



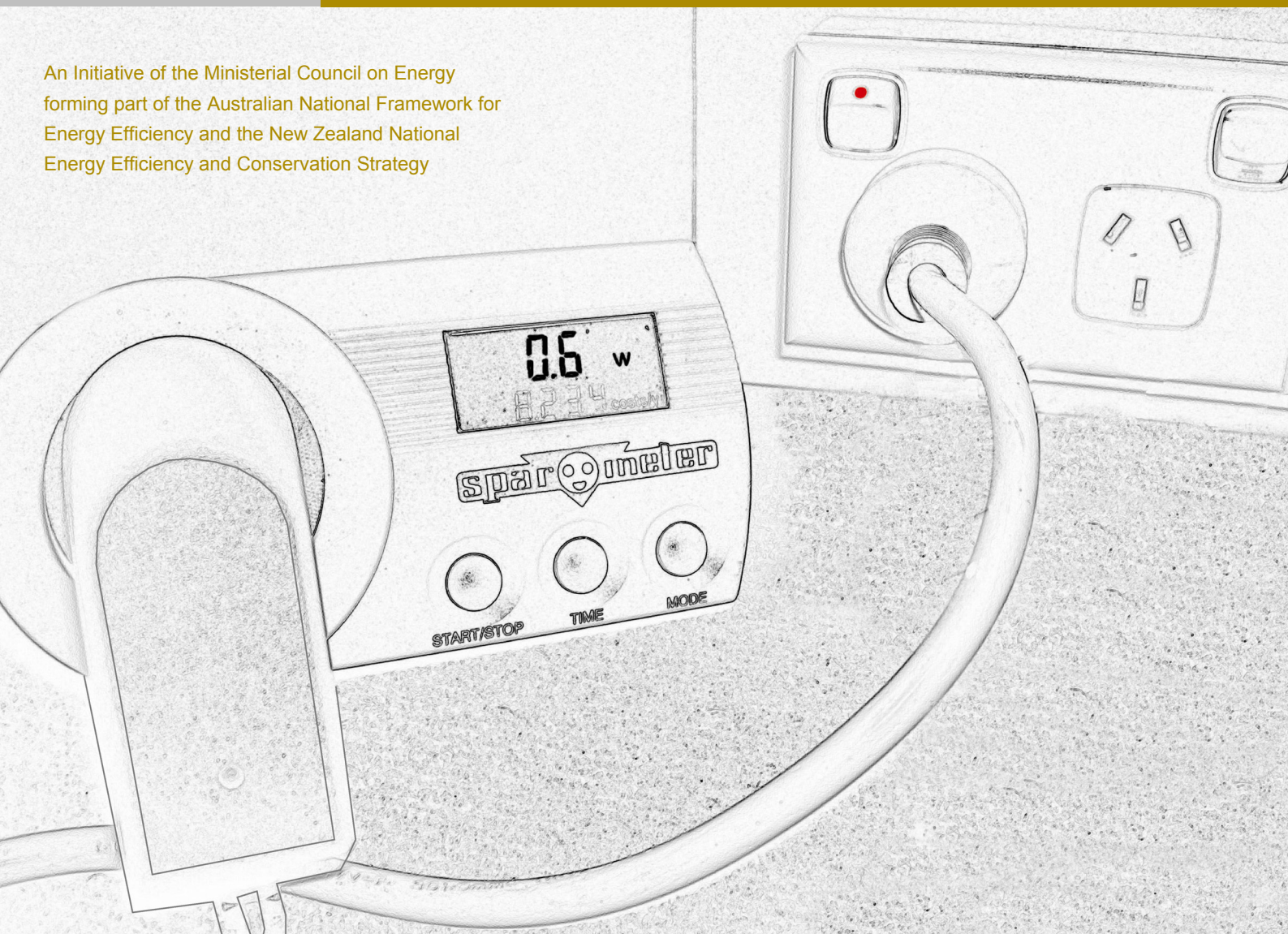
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Report for E3

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2005 Intrusive Residential Standby Survey Report

An Initiative of the Ministerial Council on Energy forming part of the Australian National Framework for Energy Efficiency and the New Zealand National Energy Efficiency and Conservation Strategy



Prepared by Energy Efficient Strategies

Executive Summary

Background

The energy consumption of major household appliances in Australia is generally well understood. Many of these products are now regulated for energy efficiency through programs such as energy labelling and Minimum Energy Performance Standards (MEPS). However, there is a significant proportion of household electricity consumption, most commonly called “miscellaneous end uses”, that is not well understood or documented.

Over the past 10 years there has been a rapid growth in the ownership of home electronics and entertainment devices and many traditional appliances have also been modified to incorporate smart electronic controls. While these devices offer increased flexibility, versatility and in many cases improved performance, many also result in power consumption when not performing their main function. Such energy consumption is generically described as “standby power” but it includes a range of modes from “off” through to “on” or continuous loads, depending on the product and its function.

There was a growing awareness of the issue of standby power through the 1990’s, and in 2000 Australia commenced research into the issue and began actively developing policies to deal with it. Subsequently Australia established standby goals for a range of appliances in their lowest standby mode in 2012, outlined in a strategy launched in 2002 (MCE 2002) and the associated standby product profiles.

The first study to establish the magnitude of standby power in the residential sector in Australia, which was commissioned by the National Appliance and Equipment Energy Efficiency Committee (now simply known as the Equipment Energy Efficiency committee – E3), was an intrusive survey of 64 homes in late 2000 (EES and Energy Consult, 2001). This study involved power measurement in various modes of nearly every plug load present in these households, which consisted of some 2312 individual products. That study estimated that standby power in a typical home was some 86.8W (although this value is not directly comparable to the findings of the current study – see discussion below).

Since 2000, E3 has commissioned regular surveys to determine the standby attributes of a wide range of new appliances and products offered for sale in retail stores (Energy Consult, 2006). This has provided accurate standby trends for many new product types in Australia.

This report documents the findings of the second intrusive standby survey which was commissioned by E3 in 2005. This survey covered some 120 homes, which was a sample size almost double that of the 2000 survey. The larger sample enabled the households selected to be a more accurate representation of households expected across Australia, although inevitably, some bias in the sample will be present. This study estimates that standby power in a typical home was some 92.2W in 2005 (although this value is not directly comparable to the findings of the previous study). The detailed findings from this survey are presented below.

Study Objectives

This is the second intrusive residential survey undertaken to quantify the standby power of appliances in Australian households. In most cases several modes were measured for most appliances. This survey was primarily concerned with quantification of the stock of appliances and equipment currently installed in households.



The general objectives of this survey were to:

- Quantify the magnitude of standby power used by all appliances and equipment found in Australian residential households in 2005, in their applicable standby modes.
- Identify behavioural trends in the use of appliances that have programmable standby settings.
- Identify product types that are of particular concern (now and in the future) when considering their standby use and ownership trends.
- Compare the standby attributes of appliances in houses measured in 2005 with the results from the 2000 survey to ascertain key trends.

Project Scope

This intrusive survey covered some 120 houses including 40 houses in Brisbane, 30 houses in Sydney and 50 houses in Melbourne and Gippsland, Victoria. Field work was undertaken in the period September to November 2005. A total of 8000 individual appliances were recorded during the survey.

Appliances were recorded in all relevant standby modes, such as active standby, passive standby or off mode. This includes most appliances that have a continuous power draw which is not associated with their primary function. A small selection of products also had power consumption recorded in on mode (mainly televisions, computers and monitors).

Key Results 2005

The average standby consumption for 2005 was found to be 92.2 Watts per household, or some 807 kWh per year. This equates to around 10.7% of Australia's residential electricity consumption in 2005. This level of residential standby power consumption was estimated to cost Australian consumers approximately \$950 million (at an average retail tariff of 15c/kWh) and will have resulted in emissions of nearly 6.5 million tonnes of carbon dioxide in 2005.

The total number of appliances that run on mains power in a typical house was found to be 67 (although this ranged from as few as 16 to as many as 136 items per house). During the survey, about 28% (19) of all appliances were in fact found to be unplugged at the time of the survey. These appliances were assumed to contribute no power to the total average standby power estimated for all households above.

Of the 48 or so appliances that were found to be plugged in at the time of the survey, on average around 56% (27) used some standby power when plugged in and not performing their main function.

The figure of 92.2 Watts per house could be seen as alarming. However, if all products were in fact plugged in and left in their highest recorded non operating mode, then this power consumption would be as high as 178.3 Watts per household. If all products were left plugged in and left in their lowest recorded non operating mode, then this power consumption would fall to 86.2 Watts per household. If all products found had a maximum non operating mode power consumption of 1 Watt or less, then the average power consumption would be 32.3 Watts per household.

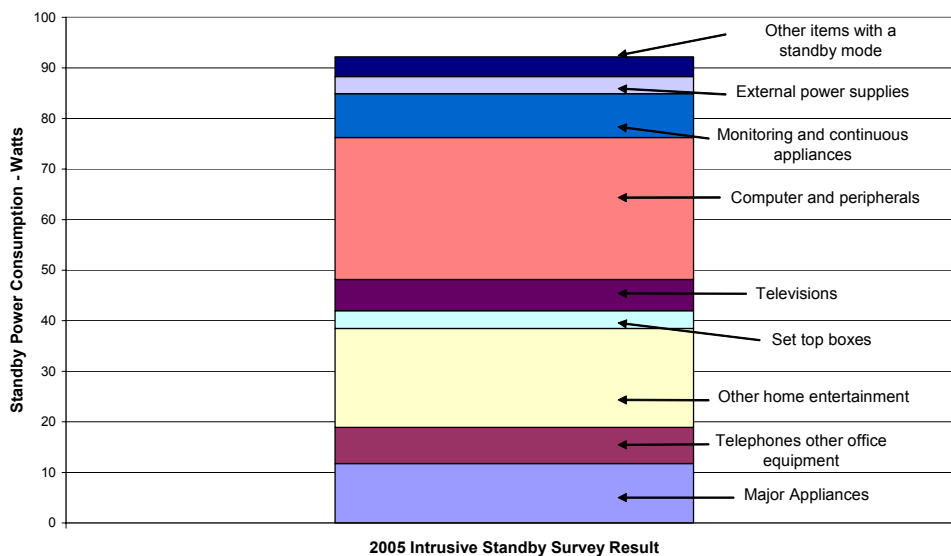
The most important product groups in terms of their total contribution to standby are computers and peripherals, home entertainment equipment (including televisions and set top boxes), major appliances and other office equipment.



The contribution to the total average standby power for each of the major product groups is illustrated in the table and figure below. Other important parameters, such as the number of items per household for each of the main product groups, and the average standby power consumption per item within the product groups is also shown. When these parameters are considered, the power consumed per item and the number of items is quite critical for computers and home entertainment equipment. Set top boxes also have a large power consumption per item, even though the total contribution to overall standby is still low due to their low household penetration. This is a product that is likely to have a rapid growth in ownership over the next 5 years. The average power per item is also reasonably high for televisions and telephones and other office equipment.

Type of Product	Contribution to Total Standby W	Number of Items per Household	Average Watts per Item
Major Appliances	11.8	8.5	1.4
Telephones other office equipment	7.1	2.0	3.6
Other home entertainment	19.6	5.0	3.9
Set top boxes	3.5	0.3	12.1
Televisions	6.2	1.7	3.6
Computer and peripherals	28.1	5.4	5.2
Monitoring and continuous appliances	8.7	7.6	1.1
External power supplies	3.4	4.7	0.7
Other items with a standby mode	3.9	9.7	0.4
Products unplugged	0	18.7	N/A
Products with no standby mode	0	3.1	N/A
Total	92.2	67.7	

The contribution from each appliance group is illustrated in the following figure:



The following table provides a summary for key appliances together with data on ownership and average product age for selected products. A full table of all products is included in the main report.

Appliance Type	Average On Mode (Watts)	Average Active Standby (Watts)	Average Passive Standby (Watts)	Average Off Mode (Watts)	Ownership	Average Age (Years)
Amplifiers	NA	22.4	3.4	0.2	0.36	8.7
Answering Machines	NA	3.1	NA	NA	0.17	NA
AV Receivers	NA	65.3	3.1	0.3	0.13	3.2
Breadmakers	NA	1.7	NA	NA	0.18	NA
Clock Radios	NA	2.1	NA	NA	1.33	NA
Clothes Dryers	NA	3.3	NA	0.2	0.63	10.3
Clothes Washers	NA	5.8	NA	1.9	0.95	7.0
Computer Speakers	NA	4.1	6.0	2.2	0.83	3.9
Computers	82.2	NA	35.5	3.5	1.25	3.5
Cordless Phone Base Stations	NA	3.3	2.4	NA	0.98	NA
CRT Monitors	61.7	NA	8.2	1.9	0.86	4.6
CRT Televisions	66.9	NA	7.4	0.1	2.07	7.7
Set Top Boxes	13.3	NA	10.7	0.0	0.32	1.8
Dishwashers	NA	2.8	NA	0.8	0.57	6.6
DVD Players	NA	9.0	2.6	0.0	0.82	1.8
DVD Recorders	NA	26.5	4.9	NA	0.08	0.7
External Power Supplies	NA	NA	1.2	NA	6.86	NA
Facsimiles	NA	5.9	NA	NA	0.26	NA
Game Consoles	NA	26.7	1.9	1.4	0.33	3.7
Inkjet Printers	NA	4.6	NA	1.9	0.89	4.4
Integrated Stereos	NA	18.1	6.5	1.8	0.97	5.9
Laptops	34.1	NA	16.5	9.2	0.54	2.8
LCD Monitors	29.3	NA	2.6	1.0	0.37	1.4
Modems	NA	5.9	4.4	2.4	0.68	NA
Multifunction Devices	NA	11.2	NA	5.5	0.23	2.3
Non Convection Microwaves	NA	NA	3.0	NA	0.77	NA
Portable Stereos	NA	5.8	2.2	2.3	0.63	5.3
Radios	NA	NA	1.5	NA	0.46	NA
Remote Garage Door Openers	NA	4.1	NA	NA	0.30	NA
Scanners	NA	8.3	NA	0.9	0.25	4.5
Smoke Alarms	NA	0.4	NA	NA	1.23	NA
VCRs	NA	10.5	5.1	1.7	1.11	6.7

Note: Information on all significant product types is included in the main report.



Comparison of Results with the 2000 Survey

Direct comparisons between the 2000 and 2005 surveys are not possible for a number of reasons. To enable a direct comparison between the 2000 and the 2005 survey results it is necessary to remove selected readings from both data sets. When the appliance data sets are made comparable (by taking out appliances that were regarded as using standby in 2000, but not in 2005 or visa versa), average household standby consumption was found to be 74.2 Watts in 2000 and 82.9 Watts in 2005. This equates to a 12% increase in standby power consumption per household over the 5 year period (equivalent to an increase of approximately 2.3% per annum).

Over the same period the total electricity consumption per household also grew by 11% (2.2% per annum), so the share of standby over this period remained almost constant. However, over the same period the number of households also increased from 7.3 million to 7.85 million (7.5%), meaning that in absolute terms, standby energy consumption increased by 20.4% over the 5 year period.

A conscious decision was made during the recruiting process for the 2005 intrusive survey to approach all of the participants from the 2000 intrusive survey to see whether they would be willing to participate again in 2005. Some 14 of the original 64 households accepted. So of the 120 houses measured in 2005, 14 had also participated in 2000. This provided an important benchmark between the two data sets and provides more insight into detailed changes in standby at a house level over the 5 years between the surveys.

Only a very preliminary analysis of these houses is included in this report. A more detailed and in depth analysis at a product by product and house by house level is in preparation, and should be available as a separate report in the near future.

Initial analysis show that changes in standby power at a house level are extremely complex. Some houses decreased their total standby power while most increased. However, it would certainly appear that, on average, there has been a large increase in the number of appliances connected to the mains which use some standby power when not performing their main function. Examination of the whole sample for the 2000 and 2005 samples suggests that the standby power per appliance has improved slightly since 2000, although this is not reflected in the 14 common houses.

Analysis of data from the 14 common houses suggest that the sample in 2000 was possibly skewed towards a higher standby power consumption. While this has no particular impact on the results for the 2005 survey, an overestimate on the average standby for 2000 would mask the real growth rate in standby that is likely to have occurred over the 5 year period. So real growth rate in standby power may be somewhat higher than that estimated above. Standby power growth in the 14 common houses over the 5 year period was 40% compared to just 12% for the whole sample. This suggests that the growth rate in standby is somewhat uncertain, but is likely to be more than 12% per household over the 5 year period.



Conclusions

The data in this report suggests that there is likely to be a significant growth in standby power in Australian households. While there is some uncertainty about the precise rate of growth, it would appear to be a minimum increase of the order of 2.5% per annum per household, which is extremely rapid if this rate persists over a long period. However, this rate could be as high as 5% per annum per household or even higher in absolute terms (total national standby, given continued new household formation). There certainly appears to be a proliferation of products within households that have the potential to use standby power and all evidence suggests that there is rapid growth in the number of products that are connected to the mains and that use some power when not performing their main function.

While most products appear to be improving their standby power consumption attributes over time (new products have lower standby than older products for many product types), this is more than offset by the increase in the number of products connected to the mains in an average house.

This report helps to identify the key product types that appear to be driving the growth in standby power and will provide valuable data to address this through ongoing policy development.



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ABBREVIATIONS

ABS	Australian Bureau of Statistics
AGO	Australian Greenhouse Office
AS	Active Standby
CPU	Central Processing Unit
E3	Equipment Energy Efficiency Committee (formerly NAEEEEC)
EES	Energy Efficient Strategies
EPS	External Power Supply
H	Hard Switch
kWh/y	Kilowatt-hour per year
MCE	Ministerial Council on Energy
Mt	Mega Tonnes
NAEEEC	National Appliance and Equipment Energy Efficiency Committee (predecessor of E3)
PS	Passive Standby
SO	Soft Switch
UP	Unplugged
W	Watts



1. Introduction

1.1 Background

In 2000 the Australian Greenhouse Office (AGO) and the Equipment Energy Efficiency Committee (E3,, formerly NAEEEEC) commissioned the report; *Quantification of Residential Standby Consumption in Australia* (EES and EnergyConsult, 2001). This involved an intrusive survey of 64 households in Brisbane, Melbourne and Sydney, with the goal of ascertaining the standby attributes of appliances in these households. The study found that standby power¹ accounts for 11.6% of the electricity used in residential applications and it was estimated that it was costing Australian consumers over \$500 million per annum and generating more than 5 million tonnes of carbon dioxide annually.

In 2002 the Ministerial Council of Energy (MCE) initiated a ten year policy on standby power entitled “Money isn’t all you’re Saving” (MCE 2002). This policy set out the “One Watt” target for appliances, with an overall goal that by 2012 all appliances would only use one watt in their lowest standby mode. It was envisioned that during this ten year timeframe, product profiles would be developed for individual product types or categories, which would be used to assess the need for further action involving either voluntary or mandatory policy measures.

To complement each product profile, since 2001, regular store surveys have been undertaken with the specific goal to “quantify the magnitude of electricity used in standby modes by new appliances offered for sale on the Australian market” (EnergyConsult, 2006). These store surveys involve the measurement of product types in each of their applicable standby modes. These store surveys allow any trends in standby to be viewed, including trends that are specific to certain appliance types.

1.2 Study Objectives

This is the second intrusive residential survey undertaken to quantify the standby power of appliances in Australian households. In most cases several modes were measured for most appliances. This survey was primarily concerned with quantification of the stock of appliances and equipment currently installed in households. The results attained from this latest intrusive survey compliment results obtained from the 2000 intrusive survey and together with data from the annual store surveys provides information which can be used to assess trends in standby power.

The general objectives of this survey were to:

¹ Standby power quantified in the 2000 survey included a number of small continuous loads that may not be regarded as standby by some analysts.



- Quantify the magnitude of standby power used by all appliances and equipment found in Australian residential households in 2005, in their applicable standby modes.
- Identify behavioural trends in the use of appliances that have programmable standby settings.
- Identify product types that are of particular concern (now and in the future) when considering their standby use and ownership trends.
- Compare the standby attributes of appliances in houses measured in 2005 with the results from the 2000 survey to ascertain key trends.

1.3 Project Tasks and Outputs

This intrusive survey covered some 120 houses including 40 houses in Brisbane, 30 houses in Sydney and 50 houses in Melbourne and Gippsland, Victoria. Field work was undertaken in the period September to November 2005. A total of 8000 individual appliances were recorded during the survey. Power measurements were taken on a range of relevant modes for most products and data was recorded and later analysed for this report. Most readings were taken using small portable power meters (so called Spar meters) but readings on 290 products in 4 houses were taken with both the portable meters and a Yokogawa power analyser. A small correction was applied to all readings from portable readings to improve the accuracy of the results. The results of the comparison between meters are shown in Appendix Three.

For this study, appliances were recorded in all relevant standby modes, such as active standby, passive standby or off mode. This includes most appliances that have a continuous power draw which is not associated with their primary function. A small selection of products also had power consumption recorded in on mode (mainly televisions, computers and monitors).

Some appliances were excluded from measurement for this study. In general these appliances were considered only to have an “on” mode when connected to mains power and/or the energy consumption is regulated over time either by the user or by internal controls such as a thermostat. Products that were excluded on this basis include refrigerators and freezers, water beds, most lighting equipment, fish tank heaters and a range of small kitchen appliances (generally those that run when plugged in, most of which are used infrequently). Larger products such as refrigerators, freezers and water beds have an energy profile that depends on internal and external temperature conditions and determination of their energy consumption requires careful long term measurements, which are beyond the scope of this study.

This report documents the findings of the 2005 intrusive survey.



1.4 Acknowledgements

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While this report was commissioned by government, any views expressed are those of the authors. While the authors have taken every care to accurately report and analyse the data collected during the survey, the authors are not responsible for any use or misuse of data and information provided in this report or any loss arising from the use of this data.



2. Overall Results

2.1 Key Findings

The average standby consumption for 2005 was found to be 92.2 Watts per household, which equates to around 10.7% of Australia's residential electricity consumption in 2005. This level of residential standby power consumption was estimated to cost Australian consumers approximately \$950 million (at an average residential retail tariff of 15c/kWh) and to generate more than 6.5 million tonnes of carbon dioxide emissions in 2005.

The total number of appliances that run on mains power in a typical house was found to be 67 (although this ranged from as few as 16 to as many as 136 items per house). During the survey, about 28% (19) of all appliances were in fact found to be unplugged at the time of the survey. These appliances were assumed to contribute no power to the total average standby power estimated for all households above. This indicates that there are some products that are not used on a regular basis but it also shows that many consumers tend to switch off or unplug some of their products when not in use for some time. While this behaviour is to be applauded, it can only be expected to have a marginal additional impact on the current standby power consumption in typical households.

Of the 48 or so appliances that were found to be plugged in at the time of the survey, on average around 56% (27) used some standby power when plugged in and not performing their main function. Of the 19 unplugged appliances, 36% were found to use some standby power when plugged in. This tends to suggest that many of the products that were not plugged in at the time of the survey may not have an off switch.

The figure of 92.2 Watts per house could be seen as alarming. However, if all products were in fact plugged in and left in their highest recorded non operating mode, then this power consumption would be as high as 178.3 Watts per household. If all products were left plugged in and left in their lowest recorded non operating mode, then this power consumption would fall to 86.2 Watts per household. If all products found had a maximum non operating mode power consumption of 1 Watt or less, then the average power consumption would be 32.3 Watts per household.

The most important product groups in terms of their total contribution to standby are computers and peripherals, home entertainment equipment (including televisions and set top boxes), major appliances and other office equipment. The contribution from computers is perhaps surprising, but it is important to note that this includes the power consumed by 11 computers (in the 120 homes) that the owners said that they left running continuously (home servers). If these were assumed to be off, then the average "standby" power for computers would be reduced by 9.7 Watts to 18.4 Watts



on average, which is still the one of the most significant product groups in terms of the total contribution to standby.

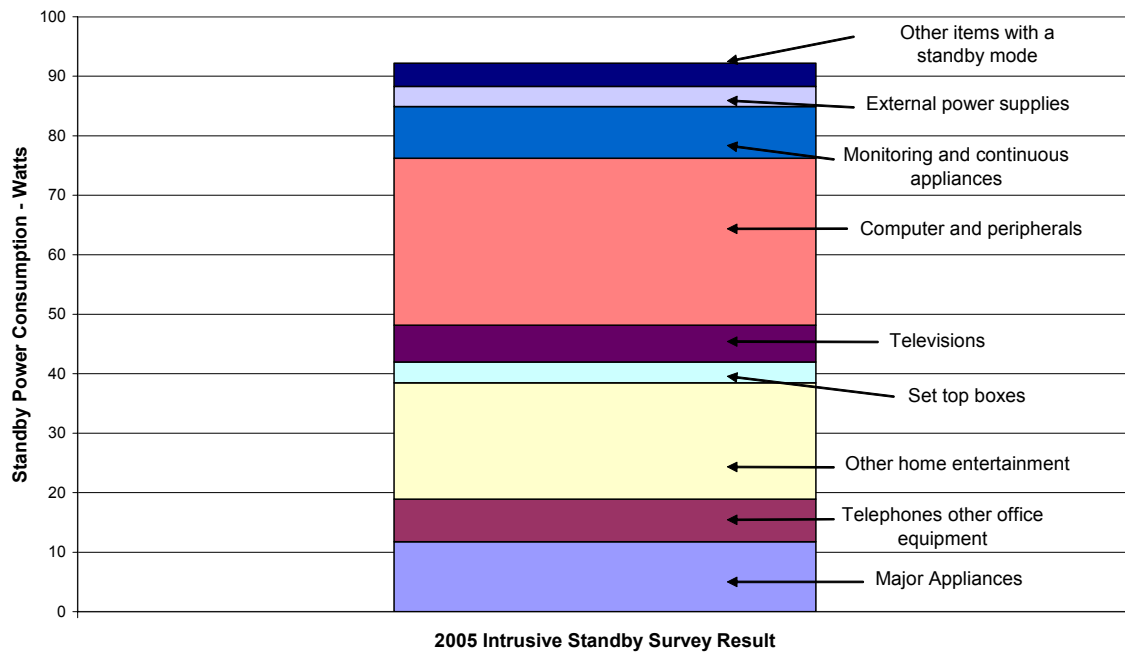
The contribution to the total average standby power for each of the major product groups is illustrated in the table and figure below. Other important parameters such as the number of items per household for each of the main product groups, and the average standby power consumption per item within the product groups is also shown. When these parameters are considered, the power consumed per item and the number of items is quite critical for computers and home entertainment equipment. Set top boxes also have a large power consumption per item, even though the total contribution to overall standby is still low due to their low household penetration. This is a product that is likely to have a rapid growth in ownership over the next 5 years. The average power per item is also reasonably high for televisions and telephones and other office equipment.

The contribution to total household standby from each major product type is illustrated in Table 1 and Figure 1.

Table 1: Contribution of Major Product Type to Household Standby – 2005

Type of Product	Contribution to Total Standby W	Number of Items per Household	Average Watts per Item
Major Appliances	11.8	8.5	1.4
Telephones other office equipment	7.1	2.0	3.6
Other home entertainment	19.6	5.0	3.9
Set top boxes	3.5	0.3	12.1
Televisions	6.2	1.7	3.6
Computer and peripherals	28.1	5.4	5.2
Monitoring and continuous appliances	8.7	7.6	1.1
External power supplies	3.4	4.7	0.7
Other items with a standby mode	3.9	9.7	0.4
Products unplugged	0	18.7	N/A
Products with no standby mode	0	3.1	N/A
Total	92.2	67.7	



Figure 1: Contribution of Major Product Type to Household Standby - 2005

Note that this report does not include any stock modelling of the future impacts of the findings of the surveys conducted for this study. E3 may examine this issue in more detail in the future.

2.2 Product Summary

A large proportion of appliances were found to have power consumption in both standby and off modes. The most important products in this respect are:

- Clothes washers
- Computers and computer related equipment: computer speakers, monitors, printers, scanners, multifunction devices
- Set top boxes
- DVD recorders
- DVD/VCR players
- Integrated stereos
- Portable stereos
- VCRs

All the above appliance types have either a sizable ownership and/or have ownerships that are likely to rapidly increase and/or consume significant energy in non-operational

modes. The power consumption of even the lowest standby mode of many of these products is somewhat above the notional 1.0 Watt target.

A summary of all major product groups for the 2005 intrusive survey is shown below in Table 2.

Table 2 – Summary of Overall Findings by Product

Appliance Type	Average On Mode (Watts)	Average Active Standby (Watts)	Average Passive Standby (Watts)	Average Off Mode (Watts)	Ownership	Average Age (Years)
Air Fresheners	1.9	NA	NA	NA	0.13	NA
Amplifiers	NA	22.4	3.4	0.2	0.36	8.7
Answering Machines	NA	3.1	NA	NA	0.17	NA
AV Receivers	NA	65.3	3.1	0.3	0.13	3.2
Battery Rechargers	NA	NA	1.2	NA	0.51	NA
Breadmakers	NA	1.7	NA	NA	0.18	NA
CD Players	NA	7.3	4.5	1.5	0.30	NA
Clock Radios	NA	2.1	NA	NA	1.33	NA
Clothes Dryers	NA	3.3	NA	0.2	0.63	10.3
Clothes Washers	NA	5.8	NA	1.9	0.95	7.0
Computer Speakers	NA	4.1	6.0	2.2	0.83	3.9
Computers	82.2	NA	35.5	3.5	1.25	3.5
Convection Microwaves	NA	NA	4.0	NA	0.09	NA
Cordless Drills	NA	NA	2.4	NA	0.3	NA
Cordless Phone Base Stations	NA	3.3	2.4	NA	0.98	NA
Cordless Phone Extra Handsets	NA	2.3	1.3	NA	0.35	NA
CRT Monitors	61.7	NA	8.2	1.9	0.86	4.6
CRT Televisions	66.9	NA	7.4	0.1	2.07	7.7
Set Top Boxes	13.3	NA	10.7	0.0	0.32	1.8
Dishwashers	NA	2.8	NA	0.8	0.57	6.6
DVD Players	NA	9.0	2.6	0.0	0.82	1.8
DVD Recorders	NA	26.5	4.9	NA	0.08	0.7
DVD/VCR Players	NA	14.8	3.5	NA	0.18	2.2
Electric Ovens	NA	NA	NA	1.0	0.42	NA



Appliance Type	Average On Mode (Watts)	Average Active Standby (Watts)	Average Passive Standby (Watts)	Average Off Mode (Watts)	Ownership	Average Age (Years)
Electric Resistance Heaters	NA	NA	NA	0.8	0.19	NA
Electric Stoves	NA	NA	NA	0.2	0.43	NA
External Power Supplies	NA	NA	1.2	NA	6.86	NA
Facsimiles	NA	5.9	NA	NA	0.26	NA
Game Consoles	NA	26.7	1.9	1.4	0.33	3.7
Gas Convection Heaters	NA	NA	7.2	3.9	0.18	6.3
Gas Instantaneous Water Heaters	NA	9.6	NA	NA	0.14	NA
Gas Stoves	NA	NA	NA	0.9	0.32	NA
Hand Held Vacuum Cleaners	NA	2.5	1.0	NA	0.33	NA
Hubs	NA	5.0	NA	NA	0.33	NA
Inkjet Printers	NA	4.6	NA	1.9	0.89	4.4
Integrated Stereos	NA	18.1	6.5	1.8	0.97	5.9
Laptops	34.1	NA	16.5	9.2	0.54	2.8
Laser Printers	NA	12.9	15.9	0.1	0.13	3.6
LCD Monitors	29.3	NA	2.6	1.0	0.37	1.4
Modems	NA	5.9	4.4	2.4	0.68	NA
Multifunction Devices	NA	11.2	NA	5.5	0.23	2.3
Non Convection Microwaves	NA	NA	3.0	NA	0.77	NA
Plasma Televisions	165.8	NA	8.3	0.2	0.04	1.8
Pool Filters	NA	3.4	NA	NA	0.11	NA
Pool Pumps	NA	4.1	NA	NA	0.16	NA
Portable Stereos	NA	5.8	2.2	2.3	0.63	5.3
Powerboards	NA	0.2	NA	NA	4.17	NA
Radios	NA	NA	1.5	NA	0.46	NA
Rechargeable Toothbrushes	NA	1.5	1.4	NA	0.33	NA
Remote Garage Door Openers	NA	4.1	NA	NA	0.30	NA
Scanners	NA	8.3	NA	0.9	0.25	4.5
Security Systems	NA	4.8	NA	NA	0.15	NA



Appliance Type	Average On Mode (Watts)	Average Active Standby (Watts)	Average Passive Standby (Watts)	Average Off Mode (Watts)	Ownership	Average Age (Years)
Sensor Lights	NA	0.8	NA	NA	0.17	NA
Smoke Alarms	NA	0.4	NA	NA	1.23	NA
Subwoofers	NA	9.3	NA	0.6	0.13	3.7
Surge Guards	NA	NA	0.8	NA	0.13	NA
Tape Decks	NA	7.9	3.5	0.7	0.21	NA
Timers	NA	1.1	NA	NA	0.29	NA
Tuners	NA	9.1	2.69	0.5	0.13	NA
Turntables	NA	7.3	1.5	0.4	0.15	NA
VCRs	NA	10.5	5.1	1.7	1.11	6.7

With regard to external power supplies, an average of nearly 7 units were found per household as indicated above. Where an appliance was found to have an external power supply (EPS), the relevant modes with the EPS connected were measured and recorded for each product. The EPS was then also recorded as a separate product when disconnected from the appliance and the no load input power consumption of the EPS was then recorded as passive standby mode for the EPS. The distribution of EPS no load consumption by product type has not been separately documented in this report. Where an EPS was found as a stand alone product (eg a mobile telephone charger) then the passive standby mode was determined. Only stand alone EPS products were assumed to contribute to the total household standby power consumption (as EPSs connected to dedicated products were already counted in the relevant appliance measurement).

2.3 Comparison with 2000 Survey Results

Direct comparisons between the 2000 and 2005 surveys are not possible for a number of reasons. Firstly, in the 2005 survey, a number of computers were noted by their users as operating on a continuous basis. These computers were recorded in this mode when determining the actual standby power consumption of these houses. In the 2000 survey, all computers were only measured in off mode, irrespective of their normal usage pattern or operation.

The 2000 survey contained a small number of readings for products that had significant power readings which appeared to be continuous. These included some fish tank heaters and towel rail heaters and some other unusual products. The few products of these types that were found in the 2005 survey were excluded for obvious reasons.



Thus to enable a direct comparison between the 2000 and the 2005 survey results it is necessary to remove selected readings from both data sets. When the appliance data sets are made comparable (by taking out appliances that were regarded as using standby in 2000, but not in 2005 or visa versa), average household standby consumption was found to be 74.2 Watts in 2000 and 82.9 Watts in 2005. This equates to a 12% increase in standby power consumption per household over the 5 year period (equivalent to an increase of approximately 2.3% per annum).

Over the same period the total electricity consumption per household also grew by 11% (2.2% per annum), so the share of standby over this period remained almost constant. However, over the same period the number of households also increased from 7.3 million to 7.85 million (7.5%), meaning that in absolute terms, standby energy consumption increased by 20.4% over the 5 year period.

There are a number of other factors that make the direct comparison of the results from the 2000 and 2005 surveys uncertain. Firstly, the sample size for 2000 was quite small and there is a real chance that the sample was not fully representative. While the key parameters were checked and controlled as far as possible, there may be some significant sample bias present. The sample size for 2005 was nearly double the sample of the earlier survey and the degree of bias from the sample selection should consequently be somewhat reduced. However, despite having a larger pool from which to select participants, it was not possible to meet all the household attribute targets for the 3 income strata for the final sample as determined by the Australian Bureau of Statistics. It was also found that some attributes such as computer ownership were higher in the selected sample than found in ABS4602.0-2005. This may be in part due to the recruiting method used for the survey. However, despite the shortcomings, the 2005 data set is considered to be superior in terms of representativeness.

Reasons for the increase in standby power over the period may include:

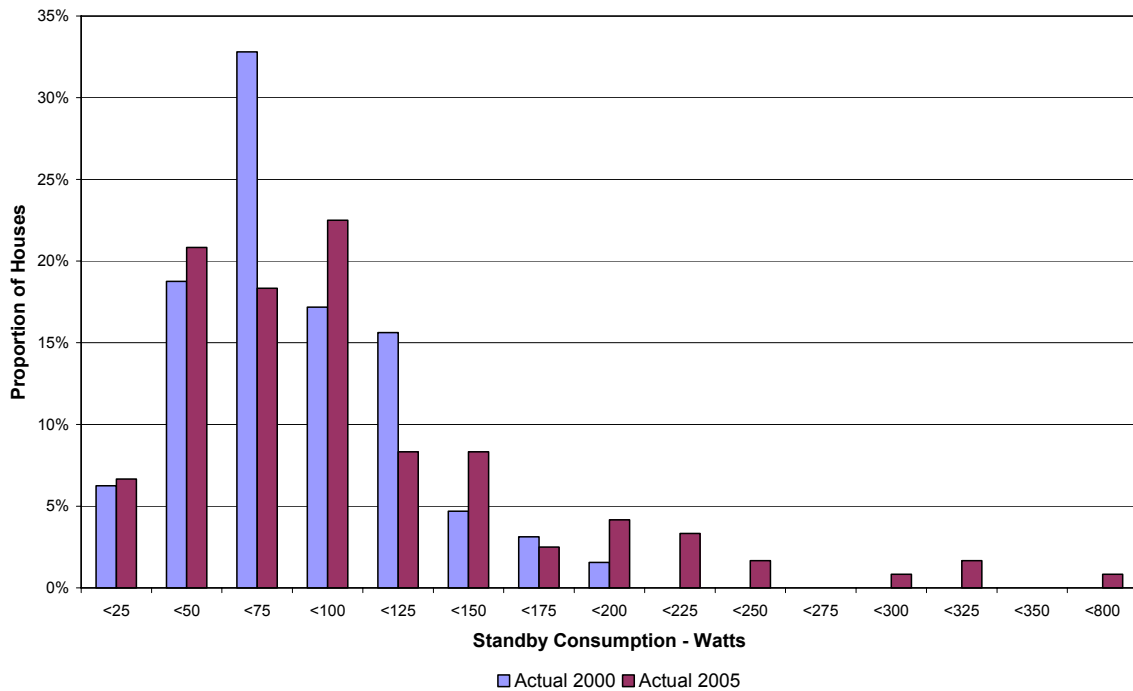
- Increasing appliance ownership, especially for products with standby modes and with external power supplies;
- Increasing prevalence of 'smart' appliances, with functions like fuzzy logic and favourite settings savers;
- Increasing computer ownership and subsequent increase in peripheral ownership;
- Increasing home entertainment appliance ownership, including more complex and higher power DVD recorders, set top boxes and home theatre components.

Despite trends of increased ownership, some products appear to have improved their standby attributes, which will slow the rate of standby power growth. Therefore future trends are potentially complex, depending on the attributes of new products that enter the stock, ownership trends, product turnover and lifetime. Some of the energy



efficiency programs being developed by government will also exert downward pressure on the standby power of new products sold.

Figure 2 – Residential Standby Power – Total Household Standby Distribution; 2000 vs 2005



2.4 Comparison of Common Houses: 2000 vs 2005

A conscious decision was made during the recruiting process for the 2005 intrusive survey to approach all of the participants from the 2000 intrusive survey to see whether they would be willing to participate again in 2005. The response was quite good and some 14 of the original 64 household accepted. So of the 120 houses measured in 2005, 14 had also participated in 2000. It was felt that this would provide an important benchmark between the two data sets and could provide more insight into detailed changes in standby at a house level over the 5 years between the surveys. It would also highlight any methodological issues and give some indication of the turnover of stock in the period.

Only a very preliminary analysis of these houses is included in this report. A more detailed and in depth analysis at a product by product and house by house level is in preparation and should be available as a separate report in the near future.

Table 3 below shows the average total standby results of the 14 houses which participated in both the 2000 and 2005 surveys. The values reported are “adjusted” so that the products included and modes are comparable for the two surveys (see previous section for more details on this adjustment process). The percentage

changes indicated in the final column are the 2005 value relative to what was found in 2000.

Table 3 – Average of Results of Houses which Undertook 2000 and 2005 Surveys

	2000 (corrected)	2005 (corrected)	Change from 2000 to 2005 (corrected)
Average Total Standby (full sample)	74.2 Watts	82.9 Watts	11% increase
Average Total Standby (14 houses)	70.4 Watts	98.4 Watts	40% increase
Average Number of Appliances (full sample)	35.9	66.7	86% increase
Average Number of Appliances (14 houses)	35.5	75.9	113% increase
Average Number of Appliances Using Energy (full sample)	20.9	26.7	28% increase
Average Number of Appliances Using Energy (14 houses)	20.3	30.8	52% increase
Average Number of Appliances Not Using Energy (full sample)	15.0	18.3	22% increase
Average Number of Appliances Not Using Energy (14 houses)	15.2	20.9	38% increase
Average Power of Appliances Using Some Standby Energy (full sample)	3.6 Watts	3.1 Watts	16% decrease
Average Power of Appliances Using Some Standby Energy (14 houses)	3.5 Watts	3.7 Watts	6% increase
Average Total Electricity Used Per Year (full sample)	650.0 kWh/y	726.2 kWh/y	12% increase
Average Total Electricity Used Per Year (14 houses)	616.3 kWh/y	862.0 kWh/y	40% increase

One important observation is that the 14 houses who participated in both surveys were close to the sample average in 2000 (slightly below) in terms of all of the parameters reported above. However, these same houses were somewhat above the sample average in 2005 for most parameters. While the sub-sample set is quite small, and it is not possible to adjust this sample (given the restrictive nature of the eligibility), it does pose some interesting questions about the trends in standby within individual houses.



The selection of participants for the 2005 survey was done quite carefully and covered a wide range of household, income and demographic types. The main parameter within the 2005 participants that is not nationally representative is the higher than average computer ownership (which can be partly explained by the recruitment method). For the 2000 survey, the sample was obtained from a selection of responses from Choice magazine subscribers. It may be that Choice subscribers on average have higher ownership levels for many appliance types and higher average standby power when compared to typical average households.

While the common houses for 2000 and 2005 represent only a small portion of the total sample in the respective surveys, their position relative to the sample as a whole seems to suggest that the participants selected for the 2000 sample were perhaps somewhat biased towards higher standby consumption.

The most important observation, that is true for both the full sample and the sub-sample for both surveys, is that the total number of appliances has increased dramatically (in the order of 100% increase). While this superficially appears to be alarming, initial examination of the data suggests that this is partially due to a more thorough and full documentation of appliances that were in the home in 2005 compared to 2000. But in 2005 there was a substantial increase in the number of appliances that were actually plugged into mains power at the time of the survey and that were using some power when not performing their main function – the enumeration of these products is comparable for both surveys. In the whole sample this increase from 21 to 27 appliances, while in the 14 common houses this increased from 20 to 31. This is perhaps the most important explanatory variable which accounts for the larger increase in standby power of the common houses. Irrespective of how representative the common houses are within the sample for 2000 and 2005, it would appear that the number of appliances which use standby power has increased somewhere between 30% and 50% over the 5 year period.

This is a substantial increase and examination of some of the houses indicates a proliferation of many new electronic devices in some cases. But the trend is not universal in all houses.

The other observation is that the average standby per appliance in 2005 for the common houses is somewhat higher than for the whole sample in 2005. It is hard to explain why the common houses would have worse than average standby attributes for their appliances. The trend is that standby per appliance in the common houses has deteriorated while the whole sample has improved per appliance from 2000 to 2005.

While the above table is useful as a summary device, a separate more in-depth analysis is required to better understand the main differences and reasons for these changes over the 5 year period. Such an analysis would include comparisons of the actual appliances and products found, which appliances are common to the data sets and which ones have been replaced, which new end uses have appeared since the 2000 survey and whether the changes in ownership in these houses are consistent with other sites and wider appliance ownership trends.



Table 4 shows the results for the individual common houses for the 2000 and 2005 surveys. It can be seen that there are very mixed results. About half of the houses (7 out of 14) had a significant increase in total standby power (more than 50% between the surveys). One of these houses had a 200% increase in standby power and one had a 500% increase (although both houses started from a relatively low standby base in 2000). These are real effects and there is a vast array of new electronic equipment in these homes. A further 36% of houses (5 out of 14) had a result that was similar for the 2000 and 2005 survey (within $\pm 25\%$ of the 2000 result), while 2 houses had a large decrease in standby power from 2000 to 2005. One of the houses that had a significant decrease in standby had a very small number of appliances in any case and the occupant had persisted with the behaviour of unplugging or switching off all appliances when not in use after the 2000 survey. The other house with a large reduction in standby had a number of home entertainment products in 2000 with very high standby power consumption and the occupant had consciously disposed of these after they were identified in the 2000 survey. So the two houses with reductions in standby are probably atypical in terms of being representative of trends in the residential sector.

Table 4 – Individual Site Comparisons for the 2000 and 2005 Surveys

House	2000 Total Watts Used (corrected)	2005 Total Watts Used (corrected)	Total Increase from 2000 to 2005	2000 Number of Appliances Using Energy	2005 Number of Appliances Using Energy	2000 Average Watts per Appliance	2005 Average Watts per Appliance
1	32.9	202.3	515%	15	43	2.2	4.7
2	61.6	193.3	214%	24	47	4.1	2.6
3	54.8	42.1	-23%	18	21	3.0	2.0
4	89.8	75.0	-16%	27	36	3.3	2.1
5	18.4	21.2	15%	12	9	1.5	2.4
6	58.9	53.2	-10%	17	24	3.5	2.2
7	74.2	117.8	59%	20	36	3.7	3.3
8	57.1	107.6	88%	20	39	2.9	2.8
9	39.8	20.4	-49%	17	15	2.3	1.4
10	73.4	124.6	70%	25	31	2.9	4.0
11	89.8	125.9	40%	23	35	3.9	3.6
12	100.8	76.0	-25%	19	22	5.3	3.5
13	98.9	171.4	73%	26	55	3.8	3.1
14	134.7	46.7	-65%	21	18	6.4	2.6



Similarly, the number of appliances using energy has changed, mostly as a sizable increase, although for three houses there has been a reduction. Average watts per appliance has for the most part decreased (although some households had an increase), although this overall trend is offset by the increase in the number of appliances using energy in most cases.

Many external factors may have influenced the changes seen at an individual house level; there are most likely changes in household occupant size and structure (more or less occupants, children leaving home) and also changes in other uses on site (eg at least one site had the addition of a home office while one had a home office removed). Increases in the ownership of computers and peripherals, home entertainment devices and appliances requiring external power supplies appear to be a prominent driving force behind most of the increases.

So the trends at a house level in standby power are extremely complex and require more detailed analysis. However, it would certainly appear that there has been a large increase in the number of appliances connected to the mains which use some standby power when not performing their main function. Examination of the whole sample for the 2000 and 2005 samples suggests that the standby power per appliance has improved slightly since 2000, although this is not reflected in the 14 common houses. Analysis of data from the 14 common houses suggest that perhaps that sample in 2000 was skewed towards higher power consumption. While this has no particular impact on the results for the 2005 survey, an overestimate on the average standby for 2000 would mask the apparent growth rate in standby that is likely to have occurred over the 5 year period. So the real growth rate in standby power may be somewhat higher than estimated in the previous section.

2.5 Discussion on Modes

One of the aims of this project was to quantify the magnitude of “standby power” used by all appliances and equipment found in Australian households, in their applicable modes. The definition of what makes up “standby power” in some appliances can be a contentious issues and for some products the primary task is somewhat unclear. The issue is relatively clear cut when considering appliances like VCRs and when a remote control has been used to put the unit into passive standby mode, but becomes less clear with appliances that have continuous draws (eg smoke alarms, alarms, set top boxes).

The core issue is whether the product is in some lower energy state or whether it is simply in “on mode”. For appliances such as refrigerators, freezers and water heaters, which utilise a thermostat to govern behaviour, the products are usually considered to be continuously “on” but they regulate their energy consumption in response to ambient conditions and demands (determination of energy consumption for these products is complex and adequately defined in relevant test procedures). Some other products have no standby modes as they are either off or on (they have no switch and operate when electricity is supplied) – this would include most lighting products and many small kitchen appliances. The issue becomes less clear with appliances like fish



tank bubblers and filters. A fish tank bubbler for example, gives oxygen and filters a tank by means of air pumped through the water, which is the only mode which it has. Similarly, set top box units often have several modes, but they are generally found in “on mode” (most are configured so that they have no effective lower power mode in any case). This mode is where the unit is decoding a signal and possibly downloading data (in terms of program guides etc), but may not in fact be communicating with the television unit. While these appliances may be regarded as being in on mode (not strictly standby), they usually run continuously and their energy consumption is very significant and relatively stable over time, so they have been included.

For this study, appliances that use a thermostat to regulate their power consumption over time (eg refrigerators, freezers, water beds, water heaters, fish tank heaters etc) have not been included. Appliances like set top boxes, computers (where the owner indicates that they are left on), air fresheners, fish tank equipment (with the exception of lights and heaters) and clocks (including clock radios), have been included, even though they may be regarded as being on. For appliances that have a continuous power draw (eg smoke alarms, security systems), these have been considered as having standby attributes and are generally seen as being in active standby mode.

Where possible, information was recorded on whether the product had a remote control. However, not all remote controls were present when information was recorded and sometimes they were lost or did not work. So information reported on the share of products with a remote control are likely to be underestimated in many cases.

2.6 User Behaviour and Appliance Passive Standby Settings

Passive standby settings are generally only found on office type equipment. They enable the user to set whether these settings will be used (ie the product is programmed to enter a lower power state) and also to define the time until that state is initiated.

For any appliance where the user could define these passive standby settings, information on whether the setting was active and the time before powering to a lower mode were both recorded. Table 5 below shows the findings for user defined passive settings.

Table 5 – Summary of User Defined Passive Standby Settings

Appliance Type		Statistic	Number of Readings
Computers	Percentage of Products with Standby Settings Enabled	29%	120
	Average Time to Activate	58 mins	35
Laptops	Percentage of Products with Standby Settings Enabled	73%	48
	Average Time to Activate	18 mins	35
CRT Monitors	Percentage of Products with Standby Settings Enabled	72%	82
	Average Down Time	37 mins *	59
LCD Monitors	Percentage of Products with Standby Settings Enabled	82%	34
	Average Down Time	21 mins *	28

Note: * This is the average time that the computer had set to turn the screen off in the screen power management properties.



3. Detailed Results by Product

The following provides detailed results for each appliance or appliance category for all the households with the product. Appliance categories consisting of similar appliance types were created where appropriate to consolidate results and provide more statistical robustness to the results. Appliance types/categories include:

- Major Appliances;
 - Air Conditioners and Related Equipment'
 - Whitegoods (such as Clothes Washer, Clothes Dryers, and Dishwashers)'
 - Heating Appliances (both gas and electric)'
 - Water Heaters (both gas and electric)'
 - Cooking Appliances (such as Cooktops, Ovens, Microwaves etc).
- Telephones and other Office Equipment;
 - Telephones and Accessories (such as Cordless Phones, Answering Machines etc),
 - Office Equipment (such as Multifunction Devices, Facsimiles etc).
- Home Entertainment;
 - Home Audio Visual Equipment (such as DVD Players, VCRs, DVD/VCRs, Integrated Stereos, Portable Stereos, Amplifiers, AV Receivers etc),
 - Other Audio Equipment.
- Set Top Boxes;
- Televisions;
- Computers and Peripherals (such as Computers, Computer Monitors (CRT and LCD), Computer Speakers, Hubs, Modems, Printers, Scanners etc);
- Monitoring and Continuous Appliances (such as Remote Garage Door Openers, Smoke Alarms, Powerboards, Security Systems, Clock Radios etc);
- External Power Supplies;
- Other Items;
 - Home Cleaning Aids,
 - Lighting,



- Miscellaneous Appliances (such as Game Consoles, Battery Rechargers etc),
- Personal Health and Hygiene Products (such as Rechargeable Toothbrushes, Hair Straighteners, Air Fresheners etc),
- Small Kitchen Appliances (such as Breadmakers, Kettles, Toasters, Espresso Machines, Juicers etc),
- Tools.

3.1 Major Appliances

3.1.1 Air Conditioners and Related Equipment

The air conditioner and related equipment category is made up of appliances including:

- Window Wall Air Conditioners
- Split System Air Conditioners
- Ducted Air Conditioners (mainly refrigerative)
- Pedestal Fans
- Tower Fans
- Ceiling Fans

There were other air conditioner types found in smaller numbers (mainly portable evaporative units) and mostly these had no relevant standby mode.

Window wall air conditioner ownership was found to be 0.16 units per house in 2005, with ownership probably steady or slightly decreasing. About 95% of units were found to have hard off switches (with 39% of these being hardwired or inaccessible) and found to use 0.0 Watts in off mode. About 5% of units (one unit) were found to have soft off switches, consuming 3.5 Watts in off mode.

Ducted air conditioner ownership was found to be below 0.1 units per house in 2005, with ownership probably slightly increasing. All units were found to be hardwired or inaccessible. For both these reasons, no standby power consumption analysis has been undertaken. Of note though, is that the average age of ducted air conditioners is 0.8 year, potentially indicating increasing ownership.

Pedestal fan ownership was found to be 0.57 units per house in 2005, with ownership probably steady. About 99% of units were found to have a hard off switch and about 97% of units were found to use 0.0 Watts in off mode.

Tower fan ownership was found to be 0.49 units per house in 2005, with ownership probably steady. About 95% of units were found to have a hard off switch and about 97% of units were found to use 0.0 Watts in off mode.



Ceiling fan ownership was found to be 1.02 units per house in 2005, with ownership probably steady. As all units were found hardwired or inaccessible, 97% of units were assumed to use 0.0 Watts in off mode. The other 3% had remote control capabilities and were assumed to use an average of 2.5 Watts in passive standby mode.

Split system air conditioner ownership was found to be 0.38 units per house in 2005, with ownership probably increasing. About 82% of units were found to have no off switch, all of these were found to be in passive standby mode. About 11% of units were found to have a soft off switch, with 60% of these found in off mode and the rest in passive standby mode. About 7% of units were found to have a hard off switch, all were found in off mode. About 91% of units were found to be hardwired or inaccessible and the same percentage were found to have remote control capabilities. The average passive standby mode of split system air conditioners was found to be 10.7 Watts, while the average off mode was found to be 1.9 Watts. Please note, both these average power consumptions should be interpreted with caution due to the sample size of the units able to be measured (four and one unit for passive and off mode respectively). The average age of split system air conditioners was found to be 4.6 years.

3.1.2 *Whitegoods*

The whitegoods category is made up of appliances including:

- Clothes dryers;
- Clothes washing machines;
- Dishwashers.

Refrigerators and freezers have no standby mode that is relevant (they are always “on”) but details on the brand and models present in households covered by the survey were recorded.

Clothes Dryers

Clothes dryer ownership was found to be 0.63 units per house, with ownership probably steady or increasing slightly. This ownership is higher than that found by ABS in its 4602 report, possibly due to under representation by ABS or a sample bias in the residential survey. Almost all clothes dryers were found in off mode or unplugged, although one unit was found to have no hard or soft off switch and was plugged in, therefore being in active standby mode all the time. The average active standby was found to be 3.3 Watts and the average off mode was found to be 0.2 Watts. Four units were found to have delay start capabilities, with none of the participants answering that they use this function. The average power consumption of delay start mode was found to be 4.0 Watts. The average age of clothes dryers was found to be 10.3 years.



Table 6 – Summary of Clothes Dryer Findings

Clothes Dryers	Statistic	Number of Readings
Ownership	0.63	75
Average Age	10.3 years	72
Average Active Standby	3.3 Watts	9
Minimum Active Standby	0.5 Watts	9
Maximum Active Standby	4.3 Watts	9
Average Off Mode	0.2 Watts	74
Minimum Off Mode	0.0 Watts	74
Maximum Off Mode	3.6 Watts	74
Average Delay Start Mode	4.0 Watts	4

Figure 3 below shows the off mode power consumption for clothes dryers for 2005. It can be seen that the vast majority of units (just over 80%) recorded a power consumption of less than 0.0 Watts in off mode.

Note: Figure 3 below does not use the standard bin sizes.

Figure 3 – Off mode power consumption of Clothes Dryers for 2005

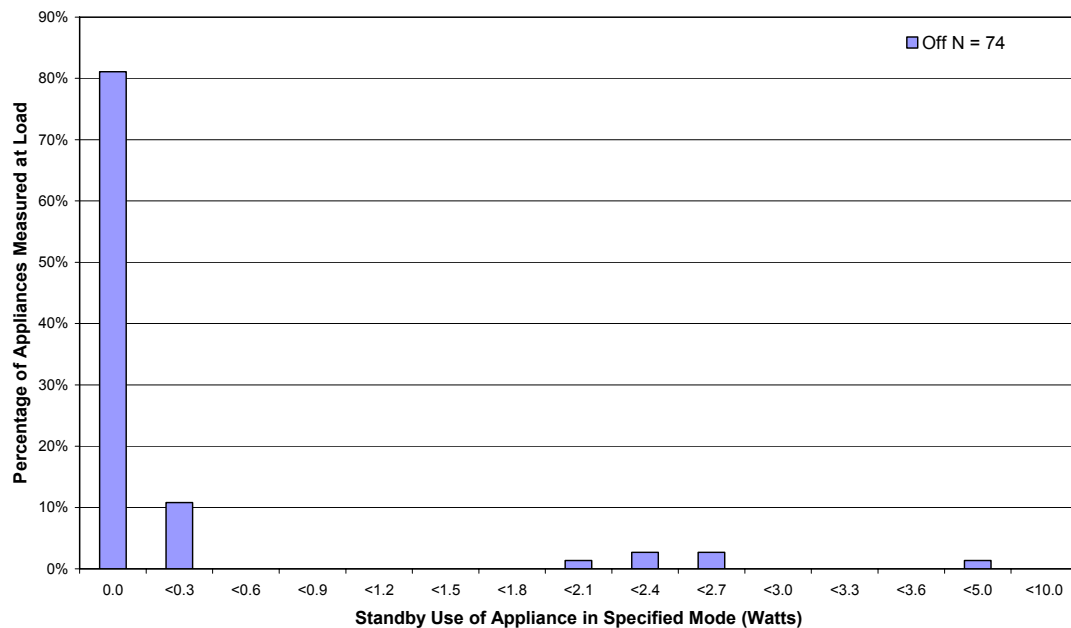
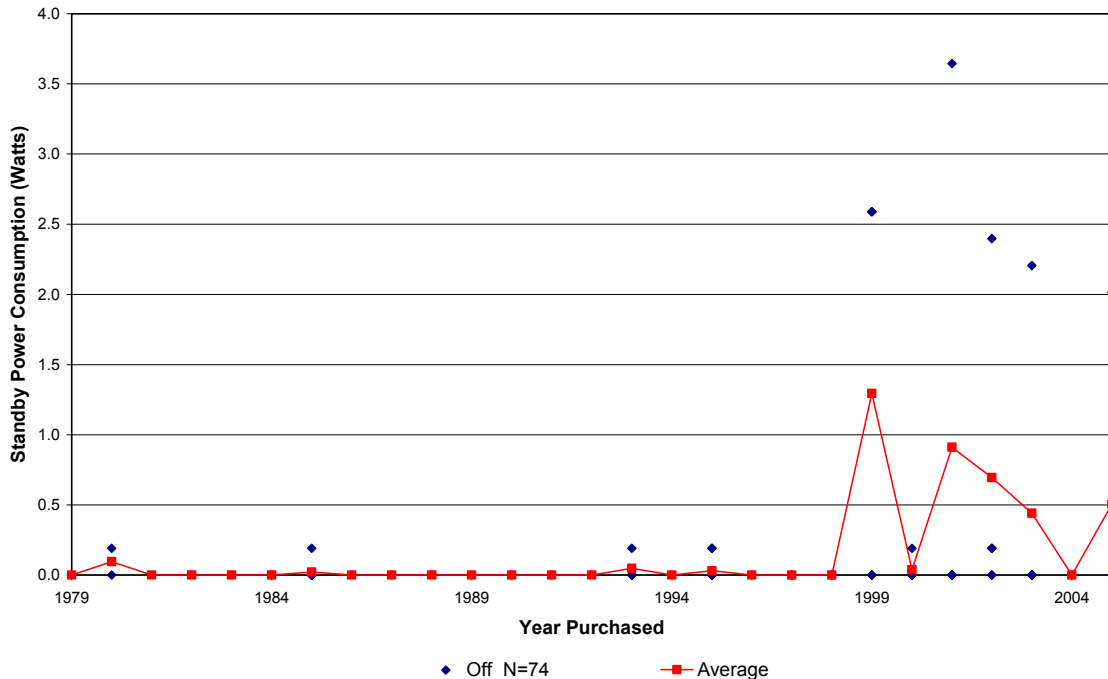


Figure 4 below shows the off mode power consumption of clothes dryers compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has increased over time. This can mainly be explained in terms of migration from simple switches to electronic controls and soft switches in recent years.

Figure 4 – Clothes Dryers measured in off mode and year purchased



Clothes Washers

Clothes washing machine ownership was found to be 0.95 units per house, with ownership probably steady. This is almost exactly the ownership found by the ABS in its 4602 report. The sample was made up of 73% top loaders, 26% front loaders and less than 1% twin tubs.

About 68% of units were found to be off, 9% were in active standby and 24% were switched off at the power outlet or unplugged. Alarming, 25% of the front loaders were found to be left in active standby mode when not in use. About 67% of units were found to have a hard off switch, about 32% had a soft off switch. Two units were found to have no hard or soft off switch. The average active standby was found to be 5.8 Watts and the average off mode was found to be 1.9 Watts. About 22% of clothes washers were found to have delay start capabilities, with about 24% of participants with these machines answering that they use this function. The average power consumption for delay start mode was found to be 7.1 Watts. The average age of clothes washers was found to be 7.0 years.



Table 7 – Summary of Clothes Washer Findings

Clothes Washers	Statistic	Number of Readings
Ownership	0.95	114
Average Age	7.0 years	110
Average Active Standby	5.8 Watts	65
Minimum Active Standby	0.5 Watts	65
Maximum Active Standby	17.3 Watts	65
Average Off Mode	1.9 Watts	112
Minimum Off Mode	0.0 Watts	112
Maximum Off Mode	9.3 Watts	112
Average Delay Start Mode	7.1 Watts	25

Figure 5 below shows the active standby power consumption of clothes washers for 2005. It can be seen that there are a range of consumptions, with the majority (75%) falling between 2 Watts and 8 Watts.

Figure 5 – Active standby power consumption of Clothes Washers for 2005

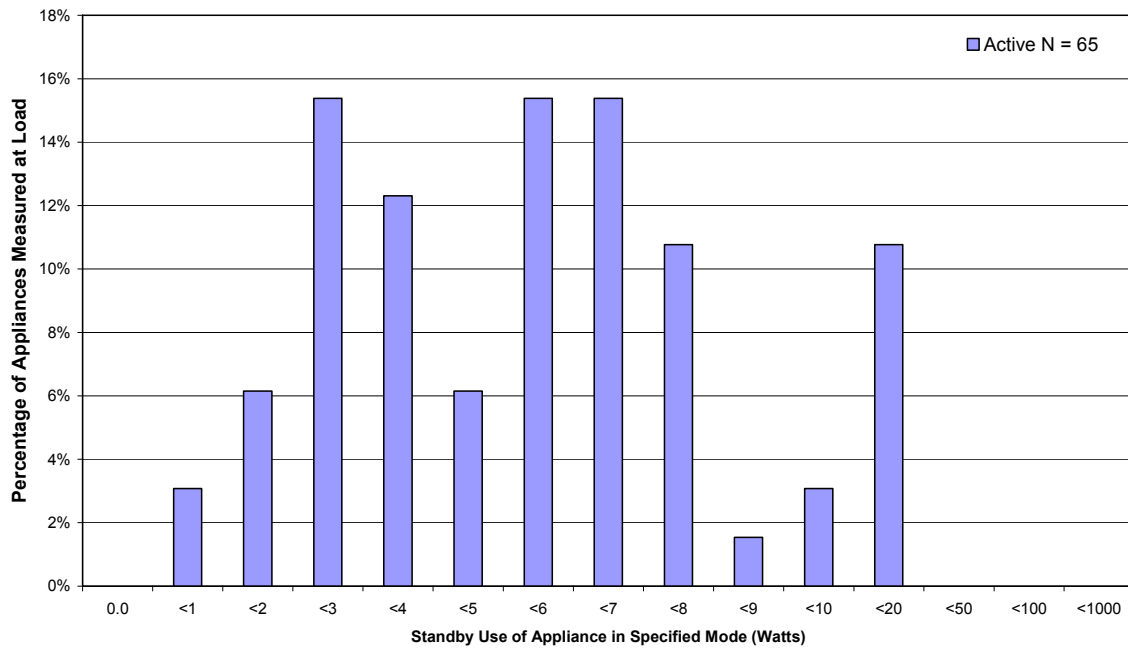


Figure 6 below shows the off mode power consumption for clothes washers for 2005. It can be seen that just over half of the units (54%) consume 0.0 Watts in off mode. The rest of the readings are spread relatively evenly from less than 1 Watt to less than 10 Watts.

Figure 6 – Off mode power consumption of Clothes Washers for 2005

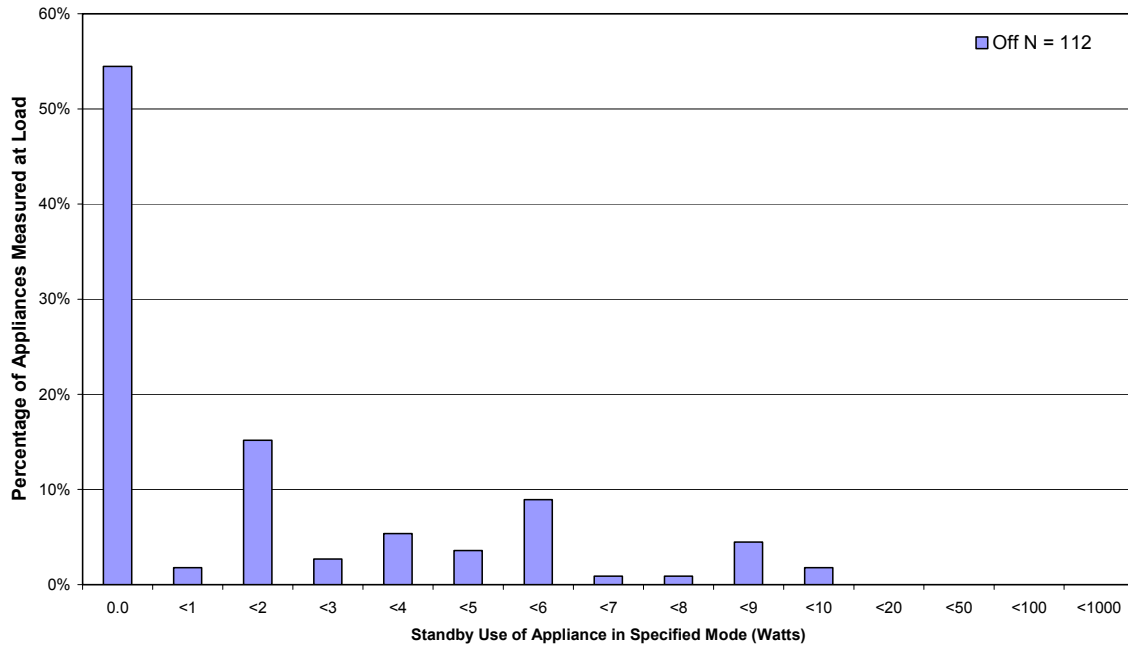
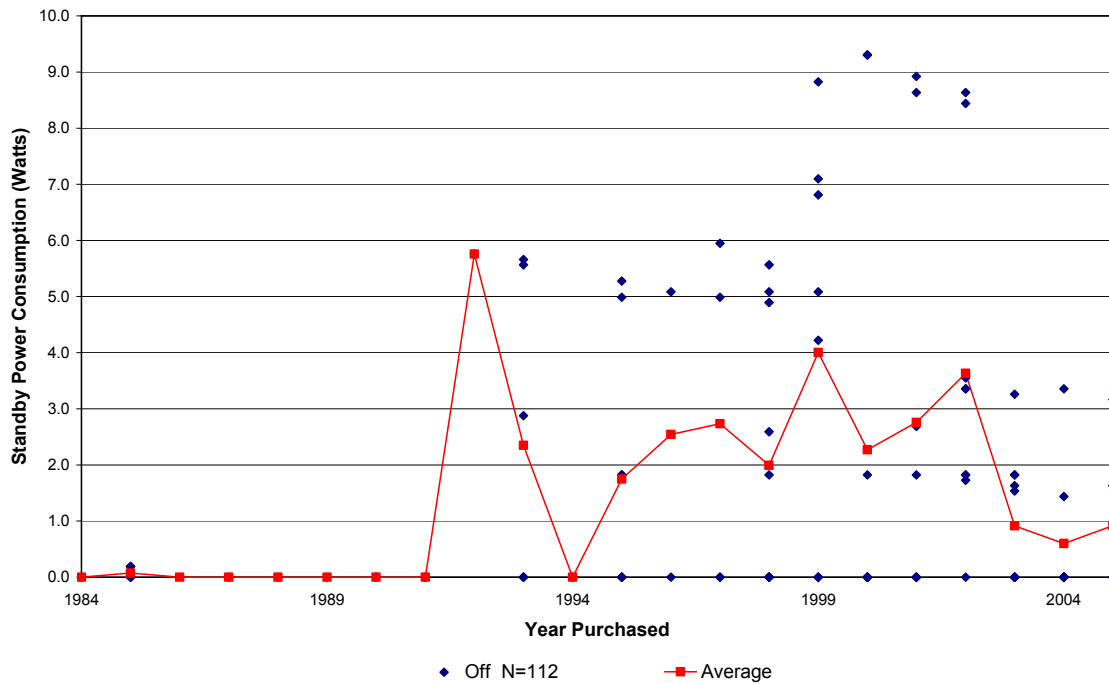


Figure 7 below shows the off mode power consumption of clothes washers compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has decreased over time. This can mainly be explained in terms of migration from simple switches to electronic controls and soft switches in recent years. It should also be noted that many high values prior to 2003 (typically from 7W to 10W) are for Fisher & Paykel models which have a substantial market share. Since 2003, they have altered their models to reduce power in off mode to around 1W to 2W for most models (although none of these were included in this survey). A large number of models with hard off switches use 0.0 Watts in off mode.



Figure 7 - Clothes Washers measured in off mode and year purchased



Dishwashers

Dishwasher ownership was found to be 0.57 units per house, with ownership increasing. This ownership is higher than that found by ABS in its 4602 report, probably due to the income sample bias of the residential survey. About 76% of units were found to be switched off, with the rest found in active standby mode. About 66% of units were found to have a hard off switch, about 33% with a soft switch off. One unit was found to have no hard or soft off switch. About 28% of units were found to be hardwired or inaccessible. The average active standby was found to be 2.8 Watts and the average off mode was found to be 0.8 Watts. About 25% of dishwashers were found to have delay start capabilities, with 20% of participants with these machines indicating that they use this function. The average power consumption for delay start mode was found to be 3.8 Watts. The average age of dishwashers was found to be 6.6 years.



Table 8 – Summary of Dishwashing Machine Findings

Dishwashers	Statistic	Number of Readings
Ownership	0.57	68
Average Age	6.6 years	62
Average Active Standby	2.8 Watts	34
Minimum Active Standby	0.3 Watts	34
Maximum Active Standby	7.0 Watts	34
Average Off Mode	0.8 Watts	44
Minimum Off Mode	0.0 Watts	44
Maximum Off Mode	4.4 Watts	44
Average Delay Start Mode	3.8 Watts	17

Figure 8 below shows the active standby power consumption of dishwashers for 2005. It can be seen that about 29% of units had a power consumption of between 2 Watts and 3 Watts, 36% of units were found to use less than 2 Watts and the other 35% of units found to use more than 3 Watts.

Figure 8 - Active standby power consumption of Dishwashers for 2005

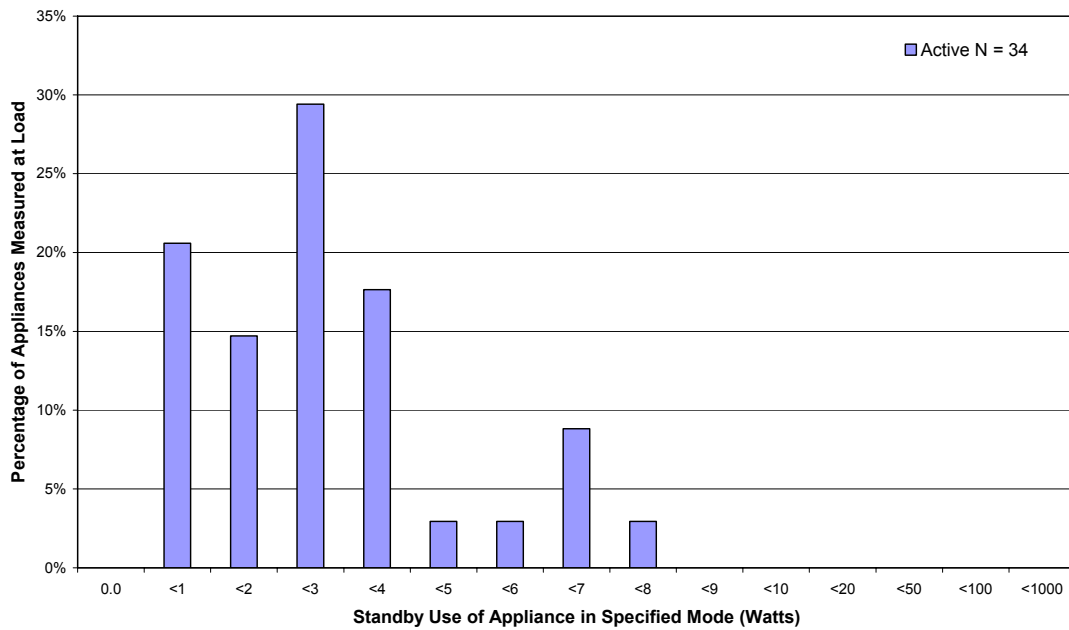


Figure 9 below shows the off mode power consumption for dishwashers for 2005. It can be seen that about 64% of the units had a power consumption of 0.0 Watts, with the rest of the sample having a range of consumptions up to 5.0 Watts

Note: Figure 9 below does not use standard bin sizes.

Figure 9 – Off mode power consumption of Dishwashers for 2005

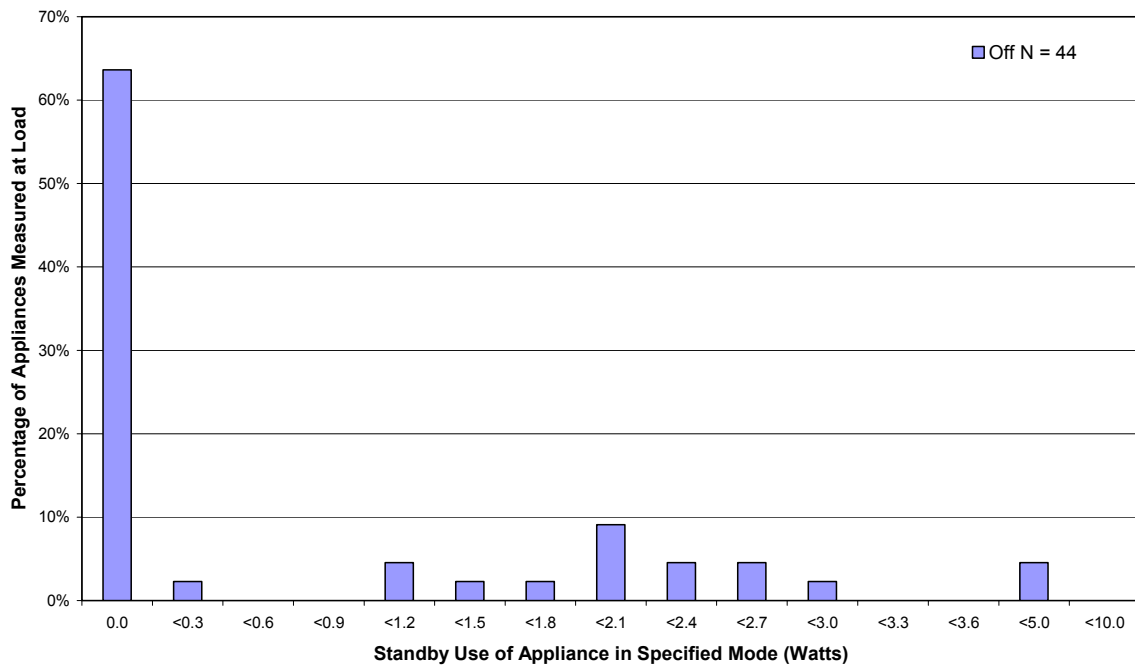
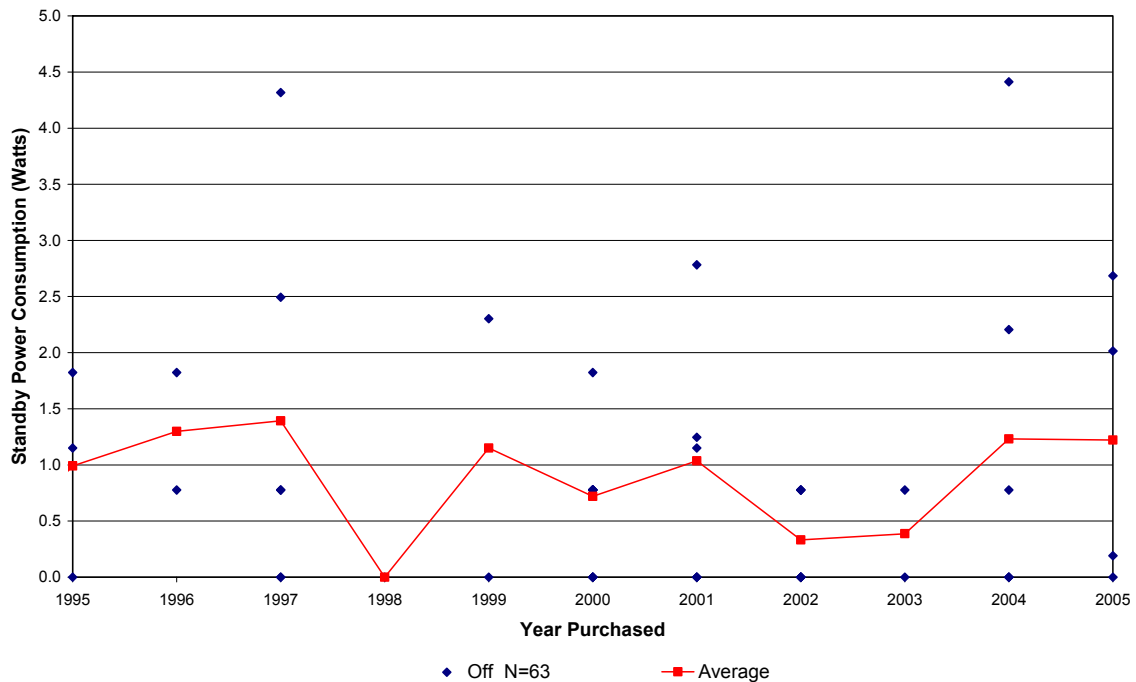


Figure 10 below shows the off mode power consumption of dishwashers compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has increased slightly as time has progressed. This can mainly be explained in terms of migration from simple switches to electronic controls and soft switches in recent years. Note there are some data points for years before 1995, but these points are intermittent and not very illustrative.



Figure 10 - Dishwashers measured in off mode and year purchased

3.1.3 Heating Appliances

The heating appliances category is made up of appliances including:

- Electric Heaters Panel Heaters;
- Electric Fan Heaters;
- Electric Oil Heaters;
- Electric Resistance Heaters;
- Gas Convection Heaters;
- Gas Ducted Heaters;
- Gas Radiant Heaters.

About 95% of electric panel heaters (usually fixed, wall mounted radiant panels which operate at relatively low temperature) were found to have no power consumption in off mode. All units measured were found to have a hard off switch. Electric convection heater ownership was found to be 0.13 units per house in 2005, with ownership probably steady.

About 92% of electric fan heaters were found to have no power consumption in off mode. All units measured were found to have a hard off switch. Electric fan heater

ownership was found to be 0.33 units per house in 2005, with ownership probably steady.

About 85% of electric oil heaters (usually mobile radiant panels which use an internal heat transfer medium and which operate at relatively low temperature) were found to have no power consumption in off mode, while the remainder had some power consumption in this mode. All units measured were found to have a hard off switch. The average off mode power consumption was found to be 0.2 Watts. Electric oil heater ownership was found to be 0.38 units per house in 2005, with ownership probably steady.

Gas radiant heaters (usually fixed into position, some were flued) were found to have no power consumption in off mode. All units measured were found to have a hard off switch. Gas radiant heater ownership was found to be 0.12 units per house in 2005, with ownership probably steady or slightly decreasing.

Electric Resistance Heaters

The ownership for electric resistance heaters (high temperature radiant heaters with or without convection capability, mostly portable) was found to be 0.19 units per house in 2005, with ownership probably steady. About 78% of units were found to have a hard off switch, with 56% of these units found unplugged. About 17% of units were found to have no off switch and 4% of units were found to have a soft off switch. The average off mode for electric resistance heaters was found to be 0.8 Watts.

Table 9 – Summary of Electric Resistance Heater Findings

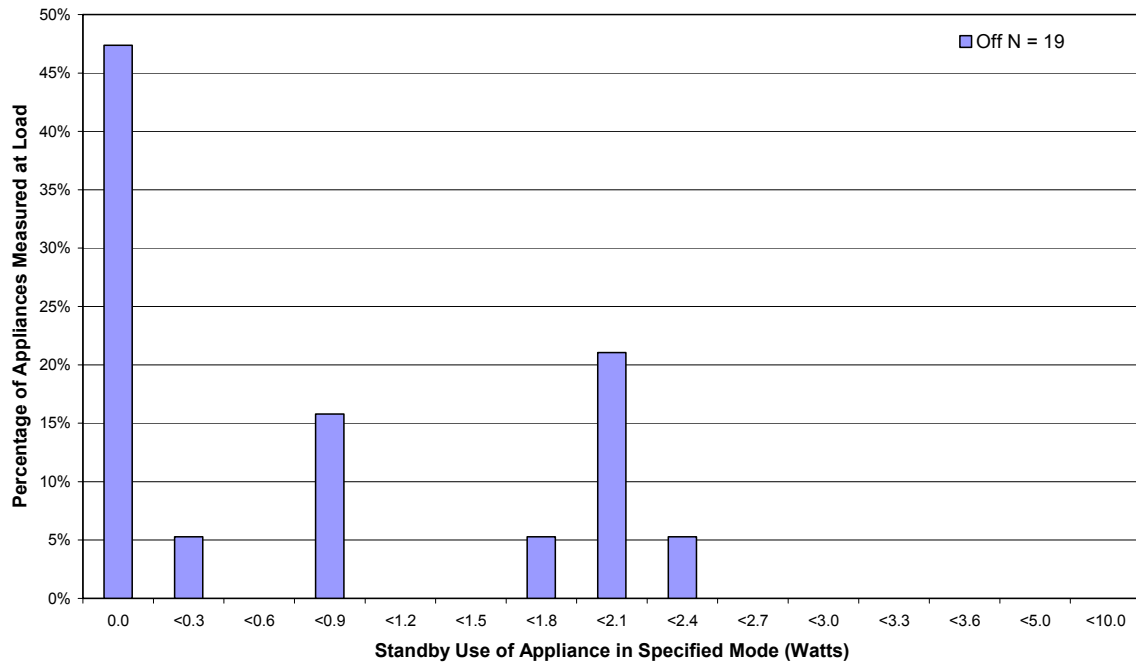
Electric Resistance Heaters	Statistic	Number of Readings
Ownership	0.19	23
Average Off Mode	0.8 Watts	19
Minimum Off Mode	0.0 Watts	19
Maximum Off Mode	2.1 Watts	19

Figure 11 below shows the off mode power consumption for electric resistance heaters in 2005. It can be seen that a large percentage of units (47%) consume no standby power.

Note: Figure 11 below does not use the standard bin sizes.



Figure 11 - Off mode power consumption for Electric Resistance Heaters in 2005



Gas Convection Heaters

The ownership of gas convection heaters (usually floor mounted units, usually flued) was found to be 0.18 units per house in 2005, with ownership probably steady or slightly increasing. About 67% of units were found to have soft off switches, with about 57% of these found switched off, 38% found unplugged and about 5% found in passive standby mode. About 29% of units were found to have a hard off switch and about 5% were found to not have an off switch. About 43% of units were found to have remote control capabilities. About 10% of units were found to have delay start (timer) capabilities, the average delay start mode was found to be 11.2 Watts. The average passive standby mode for gas convection heaters was found to be 7.2 Watts, while the average off mode was found to be 3.9 Watts. The average age of gas convection heaters was found to be 6.3 years.

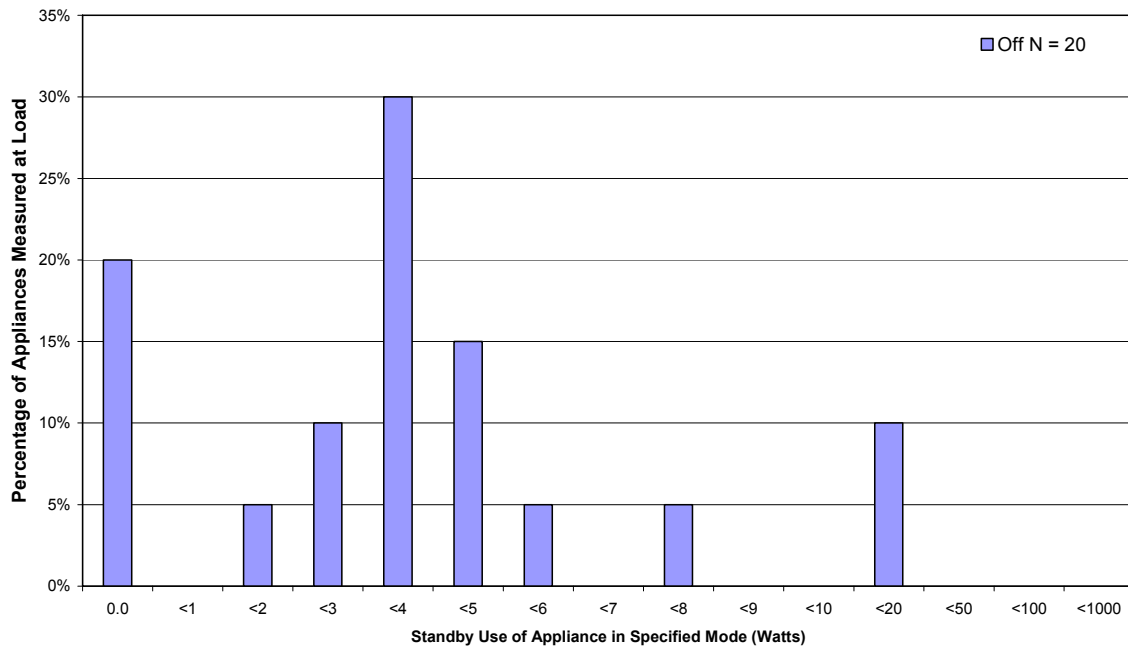


Table 10 – Summary of Gas Convection Heater Findings

Gas Convection Heaters	Statistic	Number of Readings
Ownership	0.18	21
Average Age	6.3 years	20
Average Passive Standby Mode	7.2 Watts	3
Minimum Passive Standby Mode	6.8 Watts	3
Maximum Passive Standby Mode	7.6 Watts	3
Average Off Mode	3.9 Watts	20
Minimum Off Mode	0.0 Watts	20
Maximum Off Mode	11.2 Watts	20
Average Delay Start Mode (Timer)	11.2 Watts	2

Figure 12 below shows of the off mode power consumption for gas convection heaters in 2005. It can be seen that there is a range of power consumptions, with the highest percentage (30%) of units consuming between 3.0 Watts and 5.0 Watts.

Figure 12 – Off mode power consumption for Gas Convection Heaters in 2005



Gas Ducted Heaters

The ownership of gas ducted heaters was found to be 0.13 units per house in 2005, with ownership probably steady. About 53% of units were found to have a standby switch (digital control panel on wall) and all these were found to be in passive standby mode. About 47% of units were found to have a hard off switch (analogue control panel on wall) and all these were found to be in off mode. About 87% of units were found to be hardwired or inaccessible. The average off mode was found to be 5.8 Watts (should be interpreted with caution as this is made up of two units). The average age of gas ducted heaters was found to be 9.0 years.

3.1.4 Water Heaters

The water heater category is made up of appliances including:

- Electric Water Heaters;
- Gas Water Heaters;
- Solar/Electric Water Heaters;
- Gas Instantaneous Water Heaters.

With the exception of gas instantaneous water heaters, all the appliances in the above list did not have any relevant standby modes. They have therefore not been included in this report.

The ownership of gas instantaneous water heaters was found to be 0.14 units per house in 2005, with ownership probably steady or slightly increasing. All units were found to be in active standby mode. The average active standby mode was found to be 9.6 Watts

Table 11 – Summary of Gas Instantaneous Water Heaters

Gas Instantaneous Water Heaters	Statistic	Number of Readings
Ownership	0.14	17
Average Active Standby Mode	9.6 Watts	7
Minimum Active Standby Mode	7.1 Watts	7
Maximum Active Standby Mode	11.1 Watts	7



3.1.5 Cooking Appliances

The cooking appliances category is made up of appliances including:

- Cooktops (electric and gas);
- Ovens (electric and gas);
- Stoves (electric, gas and combination);
- Ranges; and
- Microwaves (non convection and convection based).

Both types of cooktop were also found to be mostly 100% hardwired or inaccessible so few measurements were possible. Limited readings for gas cooktops from other studies indicate these mostly use zero power except during ignition. Little data is available for electric cooktops as these are usually hard wired. Ranges were also found to have no standby power consumption in off mode and all were found to have hard off switches. Both of these two appliance types have been excluded from further analysis. Gas oven and combination stove ownership was found to be less than 0.1 units per house and has been ignored in terms of analysis.

Electric oven ownership was found to be 0.42 units per house in 2005, with ownership probably steady. As 94% of units found were hardwired or inaccessible, an estimated average off mode of 1.0 Watt was used.

Electric stove ownership was found to be 0.13 units per house in 2005, with ownership probably steady. As 100% of the units found were hardwired or inaccessible, an estimated average off mode of 0.2 Watts was used (taken from Store Report).

Gas stove ownership was found to be 0.32 units per house in 2005, with ownership probably steady. As 95% of units found were hardwired or inaccessible, an estimated average off mode of 0.9 Watts was used.

Table 12 – Summary of Selected Cooking Appliance Findings

Appliance Type		Statistic	Number of Readings
Electric Ovens	Ownership	0.42	50
	Average Off Mode	1.0 Watts	50
Electric Stoves	Ownership	0.13	16
	Average Off Mode	0.2 Watts	16
Gas Stoves	Ownership	0.32	38
	Average Off Mode	0.9 Watts	38



Microwaves

The ownership for non convection microwaves was found to be 0.77 units per house in 2005, with ownership probably steady or slightly increasing. The combined ownership of convection and non-convection microwaves was found to be 0.86 which is lower than that found in the ABS 4602 report (ABS does not separate the two microwave types). About 7% of units were found unplugged, about 10% were found off (as they had hard off switches) and the other 83% were found in passive standby mode (as they had no off switch). The passive standby mode for non convection microwaves was found to be 3.0 Watts and the average off mode, where present, was found to be 0.0 Watts.

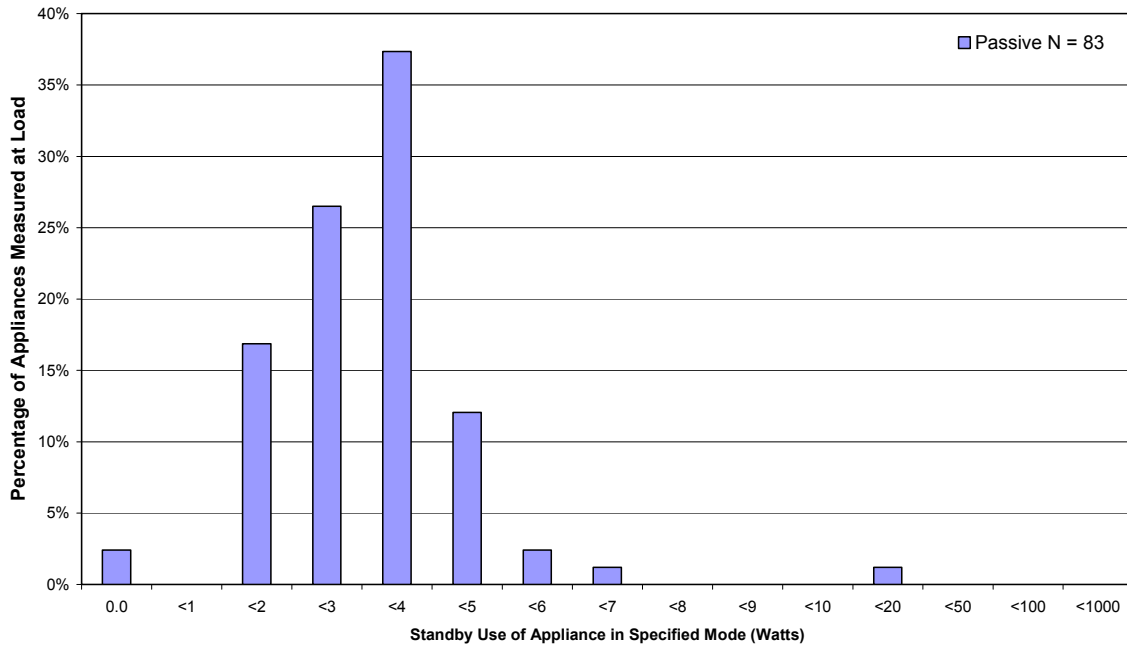
Table 13 – Summary of Non Convection Microwave Findings

Non Convection Microwaves	Statistic	Number of Readings
Ownership	0.77	92
Average Passive Standby Mode	3.0 Watts	83
Minimum Passive Standby Mode	0.0 Watts	83
Maximum Passive Standby Mode	14.2 Watts	83
Average Off Mode	0.0 Watts	9

Figure 13 below shows the passive standby mode power consumption for non convection microwaves in 2005. It can be seen that the majority of units (81%) consume between 2.0 Watts and 5.0 Watts. The models with no power consumption are simple dial timer units without a clock and therefore do not have passive standby mode.



Figure 13 - Passive standby mode power consumption for Non Convection Microwaves in 2005



The ownership for convection based microwaves was found to be 0.09 units per house in 2005, with ownership probably steady or slightly increasing. All were found in passive standby mode and none had off switches. The average passive standby mode for convection based microwaves was found to be 4.0 Watts.

Table 14 – Summary of Convection Microwave Findings

Convection Microwaves	Statistic	Number of Readings
Ownership	0.09	11
Average Passive Standby Mode	4.0 Watts	11
Minimum Passive Standby Mode	1.7 Watts	11
Maximum Passive Standby Mode	5.4 Watts	11

3.2 Telephones and Other Office Equipment

3.2.1 Telephones and Accessories

The telephones category is made up of appliances including:

- Answering Machines;
- Cordless Phones – Base Station;
- Cordless Phones – Extra Handset;
- Mobile Phone Chargers;
- PABX;
- Conventional Phones;
- ISDN Boxes.

Please note that the bottom four appliance types of the above list had relevant standby modes, but the ownership for each was less than 0.1 per house, so they have not been individual analysed or reported. Also note that mobile phone chargers were generally classified as external power supplies except where the charger plugged into a mobile phone base station of some sort (which is uncommon).

Answering Machines

The ownership of answering machines was found to be 0.17 units per house in 2005, with ownership probably steady or slightly decreasing. Please note that cordless phones – base stations sometimes included a built in answering machine, but these have been included as cordless phones and not answering machines. All of the units were found in active standby mode and none had a power switch of any type. About 25% of the units were found to be inaccessible. The average active standby for answering machines was found to be 3.1 Watts.

Table 15 – Summary of Answering Machine Findings

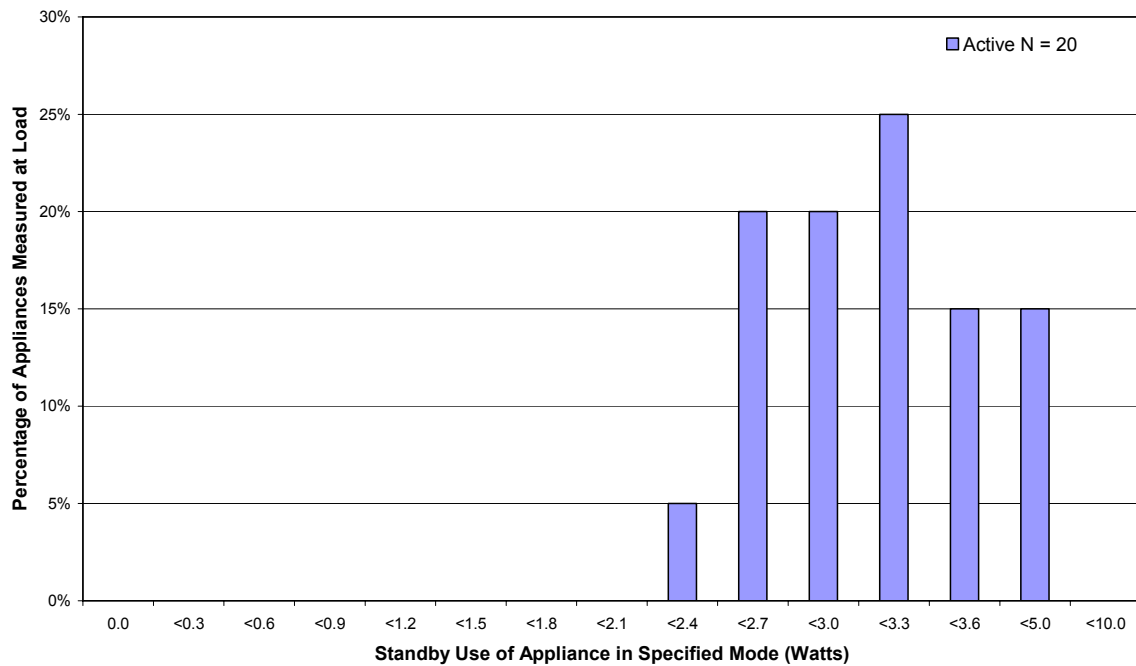
Answering Machines	Statistic	Number of Readings
Ownership	0.17	20
Average Active Standby Mode	3.1 Watts	20
Minimum Active Standby Mode	2.4 Watts	20
Maximum Active Standby Mode	4.8 Watts	20



Figure 14 below shows the active standby mode power consumption for answering machines in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (25%) had a consumption of between 3 Watts and 3.3 Watts.

Note: Figure 14 below does not use the standard bin sizes.

Figure 14 – Active standby mode power consumption for Answering Machines in 2005



Cordless Phones – Base Stations & Extra Handsets

Cordless phones usually consist of a portable handset with a base station. Additional hand sets which communicate with the main base station but with their own base charger are also included. Although it can be difficult to differentiate between the two different appliance types, they do have different standby qualities, and even though they are found in conjunction with each other, the results have been reported separately. Base stations tend to have a slightly higher power consumption due to the presence of a transmitter and occasionally an answering machine.

Cordless phone base station ownership was found to be 0.98 units per house in 2005, with ownership steady or slightly increasing. About 16% of these units also had an answering machine function. About 75% of units were found to be in active standby mode (where the phone is on the cradle and may be charging), about 22% were found to be in passive standby mode (where the phone is off the cradle) and about 4% of units were found to be unplugged. All units were found to have an external power supply (please note all standby readings for cordless phone base stations will include the power consumption of the external power supply when connected to the base station – a reading for the power supply disconnected will be included in external



power supplies). These have been measured separately and have been analysed in their respective section). The statistics for the active standby mode included below should be interpreted with some caution due to the variable state of charge of the handset when measured which could not be controlled for field measurements. The average active standby for cordless phone base stations was found to be 3.3 Watts, while the average passive standby was found to be 2.4 Watts.

Table 16 – Summary Cordless Phone Base Station Findings

Cordless Phone Base Stations	Statistic	Number of Readings
Ownership	0.98	118
Average Active Standby Mode	3.3 Watts	115
Minimum Active Standby Mode	1.2 Watts	115
Maximum Active Standby Mode	6.7 Watts	115
Average Passive Standby Mode	2.4 Watts	116
Minimum Passive Standby Mode	0.7 Watts	116
Maximum Passive Standby Mode	5.1 Watts	116

Figure 15 below shows the active standby mode power consumption for cordless phone base stations in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (33%) using between 5.0 Watts and 6.0 Watts in active standby mode.

Note: Figure 15 below does not use standard bin sizes.

Figure 15 – Active standby mode power consumption for Cordless Phone Base Stations in 2005

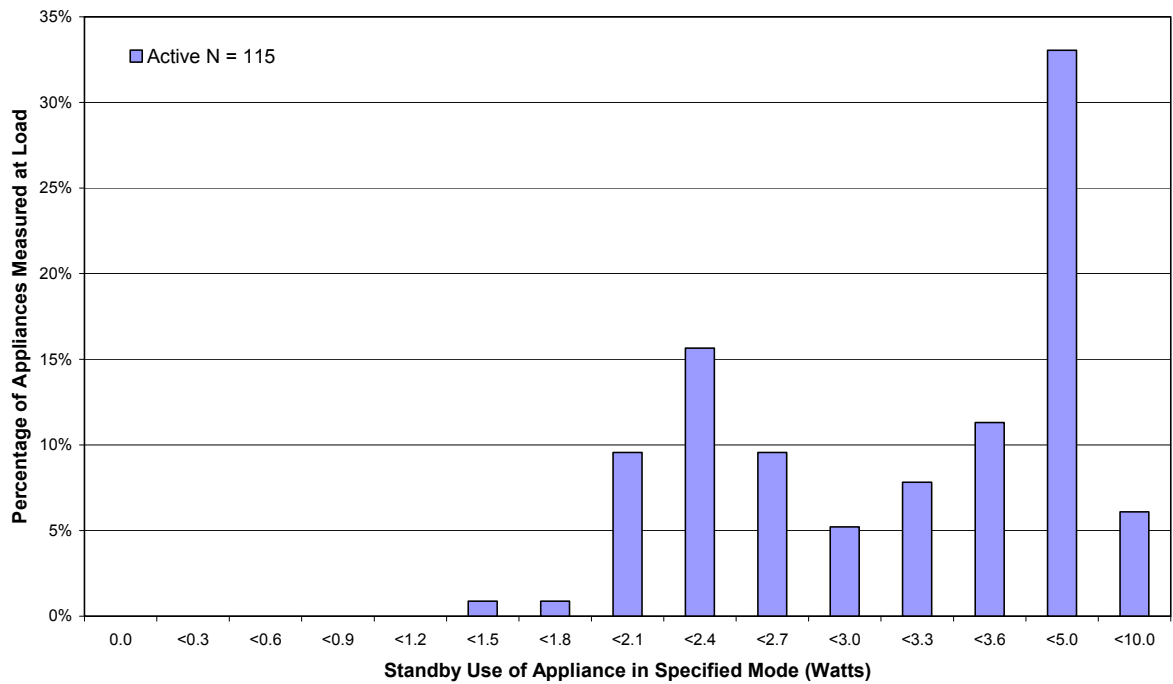
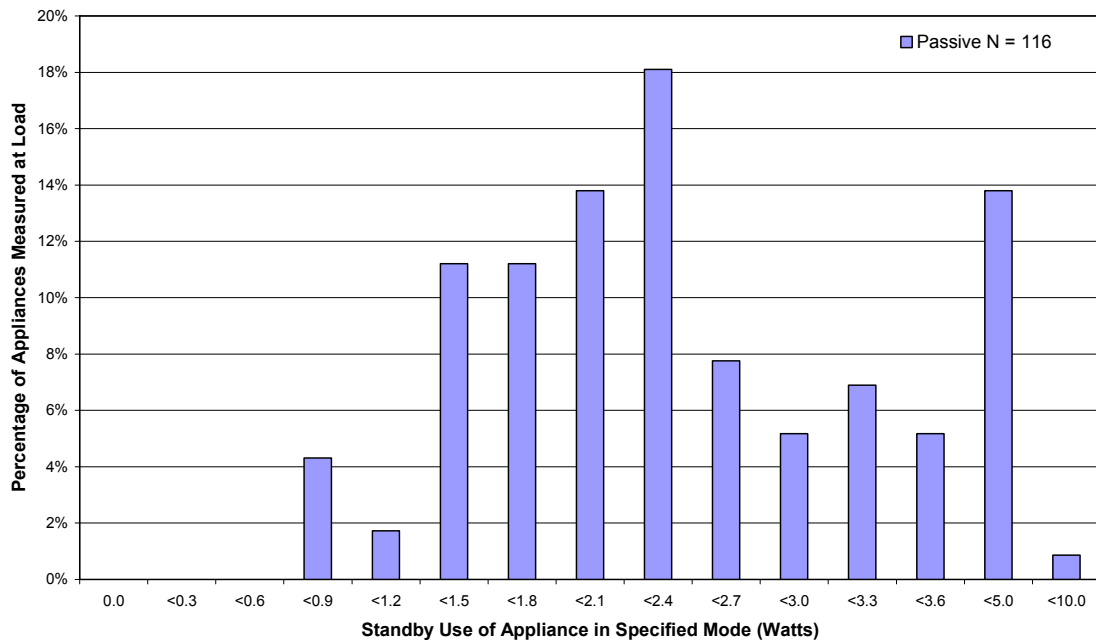


Figure 16 below shows the passive standby mode power consumption for cordless phone base stations in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (18%) used between 2.4 and 2.7 Watts in passive standby mode.

Note: Figure 16 below does not use the standard bin sizes.

Figure 16 – Passive standby mode power consumption for Cordless Phone Base Stations in 2005



The ownership of cordless phone extra handsets was found to be 0.35 units per house in 2005, with ownership steady or slightly increasing. About 79% of units were found to be in active standby mode (where the phone is on the cradle and may be charging), about 19% were found to be in passive standby mode (where the phone is off the cradle) and about 2% of units were found to be unplugged. The statistics for the active standby mode included below should be interpreted with some caution due to the variable state of charge of the handset when measured which could not be controlled for field measurements. The average active standby for cordless phone extra handsets was found to be 2.3 Watts, while the average passive standby was found to be 1.3 Watts.

Table 17 – Summary of Cordless Phone Extra Handset Findings

Cordless Phone Extra Handsets	Statistic	Number of Readings
Ownership	0.35	42
Average Active Standby Mode	2.3 Watts	39
Minimum Active Standby Mode	1.0 Watts	39
Maximum Active Standby Mode	4.5 Watts	39
Average Passive Standby Mode	1.3 Watts	42
Minimum Passive Standby Mode	0.5 Watts	42
Maximum Passive Standby Mode	3.6 Watts	42

Figure 17 below shows the active standby mode power consumption for cordless phone extra handsets in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (18%) using between 2.7 and 3.0 Watts.

Figure 17 – Active standby mode power consumption for Cordless Phone Extra Handsets in 2005

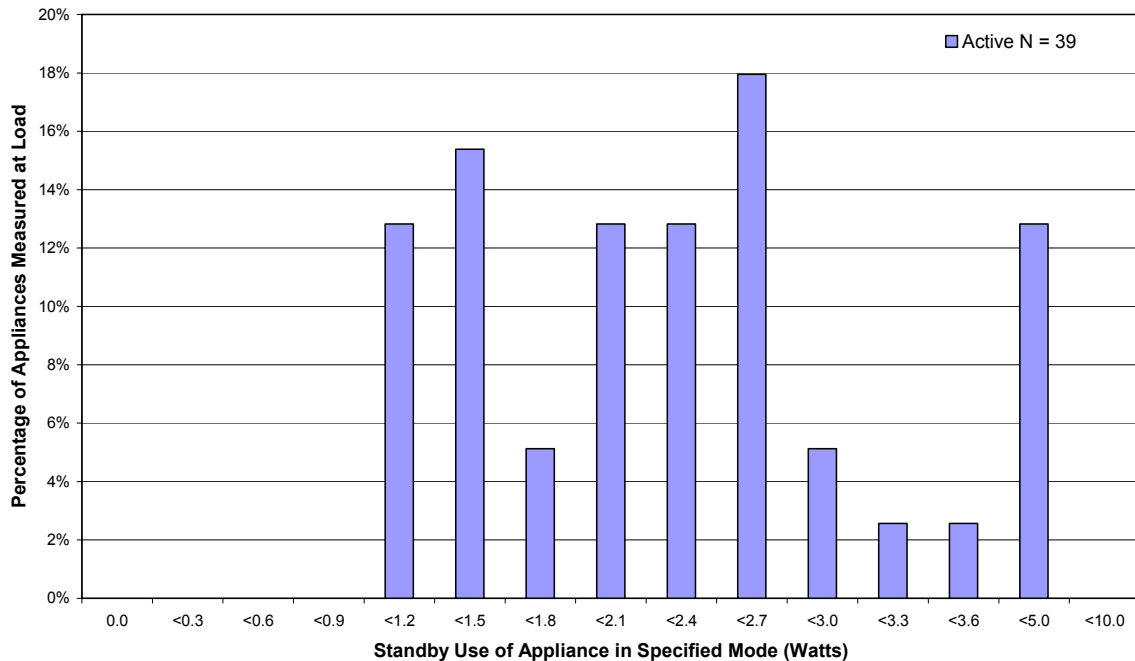
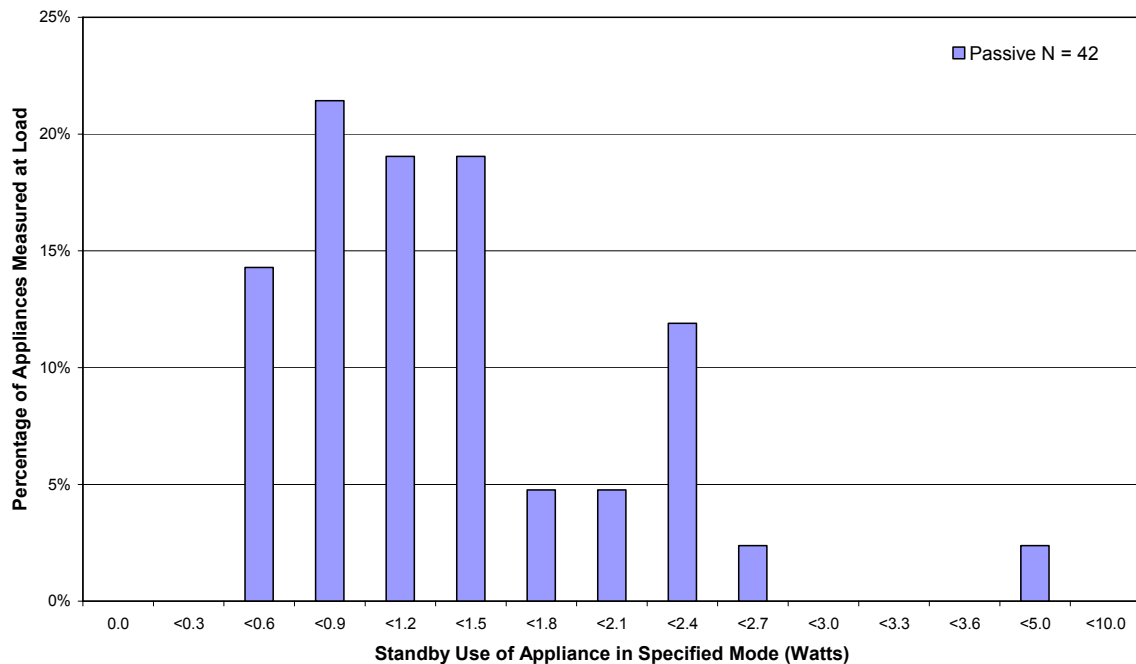


Figure 18 below shows the passive standby mode power consumption for cordless phone extra handsets in 2005. It can be seen that there are a range of consumptions, with the largest percentage of (19%) using between 0.9 Watts and 1.2 Watts in passive standby mode.

Note: Figure 18 below does not use the standard bin sizes.

Figure 18 – Passive standby mode power consumption for Cordless Phone Extra Handsets in 2005



3.2.2 Office Equipment

The office equipment category is made up of appliances including:

- Multifunction Devices;
- Facsimiles;
- Photocopiers;
- Shredders;
- Electric Typewriters;
- Laminators;
- Electric Staplers.

Only the first two items above had sufficient numbers (ownership for each was more than 0.1 per house) to have the results included in this report.

Multifunction Devices

Multifunction devices are appliances that can perform several types of functions. The most common can be used as a printer (generally colour inkjet type, but some are laser), scanner, copier and sometimes as a facsimile. They can also have digital camera connection capabilities (ie camera unit plugged directly into multifunction device and enabling user to print from camera memory).

The ownership of multifunction devices was found to be 0.23 units per house in 2005, with ownership probably increasing. About 52% of units were found to be switched off, predominately with a soft off switch, 26% of units were found in active standby mode and the rest were found unplugged. Three units (11%) were plugged in and did not have a hard or soft off switch and therefore were always in active standby mode. The average active standby consumption was found to be 11.2 Watts and the average off mode was found to be 5.5 Watts. The average age of multifunction devices was found to be 2.3 years.

Table 18 – Summary of Multifunction Device Findings

Multifunction Devices	Statistic	Number of Readings
Ownership	0.23	27
Average Age	2.3 years	25
Average Active Standby	11.2 Watts	27
Minimum Active Standby	4.2 Watts	27
Maximum Active Standby	19.4 Watts	27
Average Off Mode	5.5 Watts	24
Minimum Off Mode	0.0 Watts	24
Maximum Off Mode	10.7 Watts	24

Figure 19 below shows the active standby mode power consumption of multifunction devices for 2005. It can be seen that the majority of units (41%) consume between 15.0 and 17.5 Watts in active standby mode.

Note: Figure 19 below does not use the standard bin sizes.



Figure 19 – Active standby mode power consumption of Multifunction Devices for 2005

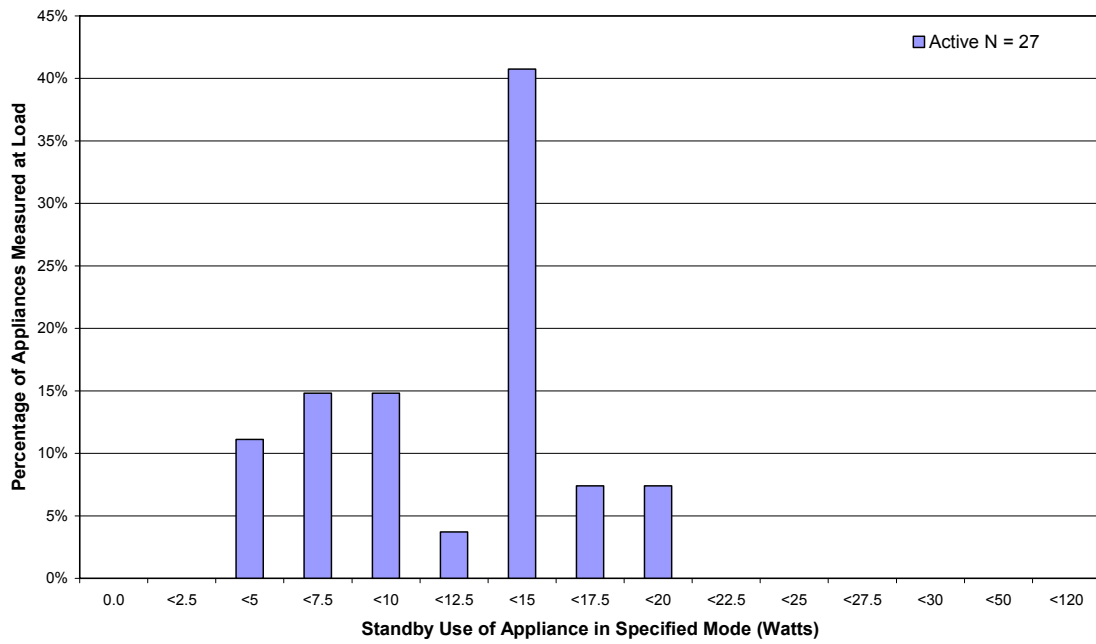


Figure 20 below shows the off mode power consumption of multifunction devices for 2005. It can be seen that there is a spread of reading with the majority (63%) of units consuming between 6 Watts and 9 Watts.

Figure 20 - Off mode power consumption of Multifunction Devices for 2005

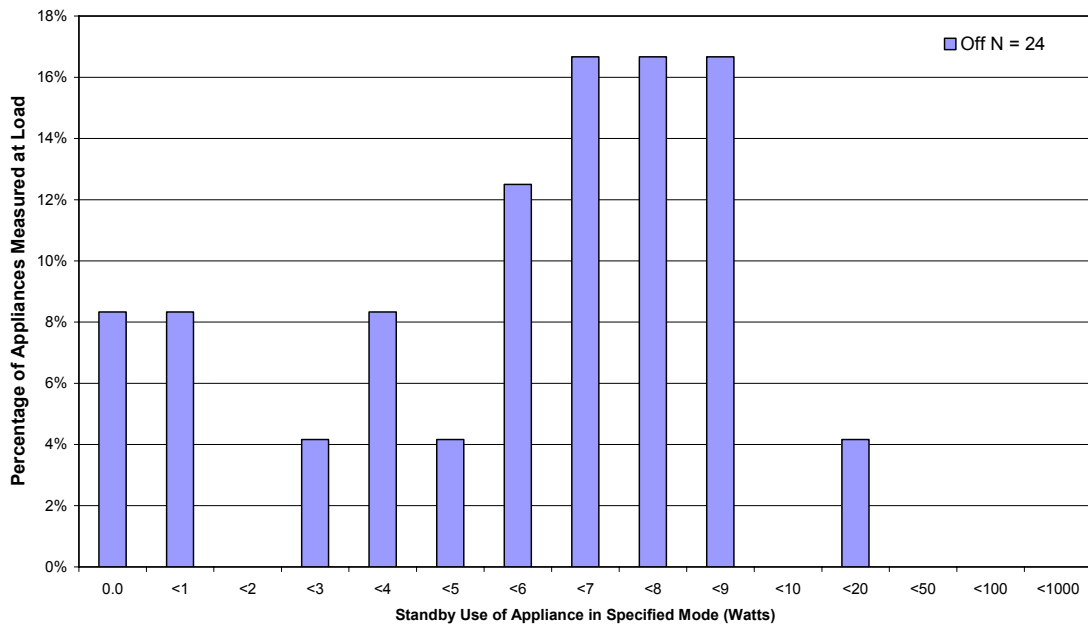


Figure 21 below shows the active standby mode power consumption of multifunction devices compared to year of purchase. It can be seen from the trendline that the average active standby mode power consumption has increased over time.

Figure 21 – Multifunction Devices measured in active standby mode and year purchased

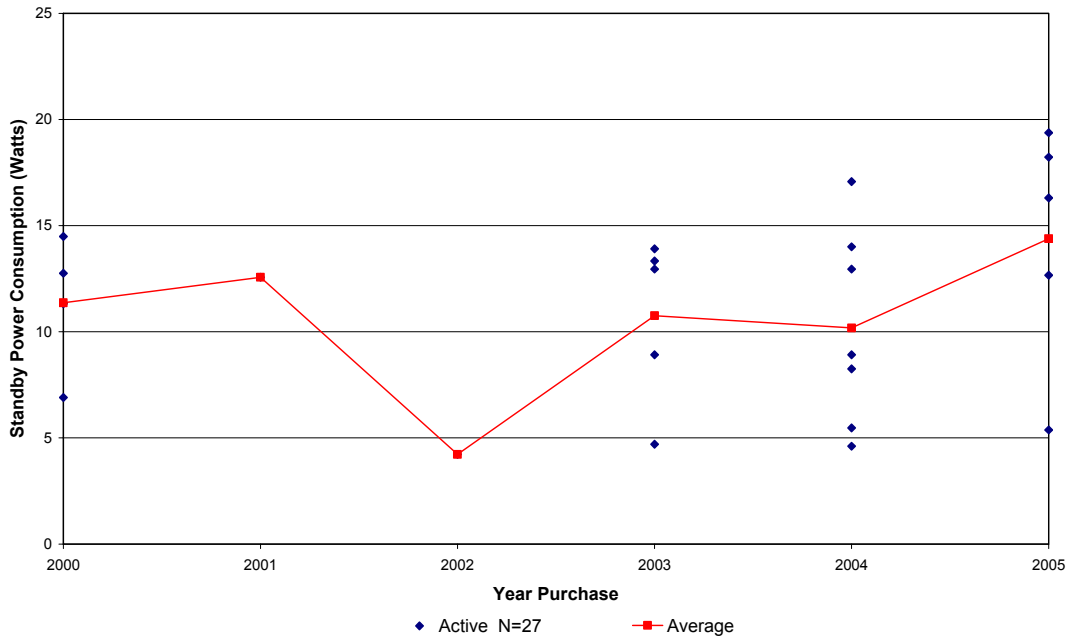
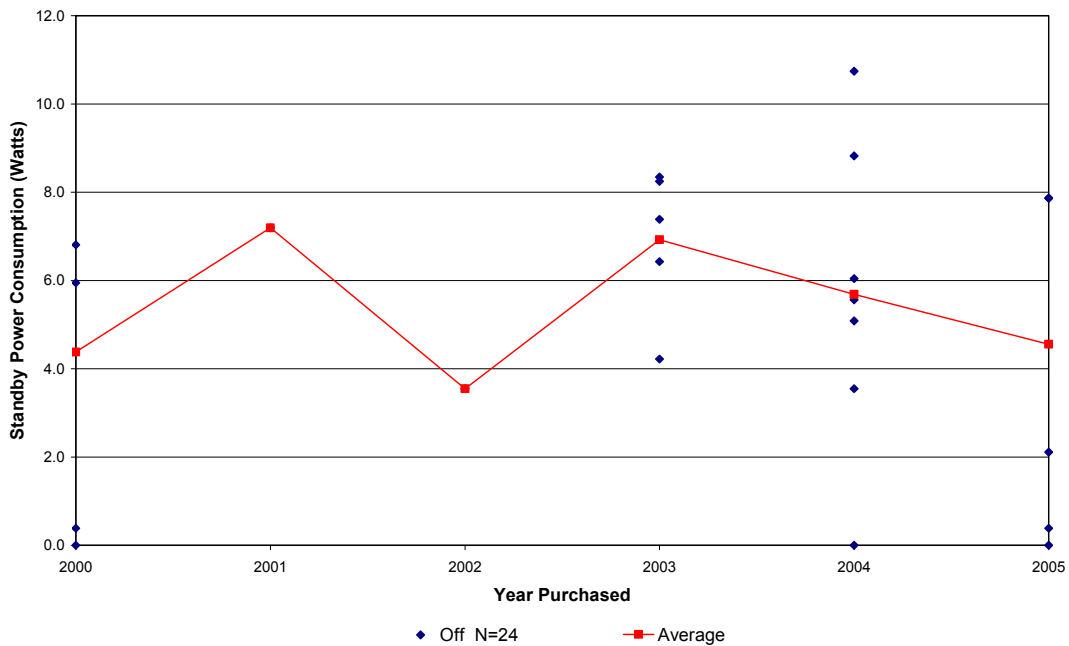


Figure 22 below shows the off mode power consumption of multifunction devices compared to year of purchase. It can be seen from the trendline, that the average off mode power consumption has remained relatively stable over time.

Figure 22 – Multifunction Devices measured in off mode and year purchased



Facsimiles

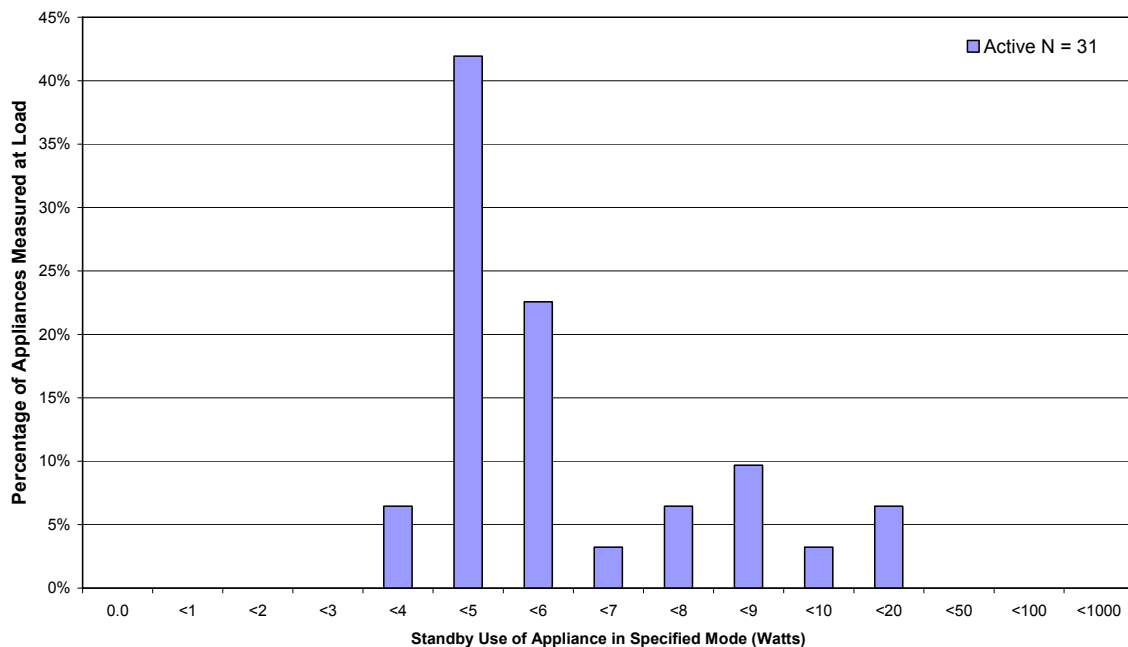
The ownership of facsimiles was found to be 0.26 units per house, with ownership probably steady or slightly decreasing (due to increased multifunction device ownership). The average active standby power consumption of facsimiles was found to be 5.9 Watts. About 87% of facsimiles were found plugged in and are therefore in active standby mode for 24 hours of the day.

Table 19 – Summary of Facsimile Findings

Facsimiles	Statistic	Number of Readings
Ownership	0.26	31
Average Active Standby	5.9 Watts	31
Minimum Active Standby	3.7 Watts	31
Maximum Active Standby	12.5 Watts	31

Figure 23 below shows the active standby power consumption of facsimiles for 2005. It can be seen that the majority of units (65%) had a consumption of between 4 Watts and 6 Watts.

Figure 23 - Active standby power consumption of Facsimiles for 2005



3.3 Home Entertainment

3.3.1 Home Audio Visual Equipment

The home audio visual equipment category is made up of appliances including:

- AV Receivers and amplifiers;
- DVD Players (usually without a tuner);
- DVD Recorders (usually with a tuner);
- DVD/VCR Players (usually with a tuner);
- VCRs (usually with a tuner);
- Subwoofers;
- Integrated Stereos;
- Portable Stereos;
- Amplifiers;
- Other Audio Components (CD Players, Tape Decks, Tuners, Turntables).

There were also a number of other appliance types found to have standby consumption, but these were found to have ownerships below 0.1 and have been ignored in terms of analysis.

AV Receivers

AV Receivers have a radio tuner, amplifier and connections for dealing with several AV inputs which can be switched to a television while simultaneously providing audio output through hi-fi speakers. The ownership of AV receivers was found to be 0.13 units per house in 2005, with ownership probably increasing (as standard amplifiers and receivers are no longer generally available). About 73% of units were found to have a standby switch, while 27% were found to have a hard off switch. About 73% of units were found in passive standby mode, 13% were found in active standby mode, 7% in off mode and 7% of units were found unplugged. About 87% of units were found to have remote control capabilities. The average active standby for AV receivers was found to be 35.3 Watts, while the average passive standby was found to be 3.1 Watts and the average off mode was found to be 0.3 Watts. The average age of AV receivers was found to be 3.2 years.

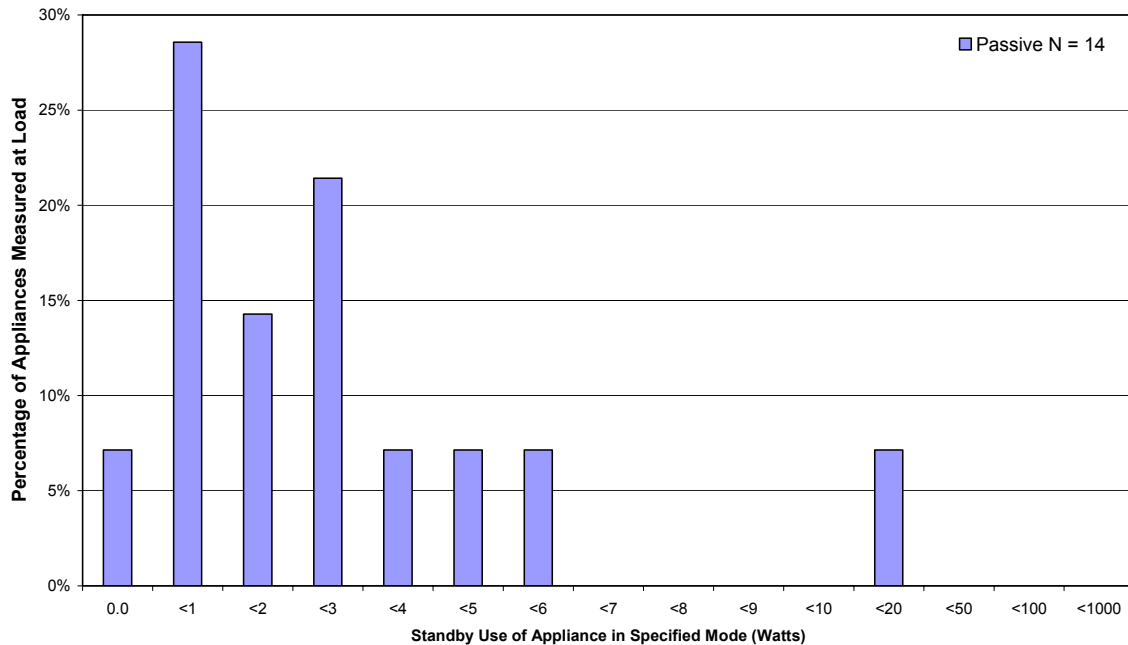


Table 20 – Summary of AV Receiver Findings

AV Receivers	Statistic	Number of Readings
Ownership	0.13	15
Average Age	3.2 years	13
Average Active Standby	35.3 Watts	14
Minimum Active Standby	12.7 Watts	14
Maximum Active Standby	54.4 Watts	14
Average Passive Standby	3.1 Watts	14
Minimum Passive Standby	0.0 Watts	14
Maximum Passive Standby	18.1 Watts	14
Average Off Mode	0.3 Watts	4

Figure 24 below shows the passive standby power consumption of AV receivers for 2005. It can be seen that there is a range of consumptions, with the highest percentage of units (29%) using between less than 1.0 Watts and 2.0 Watts

Figure 24 - Passive standby power consumption of AV Receivers for 2005



DVD Players

DVD player are designed only to play DVDs with audio and video outputs and have no recording capability and no television tuner. The ownership of DVD players was found to be 0.82 units per house in 2005, with ownership probably increasing although they are nearing saturation. This ownership is comparable to that found by ABS in its ABS4602 report (2005) (although ABS does not split DVD players and recorders when considering this ownership). About 58% of units were found to have a standby switch, 34% were found to have a hard off switch, 4% were found to have no switch and 3% of units were found to have a soft off switch. About 55% of units were found in passive standby mode (20% of these units were found to use 0.0 Watts), 26% were found in off mode, 12% were found unplugged and 7% of units were found in active standby mode. About 92% of units were found to have remote control capabilities. The average active standby for DVD players was found to be 9.0 Watts, while the average passive standby was found to be 2.6 Watts and the average off mode was found to be 0.0 Watts. The average age of DVD players was found to be 1.8 years.

Table 21 – Summary of DVD Player Findings

DVD Players	Statistic	Number of Readings
Ownership	0.82	98
Average Age	1.8 years	95
Average Active Standby	9.0 Watts	97
Minimum Active Standby	4.9 Watts	97
Maximum Active Standby	27.9 Watts	97
Average Passive Standby	2.6 Watts	90
Minimum Passive Standby	0.0 Watts	90
Maximum Passive Standby	12.9 Watts	90
Average Off Mode	0.0 Watts	36



Figure 25 below shows the active standby power consumption of DVD players for 2005. It can be seen that there is a range of consumptions, with the majority of units (87%) using between 7.0 Watts and 20.0 Watts in active standby.

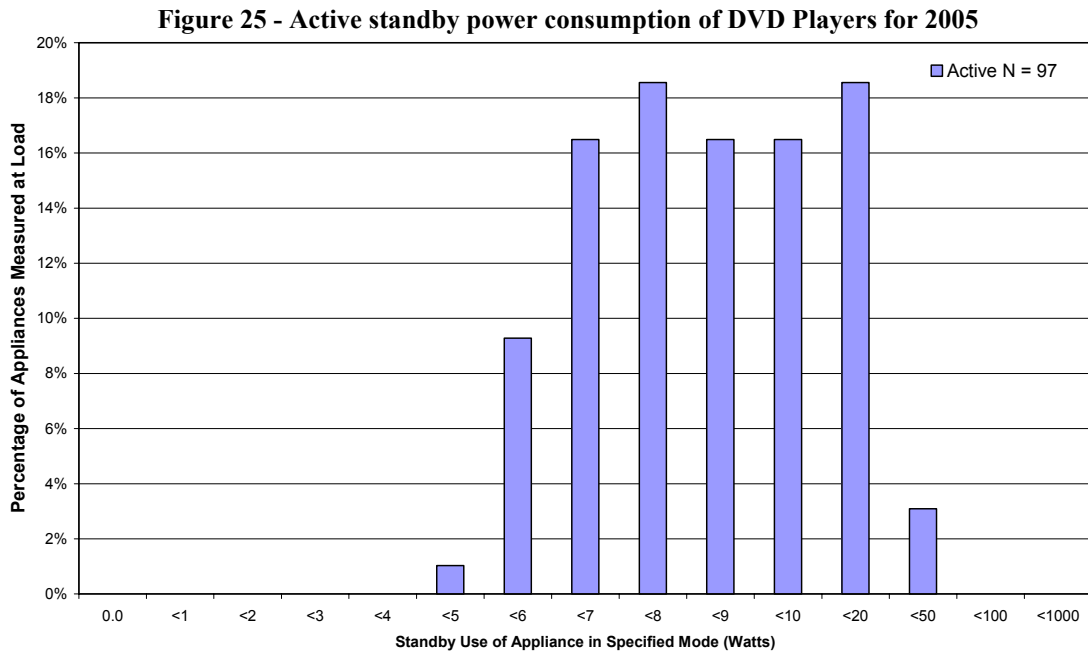


Figure 26 below shows the passive standby power consumption of DVD players for 2005. It can be seen that there is a range of consumptions, with the largest percentage of units (27%) consuming less than 1.0 Watt in passive standby.

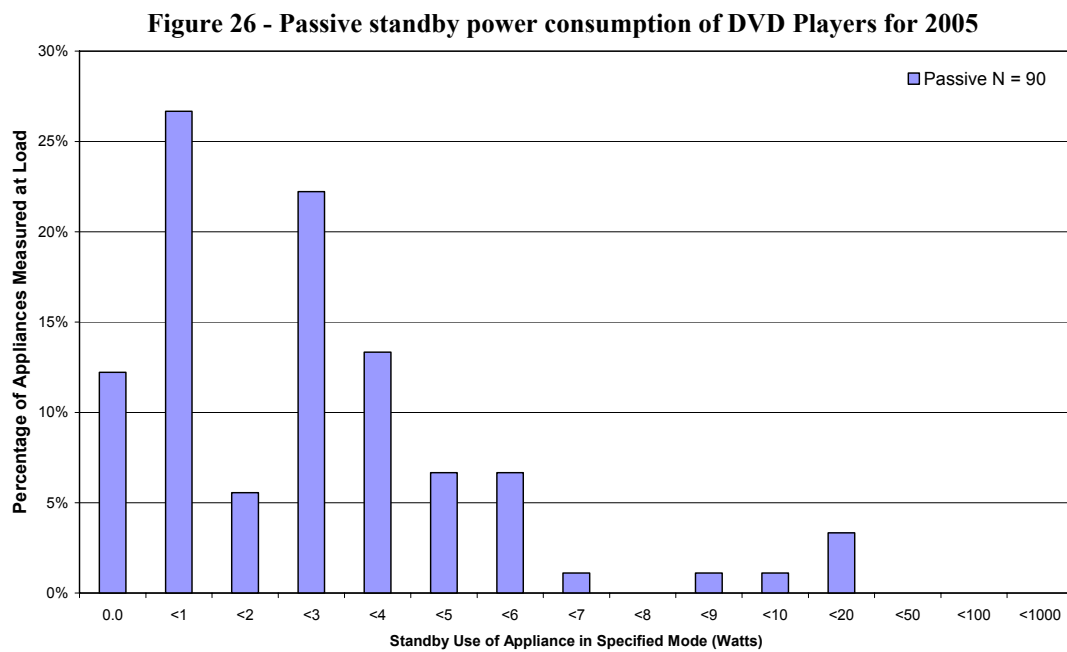


Figure 27 below shows the active standby consumption of DVD players when compared to year of purchase. It can be seen from the trendline that the average active standby of DVD players has decreased over time.

Figure 27 – DVD Players measured in active standby mode and year purchased

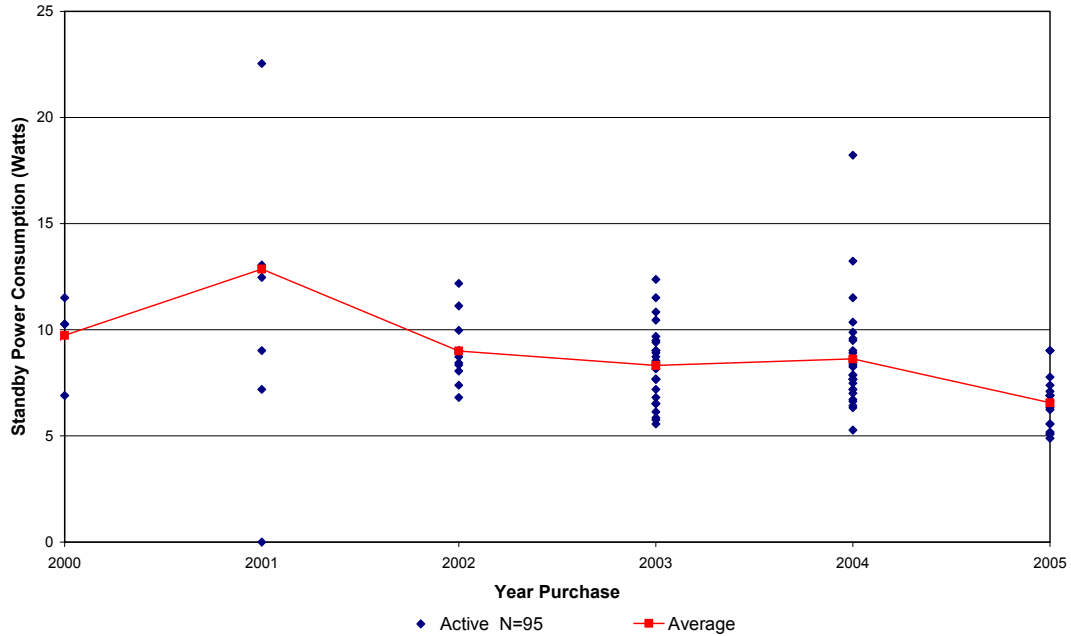
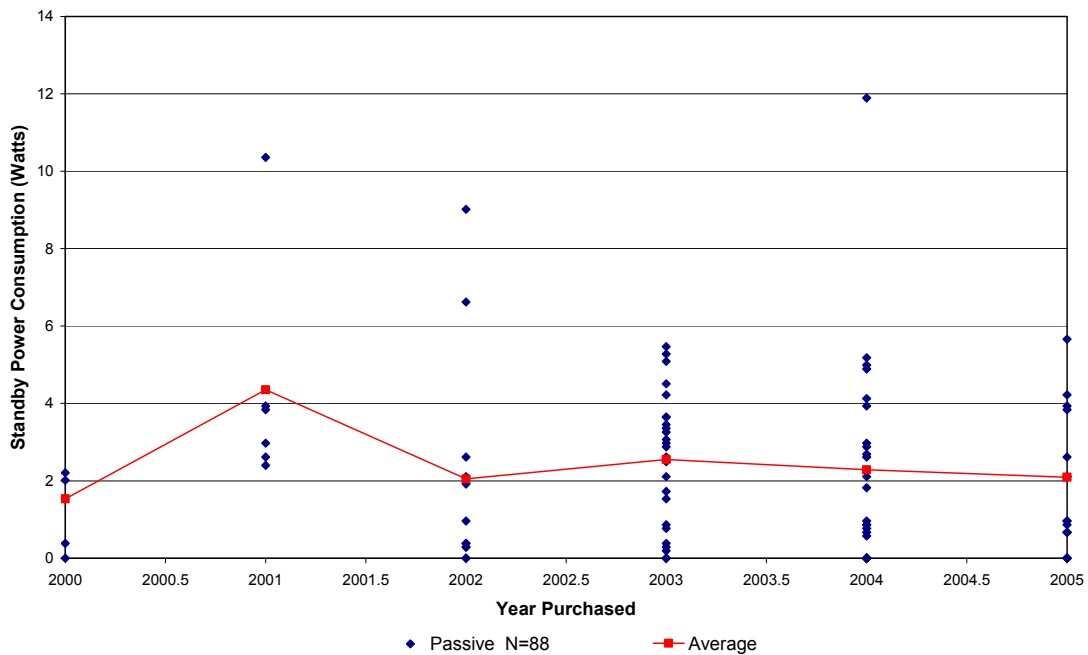


Figure 28 below shows the passive standby consumption of DVD players when compared to year of purchase. It can be seen from the trendline that the average passive standby of DVD players has decreased over time.

Figure 28 – DVD Players measured in passive standby mode and year purchased



DVD Recorders

These are DVD players which also have a recording capability. Almost all DVD recorders have a television tuner and can record television to DVD (either directly or via a hard disk). Most of the units measured also have a hard drive, but it was not possible to identify all of these during the survey.

Please note that caution is required with any interpretation of the following results, due to the small sample size.

The ownership of DVD recorders was found to be 0.08 units per house in 2005, with ownership probably set to increase as prices decrease. These units will replace VCRs in due course. All units were found to have a standby switch. About 89% of units were found in passive standby mode and 11% of units were found unplugged (one unit). About 89% of units were found to have remote control capabilities. The average active standby for DVD recorders was found to be 26.5 Watts (noting that many will have hard drives) and the average passive standby was found to be 4.9 Watts. The average age of DVD recorders was found to be 0.7 years.

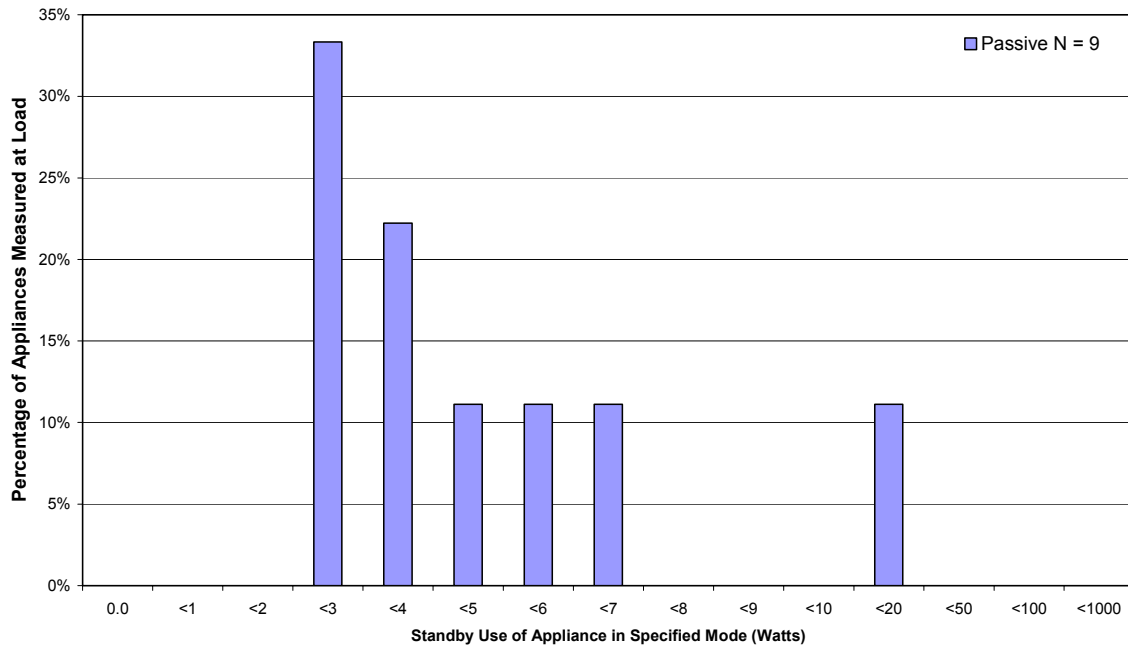
Table 22 – Summary of DVD Recorder Findings

DVD Recorders	Statistic	Number of Readings
Ownership	0.08	9
Average Age	0.7 years	9
Average Active Standby	26.5 Watts	9
Minimum Active Standby	16.3 Watts	9
Maximum Active Standby	36.2 Watts	9
Average Passive Standby	4.9 Watts	9
Minimum Passive Standby	2.0 Watts	9
Maximum Passive Standby	12.9 Watts	9



Figure 29 below shows the passive standby power consumption of DVD recorders for 2005. It can be seen that the majority of units (55%) consumed between 2.0 Watts and 4.0 Watts in passive standby.

Figure 29 - Passive standby power consumption of DVD Recorders for 2005



DVD/VCR Players

These are DVD players that also have a VCR built in to allow recording capability (from a television signal or DVD). All DVD/VCRs have a television tuner (almost all are analogue). The ownership of DVD/VCR players was found to be 0.18 units per house in 2005, with ownership probably slightly increasing (although they are a low cost transition technology and are expected to be obsolete in due course). All units were found to have a standby switch. About 82% of units were found in passive standby mode and 29% of units were found in active standby mode. About 95% of units were found to have remote control capabilities. The average active standby for DVD/VCR players was found to be 14.8 Watts and the average passive standby was found to be 3.5 Watts. The average age of DVD/VCR players was found to be 2.2 years.



Table 23 – Summary of DVD/VCR Player Findings

DVD/VCR Players	Statistic	Number of Readings
Ownership	0.18	22
Average Age	2.2 years	22
Average Active Standby	14.8 Watts	22
Minimum Active Standby	12.8 Watts	22
Maximum Active Standby	20.9 Watts	22
Average Passive Standby	3.5 Watts	22
Minimum Passive Standby	2.2 Watts	22
Maximum Passive Standby	5.7 Watts	22

Figure 30 below shows the passive standby power consumption of DVD/VCR players for 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (23%) using between 3.3 Watts and 3.6 Watts in passive standby mode.

Note: Figure 30 below does not use the standard bin sizes.

Figure 30 - Passive standby power consumption of DVD/VCR Players for 2005

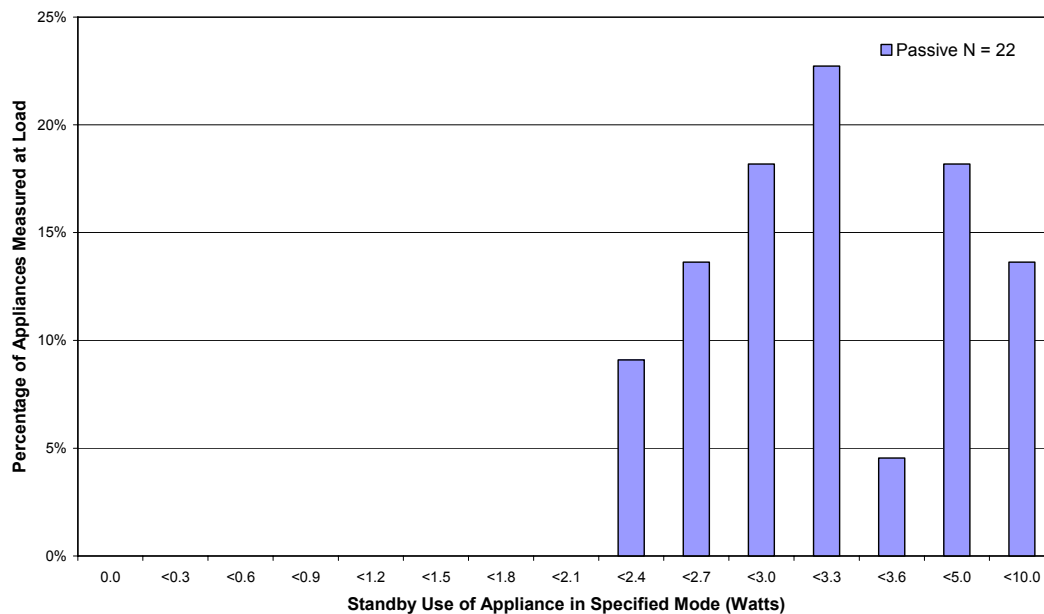
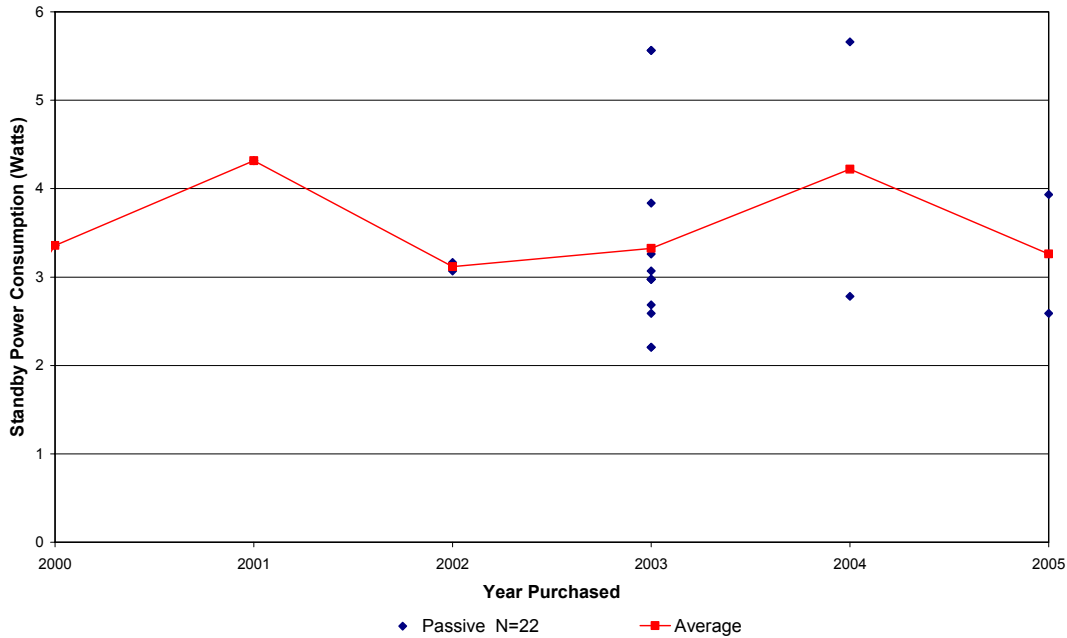


Figure 31 below shows the passive standby consumption of DVD/VCR players when compared to year of purchase. It can be seen from the trendline that the average passive standby of DVD/VCR players has remained relatively stable over time.

Figure 31 – DVD/VCR Players measured in passive standby mode and year purchased



VCRs

VCRs have a television tuner (almost all are analogue) with a capability to record TV to tape or to play back from a tape. The ownership of VCRs was found to be 1.11 units per house in 2005, with ownership probably stable but may decrease in future. This ownership is very close to that found by ABS in its 4602 report. VCRs are an obsolete technology, but will be present in the stock for many years to come and there are still significant sales (prices are generally very low). About 96% of units were found to have a standby switch, the rest were found to have a soft off switch. About 73% of units were found in passive standby mode, 15% were found in active standby mode and 12% of units were found unplugged. About 89% of units were found to have remote control capabilities. The average active standby for VCRs was found to be 10.5 Watts, the average passive standby was found to be 5.1 Watts and the average off mode was found to be 1.7 Watts. The average age of VCRs was found to be 6.7 years.



Table 24 – Summary of VCR Findings

VCRs	Statistic	Number of Readings
Ownership	1.11	133
Average Age	6.7 years	125
Average Active Standby	10.5 Watts	132
Minimum Active Standby	2.4 Watts	132
Maximum Active Standby	26.1 Watts	132
Average Passive Standby	5.1 Watts	133
Minimum Passive Standby	0.3 Watts	133
Maximum Passive Standby	18.1 Watts	133
Average Off Mode	1.7 Watts	5

Figure 32 below shows the active standby power consumption of VCRs for 2005. It can be seen that the majority of units (37%) consume between 10.0 Watts and 12.5 Watts in active standby mode.

Note: Figure 32 below does not use the standard bin sizes.

Figure 32 - Active standby power consumption of VCRs for 2005

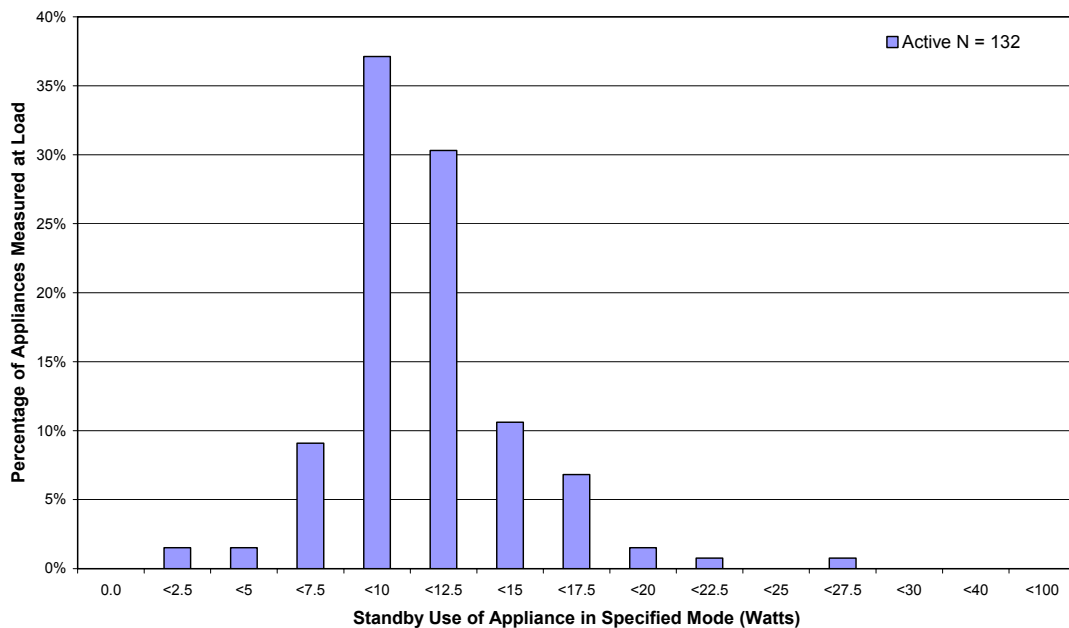


Figure 33 below shows the passive standby power consumption of VCRs for 2005. It can be seen that there are a range of consumptions, although the largest percentage of units (25%) use between 5.0 Watts and 7.0 Watts in passive standby mode.

Figure 33 - Passive standby power consumption of VCRs for 2005

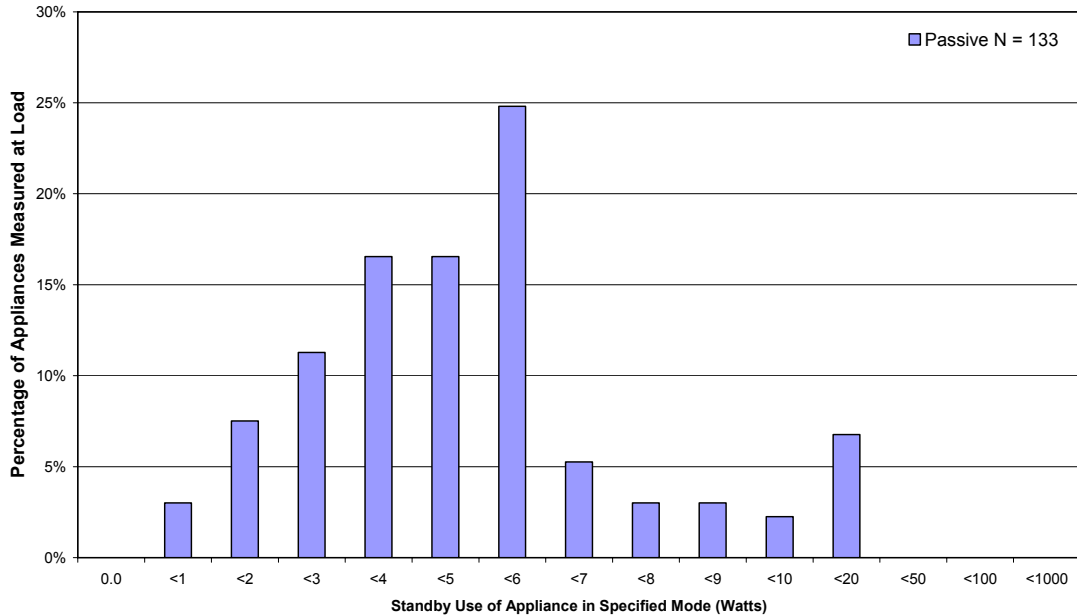


Figure 34 below shows the active standby consumption of VCRs when compared to year of purchase. It can be seen from the trendline that the average active standby of VCRs has decreased over time.

Figure 34 – VCRs measured in active standby mode and year purchased

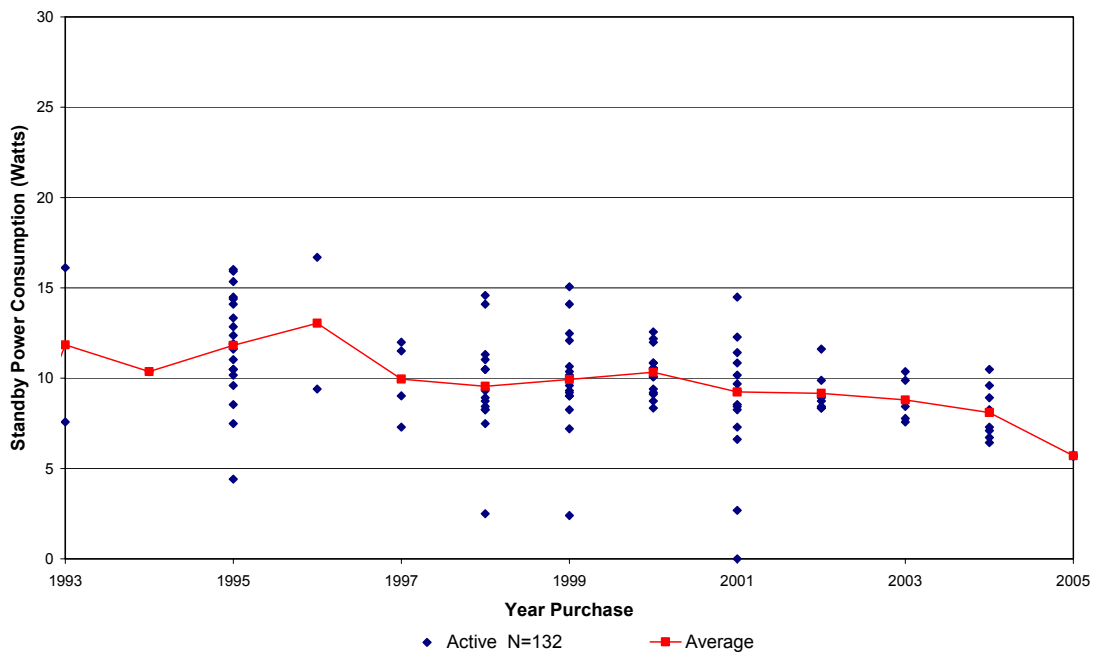
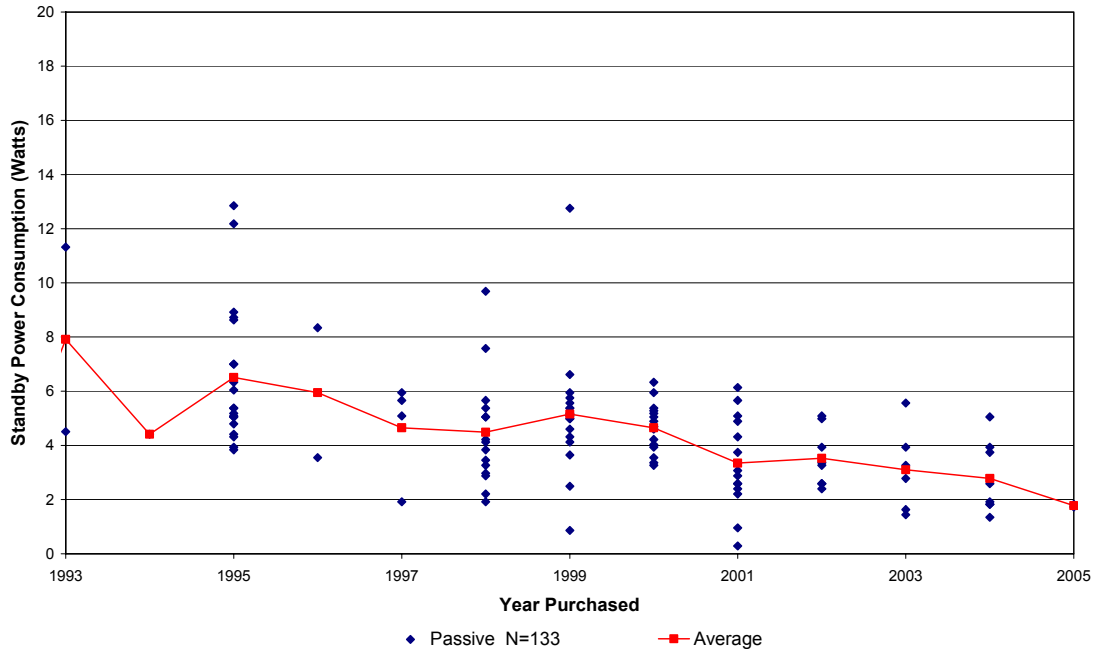


Figure 35 below shows the passive standby consumption of VCRs when compared to year of purchase. It can be seen from the trendline that the average passive standby of VCRs has decreased over time.

Figure 35 - VCRs measured in passive standby mode and year purchased



Subwoofers

A subwoofer is a separate power supply for a bass speaker that is part of a surround sound system. The ownership of subwoofers was found to be 0.13 units per house in 2005, with ownership probably slightly increasing, as home entertainment systems become more prevalent. About 63% of units were found to have a hard off switch, the rest were found to have no switch. About 56% of units were found in active standby mode, 31% were found in off mode and 13% of units were found unplugged. The average active standby for subwoofers was found to be 9.3 Watts and the off mode was found to be 0.6 Watts. The average age of subwoofers was found to be 3.7 years.

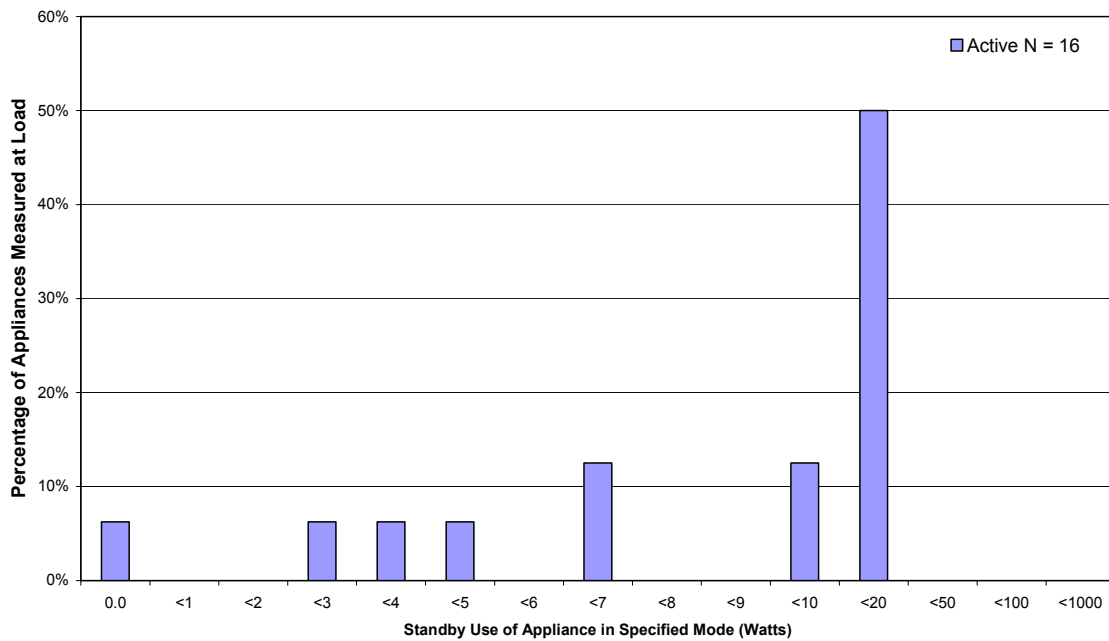


Table 25 – Summary of Subwoofer Findings

Subwoofers	Statistic	Number of Readings
Ownership	0.13	16
Average Age	3.7 years	11
Average Active Standby	9.3 Watts	16
Minimum Active Standby	0.0 Watts	16
Maximum Active Standby	15.5 Watts	16
Average Off Mode	0.6 Watts	10
Minimum Off Mode	0.0 Watts	10
Maximum Off Mode	2.5 Watts	10

Figure 36 below shows the active standby power consumption of subwoofers for 2005. It can be seen that the majority of units (50%) consume between 10.0 Watts and 20.0 Watts in active standby mode.

Figure 36 – Active standby power consumption of Subwoofers for 2005



Integrated Stereos

Integrated stereos have multiple audio functions in the one system (amplifier with CD, radio tuner, tape player, possibly turntable) which are typically mounted in a stacked deck with separate speakers. The unit is not intended to be portable. The ownership of integrated stereos was found to be 0.97 units per house in 2005, with ownership probably steady. This ownership is slightly lower than that found by ABS in its 4602 report (some ambiguity, as ABS reports on 'stereo systems' and doesn't give a product definition). About 73% of units were found to have a standby switch, 14% were found to have no switch, 11% were found to have a hard off switch and 2% of units were found to have a soft off switch. About 70% of units were found in passive standby mode, 18% were found unplugged, 7% were found in off mode and 5% of units were found in active standby mode. About 63% of units were found to have remote control capabilities. The average active standby for integrated stereos was found to be 18.1 Watts, the average passive standby was found to be 6.5 Watts and the average off mode was found to be 1.8 Watts. The average age of integrated stereos was found to be 5.9 years.

Table 26 – Summary of Integrated Stereo Findings

Integrated Stereos	Statistic	Number of Readings
Ownership	0.97	116
Average Age	5.9 years	109
Average Active Standby	18.1 Watts	116
Minimum Active Standby	0.9 Watts	116
Maximum Active Standby	60.3 Watts	116
Average Passive Standby	6.5 Watts	103
Minimum Passive Standby	0.3 Watts	103
Maximum Passive Standby	27.9 Watts	103
Average Off Mode	1.8 Watts	13

Figure 37 below shows the active standby power consumption of integrated stereos for 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (18%) using between 7.5 Watts and 10.0 Watts in active standby mode.

Note: Figure 37 below does not use the standard bin sizes.



Figure 37 - Active standby power consumption of Integrated Stereos for 2005

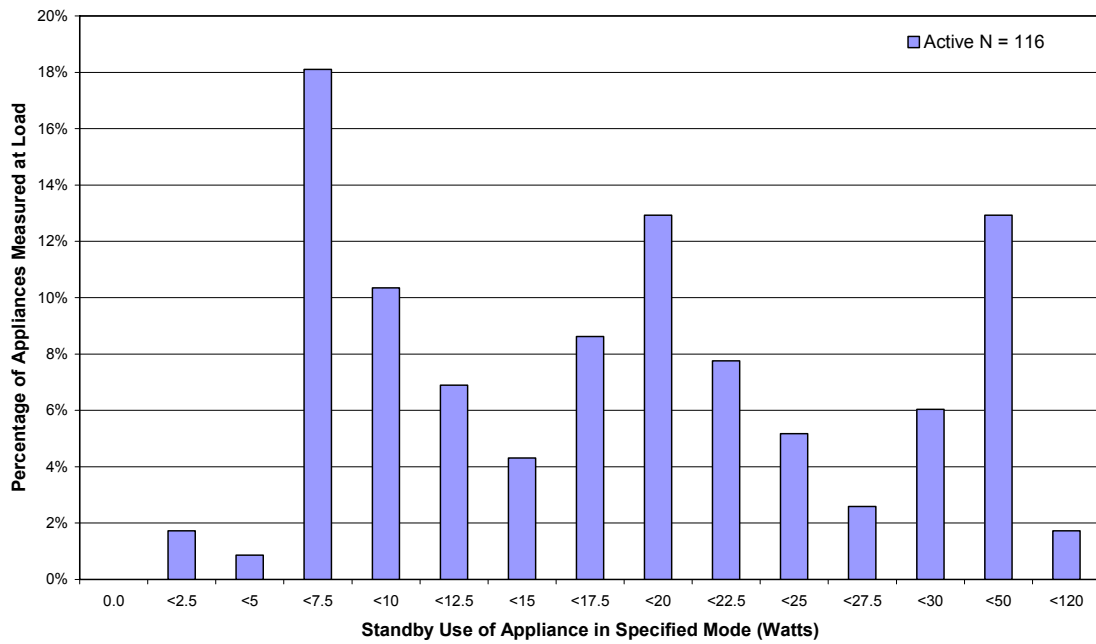


Figure 38 below shows the passive standby power consumption of integrated stereos for 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (18%) using between 20.0 Watts and 50.0 Watts in passive standby mode.

Figure 38 – Passive standby power consumption of Integrated Stereos for 2005

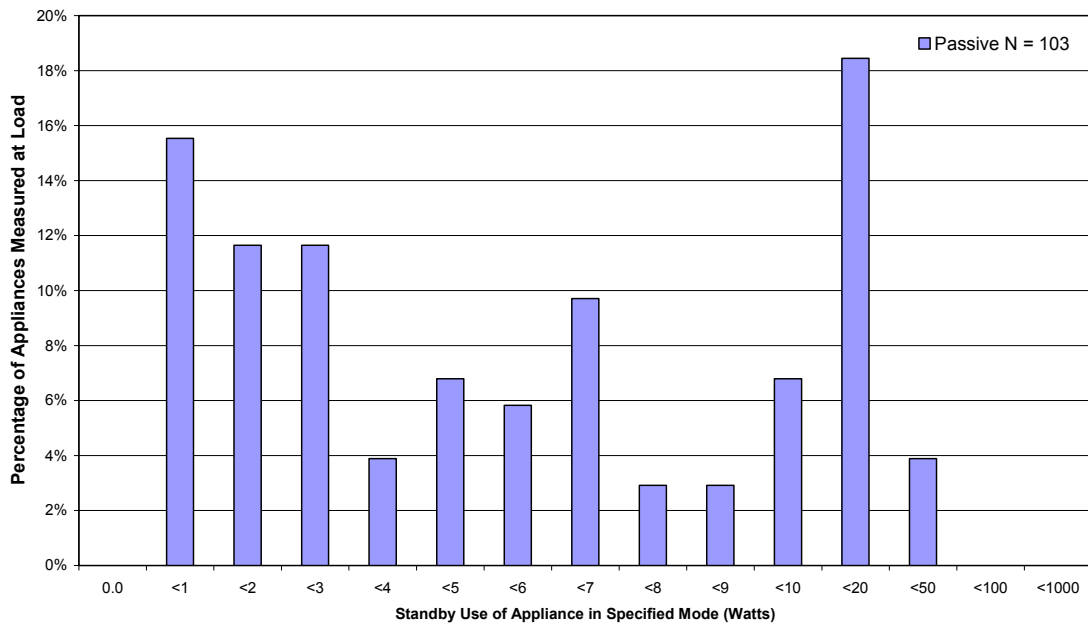


Figure 39 below shows the active standby consumption of integrated stereos when compared to year of purchase. It can be seen from the trendline that the average active standby of integrated stereos has increased slightly over time.

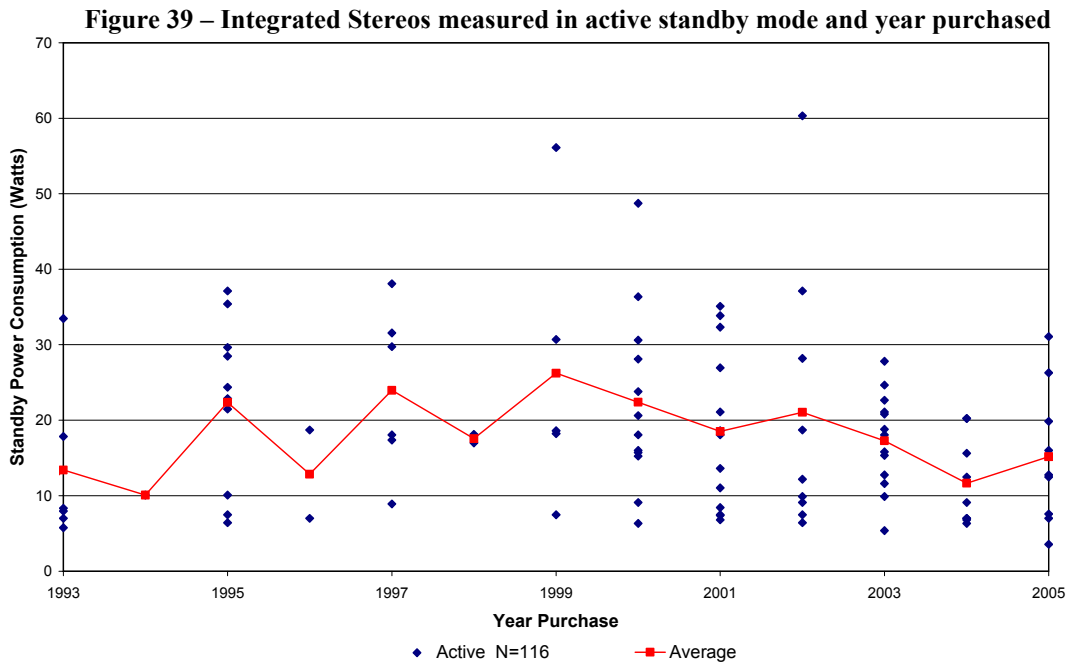
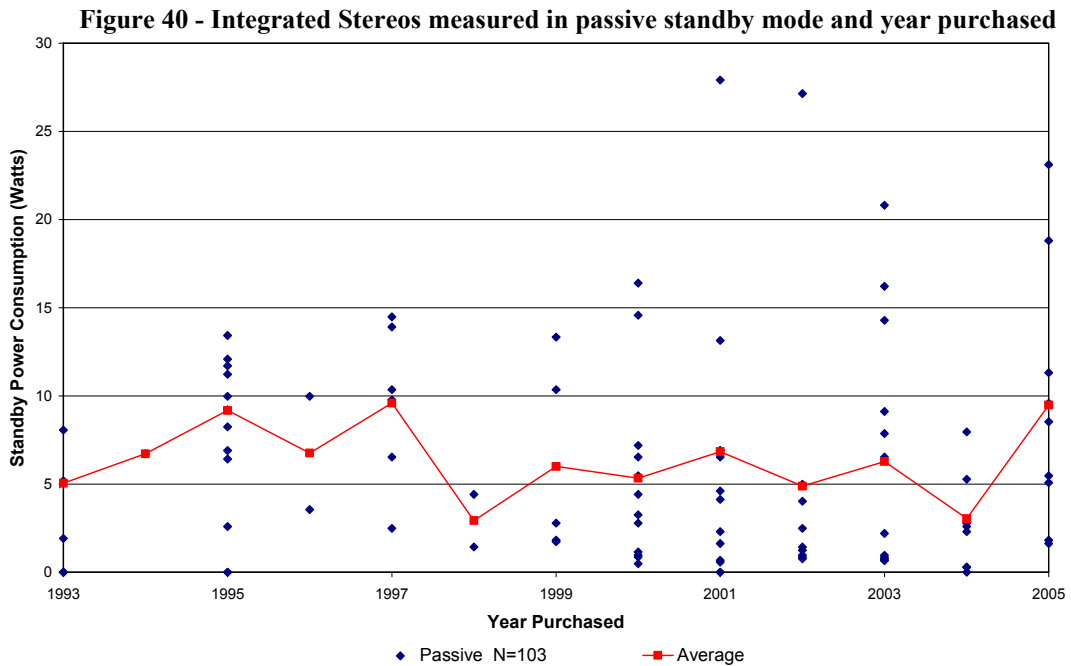


Figure 40 below shows the passive standby consumption of integrated stereos when compared to year of purchase. It can be seen from the trendline that the average passive standby of integrated stereos has decreased over time. Note there are some data points for years before 1993, but these points are intermittent and not very illustrative.



Portable Stereos

Portable stereos have multiple audio functions in the one system (amplifier with CD, radio tuner, tape player) which are mounted in a single portable unit with integrated speakers (which may be detachable). The unit usually has the capability to operate without mains power. The ownership of portable stereos was found to be 0.63 units per house in 2005, with ownership probably slightly increasing or steady. About 91% of units were found to have no switch, 8% were found to have a standby switch and 1% of units were found to have a hard off switch. About 57% of units were found in passive standby mode, 39% were found unplugged, 3% were found in active standby mode and 1% of units were found in off mode. About 7% of units were found to have remote control capabilities. The average active standby for portable stereos was found to be 5.8 Watts, the average passive standby was found to be 2.2 Watts and the average off mode was found to be 2.3 Watts. The average age of portable stereos was found to be 5.3 years.

Table 27 – Summary of Portable Stereo Findings

Portable Stereos	Statistic	Number of Readings
Ownership	0.63	76
Average Age	5.3 years	65
Average Active Standby	5.8 Watts	68
Minimum Active Standby	1.7 Watts	68
Maximum Active Standby	41.6 Watts	68
Average Passive Standby	2.2 Watts	75
Minimum Passive Standby	0.7 Watts	75
Maximum Passive Standby	16.4 Watts	75
Average Off Mode	2.3 Watts	1

Figure 41 below shows the active standby power consumption of portable stereos for 2005. It can be seen that there was a range of power consumption, with the largest percentage of units (31%) using between 4.0 Watts and 7.0 Watts in active standby mode.



Figure 41 - Active standby power consumption of Portable Stereos for 2005

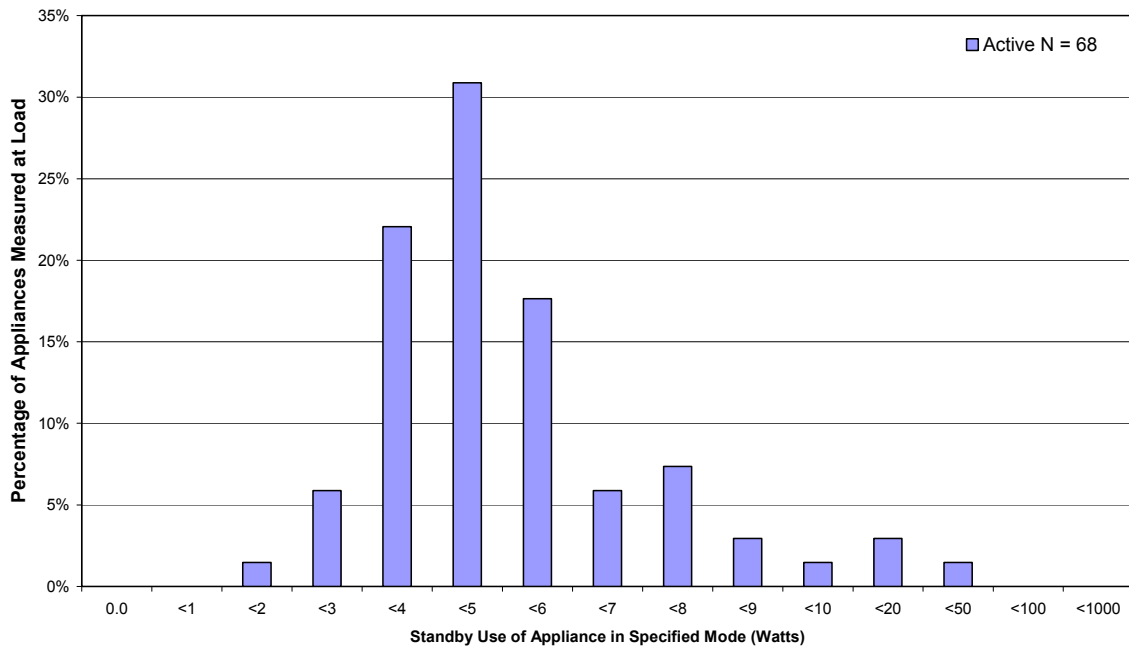


Figure 42 shows the passive standby power consumption of portable stereos for 2005. It can be seen that the majority of units (48%) consume between 1.0 Watts and 3.0 Watts in passive standby mode.

Figure 42 - Passive standby power consumption of Portable Stereos for 2005

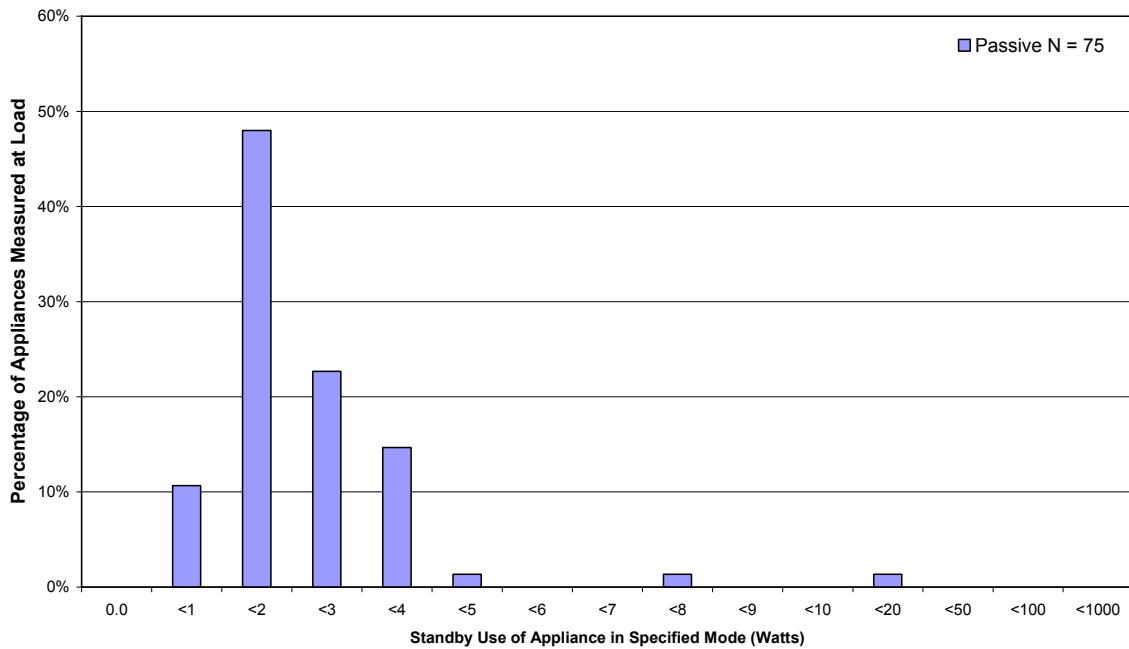


Figure 43 below shows the active standby consumption of portable stereos when compared to year of purchase. It can be seen from the trendline that the average active standby of portable stereos has remained relatively stable over time.

Figure 43 - Portable Stereos measured in active standby mode and year purchased

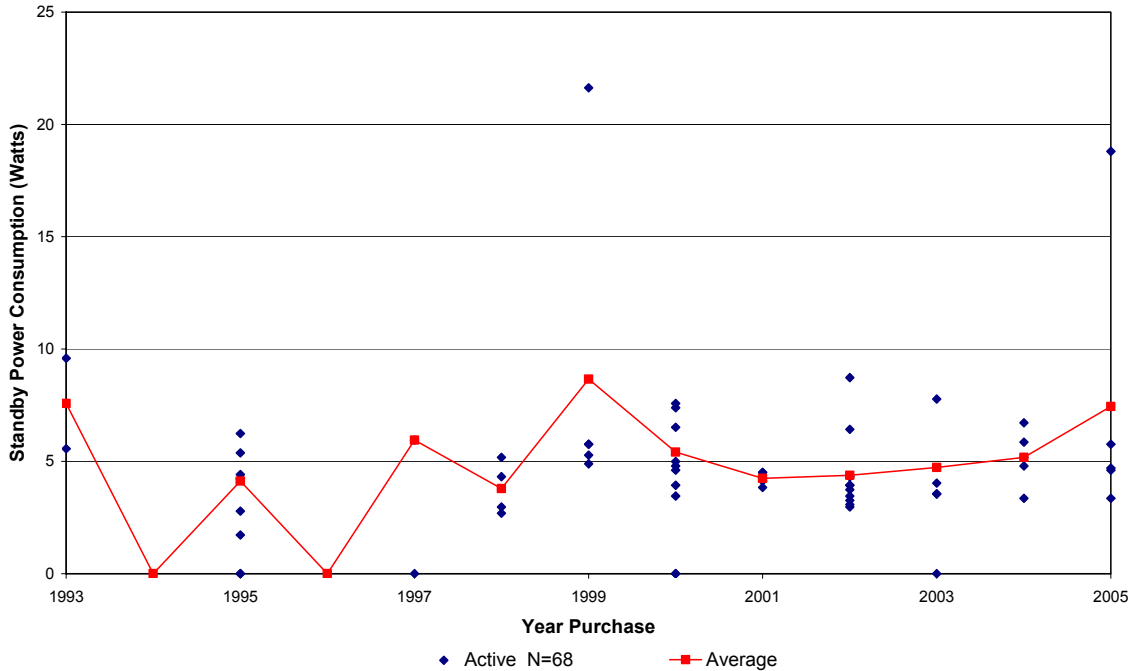
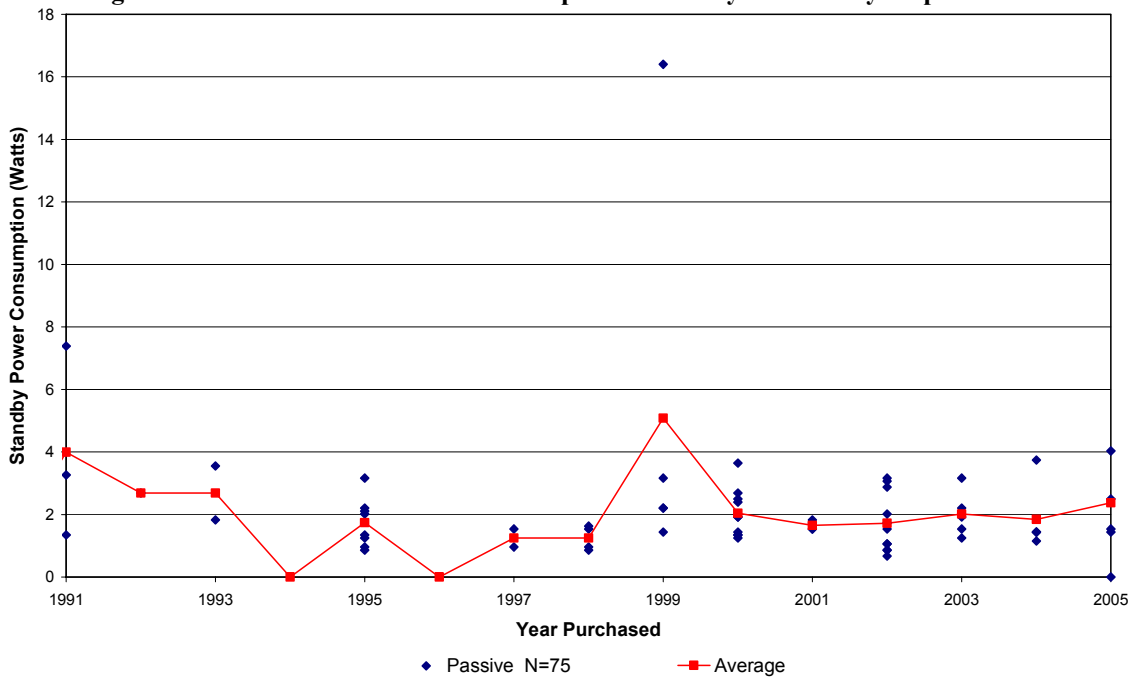


Figure 44 below shows the passive standby consumption of portable stereos when compared to year of purchase. It can be seen from the trendline that the average passive standby of portable stereos has remained relatively stable over time.

Figure 44 - Portable Stereos measured in passive standby mode and year purchased



Amplifiers

Amplifiers are generally part of a home entertainment package and are found usually as the central appliance into which all other parts of the package are plugged. This means amplifiers can be used for the sound for various entertainment components including game consoles, televisions, DVD players etc, but they do not have capability to handle or switch video signals. A question was asked of users to ascertain whether there was a pattern of usage (different components will have different usages) and no usage pattern was discovered.

The ownership of amplifiers was found to be 0.36 units per house in 2005, with ownership probably set to increase as prices decrease and home entertainment systems become more prevalent. About 58% of units were found to have a hard off switch, 35% were found to have a standby switch and 7% of units were found to have no switch. About 51% of units were found in off mode, 30% were found in passive standby mode, 12% were found unplugged and 7% of units were found in active standby mode. About 42% of units were found to have remote control capabilities. The average active standby for amplifiers was found to be 22.4 Watts, the average passive standby was found to be 3.4 Watts and the average off mode was found to be 0.2 Watts. The average age of amplifiers was found to be 8.7 years.

Table 28 – Summary of Amplifier Findings

Amplifiers	Statistic	Number of Readings
Ownership	0.36	43
Average Age	8.7 years	21
Average Active Standby	22.4 Watts	41
Minimum Active Standby	3.3 Watts	41
Maximum Active Standby	52.1 Watts	41
Average Passive Standby	3.4 Watts	20
Minimum Passive Standby	0.0 Watts	20
Maximum Passive Standby	11.4 Watts	20
Average Off Mode	0.2 Watts	25

Figure 45 below shows the active standby power consumption of amplifiers for 2005. It can be seen that the majority of units (81%) consume between 20.0 Watts and 50.0 Watts.



Note: Figure 45 below does not use the standard bin sizes.

Figure 45 - Active standby power consumption of Amplifiers for 2005

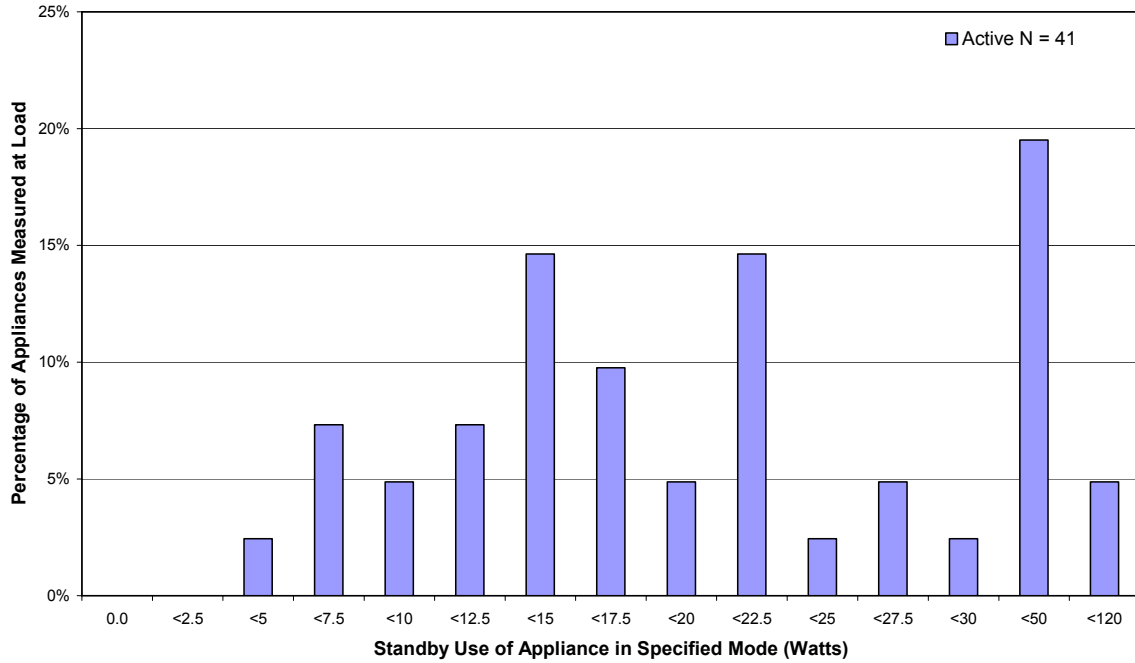
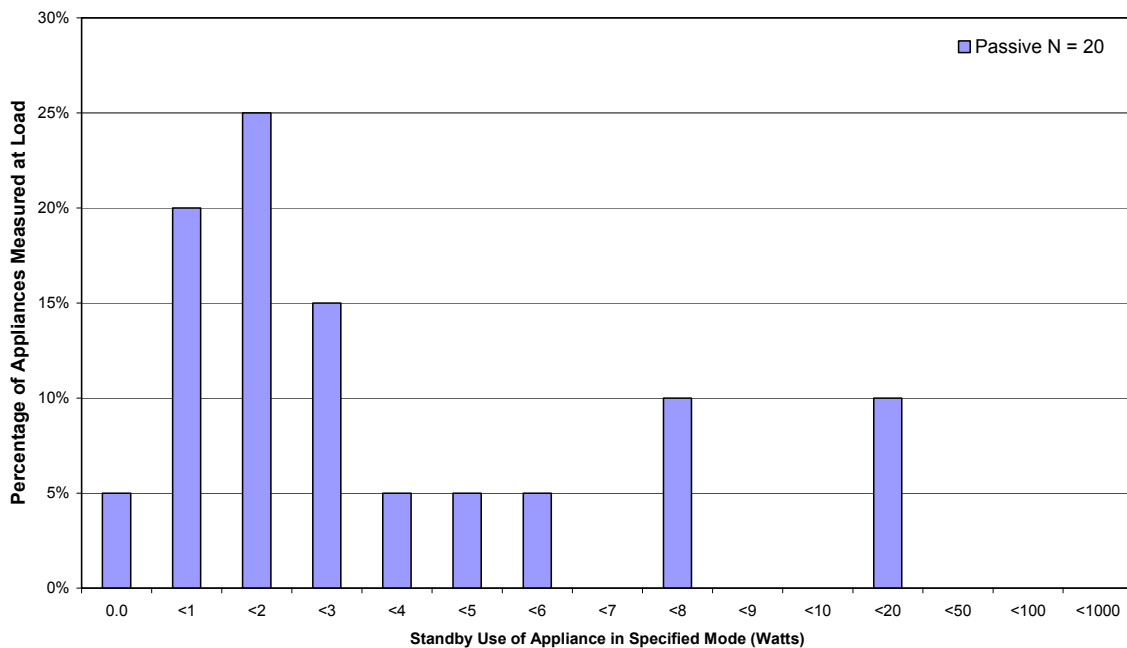


Figure 46 below shows the passive standby power consumption of amplifiers for 2005. It can be seen that there is a range of consumptions, with the largest percentage of units (45%) using between 3.0 Watts and less than 1.0 Watts.

Figure 46 - Passive standby power consumption of Amplifiers for 2005



Other Audio Components

Other audio components comprise of appliances including separate CD players, separate tuners, turntables and tape decks. These may be combined in a single unit or as separate components that are linked together. Not all of the above list may be present. Components usually use the same speakers for sound output. Sometimes a receiver may also be present (but ownership was found to be less than 0.1 units per house so results have not been separately reported).

The ownership of CD players was found to be 0.3 units per house in 2005, with ownership probably decreasing or steady. About 78% of units were found to have a hard off switch, 14% were found to have a standby switch, 6% were found to have a soft off switch and 3% of units were found to have no switch. About 67% of units were found in off mode, 17% were found unplugged, 11% were found in passive standby mode and 6% of units were found in active standby mode. The average active standby for CD players was found to be 7.3 Watts, the average passive standby was found to be 4.5 Watts and the average off mode was found to be 1.5 Watts. About 50% of units were found to have remote control capabilities.

The ownership of tape decks was found to be 0.21 units per house in 2005, with ownership probably decreasing given that this is an obsolete technology. About 80% of units were found to have a hard off switch, 16% were found to have no switch and 4% were found to have a standby switch. About 72% of units were found in off mode, 17% were found unplugged, 8% were found in passive standby mode and 8% of units were found in active standby mode. The average active standby for tape decks was found to be 7.9 Watts, the average passive standby was found to be 3.5 Watts and the average off mode was found to be 0.7 Watts.

The ownership of tuners was found to be 0.13 units per house in 2005, with ownership probably decreasing or steady. About 94% of units were found to have a hard off switch and 6% were found to have a standby switch. About 81% of units were found in off mode, 6% were found unplugged and 6% were found in passive standby mode. The average active standby for tuners was found to be 9.1 Watts, the average passive standby was found to be 2.9 Watts and the average off mode was found to be 0.5 Watts.

The ownership of turntables was found to be 0.15 units per house in 2005, with ownership probably decreasing as it is an obsolete technology. About 94% of units were found to have a hard off switch and 6% were found to have no switch. About 67% of units were found in off mode, 28% were found unplugged and 6% were found in passive standby mode. The average active standby for turntables was found to be 7.3 Watts, the average passive standby was found to be 1.5 Watts and the average off mode was found to be 0.4 Watts.



Table 29 – Summary of Other Audio Component Findings

Appliance Type		Statistic	Number of Readings
CD Players	Ownership	0.3	36
	Average Active Standby Mode	7.3 Watts	36
	Average Passive Standby Mode	4.5 Watts	8
	Average Off Mode	1.5 Watts	30
Tape Decks	Ownership	0.21	25
	Average Active Standby Mode	7.9 Watts	21
	Average Passive Standby Mode	3.5 Watts	10
	Average Off Mode	0.7 Watts	19
Tuners	Ownership	0.13	16
	Average Active Standby Mode	9.1 Watts	14
	Average Passive Standby Mode	2.9 Watts	4
	Average Off Mode	0.5 Watts	15
Turntables	Ownership	0.15	18
	Average Active Standby Mode	7.3 Watts	4
	Average Passive Standby Mode	1.5 Watts	4
	Average Off Mode	0.4 Watts	17

3.3.2 Other Audio

The other audio category is made up of appliances including:

- Portable CD players (ie Discman type players);
- Headphones;
- Infra-red cordless headphones;
- Radios.

With the exception of radios, all other appliance types in the other audio category were found to be of negligible appliance numbers (ie less than 10 units). It must be noted that each of these other appliance types did have relevant standby modes, although the ownership for each was less than 0.1 per house and therefore have not been reported.



Radios

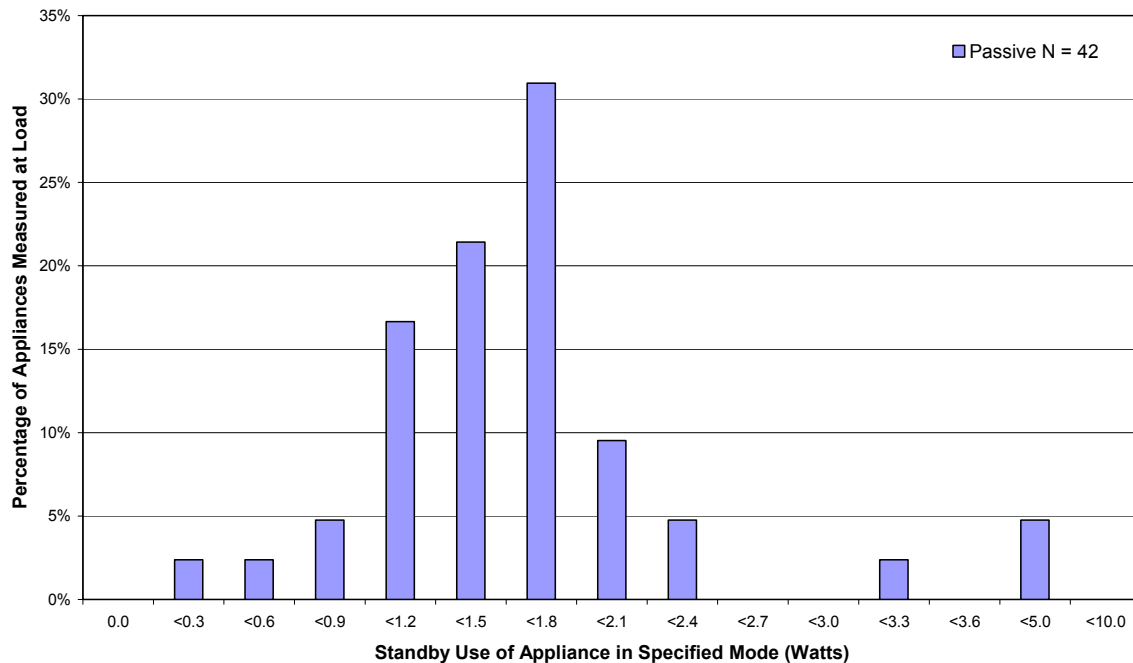
The ownership of radios was found to be 0.46 units per house in 2005, with ownership probably steady. About 36% were found to be unplugged, about 53% were found in passive standby mode and the other 11% were found to be switched off using a hard off switch. The average passive standby for radios was found to be 1.5 Watts.

Table 30 – Summary of Radio Findings

Radios	Statistic	Number of Readings
Ownership	0.46	55
Average Passive Standby Mode	1.5 Watts	42
Minimum Passive Standby Mode	0.3 Watts	42
Maximum Passive Standby Mode	3.8 Watts	42

Figure 47 – below shows the passive standby mode power consumption for radios in 2005. It can be seen that the majority of units (31%) consume between 1.8 Watts and 2.1 Watts.

Figure 47 - Passive standby mode power consumption for Radios in 2005



3.4 Set Top Boxes

Set top boxes provide a tuner which can be used to translate digital broadcast signals into an analogue signal which can be viewed on an existing television. Set top boxes are also used to receive (and sometimes transmit) signals from cable, satellite or terrestrial broadcasts (usually pay TV, sometimes free to air). Most set top boxes found in this survey are likely to have digital tuners. For this survey, set top boxes were classified as such if they had no DVD recording or playing capability (ie had no facility for playing or recording external media). Many of the set top boxes would have hard drives, although these could not always be identified during the survey.

Set top box ownership was found to be 0.32 units per house, with ownership probably increasing fairly quickly. About 76% of units were found to have standby switches, about 18% were found to have no switch, about 3% were found to have a soft off switch and 3% were found with a hard off switch. About 47% of units were found in on mode, 42% in passive standby mode and 11% were found unplugged. The average on mode was found to be 13.3 Watts, while the average passive standby was found to be 10.7 Watts. About 89% of units were found to have remote control capabilities. About 60% of the owners, when asked, answered that they left their set top box in active standby mode for 24 hours of the day. The average age of set top boxes was found to be 1.8 years.

It was found that two of set top boxes had built in hard drive recording capabilities (although more may have had this function). One measurement was possible whilst this function was initiated, the energy consumption was found to be 23.6 Watts (it must be noted that the active standby for these recording units was between 20 Watts and 21 Watts, amongst the four highest readings for set top boxes). One other unit which was a combination set top box/DVD player was also found (this unit was separately classified and is not included in the following results).

Table 31 – Summary of Set Top Box Findings

Set Top Boxes	Statistic	Number of Readings
Ownership	0.32	38
Average Age	1.8 years	36
Average On Mode	13.3 Watts	38
Minimum On Mode	6.2 Watts	38
Maximum On Mode	20.9 Watts	38
Average Passive Standby	10.7 Watts	37
Minimum Passive Standby	2.0 Watts	37
Maximum Passive Standby	20.5 Watts	37
Average Off Mode	0.0 Watts	2

Figure 48 below shows the on mode consumption of set top boxes for 2005. It can be seen that majority of units (32%) used between 15.0 and 17.5 Watts in on mode.

Note: Figure 48 below does not use standard bin sizes.

Figure 48 – On mode power consumption of Set Top Boxes for 2005

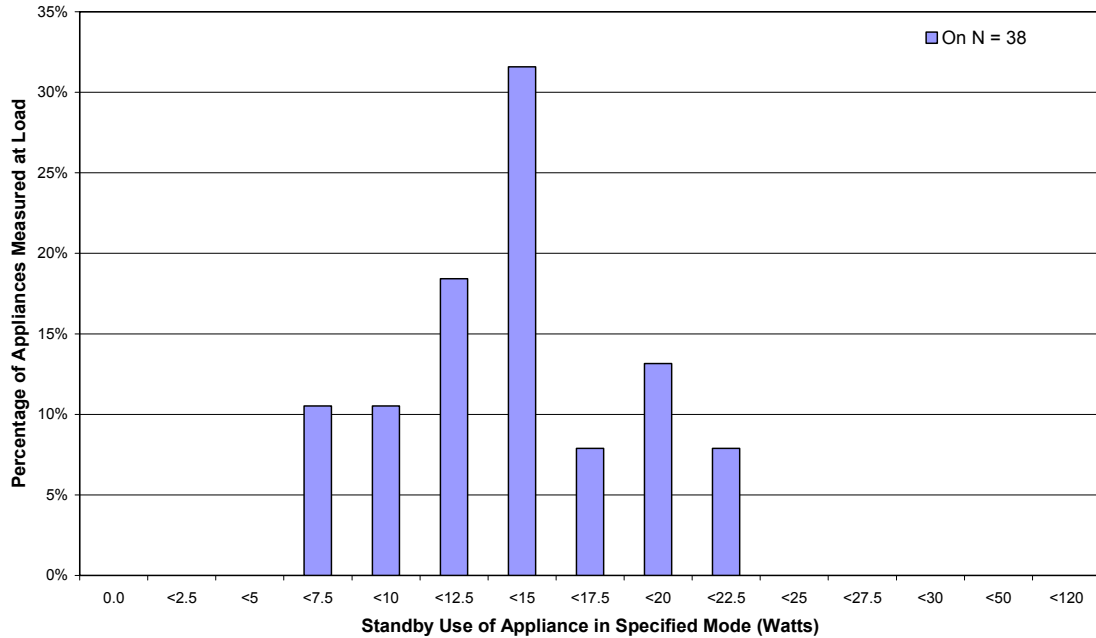


Figure 49 below shows the passive standby consumption of set top boxes for 2005. Once again, it can be seen that majority of units (almost 60%) used between 10 and 20 Watts in passive standby.

Note: Figure 49 below does not use standard bin sizes.

Figure 49 – Passive standby power consumption of Set Top Boxes for 2005

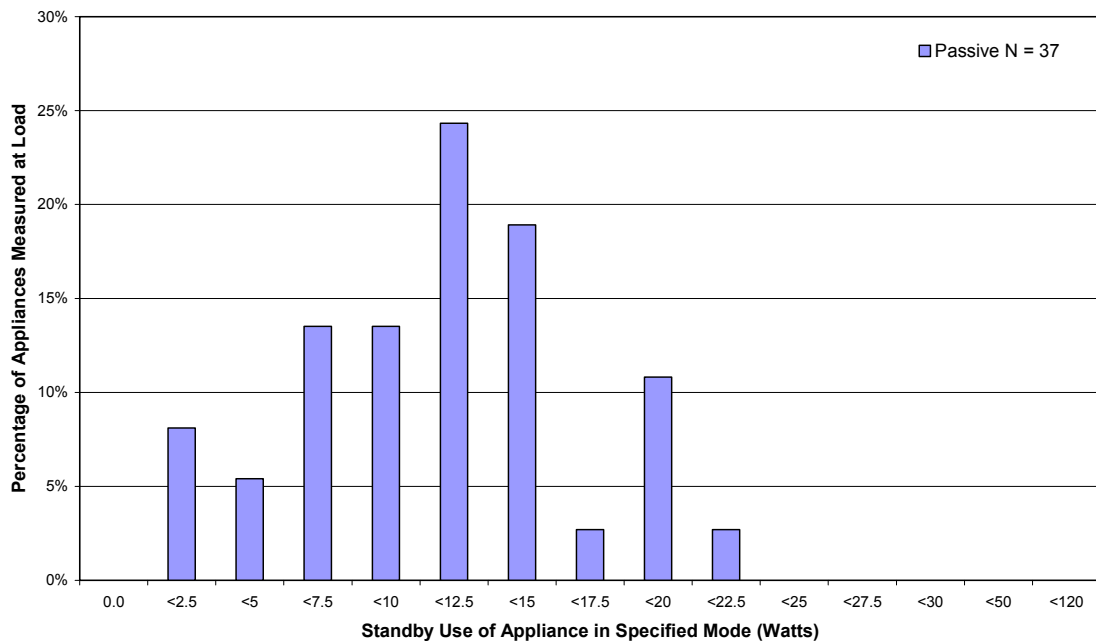


Figure 50 below shows the on mode consumption of set top boxes when compared to year of purchase. It can be seen from the trendline, that the average on mode of set top boxes has remained relatively stable over time.

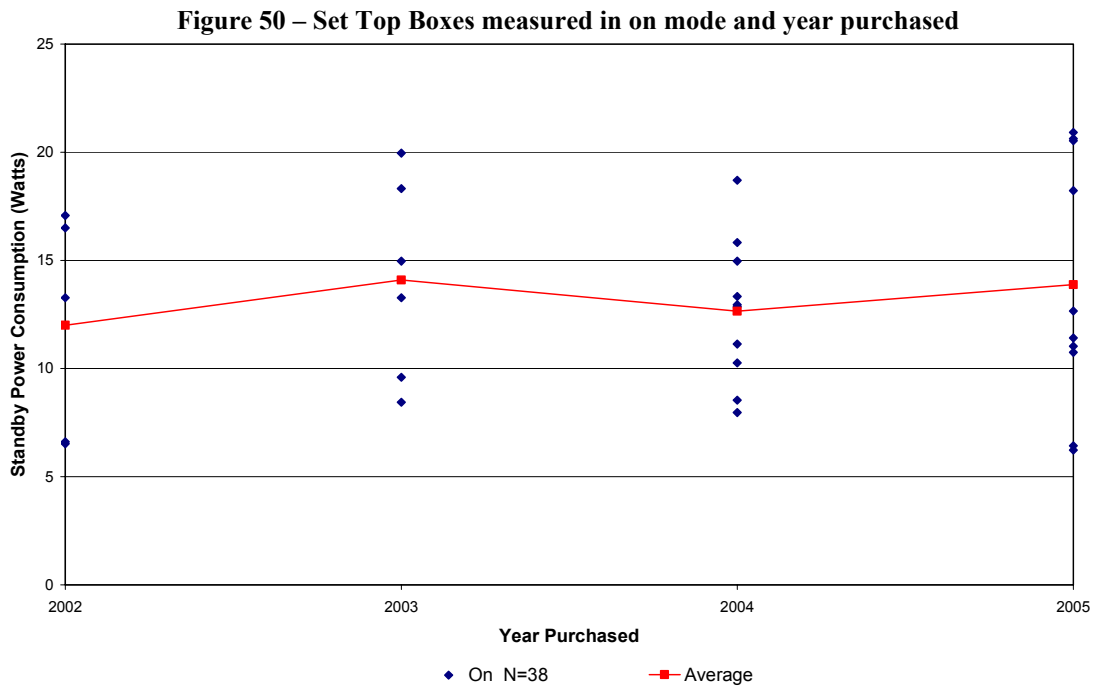
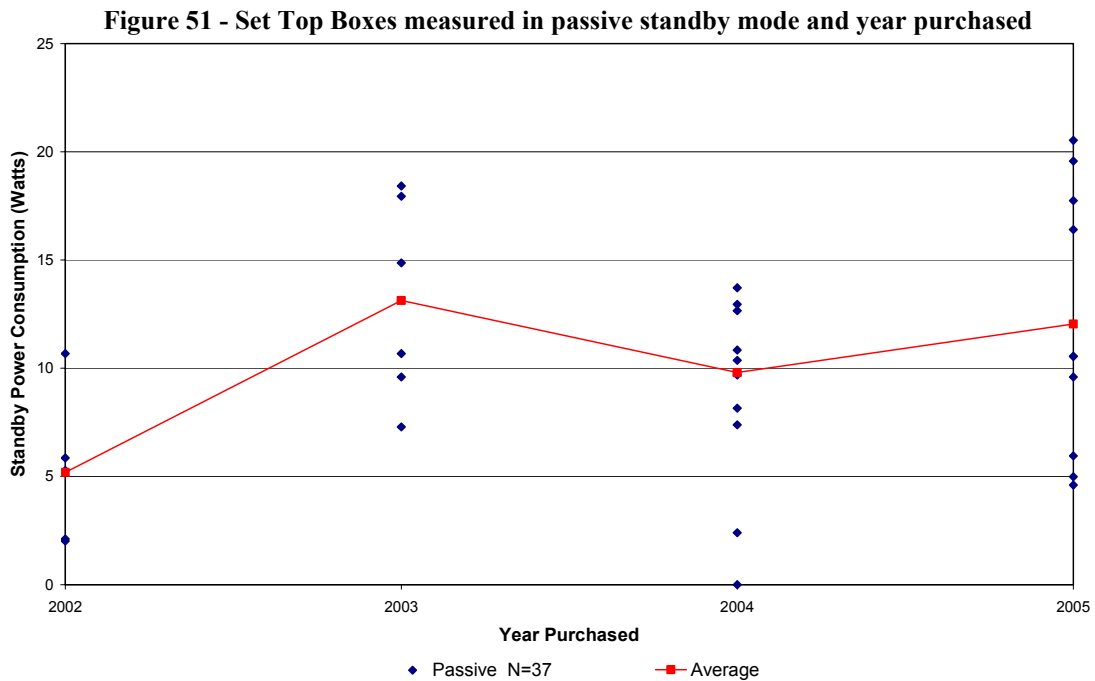


Figure 51 below shows the passive standby consumption of set top boxes when compared to year of purchase. It can be seen from the trendline that the average passive standby of set top boxes has increased over time. Note there are some data points for years before 2002, but these points are intermittent and not very illustrative.



3.5 Televisions

The televisions category is made up of appliances including:

- CRT Televisions;
- Plasma Televisions.

There was also one front projection television found, but as it was mounted on the ceiling, no measurement could be made. No LCD televisions were included in the sample.

3.5.1 CRT Televisions

The ownership of CRT televisions was found to be 2.07 units per house in 2005, with ownership probably slightly increasing or steady. This ownership is slightly higher than that found by the ABS in its 4602 report, possibly due to a sample bias in the intrusive survey sample. About 95% of units were found to have a hard off switch, about 4% were found to have a soft off switch or standby switch. About 41% of units were found to be in passive standby mode (remote used to turn screen off), 40% were found in off mode (hard or soft switch used to turn unit off) and about 19% were found to be unplugged or off at the mains. About 69% of units were found to have remote control capabilities – this suggests that many second televisions are older units which are retained. The average on mode power (unit on and showing either a bluescreen, blackscreen or snow) for CRT televisions was found to be 66.9 Watts. The average passive standby mode (when the unit is ‘turned off’ with the remote control or with a standby switch) for CRT televisions was found to be 7.4 Watts and the average off mode was found to be 0.1 Watts. The average age of CRT televisions was found to be 7.7 years. Screen size was not recorded.



Table 32 – Summary of CRT Television Findings

CRT Televisions	Statistic	Number of Readings
Ownership	2.07	248
Average Age	7.7 years	243
Average On Mode	66.9 Watts	246
Minimum On Mode	3.0 Watts	246
Maximum On Mode	154.8 Watts	246
Average Passive Standby	7.4 Watts	183
Minimum Passive Standby	0.3 Watts	183
Maximum Passive Standby	36.5 Watts	183
Average Off Mode	0.1 Watts	243
Minimum Off Mode	0.0 Watts	243
Maximum Off Mode	6.2 Watts	243

Figure 52 below shows the passive standby power consumption for CRT televisions in 2005. It can be seen that there is a wide range of consumptions, with the largest percentage of units (22%) consuming between 10.0 Watts and 20.0 Watts.

Figure 52 – Passive standby power consumption for CRT Televisions in 2005

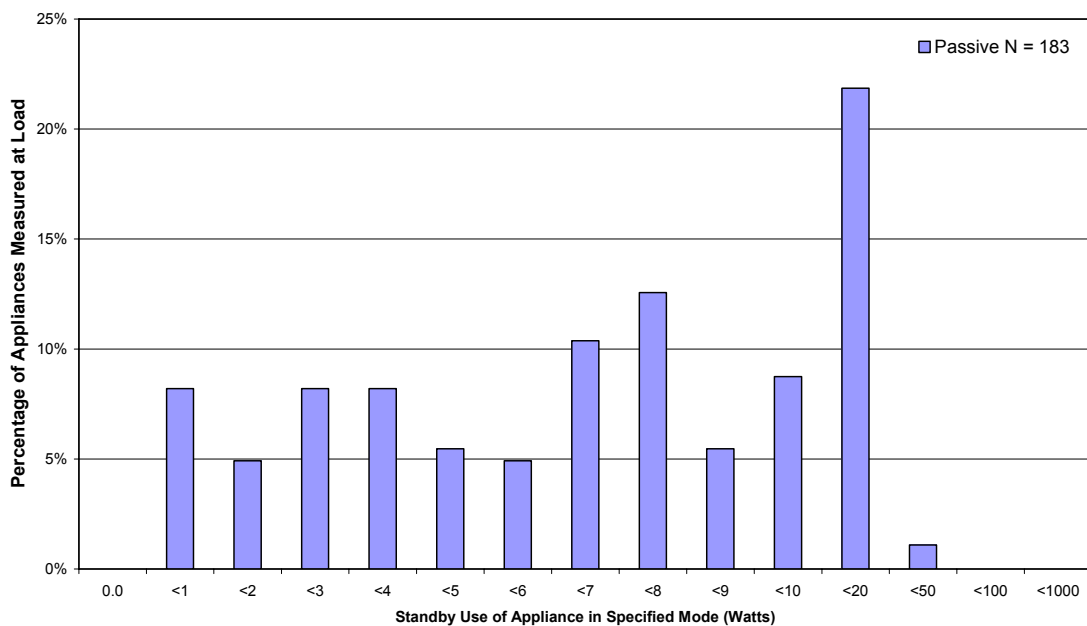


Figure 53 below show the off mode power consumption for CRT televisions in 2005. It can be seen that the majority of units (93%) consume 0.0 Watts in off mode.

Note: Figure 53 below does not use the standard bin sizes.

Figure 53 – Off mode power consumption for CRT Televisions in 2005

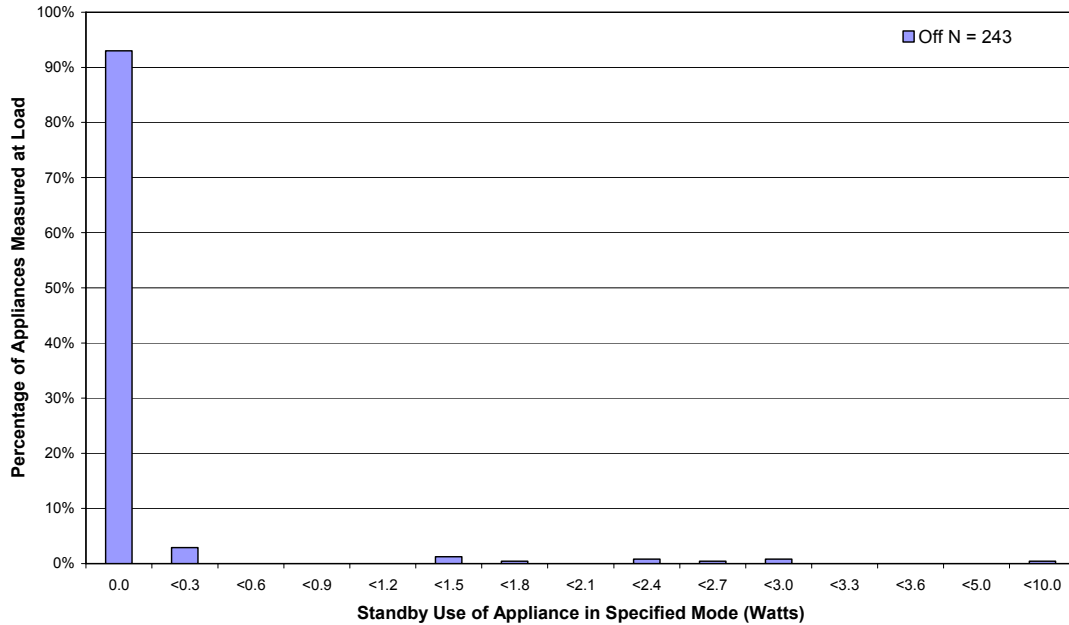
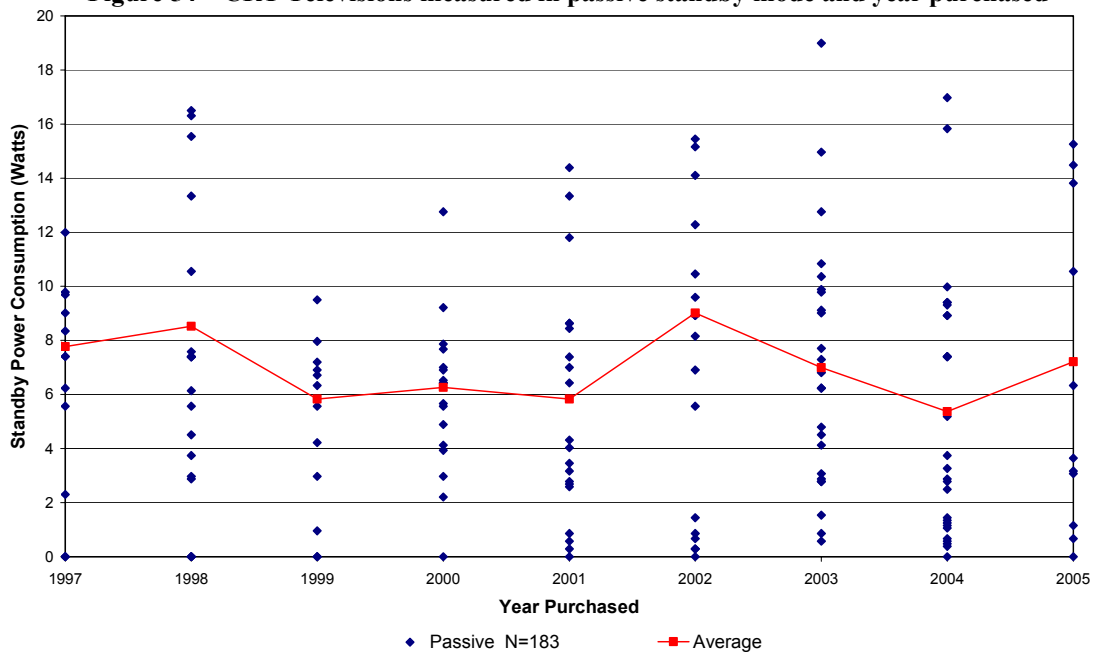


Figure 54 below shows the passive standby consumption of CRT televisions when compared to year of purchase. It can be seen from the trendline that the average passive standby of CRT televisions has decreased over time.

Figure 54 – CRT Televisions measured in passive standby mode and year purchased



A figure showing the off mode trend for CRT televisions has not been included due to almost all models using 0.0 Watts in off mode. This trend has not changed over the time in which televisions were found to be purchased.

Plasma Televisions

Please note that caution is required with any interpretation of following results, due to the small sample size.

The ownership of plasma televisions was found to be 0.04 units per house in 2005 (5 units in 120 households), with ownership probably set to increase as prices decrease, although the share of LCD televisions is also likely to increase as well. About 80% of units (four units) were found to have passive standby mode and a hard off switch, while 20% of units (one unit) was found to have a standby mode only (no off switch). All units were found to be in passive standby mode and all units were found to have remote control capabilities. The average on mode (unit on and showing either a bluescreen, blackscreen or snow) for plasma televisions was found to be 165.8 Watts. This value will be affected somewhat by what was showing, as power consumption for plasma televisions is quite sensitive to picture content. The average passive standby mode (when the unit is 'turned off' with the remote control or with a standby switch) for plasma televisions was found to be 8.3 Watts and the average off mode was found to be 0.2 Watts. Interestingly, the unit with the standby switch recorded the lowest passive standby mode and the highest on mode. The average age of plasma televisions was found to be 1.8 years.

Table 33 – Summary of Plasma Television Findings

Plasma Televisions	Statistic	Number of Readings
Ownership	0.04	5
Average Age	1.8 years	5
Average On Standby	165.8 Watts	5
Minimum On Standby	130.5 Watts	5
Maximum On Standby	247.7 Watts	5
Average Passive Standby	8.3 Watts	5
Minimum Passive Standby	0.2 Watts	5
Maximum Passive Standby	35.1 Watts	5
Average Off Mode	0.2 Watts	4
Minimum Off Mode	0.0 Watts	4
Maximum Off Mode	1.0 Watts	4



3.6 Computers and Peripherals

The computer and peripherals category is made up of appliances including:

- Computers;
- Laptop Computers;
- CRT Computer Monitors;
- LCD Computer Monitors;
- Computer Speakers;
- Hubs and Switches;
- Modems;
- Inkjet Printers;
- Laser Printers;
- Scanners.

Please note that there were other appliance types in the computers and peripherals category that did have standby attributes, but the ownership for each was less than 0.1 per house so the results have not been reported.

3.6.1 Computers

Computers included only separate boxes with processor and power supply (desktops). The ownership of desktop computers was found to be 1.25 units per house in 2005, with ownership increasing. About 93% of the households surveyed were found to have at least one computer or one laptop, while total computer ownership was 1.8 (desktops and laptops). This is somewhat higher than the reported value by ABS, indicating a possible bias in the sample used for this survey (or under-reporting by ABS).

About 79% of units were found to have a hard off switch the other 21% were found to have to a soft off switch. About 81% of units were found in off mode, 11% were found unplugged, 7% were found to be in use (on) mode and 1% of units were found in passive standby mode. The average on mode for computers was found to be 82.2 Watts, the average passive standby was found to be 35.5 Watts and the average off mode was found to be 3.5 Watts. The average age of computers was found to be 3.5 years.



Table 34 – Summary of Computer Findings

Computers	Statistic	Number of Readings
Ownership	1.25	150
Average Age	3.5 years	146
Average On Mode	82.2 Watts	146
Minimum On Mode	25.9 Watts	146
Maximum On Mode	215.3 Watts	146
Average Passive Standby	35.5 Watts	43
Minimum Passive Standby	1.2 Watts	43
Maximum Passive Standby	160.5 Watts	43
Average Off Mode	3.5 Watts	150
Minimum Off Mode	0.0 Watts	150
Maximum Off Mode	9.9 Watts	150

Figure 55 below shows the on mode power consumption of computers for 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (15%) using between 90 and 100 Watts in on mode.

Note: Figure 55 below does not use the standby bin sizes.

Figure 55 – On mode power consumption of Desktop Computers for 2005

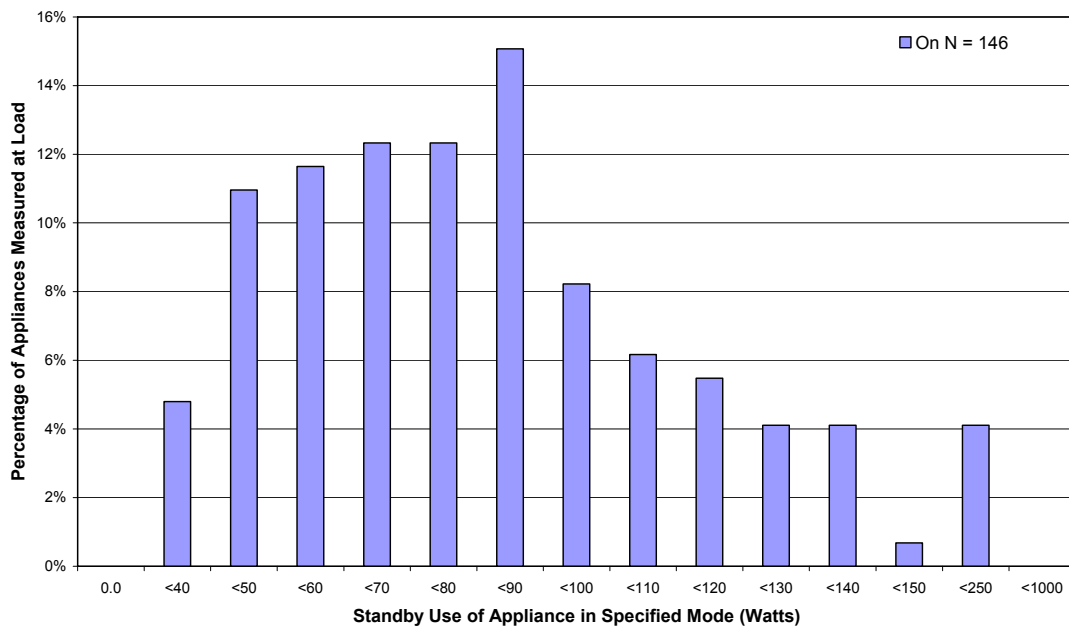


Figure 56 below shows the passive standby mode power consumption of computers for 2005. It can be seen that there are a range of usages, with the largest percentage of units (23%) consuming between 5 Watts and 10 Watts. The results for passive standby mode are complex and probably not very representative. More accurate data would have to be measured in a laboratory under controlled conditions. Variations in the recorded values are probably due to several reasons:

- Some computers could not be put into passive standby mode, due to passwords, access restrictions and software incompatibility.
- If the monitor was plugged into the back of the computer and there was no access to this plug, passive standby mode was defined as having the monitor powered down.
- Some computers had a sleep button on the keyboard; where present this was used in preference to changing properties settings. Unfortunately no comparison was possible between this consumption and the consumption of the unit when placed into passive standby mode using properties settings. Some models clearly powered down to a true “standby” or sleep mode while others had most of the core functions still running in passive standby mode. This may be a function of the age and type of processor used.

Only 23% of units had any passive standby mode enabled (see also results section on passive standby mode), and as reducing passive standby in computers requires user behaviour change, the off mode for computers is perhaps more representative of computer standby power consumption.

Figure 56 – Passive standby mode power consumption of Desktop Computers for 2005

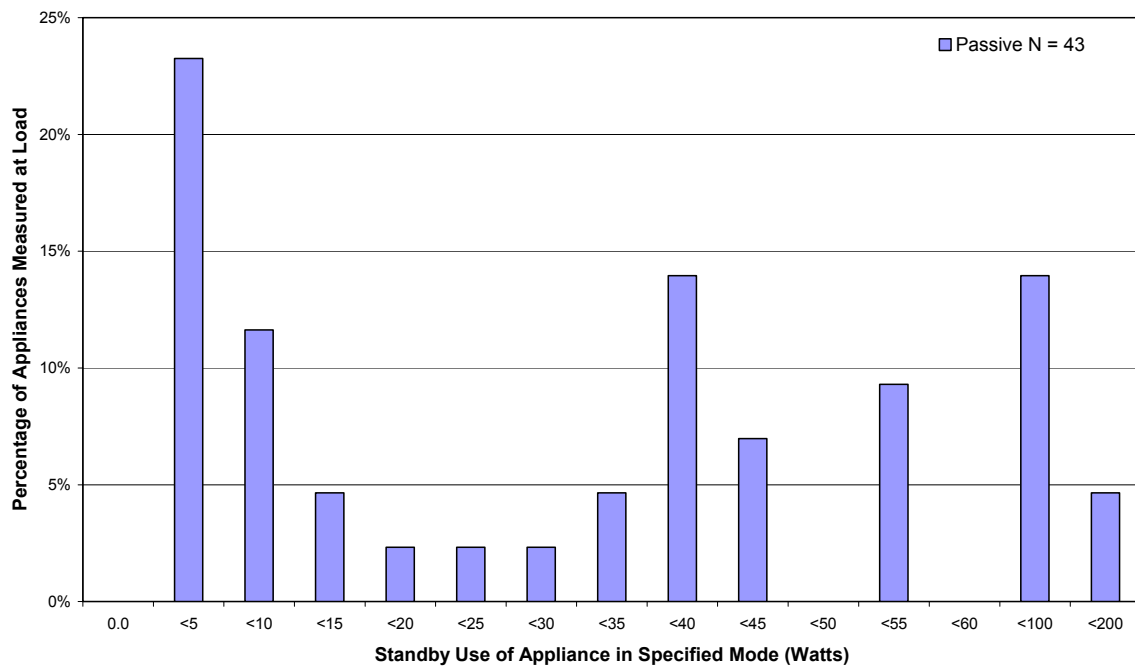


Figure 57 below shows the off mode power consumption of computers for 2005. It can be seen that there is a range of consumptions, with the largest percentage of units (28%) using between 4.0 Watts and 5.0 Watts.

Figure 57 - Off mode power consumption of Desktop Computers for 2005

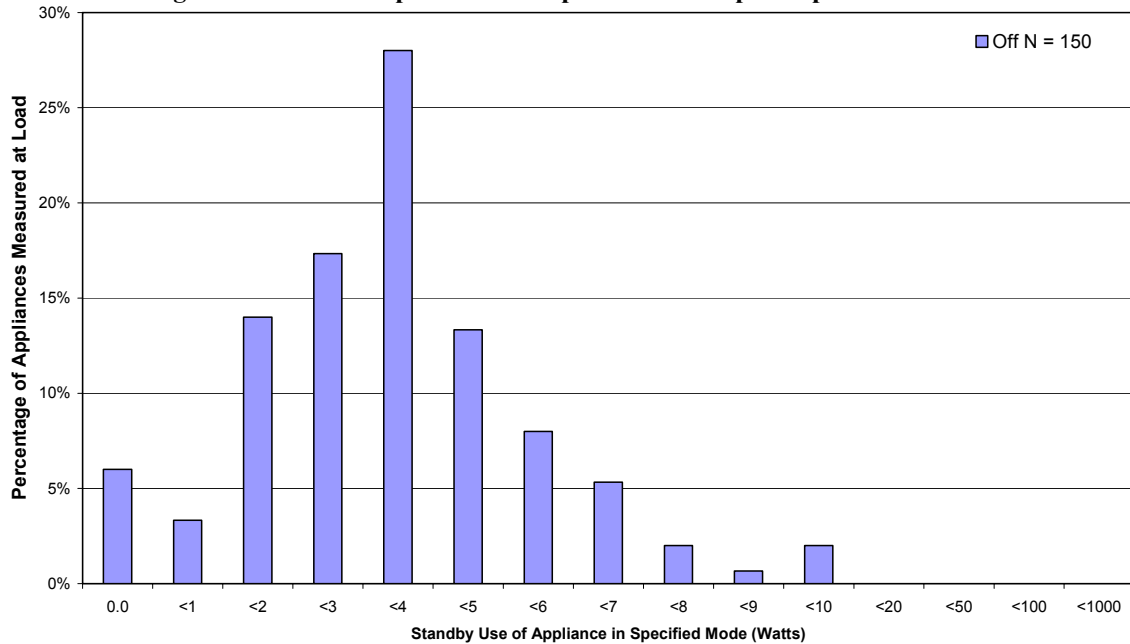


Figure 58 below shows the on mode power consumption of computers compared to year of purchase. It can be seen from the trendline that the average on mode power consumption has increased over time.

Figure 58 – Desktop Computers measured in on mode and year purchased

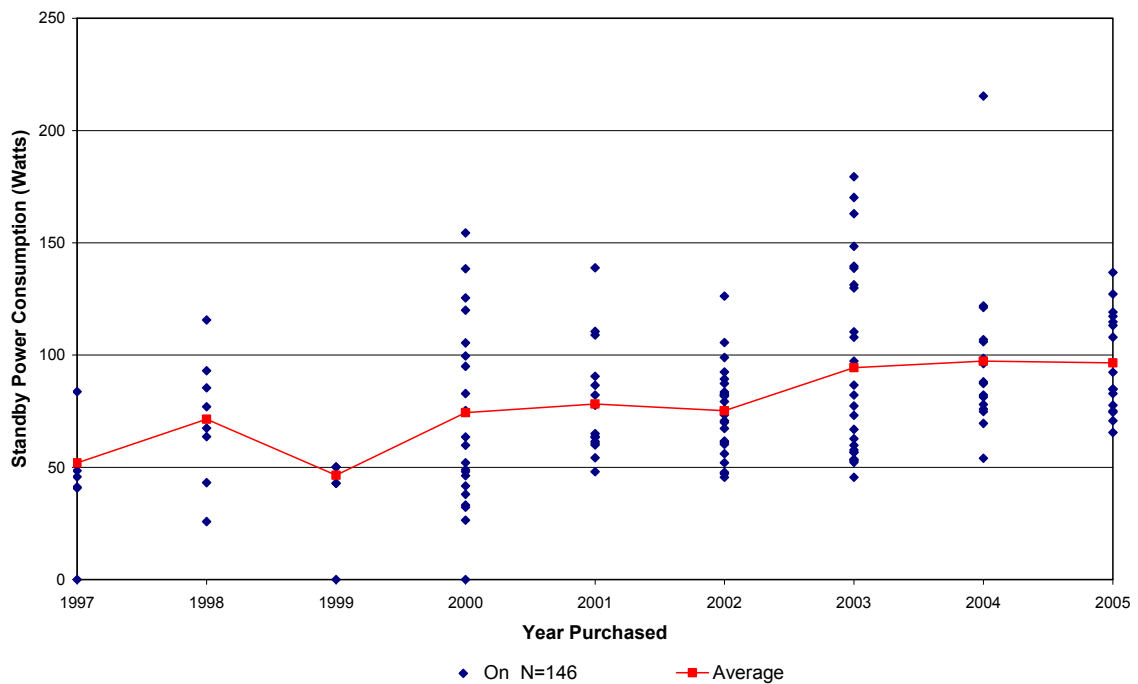


Figure 59 below shows the passive standby mode power consumption of computers compared to year of purchase. It can be seen from the trendline that the average passive standby mode power consumption has increased slightly as time has passed. Note there are some data points for years before 2000, but these points are intermittent and not very illustrative.

Figure 59 – Desktop Computers measured in passive standby mode and year purchased

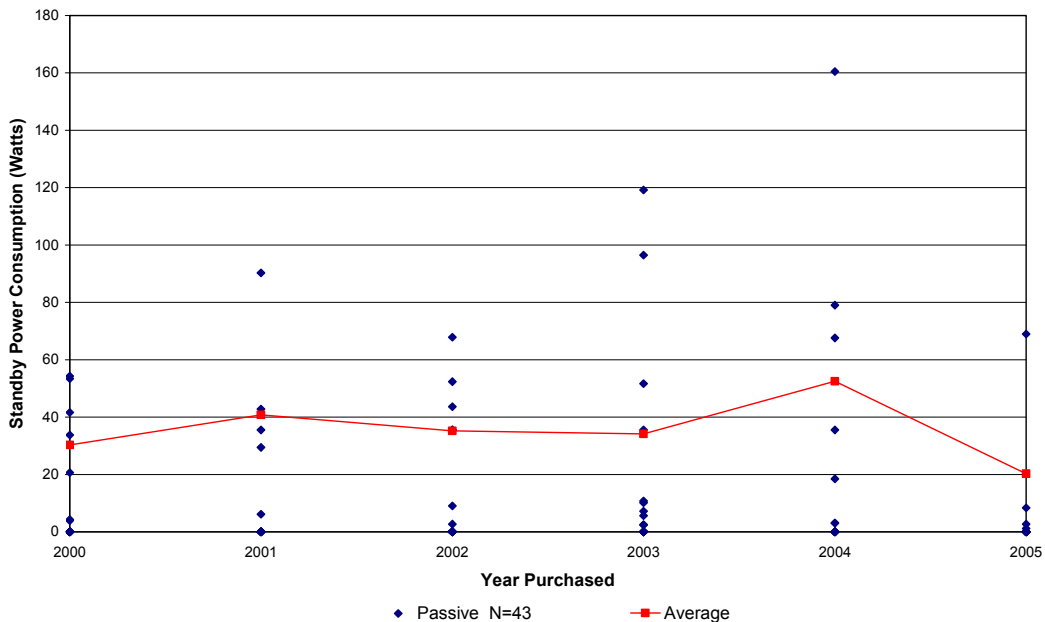
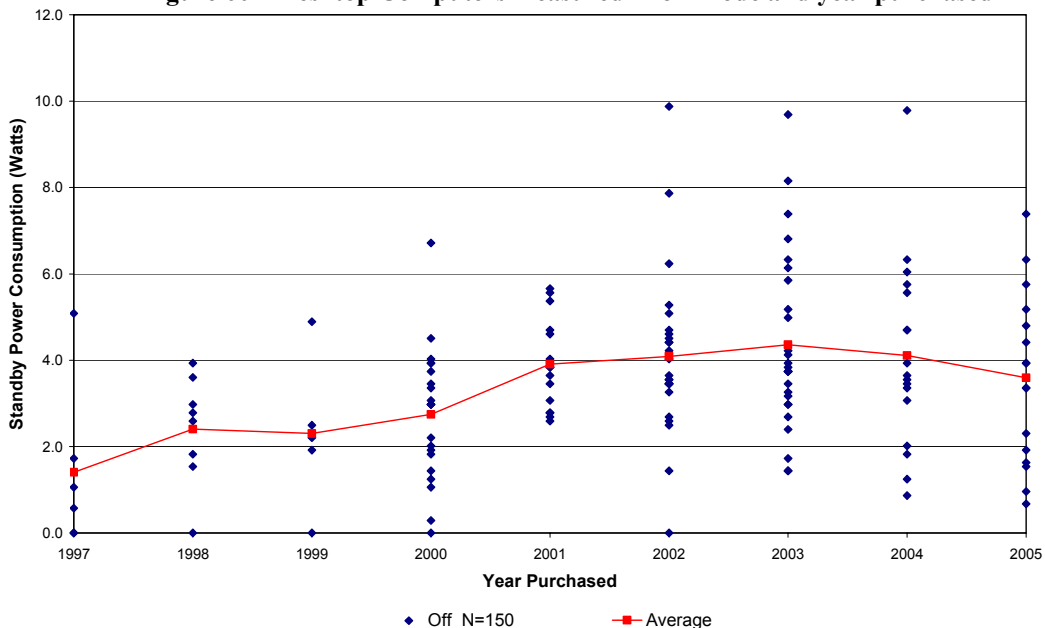


Figure 60 below shows the off mode power consumption of computers compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has increased as time has passed. Note there are some data points for years before 1997, but these are intermittent and not very illustrative.

Figure 60 – Desktop Computers measured in off mode and year purchased



3.6.2 Laptop Computers

The ownership of laptop computers was found to be 0.54 units per house in 2005, with ownership increasing. About 93% of the households surveyed were found to have at least one computer or one laptop while total computer ownership was 1.8 (desktops and laptops). This is somewhat higher than the reported value by ABS, indicating a possible bias in the sample used for this survey (or under-reporting by ABS).

All units were found to have a soft off switch. About 46% of units were found unplugged, 40% were found in off mode, 12% were found in passive standby mode and 2% of units were found to be in use (on mode). For 2 units, the power supply could not be located for measurement. The average active standby for laptop computers was found to be 34.1 Watts, the average passive standby was found to be 16.5 Watts and the average off mode was found to be 9.2 Watts. Please note that values for all modes measured are affected by the state of charge of the batteries which could not be controlled for field measurements, so these results are of limited value. The average age of laptop computers was found to be 2.8 years.

Table 35 – Summary of Laptop Computer Findings

Laptop Computers	Statistic	Number of Readings
Ownership	0.54	65
Average Age	2.8 years	59
Average On Mode	34.1 Watts	64
Minimum On Mode	14.8 Watts	64
Maximum On Mode	83.8 Watts	64
Average Passive Standby	16.5 Watts	63
Minimum Passive Standby	0.5 Watts	63
Maximum Passive Standby	71.6 Watts	63
Average Off Mode	9.2 Watts	61
Minimum Off Mode	0.7 Watts	61
Maximum Off Mode	59.4 Watts	61

Figure 61 below shows the passive standby mode power consumption of laptop computers for 2005. It can be seen that there are a range of measurements and that a large split occurs between 5 Watts and 10 Watts. This is due to some units charging batteries (above 10W) while others are not (below 5W). The state of charge of the

laptop battery could not be controlled for these field measurements so this measurement is of limited value.

Figure 61 - Passive standby mode power consumption of Laptop Computers for 2005

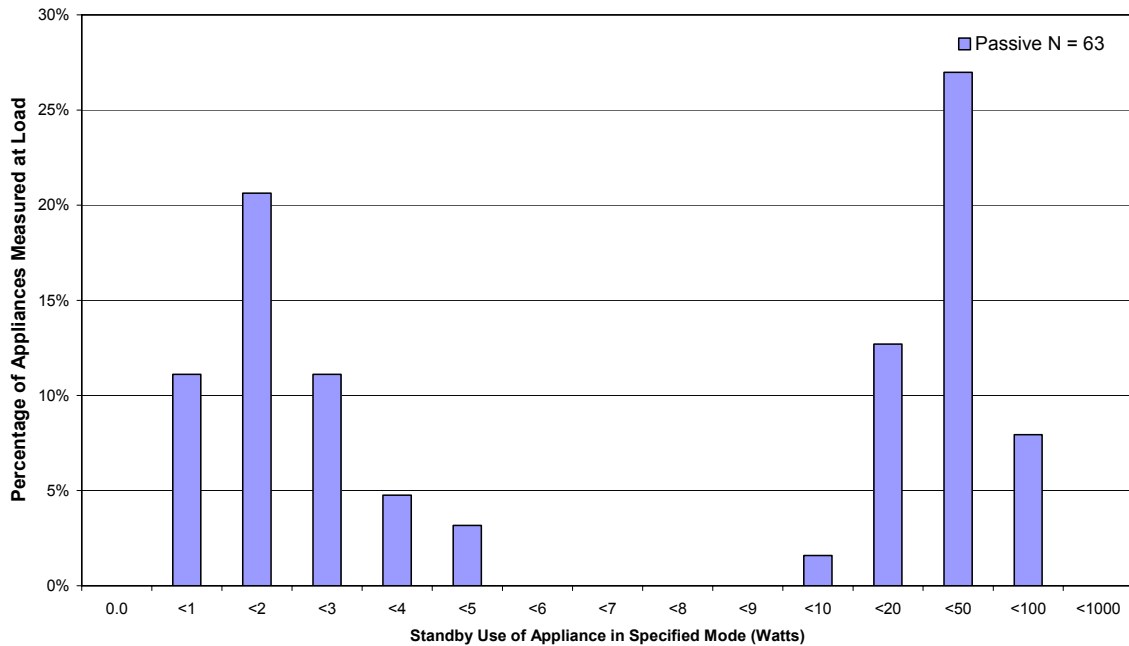
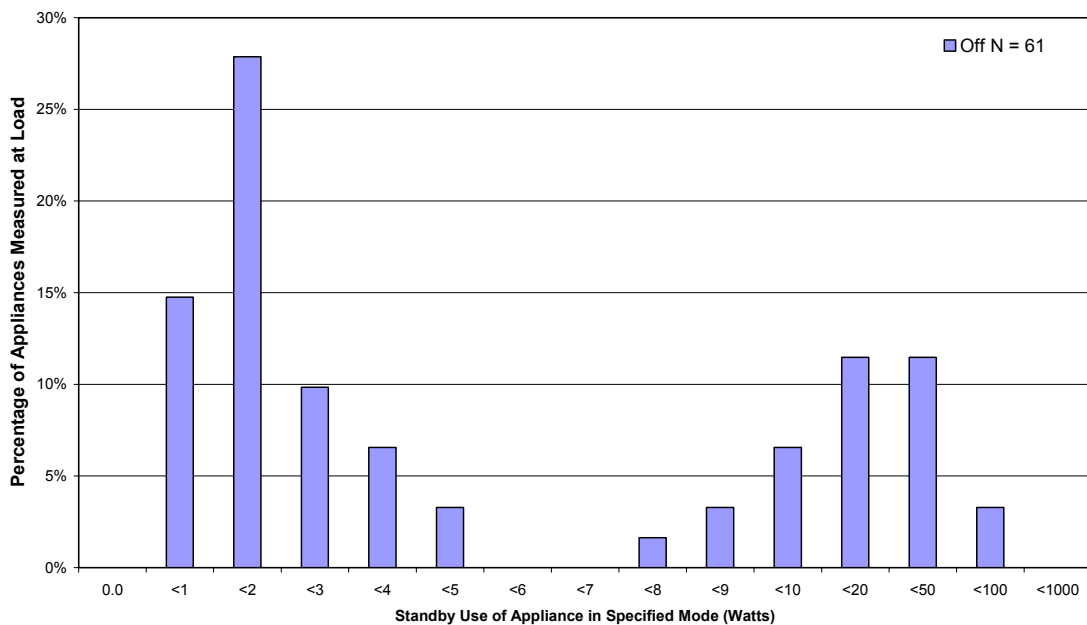


Figure 62 below shows the off mode power consumption of laptop computers for 2005 (with the laptop power supply plugged in but with the laptop completely shut down). As per passive standby mode, the measurements largely reflect the state of charge of the battery which could not be controlled for these field measurements.

Figure 62 - Off mode power consumption of Laptop Computers for 2005



3.6.3 CRT Computer Monitors

The ownership of CRT computer monitors was found to be 0.86 units per house in 2005, with ownership probably steady. About 62% of units were found to have a hard off switch and 38% of units were found to have a soft off switch. About 51% of units were found in off mode, 34% were found in passive standby mode, 13% were found unplugged and 2% of units were found in on mode. The average on mode power for CRT computer monitors was found to be 61.7 Watts, the average passive standby was found to be 7.2 Watts and the average off mode was found to be 1.9 Watts. The average age of CRT computer monitors was found to be 4.6 years.

Table 36 – Summary of CRT Computer Monitor Findings

CRT Computer Monitors	Statistic	Number of Readings
Ownership	0.86	103
Average Age	4.6 years	99
Average On Mode	61.7 Watts	97
Minimum On Mode	20.2 Watts	97
Maximum On Mode	164.0 Watts	97
Average Passive Standby	7.2 Watts	101
Minimum Passive Standby	0.0 Watts	101
Maximum Passive Standby	62.4 Watts	101
Average Off Mode	1.9 Watts	100
Minimum Off Mode	0.0 Watts	100
Maximum Off Mode	11.1 Watts	100

Figure 63 below shows the on mode power consumption of CRT computer monitors for 2005. It can be seen that there are a range of consumptions, with the largest percentage (37%) of units consuming between 70 and 80 Watts in on mode.

Note: Figure 63 below does not use the standby bin sizes.



Figure 63 – On mode power consumption of CRT Computer Monitors for 2005

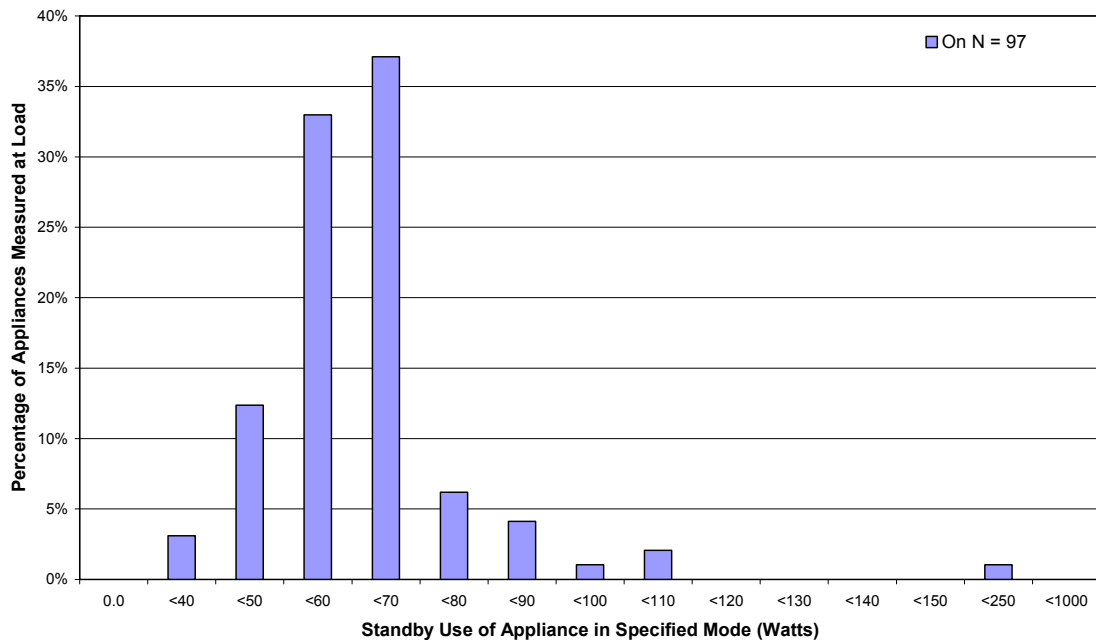


Figure 64 below shows the passive standby mode power consumption of CRT computer monitors for 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (24%) using between 4.0 Watts and 5.0 Watts in passive standby mode.

Figure 64 - Passive standby mode power consumption of CRT Computer Monitors for 2005

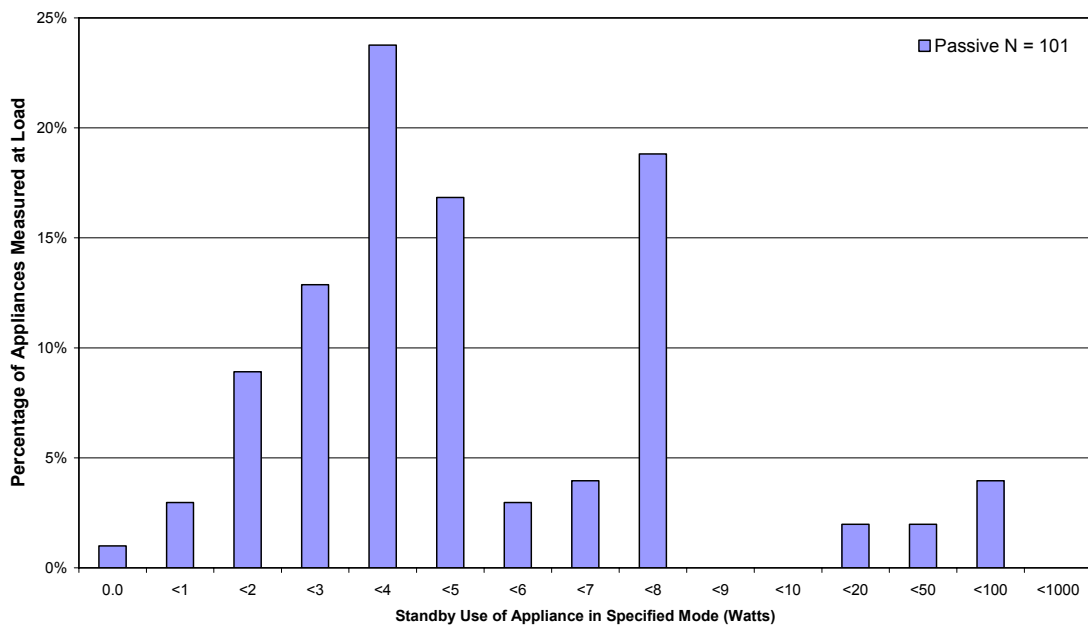


Figure 65 below shows the off mode power consumption of CRT computer monitors for 2005. It can be seen that there are a range of consumptions with the largest percentage of units using 0.0 Watts in off mode.

Figure 65 - Off mode power consumption of CRT Computer Monitors for 2005

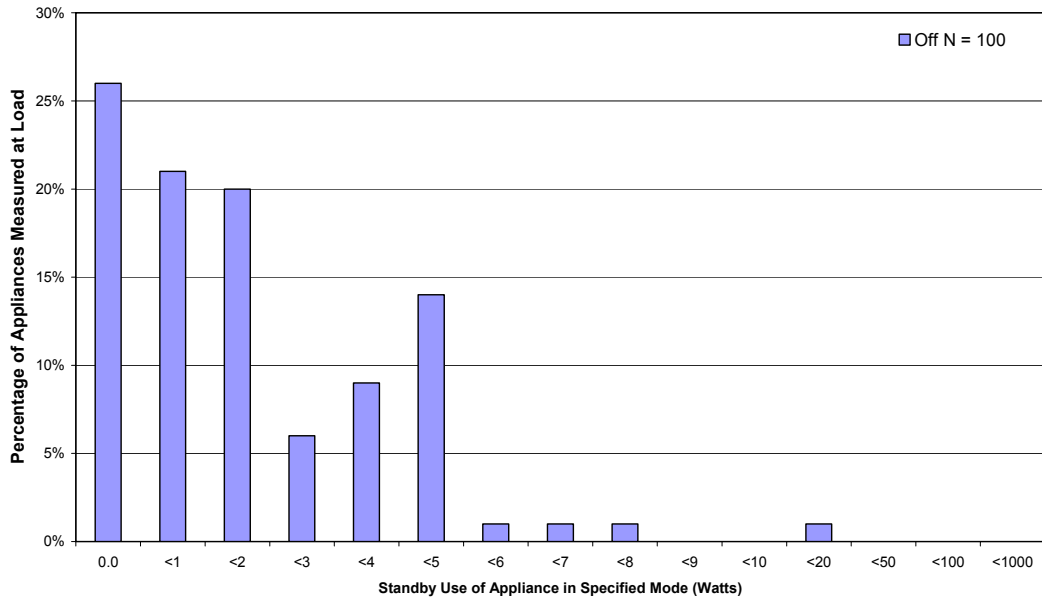


Figure 66 below shows the on mode power consumption of CRT computer monitors compared to year of purchase. It can be seen from the trendline that the average on mode power consumption has increased over time. Note there are some data points for years before 1997, but these points are intermittent and not very illustrative.

Figure 66 – CRT Computer Monitors measured in on mode and year purchased

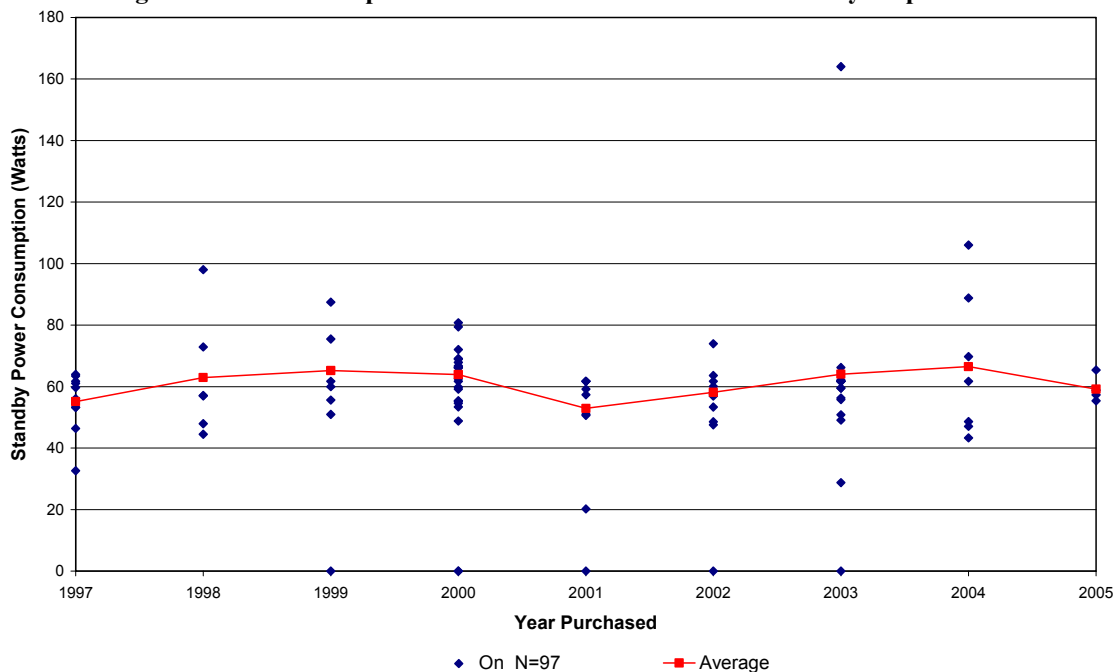


Figure 67 below shows the passive standby mode power consumption of CRT computer monitors compared to year of purchase. It can be seen from the trendline that the average passive standby mode power consumption has decreased as time has progressed. Note there are some data points for years before 1997, but these points are intermittent and not very illustrative.

Figure 67 – CRT Computer Monitors measured in passive standby mode and year purchased

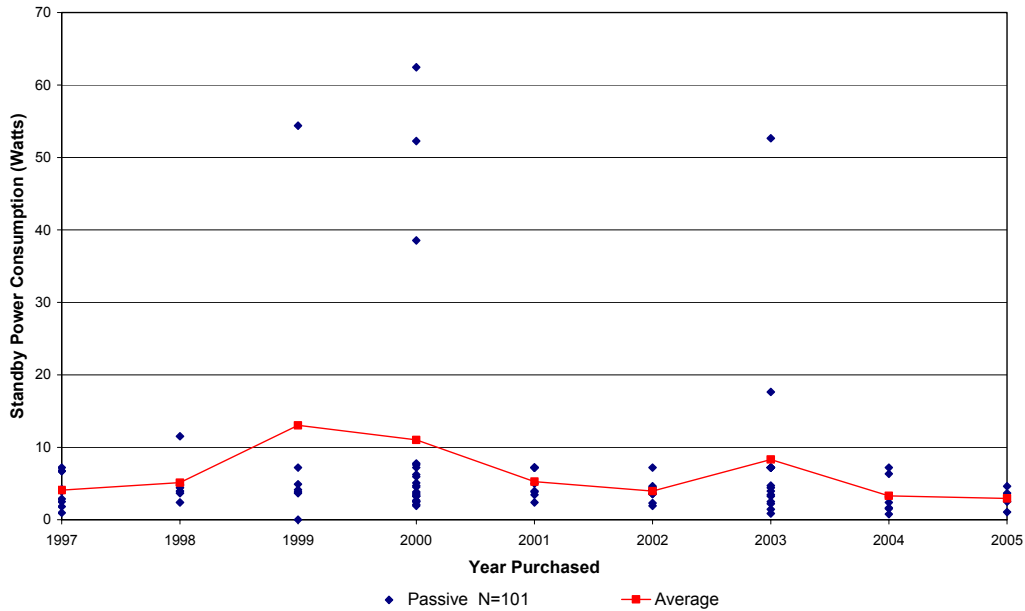
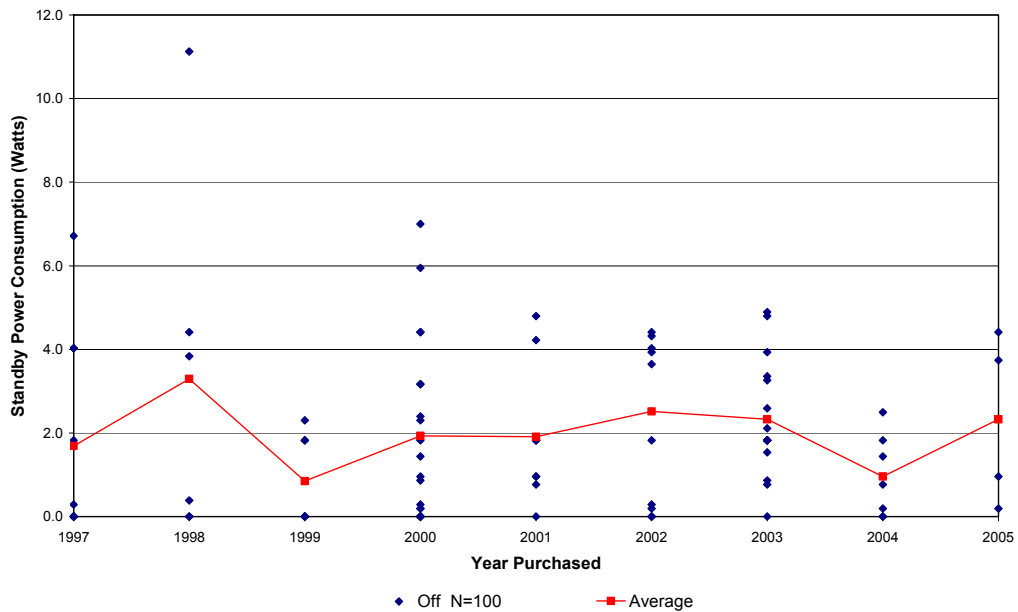


Figure 68 below shows the off mode power consumption of CRT computer monitors compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has increased over time. Note there are some data points for years before 1997, but these points are intermittent and not very illustrative.

Figure 68 - CRT Computer Monitors measured in off mode and year purchased



3.6.4 LCD Computer Monitors

The ownership of LCD computer monitors was found to be 0.37 units per house in 2005, with ownership probably increasing. About 93% of units were found to have a soft off switch, 5% were found to have a hard off switch and 2% of units (one unit) were found to have no switch. About 55% of units were found in off mode, 36% were found in passive standby mode, and about 9% of units were found unplugged. The average on mode for LCD computer monitors was found to be 29.3 Watts, the average passive standby was found to be 2.9 Watts and the average off mode was found to be 1.0 Watts. A majority of LCD monitors had external power supplies, but this varied by model. The average age of CRT computer monitors was found to be 1.4 years.

Table 37 – Summary of LCD Computer Monitor Findings

LCD Computer Monitors	Statistic	Number of Readings
Ownership	0.37	44
Average Age	1.4 years	43
Average On Mode	29.3 Watts	43
Minimum On Mode	13.7 Watts	43
Maximum On Mode	52.6 Watts	43
Average Passive Standby	2.6 Watts	43
Minimum Passive Standby	0.5 Watts	43
Maximum Passive Standby	27.9 Watts	43
Average Off Mode	1.0 Watts	43
Minimum Off Mode	0.3 Watts	43
Maximum Off Mode	3.3 Watts	43

Figure 69 below shows the on mode power consumption of LCD computer monitors for 2005. It can be seen that the majority of units (42%) consume between 30 and 35 Watts in on mode.

Note: Figure 69 below does not use standard bin sizes.



Figure 69 – On mode power consumption of LCD Computer Monitors for 2005

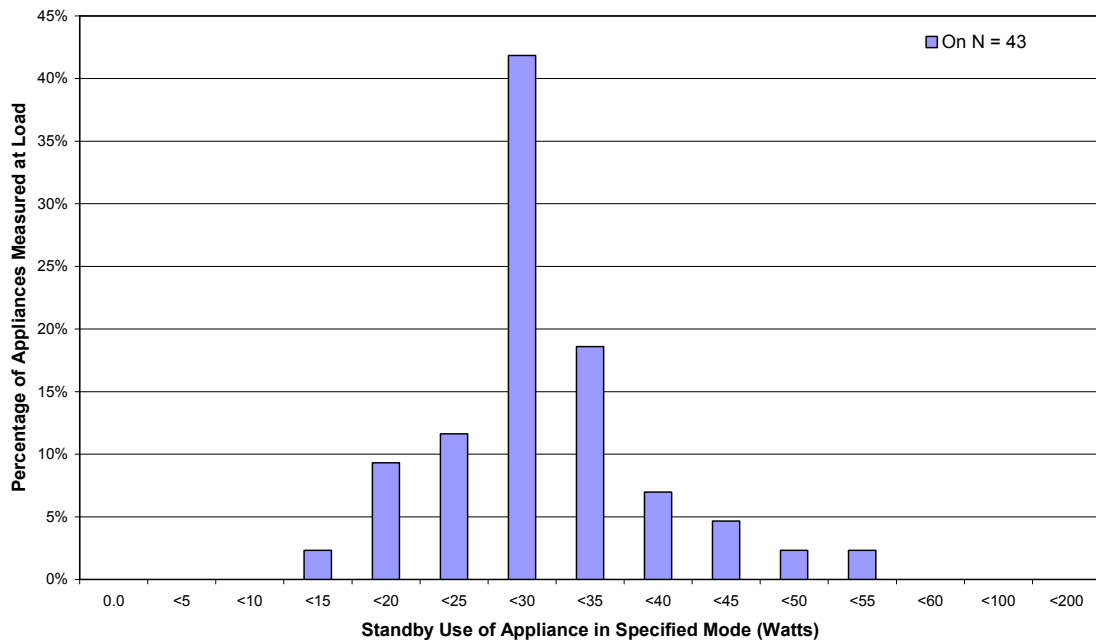


Figure 70 below shows the passive standby mode power consumption of LCD computer monitors for 2005. It can be seen that the majority of units (29%) use between 0.9 Watts and 1.2 Watts in passive standby mode.

Note: Figure 70 below does not use the standard bin sizes.

Figure 70 - Passive standby mode power consumption of LCD Computer Monitors for 2005

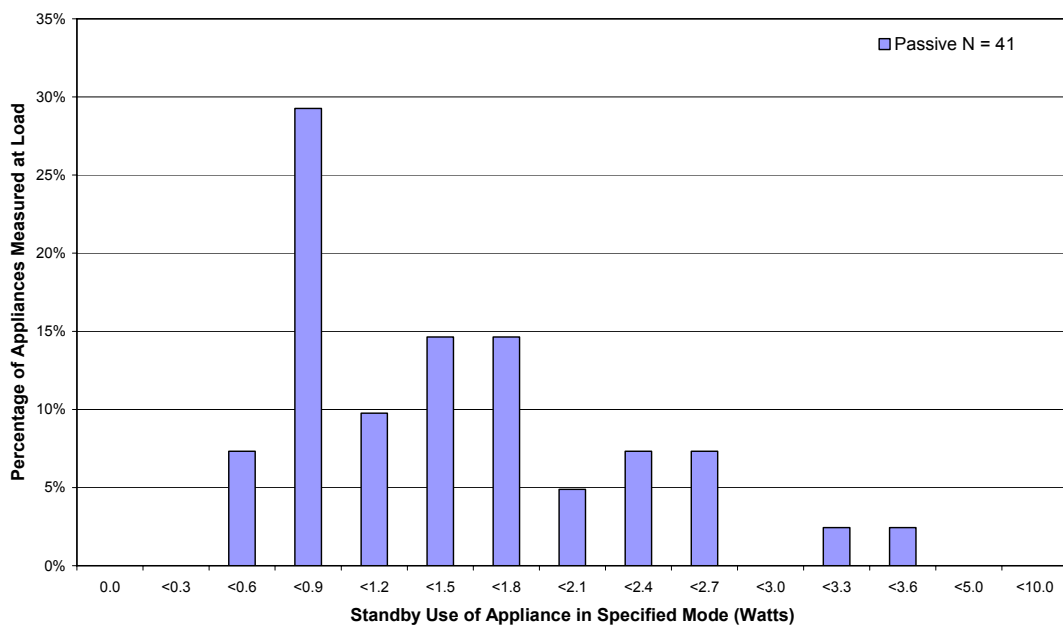


Figure 71 below shows the off mode power consumption of LCD computer monitors for 2005. It can be seen that the majority of units (30%) use between 0.9 Watts and 1.2 Watts in off mode.

Note: Figure 71 below does not use standard bin sizes.

Figure 71 - Off mode power consumption of LCD Computer Monitors for 2005

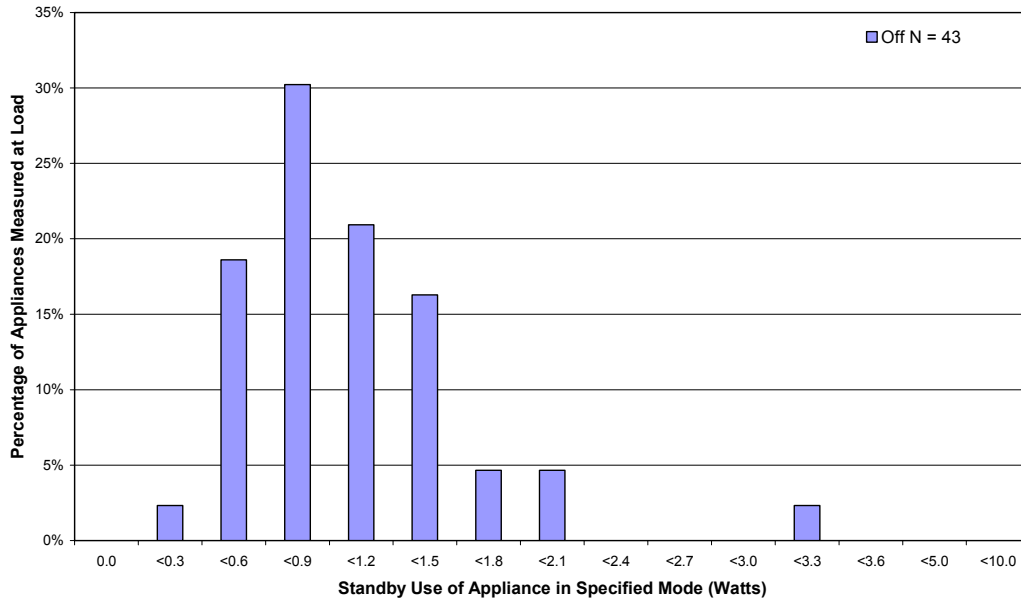


Figure 72 below shows the on mode power consumption of LCD computer monitors compared to year of purchase. It can be seen from the trendline that the average on mode power consumption has increased slightly as time has progressed. Note there are some data points for years before 2002, but these points are intermittent and not very illustrative.

Figure 72 – LCD Computer Monitors measured in on mode and year purchased

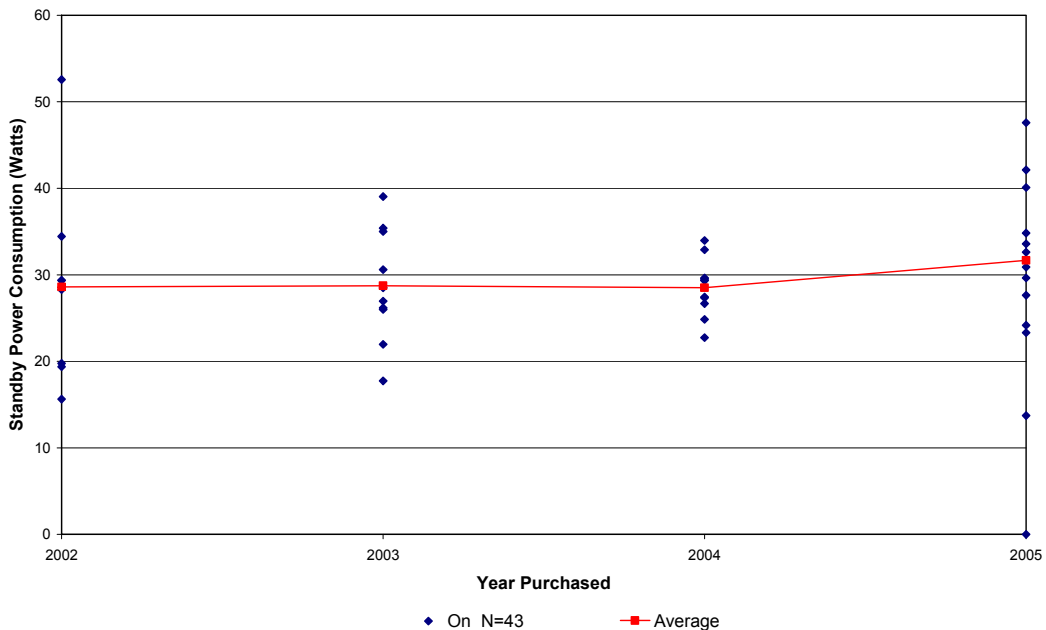


Figure 73 below shows the passive mode power consumption of LCD computer monitors compared to year of purchase. It can be seen from the trendline that the average passive standby mode power consumption has remained relatively stable as time has passed.

Figure 73 - LCD Computer Monitors measured in passive standby mode and year purchased

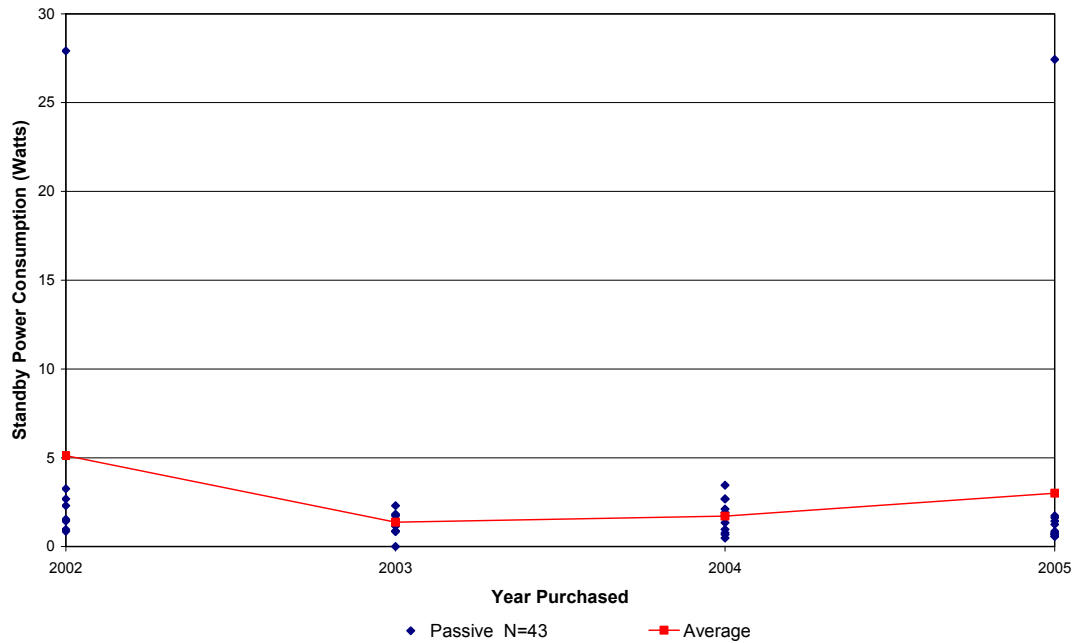
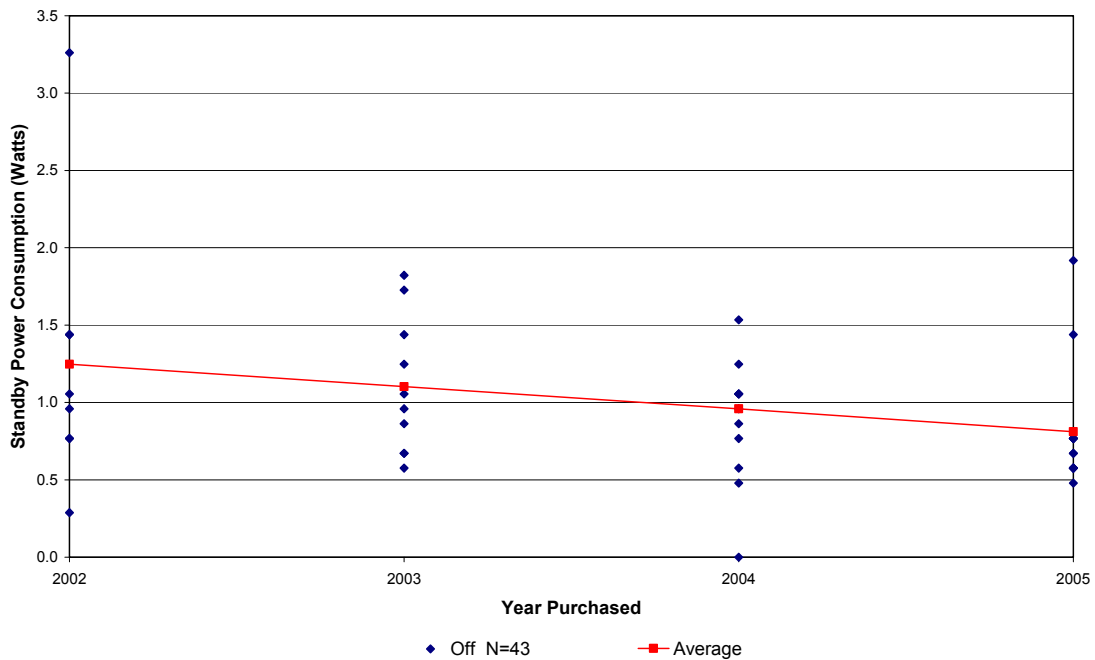


Figure 74 below shows the off mode power consumption of LCD computer monitors compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has decreased over time.

Figure 74 - LCD Computer Monitors measured in off mode and year purchased



3.6.5 Computer Speakers

The ownership of computer speakers was found to be 0.83 units per house in 2005, with ownership probably slightly increasing with computer ownership. About 89% of units were found to have a hard off switch, 7% were found to have no switch, 2% were found to have a standby switch and 2% of units were found to have a soft off switch. About 56% of units were found in off mode, 30% were found in active standby mode, about 2% were found in passive standby mode and about 12% of units were found unplugged. The average active standby for computer speakers was found to be 4.1 Watts, the average passive standby was found to be 6.0 Watts (noting that few units had this mode available) and the average off mode was found to be 2.2 Watts. About 23% of computer speakers were found to use external power supplies. The average age of computer speakers was found to be 3.9 years.

Table 38 – Summary of Computer Speaker Findings

Computer Speakers	Statistic	Number of Readings
Ownership	0.83	99
Average Age	3.9 years	92
Average Active Standby	4.1 Watts	98
Minimum Active Standby	1.2 Watts	98
Maximum Active Standby	42.3 Watts	98
Average Passive Standby	6.0 Watts	6
Minimum Passive Standby	3.7 Watts	6
Maximum Passive Standby	8.4 Watts	6
Average Off Mode	2.2 Watts	90
Minimum Off Mode	0.0 Watts	90
Maximum Off Mode	6.0 Watts	90

Figure 75 below shows the active standby mode power consumption of computer speakers for 2005. It can be seen that there is a range of consumptions, with the largest percentage of units (31%) using between 3 and 4 Watts in active standby mode.

Figure 75 – Active standby mode power consumption of Computer Speakers for 2005

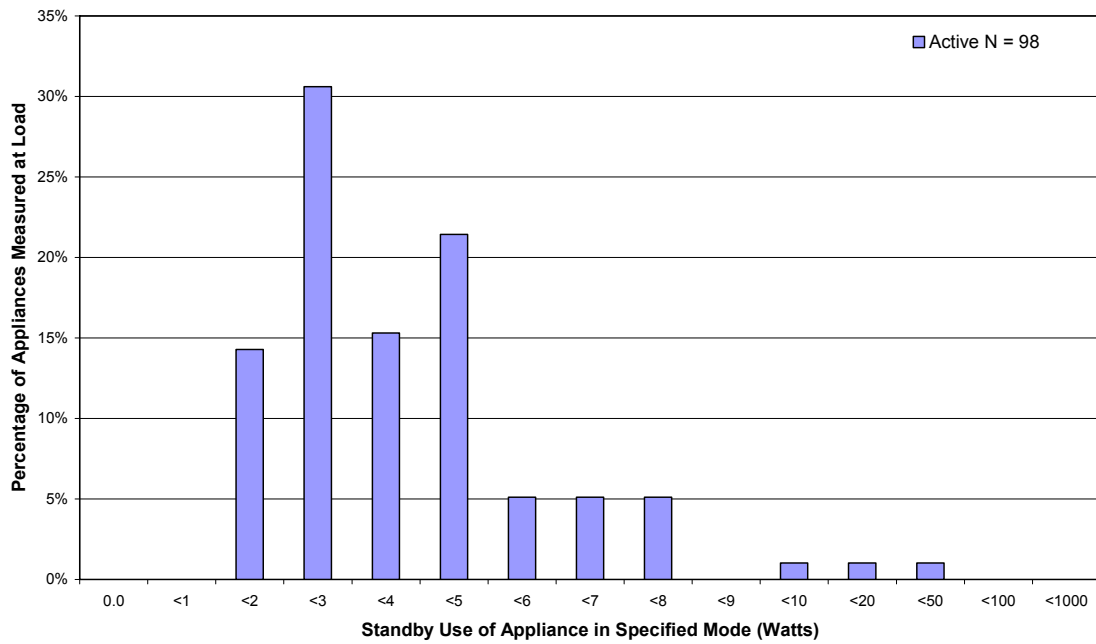


Figure 76 below shows the off mode power consumption of computer speakers for 2005. It can be seen that the majority of units (26%) consume between 2.4 Watts and 2.7 Watts in off mode.

Note: Figure 76 below does not use standard bin sizes.

Figure 76 - Off mode power consumption of Computer Speakers for 2005

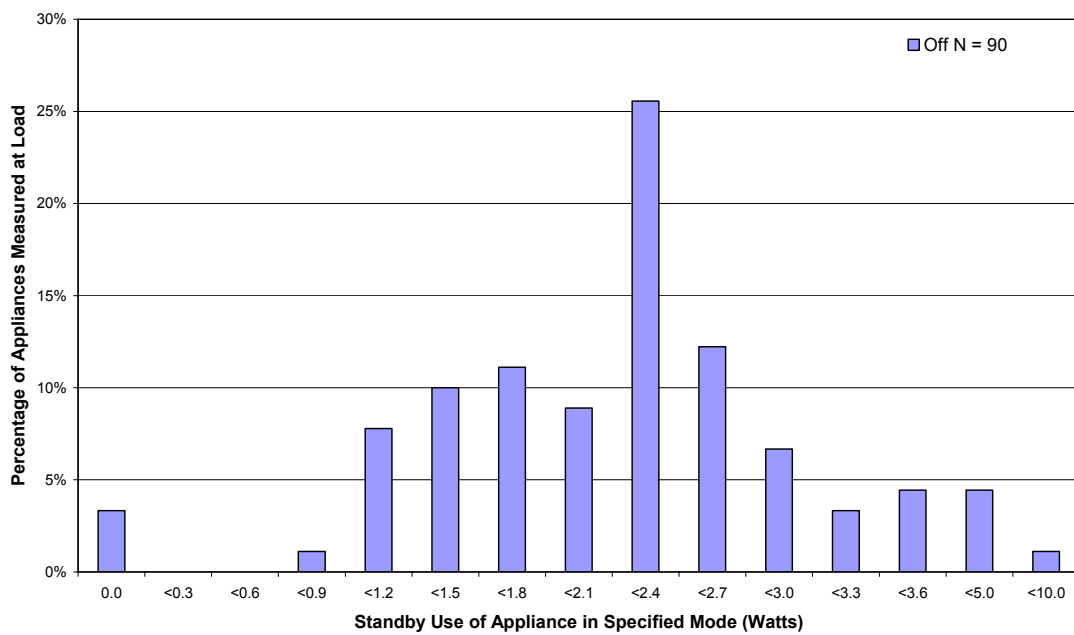


Figure 77 below shows the active standby mode power consumption of computer speakers compared to year of purchase. It can be seen from the trendline that the average active standby mode power consumption has remained relatively stable over time. Note there are some data points for years before 1998, but these points are intermittent and not very illustrative.

Figure 77 – Computer Speakers measured in active standby mode and year purchased

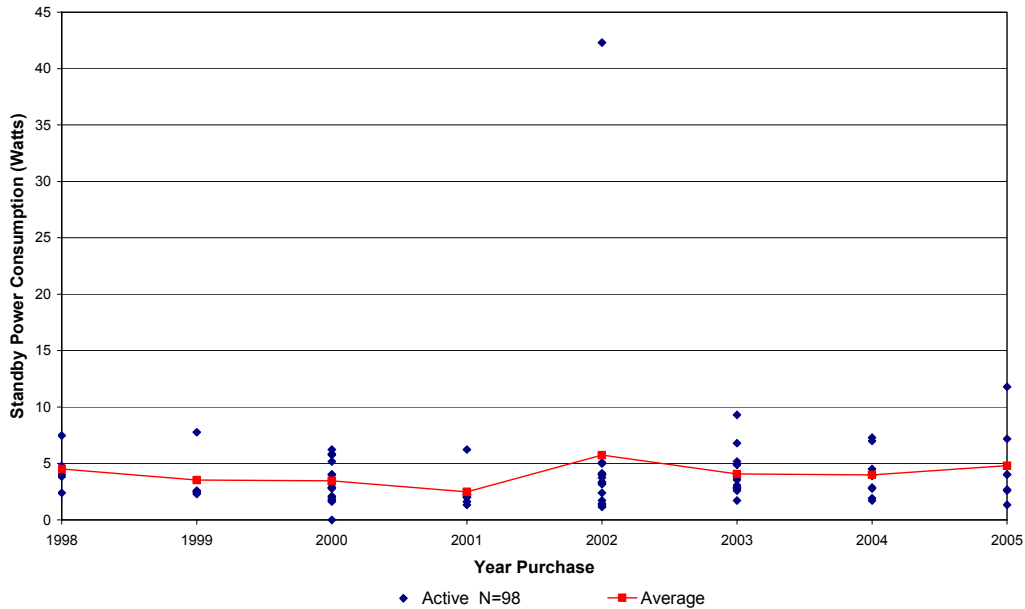
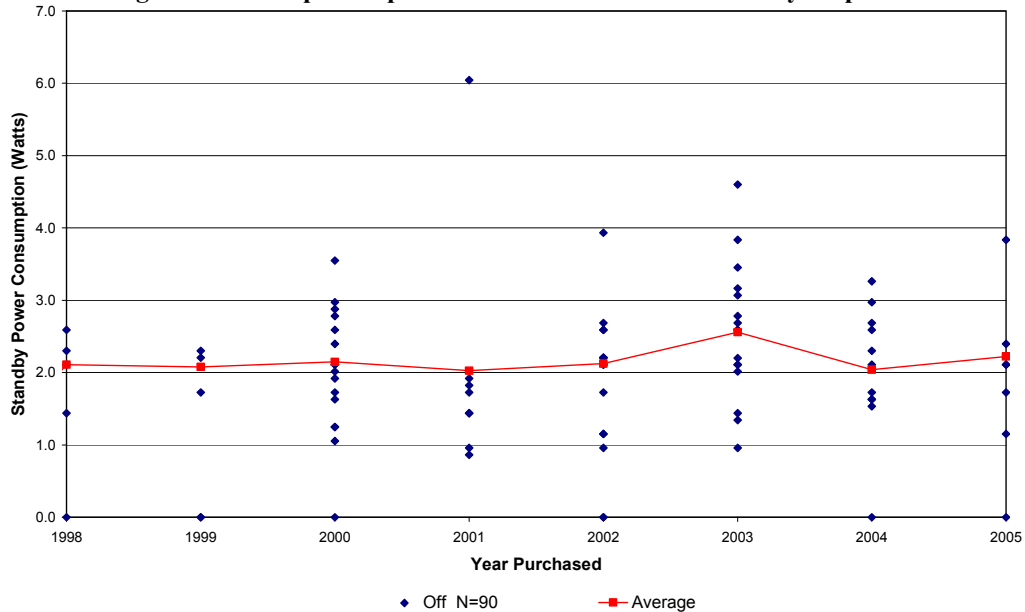


Figure 78 below shows the off mode power consumption of computer speakers compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has increased slightly as time has passed. Note there are some data points for years before 1998, but these points are intermittent and not very illustrative.

Figure 78 – Computer Speakers measured in off mode and year purchased



3.6.6 Hubs and Switches

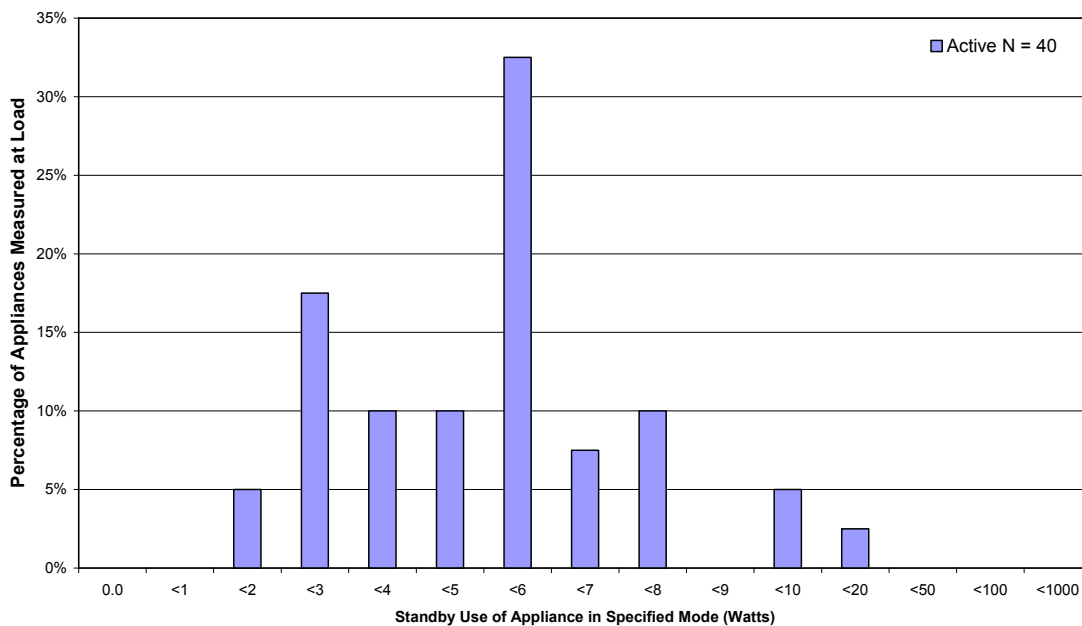
Hubs and switches distribute data and signals around local area networks between other computers and devices within a home. For this survey, routers were also included in this category. The ownership of hubs was found to be 0.33 units per house in 2005, with ownership probably increasing. About 98% of units were found to have no switch and about 2% of units were found to have a hard off switch. About 80% of units were found in active standby mode and 20% of units were found unplugged. The average active standby for hubs was found to be 5.0 Watts. Most hubs were found to use external power supplies. Off mode readings for units with external power supplies are included in data for external power supplies.

Table 39 – Summary of Hub and Switch Findings

Hubs	Statistic	Number of Readings
Ownership	0.33	40
Average Active Standby	5.0 Watts	40
Minimum Active Standby	1.3 Watts	40
Maximum Active Standby	10.2 Watts	40

Figure 79 below shows the active standby mode power consumption of hubs for 2005. It can be seen that there is a range of consumptions, with the largest percentage of units (34%) using between 6.0 Watts and 7.0 Watts.

Figure 79 – Active standby mode power consumption of Hubs and Switches for 2005



3.6.7 Modems

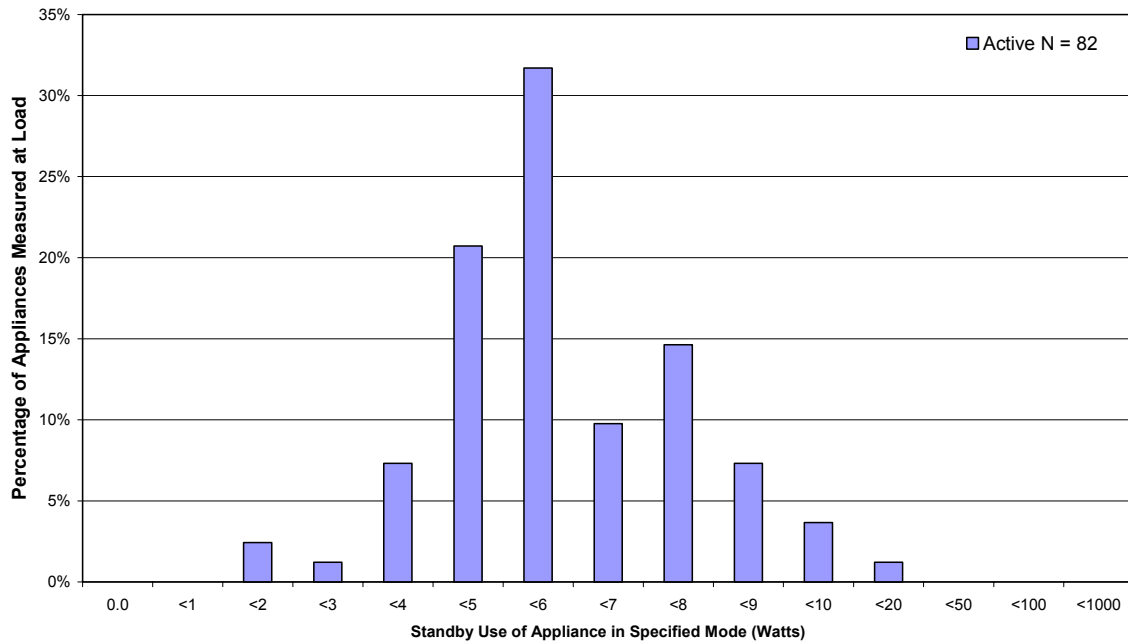
Modems included in this survey included traditional dialup modems and ADSL modems of various types. The ownership of modems was found to be 0.68 units per house in 2005, with ownership probably increasing as internet access increases. About 62% of units were found to have no switch, 18% were found to have a hard off switch, 11% were found to have a standby switch and about 9% of units were found to have a soft off switch. About 80% of units were found in active standby mode, 13% were found to be unplugged, 5% were found in off mode and about 1% of units were found in passive standby mode. The average active standby for modems was found to be 5.9 Watts, the average passive standby was found to be 4.4 Watts and the average off mode for modems was found to be 2.4 Watts. About 86% of modems were found to use external power supplies (various Motorola broadband modems had no EPS). Off mode readings for units with external power supplies are included in data for external power supplies.

Table 40 – Summary of Modem Findings

Modems	Statistic	Number of Readings
Ownership	0.68	82
Average Active Standby	5.9 Watts	82
Minimum Active Standby	1.2 Watts	82
Maximum Active Standby	10.7 Watts	82
Average Passive Standby	4.4 Watts	18
Minimum Passive Standby	1.2 Watts	18
Maximum Passive Standby	6.2 Watts	18
Average Off Mode	2.4 Watts	21
Minimum Off Mode	1.2 Watts	21
Maximum Off Mode	6.2 Watts	21

Figure 80 below shows the active standby mode power consumption of modems for 2005. It can be seen that there are a range of readings, with the largest percentage of units (32%) consuming between 5.0 Watts and 6.0 Watts.

Figure 80 - Active standby mode power consumption of Modems for 2005



3.6.8 Inkjet Printers

The ownership of inkjet printers was found to be 0.89 units per house in 2005, with ownership probably steady. About 75% of units were found to have a soft off switch, 16% were found to have no switch and 9% of units were found to have a hard off switch. About 47% of units were found in off mode, 27% were found to be unplugged and 26% of units were found in active standby mode. The average active standby for inkjet printers was found to be 4.6 Watts and the average off mode for inkjet printers was found to be 1.9 Watts. About 23% of inkjet printers were found to use external power supplies. The average age of inkjet printers was found to be 4.4 years.

Table 41 – Summary of Inkjet Printer Findings

Inkjet Printers	Statistic	Number of Readings
Ownership	0.89	107
Age	4.4 years	100
Average Active Standby	4.6 Watts	106
Minimum Active Standby	1.2 Watts	106
Maximum Active Standby	41.3 Watts	106
Average Off Mode	1.9 Watts	90
Minimum Off Mode	0.0 Watts	90
Maximum Off Mode	8.8 Watts	90



Figure 81 below shows the active standby mode power consumption of inkjet printers for 2005. It can be seen that the majority of units (35%) use between 3.0 Watts and 4.0 Watts in active standby mode.

Figure 81 - Active standby mode power consumption of Inkjet Printers for 2005

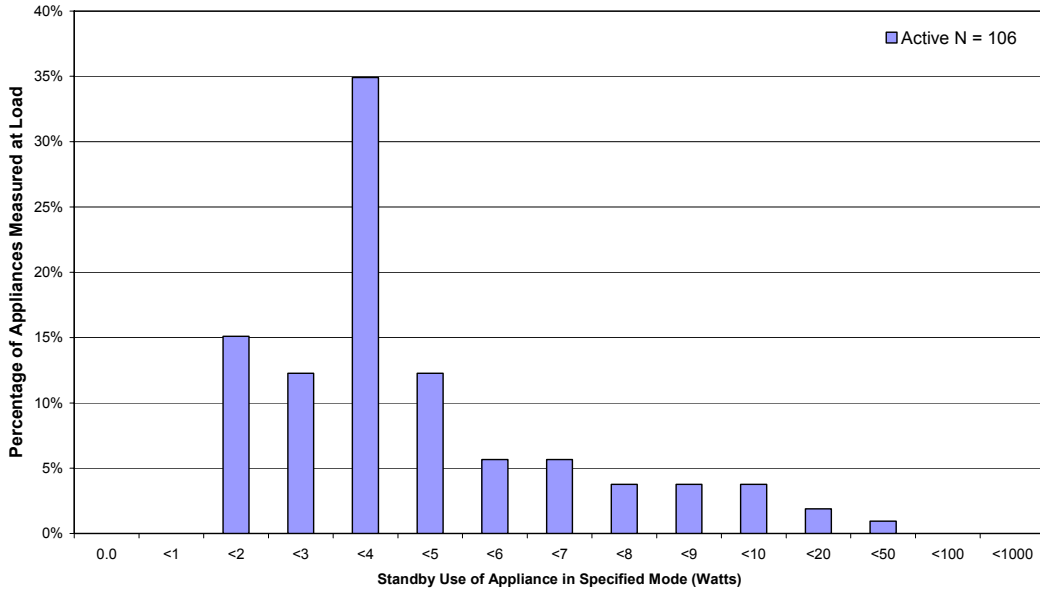


Figure 82 below shows the off mode power consumption of inkjet printers for 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (14%) using between 0.3 Watts and 0.6 Watts in off mode.

Note: Figure 82 below does not use the standard bin sizes.

Figure 82 - Off mode power consumption of Inkjet Printers for 2005

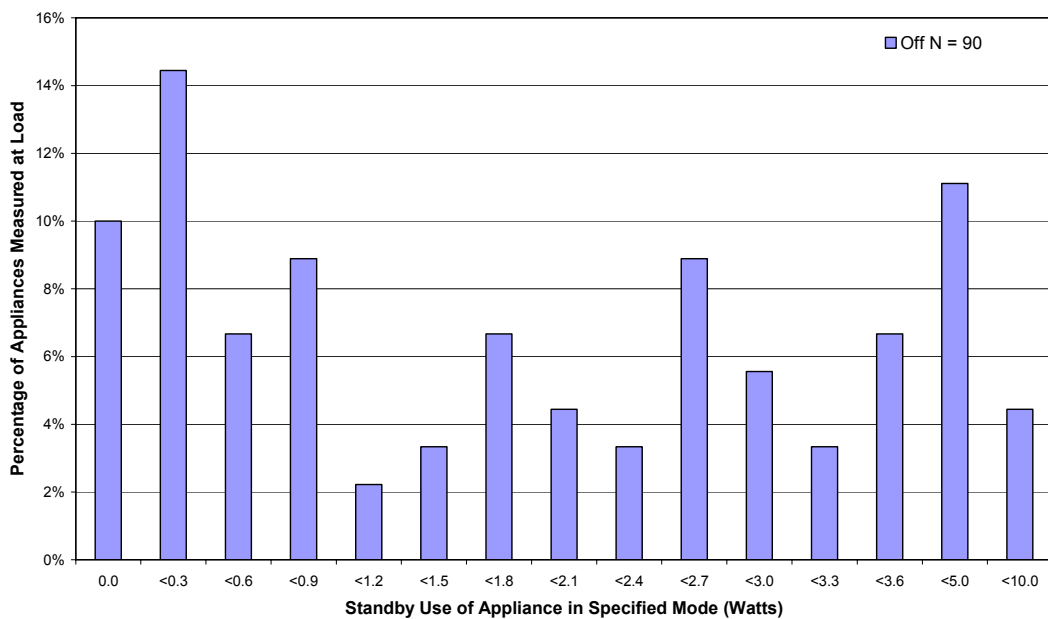


Figure 83 below shows the active standby mode power consumption of inkjet printers compared to year of purchase. It can be seen from the trendline that the average active standby mode power consumption has decreased over time.

Figure 83 – Inkjet Printers measured in active standby mode and year purchased

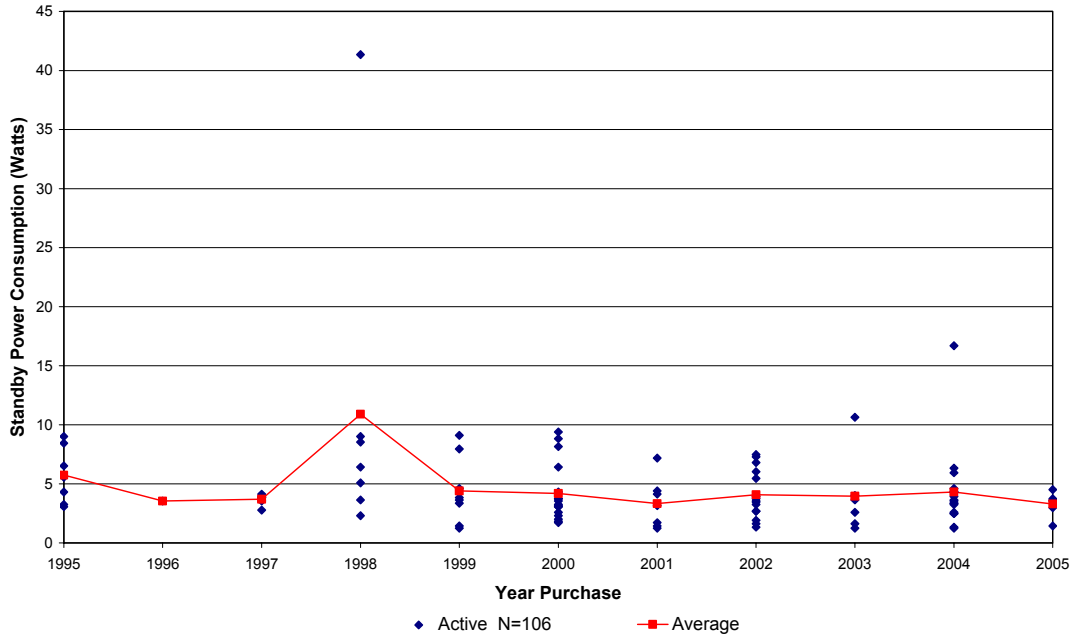
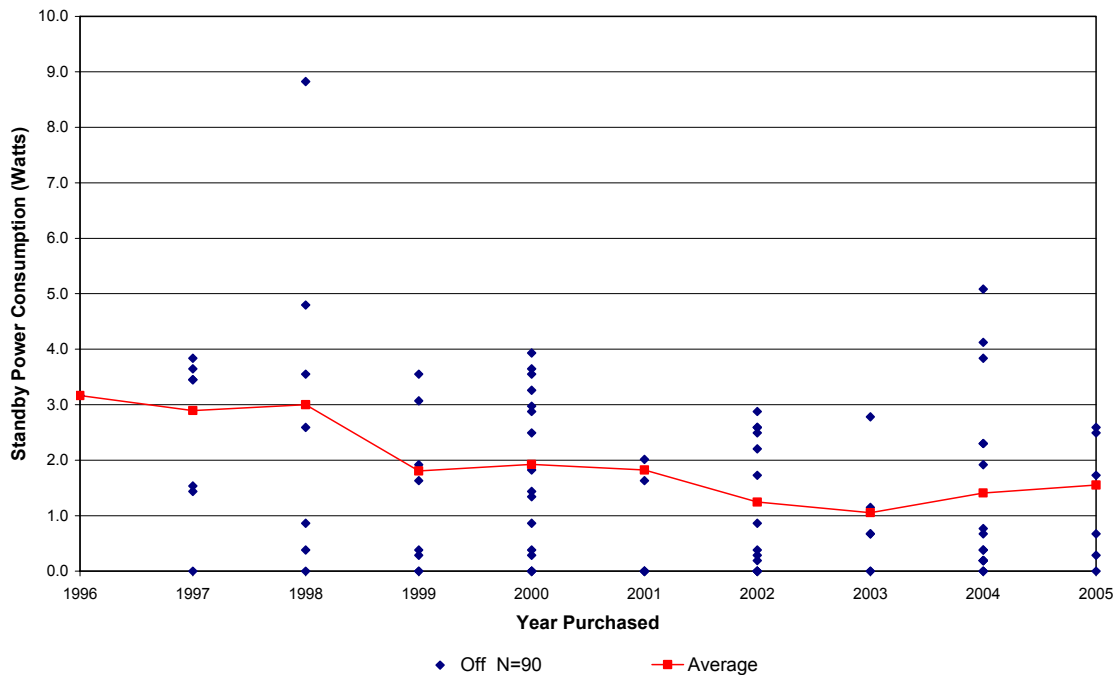


Figure 84 below shows the off mode power consumption of inkjet printers compared to year of purchase. It can be seen from the trendline that the average off mode power consumption has decreased over time.

Figure 84 - Inkjet Printers measured in off mode and year purchased



3.6.9 Laser Printers

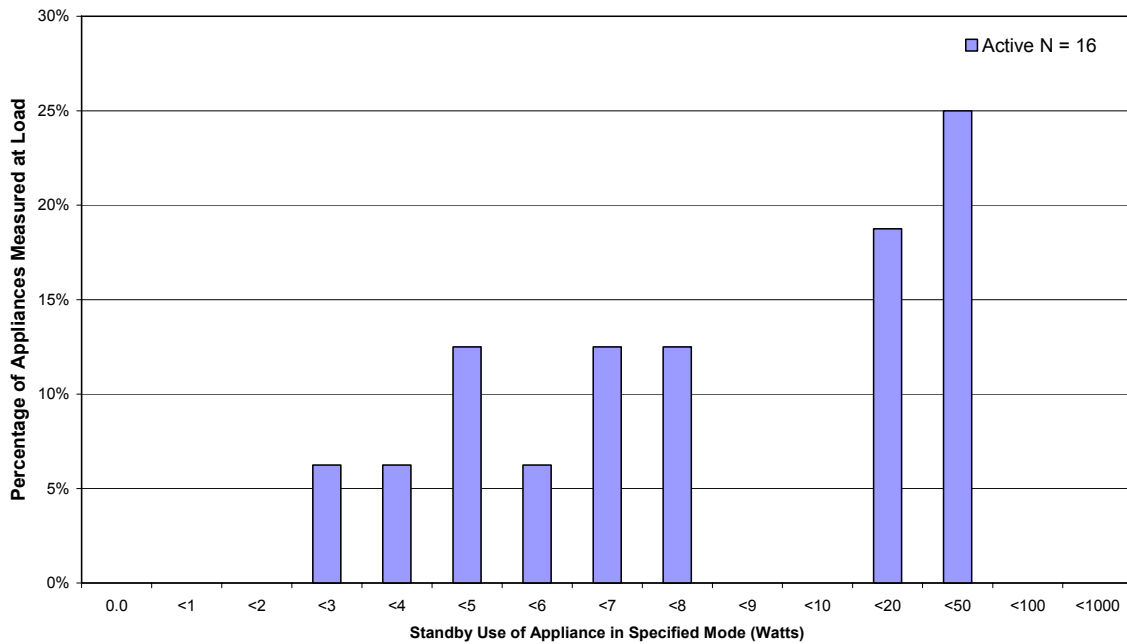
The ownership of laser printers was found to be 0.13 units per house in 2005, with ownership probably steady. About 50% of units were found in off mode, 44% were found in active standby mode and 6% of units were found in passive standby mode. The average active standby for laser printers was found to be 12.9 Watts, the average passive standby mode was found to be 15.9 Watts and the average off mode for laser printers was found to be 0.1 Watts. Note that these values may not be very representative and powering down to the lowest state in some modes takes some time for some laser printers which could not be controlled for field measurements. The average age of laser printers was found to be 3.6 years.

Table 42 – Summary of Laser Printer Findings

Laser Printers	Statistic	Number of Readings
Ownership	0.13	16
Age	3.6 years	16
Average Active Standby	12.9 Watts	16
Minimum Active Standby	2.1 Watts	16
Maximum Active Standby	46.4 Watts	16
Average Passive Standby	15.9 Watts	3
Minimum Passive Standby	9.5 Watts	3
Maximum Passive Standby	20.7 Watts	3
Average Off Mode	0.1 Watts	10
Minimum Off Mode	0.0 Watts	10
Maximum Off Mode	1.1 Watts	10

Figure 85 below shows the active standby mode power consumption of laser printers for 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (25%) using between 20 Watts and 50 Watts. Some of the high readings made include some short term drum heating operations.

Figure 85 - Active standby mode power consumption of Laser Printers for 2005



3.6.10 Scanners

The ownership of scanners was found to be 0.25 units per house in 2005, with ownership probably steady. About 67% of units were found to have no switch, 27% were found to have a hard off switch and 7% of units were found to have a soft off switch. About 53% of units were found in active standby mode, 23% in off mode and about 23% of units were found unplugged. The average active standby for scanners was found to be 8.3 Watts and the average off mode was found to be 0.9 Watts. About 80% of scanners were found to have an external power supply. The average age of scanners was found to be 4.5 years.



Table 43 – Summary of Scanner Findings

Scanners	Statistic	Number of Readings
Ownership	0.25	30
Age	4.5 years	28
Average Active Standby	8.3 Watts	22
Minimum Active Standby	3.3 Watts	22
Maximum Active Standby	16.3 Watts	22
Average Off Mode	0.9 Watts	8
Minimum Off Mode	0.0 Watts	8
Maximum Off Mode	2.3 Watts	8

Figure 86 below shows the active standby mode power consumption of scanners for 2005. It can be seen that there is a range of consumptions, with the largest percentage of units (27%) using between 5.0 Watts and 7.5 Watts in active standby mode.

Note: Figure 86 below does not use the standard bin sizes.

Figure 86 - Active standby mode power consumption of Scanners for 2005

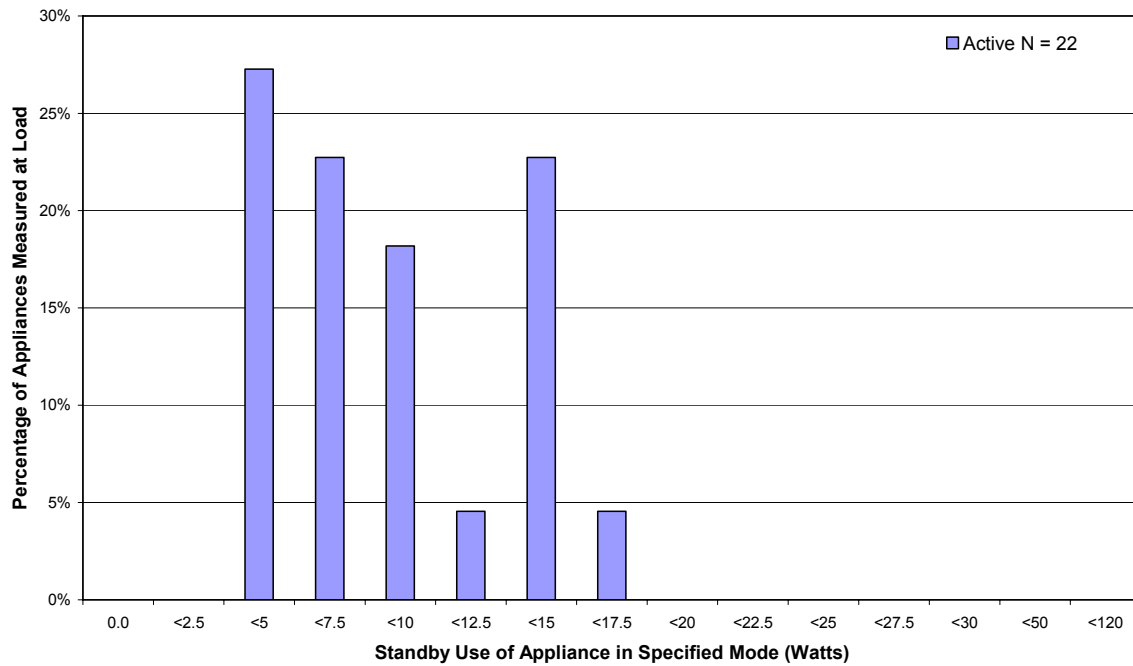
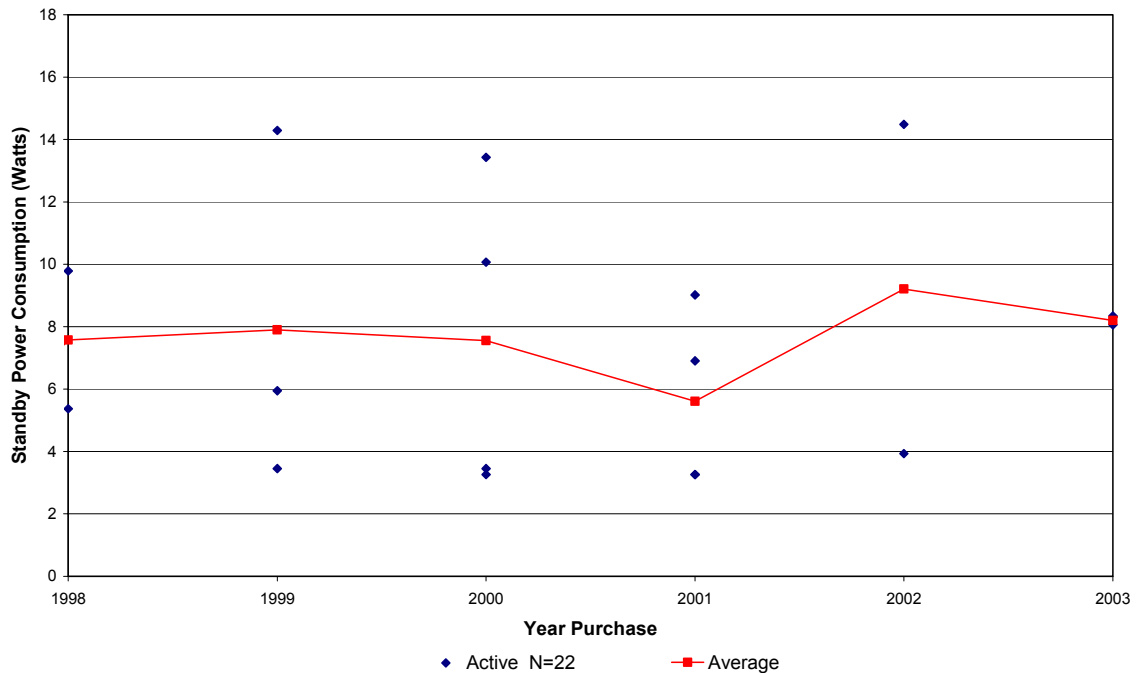


Figure 87 below shows the active standby mode power consumption of scanners compared to year of purchase. It can be seen from the trendline that the average active standby mode power consumption has increased over time. Note there are some data points for years before 1998 and after 2003, but these points are intermittent and not very illustrative.

Figure 87 - Scanners measured in active standby mode and year purchased



3.7 Monitoring and Continuous Appliances

The monitoring and continuous appliances category is made up of appliances including:

- Smoke Alarms;
- Clock Radios;
- Powerboards;
- Remote Garage Door Openers;
- Sensor Lights;
- Surge Guards;
- Timers;
- Security Systems;
- Pool Pumps.



Please note that there were other appliance types in the monitoring and continuous appliances category that did have relevant standby modes, but the ownership for each was less than 0.1 per house so they have not been separately analysed for this report.

The ownership of smoke alarms was found to be 1.23 units per house in 2005, with ownership probably increasing. About 46% of units were found to be hardwired, with the rest found to be battery operated (no main power supply). An assumed average active standby of 0.4 Watts has been used, which was measured for the standby profile for household smoke alarms. However, as all mains powered units were hard wired, no measurements were possible as part of this survey.

The ownership of clock radios was found to be 1.33 units per house in 2005, with ownership probably steady. All units were found to have no switch. The average active standby for clock radios was found to be 2.1 Watts.

The ownership of powerboards was found to be 4.17 units per house in 2005, with ownership probably increasing. About 5.4% of units were found to have a hard off switch. Units may have used standby power for surge protection circuits or for lights that indicated power connection. The average passive standby for powerboards was found to be 0.2 Watts.

The ownership of sensor lights was found to be 0.17 units per house in 2005, with ownership probably steady. An average active standby of 0.8 Watts has been used, this was found using the standby profile as in-house sensor light measurements were not possible as part of this survey.

The ownership of surge guards was found to be 0.13 units per house in 2005, with ownership probably increasing. About 20% of units were found unplugged, the other 80% were found in passive standby mode. The average passive standby for surge guards was found to be 0.8 Watts.

The ownership of timers was found to be 0.29 units per house in 2005, with ownership probably steady. About 34% of units were found unplugged, the other 66% were found in active standby mode. The average active standby for timers was found to be 1.1 Watts. This included a mixture of electromechanical and electronic timers.

The ownership of security systems was found to be 0.15 units per house in 2005, with ownership probably steady. An average passive standby of 4.8 Watts has been used, this has been determined using the standby profile as only one in-house security system measurement was able to be made during this survey.

The ownership of pool pumps was found to be 0.16 units per house in 2005, with ownership probably steady. All units were found in active standby mode and all had no switch. An average active standby of 4.1 Watts has been used, this should be interpreted with some caution as only one direct measurement of pool pumps was made during this survey due to the complicated connections and remote location of controls. About 30% of pools covered in the survey had separate controllers for solar heating systems, but these were only present in NSW and Victoria.



Table 44 – Summary of Monitoring and Continuous Appliance Findings

Appliance Type		Statistic	Number of Readings
Smoke Alarms	Ownership	1.23	147
	Average Active Standby Mode	0.4 Watts	
Clock Radios	Ownership	1.33	160
	Average Active Standby Mode	2.1 Watts	160
	Minimum Active Standby Mode	1.0 Watts	160
	Maximum Active Standby Mode	6.2 Watts	160
Powerboards	Ownership	4.17	500
	Average Passive Standby Mode	0.2 Watts	500
	Minimum Passive Standby Mode	0.0 Watts	500
	Maximum Passive Standby Mode	6.6 Watts	500
Sensor Lights	Ownership	0.17	20
	Average Active Standby Mode	0.8 Watts	
Surge Guards	Ownership	0.13	15
	Average Passive Standby Mode	0.8 Watts	15
	Minimum Passive Standby Mode	0.0 Watts	15
	Maximum Passive Standby Mode	1.5 Watts	15
Timers	Ownership	0.29	35
	Average Active Standby Mode	1.1 Watts	35
	Minimum Active Standby Mode	0.8 Watts	35
	Maximum Active Standby Mode	1.9 Watts	35
Security Systems	Ownership	0.15	18
	Average Passive Standby Mode	4.8 Watts	18
	Minimum Passive Standby Mode	4.8 Watts	18
	Maximum Passive Standby Mode	5.8 Watts	18
Pool Pumps	Ownership	0.16	19
	Average Active Standby Mode	4.1 Watts	19
	Average Passive Standby Mode	4.1 Watts	19
	Average Off Mode	4.1 Watts	19

Figure 88 below shows the active standby mode power consumption for clock radios in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (24%) using between 2.4 and 2.7 Watts in active standby mode.

Note: Figure 88 below does not use the standard bin sizes.

Figure 88 – Active standby mode power consumption for Clock Radios in 2005

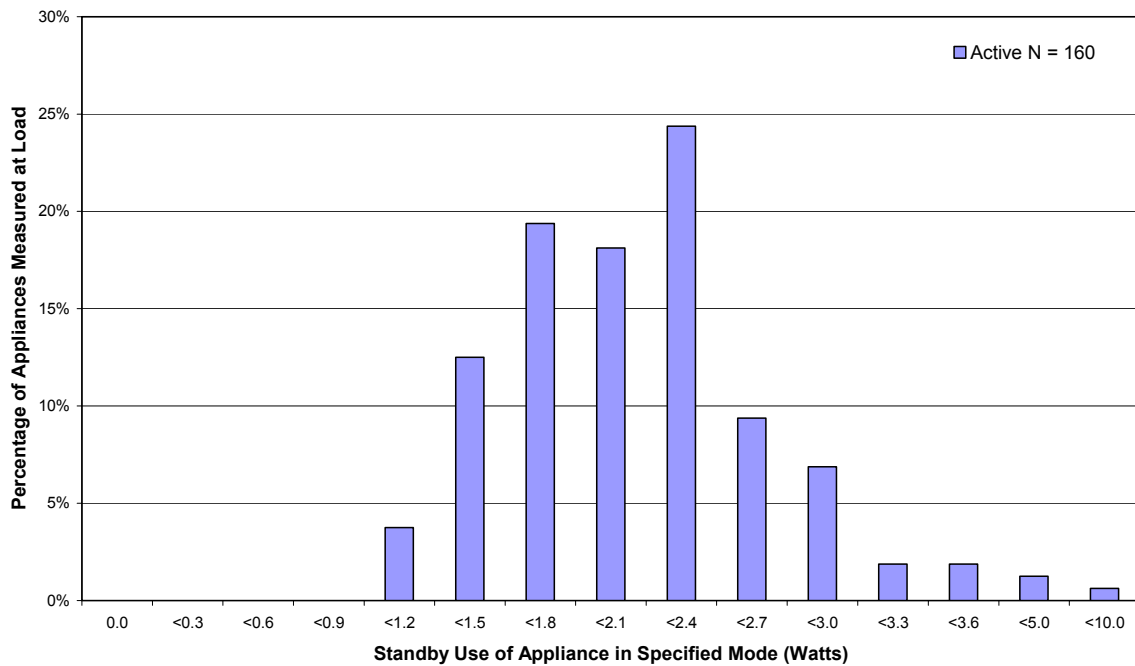


Figure 89 below shows the passive standby mode power consumption for powerboards in 2005. It can be seen that the majority of units (75%) use 0.0 Watts in passive standby mode.

Note: Figure 89 below does not use the standard bin sizes.



Figure 89 – Passive standby mode power consumption for Powerboards in 2005

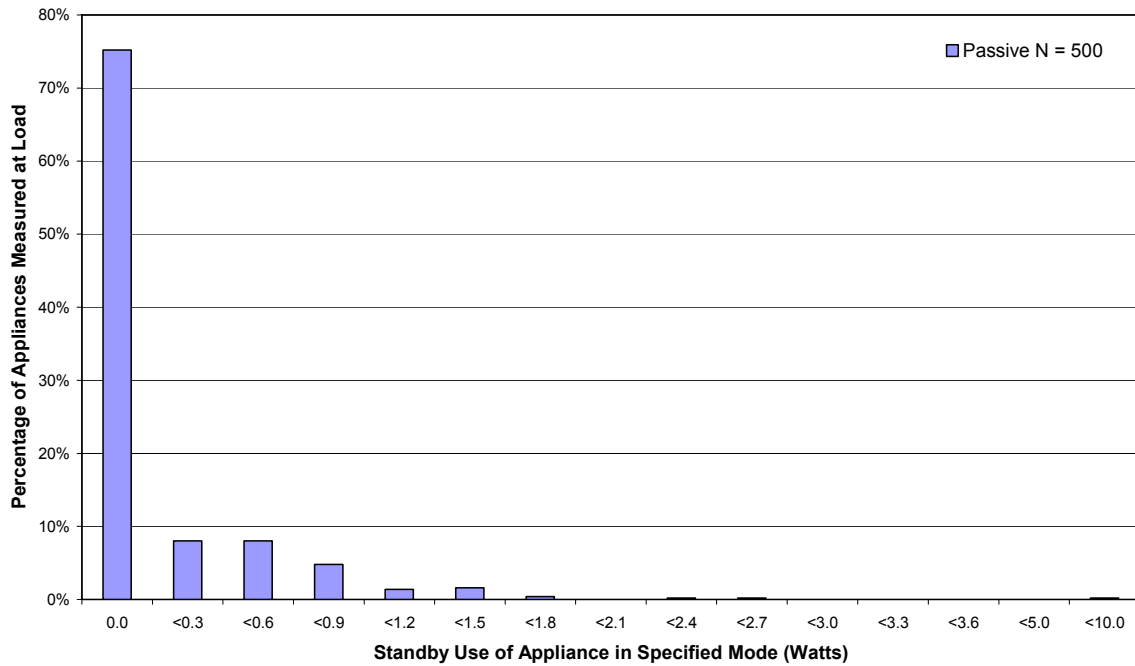
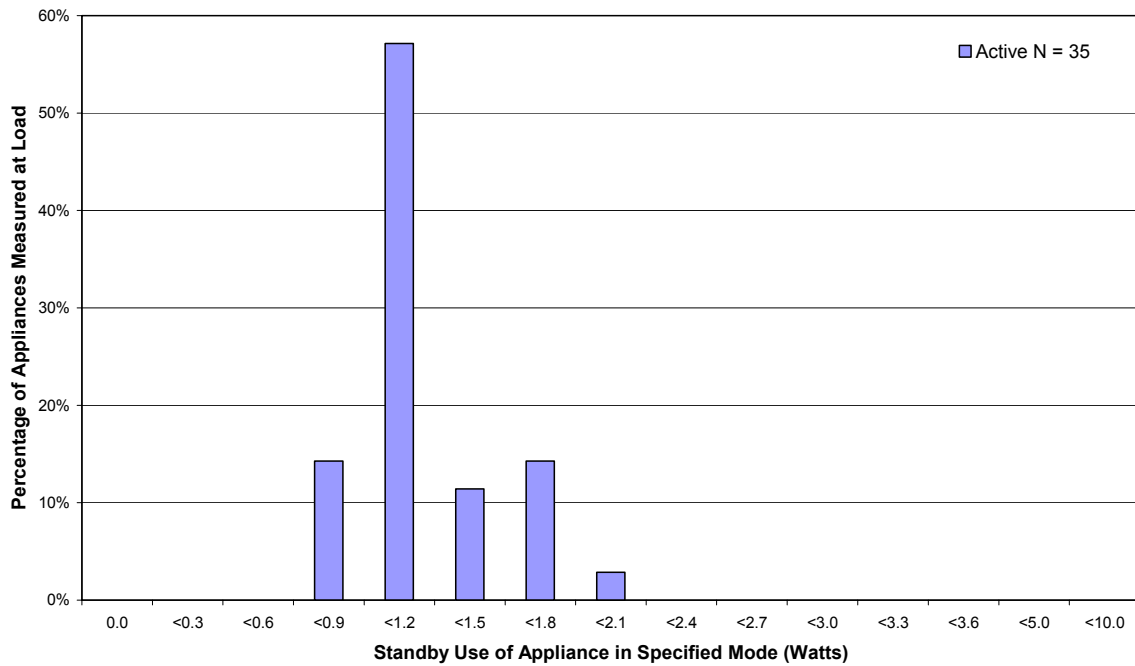


Figure 90 below shows the active standby mode power consumption for timers in 2005. It can be seen that the majority of units (57%) use between 1.2 Watts and 1.5 Watts in active standby mode.

Note: Figure 90 below does not use standard bin sizes.

Figure 90 – Active standby mode power consumption for Timers in 2005



3.7.1 Remote Garage Door Openers

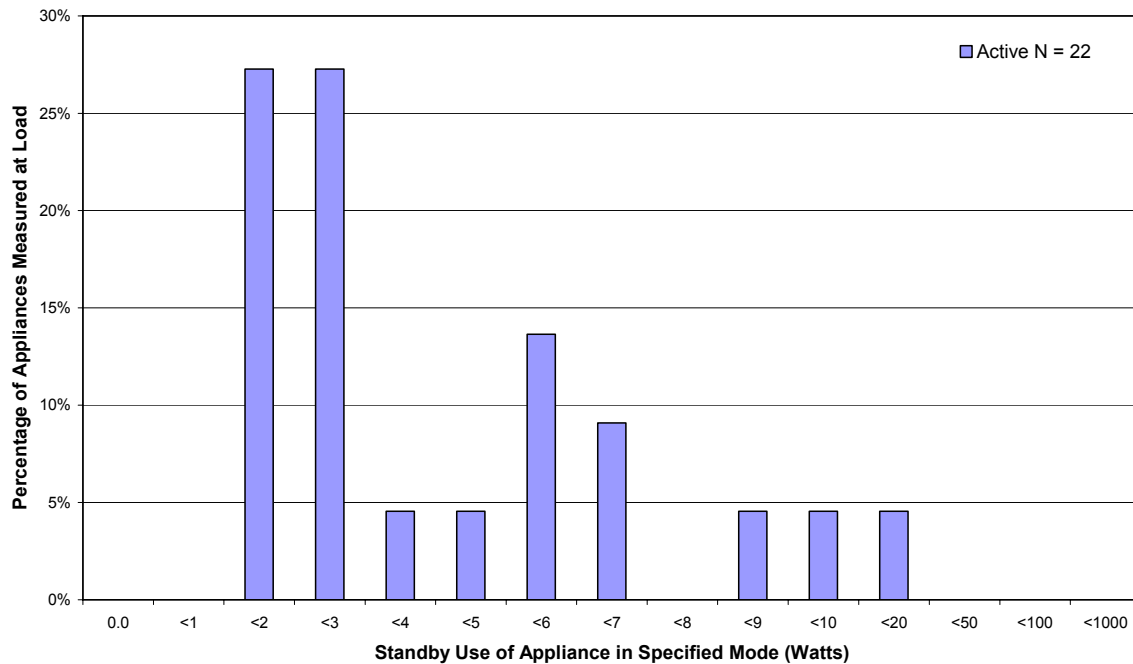
Remote garage door opener ownership was found to be 0.3 units per house in 2005, with ownership probably increasing. All units were found to be in active standby mode and were found to have remote control capabilities. About 39% of units were found to be inaccessible. The average passive standby mode of remote garage door openers was found to be 4.1 Watts.

Table 45 – Summary of Remote Garage Door Opener Findings

Remote Garage Door Openers	Statistic	Number of Readings
Ownership	0.3	36
Average Active Standby Mode	4.1 Watts	22
Minimum Active Standby Mode	1.2 Watts	22
Maximum Active Standby Mode	10.7 Watts	22

Figure 91 below shows the active standby mode power consumption for remote garage door openers in 2005. It can be seen that the majority of units (54%) use between 2.0 Watts and 4.0 Watts.

Figure 91 - Active standby mode power consumption for Remote Garage Door Openers in 2005



3.8 External Power Supplies

The ownership of external power supplies (EPS) was found to be 6.68 units per house in 2005, with ownership probably increasing. Note that EPS were normally dedicated to a particular appliance or product, but the no load power consumption of all EPS was separately measured and recorded as a stand alone EPS. About 31% of units were found to be unplugged, while the rest were found to be in passive standby mode attached to the product which it was intended to power. One unit was found to have a hard off switch. External power supplies are necessary for many appliance types found throughout houses. The most recognisable use is as a mobile phone charger, but units are generally also part of cordless phone equipment, modems, battery chargers, printers, laptop computers, LCD monitors, hubs and switches, computer speakers, scanners, answering machines etc. The average passive standby for external power supplies was found to be 1.2 Watts when disconnected from its associated product (no load state).

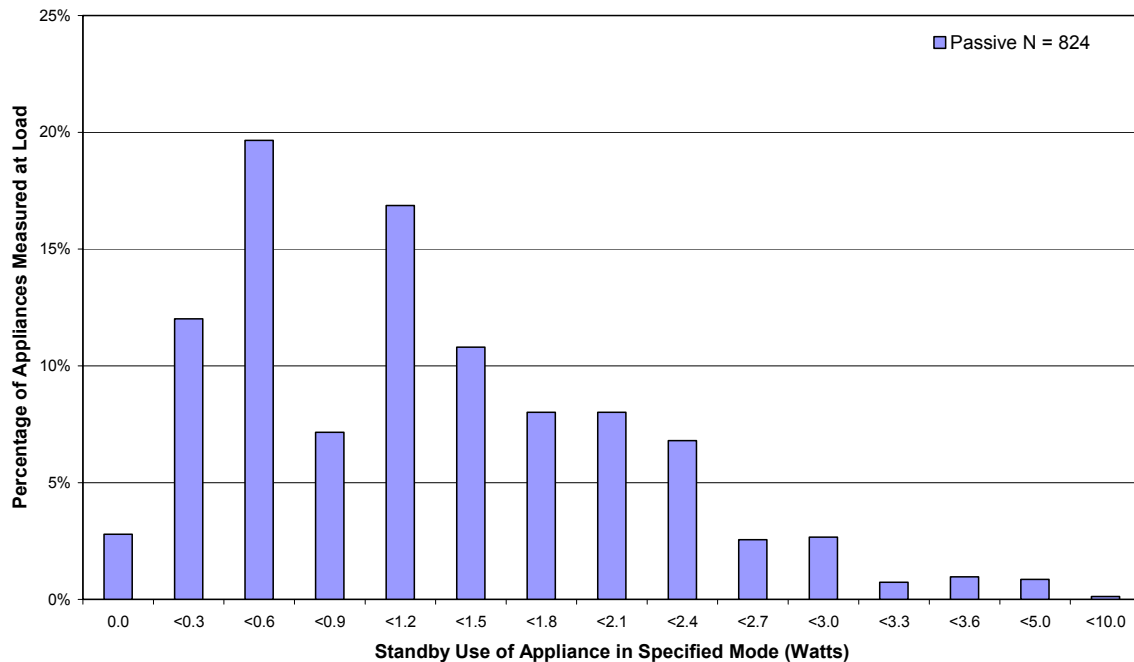
Table 46 – Summary of External Power Supply Findings

External Power Supplies	Statistic	Number of Readings
Ownership	6.86	823
Average Passive Standby Mode	1.2 Watts	823
Minimum Passive Standby Mode	0.0 Watts	823
Maximum Passive Standby Mode	6.6 Watts	823

Figure 92 below shows the passive standby mode power consumption for external power supplies in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (20%) using between 0.6 and 0.9 Watts. About 3% use 0.0 Watts in passive standby mode, these are most probably switch type mode supplies, which are designed differently to conventional external power supply units.

Note: Figure 92 below does not use the standard bin sizes.



Figure 92 – Passive standby mode power consumption for External Power Supplies in 2005

3.9 Other Items

3.9.1 Home Cleaning Aids

The home cleaning aid category is made up of appliances including:

- Irons
- Hand Held Vacuum Cleaners
- Ducted Vacuum Cleaners
- Vacuum Cleaners

With the exception of hand held vacuum cleaners, the above appliances types were either found to have no relevant standby mode or where there was a relevant standby mode, the ownership was less than 0.1 units per house (which applied to ducted vacuum cleaners). These appliances have not been separately analysed for this report.

Hand held vacuum cleaner ownership was found to be 0.33 units per house in 2005, with ownership probably steady. About 67% of units were found to be in active standby mode (where the vacuum cleaner is on the cradle and may be charging), about 31% of units were found to be unplugged and about 3% of units were found in passive standby mode (where the vacuum cleaner is not on its cradle). While not necessarily illustrative (due to uncertainties with charging power use), the statistics for

the active standby mode have been included in Table 47 below. These should be interpreted with some caution due to the variable state of charge of the battery when measured. The average active standby for hand held vacuum cleaners was found to be 2.5 Watts, while the average passive standby for hand held vacuum cleaners was found to be 1.0 Watts.

Table 47 – Summary of Hand Held Vacuum Cleaner Findings

Hand Held Vacuum Cleaners	Statistic	Number of Readings
Ownership	0.33	39
Average Active Standby Mode	2.5 Watts	36
Minimum Active Standby Mode	0.6 Watts	36
Maximum Active Standby Mode	9.5 Watts	36
Average Passive Standby Mode	1.0 Watts	35
Minimum Passive Standby Mode	0.4 Watts	35
Maximum Passive Standby Mode	1.6 Watts	35

3.9.2 Lighting

The lighting category is made up of lighting appliances that are designed to plug into a normal mains outlet and include:

- Lamps (desk or standard lamps);
- Lamps with dimmer switches;
- Outdoor Lights;
- Touch Lamps;
- Rechargeable Torches;
- Heat Lamp arrays (generally found in bathrooms);
- Insect Zappers.

The ownership of lamps was found to be 4.97 units per house in 2005, with ownership probably steady. The average off mode was found to be 0.1 Watts, only 2.7% of the measured units recorded an off mode of above 0.0 Watts. In all cases this was due to an external power supply (mostly for a low voltage quartz halogen lamp) which was upstream of the main user switch, which is a relatively uncommon configuration.

The only other appliance type of note in terms of standby power consumption in the lighting category was touch lamps. These were found to have an average off mode



power consumption of 0.6 Watts and their ownership was found to be 0.2 units per house, with ownership probably steady. The standby usage of this appliance type is due to design; the lamp requires a circuit to be created (generally by a finger touch) before it turns on or adjusts lighting luminosity.

All other appliance types in the lighting category, with the exception of Heat Lamp arrays, were found to be of negligible appliance numbers (ie less than 10 units) and have been therefore ignored in terms of analysis. Heat lamp array ownership was found to be 0.41 per house, all units were found hardwired and were assumed to have no relevant standby mode as most are switched at the mains.

3.9.3 Miscellaneous Appliances

The miscellaneous appliances category is made up of appliances including:

- Battery Rechargers
- Game Consoles

Please note that there were some other appliance types in the miscellaneous appliances category that did have relevant standby modes. However the ownership for each was less than 0.1 per house so they have not been separately analysed for this report.

Battery Rechargers

The ownership of battery rechargers was found to be 0.51 units per house in 2005, with ownership probably steady. About 28% of units were found in passive standby, the other 72% were found unplugged. All units were found to have no off switch. The average passive standby for battery rechargers was found to be 1.2 Watts.

Table 48 – Summary of Battery Recharger Findings

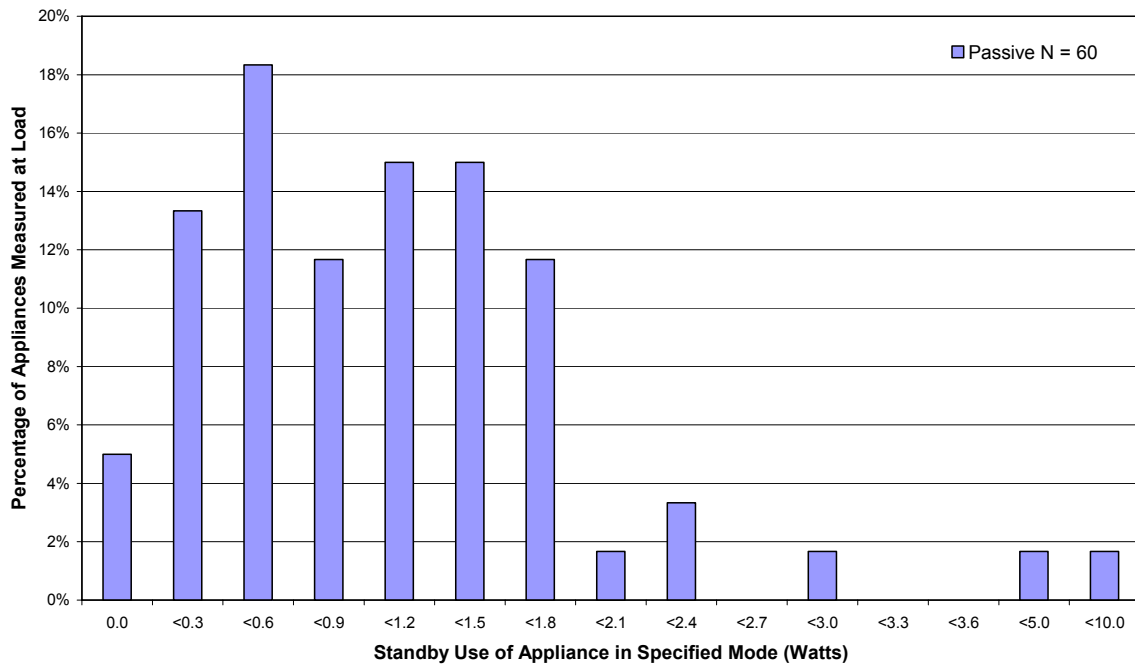
Battery Rechargers	Statistic	Number of Readings
Ownership	0.51	61
Average Passive Standby Mode	1.2 Watts	61
Minimum Passive Standby Mode	0.0 Watts	61
Maximum Passive Standby Mode	10.6 Watts	61

Figure 93 below shows the passive standby mode power consumption for battery rechargers in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (18%) consuming between 0.6 and 0.9 Watts in passive standby mode.

Note: Figure 93 below does not use the standard bin sizes.



Figure 93 - Passive standby mode power consumption for Battery Rechargers in 2005



Game Consoles

The ownership of game consoles was found to be 0.33 units per house in 2005, with ownership probably increasing. This ownership is very close to that found by ABS in its 4602 report. About 72% of units were found in off mode, 23% were found unplugged and about 5% of game consoles were found in passive standby mode. About 53% of units were found to have a hard off switch, 33% were found to have a soft off switch, 8% were found to have a standby switch and about 8% of game consoles were found to have a hard off and a standby switch. The average active standby for game consoles was found to be 26.7 Watts, the average passive standby was found to be 1.9 Watts and the average off mode for game consoles was found to be 1.4 Watts. The average age of game consoles was found to be 3.7 years.

Table 49 – Summary of Game Consoles Findings

Game Consoles	Statistic	Number of Readings
Ownership	0.33	40
Age	3.7 years	23
Average Active Standby Mode	26.7 Watts	40
Minimum Active Standby Mode	2.0 Watts	40
Maximum Active Standby Mode	63.3 Watts	40
Average Passive Standby Mode	1.9 Watts	10
Minimum Passive Standby Mode	0.9 Watts	10
Maximum Passive Standby Mode	3.8 Watts	10
Average Off Mode	1.4 Watts	37
Minimum Off Mode	0.0 Watts	37
Maximum Off Mode	4.9 Watts	37

Figure 94 below shows the active standby mode power consumption for game consoles in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (35%) using between 10.0 Watts and 15.0 Watts in active standby mode.

Note: Figure 94 below does not use the standard bin sizes.

Figure 94 - Active standby mode power consumption for Game Consoles in 2005

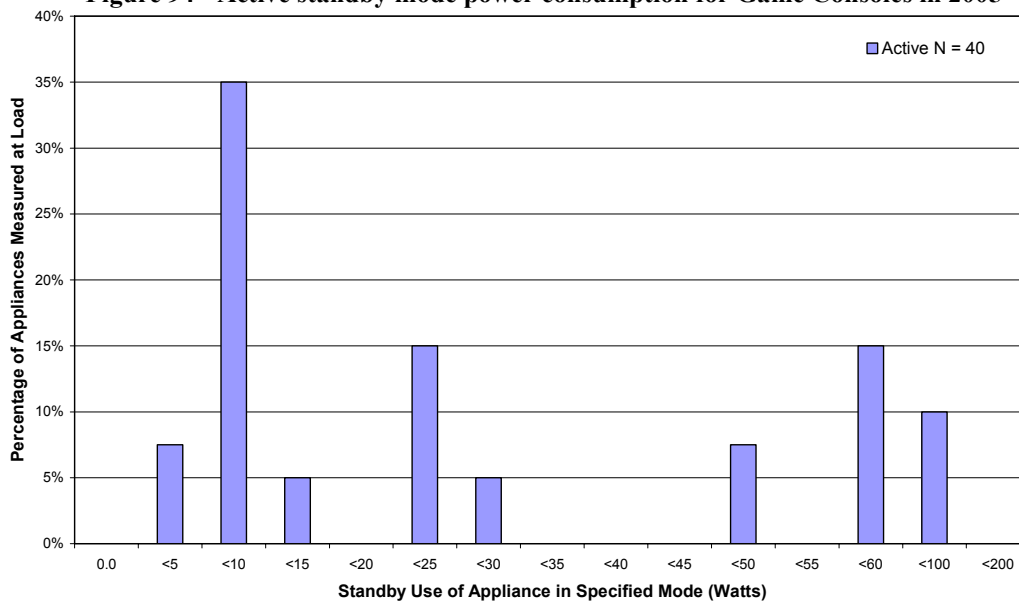
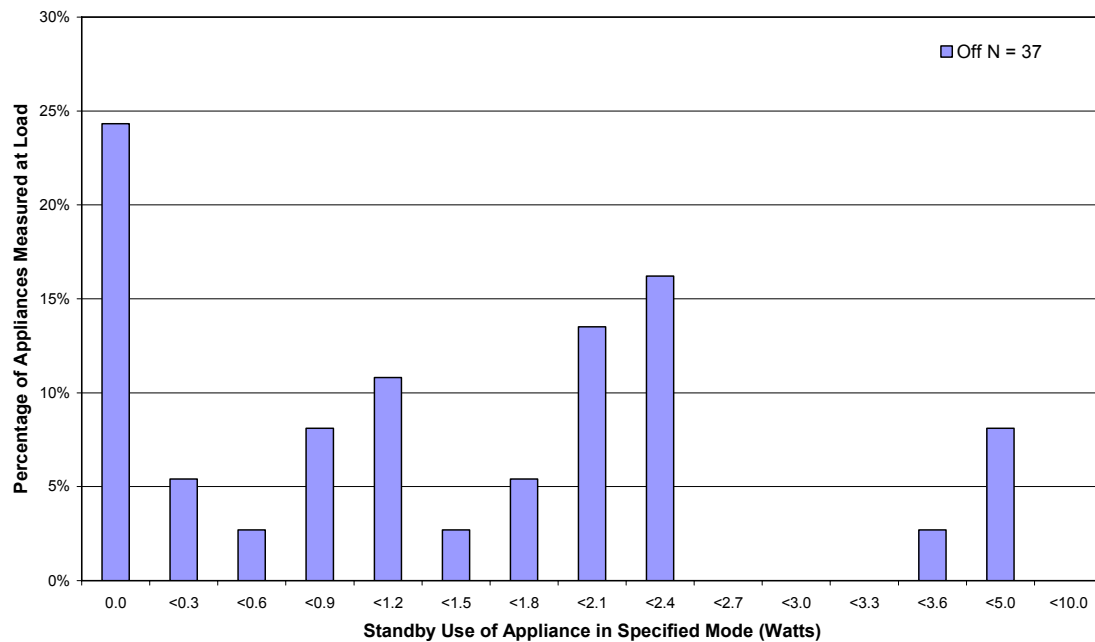


Figure 95 below shows the off mode power consumption for game consoles in 2005. It can be seen that there are a range of consumptions, with the largest percentage of units (24%) using between 0.0 Watts in off mode.

Note: Figure 95 below does not use the standard bin sizes.

Figure 95 - Off mode power consumption for Game Consoles in 2005



3.9.4 Personal Health and Hygiene Products

The personal health and hygiene products category is made up of appliances including:

- Air Fresheners
- Shavers (electric, rechargeable, epilators etc)
- Relaxant appliances (foot spas, massage units, aromatherapy etc)
- Hair appliances (crimpers, dryers, curlers, straighteners etc)
- Rechargeable Toothbrushes

With the exceptions of air fresheners and rechargeable toothbrushes, the above appliance types were either found have no relevant standby mode or the ownership was less than 0.1 units per house. These appliances have not been separately analysed for this report. It must be noted though, that a number of hair curling and straightening units were found to have soft off switches and did use a some standby power when off. However, these units were generally found unplugged.

Air freshener ownership was found to be 0.13 units per house in 2005, with ownership probably steady. About 75% of units were found to be in on mode, while the rest were found unplugged. The average on mode for air fresheners was found to be 1.9 Watts.

Table 50 – Summary of Air Freshener Findings

Air Fresheners	Statistic	Number of Readings
Ownership	0.13	16
Average On Mode	1.9 Watts	16
Minimum On Mode	1.6 Watts	16
Maximum On Mode	2.6 Watts	16

Rechargeable toothbrush ownership was found to be 0.33 units per house in 2005, with ownership probably steady or slightly increasing. About 48% of units were found to in active standby mode (where the toothbrush is on the holder and may be charging), about 48% were found to be unplugged and about 5% were found to be in passive standby mode (where the toothbrush is not on the holder). While not necessarily illustrative (due to uncertainties with charging power use), the statistics for the active standby mode have been included in Table 51 below. These should be interpreted with some caution. The average active standby for rechargeable toothbrushes was found to be 1.5 Watts, while the average passive standby was found to be 1.4 Watts.

Table 51 – Summary of Rechargeable Toothbrush Findings

Rechargeable Toothbrushes	Statistic	Number of Readings
Ownership	0.33	40
Average Active Standby Mode	1.5 Watts	39
Minimum Active Standby Mode	1.1 Watts	39
Maximum Active Standby Mode	3.5 Watts	39
Average Passive Standby Mode	1.4 Watts	40
Minimum Passive Standby Mode	1.0 Watts	40
Maximum Passive Standby Mode	3.5 Watts	40

3.9.5 *Small Kitchen Appliances*

The small kitchen appliance category is made up of appliance including:

- Breadmakers
- Electric Can Openers
- Coffee Makers
- Espresso Machines
- Food Processors
- Hand Held Beaters
- Juicers
- Kettles
- Toasters

With the exception of the breadmaker appliance type, most of the above products had no or few relevant standby modes. There were also a number of other small kitchen appliance types which were found in smaller numbers than those on the above list which mostly had no relevant standby mode. Only the breadmaker appliance type is deemed applicable in terms of standby consumption, all other small kitchen appliance types have been ignored in terms of analysis. It must be noted that two kettles, one toaster and two food processor were found to use standby power while no in use. One of the kettles had a soft off switch and an internal thermostat; it worked like a boiling water unit (active standby consumption of 1.7 Watts), the other had a light up base (off mode consumption of 0.2 Watts). The toaster had a digital display that showed the user the cooking settings of the unit (off mode consumption of 1.0 Watt). One of the food processors had a soft off switch (off mode consumption of 1.2 Watts) and the other had hard off switch with a light up dial (off mode consumption of 0.4 Watts). These five appliances were exceptions and made up a tiny percentage of all small kitchen appliances measured.

A note on espresso machines. The ownership of espresso machines was found to be 0.18 units per house in 2005, with ownership probably increasing. All machines except two, had hard off switches and didn't have any power consumption in off mode. Of the two with a different switch type, one had no off switch and therefore no standby mode, and the other had a soft off switch and used 2.0 Watts in off mode.

Breadmakers

The ownership of breadmakers was found to be 0.18 units per house in 2005, with ownership probably steady. About 5% of the units (one unit) were found to have a soft hard off switch, while the other 95% were found to have no off or power switch. About 90% of units were found unplugged, with 5% found in off mode and 5% found in active standby mode. The active standby consumption of breadmakers was found to be 1.7 Watts.

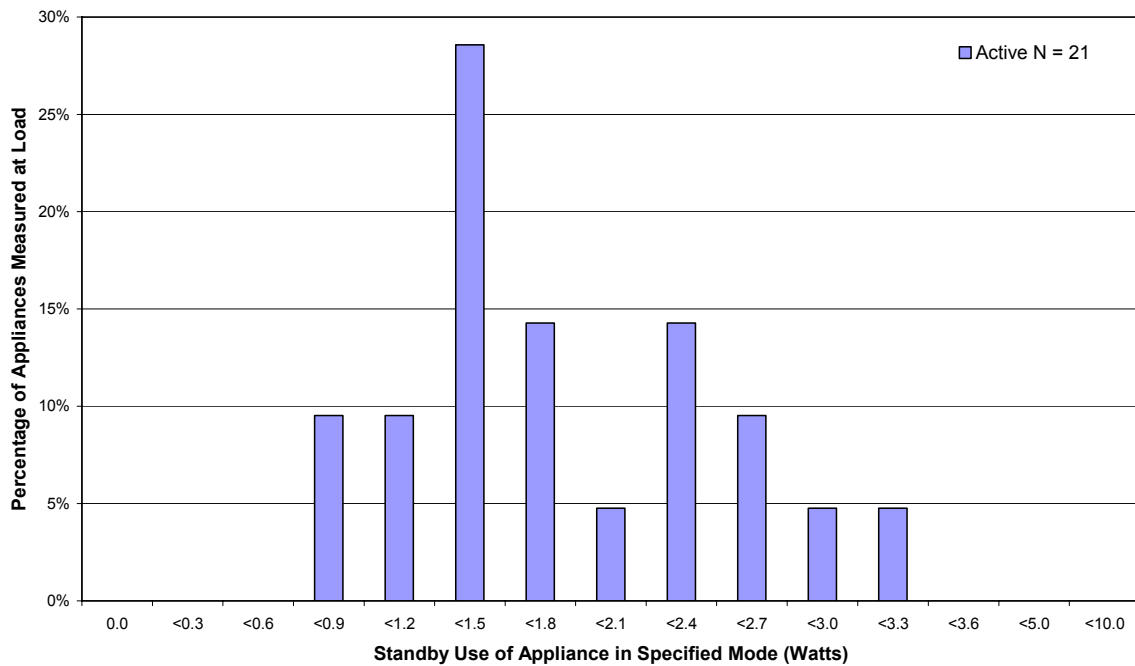


Table 52 – Summary of Breadmaker Findings

Breadmakers	Statistic	Number of Readings
Ownership	0.18	22
Average Active Standby Mode	1.7 Watts	21
Minimum Active Standby Mode	0.8 Watts	21
Maximum Passive Standby Mode	3.1 Watts	21

Figure 96 below shows the active standby mode power consumption for breadmakers in 2005. It can be seen that the majority of units (29%) use between 1.5 Watts and 1.8 Watts in active standby mode.

Figure 96 - Active standby mode power consumption for Breadmakers in 2005



3.9.6 Tools

The tools category is made up of appliances including:

- Cordless Drills
- Electric Drills
- Electric Whippersnippers
- Electric grinders (bench, angle etc)
- Electric saws of various types (ie benchsaws, jig saws etc)
- Leaf Blowers
- Sanders

With the exception of the cordless drill appliance type, all of the above products did not have any relevant standby mode. There were also a number of other tool types which were found in smaller numbers than those on the above list, but none of these types had any relevant standby mode. Only the cordless drills appliance type is deemed applicable in terms of standby consumption, all other tool types have been ignored in terms of analysis.

Cordless drill ownership was found to be 0.3 units per house in 2005, with ownership probably steady or slightly increasing. About 14% of units were found to be in passive standby mode (recharging unit plugged in, but with no battery connected), while the rest were found to be unplugged. About 19% of the units were found to have an external power supply (please note any standby readings for cordless drills will include the power consumption of the external power supply when attached to the charging station). External power supplies when unplugged have been measured separately and have been analysed in their respective section).

Table 53 – Summary of Cordless Drill Findings

Cordless Drills	Statistic	Number of Readings
Ownership	0.3	36
Average Passive Standby Mode	2.4 Watts	36
Minimum Passive Standby Mode	0.4 Watts	36
Maximum Passive Standby Mode	12.4 Watts	36



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Appendix One

Sampling Approach

The sample was selected from houses in Brisbane, Melbourne, Sydney and Gippsland, Victoria. Each of the three capital cities were chosen due to their high and representative proportions of Australia's total population and also because they were the focus cities for the 2000 survey. Gippsland, Victoria was chosen as being representative of a regional rural area. The four study areas were also chosen in an attempt to capture any climatic or other differences in appliance ownership and use behaviour.

Recruitment and Selection of Volunteer Households

The recruitment of households, with the exception of Brisbane, involved word of mouth and the circulation of emails. Invitations of interest were sent to industry organisations, friends and family, and were subsequently further spread by the addressees. The subject of the study was aired on television in Brisbane as well as being spread by word of mouth and email.

Parties were asked to indicate their interest by completing an online demographic questionnaire, which comprised of questions pertaining to the age, family makeup, income bracket of the participants as well as the household type, prevalence of appliances and contact details.

In total, 176 individual on-line responses were received. This response rate was not ideal for selecting a sample that closely represented the Australian demographic. Of these respondents; 20% were from Sydney, 35% were from Brisbane, 33% were from Melbourne and 11% were from Gippsland Victoria. A breakdown of the 2002 Census was used to define an ideal sample, with target breakdowns for the main demographic features.

The final chosen sample provides a good representation of the Australian demographic, with the following exceptions (when compared to the 2002 Census breakdown):

- A high proportion (major skew) of incomes above \$50,000 pa, when considering the census predominance of incomes below \$30,000 pa.
- Slightly increased proportions of the age groups making up the years 25 to 54.
- Single member and one parent households are under-represented, with a slight skew towards group member households.
- Major skew towards household containing only two members.



-
- Given the recruitment method, there was a higher than typical ownership of computers in the sample (although ABS surveys may understate the actual levels present in a typical household).

The sample demographics are illustrated in the Appendix One.

Preparation and Equipment

The meter used for all field measurements throughout the survey was the Sparmeter. To ensure that readings from the sparmeter were sufficiently accurate, four control houses were also measured with the Yokogawa power analyser WT200 (Model 2504-99). Further discussion on the comparison of the measurements using both meters in the control houses can be found in Appendix Two.

Measurements were taken of all plug in appliances found in the participating households, excepting those that were hardwired, inaccessible or were found to have no relevant standby mode.

Appliances were measured in each applicable standby mode. Further information collected included:

- Appliance type
- Brand
- Model
- Whether it had an external power supply (EPS)
- Switch type
- Status in which it was found
- Whether it had a remote control²
- Modes applicable; On, Active Standby, Passive Standby, Off and Delay Start
- Whether it had an Energy Star sticker
- Hours of use and behavioural questions including; days used per week/month/year, hours used for, hours used yesterday, age and use of delay start

A total of 8000 individual appliances were recorded, with 7276 having power measurements recorded in at least one relevant mode. Products without a relevant standby mode included storage water heaters, fish tank accessories, refrigerators and freezers.

² The remote control was only recorded during the survey if it was found during the measurement process. Sometimes remote controls were lost or were stored away from the unit and the owner was not always queried about every product during the visit. Therefore some products with remote control capability will not be recorded as such so generally the proportion with remote controls will be understated..



Problems Encountered and Standards Used During Data Collection

The standby power for some appliances is affected by a range of different conditions and factors. Therefore a standard measuring protocol was used for several appliance types, including:

- CD and DVD players; gave a higher active standby (AS) reading if they had a disc in the tray. The measurement was always taken with the disk removed and when a steady state had been reached.
- VCRs; gave a higher AS reading if they contained a cassette tape. The measurement was always taken with cassette removed and a measurement was taken when a steady state had been reached.
- Clock Radios; if the unit did not have batteries, the display would flash indicating a loss of power once the power was reconnected, this gave a lower AS reading. To obtain a measurement the time was set so the display stopped flashing.
- Remote Garage Door Openers; after loss of power, the courtesy light sometimes comes on. Before measuring, it was made certain that the courtesy light had gone off and steady state was reached.
- Computer Boxes, Laptops; if the CPU was still processing, this gave a higher AS reading. To measure, wait until steady state was reached. Typically measured on (no tasks running), passive standby (sleep) and off modes.
- Computer – Laptop; PS mode was reached and measured by closing the lid of the unit.

For appliances that were either hardwired (permanently connected to mains power supply) or inaccessible (plug was unreachable, or where there was a risk the unit could not be plugged back in or where the removal of power would potentially upset the workings of the appliance), an average estimated reading was used. This was obtained by averaging those readings of the same appliance type that had been obtained in the survey, by using standby measurements from other sources, or a combination of both. For some products, data from the relevant standby profile was used to replace missing readings. For example; smoke alarms are all hardwired so data from standby profiles was used as an estimate.

For appliances that had no relevant standby mode, some information was collected. This included appliance type, brand, model, switch type, status found in and for refrigerators and freezers, their age. Otherwise no measurements were taken; if the appliance was plugged in and functioning, generally the appliance was regarded as 'On'. All this information was gathered for completeness sake, for ownership purposes and in the case of refrigerators and freezers, to assess the age of units still in operation.

It is not possible to be absolutely sure that all appliances in the house were found and subsequently measured. It is quite probable that some appliances were missed (ie products that may have been in cupboards, packed away or simply overlooked). Every



reasonable effort was made to measure and record all appliances. It can be assumed though, that for any missed appliances, the majority of these would not have been plugged into a power into a power point so they would not have contributed to the whole house standby.



Appendix Two

Demographics Category Breakdown

Figure 97 – Percentage Breakdown of Houses Measured in Each State

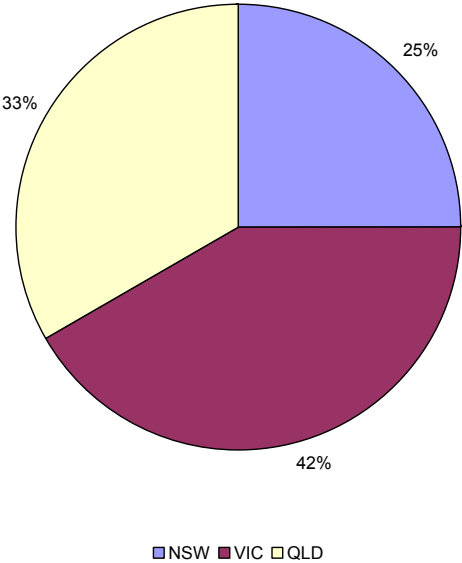


Figure 98 – House Type Breakdown of 2005 Survey Sample vs ABS Census Breakdown

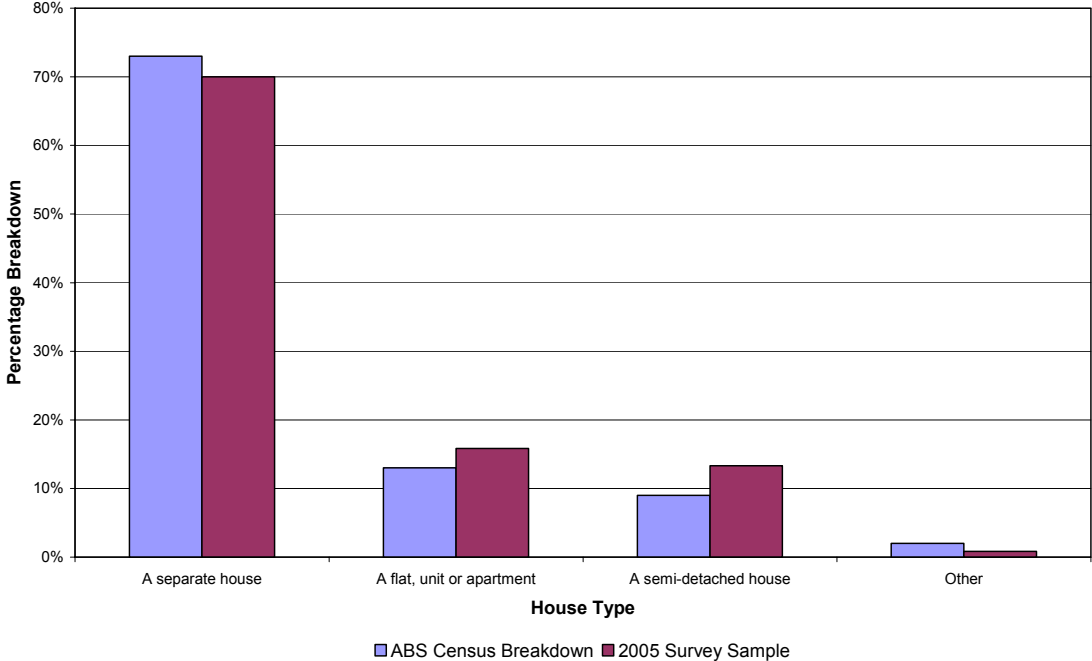


Figure 99 – Income Breakdown of 2005 Survey Sample vs ABS Census Breakdown

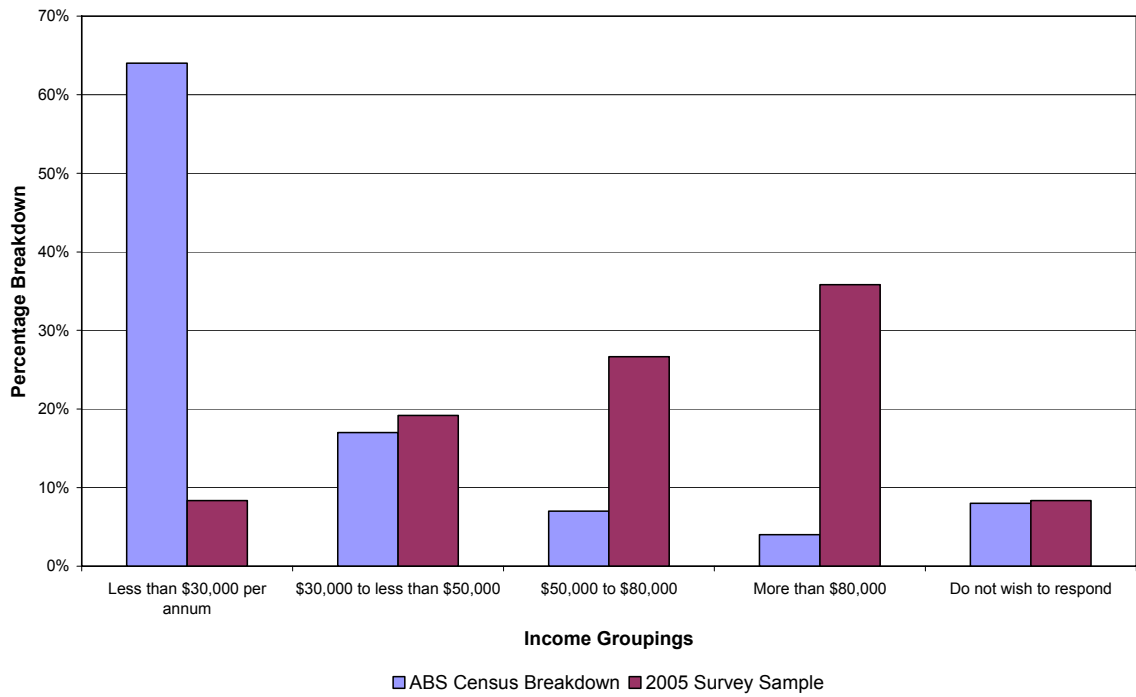


Figure 100 – Age Breakdown of 2005 Survey Sample vs ABS Census Breakdown

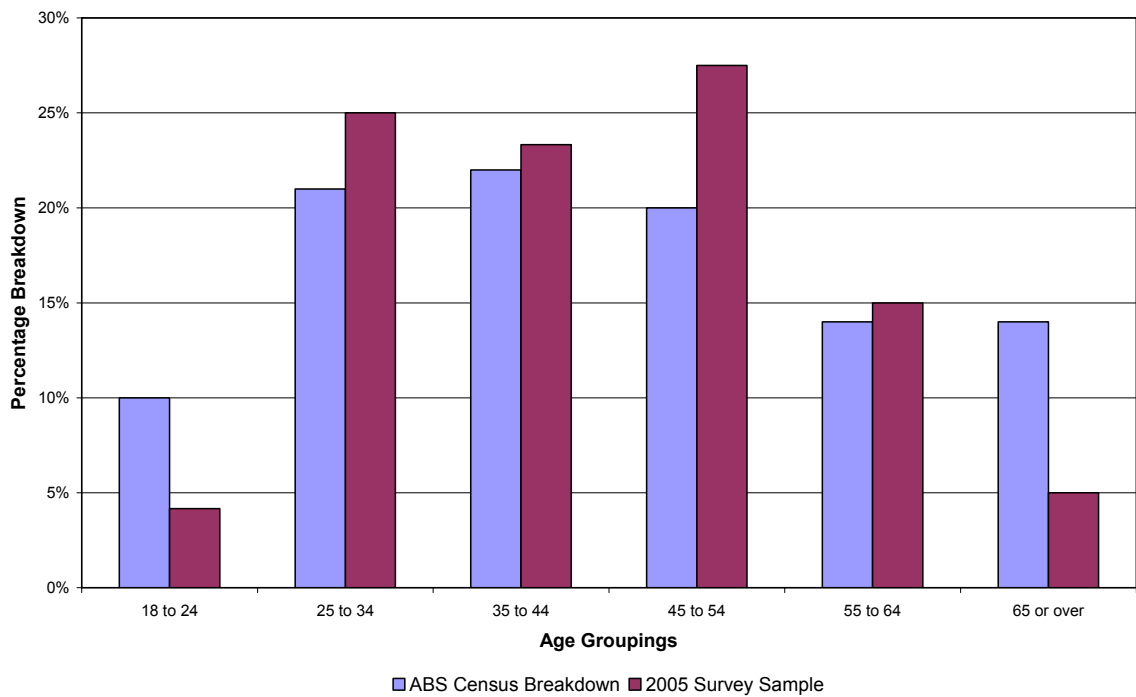


Figure 101 – Family Type Breakdown of 2005 Survey Sample vs ABS Census Breakdown

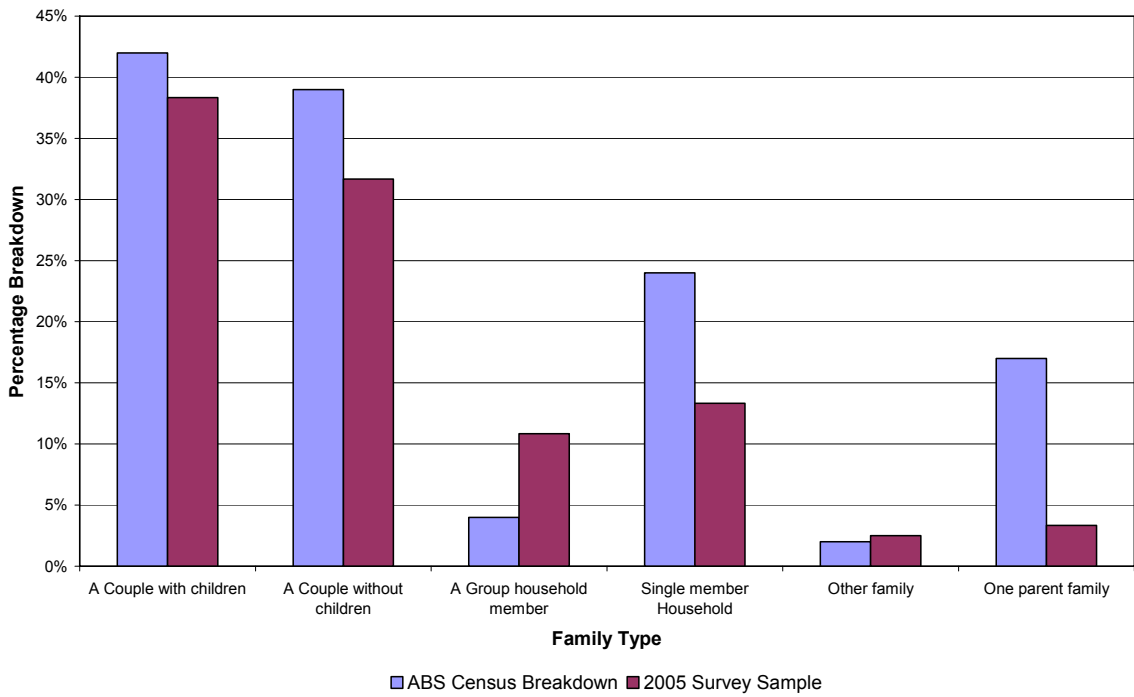


Figure 102 - Family Type Breakdown of 2005 Survey Sample vs ABS Census Breakdown

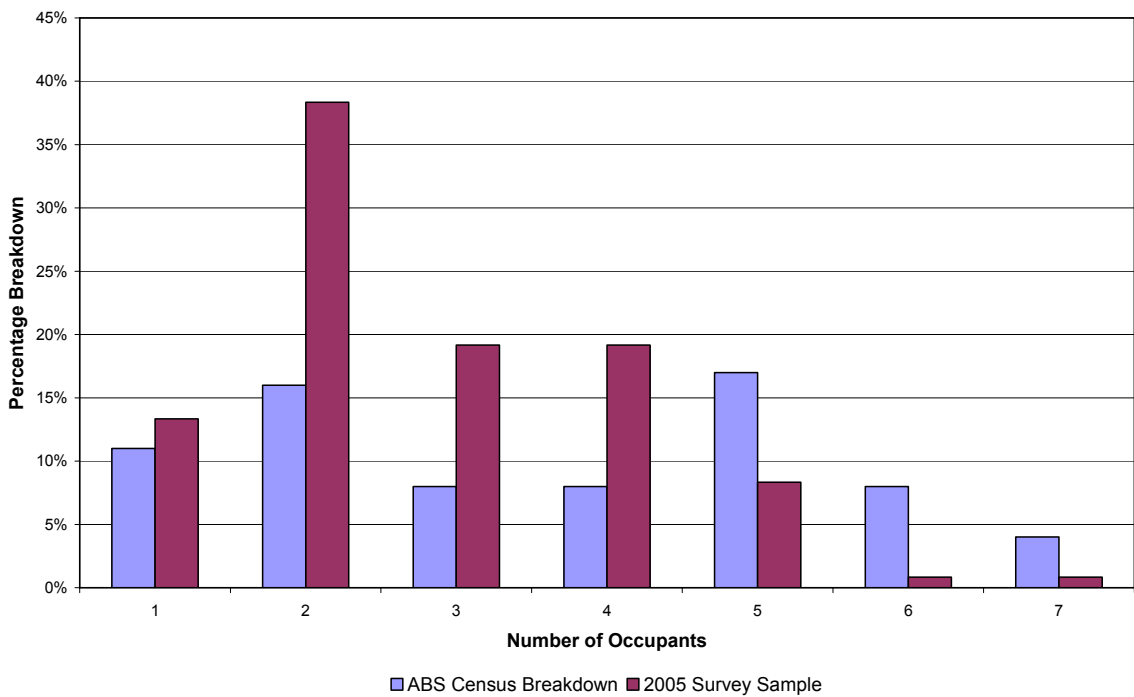


Table 54 below shows the ownership and penetration of some appliances found in the sample selected for this intrusive standby survey compared to the ownership and penetration found in the ABS4602 (2005) (Environmental Issues: People’s Views and Practices). There are four appliance category discrepancies with the ABS reporting which make it more difficult to directly compare the results of this survey with ABS4602: these are noted in the table below. Several other appliance types were reported by ABS, but they way these were reported meant that direct comparisons were not possible (eg air conditioners and heaters).

Table 54 – Summary of ABS4602 and Intrusive Survey Appliance Ownership and Penetrations

Appliance Type	Intrusive - Ownership	ABS4602-2005 - Ownership	Intrusive - Penetration	ABS4602-2005 – Penetration
Dishwashers	0.57	0.42	57.0%	41.5%
Clothes Washers	0.95	0.96	95.0%	96.4%
Clothes Dryers	0.63	0.55	63.0%	55.1%
Vacuum Cleaners	0.81	0.95	81.0%	95.2%
Televisions	2.07	1.95	99.0%	98.5%
VCRs	1.11	1.09	80.0%	83.7%
DVD Players and Recorders*	0.89	0.93	69.0%	72.0%
Microwaves**	0.86	0.93	85.0%	90.6%
Stereo Systems***	0.97	1.02	62.0%	77.8%
Computers****	1.79	0.87	92.0%	67.8%
Waterbeds	0.08	0.04	5.0%	3.3%
Game Consoles	0.33	0.35	25.0%	30.8%

* ABS does not separate DVD players and DVD recorders, thus both appliance types have been aggregated in this table.

** ABS does not separate convection and non-convection type microwaves, thus both microwave types found in houses have been aggregated in this table.

*** ABS does not report stereo system type, thus the integrated stereo type has been used for the Intrusive Survey (but this is likely to be an underestimate compared to ABS).

**** ABS does not separate Desktop and Laptop computers, thus both computer types have been aggregated in this table. Ownership and penetration found in the intrusive survey sample was much higher than reported by ABS which may indicate some sample bias.



Appendix Three

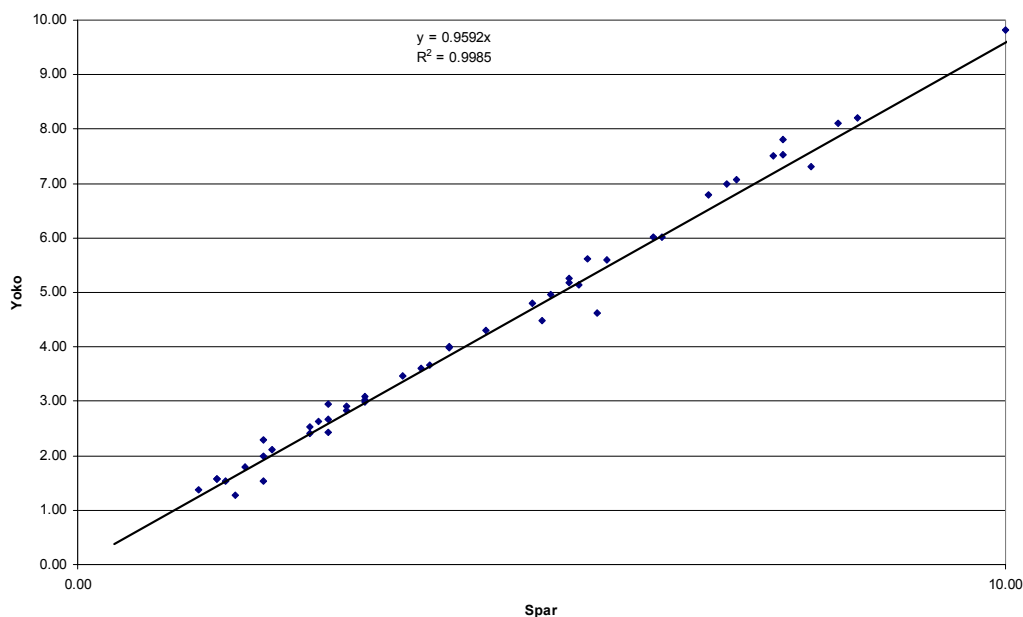
Control Houses Discussion

The primary meter used for the 2005 survey was the Sparmeter as this is small and highly portable and was known to give reasonably accurate results. This meter gives readings in Watts to one decimal place. To assess the overall accuracy of the Sparmeter, all of the appliances in five control houses were measured with both the Yokogawa power analyser, Model WT200 (2504-99) and the Spar meter. A total of about 300 measurements were taken and recorded with both meters for a wide range of power levels.

Analysis found that the Sparmeter tended to slightly overestimate the power measurements of appliances when compared to the Yokogawa power analyser by about 4%, although the measurements for individual appliances varied slightly, presumably depending on the complexity of the current waveform. Encouragingly, the data for very low power readings appeared exhibit a constant ratio between the meters with virtually no offset, so the Sparmeter readings can be taken as quite reliable even down to quite low power levels of less than 1 Watt. The relationship for all the appliances with measurements using both meters in the five houses was graphed and an R^2 (proportion of variance in y attributable to the variance in x) figure found of 0.9985, which show a very high degree of correlation between the readings. All readings from the Sparmeter were adjusted down by 4% to give a figure give an overall higher accuracy of results.

Figure 103 below shows the correlation between the Sparmeter and Yokogawa measurements for each appliance.

Figure 103 – Sparmeter vs Yokogawa Measurements



Appendix Four

Full Listing of Appliances Covered in Survey

Table 55 – Appliance Categories

Category	Category Title
1	Air Conditioners
2	Computers and Peripherals
3	Cooking Appliances
4	External Power Supplies
5	Heating Appliances
6	Home Cleaning Aids
7	Home Entertainment
8	Other Audio
9	Lighting
10	Office Equipment
11	Personal Health and Hygiene Products
12	Set Top Boxes
13	Small Kitchen Appliances
14	Telephones
15	Televisions
16	Tools
17	Water Heaters
18	Whitegoods
19	Monitoring and Continuous Appliances
20	Miscellaneous Appliances

Table 56 – Complete List of Appliance Types

Code	Group	Appliance Type
101	Air Conditioners	Air Conditioner – Window
102	Air Conditioners	Air Conditioner – Split
103	Air Conditioners	Air Conditioner – Portable
106	Air Conditioners	Evaporative Cooler – Split
107	Air Conditioners	Evaporative Cooler - Portable
109	Air Conditioners	Fan – Pedestal
110	Air Conditioners	Fan – Tower
111	Air Conditioners	Fan – Ceiling



Code	Group	Appliance Type
112	Air Conditioners	Exhaust Fan (Ceiling/Wall)
113	Air Conditioners	Ducted Air Conditioning
201	Computer and Peripherals	Computer – Box
202	Computer and Peripherals	Computer – Laptop
203	Computer and Peripherals	Computer – Monitor CRT
204	Computer and Peripherals	Computer – Monitor LCD
205	Computer and Peripherals	Computer – Speakers
206	Computer and Peripherals	External Hard Drive
207	Computer and Peripherals	Hub
208	Computer and Peripherals	Hub – USB
210	Computer and Peripherals	Modem
211	Computer and Peripherals	Palm Pilot
212	Computer and Peripherals	Printer – Inkjet
213	Computer and Peripherals	Printer – Laser
214	Computer and Peripherals	Scanner
216	Computer and Peripherals	Mouse Charger
217	Computer and Peripherals	CD Burner
218	Computer and Peripherals	Portable CD ROM
220	Computer and Peripherals	Zip Drive
221	Computer and Peripherals	Wireless Modem
222	Computer and Peripherals	Data Logger
301	Cooking Appliances	Cooktop – Electric
302	Cooking Appliances	Cooktop – Gas
303	Cooking Appliances	Oven – Electric
304	Cooking Appliances	Oven – Gas
305	Cooking Appliances	Stove – All Electric
306	Cooking Appliances	Stove – All Gas
307	Cooking Appliances	Stove – Hob Gas/Oven Electric
308	Cooking Appliances	Stove – Hob Electric/Oven Gas
309	Cooking Appliances	Rangehood
310	Cooking Appliances	Microwave – Non Convection
311	Cooking Appliances	Microwave – Convection
312	Cooking Appliances	Cooktop – Electric/Gas Induction
401	External Power Supplies	External Power Supply
501	Heating Appliances	Heater – Electric Ceramic
502	Heating Appliances	Heater – Electric Convection



Code	Group	Appliance Type
503	Heating Appliances	Heater – Electric Fan
504	Heating Appliances	Heater – Electric Oil
505	Heating Appliances	Heater – Electric Radiation
506	Heating Appliances	Heater – Gas Convection
508	Heating Appliances	Heater – Gas Ducted
509	Heating Appliances	Heater – Gas Radiation
510	Heating Appliances	Heater – Gas Wall
511	Heating Appliances	Hydronic
512	Heating Appliances	Slow Wood Combustion
513	Heating Appliances	Electric Slab Heater
514	Heating Appliances	Whole House Electric Radiation
601	Home Cleaning Appliances	Iron
604	Home Cleaning Appliances	Hand Held Vacuum Cleaner
605	Home Cleaning Appliances	Vacuum – Ducted
606	Home Cleaning Appliances	Vacuum Cleaner
607	Home Cleaning Appliances	Rechargeable Vacuum Cleaner
701	Home Entertainment	AV Receiver
702	Home Entertainment	DVD Player
703	Home Entertainment	DVD Recorder
704	Home Entertainment	VCR
706	Home Entertainment	Subwoofer
707	Home Entertainment	Speakers
708	Home Entertainment	Stereo - Integrated
709	Home Entertainment	Stereo – Portable
710	Home Entertainment	Stereo – Amplifier
711	Home Entertainment	Stereo – CD Player
712	Home Entertainment	Stereo – Minidisc Player
714	Home Entertainment	Stereo – Receiver
715	Home Entertainment	Stereo – Tape Deck
716	Home Entertainment	Stereo – Tuner
717	Home Entertainment	Stereo – Turntable
718	Home Entertainment	Stereo – Other
720	Home Entertainment	DVD/VCR
721	Home Entertainment	Aerial Booster
722	Home Entertainment	Laser Disc 12"
723	Home Entertainment	Video Switch



Code	Group	Appliance Type
724	Home Entertainment	Video Sender
725	Home Entertainment	Karaoke Player
726	Home Entertainment	Wireless Extension Unit for Foxtel
801	Other Audio	Discman – CD Player
803	Other Audio	Headphones
804	Other Audio	Headphones – Infrared Cordless
807	Other Audio	Radio
901	Lighting	Lamp
901	Lighting	Lamp – Dimmer Switch
904	Lighting	Lamp – Touch Lamp
905	Lighting	Outdoor Light
906	Lighting	Rechargeable Torch
907	Lighting	Heat Lamp – Ceiling
908	Lighting	Big Zapper
1003	Office Equipment	Multifunction Device
1004	Office Equipment	Photocopier
1005	Office Equipment	Shredder
1006	Office Equipment	Facsimile
1007	Office Equipment	Electric Stapler
1008	Office Equipment	Laminator
1009	Office Equipment	Electric Typewriter
1102	Personal Health and Hygiene Equipment	Air Freshener
1103	Personal Health and Hygiene Equipment	Aromatherapy
1106	Personal Health and Hygiene Equipment	Epilator
1107	Personal Health and Hygiene Equipment	Foot Spa
1108	Personal Health and Hygiene Equipment	Hair – Electric Rollers
1109	Personal Health and Hygiene Equipment	Hair Crimper
1110	Personal Health and Hygiene Equipment	Hair Curling Wand
1111	Personal Health and Hygiene Equipment	Hair Straightener
1112	Personal Health and Hygiene Equipment	Hair Dryer



Code	Group	Appliance Type
1113	Personal Health and Hygiene Equipment	Heated Towel Rail
1114	Personal Health and Hygiene Equipment	Massage Unit
1115	Personal Health and Hygiene Equipment	Shaver – Electric
1116	Personal Health and Hygiene Equipment	Shaver – Rechargeable
1117	Personal Health and Hygiene Equipment	Toothbrush – Electric
1118	Personal Health and Hygiene Equipment	Toothbrush – Rechargeable
1119	Personal Health and Hygiene Equipment	Vaporuriser/Steamer
1120	Personal Health and Hygiene Equipment	Ventilator
1121	Personal Health and Hygiene Equipment	Hair Clipper
1122	Personal Health and Hygiene Equipment	Waxing Unit
1202	Set Top Boxes	Set Top Box – Digital
1205	Set Top Boxes	Set Top Box/DVD Player
1301	Small Kitchen Appliances	Breadmaker
1303	Small Kitchen Appliances	Can Opener
1304	Small Kitchen Appliances	Carving Knife
1305	Small Kitchen Appliances	Coffee Maker
1306	Small Kitchen Appliances	Crock Pot/Slow Cooker
1307	Small Kitchen Appliances	Espresso Machine
1308	Small Kitchen Appliances	Food Processor
1309	Small Kitchen Appliances	Frying Pan
1310	Small Kitchen Appliances	Hand Held Beater
1312	Small Kitchen Appliances	Juicer
1313	Small Kitchen Appliances	Kettle
1314	Small Kitchen Appliances	Mix Master
1315	Small Kitchen Appliances	Other Kitchen Appliance
1316	Small Kitchen Appliances	Rice Cooker
1317	Small Kitchen Appliances	Sandwich Press
1318	Small Kitchen Appliances	Toaster
1319	Small Kitchen Appliances	Toaster Oven
1321	Small Kitchen Appliances	Water Filter



Code	Group	Appliance Type
1322	Small Kitchen Appliances	Electric Grill
1323	Small Kitchen Appliances	Steamer
1324	Small Kitchen Appliances	Popcorn Maker
1325	Small Kitchen Appliances	Egg Cooker
1326	Small Kitchen Appliances	De-Corker
1327	Small Kitchen Appliances	Coffee Grinder
1328	Small Kitchen Appliances	Grinder
1329	Small Kitchen Appliances	Ice Cream Maker
1330	Small Kitchen Appliances	Dehydrator
1331	Small Kitchen Appliances	Yogurt Maker
1332	Small Kitchen Appliances	Meat Slicer
1333	Small Kitchen Appliances	Deep Fryer
1334	Small Kitchen Appliances	Electronic Scales
1335	Small Kitchen Appliances	Steriliser
1336	Small Kitchen Appliances	Fairy Floss Maker
1401	Telephones	Answering Machine
1402	Telephones	Cordless Phones – Base Station
1403	Telephones	Cordless Phones – Extra Handset
1404	Telephones	Mobile Phone Charger
1405	Telephones	Exchange
1406	Telephones	Phone
1407	Telephones	ISDN
1501	Televisions	Televisions – CRT
1504	Televisions	Televisions – Plasma
1506	Televisions	Televisions – Front Projection
1601	Tools	Cordless Drill
1602	Tools	Electric Drill
1603	Tools	Electric Lawnmower
1604	Tools	Rechargeable Whippersnipper
1605	Tools	Electric Whippersnipper
1606	Tools	Benchgrinder
1607	Tools	Benchsaw
1608	Tools	Jig Saw
1609	Tools	Circular Saw
1610	Tools	Leaf Blower
1611	Tools	Mulcher



Code	Group	Appliance Type
1612	Tools	Heat Gun
1613	Tools	Soldering Iron
1614	Tools	Engraver
1615	Tools	Sander
1616	Tools	Compressor
1617	Tools	Router
1618	Tools	Welder
1619	Tools	Potter's Wheel
1620	Tools	Anglegrinder
1621	Tools	Plane
1622	Tools	Extractor Fan Unit
1623	Tools	Jeweller's Motor
1624	Tools	Water Blaster
1625	Tools	Chain Saw
1626	Tools	Lathe
1701	Water Heaters	Water Heater – Electric
1702	Water Heaters	Water Heater – Gas
1703	Water Heaters	Water Heater – Solar/Electric
1704	Water Heaters	Water Heater – Solar/Gas
1705	Water Heaters	Heat Exchanger
1706	Water Heaters	Electric Instantaneous Water Heater
1707	Water Heaters	Gas Instantaneous Water Heater
1801	Whitegoods	Clothes Washer
1803	Whitegoods	Clothes Dryer
1804	Whitegoods	Dishwasher
1805	Whitegoods	Refrigerator
1806	Whitegoods	Freezer
1901	Monitoring and Continuous Appliances	Aerial
1902	Monitoring and Continuous Appliances	Smoke Alarm
1903	Monitoring and Continuous Appliances	Clock
1904	Monitoring and Continuous Appliances	Clock Radio
1905	Monitoring and Continuous Appliances	Doorbell Remote Chimer
1906	Monitoring and Continuous	Double Adaptor



Code	Group	Appliance Type
	Appliances	
1907	Monitoring and Continuous Appliances	Fish Tank Bubbler
1908	Monitoring and Continuous Appliances	Fish Tank Filter
1909	Monitoring and Continuous Appliances	Fish Tank Heater
1910	Monitoring and Continuous Appliances	Fish Tank Light
1911	Monitoring and Continuous Appliances	Fish Tank Pump
1912	Monitoring and Continuous Appliances	Intercom
1914	Monitoring and Continuous Appliances	Pond Pump
1917	Monitoring and Continuous Appliances	Powerboard
1918	Monitoring and Continuous Appliances	Remote Garage Door Opener
1919	Monitoring and Continuous Appliances	Sensor Light
1920	Monitoring and Continuous Appliances	Solar Heating Pool Control
1921	Monitoring and Continuous Appliances	Sprinkler System
1922	Monitoring and Continuous Appliances	Surge Guard
1923	Monitoring and Continuous Appliances	Timer
1924	Monitoring and Continuous Appliances	Timer – Pool Pump and Chlorinator
1925	Monitoring and Continuous Appliances	Uninterruptible Power Supply
1926	Monitoring and Continuous Appliances	Security System
1927	Monitoring and Continuous Appliances	Oxygen Concentrator
1928	Monitoring and Continuous Appliances	Insect Killer
1929	Monitoring and Continuous Appliances	Standby Switch
1930	Monitoring and Continuous Appliances	Window Shutter
1931	Monitoring and Continuous Appliances	Sewerage System



Code	Group	Appliance Type
1932	Monitoring and Continuous Appliances	Gate
1933	Monitoring and Continuous Appliances	Pool Pump
2002	Miscellaneous Appliances	Battery Recharger
2003	Miscellaneous Appliances	CB Radio
2004	Miscellaneous Appliances	Digital Camera
2005	Miscellaneous Appliances	Electric Fence
2006	Miscellaneous Appliances	Electric Guitar Amplifier
2007	Miscellaneous Appliances	Game Console
2008	Miscellaneous Appliances	Music – Keyboard
2009	Miscellaneous Appliances	Nightlight
2010	Miscellaneous Appliances	Overlocker
2015	Miscellaneous Appliances	Sewing Machine
2016	Miscellaneous Appliances	Treadmill
2017	Miscellaneous Appliances	Video Camera
2018	Miscellaneous Appliances	Water Feature
2019	Miscellaneous Appliances	Water Pump
2020	Miscellaneous Appliances	Waterbed
2021	Miscellaneous Appliances	Electric Blanket
2022	Miscellaneous Appliances	Light Table
2023	Miscellaneous Appliances	Garbage Disposal
2024	Miscellaneous Appliances	Brewing Kit
2025	Miscellaneous Appliances	EFTPOS
2026	Miscellaneous Appliances	Micro Film Viewer
2027	Miscellaneous Appliances	Exercise Bike
2028	Miscellaneous Appliances	Pool Filter
2029	Miscellaneous Appliances	Pool Chlorination System
2030	Miscellaneous Appliances	Sound Mixer
2031	Miscellaneous Appliances	Spa Heater
2032	Miscellaneous Appliances	Vibrating Chair
2033	Miscellaneous Appliances	Voice Recorder
2034	Miscellaneous Appliances	Light Mirror
2035	Miscellaneous Appliances	Cash Register
2036	Miscellaneous Appliances	Walking Machine
2037	Miscellaneous Appliances	Pergola
2038	Miscellaneous Appliances	Sound Hub



