Information sheet 30

Australian Government
Department of Infrastructure, Transport, Regional Development and Local Government
Bureau of Infrastructure, Transport and Regional Economics

Fuel consumption by new passenger vehicles in Australia 1979–2008

BITRE has examined trends in the fuel consumption of new passenger vehicles sold in Australia. Up to 2001, technological advances in engine technology, which improved fuel efficiency, were offset by increases in power, weight and the popularity of 4WD vehicles. Since 2001 the overall trend in fuel consumption has continued to decrease with average new light vehicle fuel consumption down 8.4 per cent to 8.14 litres per 100 kilometres (L/100 km).

BITRE New Passenger Vehicle Database

BITRE has recently updated its New Passenger Vehicle Database which includes new light vehicle sales, by make and model, back to 1978. With average fuel consumption being the main focus of the database, it also includes time series data on other vehicle characteristics such as power, weight, engine displacement, drive type, number of cylinders and price. Data up to 2001 was collated using three sources:

- data on sales by model, reported by the VFACTS unit of the Federal Chamber of Automotive Industries
- vehicle characteristics data by model from *Glass's Guide*
- fuel consumption data by model from the Australian Greenhouse Office (previously reported by the then Commonwealth Department of Primary Industries and Energy).

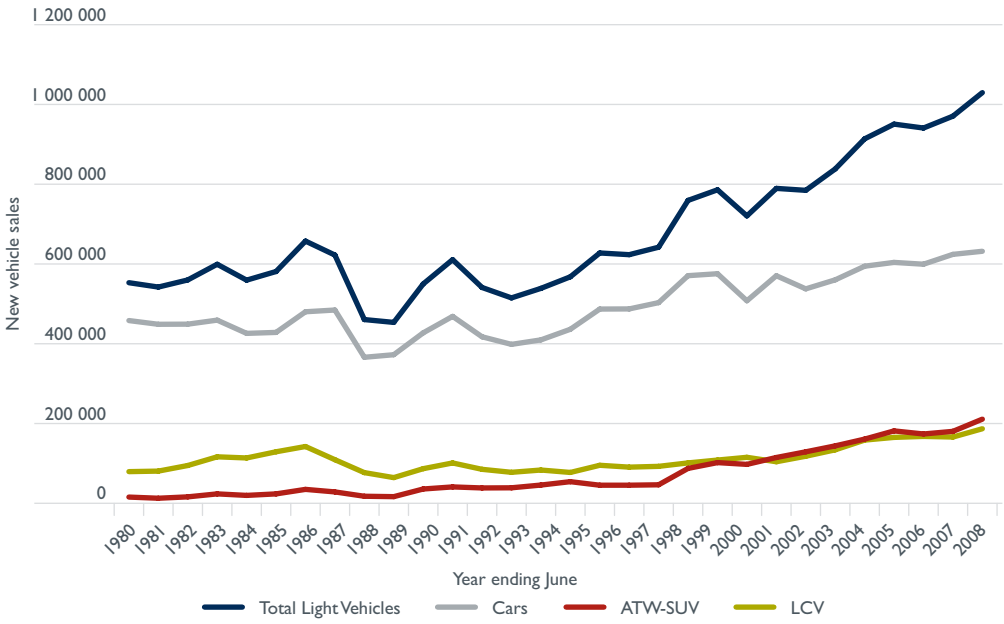
Updated data from 2001 was collated using VFACTS sales figures and Glass's Research Data (GRD) for vehicle characteristics. VFACTS Sales data was also matched to the Green Vehicle Guide for an indication of CO_2 emissions trends for the new light vehicle fleet.

New vehicle sales

Since 2001 annual new light vehicle sales have grown by 30 per cent, surpassing 1 million new light vehicle sales a year. The vehicle mix has continued the trend evident in 2001, namely a decrease in the proportion of passenger cars, with an increase in the *all terrain wagon-sports utility vehicle* (ATW-SUV) category. Between 2001 and 2008, passenger cars have decreased their share from 72 to 61 per cent, *ATW-SUV*s have increased from 15 to 20 per cent and the light commercial vehicles (LCV) share has grown from 13 to 18 per cent.

Figure 1 illustrates the new light vehicle sales in Australia since July 1978.

Figure 1 New light vehicle sales in Australia



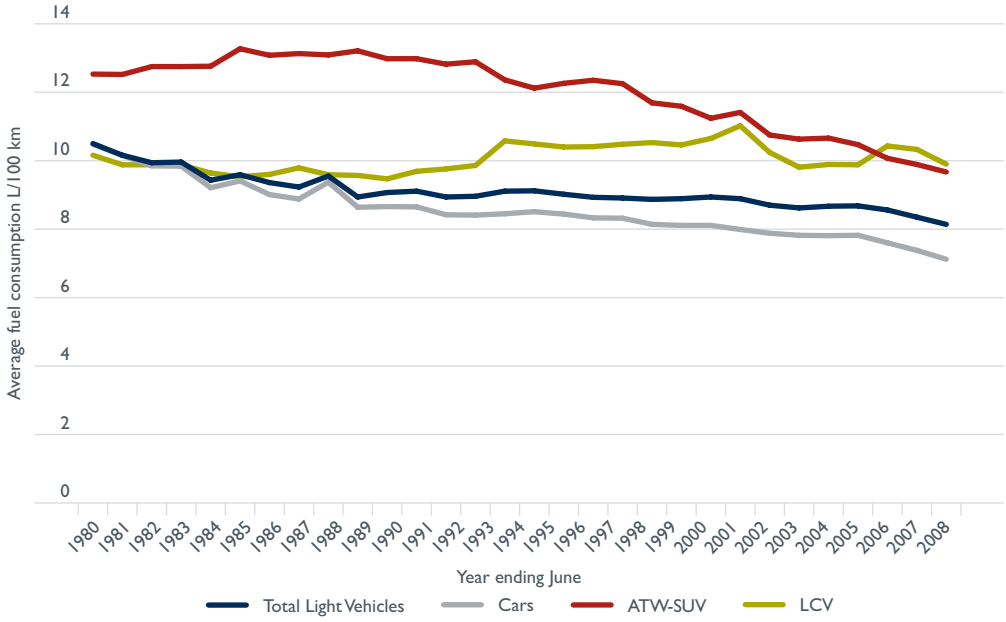
Source: BITRE estimates,VFACTS (various issues)

Average fuel consumption

The BITRE New Passenger Vehicle Database records fuel consumption as 'city-highway' cycles, as recorded in GRD. The National Average Fuel Consumption (NAFC) was calculated for the new vehicle fleet using the combined city-highway fuel cycles weighted by sales. The fuel cycles were combined by using 55 per cent city and 45 per cent highway fuel consumption values, as per convention.[1]

Figure 2 shows the NAFC trends since July 1978.

Figure 2 National Average Fuel Consumption by Australian new light vehicles

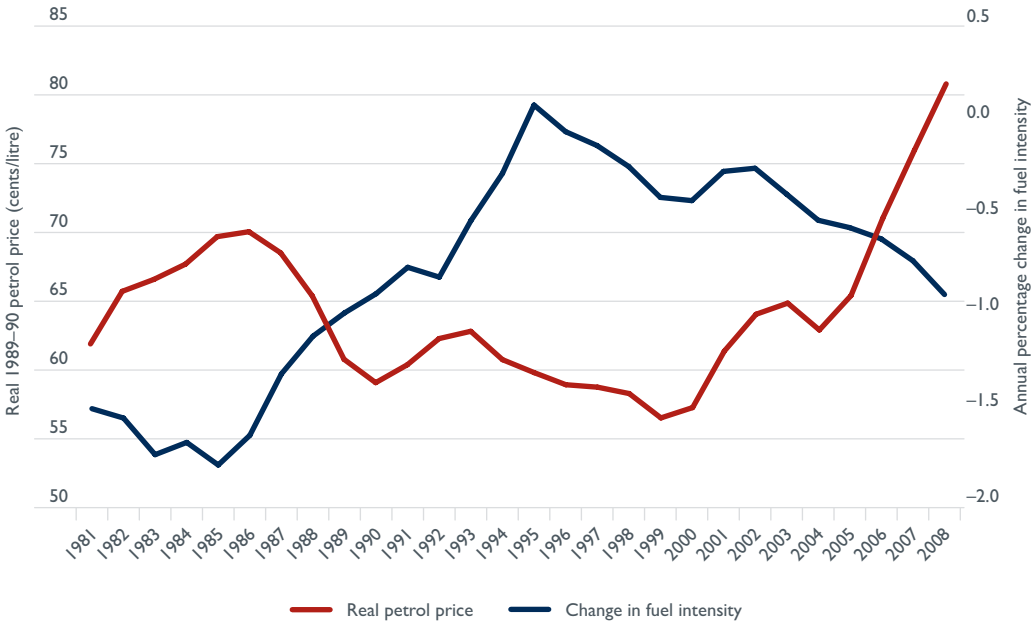


Source: BITRE estimates, GRD

1. Note that the fuel cycle values utilised are standard laboratory or dynamometer results which tend to be at least 20 per cent lower than actual on-road fuel consumption. The Glass's dataset has continued to provide this information post 2003.

New passenger cars have continued their downward trend in fuel consumption, with a steeper downward trend after 2004. Similarly, ATW-SUV fuel intensities are declining, possibly due to the emergence and popularity of the 'compact' and 'medium' ATW-SUVs. The LCV category, although somewhat volatile, has remained relatively flat and is the least fuel efficient part of the light vehicle fleet. Figure 3 shows the relationship between the smoothed annual percentage decline in the fuel intensity of total light vehicle sales and smoothed real petrol prices in Australia. In general, when real petrol prices are high, as in the early 1980s and in the period since 2004, the decline in the average fuel intensity of new vehicle sales accelerates, mainly through buyers shifting to smaller vehicles.

Figure 3 Declines in fuel intensity versus petrol price

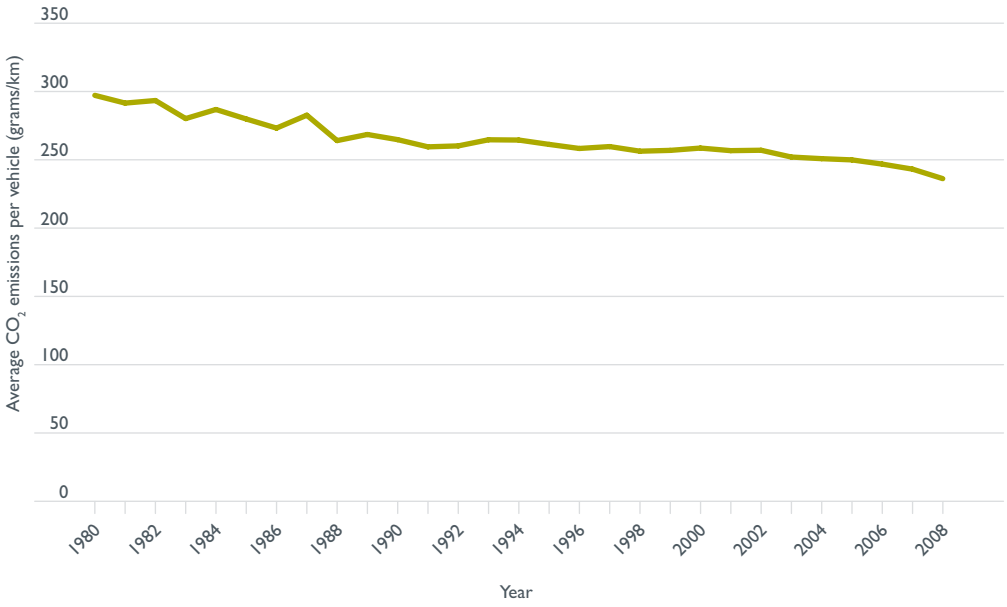


Source: BITRE estimates

Light vehicle emissions

Using fuel effiency data from 1980–2001, and data from the Green Vehicle Guide <www.greenvehicleguide.gov.au> from 2002 onwards, BITRE has estimated average CO_2 emissions from new light vehicles over time. The estimates indicate an overall drop in emissions intensity of new light vehicles of about 30 per cent over the period (see Figure 4). By 2008, the average CO_2 emission level for light vehicles had fallen to about 235 grams per kilometre.

Figure 4 Average CO_2 emissions per vehicle for new light vehicles in Australia



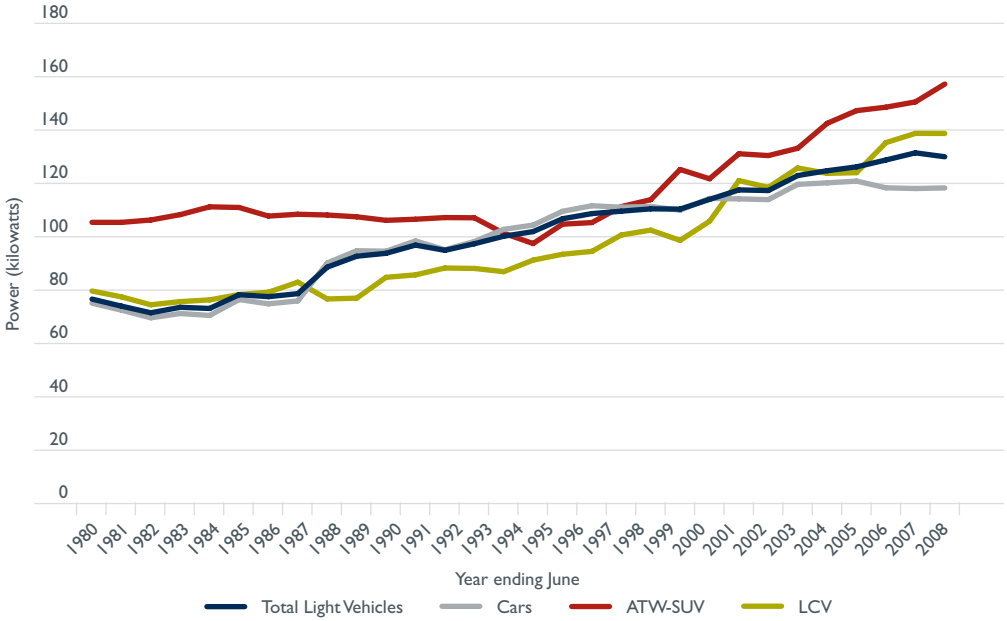
Source: BITRE estimates.

Light vehicle power and weight trends

The new light vehicle fleet has continued a steady increase in power and a slight increase in gross vehicle mass (GVM). The passenger car category however, has remained relatively flat for both power and GVM whereas the LCV and SUV-ATW categories have shown increases in mass and power. However, the top eight SUV sales for 2008 all achieved more than 10 thousand sales and all were from either the SUV Medium or SUV Compact categories (the SUV category is disaggregated by *compact*, *medium*, *large* and *luxury*).

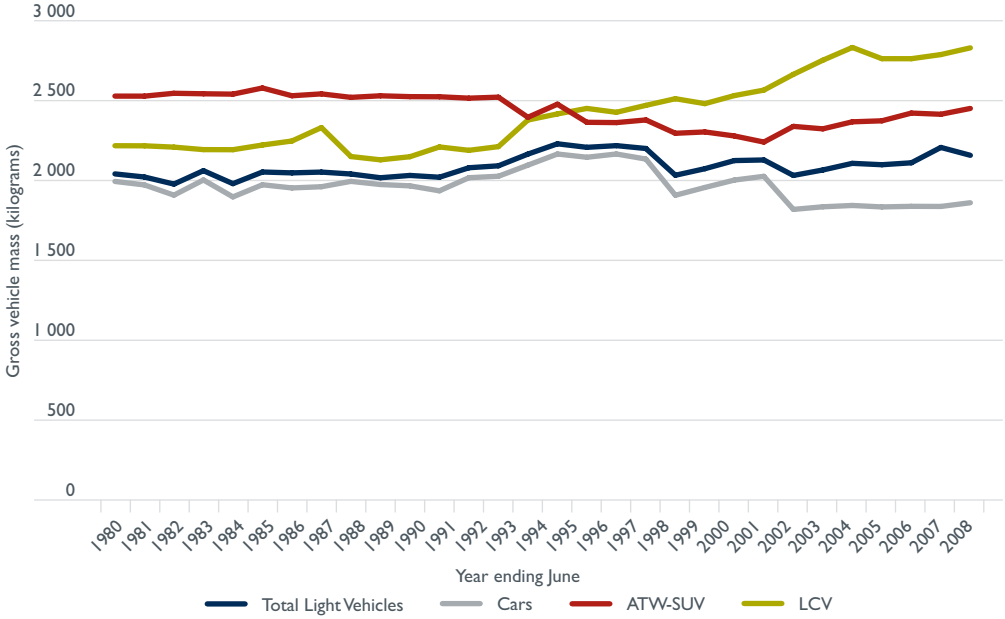
Figure 5 presents the trends in power and Figure 6 shows the trends in GVM.

Figure 5 Power for new light vehicles in Australia



Source: BITRE estimates, GRD

Figure 6: Weight for new light vehicles in Australia

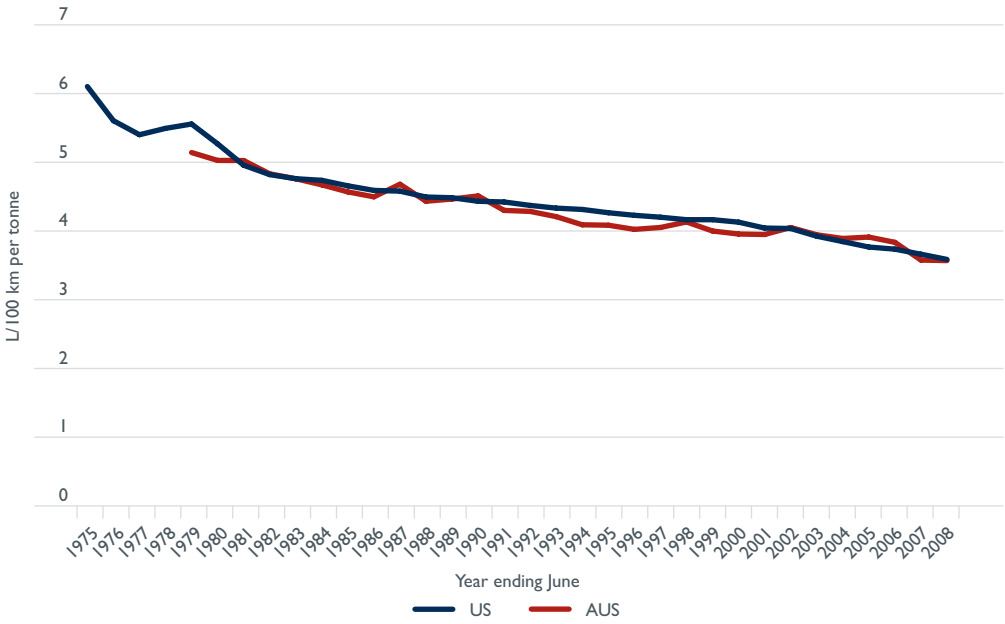


Source: BITRE estimates, GRD

Engine technology

Engine technology has advanced considerably since the 1970s. Figure 7 illustrates an element of this trend for the United States and Australia, by plotting the average fuel consumption for light vehicle sales (L/100 km) per unit of vehicle weight (GVM in tonnes). Both countries exhibit a significant increase in the intrinsic energy performance of vehicle engines, with the amount of fuel required to move a vehicle of a given size declining reasonably steadily at 1.5 per cent per year for the US and 1.3 per cent per year for Australia.

Figure 7 Engine Performance Trends for new light vehicles



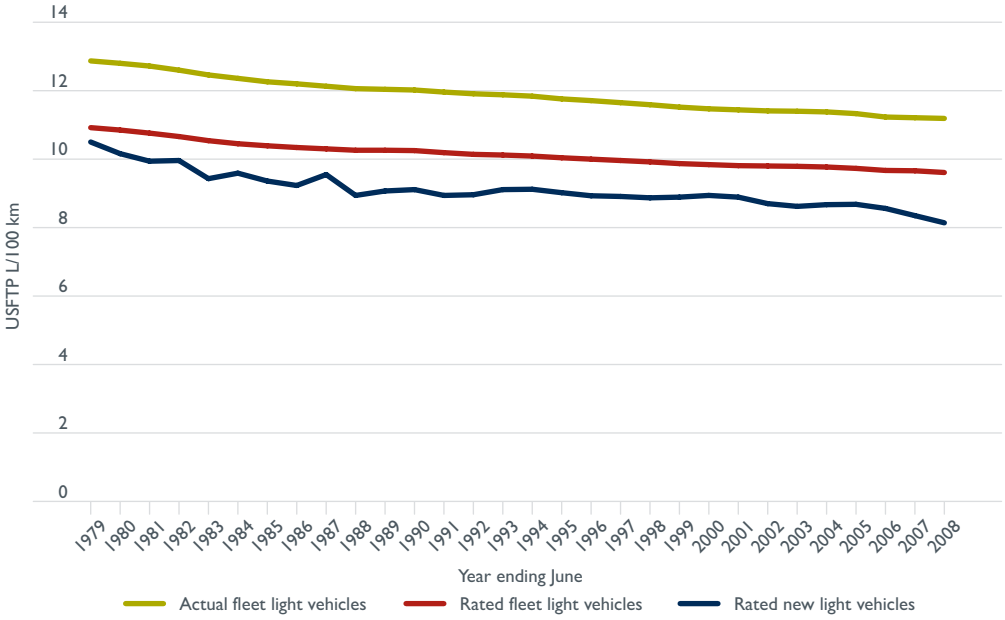
Source: BITRE estimates, US. Environmental Protection Agency <http://www.epa.gov/otaq/fetrends.htm>

Entire light vehicle fleet

The new passenger light vehicle fleet has carry-on implications for the entire light vehicle fleet. Figure 8 presents the new light vehicle average fuel consumption together with the entire light vehicle fleet rated average fuel consumption. The new light vehicle average fuel consumption has dropped a total 22 per cent since 1979 (nearly 1 per cent per year decrease), whereas the entire light vehicle fleet has decreased a total 12 per cent (nearly 0.5 per cent per year). The entire light vehicle fleet current value is similar to the new light vehicle fleet value in 1987, indicating an approximate 20 year lag.

But the "rated" value of the fleet intensity is based on the old 55/45 city/highway split, which in reality is closer to 85/15. Also, in the real world vehicle engines deteroriate with time. The combination of these two corrections means that the actual fuel intensity of the light vehicle fleet is considerably higher than the rated value (see Figure 8).

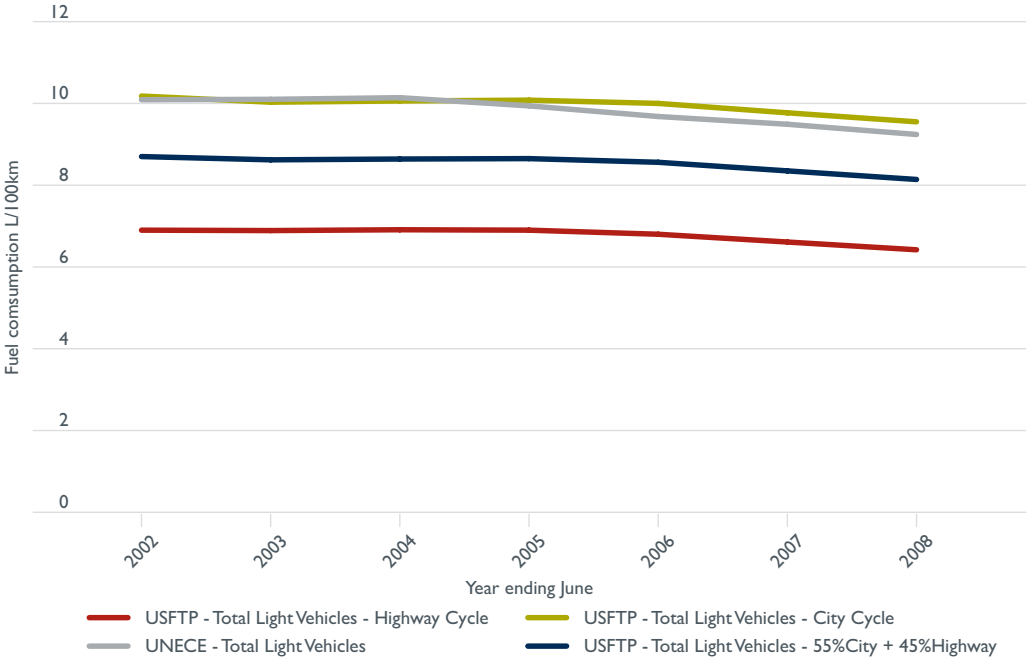
Figure 8 New and entire light vehicles fleet average fuel consumption



Source: BITRE estimates
Notes: Estimates based on drive cycle test values as opposed to on-road fuel use values.

The data on fuel intensity in this information sheet is based on the old United States Federal Test Procedure (USFTP) standard, which had city and highway components which were weighted 55/45. The new United Nations Economic Commission for Europe (UNECE) Type 1 test, which underlies the Green Vehicle Guide (GVG) figures, has a "freeway" component, but only 10 per cent of the test time is spent above 70 kph. This new standard also has much more acceleration/deceleration in its city component, which apparently more than balances the limited freeway component. Figure 9 shows that the new combined standard is approximately equal to the old *city* component, which is probably the best approximation to the value the new standard would have had pre 2003.

Figure 9 Comparison of USFTP and UNECE standards for new light vehicles



Conclusion

The trends evident in BITRE's earlier Information Sheet have continued since 2001. Vehicle sales have increased, with the ATW-SUV and LCV categories continuing to increase their shares. With the introduction of compact and more fuel efficient SUVs, the ATW-SUV category has shown a considerable reduction in fuel consumption. LCV sales have been increasing, along with power, weight and a stable level of fuel consumption.

Australian consumers' preference for vehicle characteristics that increase fuel consumption (power, weight, accessories, 4WD capability), has meant that potential reductions in fuel consumption made possible by technological advances have not been fully realised (see Thoresen 2008). This is a worldwide trend in the automobile sector, and it cautions against undue reliance on technology alone to deliver reductions in fuel use and emissions. However, that said, the long-term downward trend in energy intensity has accelerated somewhat in recent years as the latest generation of more fuel efficient light vehicles entered the market, and buyers downsized to smaller cars as petrol prices rose.

Abbreviations

ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industry Classification
ALTD	Australian Land Transport Development
ASX	Australian Stock Exchange
ATO	Australian Taxation Office
ATS	Australian Transport Statistics
BTE	Bureau of Transport Economics
BTRE	Bureau of Transport and Regional Economics
DOTARS	Department of Transport and Regional Services
FAGs	Financial Assistance Grants Identified for Roads
FBT	Fringe benefits Tax
GFS	Government Finance Statistics
GST	Goods and Services Tax
GVG	Green Vehicle Guide
Infrastructure	Department of Infrastructure, Transport, Regional Development and Local Government
RONIs	Roads of National Importance
RTA	Roads and Traffic Authority
USFTP	United States Federal Test Procedure
UNECE	United Nations Economic Commission for Europe

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Prepared by Mark Cregan and David Gargett. For further information on this publication please contact: Mark Cregan (mark.cregan@infrastructure.gov.au)

This publication is available from the Bureau of Infrastructure, Transport and Regional Economics. Postal address: GPO Box 501, Canberra ACT 2601, Australia Telephone: +61 2 6274 7210

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