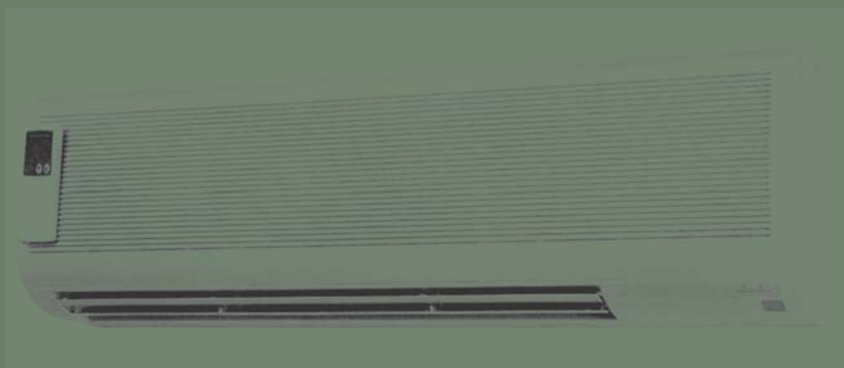
STANDBY PRODUCT PROFILE 2004/06

JUNE 2004

PRODUCT PROFILE



AIR CONDITIONERS

AUSTRALIA'S STANDBY POWER STRATEGY 2002 - 2012

AN INITIATIVE OF THE MINISTERIAL
COUNCIL ON ENERGY FORMING
PART OF THE NATIONAL
GREENHOUSE STRATEGY

The National Appliance and Equipment Energy Efficiency Committee seeks comment on this proposal from any interested person or organisation.

Please email comments to:

energy.rating@greenhouse.gov.au

Alternatively, hard copy comments can be mailed to:

Air Conditioners Product Profile
Equipment, Appliances & Transport Team
Australian Greenhouse Office
GPO Box 621
CANBERRA ACT 2601

Comments received by 31 August 2004 will assist in determining the final form of the policy proposals taken to government regarding air conditioners.

An electronic version of this Standby Product Profile and other Profiles released for public discussion can be obtained from www.energyrating.gov.au under standby.

CONTENTS

PRODUCT DESCRIPTION

Air conditioners for small commercial and residential use were invented in the early 1900's and have been widely used in Australia since the 1950's. Even as early as the mid 1960's, the ownership of air conditioners in some states was significant.

Traditionally, air conditioners used for residential and small commercial have been relatively small window-wall models. However, larger models are now being used more commonly in both the residential and commercial sectors and wall hung split systems are now the predominant configuration in Australia for new units sold. Both refrigerative and evaporative types are widely used. Absorption type air conditioners are relatively uncommon in Australia and they are not examined in this profile.

This standby profile covers air conditioners which are currently regulated for energy efficiency in Australia (single and three phase refrigerative systems up to 65kW cooling capacity) as specified by the scope of AS/NZS3823.2-2003 and all portable air conditioners (both evaporative and refrigerative types including portable ducted and portable split systems).

A separate standby profile for central evaporative and absorption types will be prepared and released later in 2004.

Refrigerative air conditioners use the vapour compression principle. This is where a refrigerant is compressed (this compression heats the refrigerant) which is then allowed to liquefy and cool under pressure in a condenser (the condenser emits heat during this cooling process). The refrigerant is then allowed to turn to a gas by controlled release through an expansion valve into the evaporator (this expansion process is accompanied by a strong cooling effect – the evaporator effectively collects heat). From the evaporator, the refrigerant is collected and once again flows to the compressor. Refrigerants are special substances which usually go through a phase change when subjected to pressure changes. There are a wide range of refrigerants commonly used today in air conditioners.

The cooling capacity of a refrigerative air conditioner has two components – the sensible cooling capacity (ie the mass of air cooled by the temperature fall) and the latent cooling or dehumidification effect (this is the increased apparent cooling and comfort from a human perspective resulting from lower humidity and is equivalent to 683 W per litre of moisture removed per hour by the air conditioner). In heating mode, only the sensible component is relevant (ie the mass of air heated by the temperature rise). Power consumption for refrigerative systems is dominated by the compressor and to a lesser extent fans. Power is also consumed by controls. In heating mode, there may also be energy associated with defrost heaters under some circumstances.

A refrigeration circuit is essentially a “heat pump” which moves heat energy from the evaporator to the condenser. Where the evaporator is on the inside of a building, the air conditioner is in cooling mode. In many air conditioners, the refrigeration process can be reversed and the function of the evaporator and condenser can be interchanged – in this case the unit acts as a heater inside the building. Models that can heat and cool as required are called reverse cycle air conditioners.

Evaporative air conditioners use a different principle. In simple terms, a stream of air is passed over or through a wet fabric. The resulting evaporation of water is accompanied by a cooling effect which lowers temperature of the air (ie a sensible cooling effect). However, unlike refrigerative air conditioners, the humidity of the cooled air increases (due to the evaporated water) during this process. Logically, the effectiveness of evaporative systems is affected by the humidity of the incoming air – if this is already saturated with moisture (ie ambient high humidity outside), little additional evaporation can take place and the cooling effect will be very limited. Therefore evaporative systems are generally restricted to hot and dry climates (eg southern and inland Australia). They tend not to be suitable for the East and North Coastal fringes of Australia. Evaporative air conditioners require large volumes of air to pass over the evaporator to achieve a large cooling capacity. These units can also result in significant water use. Power consumption for evaporative systems is dominated by fans. Power is also consumed by controls.

Refrigerative air conditioners work best in a sealed room while evaporative air conditioners require a large number of air changes per hour to achieve the required cooling effect.

The overall operational energy efficiency of refrigerative air conditioners is expressed in terms of Energy Efficiency Ratio (EER in Watts output/Watts input for cooling) or Coefficient of Performance (COP in Watts output/Watts input for heating). This EER and COP is a function of the refrigeration system design. Defining the operational energy efficiency of evaporative systems is complex and depends on a large number of variables. However, even large household central evaporative systems typically use less than 1kW at full power so they are generally “low energy” in comparison to refrigerative systems (although the “energy service” provided is difficult to compare).

At this stage, none of the Australian Standards for refrigerative or evaporative air conditioners (AS/NZS3823 series and AS2913) specify the measurement of or requirements for standby power.

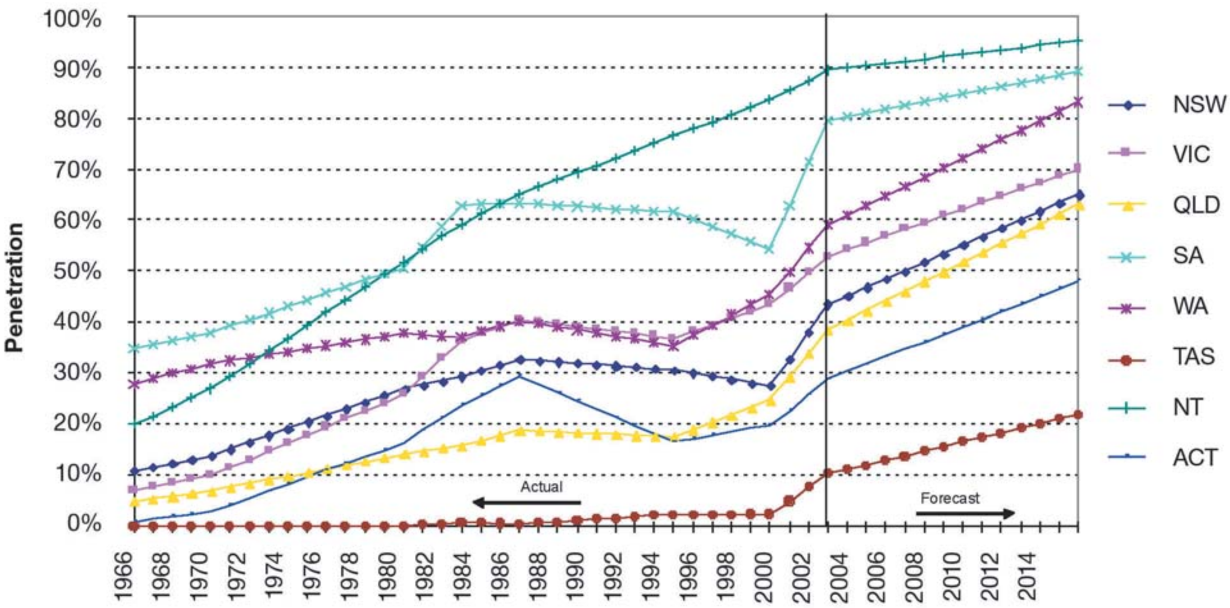
CURRENT OWNERSHIP AND TRENDS

Ownership of air conditioners has been increasing steadily since the mid 1960’s in all states. As expected, the absolute level of ownership at state level varies considerably due to climate, the extremes being the Northern Territory with a very high ownership level and Tasmania with a very low level. Of some concern is the rapid increase in ownership that has occurred in most large states over the past 4 years. These reflect an explosion in annual air conditioner sales by a factor of about 3 over the past 10 years.

In this context ***penetration*** refers to household with one or more of the appliance and ***ownership*** is the average number of total appliances per household. The trends in air conditioner penetration and ownership are illustrated below in Figure 1 and Figure 2.

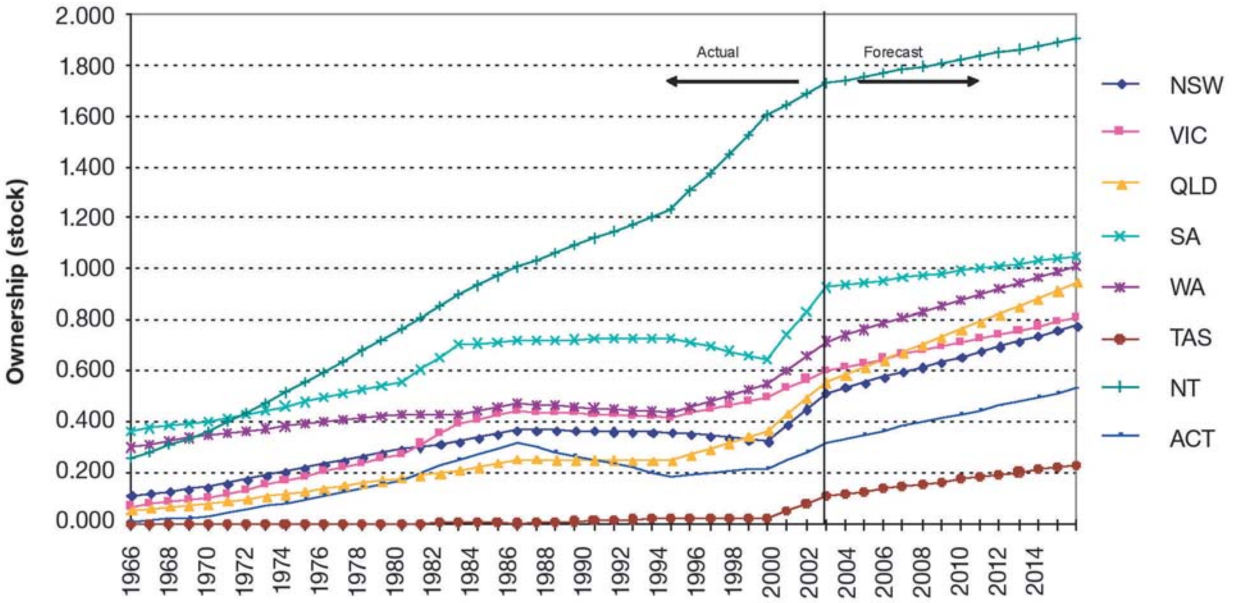
National penetration levels have increased from 34% in 1990 to an estimated 52% in 2004. Similarly, national ownership levels have increased from 0.40 in 1990 to an estimated 0.64 in 2004. Given that household numbers have also increased during this period, the installed stock of air conditioners has increased from 2.3 million units in 1990 to some 4.9 million units in 2004 (residential sector only) – see Figure 3 which illustrates historical data and projected trends for refrigerative systems beyond 2003.

FIGURE 1: PENETRATION TRENDS OF AIR CONDITIONERS BY STATE



Source: EES estimates based on ABS4602.0-2002 and EES 1999.

FIGURE 2: OWNERSHIP TRENDS OF AIR CONDITIONERS BY STATE



Source: EES estimates based on ABS4602.0-2002 and EES 1999.

Total air conditioner sales in Australia are now approaching more than 900,000 units a year, up from around 300,000 in the early 1990's (although sales are quite seasonal and vary somewhat from year to year). Clearly a substantial proportion of air conditioner sales are to the commercial sector.

The share of air conditioner types is also changing over time. These trends are illustrated in Figure 4.

The main national trends of interest are a decline in evaporative air conditioner share and an increase in reverse cycle non-ducted share. The share of other types are relatively stable. However, the trends at a state level are extremely complex and some are rapidly changing despite the stable national trends.

FIGURE 3: STOCK OF AIR CONDITIONERS IN AUSTRALIA (HISTORICAL AND PROJECTED)

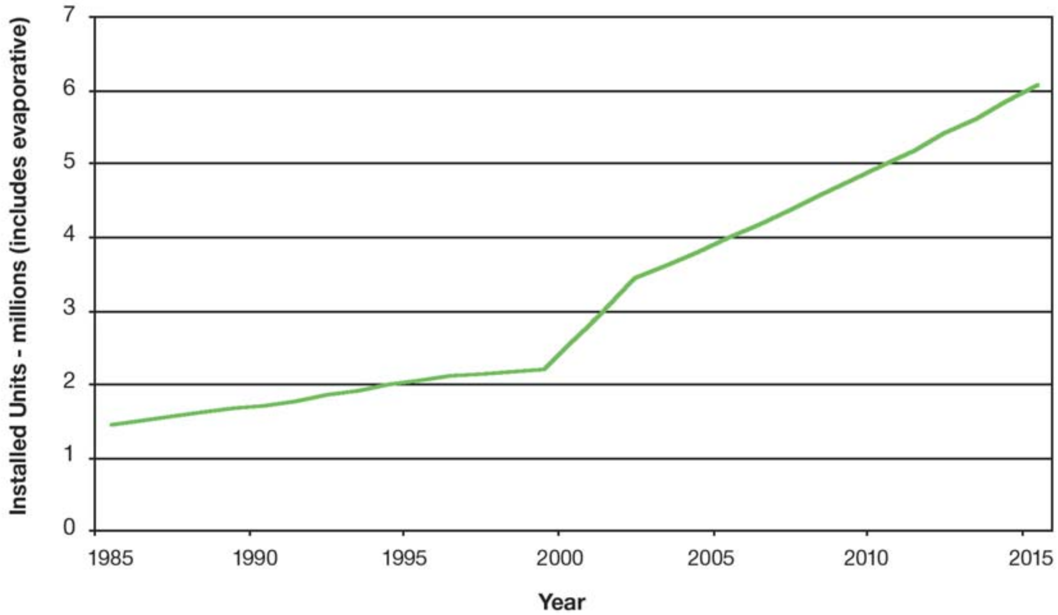
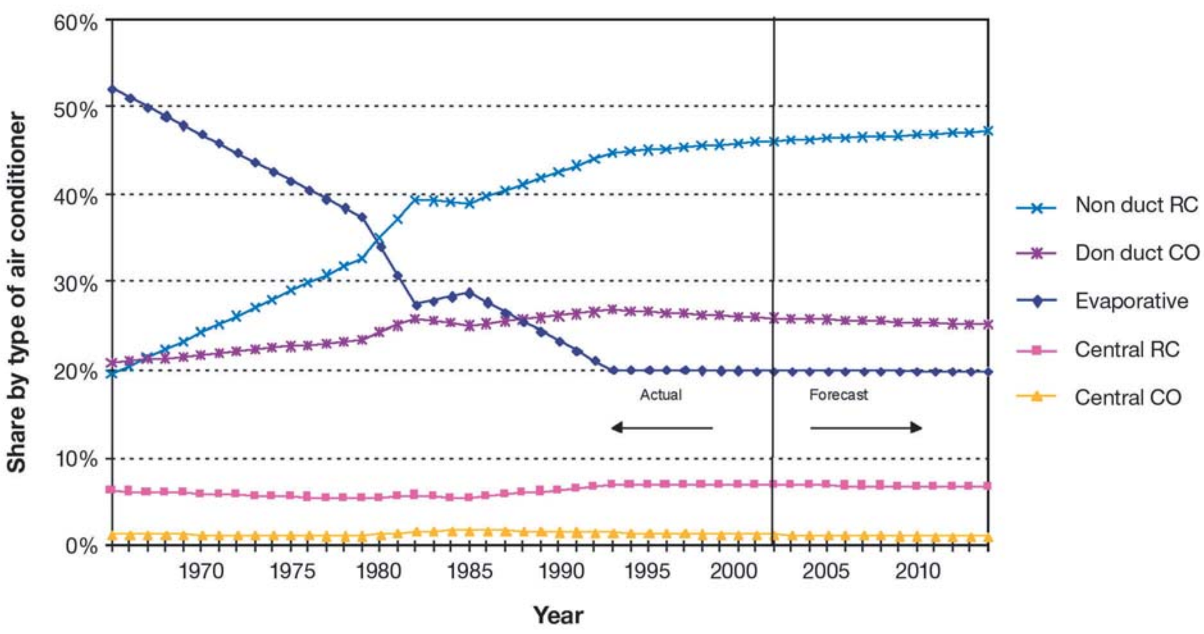


FIGURE 4: SHARE OF AIR CONDITIONER TYPE - AUSTRALIA



Source: EES estimates based on ABS4602.0-2002 and EES 1999. Note shares always add to 100%.

Note: CO = cooling only, RC = reverse cycle

RELEVANT MODES FOR THE 'ONE WATT' POWER PLAN

Air conditioners have several operational modes:

- On mode – the air conditioner is operating (performing a heating or cooling function as applicable). This mode is not relevant for this standby profile.
- Passive standby mode – where the air conditioner is not operational but where it has a remote control and is monitoring for a signal from the remote control unit or where there is a timer with some programming capability (eg timed or delay start). This mode includes those with remote communications capability.
- Off mode – where the air conditioner is not operational and where the air conditioner has no remote control or automatic program functions or these are inoperative.

There are sometimes transition modes during startup and shutdown of the air conditioner (eg inverter soft start), but these are not considered relevant for this profile. The above modes are described in more detail below.

On mode is where the air conditioner is performing its primary function of cooling or heating as applicable. During this mode fans are operational and where there is a compressor, the compressor is either on or cycling on and off according to thermostat requirements.

Passive standby mode is present on all air conditioners that use a remote control or where there is remote communication capability. It also applies to air conditioners which may not have a remote control but where there may be a control system on the air conditioner that can provide some programming capacity such as delay start or timer operation. In this mode the cooling or heating system (where applicable) is not operating. This mode includes any sump (crankcase) heaters or other forms of heating in or on the compressor where applicable (see below for further details). Air conditioners with a passive standby mode may or may not have an off mode. Typical power levels in passive standby mode are 0.2W to 10W without a sump heater.

Off mode is present on all air conditioners that do not have passive standby mode. In this mode the cooling or heating system (where applicable) is not operating and the unit can only be turned on by direct intervention by the user, using controls attached to the air conditioner. This mode includes any sump (crankcase) heaters or other forms of heating in or on the compressor where applicable (see below for further details). Some air conditioners may have both off mode and passive standby modes, but in off mode remote controls and remote communication are not able to control the unit. Typical power levels in off mode are 0.0W to 5W without a sump heater.

Sump heaters: some air conditioners have small resistive heaters attached to the compressor sump or crankcase (the sump is where oil and some refrigerant collects when the unit is not operating). Sometimes other means of warming the crackcase or compressor are used such as immersion heaters within the sump itself (more common in very large compressors) or providing some current through motor windings.

The purpose of these heaters is to limit that amount of refrigerant that condenses and mixes with the oil in the compressor while the air conditioner is not operating. In some situations where there is excessive refrigerant in the sump, when the compressor starts the rapid reduction of pressure can cause the refrigerant to boil and disperse the oil, which can result in excessive compressor wear during each start, which will reduce compressor life.

The issue of sump heaters and their associated energy is a substantial one. They appear to be present on some small air conditioners (as many as one in 10) and are even more common on larger models. The typical power draw of a sump heater is between 30W and 90W and these appear to run continuously on all models examined (except when the air conditioner is actually running). Some models have the capability of adjusting the power of the heater in response to changes in ambient temperature (so called positive temperature coefficient controls), although the heating power can remain significant even in warmer ambient temperatures. In the case of an uncontrolled sump heater where the air conditioner is not used at all, the energy consumption equates to between 250 and 720 kWh/year for the examples above, equivalent to a typical refrigerator.

The curious thing is that many air conditioners do not require sump heaters. There appear to be a number of reasons why this is the case. Some compressors appear to have designs to limit refrigerant accumulation when the unit is off. Some refrigerants appear to be more problematic than others (eg R22) and the amount of refrigerant in the system also is an important issue. Other designs to overcome these problems include slow starting options on variable speed drive units where the compressor is rotated slowly during startup (sometimes with auxiliary heating) which generates slow pressure changes and limits any refrigerant phase change. Traditional sump heaters are likely to be very inefficient in that they typically heat the outer crankcase in order to warm liquids inside the sump itself. It is likely that 90% or more of the heat does not contribute to the task.

Whatever the reason for their use, those models with sump heaters consume large amounts of energy while the unit is not in use, in many cases they probably use as much energy as when the air conditioner is operating (in milder climates). The consumer is unlikely to be aware of this power consumption as most of the models with sump heaters are hard wired. While most hard wired units have to have a "hard" off switch, this is unlikely to be used by consumers, nor should be expected to have to operate this when the unit is not being used.

The modes of interest for the "One Watt" Power Plan are **passive standby mode** and **off mode**. **Sump heaters** are included within these two modes in this profile. The term standby power in this profile is intended to cover both passive standby mode and off mode. Other modes are related to the provision of a specific energy service (heating or cooling modes) and are not relevant to this standby profile.

KNOWN STANDBY DATA FOR NEW PRODUCTS

The air conditioner market in Australia is now very large and complex. As of 1 June 2004, nearly 3000 models were approved for energy labelling and/or MEPS: 870 cooling only models and 2090 reverse cycle models. There were about 2000 energy labelling applications, with about 760 MEPS only applications and about 200 applications for energy labelling and MEPS. Note that in October 2004 MEPS for single phase air conditioners comes into force and most of the labelling only models will require re-registration for both labelling and MEPS.

It is important to note that more than 75% of air conditioners sales are now split systems, mostly wall hung splits. Common split system configurations include cassette splits, under ceiling splits, wall hung splits and ducted splits (usually where the split system is fitted onto an existing ducted heating system – eg gas ducted system). Window wall units make up a significant but declining market share (less than 25% in 2003). Large scale manufacturing of air conditioners in Australia ceased some years ago, but there is local manufacturing and assembly of models in the medium to large size range and for specialised applications. Total air conditioner sales are estimated to be of the order of 900,000 units a year in 2004 (BIS Shrapnel 2002).

NAEEEC commissioned four store surveys of new electrical products during the period 2001 to 2004 and standby data for some 80 air conditioners has been collected during the 2002 and 2003 store surveys (Energy Efficient Strategies and EnergyConsult 2003). However, readings taken during these surveys are limited to window wall units and portable units (both evaporative and refrigerative types) that have normal general purpose outlet (240V single phase) plugs.

Measurement of standby for most split systems is problematic as these are generally hard wired and an accurate power meter needs to be wired in series in a laboratory situation. Split systems often need to have refrigerant added before they can be tested, so this adds another layer of complexity for field measurement of standby for these products. At this stage readings on about 27 split systems have been obtained through various laboratory tests. The number of available split system and packaged system standby readings will increase significantly over the next year as test labs are set up to measure this parameter.

DATA FOR WINDOW WALL AND PORTABLE SYSTEMS

Standby measurements for new room air conditioners have been taken as part of the annual NAEEEC standby store survey. The detailed results are reported in Energy Efficient Strategies and EnergyConsult (2003). Readings were taken on 20 units in early 2002, 26 units in early 2003 and 34 units in late 2003 (total of 80). About half of these units were window-wall refrigerative air conditioners and the balance were a mix of portable refrigerative and evaporative units.

The standby values for each year are set out in Table 1 and Figure 5.

The average standby for these products has been stable over the past two years at about 0.5 W. However, as shown in Figure 5, about 60% of models have virtually no standby (close to 0 W), while about 20% are less than 1 Watt and about 20% are more than 1 Watt. There has been little change in this distribution over the three surveys conducted to date (note that no air conditioners were included in the 2001 survey).

Of the 34 units in the November 2003 survey, one window-wall model, one portable split and three ducted models had remote controls, so technically these models should be considered as passive standby mode (these units did not have an off mode). Some of the more recent models clearly have electronic controls and timers, so some of these will have passive standby mode as well. However, all of the results have been grouped into off mode for this analysis. None of the models measured appeared to have sump heaters.

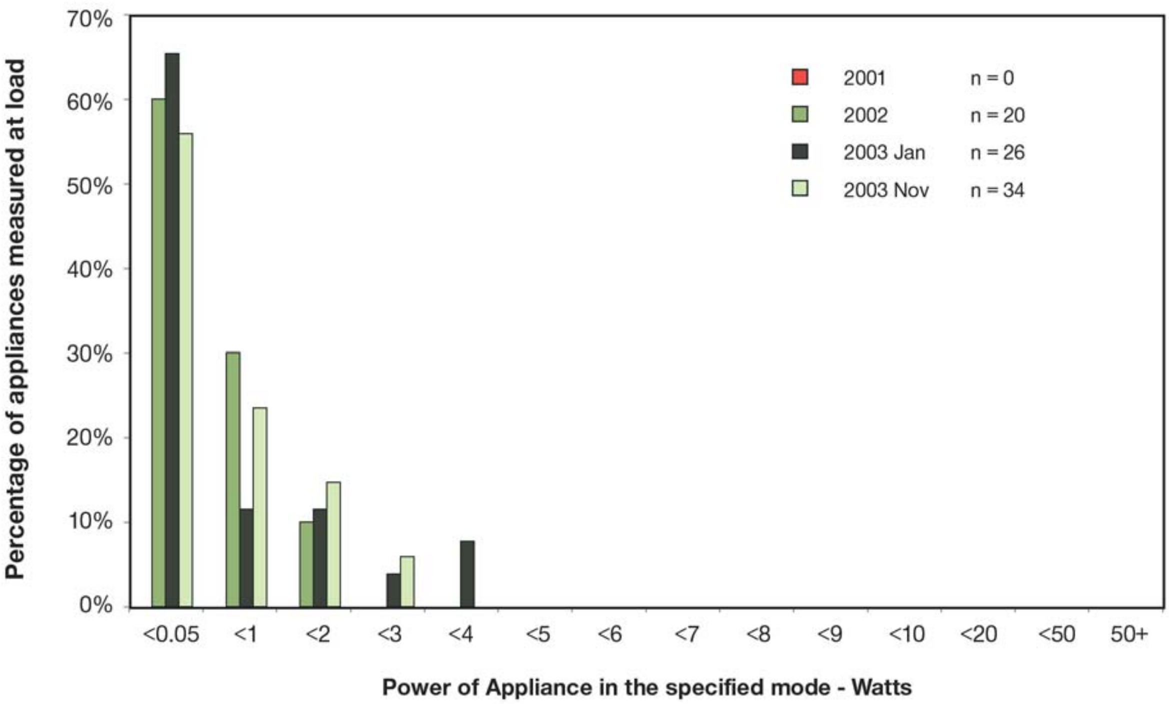
TABLE 1: VALUES FOR WINDOW WALL AND PORTABLE AIR CONDITIONERS: OFF MODE

Survey Date	Number Models	Average Off Mode W	Maximum Off Mode W
Jan 2002	20	0.4	1.9
Jan 2003	26	0.6	4.0
Nov 2003	34	0.5	2.5

Source: Energy Efficient Strategies and EnergyConsult 2003 and field data.

Note: Some models may have passive standby mode.

FIGURE 5: VALUES FOR WINDOW WALL AND PORTABLE AIR CONDITIONERS: OFF MODE



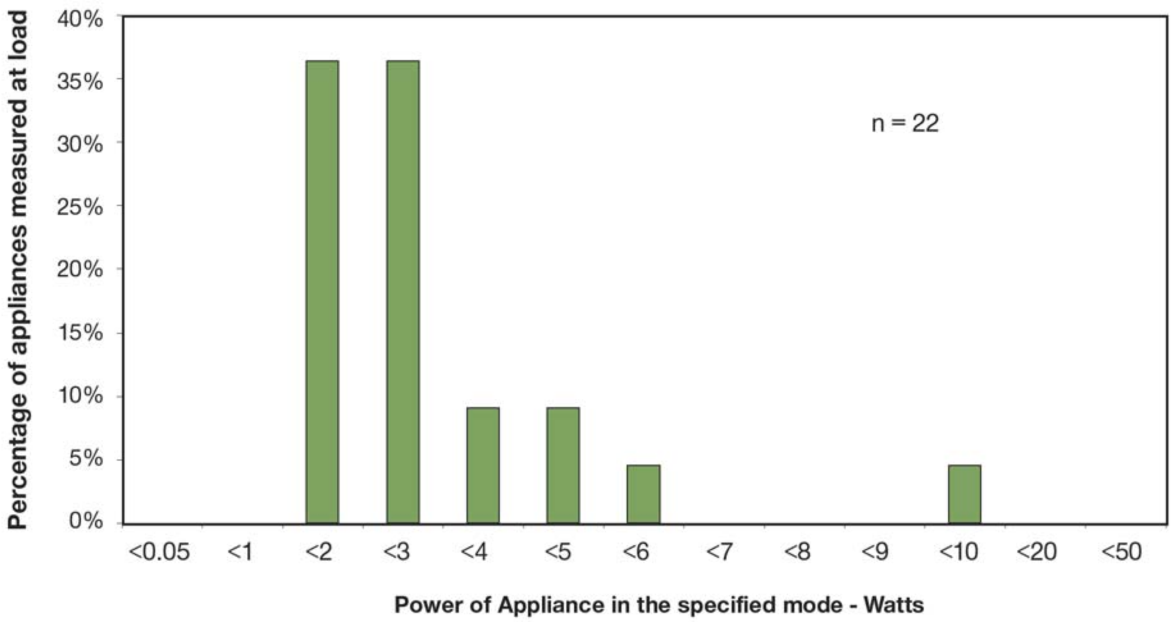
DATA FOR SPLIT SYSTEMS AND PACKAGED AIR CONDITIONERS

Standby measurements for split systems and packaged air conditioners are very limited to date. A total of 22 readings have been obtained on new wall hung split systems without sump heaters. An additional five split systems have been measured and were found to have sump heaters. While some traditional wall hung split systems did have sump heaters, these were more common in ducted split systems. No data was available on packaged systems for this standby profile, but it is believed that sump heaters are present in some models. Nearly all of the wall hung split systems had remote controls. For convenience, the mode for all split systems is assumed to be passive standby.

The passive standby power distribution of measured models is shown in Figure 6. The salient points are that most models appeared to have a passive standby power consumption between 1 and 3 W with one unit as high as 9.3 W. None of the units measured had a passive standby power of less than 1 Watt. The average passive standby power consumption for these 22 models is 2.8 W.

A total of 5 units with sump heaters were measured. The values recorded ranged from 30 to 79 W with an average of 53 W for the five models measured.

FIGURE 6: MEASURED VALUES FOR SPLIT SYSTEM AIR CONDITIONERS: PASSIVE STANDBY MODE



Note: None of these models had sump heaters.

KNOWN STANDBY DATA FOR INSTALLED STOCK

Late in 2000 an intrusive household survey in Melbourne, Brisbane and Sydney undertook standby measurements in 64 households (Harrington and Kleverlaan 2001). A total of 19 air conditioners were measured in off mode. These were all window wall units. Only 10 of these were accessible for standby measurements (presumably the balance included some split systems that were hard wired and could not be metered with the available equipment). Eight of these units had an off power consumption of 0 W, one unit had 0.1 W and one 0.8 W. The average off mode power consumption was therefore about 0.1 W for these units.

Given that these units are generally older (typically 2 to 10 years old at the time of the survey in 2000, but one unit was purchased in 1970) and the sample is small, this data does not provide any strong indications on off mode power other than perhaps the average value for new models is perhaps higher than older stock, which is to be expected given the increase in electronic controls.

Air conditioner usage varies widely due to a range of factors including climate and building shell energy efficiency. There are various estimates of air conditioner use for various parts of Australia in the report titled *Study of Greenhouse Gas Emissions from the Australian Residential Building Sector to 2010* (EES 1999). This gives typical average energy consumption estimates from various states. ABS8218.0-1986 also records hours of operation of air conditioners for each state from diary data. These range from a high value of 2500 hours per year in Darwin to a low of 33 hours per year in Tasmania. The Australia wide average is about 250 hours per year for cooling mode.

The hours of operation of heaters range from zero per year in Darwin to 2000 hours per year in Canberra for heating. Average hours of heating are about 950 per year. However, only about 50% of all air conditioners are reverse cycle and only about 50% of the reverse cycle type are used as the main heater (ABS4602.0-2002). So the total hours of operation of an air conditioner is likely to be about 500 hours per year for heating and cooling (actual hours will vary considerably depending on type and climate).

Only the hours of operation of an air conditioner are important as this sets the number of hours per year that the product is in one of the relevant standby modes. Even taking a generous estimate of use of 760 hours per year, the number of hours in off mode or passive standby is 8000 hours per year on average.

GREENHOUSE EMISSIONS

Greenhouse emissions and potential savings from the proposed standby targets are based on the assumption that no significant changes to standby power consumption would occur under the base case. These estimates include only refrigerative units and small portable evaporative systems and exclude the power associated with sump (crankcase) heaters: this is discussed below.

The greenhouse emissions reduction potential for the proposed standby target of 1W for passive standby mode and 0.3 W for off mode by 2012 is of the order of 33 kt CO_2-e pa by 2010 and 71 kt CO_2-e pa by 2015, with continued savings growth well beyond 2020. The model weighted passive standby power consumption of all air conditioners sold in Australia in 2004 is estimated to be approximately 2.4 W. This is expected to remain steady or increase without government action.

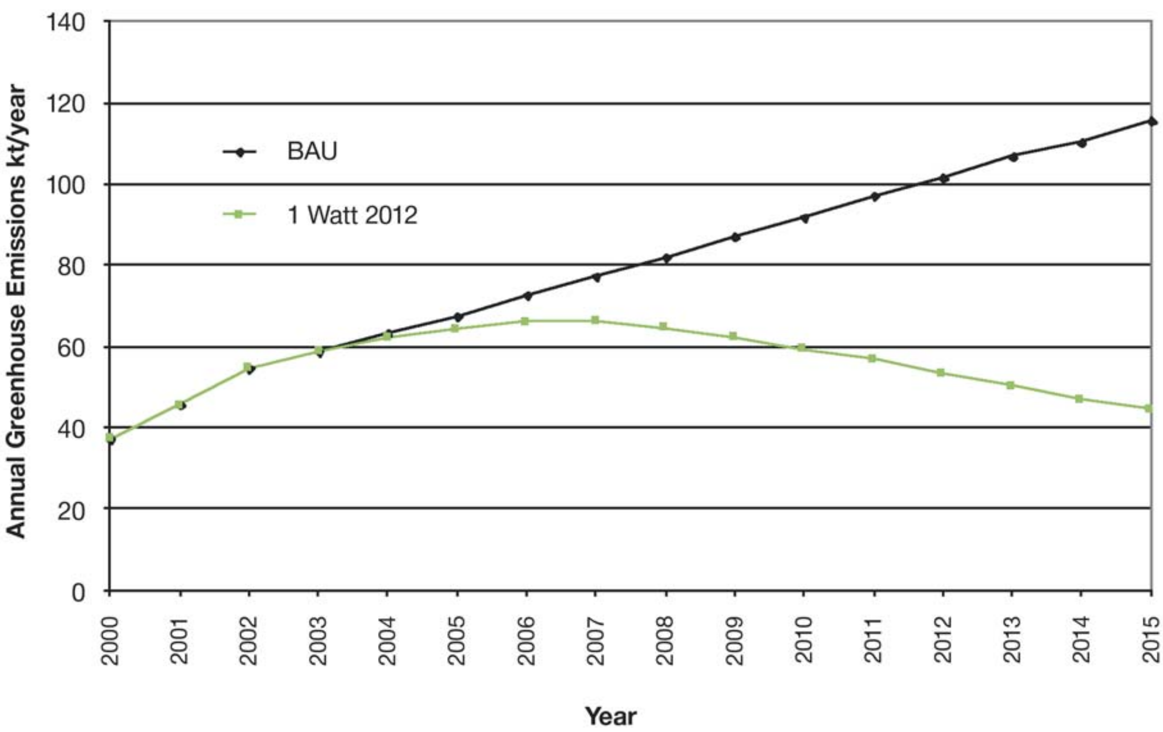
To examine the potential for greenhouse savings, one scenario was modelled based on a maximum standby power target of 1W for passive standby mode and 0.3 W for off mode applying to 90% of the market in 2012. Figure 7 shows the potential annual greenhouse emissions reduction. Cumulative greenhouse savings to 2015 are estimated to be about 380 kt CO_2-e for this scenario.

The projected total cumulative energy savings from air conditioner standby to 2015 based on the implementation of these targets in Australia is shown in Figure 8.

The issue of sump (crankcase) heaters is somewhat more complicated, in that data is limited at this stage and the range of options and their potential impact require further research. However, initial estimates suggest an average sump heater power of 50 W which is present in about one in 6 air conditioners within the scope of labelling and MEPS. Further it is assumed that 25% of crank case heaters already use positive temperature coefficient controls which are assumed to reduce average energy consumption by up to 50%. This sets current energy consumption for these devices at around an average of 5.7 W for all new air conditioners (ie double the average power from standby alone) or a total of about 180 GWh/year in 2004.

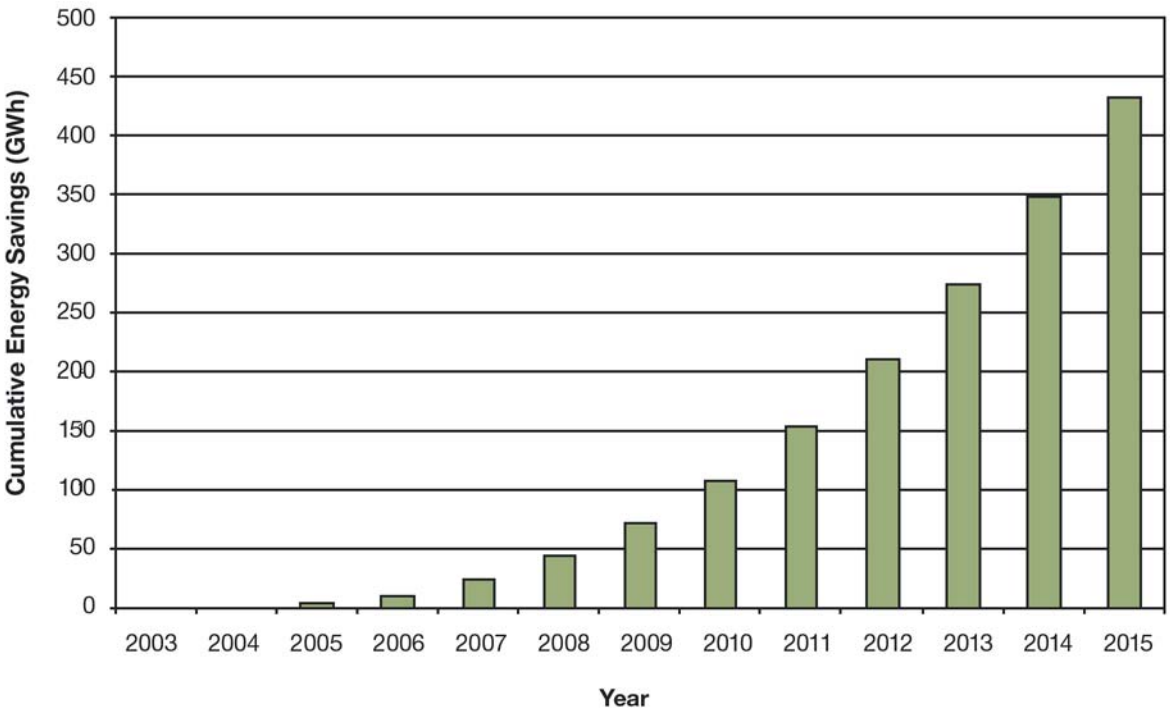
Energy and greenhouse gas savings from the introduction of mandatory use of positive temperature

FIGURE 7: BAU VS. POLICY TARGET STANDBY EMISSIONS FOR AIR CONDITIONERS



coefficient controls or even the elimination of sump heaters is clearly substantial considering the projected increase in air conditioner stock over the next 10 years. Even in the relative conservative case where only positive temperature coefficient are mandated in lieu of uncontrolled heaters, the energy and greenhouse gas savings accruing are comparable to those from standby targets. However, it may be that other factors such as the increased prevalence of inverter models and changes in compressor design and refrigerants which are currently occurring in the market may overtake events and result in a natural reduction in the incidence of crankcase heaters in any case. Nevertheless, steps are proposed which will hasten any reduction in the use of these devices.

FIGURE 8: ENERGY SAVINGS FROM STANDBY TARGETS FOR AIR CONDITIONERS



CURRENT OVERSEAS POLICIES AND TRENDS

Many countries regulate air conditioners for energy efficiency but we are unaware of any specific policies that cover or limit standby of electricity consumption for air conditioners. However, under the Executive Order 13221, President Bush mandated a general 1Watt limit for a wide range of products in 2001 (refer to MCE 2002). Under this order, the Federal Energy Management Program (FEMP) in the USA and Lawrence Berkeley Laboratory have just announced that a standby limit for air conditioners will be introduced shortly (see http://oahu.lbl.gov/level_summary.html). However, the exact scope of products covered and the limit have not yet been announced.

GOVERNMENT TARGET

In accordance with the National Standby Strategy, NAEEEC intends to recommend to the Ministerial Council on Energy an ‘interim’ target. The purpose of which is to provide governments with confidence that Australian products will meet the ultimate target, of one watt in 2012. If the ‘interim’ target is not met in the specified year, government will commence dialogue with industry to explore other options, including the possibility of moving to Stage 2 mandatory measures.

1. INTERIM TARGET - 2007

Product	Mode & Target
Single Phase Unitary Air Conditioners and all Portable units [1]	Off < 1 Watt Passive Standby [2] < 2 W
Split Systems and three phase systems up to 65kW cooling capacity [3]	Off [4] < 1 Watt Passive Standby [2] < 2 W
Air conditioners with sump (crank case) heaters	Mandatory use of Positive Temperature Coefficient heaters from 2007

Note 1: Includes wall mounted refrigerative and evaporative systems, portable refrigerative and evaporative systems, and portable split systems.

Note 2: Passive standby only applicable in the case of remote controls or timers.

Note 3: Includes refrigerative systems only within the scope of labelling and MEPS.

Note 4: Off mode only where applicable.

This target applies to all relevant air conditioners sold in Australia that year. NAEEEC proposes to monitor the sale of air conditioners in that year and to move toward regulation should that target not be met by a significant number of products.

2. NATIONAL STANDBY STRATEGY TARGET – 2012

Product	Mode & Target
Single Phase Unitary Air Conditioners and all Portable units	Off < 0.3 Watt Passive Standby < 1 Watt
Split Systems and three phase systems up to 65kW cooling capacity	Off < 0.3 Watt Passive Standby < 1 Watt
Air conditioners with sump (crank case) heaters	Mandatory use of Positive Temperature Coefficient heaters from 2007 [1]

Note: See interim target table for notes on products and modes.

Note 1: Options for elimination of heaters for some models to be investigated for 2012.

The National Standby Strategy sets out the target of 1W, to be achieved by 2012. This is consistent with international activities, in particular, the IEA “One Watt Initiative”. This target should apply to all air conditioners.

The above requirements will be inserted into the relevant Australian Standard.

GOVERNMENT PROPOSALS TO ACHIEVE THIS TARGET

Government agencies intend to take the following actions to assist industry meet the standby targets for air conditioners:

Tool Available	Action / Rationale	Date
Government procurement list	• MCE will create Government Policy of purchasing low standby air conditioners where available and fit for purpose. This policy will encourage manufacturers to supply government agencies with air conditioners that have low standby.	2005
Australian Standard	• To communicate government expectations in the relevant Australian Standard, likely to be a part of AS/NZS 3823. All products within the scope of energy labelling and MEPS in Australia are required to be registered. The standard will be amended to mandate the collection of standby data and energy associated with sump (crankcase) heaters during the registration process. This will be reported on www.energyrating.gov.au for all models. Test methods for determination of sump heater energy to be developed.	Initiate 2004
In-store surveys	• To collect data on passive standby for new air conditioners and to analyse trends. Surveys may include measurements of products provided by manufacturers or delivered through wholesalers and retailers. Data will be collected through checktesting.	Ongoing
Publish Statistics	• NAEEEC will highlight the range of standby for air conditioners in the marketplace through publishing data on a website or other means.	Ongoing
Energy Rating label	• Electricity consumption in on mode for air conditioners is already covered by an energy rating label for air conditioners. Air conditioner energy consumption in standby mode is not yet covered. There is some potential difficulty to include this on the energy label as air conditioners show hourly energy consumption (power) and not annual energy like other products. Options are to show the standby separately or to set separate MEPS levels for standby. NAEEEC will be working with the relevant Standards Committees on these issues.	Ongoing
Top Energy Saver Award	• The criteria for the Top Energy Saver Award (TESAW) will be amended to include a maximum allowable cap on the standby power consumption and the presence of sump heaters.	Consider for 2005 criteria
Future MEPS	• Future MEPS levels may be amended to include energy associated with sump heaters if sufficient progress towards their reduction or elimination is not made.	Ongoing

Government will announce whether this product should be targeted for Stage 2 intervention under the National Standby Power Strategy (involving possible regulatory intervention) or whether the abovementioned actions together with industry intervention have been successful in meeting the target at the NAEEEC Forum in the year:

2008

REFERENCES

ABS 4602.0, *Environmental Issues: People's views and practices.* March 2002 (also 1999 and 1994 editions). See www.abs.gov.au

ABS 8218.0 1986, *National Energy Survey: Household Appliances Facilities and Insulation, Australia, 1985/86.* Australian Bureau of Statistics 1987. See www.abs.gov.au

ABS 2000, *Population Survey Monitor*, private cross tabulations of household data from 1997 to 1999, Australian Bureau of Statistics.

AS/NZS 3823 - Performance of electrical appliances—Airconditioners and heat pumps. Parts 1.1 (non-ducted test method), Part 1.2 (ducted test method), Part 2 (energy labelling and MEPS), Part 3 (simulation). Availalbe from www.standards.com.au

BIS Shrapnel 2002, *The Household Appliances Market in Australia, 2002-2004* Vol 1(i): Whitegoods - Consumer Survey.

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.

Energy Efficient Strategies and Energy Consult 2002, *Appliance Standby Energy Consumption: Store Report 2002,* report for the National Appliance and Equipment Energy Efficiency Committee, June 2002, Canberra. NAEEEC Report 2002/08. Available from www.energyrating.gov.au in the electronic library.

Energy Efficient Strategies and Energy Consult 2003, *Appliance Standby Energy Consumption: Store Report 2003,* report for the National Appliance and Equipment Energy Efficiency Committee March 2003, Canberra. NAEEEC Report 2003/04. Available from www.energyrating.gov.au in the electronic library.

Harrington & Kleverlaan 2001, *Quantification Of Residential Standby Power Consumption In Australia: Results Of Recent Survey Work,* report for the National Appliance and Equipment Energy Efficiency Committee prepared by Lloyd Harrington (EES) and Paula Kleverlaan (EnergyConsult), Canberra. Available from www.energyrating.gov.au in the electronic library.

MCE 2002, *Australia's Standby Power Strategy 2002-2012 - "Money Isn't All Your Saving"*. Final report of long-term strategy to achieve Australia's One-Watt Goal 2002 to 2012, Ministerial Council on Energy. NAEEEC Report 2002/12. Available from www.energyrating.gov.au in the electronic library.