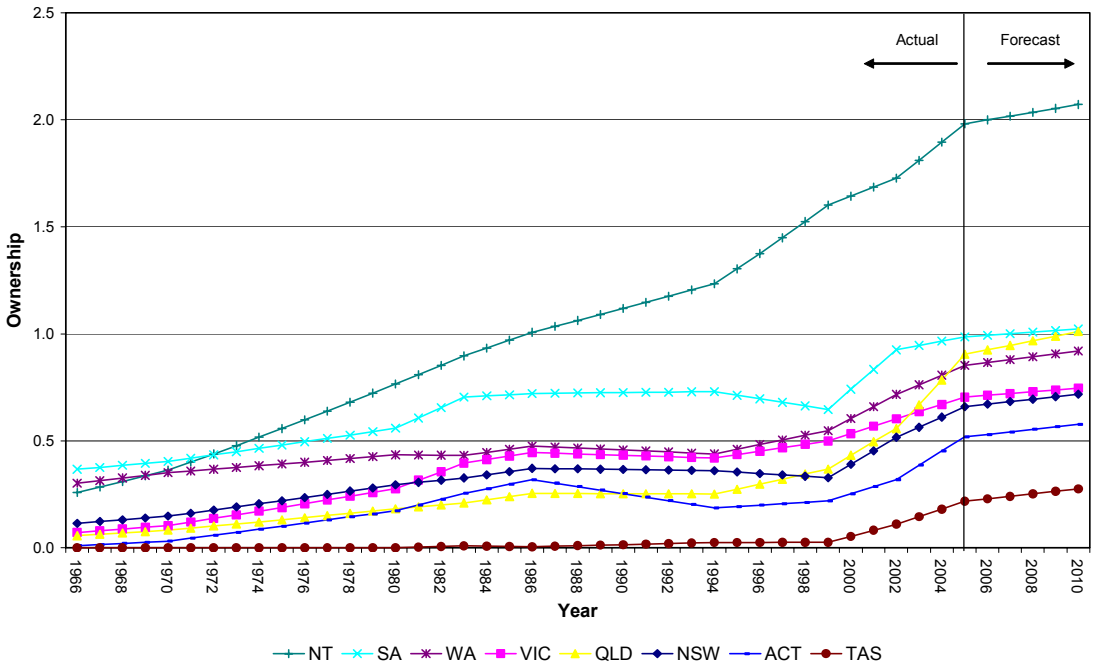
January 2006

Report for NAEEEC 2005/09 (Updated)

STATUS OF AIR CONDITIONERS IN AUSTRALIA – Updated with 2005 data



Prepared by Energy Efficient Strategies

FOREWORD

The following report has been prepared by Energy Efficient Strategies (EES) for the National Appliance and Equipment Energy Efficiency Committee.

The report has a specific aim:

> *'to provide the best available data to industry and policy makers on current trends with respect to air conditioners in Australia'*

To this end, the data contained in the following report has been compiled from the most up to date sources available at the time of publication. Some of the data is based estimates which have been prepared by the authors or third parties. Most of the data is in the public domain. However, some of the data is commercial and would need to be purchased from the source or supplier for a more detailed breakdown. Some of the data is owned by government and is not available due to privacy restrictions. In these cases, data has been processed in a way that no brand data or user information can be extracted from this report. New data is continually becoming available and this report may be updated from time to time.

Energy Efficient Strategies does not accept any responsibility for the use of this data or any errors that may be contained in the report.

Any views expressed in this report are those of Energy Efficient Strategies and not those of the Australian Greenhouse Office or NAEEEC.

This edition has been updated with ownership and penetration data from ABS 4602.0-2005 which was released November 2005.

Energy Efficient Strategies
January 2006

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
ABARE	Australian Bureau of Agriculture and Resource Economics
CCD	Cooling Degree Days
CEC	Comparative Energy Consumption
CO	Cooling Only
COP	Coefficient of Performance
DHSV	Department of Human Services Victoria
EER	Energy Efficiency Ratio
EES	Energy Efficient Strategies
HHD	Heating Degree Days
MEPS	Minimum Energy Performance Standards
NAEEEC	National Appliance and Equipment Energy Efficiency Committee
RC	Reverse Cycle
RIS	Regulatory Impact Statement

1. BACKGROUND

There has been an increasing interest shown in air conditioners in recent times. In particular, it appears that the penetration (and ownership) of air conditioners has increased substantially in most states over the past few years and a number of states are experiencing peak load problems during hot weather, in part due to the rapid increase in air conditioner numbers in use.

The market for air conditioners in Australia is complex, as there are a large number of types available and the installed stock varies significantly at the state level (both levels of ownership and share by type). While there is reasonable data on the sales and installed stock of air conditioners, there is relatively poor information on how these are used by consumers and businesses.

This report attempts to quantify some of the issues surrounding air conditioners in Australia where there is data available in the public domain, with the specific aim:

> *'to provide the best available data to industry and policy makers on current trends with respect to air conditioners in Australia'*

Peak electricity load issues are now prominent in the minds of policy makers and it appears that many State electricity systems are experiencing large summer peak demands. This paper does not examine the size or potential cost of those peaks, but there are links to a number of report in the references which provide further information on this issue.

This report uses the accepted definitions for terms that deal with appliance numbers. These are set out below for clarity:

Penetration – the proportion of households in which a particular appliance type is present (irrespective of the number of units of that appliance in the household). This value is usually given as a percentage. Penetration can never exceed 100%.

Stock – the total number of a particular appliance type in use in all households. This value is given as an integer (usually thousands or millions). The stock refers to the number in regular use, or a proxy for the number in regular use. This is normally defined at state or national level.

Ownership – the ratio of stock to the total number of households. This value is usually given as a decimal number. Ownership can exceed 1.0.

Saturation – the average number of appliances per household for those households with the appliance. Saturation must be greater than or equal to 1.0.

The following simple relationships links these terms:

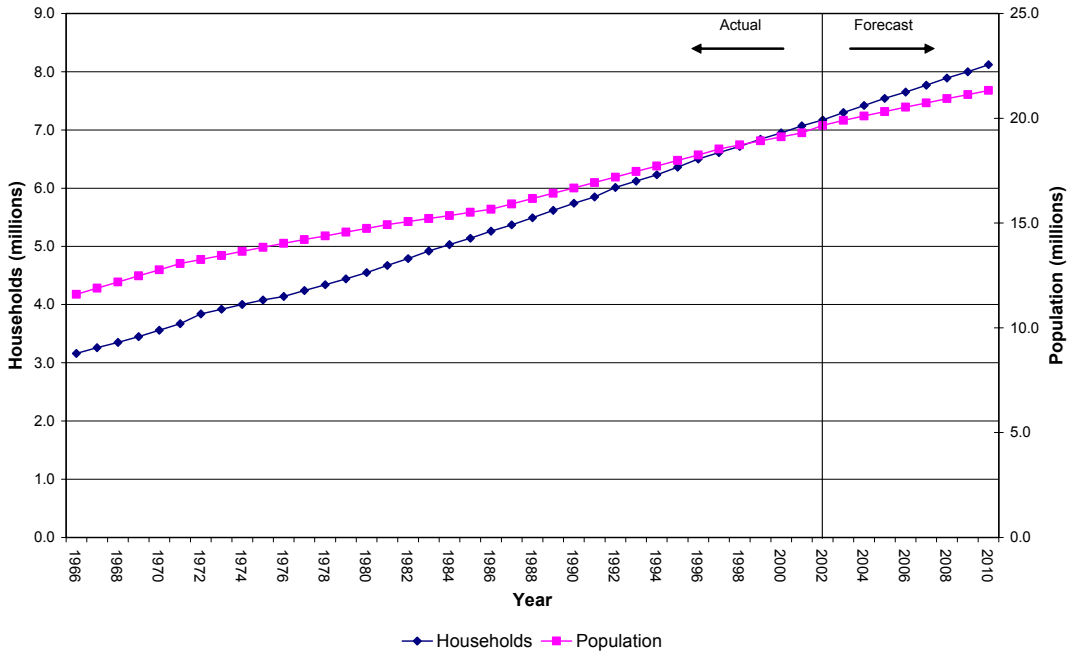
Ownership = penetration × saturation

Stock = ownership × households

2. HOUSEHOLD AND POPULATION TRENDS

Figure 1 below shows the household and population trends from 1996 to 2010. This data has been taken from ABS3222.0. Data beyond 2002 is forecast data and thus some caution should be used when interpreting it. Population forecasts are provided by the Australian Bureau of Statistics (ABS). Household forecasts have been developed by Energy Efficient Strategies (EES) based on trend data at state level.

Figure 1 – Household and Population Trends to 2010



Source: EES estimates and ABS data

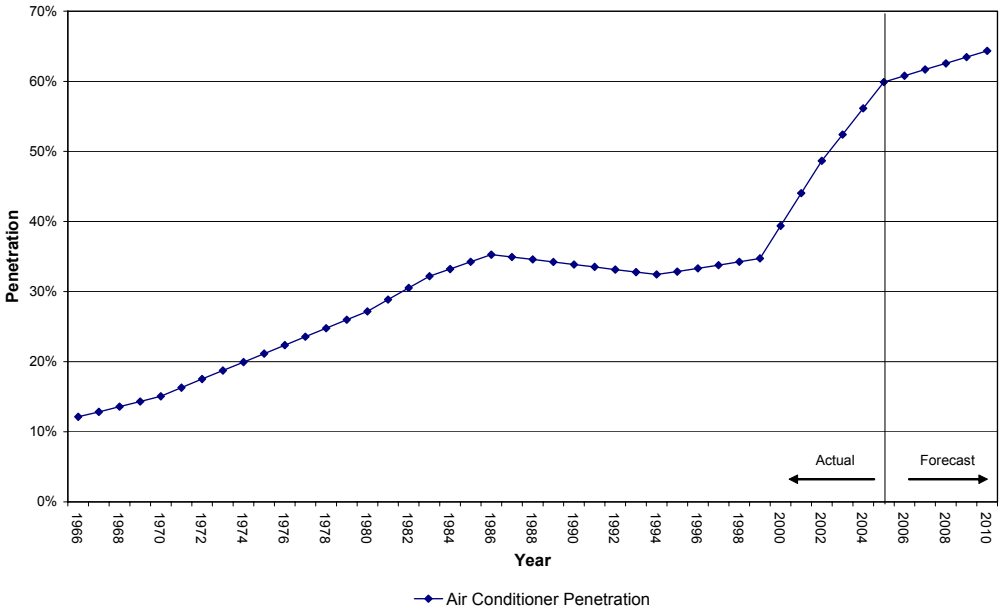
3. AIR CONDITIONER OWNERSHIP AND PENETRATION

Figure 2 below shows the national penetration of air conditioners by year for Australia. The penetration of air conditioners rose gradually until about 1986 and was fairly stable until the late 1990's. From 1999 to 2005, there has been a sharp increase in penetration in most states. It is unclear why the market has grown so rapidly since 1999, but in part it would appear that air conditioners have become more affordable together with an increase in net household incomes. This trend is forecast to steadily increase over the foreseeable future. Note that the forecast beyond 2005 to 2010 has been undertaken by the authors on the basis of extrapolation of data at a state level and may understate short term current trends (ie at the lower end of likely forecasts based on current sales and trends). The historical data depicted (ie up to 2005) is based on ABS4602 and a range of other energy surveys and census data prior to 1990. Data beyond 2005 is forecast data using a simple linear function based on author estimates for illustrative purposes only and extreme caution should be exercised if using this data as it has not be developed using standard forecasting techniques.

The stock of air conditioners in 2005 is estimated to be almost 6 million units in the residential sector. No commercial sector units are included in these figures. Data on the stock of commercial units is poor.

Separate data at a state level for all of the following figures is provided in the Appendices. Note that the data on ownership and penetration in the following figures includes all types of air conditioners (including evaporatives).

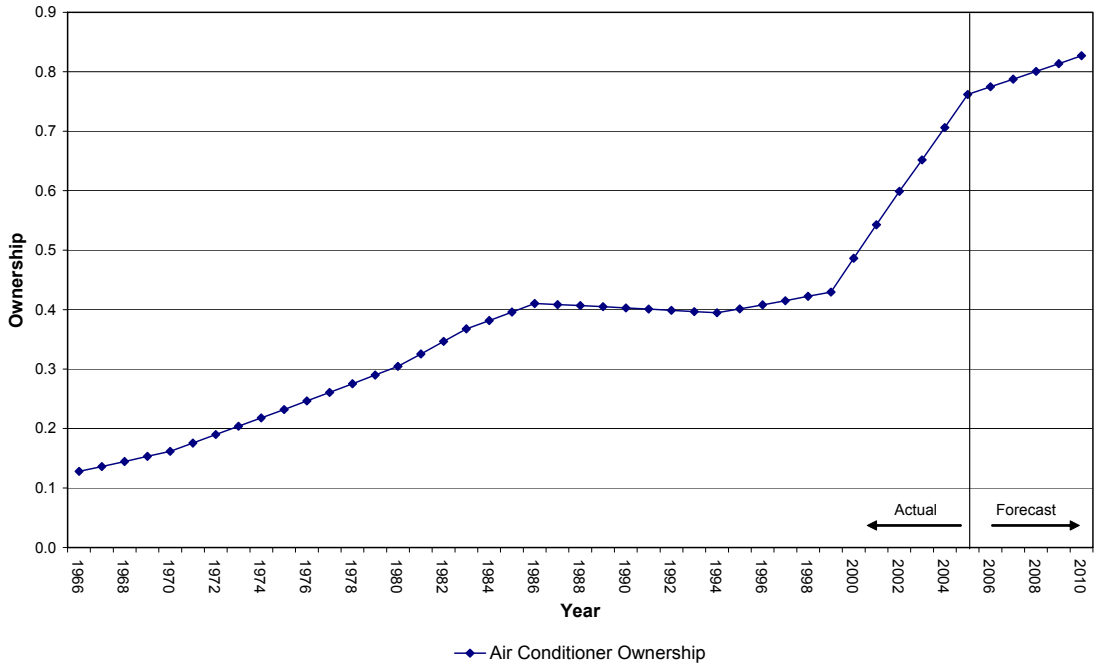
Figure 2 – National Penetration of Air Conditioners by Year



Source: EES estimates and ABS data

Figure 3 below shows the national ownership of air conditioners by year (which is a proxy for stock). Like the penetration, the ownership of air conditioners rose gradually to the mid 1980's and then remained fairly static until 1999. The national ownership of air conditioners appears set to steadily increase into the foreseeable future. The saturation implied from these figures is almost 1.3 (ie on average, households with air conditioning have 1.3 units per house). The saturation varies considerably by state (the lowest is the ACT at 1.08 and the highest is Northern Territory at 2.16).

Figure 3 – National Ownership of Air Conditioners by Year

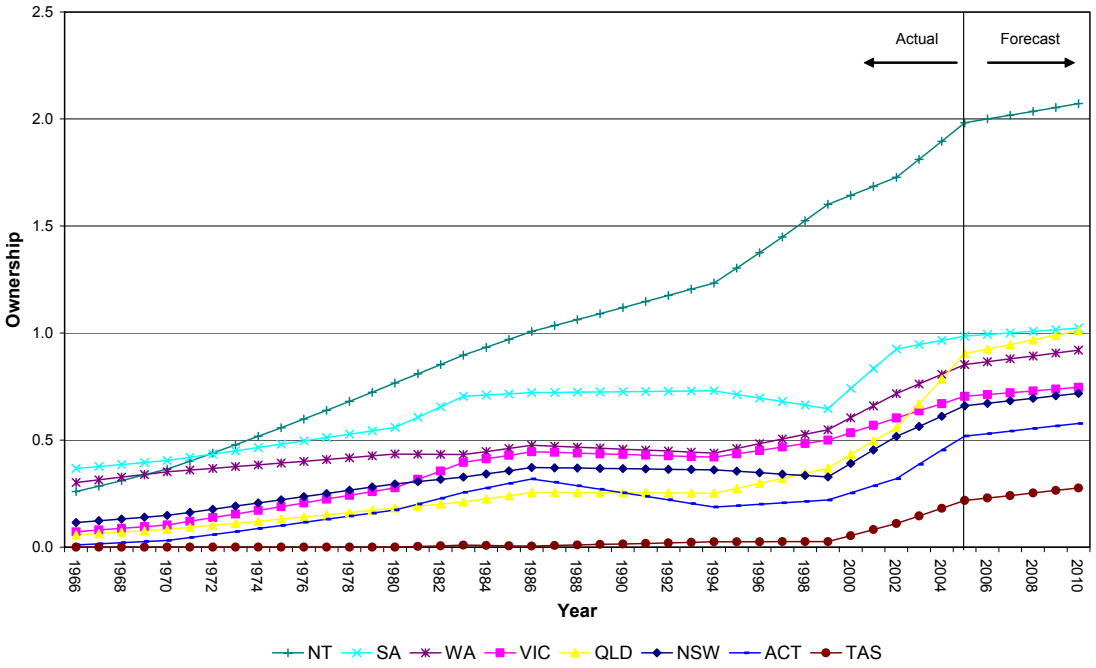


Source: EES estimates and ABS data

Figure 4 below shows the trend of ownership by state. Many states exhibit a reasonably similar ownership pattern. Typically, this was a rise in ownership up until the mid 1980's which was followed by a period of static ownership, with a rapid rise from 1999. Obviously, climatic factors influence ownership. The state that experienced a different trend was the Northern Territory: ownership in this state has increased steadily for the past 40 years.

Data for most states has been confirmed from a number of independent data sources. Data for Victoria from the Department of Human Services (DHSV 2001), for example, confirms the ABS data for 1999 and in fact suggests a slightly higher penetration in 2001 for Victoria than has been recorded in ABS4602.

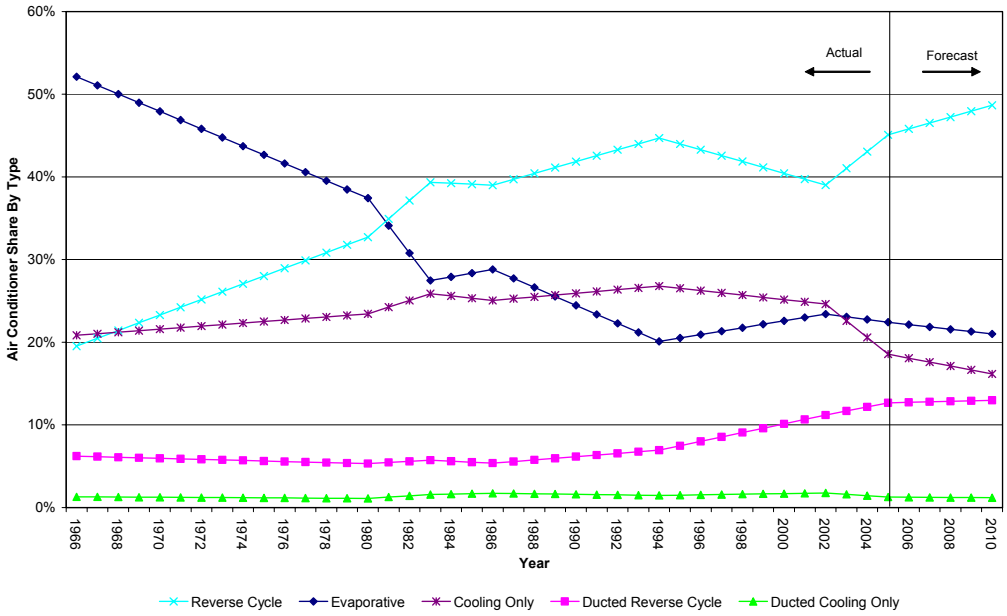
Figure 4 – National Ownership of Air Conditioners by State



Source: EES estimates and ABS data

Figure 5 illustrates some interesting trends in the share of installed stock of air conditioners. Non ducted reverse cycle has increased rapidly from 1999 while cooling only and evaporative systems have declined in total share. However, this national data masks some important trends at state level which are set out in the Appendices. Evaporative types are still dominant in some states.

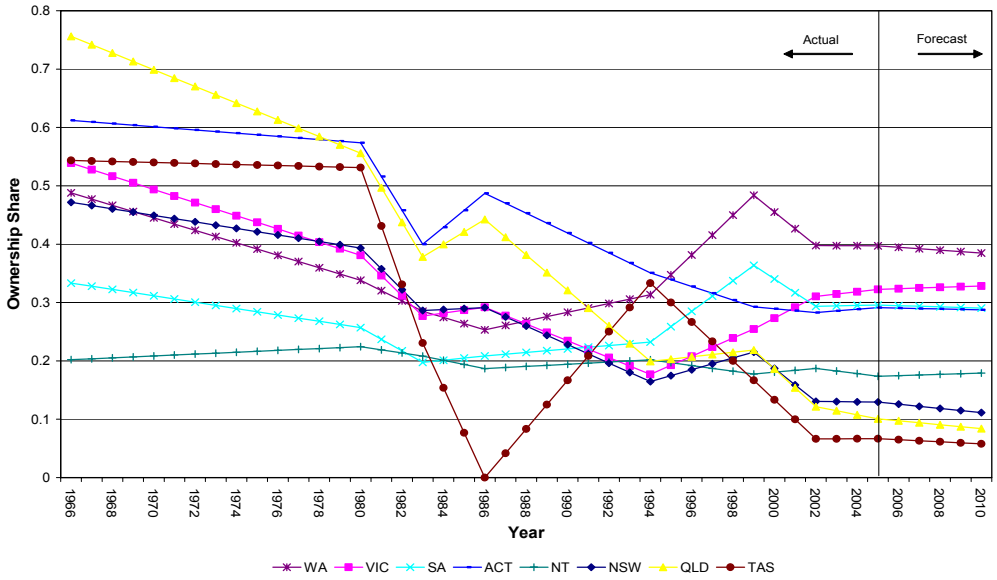
Figure 5 – National Share of Air Conditioner Type



Source: EES estimates and ABS data

Figure 6 below shows the ownership of evaporative air conditioners by year. Evaporative air conditioners are not very effective in humid climates and therefore are more prevalent in dry aired climates, particularly in the south of Australia. Please note that some states with low ownership (eg Tasmania) have small sample sizes and small numbers of installed units, which mean small changes in trends or sampling error, drastically change the state profile between surveys.

Figure 6 – Evaporative Air Conditioners Ownership Share by Year



Source: EES estimates and ABS data

4. AGE OF AIR CONDITIONERS

Data on average age of air conditioners and the age distribution is poor. One of the few sources available is from BIS Shrapnel (report titled: The Household Appliances Market in Australia, Climate Control), who report the age of models which have been replaced by new purchases. This has changed since 1999-2000 to 2001-2002, from 11 to almost 13 years. In 2003-2004 the age of models was found to be almost 14 years. Note that some of these units will be remain in the stock (re-sold or passed on to other households) so the average life of the units in the stock will be somewhat longer than this reported value (age of units replaced).

A study undertaken in February of 1995 by Test Research, found that installed air conditioner units surveyed had an average age of 8 years (average age of the units in the stock). Given the historical ownership trend in preceding years this implies a retirement age of 12 to 18 years (depending on the installation profile and retirement function used), which is broadly consistent with the BIS Shrapnel data.

5. AIR CONDITIONERS INSTALLED IN NEW HOMES

For the years 2001/2002, 42% of new detached dwellings in Australia had a climate control product installed (BIS Shrapnel 2003). These were made up of 20% ducted, 10% non-ducted and 12% evaporative for all new detached dwellings built in Australia in that period. The proportion of houses with ducted and non-ducted air conditioners installed when new increased from 1998/99.

Similarly, for the years 2001/2002, 47% of new attached dwellings in Australia had a climate control product installed (BIS Shrapnel 2003). These were made up of 20% ducted, 17% non-ducted and 10% evaporative for all new attached dwellings built in Australia. The proportion of new houses with ducted air conditioners remained steady when compared with 1998/99, while the proportion of houses with non-ducted air conditioners increased.

Interestingly, the data shows that the rate of installation of air conditioners in new dwellings is fairly comparable (or perhaps lower) than the national average ownership levels for air conditioners. The rate of installed for ducted systems in new homes is higher than the stock while the rate of installation of evaporative and non-ducted systems is lower than the installed stock. This suggests that many air conditioners are installed some time after the home is completed (especially non-ducted and evaporative systems).

Approximately 150,000 new dwellings are built each year in Australia and about two thirds of these are detached.

Some air conditioners are also installed as part of a building renovations. Air conditioners installed in new dwellings and renovations together account for about 200,000 units a year.

Care is required in the interpretation of these numbers. Total air conditioner sales in 2004 were estimated to be around 1 million units per year. While many of these will be installed in small commercial buildings, this together with the above data, shows that the overwhelming majority of air conditioner sales are either replacement units or are being installed in existing homes (without a major renovation). Many of these are likely to be in fairly new homes where an air conditioner was not fitted at the time of construction.

State level data on ownership for new houses by type is available from the BIS Shrapnel reports.

6. TRENDS IN AIR CONDITIONER SALES

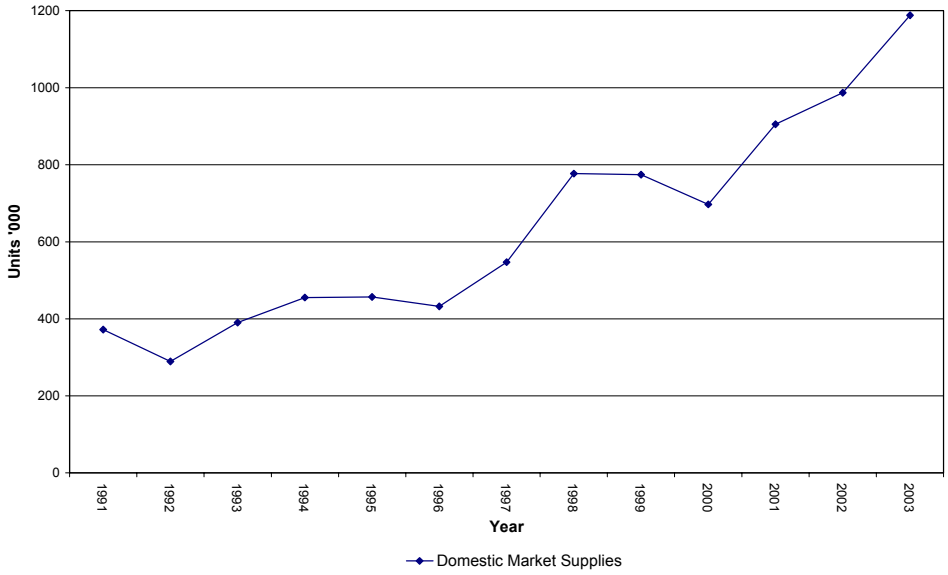
Air conditioning unit sales tend to peak in the hottest summer months (although many ducted systems are also purchased in spring time due to the installation time needed). These purchases were primarily driven by weather conditions and also by consumers not having a unit and wanting one.

In the period from 1995 to 2004, there was substantial changes in the structure of the air conditioner market. In 2004, the non ducted share of the market was 78% (the ducted share being 22%).

In the non-ducted segment of the market, window/wall cooling only units from having a 40% market share in 1995, have slipped to have only a 12% market share in 2004. Window/wall reverse cycle units have also declined in market share, from 25% to 15%. The biggest change in terms of market share has be reverse cycle split system units; these have increased from 10% sales share in 1995 to over 60% in 2004. The spilt system cooling only share has remained relatively constant, as has the mobile refrigerated share. Mobile evaporative cooler units have declined from a 14% market share to around 1%.

For the ducted section of the air conditioning market, the sales trends are very pronounced. Ducted cooling only systems have decreased from around 70% share in 1995 to around a 10% share in 2004. Evaporative cooling dominates the cooling only sector of the ducted air conditioning market, with refrigerated cooling having less than a 5% share. Reverse cycle ducted systems have increased from around a 30% market share in 1995 to around an 80% share in 2004. Ducted systems that use gas as a fuel source for heating and have electric cooling have increased from around 5% to 10% in 2004.

Figure 7 – Domestic Market Supplies of all Air Conditioner Types



Source: BIS Shrapnel, various years

7. ESTIMATED HOURS OF OPERATION

Table 1 below shows the estimated average hours of air conditioner heating and cooling for Australian capital cities. Heating hours only apply to reverse cycle air conditioning units. Many factors will influence the actual hours of use including; building shell efficiency (including use of ventilation and adequacy of insulation), climatic characteristics, weather and hours of occupancy (as well as individual thermal comfort levels). These hours are estimates developed by EES using ABS data recorded in diaries from ABS8218 in 1986 and thus, need to be treated with a great deal of caution. Building shell performance requirements in the long term will affect cooling and heating requirements.

As can be seen in

Table 1, the hours of cooling and heating are very much dependant on the respective city's climate. Darwin is the stand out in terms of hours of operation due to the persistent hot weather for most of the year.

Table 1 – Hours of Air Conditioner Heating and Cooling for Australian Capital Cities

City	Cooling Hours	Heating Hours
Hobart	50	450
Melbourne	100	350
Canberra	150	500
Sydney	180	200
Adelaide	200	250
Perth	300	150
Brisbane	600	100
Darwin	2000	0

Source: EES estimates and ABS data

Table 2 below shows an analysis of actual reported diary entries undertaken in the ABS8212 publication study for the year 1986. These diaries were given to people in each of the national capitals to ascertain air conditioner use throughout spring, summer and autumn. Table 2 only shows average cooling hours. The column of CDD is the cooling degree days (based on the hours × degrees C above 24^{o}C) for the same period as the diaries.

Table 2 – Annual Average Hours of use of Air Conditioners by State – 1986

State	Annual Average Use (Hours)	CDD >24°C
NSW	206	102
VIC	102	114
QLD	632	279
SA	108	177
WA	389	308
TAS	33	25
NT	2525	1371
ACT	53	118
Australia	235	

Source: ABS 8218 and analysis of BOM daily weather data for 1986

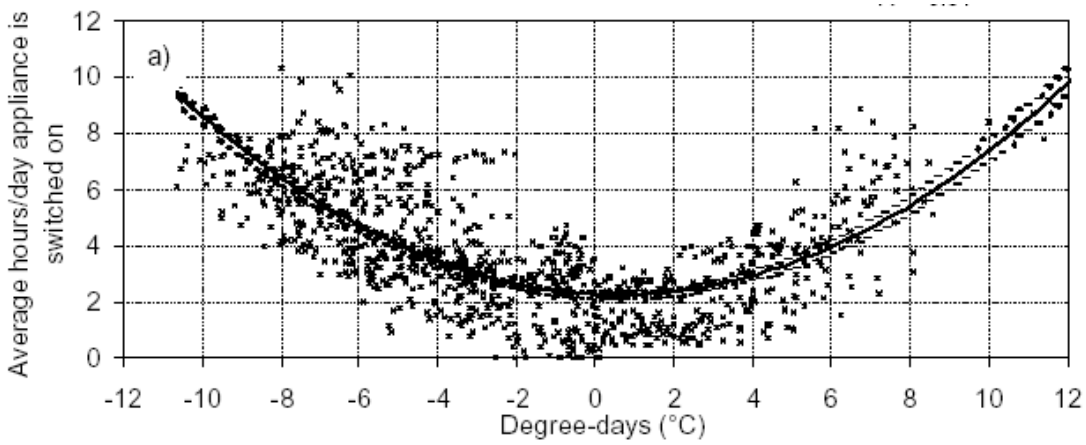
While hours of operation from diaries in Table 2 provide some indication of frequency of use, climatic measures such as cooling degree days are perhaps a better indication of potential energy consumption of air conditioners. Cooling degree days are a measure of the time multiplied by the temperature difference above 24°C, integrated over the year. There is a wide variation across individual houses and diary data is potentially very inaccurate.

In 1994, Pacific Power undertook a study of 290 residential households in New South Wales and the Australian Capital Territory. This study looked at how and when electricity was used by these consumers. This was done by metering a total of 1,670 household electrical appliances at half hourly intervals for a year. The study, called the Residential End Use Study, found that water heating contributed 36% of energy usage, refrigeration 16%, lighting 9% and space heating and cooling almost 7% of the total energy usage. The study was also able to give a daily demand picture of what energy was used and by what types of appliances (refer Pacific Power 1995).

A subsequent statistical study of the data collected during the Residential End Use Study was undertaken by Melissa Hart in a Masters thesis, to quantify appliance sensitivity to changes in weather and climatic factors (Hart & de Dear 2002). This study used only the measurements undertaken in the Sydney region for some 136 houses. The study used a base temperature of 18°C to see whether variations up and down from this base temperature made a difference to the energy usage of climate sensitive appliances including; refrigerators, freezers, air conditioners, room heaters and domestic water heaters. All of these appliances exhibited some degree of weather sensitivity, with 59% of daily variance in air conditioning (cooling mode) energy end-use attributed to external climatic fluctuations. All appliances were found to exhibit stronger climatic sensitivity in summer than in winter. For example, it was found that the amount of day-to-day variance in reverse cycle air conditioning energy

consumption, explained by outdoor weather fluctuations, was 21% greater in the cooling season than in the heating season. More detail can be found in the Hart report. A sample of the relationship between heating degree days (HDD) and cooling degree days (CDD) is shown in Figure 8.

Figure 8 – Relationship of hours of use and CDD/HDD for Sydney households

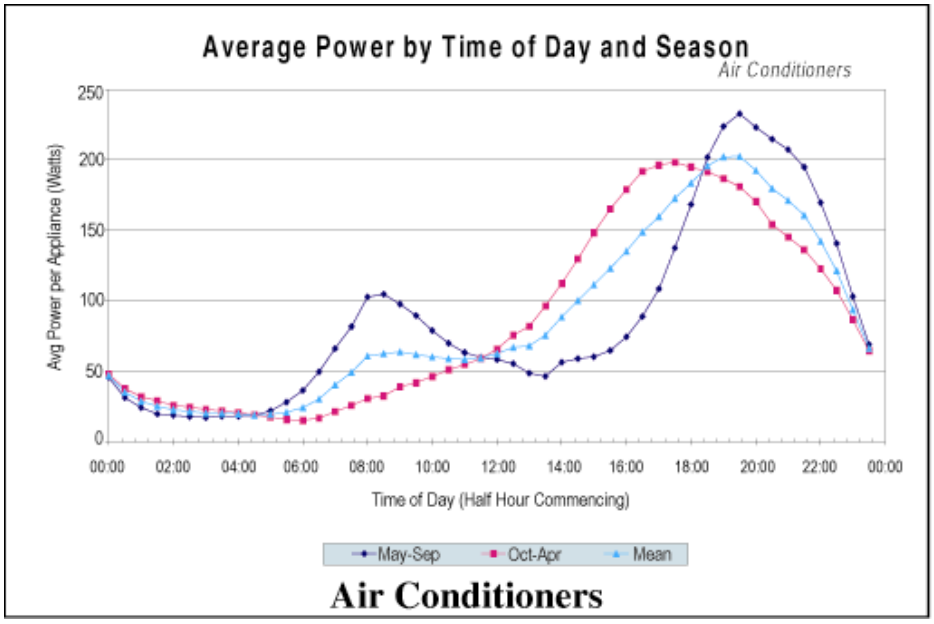


Source: Hart (2002).

Notes: Each dot represents a single day and average use across all houses. Source data was monitoring from Pacific Power (1995). 47 houses for cooling and 41 houses for heating. Base temperature 18°C.

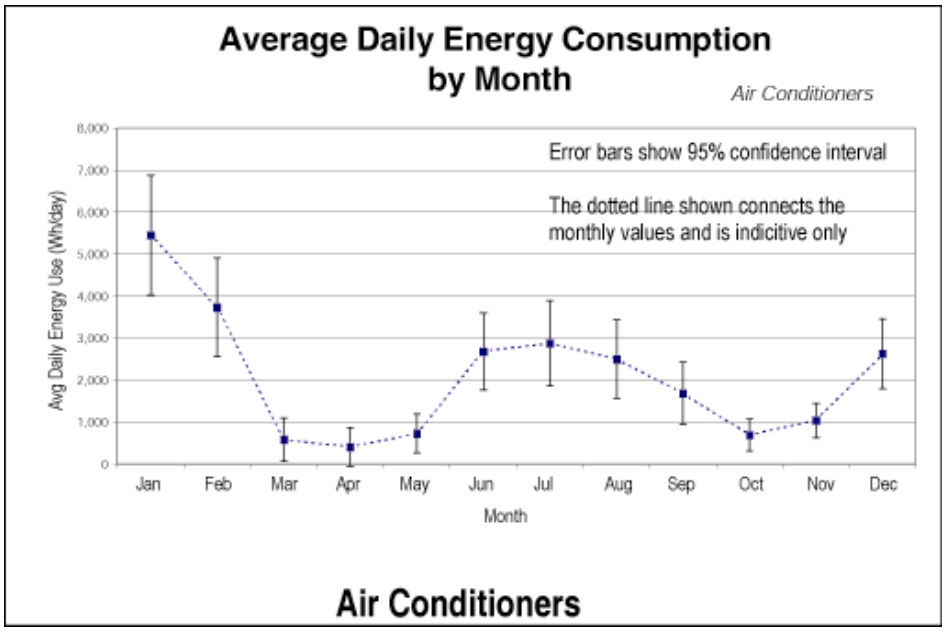
Another subsequent analysis of the results of the Residential End Use Study was undertaken by BRANZ for NAEEEC, in an effort to quantify how much energy was used in a range of typical appliances and to provide more information on the frequency and duration of use of appliances. For air conditioners in particular, the data analysis found that of the 107 houses monitored with air conditioners, each air conditioner was found to consume 2076 Wh/day, the sixth highest appliance in terms of average energy used. Key data are provided in Figure 9 and Figure 10.

Figure 9 – Average NSW Air Conditioner Use by Time of Day and Season – 1994



Source: BRANZ analysis of Residential End Use Study (Pacific Power 1995)

Figure 10 – Average NSW Air Conditioner Use by Month – 1994



Source: BRANZ analysis of Residential End Use Study (Pacific Power 1995)

The 1994 Residential End Use Study and the subsequent analysis studies, allowed a picture to be painted of the air conditioner hours of operation and factors that influence energy usage. These studies, although over ten years old, can still give an impression of what air conditioner hours of operation is likely to be today. It must be noted though, that due to the large increase in air conditioner ownership since the 1994 study, energy usage will have increased somewhat.

A number of other studies have attempted to estimate air conditioner energy consumption based on a statistical analysis of billing records and ownership data. These studies can give an indication of air conditioner energy consumption, but many of the inputs studied have multiple correlations, so care is needed in the use of this data. The key results are summarised below in Table 3. This data is broadly consistent with the Pacific Power end use measurement data.

Table 3 – Comparative Energy Usage Studies for Air Conditioning in New South Wales

Study	1983 (Bartels 1985)	1984 (Bartels 1988)	1985/86 (Fiebig & Woodland 1991)	1989 (Fiebig & Woodland 1994)	1993 (Pacific Power 1996)
Air conditioning by electricity for NSW	547 kW/yr	588 kW/yr	556 kW/yr	629 kW/yr	698 kW/yr

Source: Australian Residential Building Sector Greenhouse Gas Emissions 1990-2010 (EES 1999)

8. TRENDS FOR NEW AIR CONDITIONERS

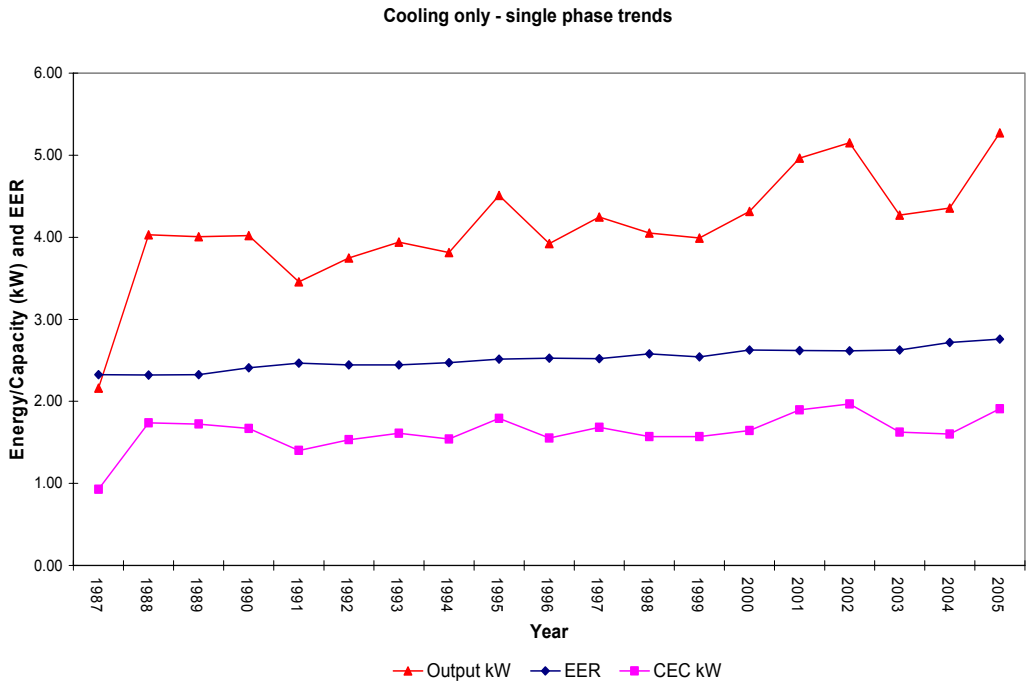
A good source of data on average air conditioner capacity and trends can be obtained for the energy labelling and MEPS register for appliances. While this is not as accurate as a sales weighted average, a model weighted average of all new registrations in each year will provide some indication of trends for each of the major product types. Note that only data for labelled products (predominately single phase units) are included in these figures and tables. Similar data is available for three phase, but this is less common in the residential sector.

Figure 11 below shows the energy, capacity and EER trends for new registrations of cooling only air conditioners, for energy labelling, by year. Table 4 shows the tabulated data and the number of new registrations by year.

In both Figure 11 and Figure 12 the cooling kW output and the CEC kW input, mirror each other in their changes.

For both cooling only and reverse cycle air conditioners there has been an overall trend towards larger capacity. There has also been a steady increase in energy efficiency (EER). The effect of 2004 MEPS for air conditioners will become apparent in the 2005 registrations and subsequent capacities and energy efficiency figures.

Figure 11 – Air Conditioners - Cooling Only Models; Capacity and Efficiency Trends



Source: Energy Labelling Registration Database

Table 4 – Air Conditioners – Cooling Only Models; Capacity and Efficiency Trends

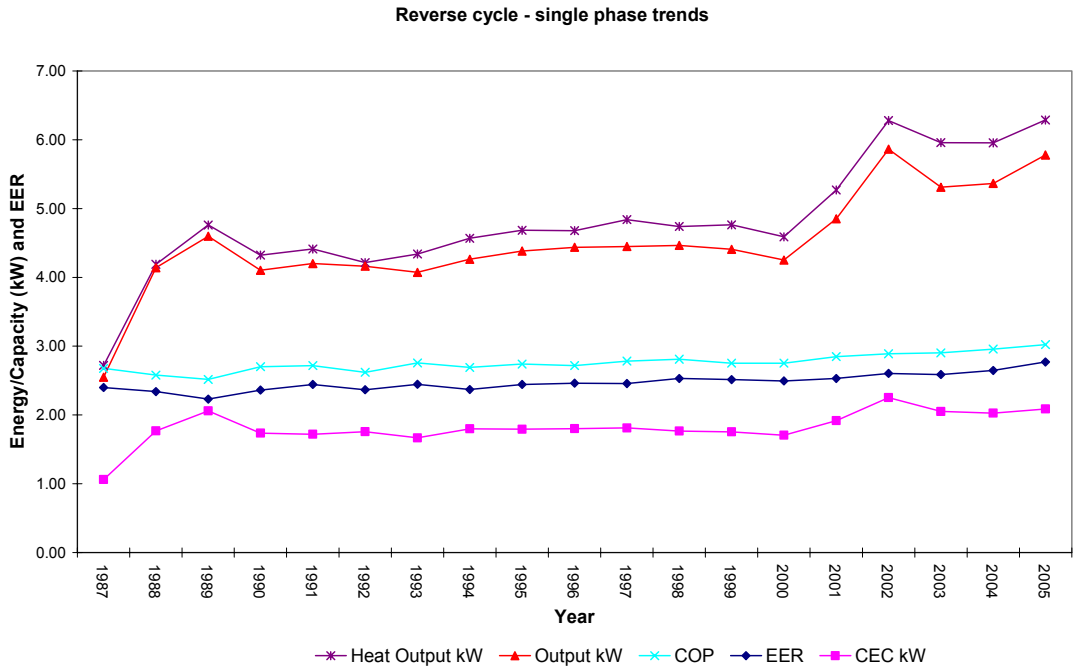
Year	EER	CEC kW	Output kW	New Registrations
1987	2.32	0.93	2.16	14
1988	2.32	1.74	4.03	52
1989	2.33	1.72	4.01	53
1990	2.41	1.67	4.02	67
1991	2.46	1.40	3.46	47
1992	2.44	1.53	3.75	86
1993	2.44	1.61	3.94	71
1994	2.47	1.54	3.81	75
1995	2.51	1.79	4.51	72
1996	2.53	1.55	3.92	77
1997	2.52	1.68	4.25	100
1998	2.58	1.57	4.05	209
1999	2.54	1.57	3.99	105
2000	2.63	1.64	4.31	337
2001	2.62	1.90	4.96	103
2002	2.62	1.97	5.15	180
2003	2.63	1.63	4.27	135
2004	2.72	1.60	4.36	277
2005	2.76	1.91	5.27	31

Source: Energy Labelling Registration Database

Figure 12 below shows the energy and heat output, COP, capacity and EER trends for reverse cycle air conditioners for new registrations for energy labelling by year.

Table 5 shows the tabulated data and the number of new registrations by year.

Figure 12 – Air Conditioners - Reverse Cycle Models; Capacity and Efficiency Trends



Source: Energy Labelling Registration Database

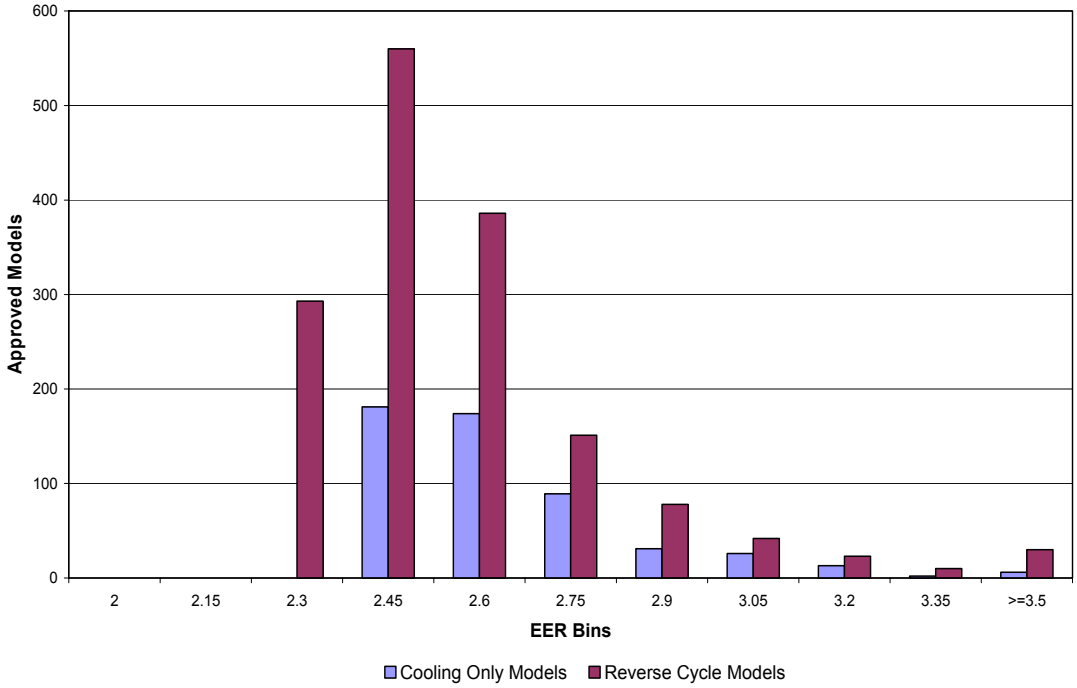
Table 5 – Air Conditioners – Reverse Cycle Models; Capacity and Efficiency Trends

Year	EER	CEC Cooling kW	Output Cooling kW	COP	CEC Heating kW	Output Heating kW	New Registrations
1987	2.40	1.06	2.55	2.68	1.02	2.72	9
1988	2.34	1.77	4.14	2.58	1.62	4.19	54
1989	2.23	2.06	4.60	2.52	1.89	4.76	68
1990	2.36	1.74	4.10	2.70	1.60	4.32	70
1991	2.44	1.72	4.20	2.72	1.62	4.41	50
1992	2.37	1.76	4.16	2.62	1.61	4.21	83
1993	2.44	1.67	4.07	2.75	1.58	4.34	67
1994	2.37	1.80	4.26	2.69	1.70	4.57	86
1995	2.44	1.79	4.38	2.74	1.71	4.69	58
1996	2.46	1.80	4.44	2.72	1.72	4.68	73
1997	2.46	1.81	4.45	2.78	1.74	4.84	103
1998	2.53	1.76	4.46	2.81	1.69	4.74	188
1999	2.51	1.75	4.41	2.75	1.73	4.76	115
2000	2.49	1.71	4.25	2.75	1.67	4.59	403
2001	2.53	1.92	4.85	2.85	1.85	5.27	189
2002	2.60	2.25	5.86	2.89	2.17	6.28	346
2003	2.59	2.05	5.31	2.90	2.05	5.96	474
2004	2.65	2.03	5.36	2.96	2.01	5.96	878
2005	2.77	2.09	5.78	3.02	2.08	6.29	371

Source: Energy Labelling Registration Database

Figure 13 below shows the EER breakdown of single phase air conditioners that had 'approved' status at mid 2005 – these only include MEPS 2004 compliant models. There is a similar spread of EER for both cooling and heating models; focussed around 2.45. Table 6 below shows the actual number of units involved in Figure 13.

Figure 13 – EER Breakdown of Approved Single Phase Air Conditioners in 2005



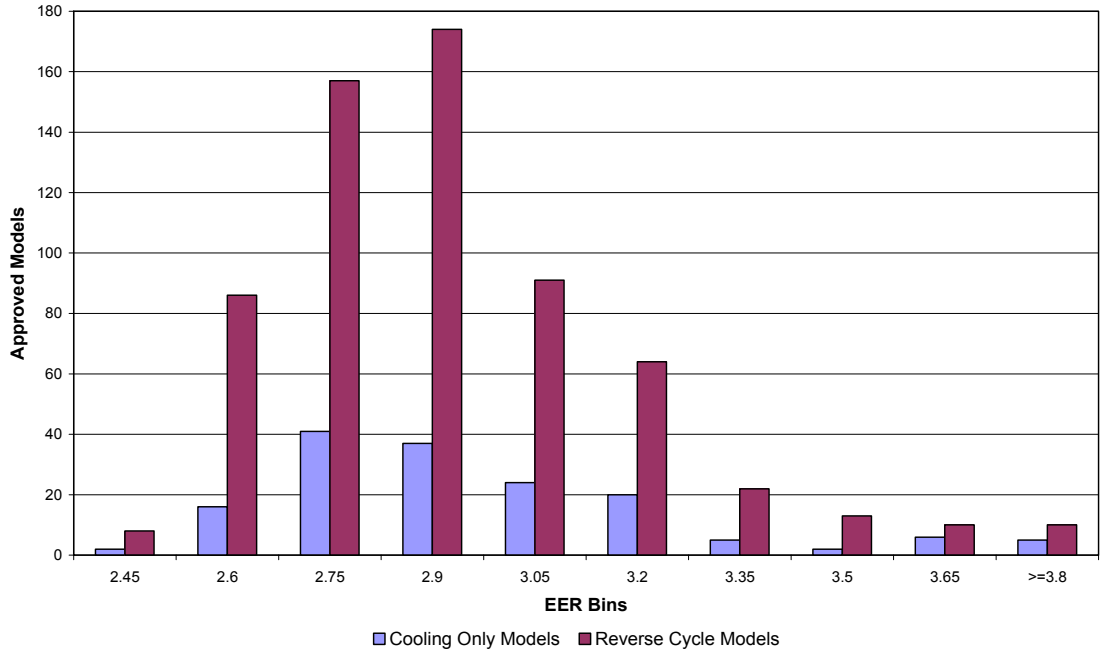
Note: 'Cooling Models' include the cooling only and reverse cycle models.

Table 6 – EER Breakdown of Approved Single Phase Air Conditioners in 2005

EER Bins	Cooling Only Models	Reverse Cycle Models
2.3	0	293
2.45	181	560
2.6	174	386
2.75	89	151
2.9	31	78
3.05	26	42
3.2	13	23
3.35	2	10
>=3.5	6	30

Figure 14 below shows the star rating breakdown of three phase air conditioners that had 'approved' registrations in 2005. It can be seen that the distribution of EER is slightly different for cooling models compared to heating models. The EER for heating models focuses around 2.9, whereas the EER for cooling models focuses around 2.75. Table 7 below shows the actual numbers involved in Figure 14.

Figure 14 – EER Breakdown of Approved Three Phase Air Conditioners in 2005



Note: 'Cooling Models' include the cooling only and reverse cycle models.

Table 7 – EER Breakdown of Approved Three Phase Air Conditioners in 2005

EER Bins	Cooling Only Models	Reverse Cycle Models
2.45	2	8
2.6	16	86
2.75	41	157
2.9	37	174
3.05	24	91
3.2	20	64
3.35	5	22
3.5	2	13
3.65	6	10
>=3.8	5	10

8.1 Current and Future MEPS Levels

The adoption of MEPS required both cooling only and reverse cycle three phase air conditioners (including ducted and non-ducted models) to be registered for MEPS in October 2001. New MEPS levels for three phase air conditioners will come into effect in October 2007, models will need to be redesigned to meet these levels or taken out of the marketplace. MEPS for single phase air conditioners was introduced in October 2004. New MEPS levels for all reverse cycle and cooling only non-ducted split and unitary systems less than 7.5kW, will come into effect in April 2006. All single phase air conditioners (including those models that needed to satisfy 2006 MEPS) will also need to satisfy new MEPS levels in October 2007 and then satisfy new MEPS levels in October 2008 (with the exception of ducted, cooling only and reverse cycle systems, and all systems greater than or equal to 10 kW).

The exact MEPS levels by air conditioner type are set out in AS/NZS3823.2 and also on www.energyrating.gov.au.

If the MEPS timetable to October 2008 was implemented, 2018 would see reductions in energy use and emissions of 5.9% of the current BAU scenario (ie current MEPS 2001 and 2004 MEPS levels for three phase and single phase air conditioners respectively). Annual energy savings in 2018 are projected to be 782 GWh per year with emissions down by about 0.61 Mt CO_2 per year; for total savings of 7,970 GWh and 6.2 Mt CO_2. The proposed MEPS timetable has a possible net benefit of $174 million at a discount rate of 6.3%, giving an overall benefit cost ratio of 1.9. Note that this is a net benefit and that benefits of the proposed timetable vary according to air conditioner type. More details can be found in the Regulatory Impact Statement (Syneca Consulting 2005b).

Figure 15 below shows the MEPS requirements, as cooling EER versus cooling capacity, for three phase air conditioners. Models shown are registered units in 2005. The red and pink lines represent the MEPS levels in 2001 and 2007 respectively. Units above these lines meet each respective MEPS level.

Figure 15 – MEPS for 3-Phase Air Conditioners

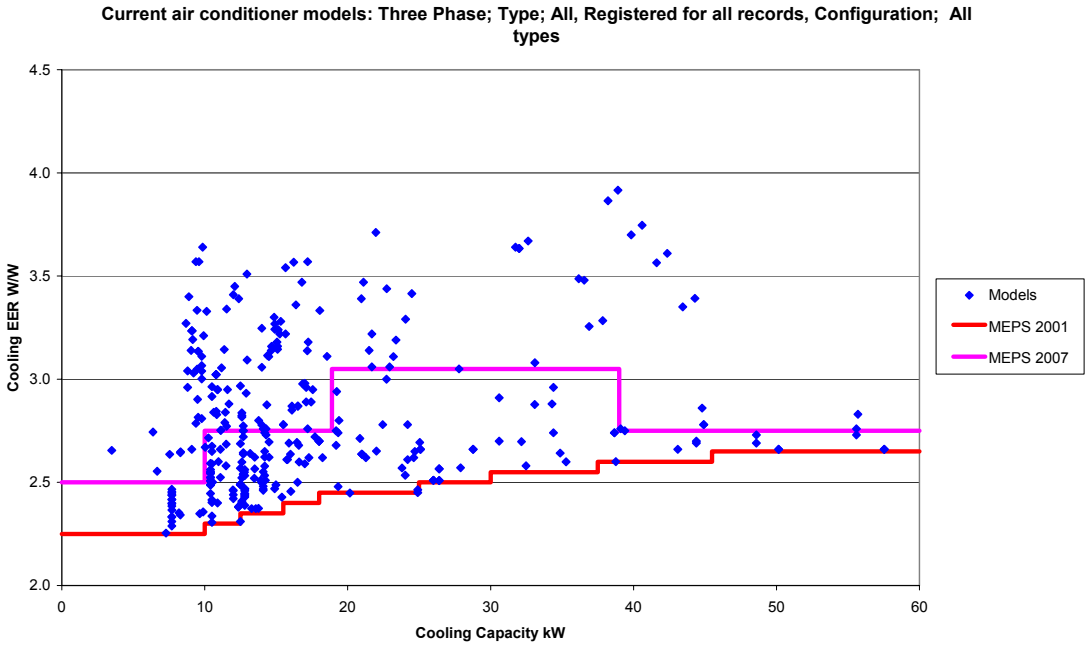


Figure 16 below shows the MEPS requirements, cooling EER versus cooling capacity, for single phase, reverse cycle, non ducted split system air conditioners. Models shown are registered units in 2005. The red, pink and green lines represent the current, 2006 and 2008 MEPS levels respectively. Units above these lines meet each respective MEPS level. It should be noted that few units below the red 2004 MEPS line are inverter units that have been tested at part load for MEPS compliance and do not appear to meet MEPS at rated load (which is shown in the figure).

Figure 16 – MEPS for Single Phase Room Air Conditioners–Reverse Cycle, Non Ducted Split Systems

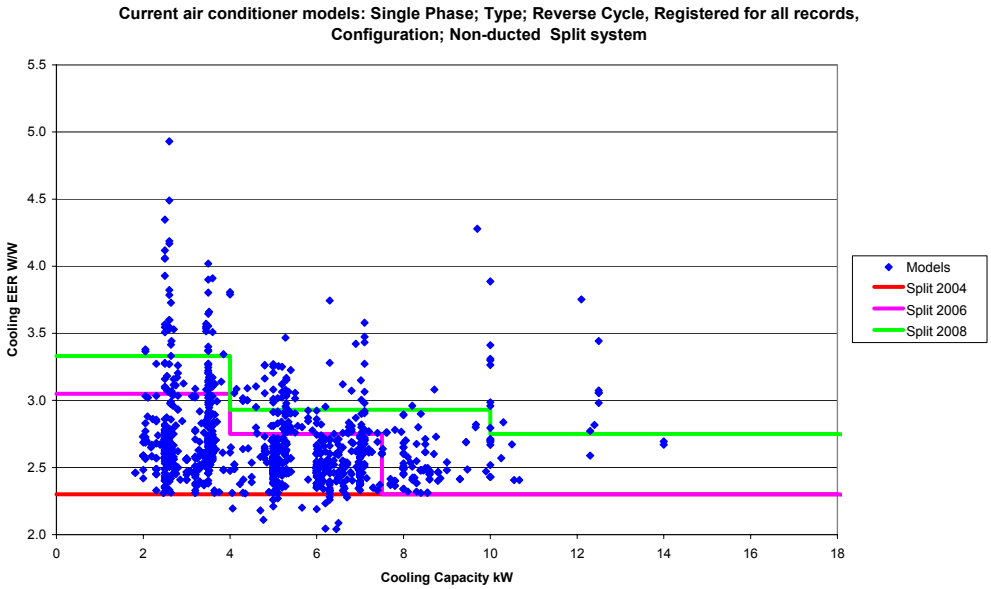


Figure 17 below shows the MEPS requirements for single phase, reverse cycle, ducted system air conditioners. Models shown are registered units in 2005. The red, pink and green lines represent the current, 2007 and 2008 MEPS levels respectively.

Figure 17 - MEPS for Single Phase Room Air Conditioners – Reverse Cycle, Ducted Systems

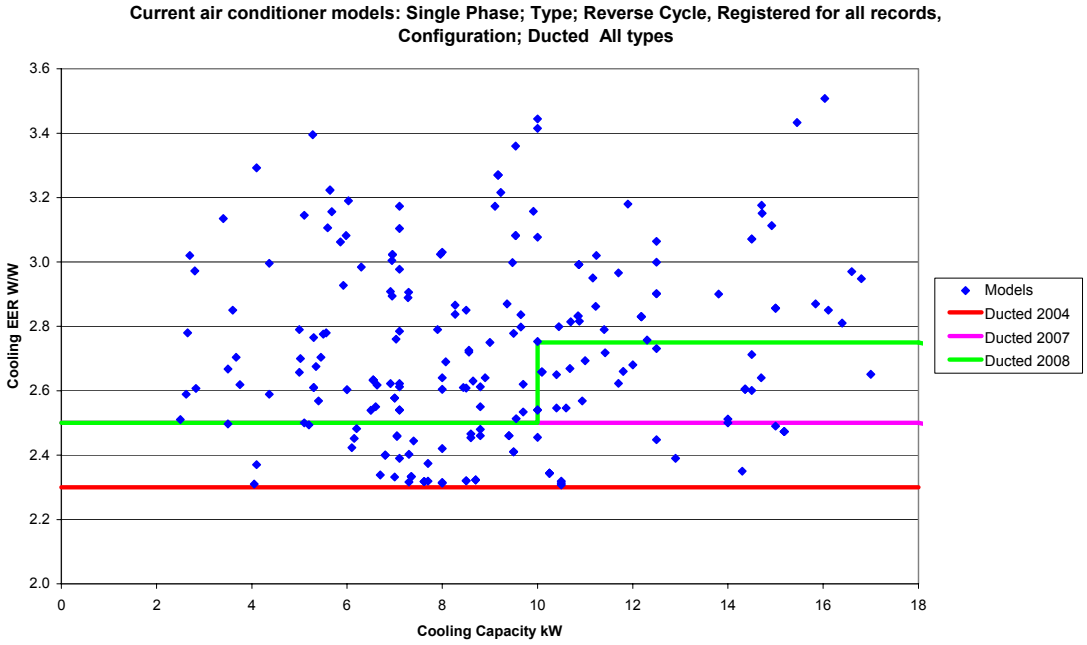


Figure 18 below shows the MEPS requirements for single phase, reverse cycle, non ducted unitary system air conditioners. Models shown are registered units in 2005. The red, pink and green lines represent the current, 2006 and 2008 MEPS levels respectively.

Figure 18 -MEPS for Single Phase Room Air Conditioners–Reverse Cycle, Non Ducted Unitary Systems

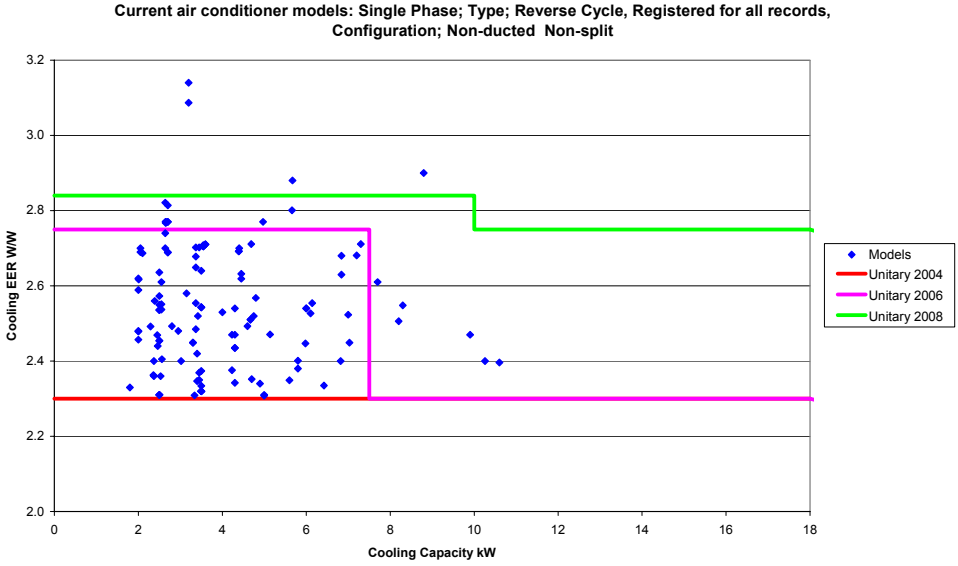


Figure 19 below shows the MEPS requirements for single phase, cooling only, non ducted unitary system air conditioners. Models shown are registered units in 2005. The red, pink and green lines represent the current, 2006 and 2008 MEPS levels respectively.

Figure 19 - MEPS for Single Phase Room Air Conditioners–Cooling Only, Non Ducted Unitary Systems

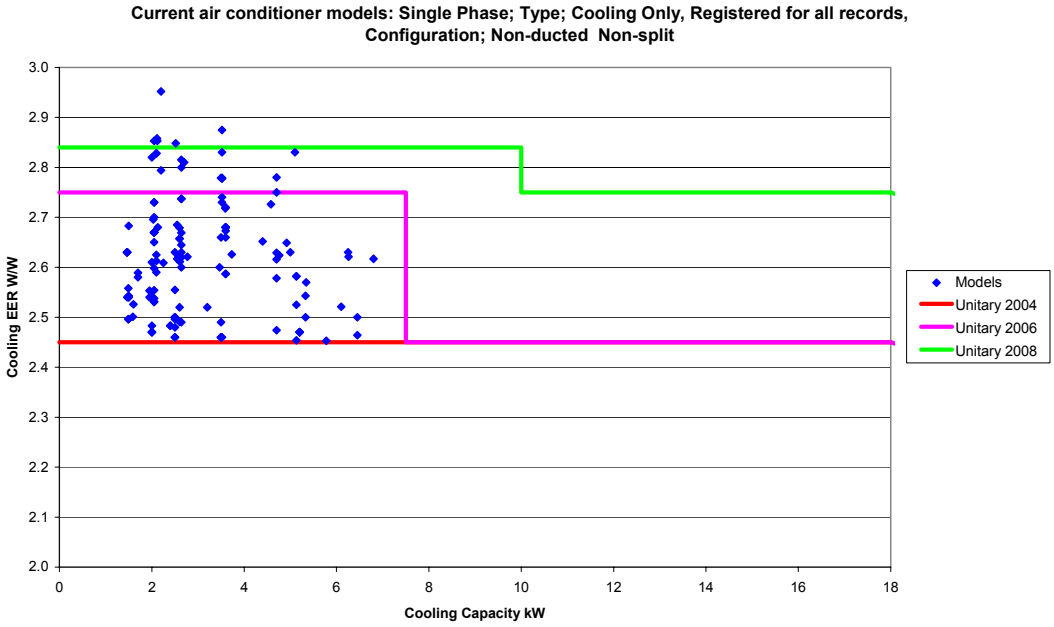


Figure 20 below shows the MEPS requirements for single phase, cooling only ducted system air conditioners. Models shown are registered units in 2005. The red, pink and green lines represent the current, 2007 and 2008 MEPS levels respectively.

Figure 20 - MEPS for Single Phase Room Air Conditioners – Cooling Only, Ducted Systems

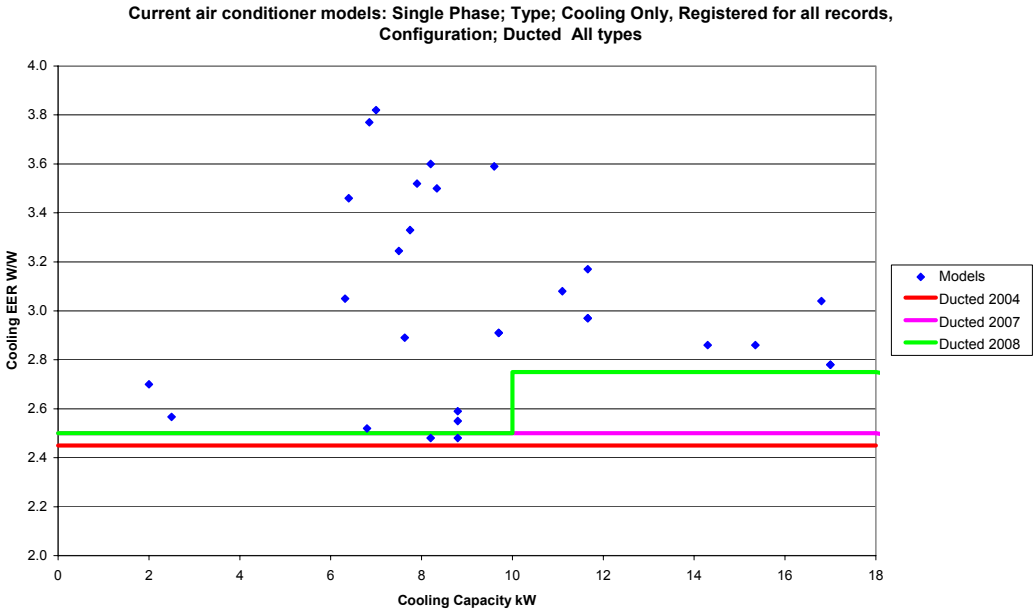
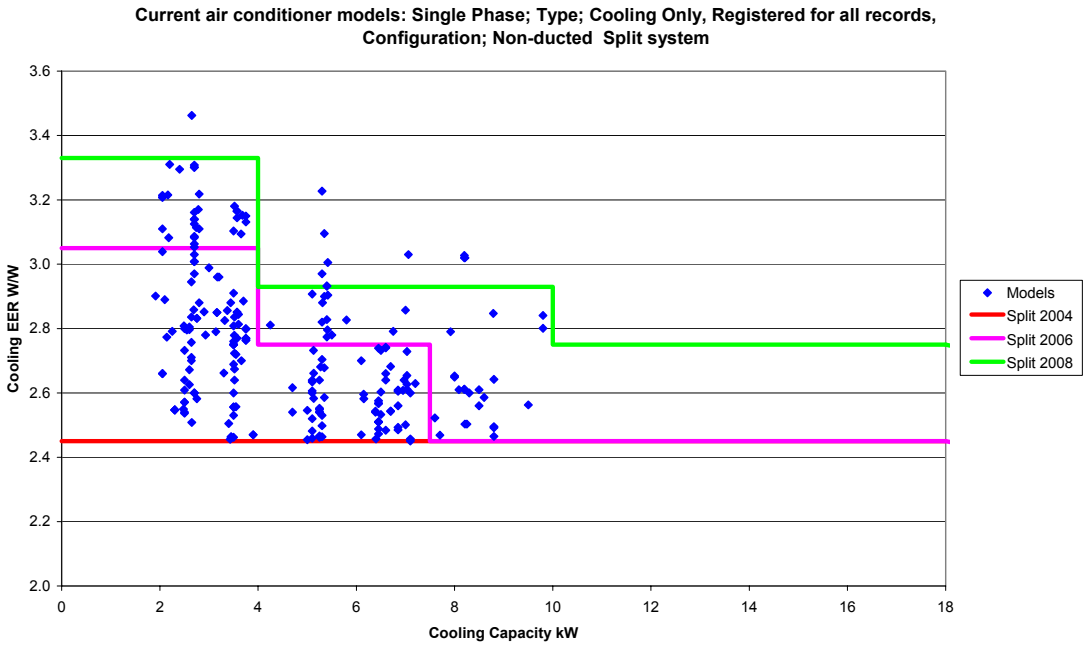


Figure 21 below shows the MEPS requirements for single phase, cooling only, non ducted split system air conditioners. Models shown are registered units in 2005. The red, pink and green lines represent the current, 2006 and 2008 MEPS levels respectively.

Figure 21 – MEPS for Single Phase Air Conditioners – Cooling Only, Non Ducted Split Systems

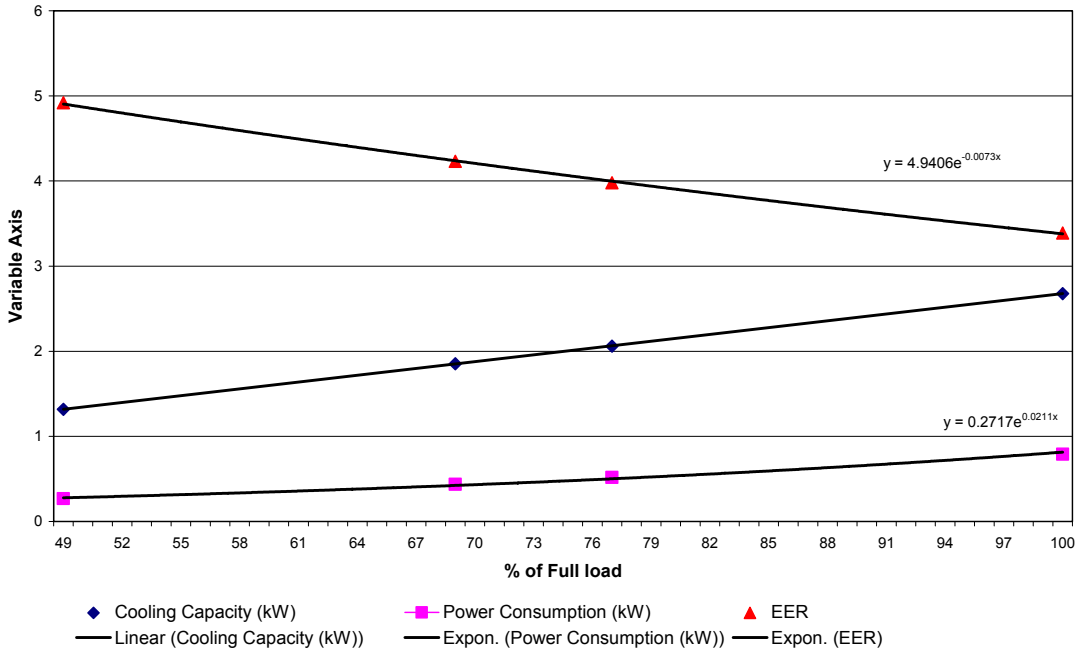


8.2 Variable Output Compressors and Efficiency

Figure 22 below shows the performance for a typical variable output compressor air conditioner, as a function of output compared to rated capacity. Most conventional single speed compressors run at a constant speed and vary their capacity by switching on and off at various times; their efficiency stays relatively constant at part load output. Air conditioners with a variable output compressor allows the compressor output to be reduced to match the steady state output required.

The efficiency (EER and COP) of the system increases as the output of the system decreases because the refrigeration system becomes more efficient with a smaller compressor output feeding into a constant sized evaporator and condenser. Although some of these systems may appear less efficient at rated output due to parasitic control system losses, they tend to be very efficient at part load operation, which is a more common mode in a typical household.

Figure 22 – Performance for a Typical Inverter



9. ESTIMATED ENERGY CONSUMPTION OF AIR CONDITIONERS IN AUSTRALIA

Table 8 below shows the estimated heating and cooling electricity used by air conditioners, by State and year (EES 1999). The estimates in Table 8 below were undertaken in 1999 and will be updated when the new ABS4602 catalogue is released, in early 2006, together with the latest ABARE data.

Table 8 – Heating and Cooling Electricity used by Air Conditioners by State and Year

Year	Total Electric PJ	Total Electric PJ	Total Electric PJ	Total Electric PJ	Total Electric PJ	Total Electric PJ	Total Electric PJ	Total Electric PJ	Total Electric PJ
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Australia
1986	0.8	0.3	0.7	0.3	0.3	0.0	0.3	0.0	2.6
1987	0.8	0.3	0.7	0.3	0.3	0.0	0.3	0.0	2.7
1988	0.9	0.4	0.7	0.3	0.3	0.0	0.3	0.0	2.8
1989	0.9	0.4	0.7	0.3	0.4	0.0	0.3	0.0	2.8
1990	0.9	0.4	0.7	0.4	0.4	0.0	0.3	0.0	2.9
1991	0.9	0.4	0.8	0.4	0.4	0.0	0.3	0.0	3.0
1992	0.9	0.4	0.8	0.4	0.4	0.0	0.3	0.0	3.1
1993	0.9	0.4	0.8	0.4	0.4	0.0	0.3	0.0	3.2
1994	0.9	0.4	0.8	0.4	0.5	0.0	0.4	0.0	3.3
1995	1.0	0.4	0.9	0.4	0.5	0.0	0.4	0.0	3.4
1996	1.0	0.4	0.9	0.5	0.5	0.0	0.4	0.0	3.5
1997	1.0	0.4	1.0	0.5	0.5	0.0	0.4	0.0	3.7
1998	1.0	0.4	1.0	0.5	0.5	0.0	0.4	0.0	3.8
1999	1.1	0.5	1.1	0.5	0.6	0.0	0.4	0.0	4.0
2000	1.1	0.5	1.1	0.5	0.6	0.0	0.5	0.0	4.1
2001	1.1	0.5	1.2	0.6	0.6	0.0	0.5	0.0	4.2
2002	1.1	0.5	1.2	0.6	0.6	0.0	0.5	0.0	4.3
2003	1.1	0.5	1.3	0.6	0.7	0.0	0.5	0.0	4.5
2004	1.2	0.5	1.3	0.6	0.7	0.0	0.5	0.0	4.6

Source: EES Residential Building Sector Report 1999

Data in the above table does not take into account any MEPS for air conditioners (either 2001, 2004 or 2007) and only covers the residential sector. The best sources of data for the impact of MEPS (single and three phase) are the various RIS studies which are available on www.energyrating.gov.au (Syneca Consulting 2005b).

10. PEAK LOAD ISSUES

The sharp increase in air conditioner ownership since 1999 has started to create peak load supply problems for some electricity utilities in some states. This is of particular concern because the peak loads generated by air conditioners can be very large and of short duration, which tends to result in poor utilisation of fixed assets. In addition, the generation and distribution system tends to be at its lowest capacity during very hot weather when air conditioner demands are likely to be at a maximum.

The issues of peak load and weather are complex and a wide range of factors will affect the magnitude of the peak on any particular day. Some detailed analysis has been undertaken in Victoria. The results are included in EES (2004).

11. REFERENCES AND BIBLIOGRAPHY

Australian Bureau of Statistics reports: see www.abs.gov.au

ABS 3222.0, *Projection of the Populations of Australia, States and Territories*.

ABS3260; *Household and Family Projections, Australia, 1996 to 2021*. March 1999,

ABS4602.0*; Environmental Issues – Peoples Views and Practices*. March 2005, Australian Bureau of Statistics. Also 2002, 1999 and 1994 reports.

ABS 8212.0, 1981, *National Energy Survey - Household Appliances, Facilities and Insulation, Australia 1980*, published July 1981.

ABS 8212.0, 1984, *National Energy Survey - Household Appliances, Facilities and Insulation, Australia 1983*, published June 1984.

ABS 8212.0, 1987, *National Energy Survey - Household Appliances, Facilities and Insulation, Australia 1985-86*, published June 1987.

ABS 8213.0, 1984, *National Energy Survey: Annual Consumption of Reticulated Energy by Households*, Australia 1983.

ABS 8213.0, 1987, *National Energy Survey Annual Consumption of Reticulated Energy by Households*, Australia 1985-86, Canberra.

ABS 8218.0, 1988, *National Energy: Survey Weekly Reticulated Energy and Appliance Usage Patterns by Season Households*, Australia 1985-86, October 1988.

APEC 2001, *Study on Algorithm Development for Energy Performance Testing - Study 3: Study of algorithms for air conditioners*, prepared for APEC Secretariat, December 2001, Project EWG 03/200T. Available from www.energyefficient.com.au

APEC 2004; Conference: *Air conditioning & energy performance - the next 5 years*, Sydney, June 2004. Papers available from http://www.energyrating.gov.au/2004-06apecmeeting.html

BIS Shrapnel (2000), *The Household Appliances Market in Australia, 2000-2002, Volume 3: Climate Control*. October 2000, BIS Shrapnel Pty Ltd

BIS Shrapnel (2002), *The Household Appliances Market in Australia, 2002-2004, Volume 3: Climate Control*. October 2002, BIS Shrapnel Pty Ltd

BIS Shrapnel (2003), *Household Appliances Installed in New Dwellings and Renovations, 2003*. April 2003, BIS Shrapnel Pty Ltd

BIS Shrapnel (2004), *The Household Appliances Market in Australia, 2004-2006, Volume 3: Climate Control*. October 2004, BIS Shrapnel Pty Ltd

BRANZ (2000), *Energy Used in Australian Appliances; Analysis of 1993/94 RES Appliance Energy Use Data*, by BRANZ for the Australian Greenhouse Office, May 2000.

DHSV (2001), Victorian Utility Consumption Survey 2001, Department of Human Services, Victoria. Available from www.dhs.vic.gov.au

Energy Consult (2001), *Air Conditioning Challenge; Program Options*, by Energy Consult for the Australian Greenhouse Office, February 2001. Available from www.energyrating.gov.au in the electronic library.

Energy Consult (2005), *Comparison of International MEPS; Room Air Conditioners*, by Energy Consult for the Australian Greenhouse Office, January 2005, NAEEEC Report 2005/03. Available from www.energyrating.gov.au in the electronic library.

EES (1999), *Study of Greenhouse Gas Emissions from the Australian Residential Building Sector to 2010*, by Energy Efficient Strategies for the Australian Greenhouse Office. Available from www.energyrating.gov.au in the electronic library.

EES (2004), *Electrical Peak Load Analysis, Victoria, 1999-2003*, by Energy Efficient Strategies for VENCORP and the Australian Greenhouse Office, December 2004. Available from www.energyrating.gov.au in the electric library.

GWA (2000), *Minimum Energy Performance Standards and Alternative Strategies for Air Conditioners and Heat Pumps; Regulatory Impact Statement*, by George Wilkenfeld and Associates for the Australian Greenhouse Office, September 2000. Available from www.energyrating.gov.au in the electronic library.

GWA (2001), *The Scope for Application of Minimum Energy Performance Standards to Additional Household Appliances*, by George Wilkenfeld and Associates for the National Appliance and Equipment Energy Efficient Committee, December 2001. Available from www.energyrating.gov.au in the electronic library.

GWA (2004), *A National Demand Management Strategy for Small Air Conditioners*, by George Wilkenfeld and Associates for the National Appliance and Equipment Energy Efficiency Committee (NAEEEC) and the Australian Greenhouse Office, November 2004, NAEEEC Report 2004/22. Available from www.energyrating.gov.au in the electric library.

Hart M. & de Dear R. (2002), *Appliance Electricity End-Use: Weather and Climate Sensitivity*, by Macquarie Research Ltd for the Australian Greenhouse Office. Available from www.energyrating.gov.au in the electronic library.

MCE (2001), *Minimum Energy Performance Standards; Evaporative Air Conditioners*, by the Ministerial Council on Energy. NAEEEC Report 2002/11, March 2001. Available from www.energyrating.gov.au in the electronic library.

MCE (2002), *Minimum Energy Performance Standards; Air Conditioners*, by the Ministerial Council on Energy. NAEEEC Report 2002/11, August 2002. Available from www.energyrating.gov.au in the electronic library.

MCE (2004), *Standby Product Profile; Air Conditioners*, by the Ministerial Council on Energy. NAEEEC Report 2004/06, June 2004. Available from www.energyrating.gov.au in the electronic library.

MCE (2004), *Minimum Energy Performance Standards; Heat Pumps*, by the Ministerial Council on Energy. NAEEEC Report 2004/17, October 2004. Available from www.energyrating.gov.au in the electronic library.

MEA (2001), *Analysis of Potential for Minimum Energy Performance Standards for Evaporative Air Conditioners*, by Mark Ellis and Associates for the Australian Greenhouse Office, March 2001. Available from www.energyrating.gov.au in the electronic library.

NAEEEC (2002), *Fact Sheet 3; MEPS and Labelling for Air Conditioners*, NAEEEC Report Fact Sheet 3, March, 2002. Available from www.energyrating.gov.au in the electronic library.

Pacific Power (1994), *The Residential End Use Study; Executive Summary*, by Pacific Power, August 1994. Available from www.energyrating.gov.au in the electronic library.

Syneca Consulting (2003), *Minimum Energy Performance Standards for Air Conditioners; Regulatory Impact Statement*, by Syneca Consulting for the Australian Greenhouse Office, August 2005, NAEEEC report 2003/08. Available from www.energyrating.gov.au in the electronic library.

Syneca Consulting (2005a), *Proposal to Increase MEPS for Room Air Conditioners; Regulatory Impact Statement*, by Syneca Consulting for the Australian Greenhouse Office, February 2005, NAEEEC report 2005/04. Available from www.energyrating.gov.au in the electronic library.

Syneca Consulting (2005b), *Proposal to increase MEPS for Room Air Conditioners and harmonise MEPS for single and three-phase units; Regulatory Impact Statement*, by Syneca Consulting for the Australian Greenhouse Office, July 2005, NAEEEC Report 2005/16. Available from www.energyrating.gov.au in the electronic library.

Test Research (1995), *Appliance Use Survey Report*, by Test Research for the National Appliance Energy Efficiency Coordinating Committee, February 1995.

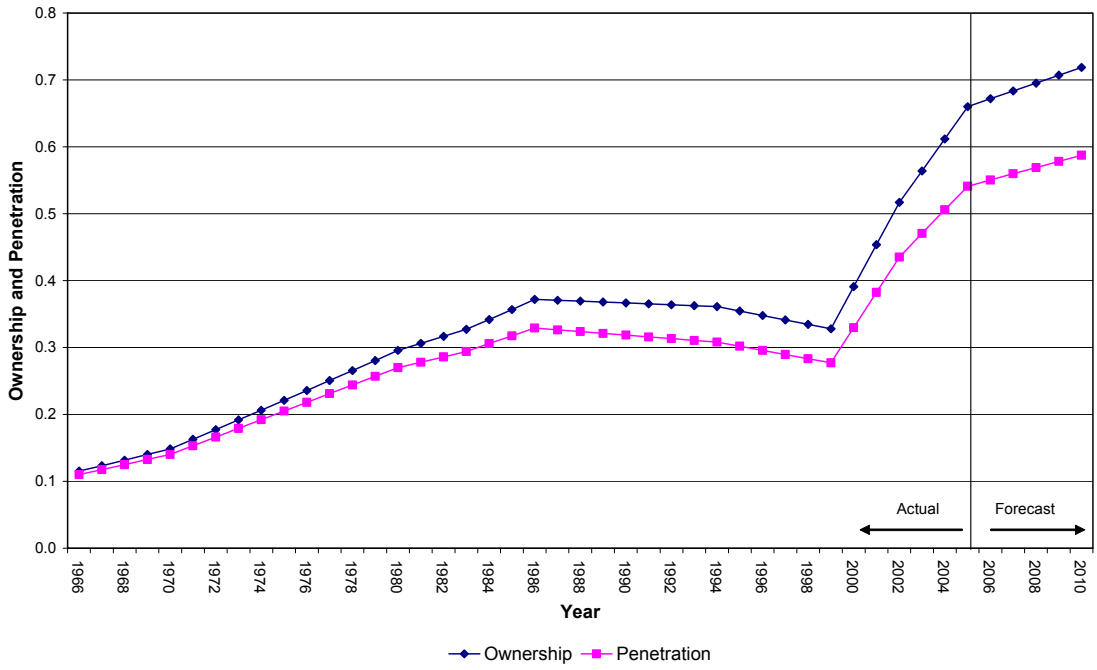
Unisearch (1998), *Proposed Energy Efficiency Program for Packaged Air Conditioners*, by Unisearch Limited for the Department of Primary Industries and Energy, June 1998. Available from www.energyrating.gov.au in the electronic library.

This report also includes analysed data from the NAEEEC Online Registration system for air conditioners which is not publicly available.

12. APPENDIX ONE

12.1 Individual State Data - New South Wales

Air Conditioner Ownership and Penetration for New South Wales



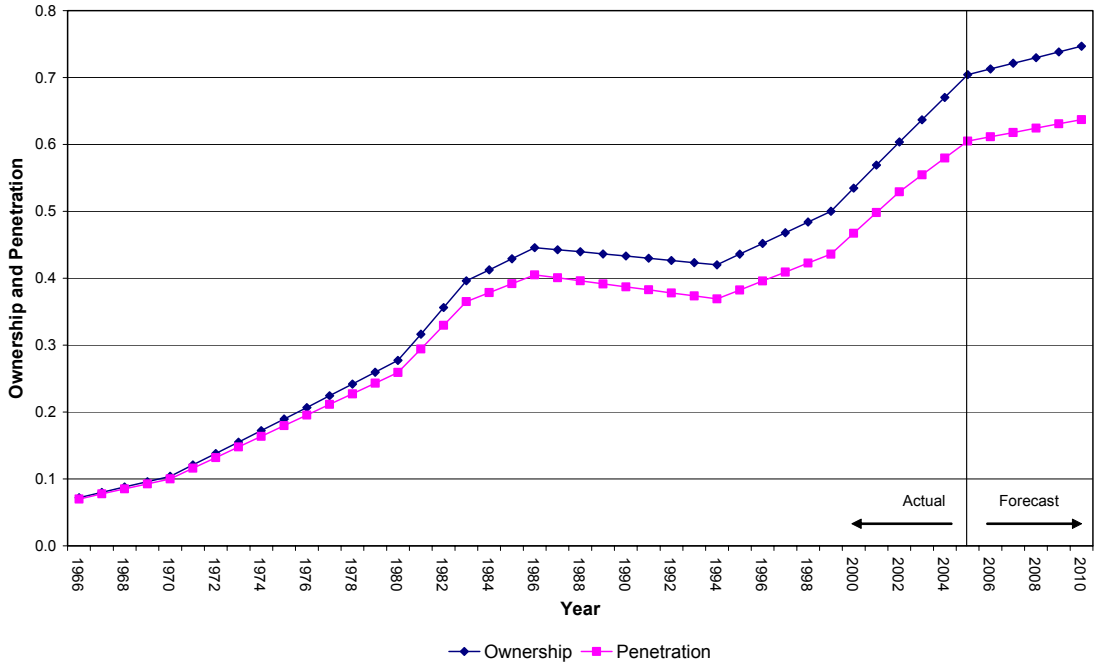
New South Wales Raw Air Conditioner Data

NSW			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	11.0%	0.115	47.2%	4.7%	0.9%	28.3%	18.9%
1967	11.8%	0.123	46.6%	4.9%	0.9%	28.8%	18.7%
1968	12.5%	0.132	46.1%	5.1%	0.9%	29.4%	18.6%
1969	13.3%	0.140	45.5%	5.3%	0.9%	29.9%	18.4%
1970	14.0%	0.148	44.9%	5.4%	0.9%	30.4%	18.3%
1971	15.3%	0.163	44.4%	5.6%	0.9%	31.0%	18.2%
1972	16.6%	0.177	43.8%	5.8%	0.9%	31.5%	18.0%
1973	17.9%	0.192	43.3%	6.0%	0.9%	32.1%	17.9%
1974	19.2%	0.206	42.7%	6.1%	0.9%	32.6%	17.7%
1975	20.5%	0.221	42.1%	6.3%	0.8%	33.1%	17.6%
1976	21.8%	0.236	41.6%	6.5%	0.8%	33.7%	17.4%
1977	23.1%	0.251	41.0%	6.7%	0.8%	34.2%	17.3%

NSW			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1978	24.4%	0.265	40.5%	6.8%	0.8%	34.7%	17.1%
1979	25.7%	0.281	39.9%	7.0%	0.8%	35.3%	17.0%
1980	27.0%	0.296	39.3%	7.2%	0.8%	35.8%	16.9%
1981	27.8%	0.306	35.8%	7.1%	0.8%	39.4%	16.8%
1982	28.6%	0.317	32.2%	7.0%	0.8%	43.1%	16.8%
1983	29.4%	0.327	28.6%	7.0%	0.9%	46.7%	16.8%
1984	30.6%	0.342	28.8%	7.2%	0.9%	46.7%	16.4%
1985	31.7%	0.357	29.0%	7.4%	1.0%	46.7%	15.9%
1986	32.9%	0.372	29.1%	7.7%	1.0%	46.8%	15.4%
1987	32.6%	0.371	27.5%	8.0%	1.0%	48.2%	15.2%
1988	32.4%	0.369	26.0%	8.4%	0.9%	49.7%	15.0%
1989	32.1%	0.368	24.4%	8.8%	0.9%	51.1%	14.8%
1990	31.9%	0.367	22.8%	9.1%	0.8%	52.6%	14.6%
1991	31.6%	0.365	21.2%	9.5%	0.8%	54.1%	14.4%
1992	31.3%	0.364	19.6%	9.9%	0.7%	55.5%	14.2%
1993	31.1%	0.362	18.0%	10.2%	0.7%	57.0%	14.0%
1994	30.8%	0.361	16.4%	10.6%	0.7%	58.5%	13.8%
1995	30.2%	0.354	17.5%	10.9%	0.7%	56.6%	14.3%
1996	29.6%	0.348	18.5%	11.3%	0.7%	54.7%	14.9%
1997	28.9%	0.341	19.5%	11.7%	0.7%	52.7%	15.4%
1998	28.3%	0.335	20.5%	12.0%	0.8%	50.8%	15.9%
1999	27.7%	0.328	21.5%	12.4%	0.8%	48.9%	16.4%
2000	33.0%	0.391	18.7%	15.1%	0.7%	50.4%	15.1%
2001	38.2%	0.454	15.9%	17.9%	0.6%	51.8%	13.7%
2002	43.5%	0.517	13.1%	20.7%	0.6%	53.3%	12.4%
2003	47.0%	0.564	13.0%	21.5%	0.6%	54.2%	10.6%
2004	50.6%	0.612	13.0%	22.4%	0.6%	55.2%	8.8%
2005	54.1%	0.660	12.9%	23.3%	0.7%	56.1%	7.0%
2006	55.0%	0.672	12.6%	23.4%	0.6%	56.5%	6.8%
2007	56.0%	0.683	12.2%	23.5%	0.6%	57.0%	6.6%
2008	56.9%	0.695	11.9%	23.6%	0.6%	57.5%	6.4%
2009	57.8%	0.707	11.5%	23.8%	0.6%	57.9%	6.2%
2010	58.7%	0.719	11.1%	23.9%	0.6%	58.4%	6.0%

12.2 Individual State Data - Victoria

Air Conditioner Ownership and Penetration for Victoria



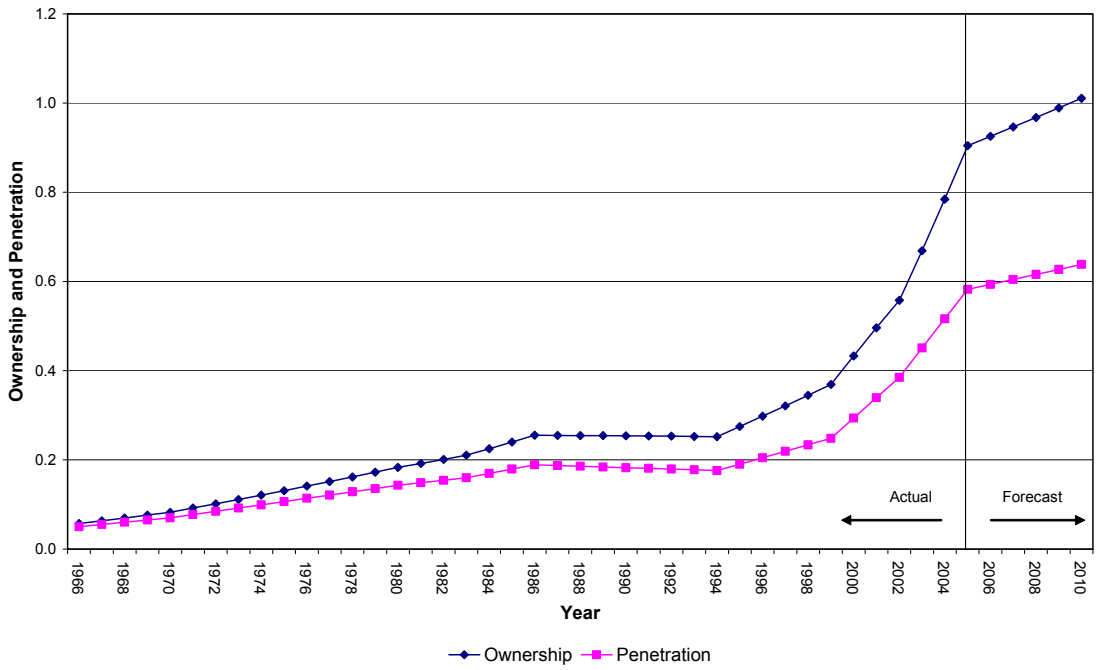
Victorian Raw Air Conditioner Data

VIC			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	7.0%	0.072	53.9%	8.4%	1.8%	12.0%	24.0%
1967	7.8%	0.080	52.8%	8.1%	1.8%	13.1%	24.3%
1968	8.5%	0.088	51.6%	7.9%	1.8%	14.1%	24.6%
1969	9.3%	0.096	50.5%	7.6%	1.7%	15.2%	24.9%
1970	10.0%	0.104	49.4%	7.4%	1.7%	16.3%	25.2%
1971	11.6%	0.121	48.2%	7.2%	1.7%	17.4%	25.5%
1972	13.2%	0.138	47.1%	6.9%	1.7%	18.5%	25.8%
1973	14.8%	0.155	46.0%	6.7%	1.7%	19.6%	26.1%
1974	16.4%	0.172	44.9%	6.4%	1.6%	20.7%	26.4%
1975	18.0%	0.189	43.7%	6.2%	1.6%	21.7%	26.7%
1976	19.5%	0.207	42.6%	5.9%	1.6%	22.8%	27.0%
1977	21.1%	0.224	41.5%	5.7%	1.6%	23.9%	27.4%
1978	22.7%	0.242	40.3%	5.4%	1.6%	25.0%	27.7%
1979	24.3%	0.259	39.2%	5.2%	1.5%	26.1%	28.0%

VIC			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1980	25.9%	0.277	38.1%	4.9%	1.5%	27.2%	28.3%
1981	29.4%	0.316	34.6%	5.0%	1.6%	29.0%	29.8%
1982	33.0%	0.356	31.2%	5.0%	1.6%	30.8%	31.4%
1983	36.5%	0.396	27.7%	5.0%	1.7%	32.7%	33.0%
1984	37.8%	0.412	28.2%	4.5%	1.6%	32.8%	32.9%
1985	39.2%	0.429	28.7%	4.1%	1.5%	32.9%	32.8%
1986	40.5%	0.446	29.2%	3.7%	1.4%	33.0%	32.7%
1987	40.1%	0.442	27.8%	3.7%	1.4%	33.8%	33.2%
1988	39.6%	0.439	26.3%	3.7%	1.5%	34.7%	33.7%
1989	39.2%	0.436	24.9%	3.8%	1.6%	35.6%	34.2%
1990	38.7%	0.433	23.4%	3.8%	1.7%	36.4%	34.7%
1991	38.3%	0.430	22.0%	3.8%	1.8%	37.3%	35.2%
1992	37.8%	0.427	20.6%	3.8%	1.8%	38.1%	35.6%
1993	37.4%	0.423	19.1%	3.8%	1.9%	39.0%	36.1%
1994	36.9%	0.420	17.7%	3.8%	2.0%	39.9%	36.6%
1995	38.2%	0.436	19.2%	4.2%	2.2%	37.1%	37.3%
1996	39.6%	0.452	20.8%	4.6%	2.4%	34.3%	37.9%
1997	40.9%	0.468	22.3%	4.9%	2.6%	31.6%	38.6%
1998	42.3%	0.484	23.9%	5.3%	2.8%	28.8%	39.2%
1999	43.6%	0.500	25.5%	5.7%	3.0%	26.1%	39.8%
2000	46.7%	0.535	27.3%	4.8%	2.9%	26.9%	38.1%
2001	49.8%	0.569	29.2%	4.0%	2.8%	27.7%	36.3%
2002	52.9%	0.604	31.1%	3.2%	2.7%	28.5%	34.5%
2003	55.4%	0.637	31.5%	3.3%	2.5%	30.3%	32.4%
2004	58.0%	0.670	31.9%	3.5%	2.3%	32.0%	30.3%
2005	60.5%	0.704	32.3%	3.6%	2.1%	33.8%	28.2%
2006	61.1%	0.713	32.4%	3.6%	2.1%	34.4%	27.5%
2007	61.8%	0.721	32.5%	3.6%	2.1%	35.0%	26.8%
2008	62.4%	0.730	32.6%	3.6%	2.0%	35.6%	26.2%
2009	63.1%	0.738	32.7%	3.5%	2.0%	36.2%	25.5%
2010	63.7%	0.747	32.8%	3.5%	2.0%	36.9%	24.8%

12.3 Individual State Data – Queensland

Air Conditioner Ownership and Penetration for Queensland



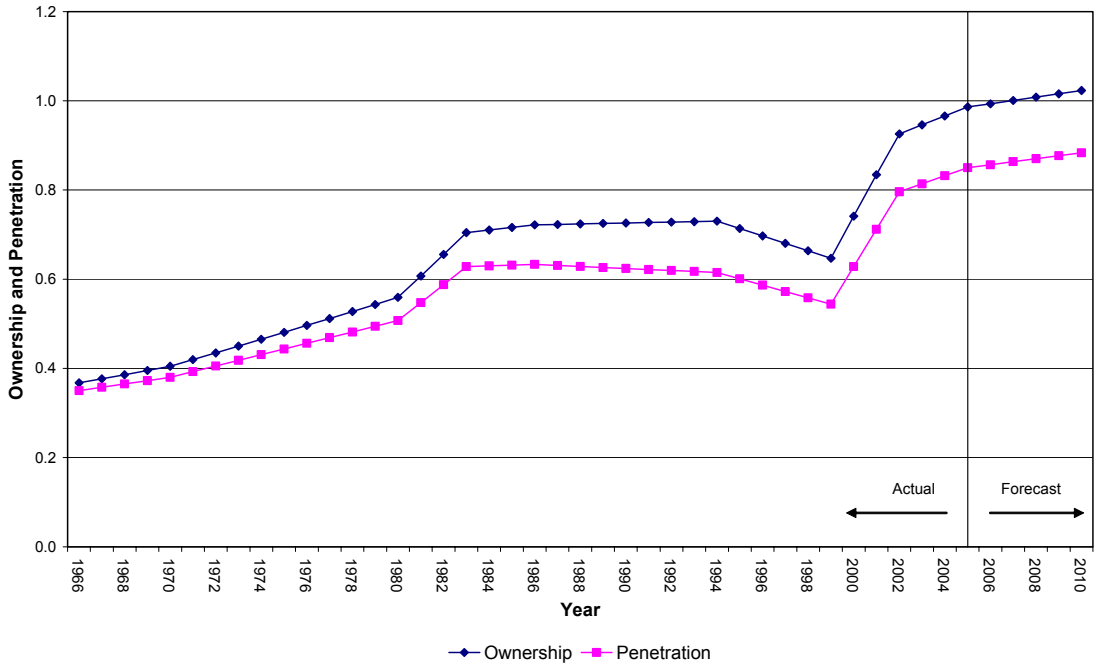
Queensland Raw Air Conditioner Data

QLD		Ownership by Type					
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	5.0%	0.057	75.6%	2.4%	2.4%	9.8%	12.2%
1967	5.5%	0.063	74.2%	2.4%	2.4%	10.6%	12.7%
1968	6.0%	0.070	72.7%	2.3%	2.3%	11.5%	13.2%
1969	6.5%	0.076	71.3%	2.3%	2.3%	12.3%	13.7%
1970	7.0%	0.083	69.9%	2.2%	2.2%	13.2%	14.2%
1971	7.7%	0.092	68.5%	2.2%	2.2%	14.0%	14.7%
1972	8.5%	0.102	67.0%	2.2%	2.2%	14.9%	15.2%
1973	9.2%	0.111	65.6%	2.1%	2.1%	15.7%	15.7%
1974	9.9%	0.121	64.2%	2.1%	2.1%	16.6%	16.2%
1975	10.7%	0.131	62.7%	2.0%	2.0%	17.4%	16.7%
1976	11.4%	0.141	61.3%	2.0%	2.0%	18.3%	17.2%
1977	12.1%	0.151	59.9%	1.9%	1.9%	19.1%	17.7%
1978	12.8%	0.162	58.4%	1.9%	1.9%	20.0%	18.2%
1979	13.6%	0.172	57.0%	1.8%	1.8%	20.8%	18.7%

QLD			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1980	14.3%	0.183	55.6%	1.8%	1.8%	21.7%	19.2%
1981	14.9%	0.192	49.7%	1.8%	1.8%	24.8%	21.7%
1982	15.4%	0.201	43.7%	1.8%	1.8%	27.8%	24.3%
1983	16.0%	0.210	37.8%	1.8%	1.8%	30.9%	26.8%
1984	17.0%	0.225	40.0%	1.6%	1.6%	29.9%	25.9%
1985	17.9%	0.240	42.1%	1.5%	1.5%	28.8%	24.9%
1986	18.9%	0.255	44.2%	1.3%	1.3%	27.8%	24.0%
1987	18.7%	0.255	41.2%	1.2%	1.2%	28.6%	26.1%
1988	18.6%	0.255	38.2%	1.1%	1.1%	29.4%	28.2%
1989	18.4%	0.254	35.1%	1.0%	1.0%	30.3%	30.4%
1990	18.3%	0.254	32.1%	0.9%	0.9%	31.1%	32.5%
1991	18.1%	0.253	29.0%	0.8%	0.8%	31.9%	34.6%
1992	17.9%	0.253	26.0%	0.7%	0.7%	32.8%	36.7%
1993	17.8%	0.253	23.0%	0.6%	0.6%	33.6%	38.8%
1994	17.6%	0.252	19.9%	0.5%	0.5%	34.4%	40.9%
1995	19.0%	0.275	20.3%	0.5%	0.5%	31.1%	43.2%
1996	20.5%	0.298	20.7%	0.6%	0.6%	27.8%	45.5%
1997	21.9%	0.321	21.1%	0.7%	0.7%	24.5%	47.7%
1998	23.4%	0.345	21.5%	0.7%	0.7%	21.2%	50.0%
1999	24.8%	0.369	21.9%	0.8%	0.8%	18.0%	52.3%
2000	29.4%	0.433	18.6%	1.0%	1.0%	26.1%	47.3%
2001	33.9%	0.496	15.4%	1.3%	1.3%	34.3%	42.3%
2002	38.5%	0.558	12.1%	1.5%	1.5%	42.4%	37.3%
2003	45.1%	0.669	11.5%	1.1%	1.1%	46.8%	33.9%
2004	51.6%	0.784	10.8%	0.6%	0.6%	51.2%	30.4%
2005	58.2%	0.904	10.1%	0.2%	0.2%	55.6%	27.0%
2006	59.3%	0.925	9.7%	0.2%	0.2%	56.7%	26.3%
2007	60.4%	0.946	9.4%	0.2%	0.2%	57.8%	25.5%
2008	61.6%	0.968	9.1%	0.2%	0.2%	58.9%	24.8%
2009	62.7%	0.989	8.7%	0.2%	0.2%	60.0%	24.1%
2010	63.8%	1.011	8.4%	0.2%	0.2%	61.1%	23.3%

12.4 Individual State Data – South Australia

Air Conditioner Ownership and Penetration for South Australia



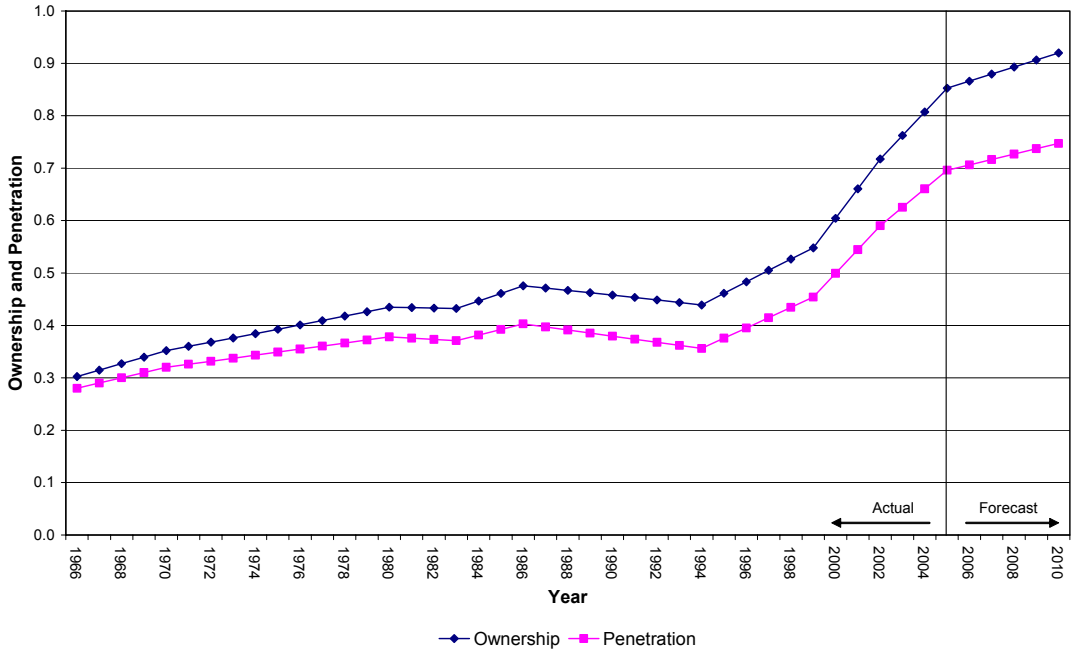
South Australian Raw Air Conditioner Data

SA			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	35.0%	0.367	33.3%	3.3%	0.0%	27.8%	35.6%
1967	35.8%	0.377	32.8%	3.4%	0.0%	28.7%	35.1%
1968	36.5%	0.386	32.2%	3.5%	0.0%	29.6%	34.7%
1969	37.3%	0.395	31.7%	3.5%	0.0%	30.5%	34.2%
1970	38.0%	0.405	31.1%	3.6%	0.1%	31.4%	33.8%
1971	39.3%	0.420	30.6%	3.6%	0.1%	32.3%	33.4%
1972	40.5%	0.435	30.1%	3.7%	0.1%	33.2%	32.9%
1973	41.8%	0.450	29.5%	3.8%	0.1%	34.1%	32.5%
1974	43.1%	0.465	29.0%	3.8%	0.1%	35.1%	32.0%
1975	44.4%	0.481	28.4%	3.9%	0.1%	36.0%	31.6%
1976	45.6%	0.496	27.9%	3.9%	0.2%	36.9%	31.1%
1977	46.9%	0.512	27.3%	4.0%	0.2%	37.8%	30.7%
1978	48.2%	0.528	26.8%	4.1%	0.2%	38.7%	30.3%

SA			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1979	49.4%	0.543	26.2%	4.1%	0.2%	39.6%	29.8%
1980	50.7%	0.559	25.7%	4.2%	0.2%	40.5%	29.4%
1981	54.7%	0.607	23.7%	4.6%	0.4%	41.8%	29.5%
1982	58.8%	0.655	21.7%	5.0%	0.6%	43.0%	29.7%
1983	62.8%	0.704	19.7%	5.4%	0.7%	44.3%	29.8%
1984	63.0%	0.710	20.1%	5.2%	0.8%	44.3%	29.6%
1985	63.1%	0.716	20.5%	4.9%	0.8%	44.4%	29.4%
1986	63.3%	0.722	20.9%	4.6%	0.9%	44.4%	29.2%
1987	63.1%	0.723	21.1%	5.1%	0.8%	44.5%	28.5%
1988	62.9%	0.724	21.4%	5.5%	0.7%	44.5%	27.7%
1989	62.6%	0.725	21.7%	6.0%	0.7%	44.6%	27.0%
1990	62.4%	0.726	22.0%	6.5%	0.6%	44.6%	26.2%
1991	62.2%	0.727	22.3%	6.9%	0.6%	44.7%	25.5%
1992	62.0%	0.728	22.6%	7.4%	0.5%	44.7%	24.7%
1993	61.7%	0.729	22.9%	7.9%	0.4%	44.8%	24.0%
1994	61.5%	0.730	23.2%	8.3%	0.4%	44.9%	23.2%
1995	60.1%	0.713	25.9%	8.9%	0.4%	40.8%	24.0%
1996	58.7%	0.697	28.5%	9.4%	0.4%	36.8%	24.9%
1997	57.2%	0.680	31.1%	10.0%	0.5%	32.7%	25.7%
1998	55.8%	0.664	33.7%	10.6%	0.5%	28.7%	26.5%
1999	54.4%	0.647	36.4%	11.1%	0.5%	24.7%	27.4%
2000	62.8%	0.741	34.0%	11.7%	0.8%	29.1%	24.4%
2001	71.2%	0.834	31.7%	12.2%	1.0%	33.6%	21.5%
2002	79.6%	0.926	29.4%	12.8%	1.3%	38.0%	18.6%
2003	81.4%	0.946	29.4%	14.0%	1.3%	37.7%	17.5%
2004	83.2%	0.966	29.5%	15.3%	1.4%	37.5%	16.3%
2005	85.0%	0.986	29.6%	16.6%	1.5%	37.2%	15.2%
2006	85.7%	0.993	29.5%	16.9%	1.5%	37.5%	14.7%
2007	86.3%	1.001	29.4%	17.2%	1.6%	37.7%	14.2%
2008	87.0%	1.008	29.3%	17.5%	1.6%	38.0%	13.7%
2009	87.7%	1.016	29.2%	17.8%	1.7%	38.2%	13.2%
2010	88.3%	1.023	29.0%	18.0%	1.7%	38.5%	12.7%

12.5 Individual State Data – Western Australia

Air Conditioner Ownership and Penetration for Western Australia



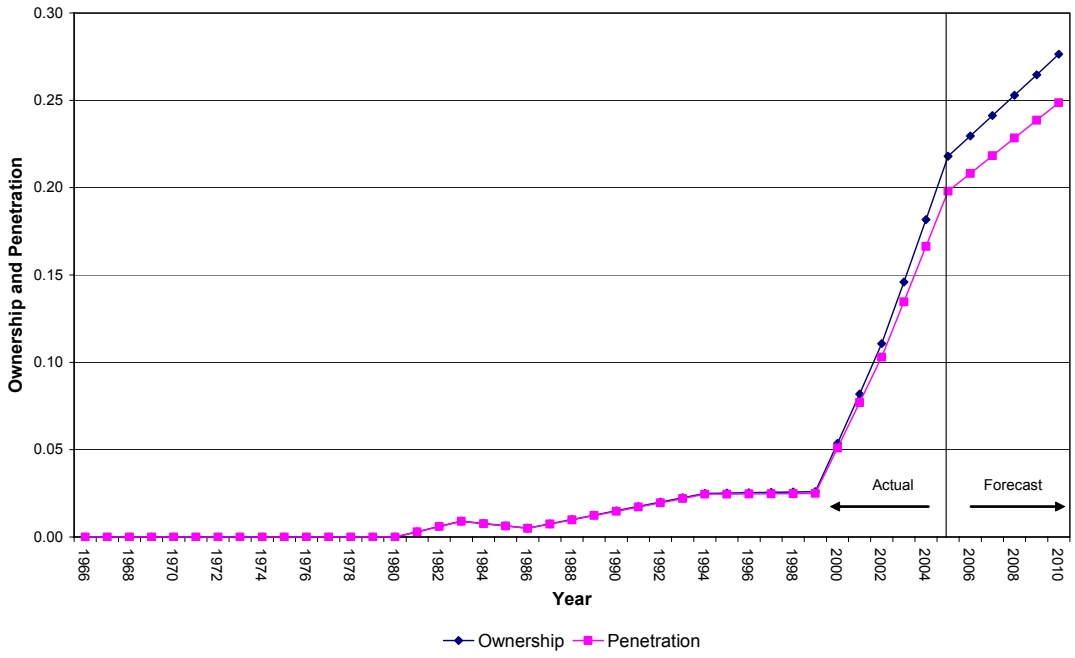
Western Australian Raw Air Conditioner Data

WA		Ownership by Type					
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	28.0%	0.302	48.8%	9.8%	1.2%	17.1%	23.2%
1967	29.0%	0.315	47.7%	9.5%	1.3%	18.2%	23.3%
1968	30.0%	0.327	46.6%	9.2%	1.4%	19.3%	23.5%
1969	31.0%	0.339	45.6%	8.9%	1.5%	20.4%	23.7%
1970	32.0%	0.352	44.5%	8.6%	1.5%	21.5%	23.8%
1971	32.6%	0.360	43.4%	8.3%	1.6%	22.7%	24.0%
1972	33.2%	0.368	42.4%	8.0%	1.7%	23.8%	24.2%
1973	33.7%	0.376	41.3%	7.7%	1.8%	24.9%	24.3%
1974	34.3%	0.384	40.2%	7.4%	1.8%	26.0%	24.5%
1975	34.9%	0.393	39.2%	7.1%	1.9%	27.1%	24.7%
1976	35.5%	0.401	38.1%	6.8%	2.0%	28.3%	24.8%
1977	36.1%	0.409	37.0%	6.5%	2.1%	29.4%	25.0%
1978	36.6%	0.418	35.9%	6.2%	2.2%	30.5%	25.2%

WA			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1979	37.2%	0.426	34.9%	5.9%	2.2%	31.6%	25.3%
1980	37.8%	0.435	33.8%	5.6%	2.3%	32.7%	25.5%
1981	37.6%	0.434	32.0%	5.7%	3.0%	33.4%	25.9%
1982	37.3%	0.433	30.3%	5.7%	3.6%	34.1%	26.2%
1983	37.1%	0.432	28.5%	5.8%	4.3%	34.8%	26.6%
1984	38.2%	0.447	27.4%	5.5%	4.6%	35.4%	27.1%
1985	39.2%	0.461	26.4%	5.2%	4.8%	36.0%	27.6%
1986	40.3%	0.476	25.3%	4.9%	5.1%	36.6%	28.1%
1987	39.7%	0.471	26.1%	4.8%	5.1%	35.8%	28.3%
1988	39.1%	0.467	26.8%	4.7%	5.0%	34.9%	28.5%
1989	38.5%	0.462	27.6%	4.6%	5.0%	34.1%	28.7%
1990	38.0%	0.458	28.3%	4.6%	4.9%	33.3%	28.9%
1991	37.4%	0.453	29.1%	4.5%	4.9%	32.5%	29.1%
1992	36.8%	0.449	29.8%	4.4%	4.8%	31.7%	29.3%
1993	36.2%	0.444	30.6%	4.3%	4.8%	30.8%	29.5%
1994	35.6%	0.439	31.3%	4.2%	4.8%	30.0%	29.7%
1995	37.6%	0.461	34.7%	4.6%	5.2%	27.6%	27.8%
1996	39.5%	0.483	38.2%	5.0%	5.6%	25.2%	26.0%
1997	41.5%	0.505	41.6%	5.4%	6.1%	22.8%	24.2%
1998	43.4%	0.527	45.0%	5.8%	6.5%	20.4%	22.4%
1999	45.4%	0.548	48.4%	6.2%	7.0%	17.9%	20.5%
2000	49.9%	0.604	45.5%	7.6%	5.8%	20.6%	20.6%
2001	54.5%	0.661	42.6%	8.9%	4.6%	23.2%	20.6%
2002	59.0%	0.717	39.8%	10.3%	3.4%	25.9%	20.7%
2003	62.5%	0.762	39.7%	10.1%	3.2%	28.1%	18.9%
2004	66.1%	0.807	39.7%	9.9%	3.0%	30.3%	17.1%
2005	69.6%	0.853	39.7%	9.7%	2.7%	32.5%	15.3%
2006	70.6%	0.866	39.5%	9.7%	2.7%	33.1%	15.0%
2007	71.7%	0.879	39.2%	9.7%	2.6%	33.7%	14.7%
2008	72.7%	0.893	39.0%	9.7%	2.6%	34.3%	14.5%
2009	73.7%	0.906	38.7%	9.7%	2.6%	34.9%	14.2%
2010	74.7%	0.920	38.5%	9.6%	2.5%	35.5%	13.9%

12.6 Individual State Data – Tasmania

Air Conditioner Ownership and Penetration for Tasmania



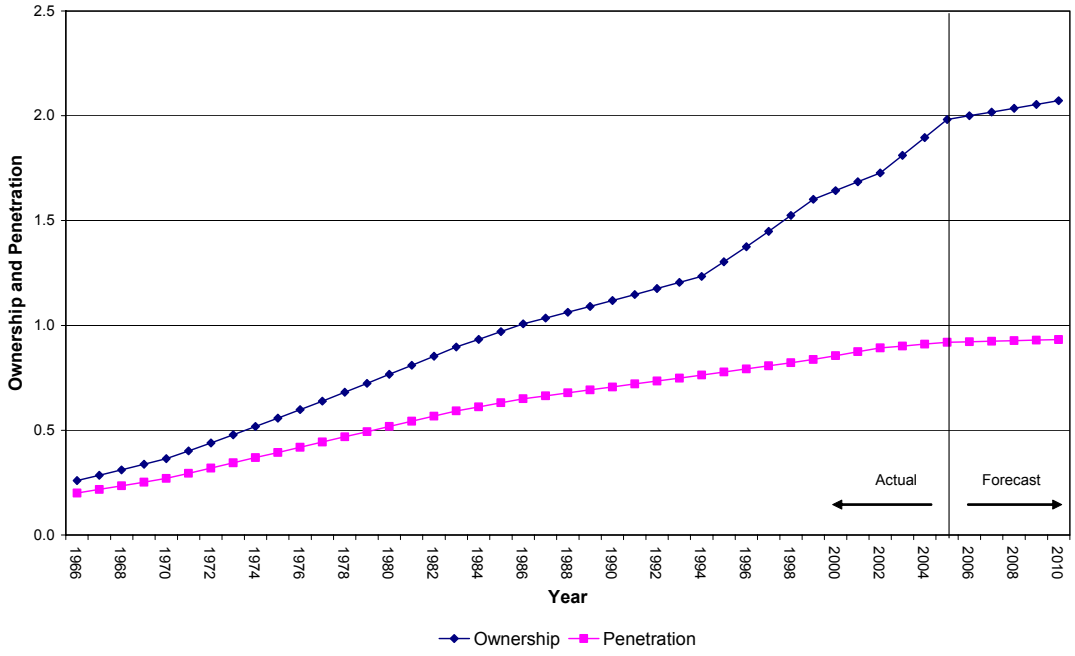
Tasmanian Raw Air Conditioner Data

TAS		Ownership by Type					
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	0.0%	0.000	54.3%	32.6%	0.0%	6.5%	6.5%
1967	0.0%	0.000	54.3%	32.5%	0.0%	6.5%	6.7%
1968	0.0%	0.000	54.2%	32.4%	0.0%	6.5%	6.9%
1969	0.0%	0.000	54.1%	32.3%	0.0%	6.5%	7.1%
1970	0.0%	0.000	54.0%	32.2%	0.0%	6.4%	7.3%
1971	0.0%	0.000	53.9%	32.1%	0.0%	6.4%	7.5%
1972	0.0%	0.000	53.8%	32.0%	0.0%	6.4%	7.7%
1973	0.0%	0.000	53.7%	31.9%	0.0%	6.4%	7.9%
1974	0.0%	0.000	53.6%	31.8%	0.0%	6.4%	8.2%
1975	0.0%	0.000	53.6%	31.7%	0.0%	6.3%	8.4%
1976	0.0%	0.000	53.5%	31.6%	0.0%	6.3%	8.6%
1977	0.0%	0.000	53.4%	31.5%	0.0%	6.3%	8.8%
1978	0.0%	0.000	53.3%	31.4%	0.0%	6.3%	9.0%

TAS			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1979	0.0%	0.000	53.2%	31.3%	0.0%	6.3%	9.2%
1980	0.0%	0.000	53.1%	31.3%	0.0%	6.3%	9.4%
1981	0.3%	0.003	43.1%	28.5%	0.0%	7.2%	21.2%
1982	0.6%	0.006	33.1%	25.8%	0.0%	8.1%	33.0%
1983	0.9%	0.009	23.1%	23.1%	0.0%	9.0%	44.9%
1984	0.8%	0.008	15.4%	15.4%	0.0%	6.0%	63.2%
1985	0.6%	0.006	7.7%	7.7%	0.0%	3.0%	81.6%
1986	0.5%	0.005	0.0%	0.0%	0.0%	0.0%	100.0%
1987	0.7%	0.008	4.2%	2.2%	0.6%	4.8%	88.1%
1988	1.0%	0.010	8.3%	4.5%	1.3%	9.6%	76.3%
1989	1.2%	0.013	12.5%	6.7%	1.9%	14.4%	64.4%
1990	1.5%	0.015	16.7%	9.0%	2.6%	19.2%	52.6%
1991	1.7%	0.018	20.8%	11.2%	3.2%	24.0%	40.7%
1992	2.0%	0.020	25.0%	13.5%	3.8%	28.8%	28.8%
1993	2.2%	0.023	29.2%	15.7%	4.5%	33.7%	17.0%
1994	2.5%	0.025	33.3%	17.9%	5.1%	38.5%	5.1%
1995	2.5%	0.025	30.0%	17.3%	4.9%	40.2%	7.5%
1996	2.5%	0.025	26.7%	16.7%	4.8%	41.9%	10.0%
1997	2.5%	0.026	23.3%	16.1%	4.6%	43.6%	12.4%
1998	2.5%	0.026	20.0%	15.4%	4.4%	45.4%	14.8%
1999	2.5%	0.026	16.7%	14.8%	4.2%	47.1%	17.2%
2000	5.1%	0.054	13.3%	13.6%	2.8%	58.8%	11.5%
2001	7.7%	0.082	10.0%	12.4%	1.4%	70.5%	5.7%
2002	10.3%	0.111	6.6%	11.2%	0.0%	82.1%	0.0%
2003	13.5%	0.146	6.6%	13.5%	0.0%	79.1%	0.7%
2004	16.6%	0.182	6.7%	15.8%	0.0%	76.1%	1.4%
2005	19.8%	0.218	6.7%	18.1%	0.0%	73.1%	2.1%
2006	20.8%	0.230	6.5%	18.3%	0.0%	73.2%	2.1%
2007	21.8%	0.241	6.3%	18.4%	0.0%	73.3%	2.0%
2008	22.8%	0.253	6.1%	18.5%	0.0%	73.5%	1.9%
2009	23.9%	0.265	6.0%	18.6%	0.0%	73.6%	1.8%
2010	24.9%	0.276	5.8%	18.8%	0.0%	73.7%	1.8%

12.7 Individual State Data – Northern Territory

Air Conditioner Ownership and Penetration for the Northern Territory



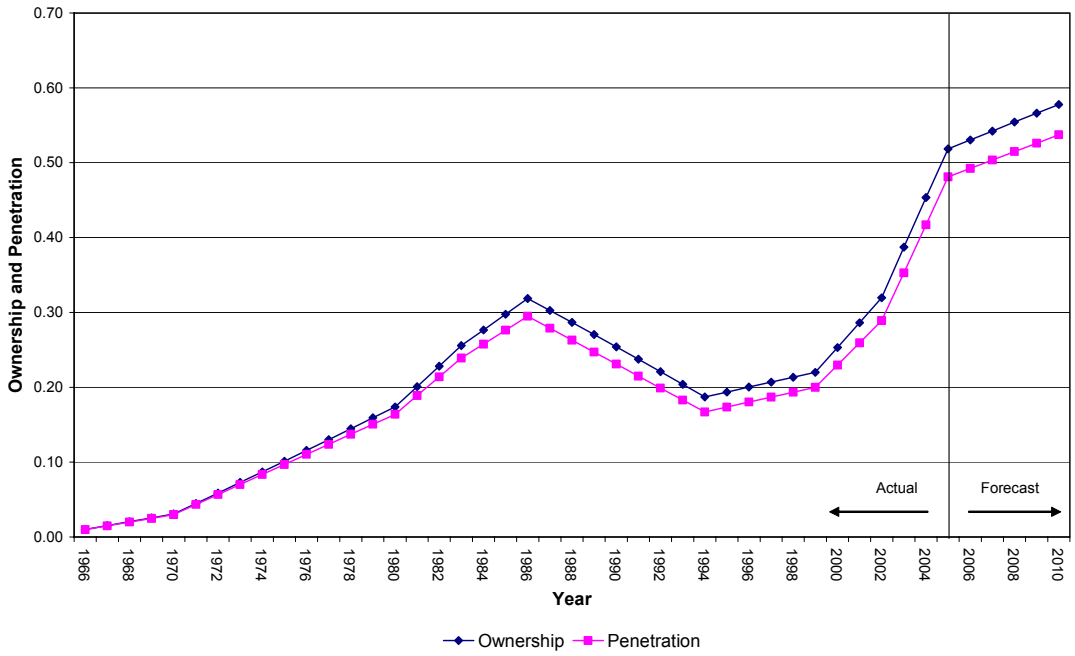
Northern Territory Raw Air Conditioner Data

NT			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	20.0%	0.260	20.2%	18.2%	5.1%	18.2%	38.4%
1967	21.8%	0.285	20.4%	17.8%	5.2%	18.1%	38.6%
1968	23.5%	0.311	20.5%	17.3%	5.3%	18.0%	38.9%
1969	25.3%	0.338	20.7%	16.9%	5.5%	17.9%	39.1%
1970	27.0%	0.365	20.8%	16.5%	5.6%	17.7%	39.3%
1971	29.5%	0.402	21.0%	16.0%	5.8%	17.6%	39.6%
1972	32.0%	0.440	21.2%	15.6%	5.9%	17.5%	39.8%
1973	34.4%	0.478	21.3%	15.2%	6.1%	17.4%	40.0%
1974	36.9%	0.518	21.5%	14.8%	6.2%	17.3%	40.3%
1975	39.4%	0.558	21.6%	14.3%	6.3%	17.2%	40.5%
1976	41.9%	0.598	21.8%	13.9%	6.5%	17.1%	40.7%
1977	44.4%	0.639	22.0%	13.5%	6.6%	17.0%	41.0%
1978	46.8%	0.681	22.1%	13.0%	6.8%	16.9%	41.2%

NT			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1979	49.3%	0.724	22.3%	12.6%	6.9%	16.8%	41.4%
1980	51.8%	0.767	22.4%	12.2%	7.1%	16.7%	41.7%
1981	54.3%	0.809	21.9%	10.5%	8.4%	16.4%	42.8%
1982	56.7%	0.853	21.4%	8.9%	9.7%	16.1%	43.9%
1983	59.2%	0.897	20.8%	7.2%	11.1%	15.9%	45.0%
1984	61.1%	0.933	20.1%	7.4%	15.0%	15.0%	42.5%
1985	63.1%	0.970	19.4%	7.6%	18.9%	14.1%	39.9%
1986	65.0%	1.008	18.7%	7.8%	22.9%	13.3%	37.3%
1987	66.4%	1.035	18.9%	7.1%	20.6%	13.2%	40.2%
1988	67.8%	1.063	19.0%	6.4%	18.2%	13.2%	43.1%
1989	69.2%	1.091	19.2%	5.8%	15.9%	13.1%	45.9%
1990	70.7%	1.119	19.4%	5.1%	13.6%	13.1%	48.8%
1991	72.1%	1.147	19.6%	4.4%	11.3%	13.1%	51.7%
1992	73.5%	1.176	19.8%	3.7%	9.0%	13.0%	54.5%
1993	74.9%	1.205	20.0%	3.0%	6.6%	13.0%	57.4%
1994	76.3%	1.234	20.2%	2.3%	4.3%	13.0%	60.2%
1995	77.8%	1.304	19.7%	2.4%	4.6%	10.7%	62.6%
1996	79.3%	1.376	19.2%	2.6%	4.8%	8.3%	65.0%
1997	80.7%	1.449	18.7%	2.7%	5.1%	6.0%	67.4%
1998	82.2%	1.524	18.2%	2.9%	5.4%	3.7%	69.9%
1999	83.7%	1.601	17.7%	3.0%	5.6%	1.4%	72.3%
2000	85.6%	1.643	18.1%	2.0%	5.2%	4.0%	70.7%
2001	87.4%	1.685	18.4%	1.0%	4.8%	6.7%	69.1%
2002	89.3%	1.727	18.7%	0.0%	4.4%	9.4%	67.6%
2003	90.2%	1.811	18.3%	0.0%	2.9%	11.8%	67.1%
2004	91.0%	1.896	17.8%	0.0%	1.5%	14.2%	66.6%
2005	91.9%	1.982	17.4%	0.0%	0.0%	16.6%	66.1%
2006	92.2%	2.000	17.5%	0.0%	0.0%	16.9%	65.6%
2007	92.4%	2.018	17.6%	0.0%	0.0%	17.3%	65.1%
2008	92.7%	2.036	17.7%	0.0%	0.0%	17.7%	64.6%
2009	93.0%	2.054	17.8%	0.0%	0.0%	18.0%	64.2%
2010	93.3%	2.072	17.9%	0.0%	0.0%	18.4%	63.7%

12.8 Individual State Data – Australian Capital Territory

Air Conditioner Ownership and Penetration for the ACT



ACT Raw Air Conditioner Data

ACT			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1966	1.0%	0.010	61.2%	6.1%	0.0%	20.4%	12.2%
1967	1.5%	0.015	60.9%	6.3%	0.0%	20.8%	12.0%
1968	2.0%	0.020	60.7%	6.4%	0.0%	21.2%	11.7%
1969	2.5%	0.026	60.4%	6.6%	0.0%	21.7%	11.4%
1970	3.0%	0.031	60.1%	6.7%	0.0%	22.1%	11.1%
1971	4.3%	0.045	59.9%	6.9%	0.0%	22.5%	10.8%
1972	5.7%	0.059	59.6%	7.0%	0.0%	22.9%	10.5%
1973	7.0%	0.073	59.3%	7.2%	0.0%	23.3%	10.2%
1974	8.4%	0.087	59.0%	7.3%	0.0%	23.7%	9.9%
1975	9.7%	0.101	58.8%	7.5%	0.0%	24.2%	9.6%
1976	11.0%	0.116	58.5%	7.6%	0.0%	24.6%	9.4%
1977	12.4%	0.130	58.2%	7.8%	0.0%	25.0%	9.1%
1978	13.7%	0.145	57.9%	7.9%	0.0%	25.4%	8.8%

ACT			Ownership by Type				
Year	All AC Penetration	All AC Ownership	Evaporative	Ducted Reverse Cycle	Ducted Cooling Only	Reverse Cycle	Cooling Only
1979	15.1%	0.159	57.7%	8.0%	0.0%	25.8%	8.5%
1980	16.4%	0.174	57.4%	8.2%	0.0%	26.2%	8.2%
1981	18.9%	0.201	51.6%	8.7%	0.0%	31.7%	8.0%
1982	21.4%	0.228	45.8%	9.2%	0.0%	37.2%	7.8%
1983	23.9%	0.256	40.0%	9.7%	0.0%	42.7%	7.6%
1984	25.8%	0.277	42.9%	11.9%	0.0%	38.4%	6.8%
1985	27.6%	0.298	45.8%	14.2%	0.0%	34.1%	6.0%
1986	29.5%	0.319	48.7%	16.4%	0.0%	29.7%	5.2%
1987	27.9%	0.303	47.0%	15.9%	0.1%	30.8%	6.1%
1988	26.3%	0.287	45.3%	15.4%	0.3%	32.0%	7.1%
1989	24.7%	0.270	43.6%	14.8%	0.4%	33.1%	8.1%
1990	23.1%	0.254	41.9%	14.3%	0.6%	34.2%	9.0%
1991	21.5%	0.238	40.2%	13.8%	0.7%	35.3%	10.0%
1992	19.9%	0.221	38.5%	13.3%	0.9%	36.4%	10.9%
1993	18.3%	0.204	36.8%	12.8%	1.0%	37.5%	11.9%
1994	16.7%	0.187	35.1%	12.3%	1.2%	38.6%	12.9%
1995	17.4%	0.194	33.9%	13.2%	1.3%	39.1%	12.5%
1996	18.0%	0.200	32.8%	14.2%	1.4%	39.5%	12.1%
1997	18.7%	0.207	31.6%	15.2%	1.4%	40.0%	11.8%
1998	19.3%	0.214	30.4%	16.2%	1.5%	40.5%	11.4%
1999	20.0%	0.220	29.3%	17.1%	1.6%	41.0%	11.0%
2000	23.0%	0.253	28.9%	17.6%	1.3%	39.6%	12.6%
2001	25.9%	0.286	28.6%	18.1%	0.9%	38.2%	14.2%
2002	28.9%	0.320	28.3%	18.6%	0.6%	36.9%	15.7%
2003	35.3%	0.387	28.6%	18.3%	0.9%	38.5%	13.6%
2004	41.7%	0.453	28.8%	18.1%	1.3%	40.2%	11.5%
2005	48.1%	0.519	29.1%	17.8%	1.7%	41.9%	9.4%
2006	49.2%	0.530	29.0%	18.0%	1.7%	42.1%	9.1%
2007	50.4%	0.542	29.0%	18.2%	1.6%	42.3%	8.8%
2008	51.5%	0.554	28.9%	18.4%	1.6%	42.5%	8.5%
2009	52.6%	0.566	28.8%	18.6%	1.6%	42.7%	8.2%
2010	53.7%	0.578	28.7%	18.8%	1.6%	42.9%	8.0%