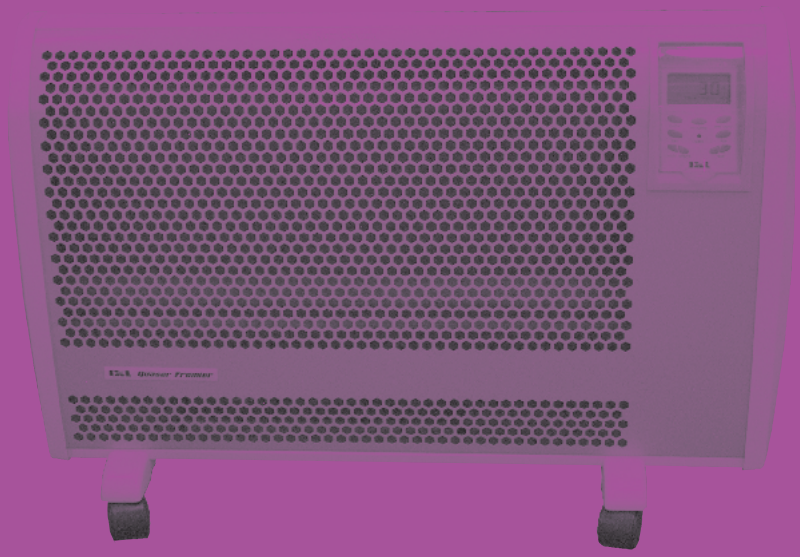
STANDBY PRODUCT PROFILE 2004/16

NOVEMBER 2004

PRODUCT PROFILE



PLUG IN ELECTRIC SPACE HEATERS

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@deh.gov.au

Alternatively, hard copy comments can be mailed to:

Equipment & Appliances Team
Australian Greenhouse Office
Department of Environment and Heritage
GPO Box 787
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Comments received by 28 February 2005 will assist in determining the final form of the policy proposals taken to government.

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

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PRODUCT DESCRIPTION

Electric space heaters work by passing a current through a resistive element which generates heat. The heat generated from this process is then delivered to users via radiation or convection or a combination of both. Electric space heaters are generally cheaper to buy than other types of space heaters (typically less than $100), are quick and easy to install and do not produce emissions in the home, but can be expensive to run over extended periods of time on general domestic tariffs. The output of electric space heaters is generally limited to 2.4 kW (10 Amps) or in some cases 3.6 kW (special 15 Amp plug). Larger outputs are possible, but these generally have to be hard wired and fixed in position.

Electric space heaters are generally portable, although depending on the unit, they can be fixed and even hard wired for larger outputs. Many have thermostats, adjustable heat settings and timers, dependant on heater type. Convection based units have a fan, allowing distribution of sensible heat around the room. Some units also have features like; tip/tilt alarms or cut offs, over heating shut off functions and obstruction sensors (for convection based units, if the heat outlet is partially or fully covered). These special features are primarily provided for safety reasons.

Electric space heaters can be split into five main types; strip/bar heaters, panel heaters, fan convectors, ceramic heaters and oil-filled column heaters (low temperature radiant heaters). Each is discussed in further detail below. This profile does not cover off-peak storage space heaters, electric in slab resistive heaters or electric boilers which are used to operate a hydronic heating system. This profile does not cover reverse cycle airconditioners which are used for heating – these are included in a previous standby profile on airconditioners (see profile SB2004/06).

Strip/bar heaters output radiant heat. They generally consist of either a metal coil or a quartz tube that heats up and radiates heat directly to the user. These may have tip/tilt cut off switches, but are otherwise generally relatively simple devices.

Panel heaters can output both radiant and/or convection derived heat. They have a large face panel that radiates heat and also vents for warmed air that is pumped by fan back into the space to be heated. These may have over heating shut off functions and/or obstruction sensors, which shut off the heater if the heat outlet vents are covered. Units can have thermostats and adjustable heat settings, some units may have timers.

Fan convectors output heat using the principle of convection. They draw in air and warm it over a resistive element, then pump it back into the space to be warmed. They have many of the same features that panel heaters use, but are generally portable and may have tip/tilt alarms or cut off switches for overheating.

Ceramic heaters. No information on this type of heater was found when this profile was written.

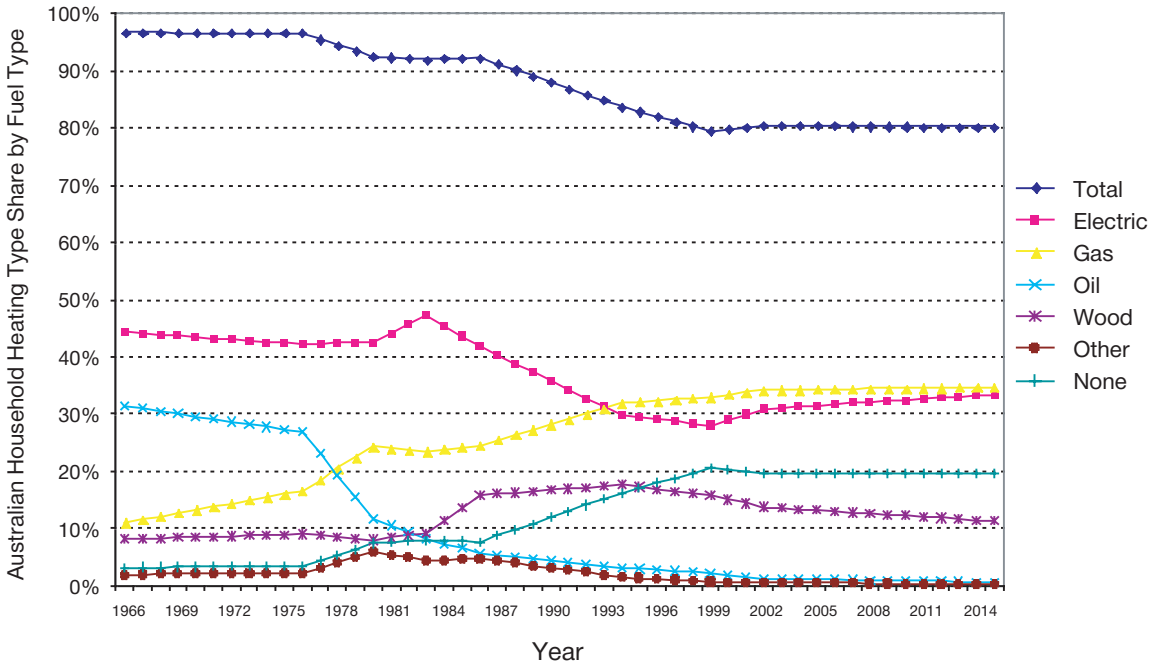
Oil-filled heaters have a smooth or corrugated metal outer case which is filled with oil. It has an electric element that is immersed in the oil, which heats the unit's outer casing through convection flow of the oil. These units have thermostats to control temperature (adjustable heat settings) and usually have timers, and over-heating shut off functions.

CURRENT OWNERSHIP AND TRENDS

As almost 80% of Australia's households have some form of "main" space heating (ABS 4602.0), the national heating market is very competitive. A large proportion of Australia has a relatively mild climate so many areas only require heating for limited periods over winter. In these situations (typically east coast north of Sydney and the tropics), electric heaters are typically favoured due to their low capital cost. Electricity derived space heating has experienced a decreasing market share over the last thirty years mainly as a result of increased gas penetration in Sydney, Adelaide and Canberra and an increase in no form of main space heating in Queensland and Northern Territory. It must be noted though, that the current and projected market share for electric space heating could increase due to increased sales of reverse cycle airconditioners, a form of electric heating that is not covered by this profile. Figure 1 below shows the proportion of Australian households by "main" heating type split by fuel type. Note that this does not include data on secondary heating sources which are common in most houses.

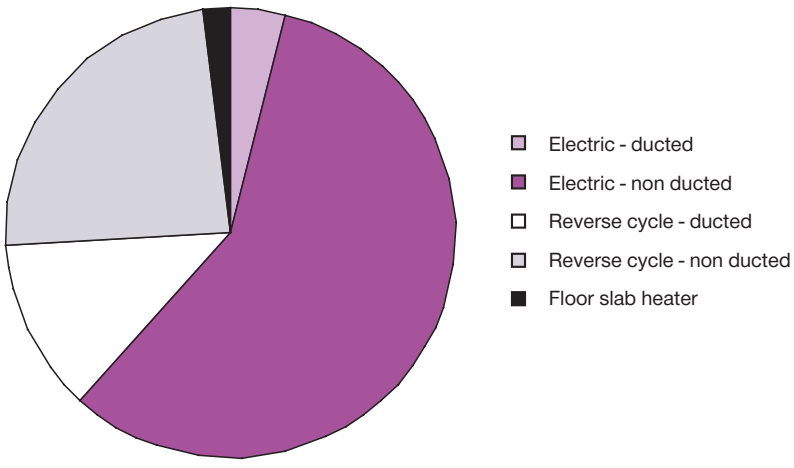
Figure 2 below shows the share of main electric space heating by type. It can be seen that electric non-ducted space heaters are the most prevalent in Australian homes,

FIGURE 1: AUSTRALIAN MAIN HEATING SOURCE SHARE BY FUEL TYPE



Source: Australian Bureau of Statistics reports, EES estimates. Electric includes reverse cycle AC.

FIGURE 2: SHARE OF MAIN ELECTRIC SPACE HEATERS BY TYPE



Source: Australian Bureau of Statistics ABS 4602.0 - 2002

this is followed by non-ducted and ducted reverse cycle airconditioners. In recent times, penetration of portable electric space heaters used as a main heater has seen a decrease due to the introduction of reverse cycle airconditioners. In spite of this decrease, non-ducted space heaters still have almost a 60% share of the main electric space heating market. Electric non-ducted space heaters are the focus of this profile.

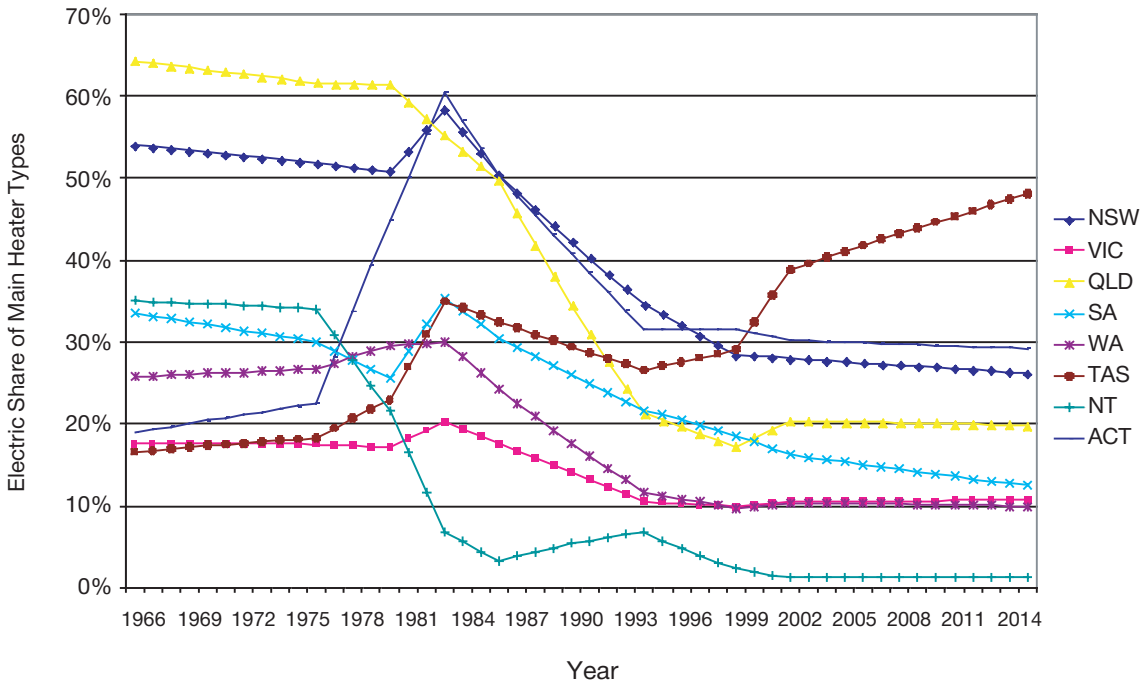
Figure 3 shows the penetration trend of main electric space heaters by State. Penetration in this context means the number of households with main electric space heaters by state. This figure excludes reverse cycle airconditioning. The state variation is a complex mix of available fuel types and climate. In Tasmania, electric space heating has been replacing wood heating and electric heating is relatively cheap in that state and has been strongly promoted. In Victoria, gas space heating dominates the market. In NSW, South Australia, Western Australia and the ACT, electric heating is still popular, but increasing gas penetration has reduced its share over the years. In Queensland, electric heating is used extensively because of the mild climate (on the coast) and increasingly households have no main space heating. In the Northern Territory, main space heating of any type is rare. It should be noted that electric space heaters are widely used as secondary heat source in all states.

The above figures show where there is a main electric space heater in use. In many households, there will be additional sources of heating such as secondary small heaters in bedrooms or places in the house where the main heating system may not be able reach. Commonly these heaters will be portable electric non-ducted units due to their low capital cost and flexibility of operation. The Australian Bureau of Statistics do not record information on the number of secondary heaters in use in households, so other data sources were examined. BIS Shrapnel (2002) undertake a biennial survey of households and record information of the stock of various appliances and equipment through a detailed household survey. This data provides information on the total stock of electric portable space heaters in use in Australia, irrespective of what heater type is used as the main heater in the household.

Figure 4 shows the saturation of electric space heaters for the largest five States (share of households with 0, 1, 2 or 3+ electric space heaters). An overall figure for Australia is also shown. Between 30% to 45% of households have no portable electric space heater, 35% to 40% of households have one, 10% to 20% of households have two and less than 10% of households have three or more portable electric space heaters.

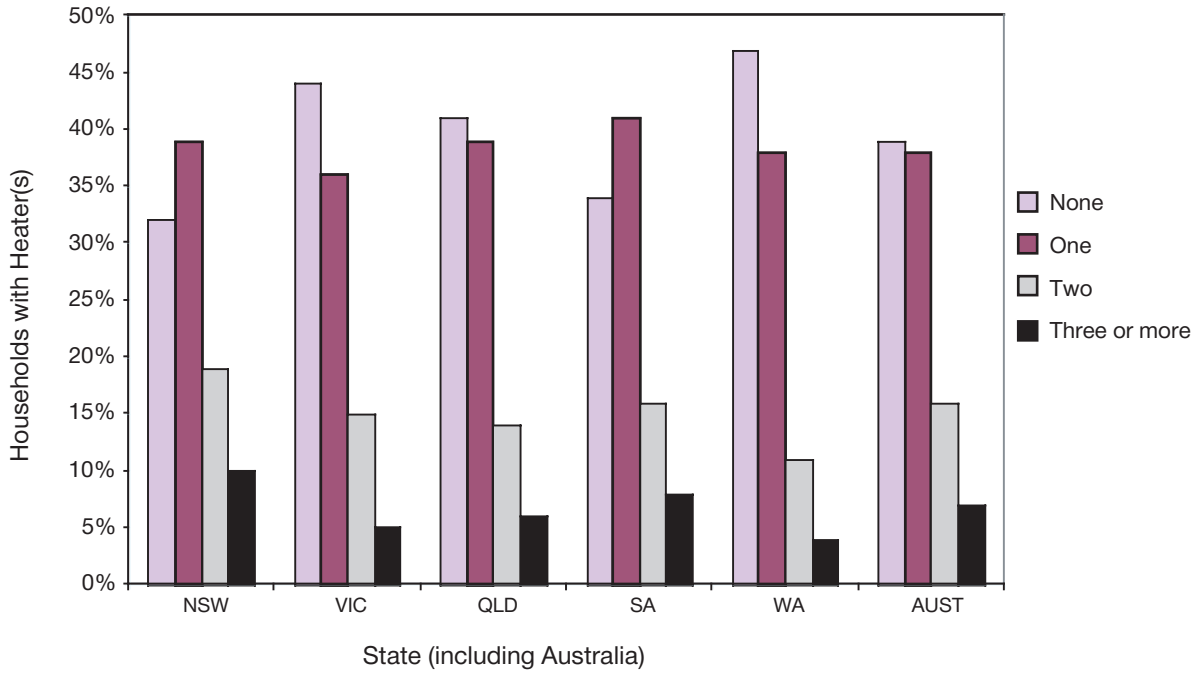
Based on the BIS data, the ownership of portable electric space heaters in Australia is currently about 0.93. This would mean that the current stock is in excess of 6.7 million, however, this may be somewhat underestimated given the annual sales data. The saturation of electric space heaters for Australia is about 1.49 (that is households in Australia that have at least one electric space heater own on average 1.49 heaters).

FIGURE 3: MAIN ELECTRIC SPACE HEATERS BY STATE



Source: Australian Bureau of Statistics reports, EES estimates beyond 2002. Electric space heating at the state level in this figure excludes reverse cycle airconditioners.

FIGURE 4: SATURATION OF PORTABLE ELECTRIC SPACE HEATERS BY JURISDICTION - 2002



Source: BIS Shrapnel 2002

The total annual sales of electric space heaters in the Australian market in 2003 is estimated to be around 1.2 million units with a total value of about $115 million. Annual supply into the Australian market has exceeded 1 million units a year since 1997 (BIS Shrapnel 2002). Total market supply in 1990 was about 700,000 units, so the market has seen significant growth over the past 15 years.

RELEVANT MODES FOR THE 'ONE WATT' POWER PLAN

Electric space heaters available in Australia have at least three operational modes:

- On mode – the heater is operating (heating an area either by convection or radiation). This mode is not relevant for this standby profile.
- Post On mode – the heater's fan is operating. This mode is not relevant for this standby profile.
- Non heating modes – where the heater is not heating a space. This includes several possible low power modes such as a timer function, modes with remote capabilities (passive standby) and off mode. These non-heating modes are of primary interest for this standby profile.

The above modes are described in more detail below:

On mode is where the heater is performing its primary task of either heating air, which is then pumped into a space, radiating heat, or a combination of the two.

Post on mode is only on fan forced models where the heater may use its fan to dissipate residual heat after the heating element has been switched off (essentially a cool down). This feature is found on many models, although older units may not have it. The fan automatically cuts off when the residual heat is reduced to an acceptable level. This feature is designed for safety considerations and to minimise any heat damage to controls and reduce heat stress on high temperature components.

Non-heating modes are present on all electric space heaters that have any option for switching power or control of the heater on the heater itself or via a remote control. Some may have manual analogue controls or remote capabilities, many have built in timer functions. For this standby profile, all non-heating modes are considered together. Note that some very old radiant heaters (e.g. bar radiators) may not have a switch on the unit so will not have a non-heating mode, but these are rare.

Only non-heating modes are applicable for the National Standby Strategy.

KNOWN STANDBY DATA FOR NEW PRODUCTS

NAEEEC commissioned four store surveys of new electrical products on display in retail outlets during the period 2001 to 2004. During the 2004 survey standby data (non-heating modes) for some 62 portable electric space heaters was collected. The survey included a representative range of different types and brand of portable electric space heaters.

The store survey found that the non-heating mode power consumption for typical new electric space heaters varied from 0.0 Watts to 3.7 Watts. Table 1 below summarises the results of the 2004 store survey.

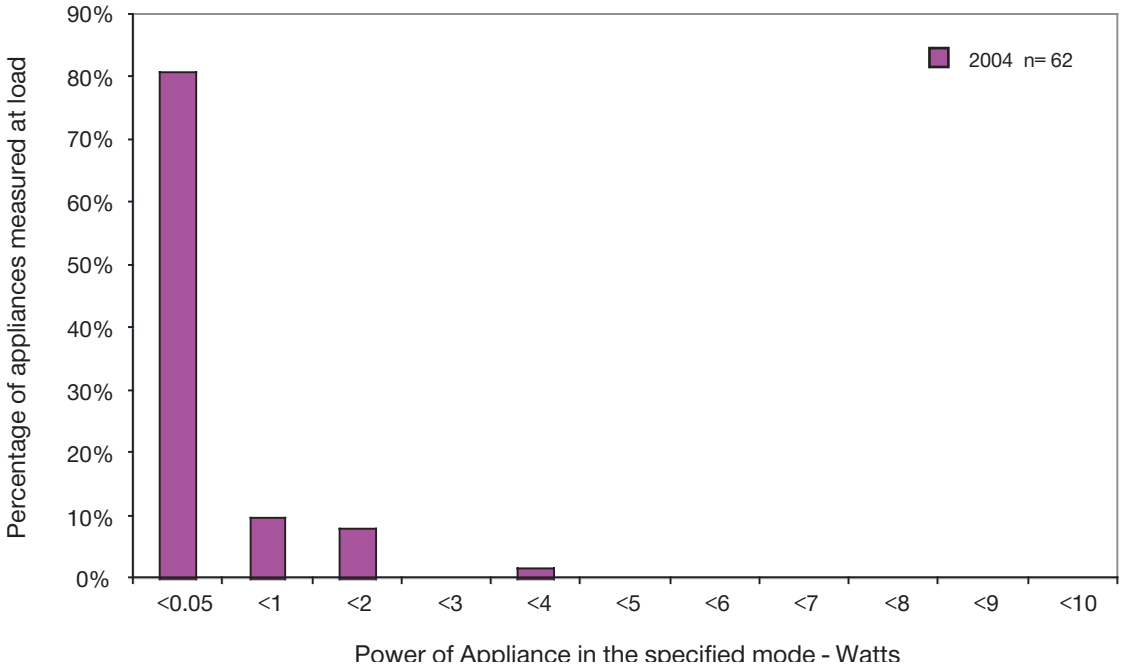
TABLE 1: SUMMARY OF 2004 STORE SURVEY

Mode 2004 (n=62)	Watts
Average non-heating Mode	**0.3**
Minimum non-heating Mode	0.0
Maximum non-heating Mode	3.7

Note: n is the total sample size in the survey

Figure 5 below shows the distribution of non-heating mode measurements taken in the 2004 store survey. Almost 80% of the units were found to have a non-heating mode power consumption of effectively zero Watts (less than 0.05W). The majority of the rest of the units were found to have a non-heating mode power consumption of between zero and 2 Watts, a very small proportion having a higher reading than 2 Watts.

FIGURE 5: DISTRIBUTION OF NON-HEATING MODE POWER CONSUMPTION – ELECTRIC SPACE HEATERS – 2004



KNOWN STANDBY DATA FOR INSTALLED STOCK

Late in 2000 NAEEEC commissioned an intrusive household survey which undertook standby measurements in 64 households in Melbourne, Brisbane and Sydney (Harrington and Kleverlaan 2001). A total of 21 electric space heaters were measured in a non-heating mode. This survey found that the non-heating mode power consumption for the installed stock of electric space heaters varied from 0.6 Watts to 3.4 Watts in 2000.

In 2004, a limited survey of 9 electric space heaters installed in homes was undertaken. Table 2 below summarises the results of the 2000 store survey and a similar 2004 survey.

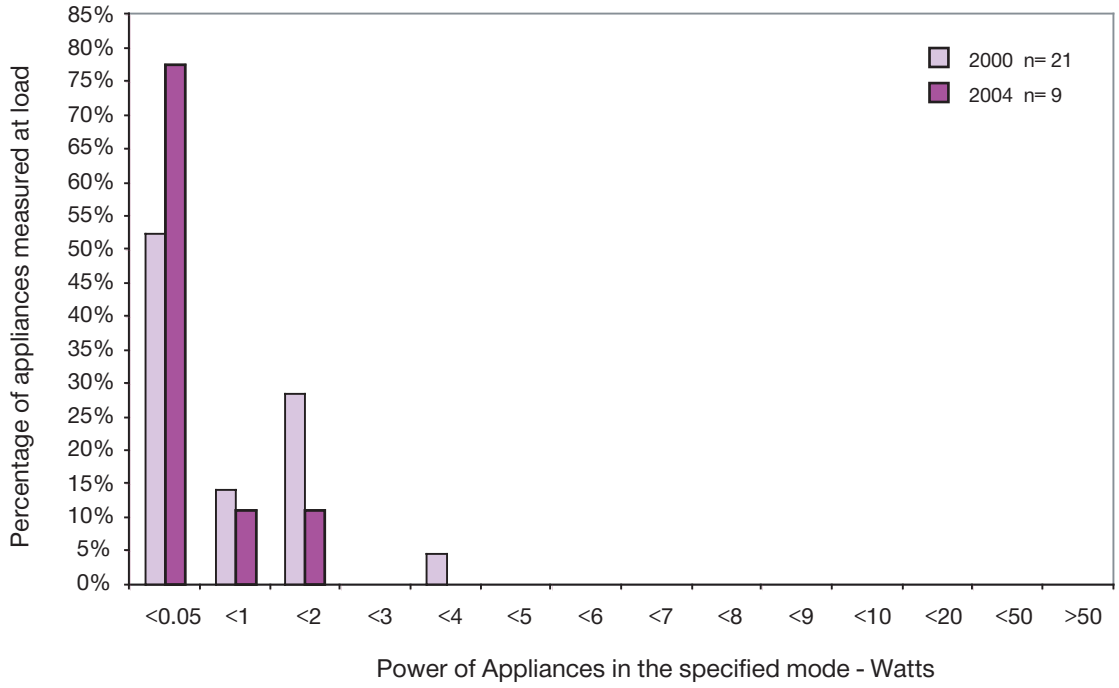
TABLE 2: SUMMARY OF RESULTS FOR 2000 AND 2004 SURVEYS

Mode/Survey	2000 survey Watts n=21	2004 survey Watts n=9
Average Passive non-heating mode	**0.6**	**0.3**
Minimum Passive Standby	0.0	0.0
Maximum Passive Standby	3.4	1.8

Note: n is the total sample size in the survey

Figure 6 below shows the distribution of non-heating mode measurements taken in both the 2000 and 2004 household surveys. For the 2000 survey, almost 52% of the units were found to have a non-heating mode power consumption of effectively zero Watts. Around 45% of the units were found to have a non-heating mode power consumption of between zero and 2 Watts. For the 2004 survey, almost 80% of the units were found to have a non-heating mode power consumption of effectively zero Watts. The other 20% of the units were found to have a non-heating mode power consumption of between zero and 2 Watts. The range of measurements for both these surveys are very similar to the measurements on new products undertaken in the 2004 retail store survey. This indicates that the control technology for electric space heaters is likely to have remained unchanged for the past 4-5 years.

FIGURE 6: DISTRIBUTION OF NON-HEATING MODE POWER CONSUMPTION – ELECTRIC SPACE HEATERS – INSTALLED STOCK – 2000 & 2004



GREENHOUSE EMISSIONS

For the purposes of estimating greenhouse emissions it has been assumed that electric space heaters are used for 500 hours per year (about 6% of the year). For 5000 hours per year (57% of the time), electric space heaters are assumed to be plugged in but in non-heating modes. For the remaining 3260 hours (37% of the time), electric space heaters are assumed to be unplugged (no standby power) to reflect that many portable space heaters (the majority of products covered by this profile) will be unplugged and packed away during the non heating season. This is intended to be broadly representative of average consumer behaviour. There will be a range of actual behaviour that varies from unplugged whenever not in use to being on or in standby for the whole year. The energy savings and greenhouse emissions can be scaled in proportion to the assumed standby hours per year.

The greenhouse emissions reductions potential for the proposed standby target of 1 Watt for all non-heating modes is in the order of 6.5 kt CO_2-e pa by 2012 and 9.4 kt CO_2-e pa by 2015. Figure 7 shows the potential annual greenhouse emissions by year for each of the future scenarios. The projected cumulative energy savings from a standby target for electric space heaters based on the implementation of a 0.3 Watt target for all non-heating modes is shown in Figure 8.

FIGURE 7: BAU VS POLICY TARGET GREENHOUSE EMISSIONS FOR ELECTRIC SPACE HEATERS

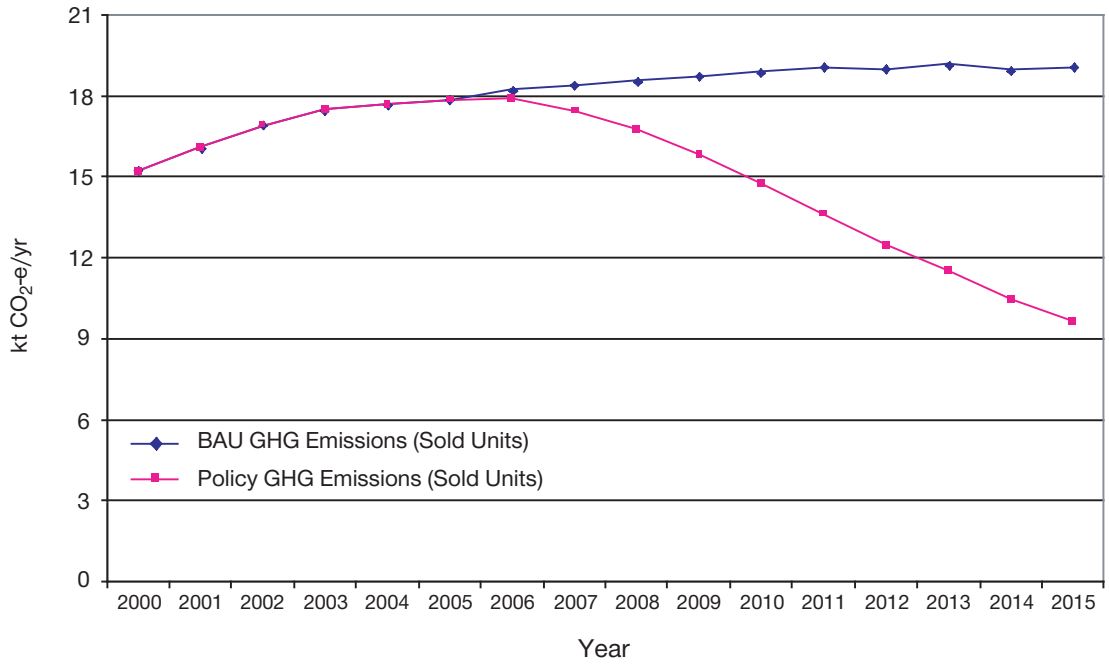
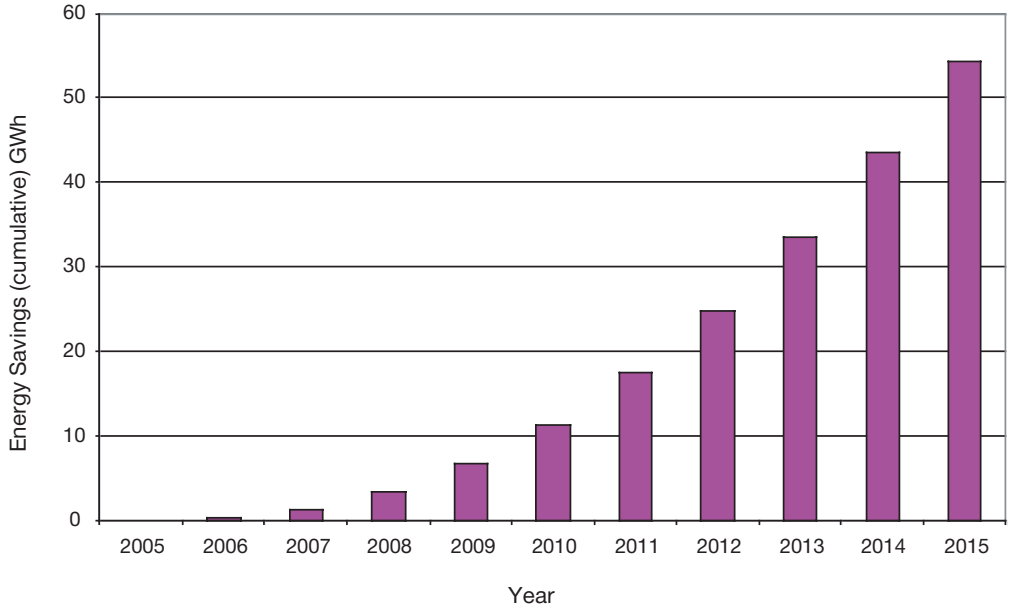


FIGURE 8: CUMULATIVE ENERGY SAVINGS FROM STANDBY TARGETS FOR ELECTRIC SPACE HEATERS



CURRENT OVERSEAS POLICIES AND TRENDS

Few countries regulate electric space heaters (other than airconditioners) for energy efficiency. This is because their nominal efficiency is already 100% (all available energy is effectively converted to heat). We are unaware of any specific policies that cover or limit standby of electricity consumption for electric space heaters. 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). However, at this stage, electric space heaters have not been included within the scope of this program.

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.

Although the proposed longer term target is less than 1W for electric space heaters, this is likely to be technically achievable without undue cost and changes in the design of the product. Standby targets for each product are developed in the context of what is achievable. It should be noted that this product is present in large numbers in Australian homes, so even modest reductions in per unit energy consumption will result in significant national energy and greenhouse savings.

1. INTERIM TARGET – 2008

Mode & Target (W)
All non-heating modes
< 1

This target applies to all relevant electric space heaters sold in Australia that year; this does not include ducted or non-ducted reverse cycle airconditioners or electric slab heaters. NAEEEC proposes to monitor the sale of electric space heaters 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

Mode & Target (W)
All non-heating modes
< 0.3

This target applies to all electric space heaters within the scope of this profile.

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 electric space heaters:

Voluntary Tool Available	Action / Rationale	Date
Government procurement list	• MCE are considering a Policy of preferencing the purchase of low standby plug-in electric space heaters where available and fit for purpose. Qualifying products to be included on the government Energy Allstars procurement database.	2005/6
Australian Standard	• To communicate government expectations in a new part of AS/NZS 62301.	From 2005
Annual survey	• To collect data on new plug-in electric space heaters and analyse trends. This data will be published annually.	ongoing

Government will announce whether this product should be targeted for stage two 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:

2009

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