in service or on sale, checking of fuel consumption is a

difficult area which requires further consideration;

6. Low cost but regular inspection of equipment affecting fuel consumption performance. Inspection procedures analogous to those currently used for emissions equipment should be devised and incorporated into roadworthy and auto club inspection practices.

If these services could be provided, the public would have access to information which would permit them to fully contribute to a fuel economy policy.

7.4.6 Establishing Fuel Consumption Certifications Including Mandatory Vehicle Labelling

A fuel economy policy involves knowing with confidence what the fuel consumption of each make/model really is. This suggests that fuel consumption certification is required on a model basis in a similar way to compliance certification under the ADRs. This certification would form the basis for any penalties applicable under a fuel economy policy, as it will take on evidentiary status.

Vehicle Labelling

If used in isolation, a vehicle labelling programme can only reinforce the message delivered by the public education campaign. It would not be examined until the buyer enters the showroom, by which time it is too late to be influential in the decisionmaking process.

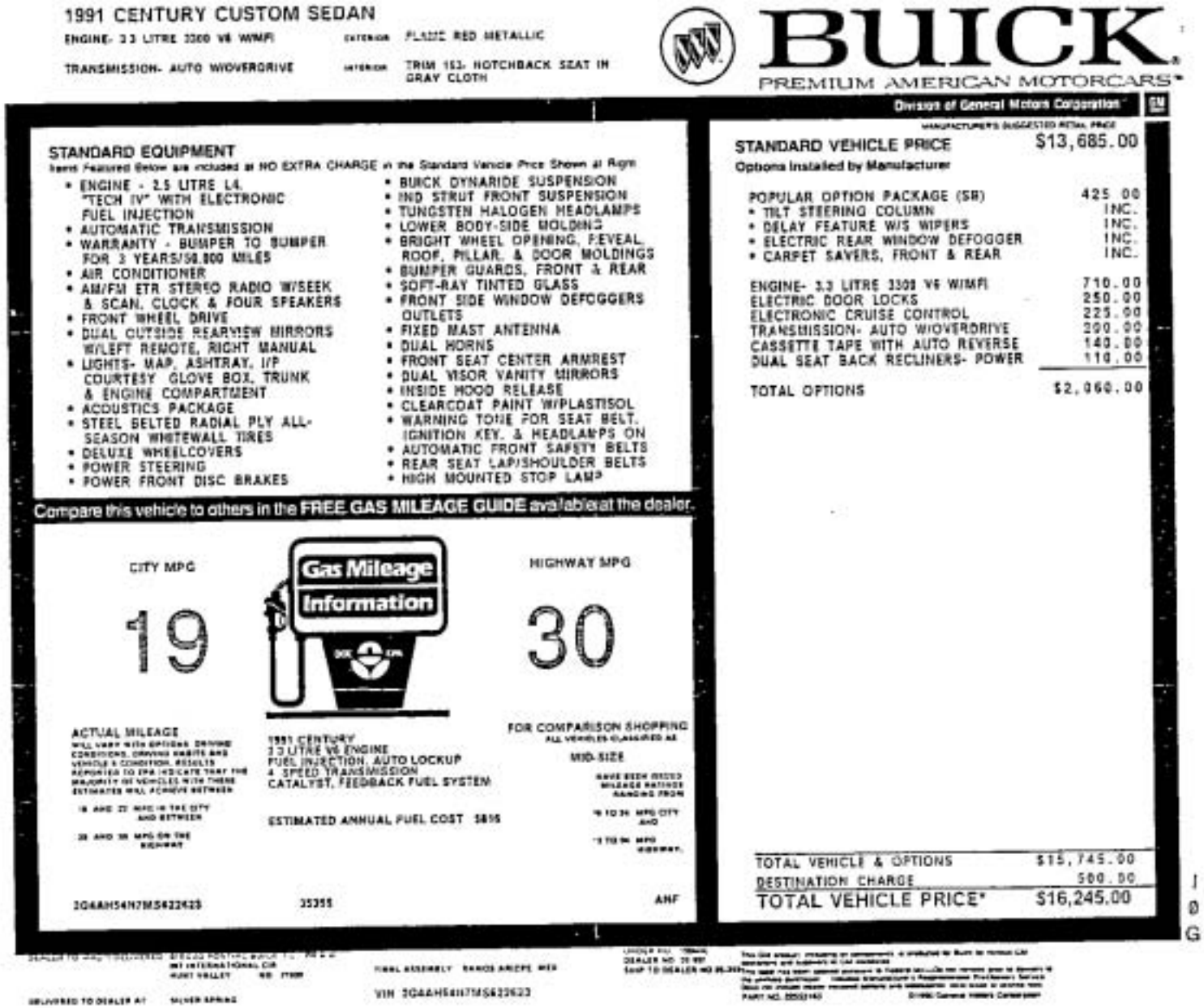
As part of a broader fuel economy programme, mandatory vehicle labelling would provide a moral and probably a legal reassurance to buyers that the car being purchased actually could deliver the stated fuel consumption, thereby achieving pre-purchase requirements.

Figure 7.1 illustrates an actual vehicle label used in the US. Note that the information provided is much more extensive than that included on electrical appliance labels in Australia, and something along these lines could be considered.

7.5 SOME INEFFECTIVE INSTRUMENTS

Throughout the Study, candidate policy instruments which were specified by the Brief or brought to attention by others were addressed. However, for one reason or other they were deemed to be less effective than the instruments included in the Technology Delivery and the Prescribed Fuel Consumption Programmes. They are mentioned here for completeness only.

A major factor affecting the effectiveness of any instrument is how it is administered. As indicated above, the modelling showed that annual charges set in Australia for vehicle registration fees including compulsory insurance, etc have a very indirect influence on automobile purchase decisions. Indeed, the response was so low that levels of charge which make a significant impact on fuel economy were beyond the sensitivity of the econometric models.



1991 CENTURY CUSTOM SEDAN

ENGINE- 3.3 LITRE 3300 V6 W/MFI

TRANSMISSION- AUTO W/OVERDRIVE

EXTERIOR PLAZIC RED METALLIC

INTERIOR TRIM 153- NOTCHBACK SEAT IN GRAY CLOTH

BUICK

PREMIUM AMERICAN MOTORCARS

Division of General Motors Corporation

STANDARD EQUIPMENT

Items Featured Below are included at NO EXTRA CHARGE in the Standard Vehicle Price Shown at Right

- ENGINE - 2.5 LITRE L4, "TECH IV" WITH ELECTRONIC FUEL INJECTION
- AUTOMATIC TRANSMISSION
- WARRANTY - BUMPER TO BUMPER FOR 3 YEARS/50,000 MILES
- AIR CONDITIONER
- AM/FM ETR STEREO RADIO W/SEEK & SCAN, CLOCK & FOUR SPEAKERS
- FRONT WHEEL DRIVE
- DUAL OUTSIDE REARVIEW MIRRORS W/LEFT REMOTE, RIGHT MANUAL
- LIGHTS- MAP, ASHTRAY, I/P COURTESY GLOVE BOX, TRUNK & ENGINE COMPARTMENT
- ACOUSTICS PACKAGE
- STEEL BELTED RADIAL PLY ALL-SEASON WHITEWALL TIRES
- DELUXE WHEELCOVERS
- POWER STEERING
- POWER FRONT DISC BRAKES
- BUICK DYNARIDE SUSPENSION
- IND STRUT FRONT SUSPENSION
- TUNGSTEN HALOGEN HEADLAMPS
- LOWER BODY-SIDE MOLDING
- BRIGHT WHEEL OPENING, FEVEAL, ROOF, PILLAR, & DOOR MOLDINGS
- BUMPER GUARDS, FRONT & REAR
- SOFT-RAY TINTED GLASS
- FRONT SIDE WINDOW DEFOGGERS OUTLETS
- FIXED MAST ANTENNA
- DUAL HORNS
- FRONT SEAT CENTER ARMREST
- DUAL VISOR VANITY MIRRORS
- INSIDE HOOD RELEASE
- CLEARCOAT PAINT W/PLASTISOL
- WARNING TONE FOR SEAT BELT, IGNITION KEY, & HEADLAMPS ON
- AUTOMATIC FRONT SAFETY BELTS
- REAR SEAT LAP/SHOULDER BELTS
- HIGH MOUNTED STOP LAMP

Compare this vehicle to others in the FREE GAS MILEAGE GUIDE available at the dealer.

CITY MPG

19

Gas Mileage Information

HIGHWAY MPG

30

ACTUAL MILEAGE

WILL VARY WITH OPTIONS, DRIVING CONDITIONS, DRIVING HABITS AND VEHICLE'S CONDITION. RESULTS REPORTED TO EPA INDICATE THAT THE MAJORITY OF VEHICLES WITH THESE ESTIMATES WILL ACHIEVE BETWEEN

18 AND 22 MPG IN THE CITY AND BETWEEN

28 AND 38 MPG ON THE HIGHWAY

1991 CENTURY
3.3 LITRE V6 ENGINE
FUEL INJECTION, AUTO LOCKUP
4 SPEED TRANSMISSION
CATALYST, FEEDBACK FUEL SYSTEM

ESTIMATED ANNUAL FUEL COST $815

FOR COMPARISON SHOPPING

ALL VEHICLES CLASSIFIED AS

MID-SIZE

HAVE BEEN ISSUED MILEAGE RATINGS RANGING FROM

18 TO 24 MPG CITY AND

23 TO 34 MPG HIGHWAY.

STANDARD VEHICLE PRICE $13,685.00

Options Installed by Manufacturer

POPULAR OPTION PACKAGE (SR)	425.00
• TILT STEERING COLUMN	INC.
• DELAY FEATURE W/S WIPERS	INC.
• ELECTRIC REAR WINDOW DEFOGGER	INC.
• CARPET SAVERS, FRONT & REAR	INC.
ENGINE- 3.3 LITRE 3300 V6 W/MFI	710.00
ELECTRIC DOOR LOCKS	250.00
ELECTRONIC CRUISE CONTROL	225.00
TRANSMISSION- AUTO W/OVERDRIVE	200.00
CASSETTE TAPE WITH AUTO REVERSE	140.00
DUAL SEAT BACK RECLINERS- POWER	110.00
TOTAL OPTIONS	$2,060.00

TOTAL VEHICLE & OPTIONS	$15,745.00
DESTINATION CHARGE	500.00
TOTAL VEHICLE PRICE*	$16,245.00

3G4AH54N7MS622625 35355 ANF

J Ø G

DELIVERED TO DEALER AT SILVER SPRING

FINAL ASSEMBLY SANDUSKY, OHIO

VIN 3G4AH54N7MS622625

FIGURE 7.1: ILLUSTRATION OF A VEHICLE LABEL DESIGN

At the level of the particular vehicle, such high charges as would be necessary may even be dysfunctional:

- if the charge is high, people may try to travel more in a particular vehicle, and to the extent that it is old, may even use more fuel than otherwise;
- new vehicles pay the same tax as old, but the new vehicles travel further per year;
- older vehicles tend to be owned by the lower socio-economic groups, so the impact of equal charges is inequitable.

Effectiveness requires operating on purchase price, and those vehicle attributes which cause high fuel consumption, so as to encourage individuals and companies to buy fuel efficient cars.

The more relevant and easily accessible vehicle attributes are interior volume, weight and specific power output. Any instrument should operate on one or more of these parameters.

Tinkering with other possibilities such as those discussed below will serve to drive up tax compliance and other administration costs, without significantly impacting on the fuel consumption of cars sold and used in Australia, and particularly the used car fleet.

7.5.1 Annual Registration Charges

Annual charges are seen to operate on the annual cost of ownership rather than vehicle choice or use. They include State registration fees and third party insurance. In NSW, registration charges are calculated on the basis of weight and size, which would be useful parameters if it were not for their low impact on perception.

It has been stated previously that the modelling procedures found that very large annual charges would be needed before this instrument would significantly impact on sales mix, which is consistent with the OECD argument of 1990 that annual charges are the most important intervention failure in transport policy.

Also, the issue of registration charges is complicated by the current debate on cost recovery of road damage and in 1990, one State (Victoria) had no annual charge for registration on passenger cars, because the damage they do to roads is very small. Hence, to impose very large charges on fuel economy grounds would possibly raise arguments about consistency of administration, which would only confuse Government messages delivered under the Fuel Economy Support Programme.

7.5.2 Abolish Deductions for Depreciation of Company Cars

It was concluded that in all probability, the fall in market share would be much less than described for complete abolition of company tax deductions as discussed under Section 7.2.5. Allowable deductions for company car depreciation is around 22.5 percent, but this is subject to a limit around $45,000.

Abolition of deductions for depreciation would therefore have a proportionate impact on purchase decisions to that described

under Section 7.2.5, and the downsizing of upper medium classes would be less than 3 percent.

7.5.3 Increase Fringe Benefits Tax

This seeks to increase the annual running cost of company cars as perceived by company staffs, by raising the standard rules for calculating FBT. Using an analysis similar to that discussed under Section 7.2.5, it was estimated that raising FBT to the levels of personal income tax equivalent would produce perhaps one percent downsizing.

When considering this latter estimate, one should note that introduction of FBT since 1986 has had little if any long term effect on the mix of classes in the company fleet. FBT is regarded by many taxpayers as a tax on companies, and choices are made in that light. In particular, fuel prices have little or no impact.

Although one must also accept that as long as FBT is cheaper than paying individual tax, it will provide an avenue for individuals to avoid income tax, if this were eliminated it would not make a lot of difference to the choice of cars bought by companies.

Change to FBT - British Version

FBT rules in the UK require beneficiaries in certain circumstances to impute a proportion of the cost of a company car to personal income tax returns. If adopted here, this may eliminate one current Australian problem whereby companies simply pay the tax on behalf of employees, and the costs would be perceived by beneficiaries. If a company attempted to pay the tax, the payment would be income to the employee which itself would attract tax; this sets up a cycle which is difficult to break.

In Britain, the imputed income on cars can be very high, e.g. a Commodore/Falcon variant carries an imputed income just below the annual cost of a vehicle in Australia. However, it is not clear that it would significantly affect the size mix of cars bought, not only for the reasons indicated above, but also because the company would probably find ways to counter the cost to employees (e.g. through the use of hire cars, taxis, chauffeurs, etc.).

7.5.4 Variable Weighting of Company Tax Deductions

Those who recollect the debate when tax deductions on business entertainment were abolished would agree that a proposal to abolish company income tax deductions on company cars will be strongly resisted politically.

An alternative suggestion was made by others for a scheme which weights the deductibility of costs upward or downward, depending whether the certified fuel consumption is lower or higher than the Fuel Consumption Target. The weights would be designed to be revenue neutral.

Such a scheme could be successful, provided the weights were

sufficiently great. They would operate on the annual cost of ownership and operations, which for the sake of example is taken here to be around $10,000. On this basis, the maximum weight could have to be in the order of 0.7, i.e. the least fuel efficient vehicles would be allowed only about 70 percent of deductions, whereas the most fuel efficient vehicles would be allowed a 130 percent deduction.

This would allow neutrality in the size of company tax revenues, but it is not clear that it would lead to a significant downsizing of the company car fleet, especially in the absence of other instruments.

7.5.5 Introduce Stringent Inspection Systems

A suggestion was made by FCAI representatives that the older cars on the road are least fuel efficient because they tended to be less fuel efficient when new than are today's products, and in addition they are less well tuned.

They argue that it would be appropriate to introduce stringent inspection systems similar to those in place in Japan. There, the requirements on cars aged 6 years or more are, in practice, so demanding that it is more cost effective for the owner to buy a new vehicle than to maintain the old ones.

The suggestion is predicated on the assumption that older cars are driven about the same distances annually as new cars and would be scrapped if repair costs were driven high enough. However, this assumption is false.

Note that the policy if adopted would produce a large one off increase in sales volume. It is estimated that inspections as stringent as those in Japan would lead to demands for replacement of up to 4 million vehicles. This raises the question of the costs of such action and who is likely to have to meet them.

The questions surrounding this option are essentially beyond the Terms of Reference, but the following commentary is offered:

- a new vehicle costing say $25,000 in Australia costs some $5000 annually in opportunity cost of capital and depreciation. This is a substantial increment over the cost of owning a second hand vehicle of the same class. For such a stringent inspection system to be economic in this country, the marginal operating savings would have to outweigh the additional capital costs. This would require a lower capital investment and/or a substantial increment in fuel costs;
- it is argued that Australian consumers value other items (like rent, food and clothing) too much to be prepared to pay the $70 billion or so it would cost to replace the old with new vehicles;
- even if they were, the macroeconomic implications would be very significant, because this policy would engender a rapid increase in imports (Plan Producers do not have capacity to manufacture more than about 200,000 vehicles more annually). The $70billion cost of financing these vehicles plus the impact on the current account deficit may be more than the country can cope with;

- the Australian passenger transport task is quite different from that in Japan. Our distances are much greater, our population densities lower, our congestion less severe and our public transport systems much more primitive;
- the older vehicles tend to be owned by people on lower incomes who have to use them for work travel in Australia's sprawling cities. This option could leave particularly blue collar workers and the transport disadvantaged stranded on the outskirts of cities, with no possibility of public fp126transport systems being put in place to serve them.

Much more consideration would need to be given before a programme of stringent car inspections could be introduced in an economic and equitable way.

7.6 CONCLUSION

This Chapter has discussed subprogrammes which are likely to contribute to improved fuel economy among passenger cars sold in Australia.

The Consultant has a strong preference for programmes which are based in manipulating market forces, which in turn will impact on manufacturers' market share. This requires marketing techniques to be used in conjunction with policy instruments.

The candidate policy instruments listed in the Brief were analysed, and two possible programmes of Government intervention devised which rely on manipulation of sales and fuel taxes. These are a Technology Delivery Programme and a Prescribed Fuel Consumption Programme.

The Technology Delivery Programme involves sensitive use of taxation instruments to encourage manufacturers to deliver fuel efficient technology, and the Prescribed Fuel Consumption Programme provides a fall back position against the possibility that the Technology Delivery Programme does not work as planned. The Prescribed Fuel Consumption Programme involves much more stringent taxation and/or regulatory measures, which reduce national welfare.

Neither of these Programmes is likely to be fully effective in the absence of the Fuel Economy Support Programme, and indeed may prove counterproductive. In particular, a public awareness programme with adequate target setting and testing programmes is required to deliver the credibility and benchmarks without which no programme of taxation or regulatory instruments will work effectively.

It is considered that there would be considerable synergy between the Fuel Economy Support Programme and the Technology Delivery Programme.

Little action, if any, is required to deliver 8.0 litres/100km by 2005. Government can reasonably assume that industry competitiveness and carryover designs from the global strategies of overseas parent manufacturers will deliver this target. However, the Fuel Economy Support Programme could induce

additional gains beyond an 8 litre/100km Target.

Under the Technology Delivery Programme, technology can be used to deliver NAFC targets approaching 6.0 litres/100km, but not if new safety and emission standards are to be adopted. With new safety and emission standards, Fuel Consumption Targets down to 6.5 litres/100km can be achieved, depending on how aggressively the Technology Delivery Programme is pursued.

For the Prescribed Fuel Consumption Programme, which aims to deliver Targets below 6.5 litres/100km, it will be necessary to resort to downsizing. The Programme envisages reintroduction of some instrument like the old luxury car tax, but much more aggressively applied. Broad based market instruments such as the fuel tax can be used to reduce fuel consumption to around 80 percent of 1988 usage, but not without severe and as yet unquantifiable costs to the economy.

It is clear that target levels below 6.0 litres/100km will not be achieved without very aggressive policy action which will impact severely on consumers and, unless further measures are put in place to assist manufacturers and compensate losers among consumers, Australia may see a range of unintended consequences arise as has happened in the US during the 1980s.

To a large extent, this is because downsizing causes a loss of consumer benefits, and consumers and manufacturers will resort to gaming to prevent this happening. Downsizing preempts opportunity for a consumer to gain the considerable benefits of car use, which are real albeit controversial.

A system of mandatory fuel consumption standards might go some way to reducing fuel consumption, depending on the target and the design of the system but it will certainly attract compliance problems and may have economic and political costs.

The impact of downsizing on consumers and manufacturers is a major source of irritation with the US CAFE regulation; this can also be anticipated in Australia, due to the value placed by Australians on interior volume. These values are confirmed by both market research and econometric testing.

Mandatory fuel economy standards will not necessarily achieve a 20 percent reduction in fuel use below 1988 levels. Not only does it take too long for new vehicles to feed through the total fleet, but political action by manufacturers may frustrate progress, as has happened in the US.

Developing a programme to improve fuel economy in Australia is necessary, but not straightforward and without risk.

> *"It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things."*
>
> **Machiavelli, The Prince.**