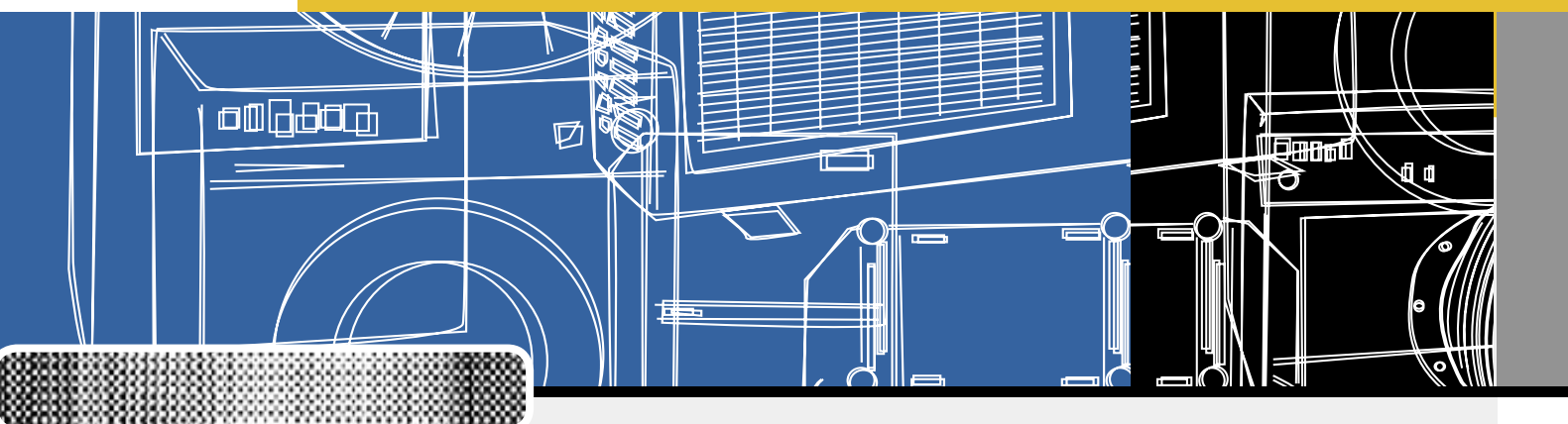


**NATIONAL APPLIANCE AND EQUIPMENT
ENERGY EFFICIENCY PROGRAM**

**APPLIANCE STANDBY POWER CONSUMPTION
STORE SURVEY 2004/2005 - FINAL REPORT**



AUGUST 2005

AN INITIATIVE OF THE MINISTERIAL COUNCIL ON ENERGY FORMING PART OF THE
AUSTRALIAN NATIONAL FRAMEWORK FOR ENERGY EFFICIENCY AND
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Appliance Standby Power Consumption: Store Survey 2004/05 - Executive Summary

Prepared for

***NATIONAL APPLIANCE & EQUIPMENT
ENERGY EFFICIENCY COMMITTEE***

31 August 2005



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Overview

This report summarises the results of in-store standby measurements for some 1313 new household appliances that were undertaken in November 2004 and May 2005. The results are summarised by product group and are compared with readings undertaken in similar surveys in 2001, 2002, 2003 and 2003/04. These five in-store surveys are part of a longer term benchmarking program and results need to be viewed in this light. NAEEEEC propose to undertake similar surveys in future years to assess industry progress in reducing standby consumption of appliances.

Background

In 2000, the Australian Greenhouse Office (AGO) and the National Appliance & Equipment Energy Efficiency Committee (NAEEEC) commissioned the report, *Quantification of Residential Standby Power Consumption in Australia* (EES and EnergyConsult, 2001). This study provides results of an intrusive survey where measurements on 2,500 appliances were undertaken in 64 houses in Melbourne, Sydney and Brisbane. The report also includes results of measurements on 531 new appliances in retail outlets and results of a telephone survey of 801 households in Australia, which documents information on appliance ownership, age and usage patterns. This research revealed that 11.6% of Australia's household electricity consumption can be attributed to energy used by appliances and electronic equipment when not performing their primary function (this figure also includes some small continuous loads not traditionally classified as "standby"). This "standby" consumption was estimated in 2000 to be costing Australians more than \$500 million per year and generating more than 5 million tonnes of carbon dioxide per annum.

Following the 2000 study, three follow-up store surveys of new appliances have been conducted. The reports titled *Appliance Standby Power Consumption: Store Survey* (Energy Efficient Strategies & Energy Consult), measured energy consumption of 635 in 2002, 573 in 2003 and 1431 appliances in 2003/04. This data was compared with the information recorded in the 2001 report; a large proportion of products still consumed more than 1 W in standby and off modes.

This executive summary outlines results which are detailed in the report titled *Appliance Standby Power Consumption: Store Survey 2004/05* (EnergyConsult & Energy Efficient Strategies, 2005).

Objectives of this Study

The AGO and the NAEEEEC commissioned this survey as part of the monitoring of its program to reduce the standby consumption of all electronic appliances to less than 1W. The main objectives of this survey were to:

- Quantify the magnitude of electricity used in standby mode by new appliances offered for sale in the Australian market in 2004/05.
- Compare the results from this study with the results of similar studies undertaken between 2001 and 2004 in order to track the industry's progress in reducing standby power consumption.

Similar studies are proposed in future years to assess industry progress towards the government's 1 Watt target.

Research Methods

Seven major Melbourne retail stores were approached to take part in the study, along with three suburban computer stores. This year's survey was conducted in winter and in summer to broaden the appliance types. The metering device was systematically plugged into the floor stock across 43 appliances categories. Power consumption was measured in Watts for a range of modes including "in use", "passive and/or active standby", "off mode" and delay start mode, where applicable (only certain modes were measured for each appliance group). Other information recorded included brand, model, price, features, and supply voltage. These results were analysed and compared with outcomes from the four previous in-store surveys.

For the purposes of this report, "standby" is a general term which refers to the power consumption of a product or appliance that is connected to a power source but does not produce any sound or picture, transmit or receive information or is waiting to be switched "on" by a direct or indirect signal from the consumer. This includes the "off" mode, even where there is no remote control. Unqualified use of the term standby generally means the lowest power consumption when connected to the mains.

Key Findings

- *The significant decline in passive standby since 2001 appears to have stabilised.*

When all products measured are analysed as one group and compared to 2001 data, a statistically significant¹ decline in average consumption was evident in passive standby mode. The decline in average consumption was significant between 2001 and 2002 and between 2002 and 2003. In 2003/04 it remained stable with slight rise of just 0.2W and experienced an increase of 0.01W in 2004/05. This indicates that the downward trend in passive standby consumption noted in the previous surveys has stabilised for the products measured in this survey (noting that the mix of products measured in each year is comparable but not identical).

- *At present no trend can be identified in consumption for active standby or off mode.*

In previous years active standby has appeared to be in decline and had shown significant improvement between 2002 and 2003. However, in 2003/04 this trend was reversed with a statistically significant increase in average consumption when compared to 2003. This level increased only slightly in 2004/05, with a rise of 0.6W.

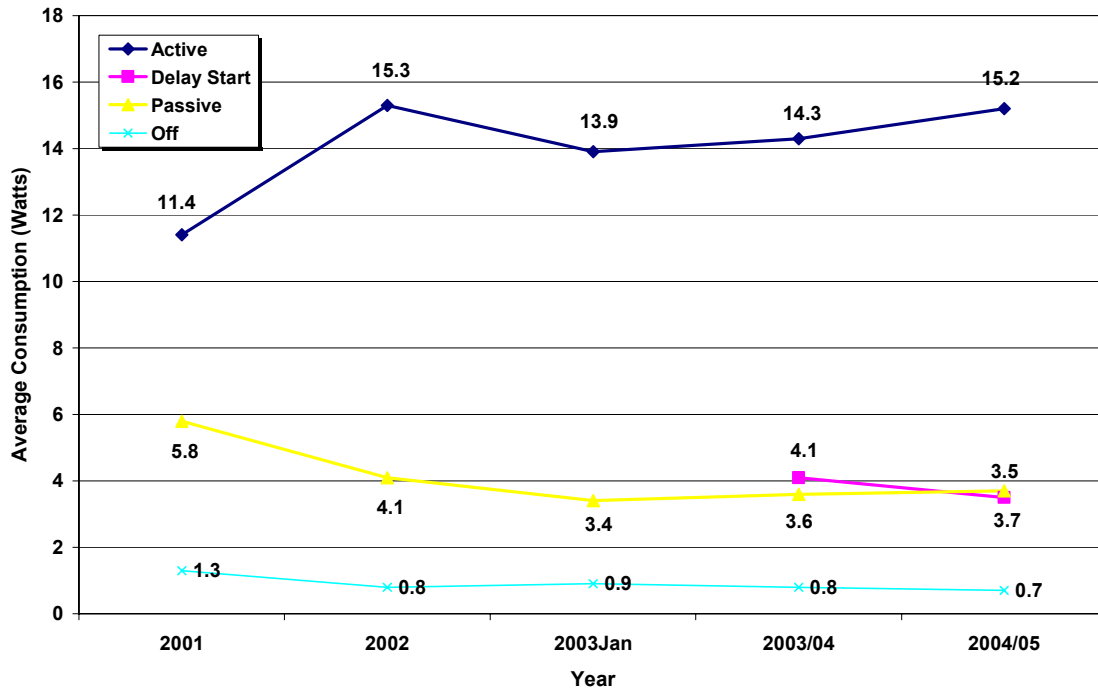
In 2004/05 the average off mode consumption has reached its lowest level at 0.7W. The average off mode consumption declined significantly from 2001 to 2002 and has remained fairly static since. These results suggest that the off mode consumption is fairly stable given that the number and mix of products measured in each year of the survey were somewhat different. Results need to be taken as indicative and trends within each product need to be examined separately to give a more concise picture. Table 1 below summarises the results while Figure 1 graphs these results.

¹ Significant at the 95% confidence level.

Table 1 – Summary of average consumption across all products

	2001	2002	2003	2003/04	2004/05
Total readings off	257	380	330	920	781
Average off	1.3W	0.8W	0.9W	0.8W	0.7W
Total readings passive standby	405	397	325	686	737
Average passive standby	5.8W	4.1W	3.4W	3.6W	3.7W
Total readings active standby	116	248	260	636	664
Average active standby	11.7W	16.2W	14.0W	14.6W	15.2W
Total readings Delay Start				71	51
Average Delay Start				4.1W	3.5W

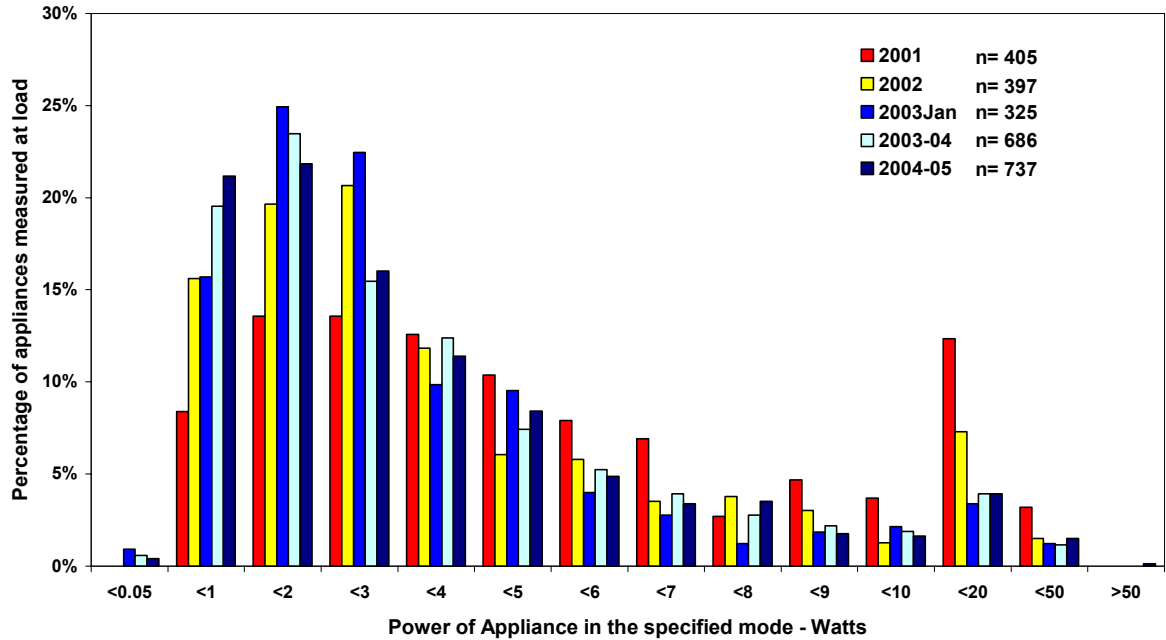
Figure 1 – Summary of average consumption across all products



- *There has been an increase in the proportion of appliances consuming less than 1W in passive standby.*

Figure 2 below shows the distribution of measurements taken for all products in passive standby mode across the five survey years. Passive standby measurements less than 1 watt have increased steadily over the years. In 2001, 8% of all measurements taken were less than 1W, in 2004/05 it is 21%. Apart from the improvement in the number of products measuring less than 1 watt, the distribution indicates no clear trends in passive standby measurements. This is perhaps indicative of the average passive standby measurement remaining stable over the years since the January 2003 survey.

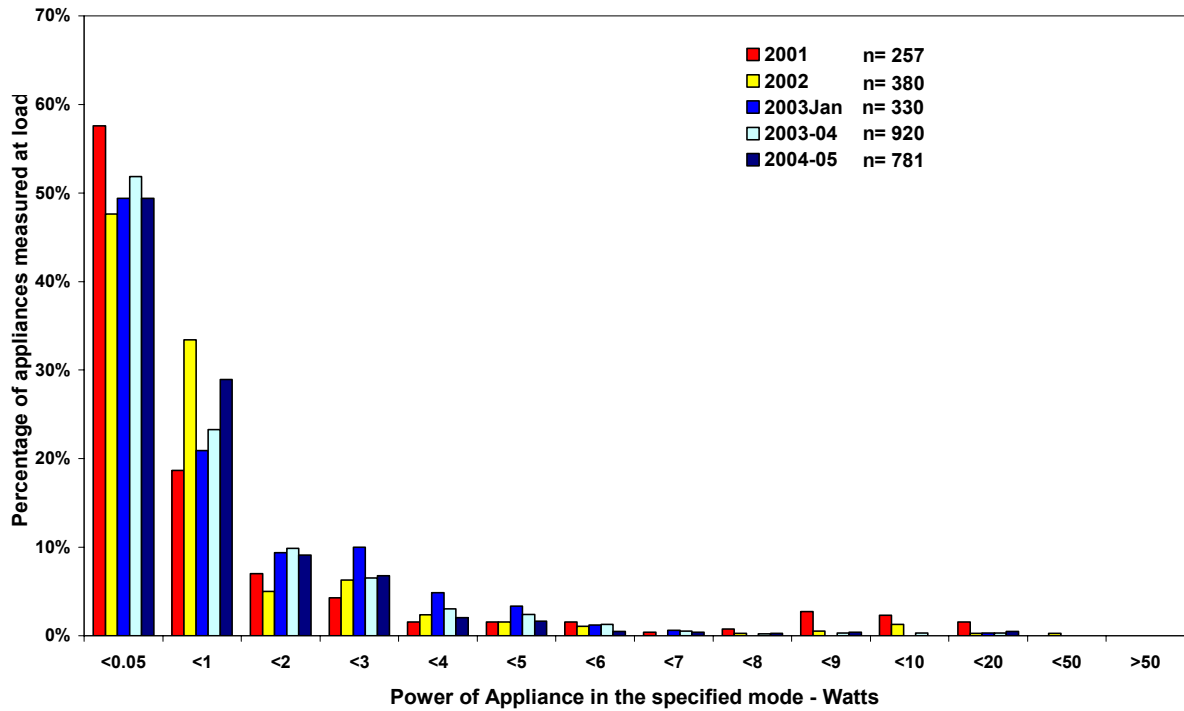
Figure 2: Distribution of “passive standby mode” power – all products



- *Most appliances continue to consume less than 1W in off mode and there has been an increase in the proportion of appliances consuming less than 1W.*

Figure 3 clearly shows that since the January 2003 survey there has been an increase in the proportion of appliances consuming less than 1 Watt in off mode. Sixty eight percent of appliances measured in the 2004/05 survey measured less than 1 Watt in off mode and a further 16% consumed less than 3W in off mode. However, 16% of appliances measured consumed more than 3W in off indicating that much improvement still needs to be made.

Figure 3: Distribution of “off mode” power – all products



- *Delay start function has become more common on major appliances.*

Delay start was first measured in appliances in the 2003/04 survey and was subsequently measured in the 2004/05 survey. Delay start allows the consumer to preset the appliance to begin functioning at a time in the future. It was found that appliances left in this mode recorded different consumption than in their lowest possible state. In the majority of cases delay start mode consumption was higher than standby. Given this information delay start mode has been added to the modes measured during in store surveys. Little is known about consumer behaviour with regard to delay start features, however if appliances are being left in this mode for significant amounts of time then this mode will impact overall consumption.

Table 2 – A summary of delay start mode results

	<i>Number of Measurements</i>	<i>Average Power (W)</i>	<i>Power Max</i>	<i>Power Min</i>
2003/04	71	4.1	9.2	0.7
2004/05	51	3.5	8.4	0.8

- *Results indicate that there is an opportunity for many appliances to improve energy consumption in standby and off modes.*

For the products measured, there was generally a wide variance in power consumption in off mode and passive standby mode without any difference in performance or

functionality between these products. This tends to suggest that there are substantial opportunities for manufacturers to reduce standby power consumption, probably at low marginal cost.

- *Trends for different product groups are mixed.*

While some products appear to be improving, there is still substantial work to be done for other product types. Some products have poor standby power characteristics. Ongoing work is required to track current and future trends. Key trends are:

Major appliances:

- Air conditioners – no improvement in off mode consumption.
- Clothes dryers – no change in off mode
- Dishwashers – no change in off mode from 2003/04 marginal increase in active standby. An increase in the number of appliances with an on/off switch will mean that active standby will need to be closely monitored.
- Washing machines – trend of decreasing off mode consumption appears to be continuing. While active standby is stable.
- Cook Tops, Ovens, Stoves and Range hoods - no trend data (new products in 2003/04).
- Heaters – gas, portable electric and water - no trend data (new products in 2003/04).

Computers and peripherals:

- Computers – possible decline in off mode;
- Monitors – Standby significantly declining;
- Speakers – no trend data
- Home theatre box – no trend data
- Inkjet printers – standby significantly declining in passive and off;
- Laser printers – passive standby much higher for colour laser printers, no trend data;

Home entertainment equipment:

- Standard TVs – passive standby declining, in use power increasing;
- LCD TVs – passive standby decreasing but not significantly;
- Projection TVs – standby appears to be stable;
- Plasma TVs – standby appears to be stable;
- VCRs – standby trending downwards;
- DVD/VCR Player - no trend data;
- DVD players – significant improvement in off and passive standby mode power;
- DVD recorders – standby stable
- Hard disk recorder – no trend data

- Integrated stereos – standby stable;
- Portable stereos – passive and active standby stable;
- AV Receivers – standby is decreasing;
- Home Theatre Systems – standby stable;
- Sub Woofers – standby stable;
- Digital Set Top Boxes – standby stable.

Small appliances:

- Breadmakers – standby is stable;
- Hand held vacuum cleaners (dust busters) – standby is stable;
- Microwaves ovens – no change, standby stable;
- Espresso machines – Off mode is stable;
- Facsimiles – no trend data, only one measured in 2004/05
- Multi Function Devices – Active standby stable, possible increase in off mode

Overall results - summary

The power consumption of 1431 appliances was measured in 14 retail stores in Melbourne, Australia during November 2004 and June 2005.

Table 3 to

Table 6 provide a summary of the average active/passive standby and off readings (as applicable) for each of the appliance groups measured.

Table 3 – A summary of power measurements for major appliances – 2004/05 survey

Major Appliance	Total Number of Appliances	Valid Readings : Off	Average of Off Power (W)	Valid Readings: Passive Standby	Average of Passive Standby Power (W)	Valid Readings: Active Standby	Average of Active Standby Power (W)	Valid Readings Delay Start	Average of Delay Start Power (W)
Air conditioner	33	27	0.5	8	2.2			4	2.1
Cook top	26	26	0.0						
Dishwasher	53	52	0.4	1	4.2	38	2.6	13	2.9
Dryer	24	24	0.2			4	2.3	3	2.9
Heater - Electric Portable	64	61	0.5	7	1.5			2	1.6
Heater – Gas	2	2	6.7	1	6.4				
Oven	5	5	1.8						
Stove	8	8	0.0						
Washer/Dryer	2	2	2.0			2.0	4.7	1.0	8.4
Washing Machine	82	82	0.9			58	3.0	28	4.0
Range Hood	23	23	0.1						
Total Major Appliance	322	312	1.2	17	3.6	102	3.1	51	3.7

Table 4 – A summary of power measurements for Small appliances – 2004/05 survey

Small Appliance	Total Number of Appliances	Valid Readings: Off	Average of Off Power (W)	Valid Readings: Passive Standby	Average of Passive Standby Power (W)	Valid Readings: Active Standby	Average of Active Standby Power (W)
Breadmaker	9					9	1.8
Cordless Phone	1					1	1.1
Espresso Machine	31	31	0.8				
Facsimile	1					1	8.8
Fan	16	14	0.0	2	1.2		
Hand-held Vac	9			9	1.3	9	4.9
Juicer	3	3	0.3				
Microwave	60			60	3.0		
Multi Function Device	47	26	4.5			47.0	9.8
Total Small Appliance	177	74	1.4	71	1.8	67	5.3

Table 5 – A summary of power measurements for Computers – 2004/05 survey

Computers and Peripherals	Total Number of Appliances	Valid Readings: Off	Average of Off Power (W)	Valid Readings: Passive Standby	Average of Passive Standby Power (W)	Valid Readings: Active Standby	Average of Active Standby Power (W)	Valid Readings: In Use	Average of In Use Power (W)
Computers - Box	16	16	2.0	1	2.2				
Computers - Home Theatre Box	9	9	2.5					1	104.4
Computers - Laptop	7	7	1.2						
Computers - Monitor	44	44	1.2	4	1.9			15	31.3
Computers - Speaker	5	4	2.9			3	5.6	1	65.0
Printer - Inkjet	21	21	0.8	21	3.6				
Printer - Laser	10	10	0.1	10	9.0				
Total Small Appliance	112	111	1.5	36	4.2	3	5.6	17	66.9

Table 6 – A summary of power measurements for Home Entertainment products – 2004/05 survey

Home Entertainment Products	Total Number of Appliances	Valid Readings: Off	Average of Off Power (W)	Valid Readings: Passive Standby	Average of Passive Standby Power (W)	Valid Readings: Active Standby	Average of Active Standby Power (W)	Valid Readings: In Use	Average of In Use Power (W)
DVD Player	69	13	0.0	66	2.4	69	9.2		
DVD Recorder	43			43	7.5	43	23.0		
Hard Disk Recorder	20	1	0.0	19	7.2	20	29.4		
Home Entertainment Other	7	4	0.0	1	4.6	7	7.5		
Home Theatre System	61	11	0.1	54	2.2	60	31.5		
Set Top Box	46	14	0.0	43	8.6	45.0	14.2	8.0	16.8
Stereo Component	12	4	0.0	8	3.0	12.0	9.0		
Stereo - Integrated	72	2	2.4	65	4.6	72.0	18.0		
Stereo - Portable	42	7	1.9	35	2.1	40.0	6.7		
Subwoofer	49	45	0.7	10	3.8	46.0	10.4		
TV – LCD	41	22	1.0	40	1.9			39.0	94.8
TV – Plasma	35	27	0.6	33	2.3			34.0	240.3
TV – Projection	32	28	0.1	32	5.8			30.0	173.5
TV – standard	95	94	0.1	88	3.5			93.0	87.3
AV Receiver	51	13	0.2	48	1.3	51	41.2		
VCR	28			28	2.9	28.0	7.7		
Total Home Entertainment	703	285	0.5	613	4.0	493	17.3	204	122.5

Further Information:

Energy Efficient Strategies and EnergyConsult, 2003, *Appliance Standby Power Consumption: Store Survey 2003*, NAEEEEC report 2003/04. This report contains the detailed results of the Australian retail store standby survey undertaken in early 2003 as outlined in this executive summary. A copy is available at www.energyrating.gov.au from the electronic library under the standby section.

Energy Efficient Strategies and EnergyConsult, 2002, *Appliance Standby Power Consumption: Store Survey 2002*, NAEEEEC report 2002/08. This report contains detailed results of the Australian retail store standby survey undertaken in early 2002. A copy is available at www.energyrating.gov.au from the electronic library under the standby section.

Energy Efficient Strategies and EnergyConsult 2001, *Quantification of Residential Standby Power Consumption In Australia: Results of Recent Survey Work*. Prepared for NAEEEEC, this report provides results of an intrusive survey where measurements on 2,500 appliances were undertaken in 64 houses in Melbourne, Sydney and Brisbane. The report also includes results of measurements on 531 new appliances in retail outlets and results of a telephone survey of 801 households in Australia, which documents information on appliance ownership, age and usage patterns. A copy is available at www.energyrating.gov.au from the electronic library under the standby section.

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Introduction

Background

In 2000 the Australian Greenhouse Office (AGO) and the National Appliance & Equipment Energy Efficiency Committee (NAEEEC) commissioned the report, *Quantification of Residential Standby Power Consumption in Australia* (Energy Efficient Strategies and EnergyConsult, 2001). This study provides results of an intrusive survey where measurements on 2,500 appliances were undertaken in 64 houses in Melbourne, Sydney and Brisbane. The report also includes results of measurements on 531 new appliances in retail outlets and results of a telephone survey of 801 households in Australia, which documents information on appliance ownership, age and usage patterns. This research revealed that 11.6% of Australia's household electricity consumption is attributed to energy used by appliances and electronic equipment when not performing their primary function (this figure includes some small continuous loads not traditionally classified as "standby"). This "standby" consumption was estimated in 2000 to be costing Australians more than \$500 million per year and generating more than 5 million tonnes of carbon dioxide per annum.

Following the 2000 study, three follow-up store surveys of new appliances have been conducted. The reports titled *Appliance Standby Power Consumption: Store Survey* (Energy Efficient Strategies & Energy Consult), measured energy consumption of 635 in 2002, 573 in 2003 and 1431 appliances in 2003/04. This data was compared with the information recorded in the 2001 report; a large proportion of products still consumed more than 1 W in standby and off modes.

The results presented in this report provide details of in-store standby measurements for 1313 new household appliances that were undertaken in November 2004 and May 2005. This report represents a continuation of the ongoing monitoring of appliance standby power usage, which began with the store survey conducted in late 2000. A summary of the findings from this report can be found in the report titled – *Executive Summary* (EnergyConsult & Energy Efficient Strategies 2005).

Definition of "Standby"

Appliances and equipment with a "standby mode" may include any household product that consumes power while not performing its primary function. A simple definition of "standby" is when an appliance is at its lowest power consumption when connected to mains power, even if the appliance is turned off (lowest power mode that can be influenced by the user). However, "standby" is better defined under various modes and for the purpose of this research, standby modes were defined as follows:

Off

When a product or appliance is connected to a power source but does not produce any sound or picture, transmit or receive information or is waiting to be switched "on" by the

consumer. If the product has a remote control, it cannot be woken by the remote control from off mode. While the product may be doing some internal functions in off mode (e.g. memory functions, EMC filters) these are not obvious to the user.

Passive Standby

When a product or appliance is not performing its main function but it is ready to be switched on (in most cases with a remote control) or is performing some secondary function (e.g. has a display or clock). This mode also applies to power supplies for battery operated equipment (portable appliances which are intended to be used when disconnected from the base station) when the appliance is not being charged.

Active Standby:

Active standby is mostly applicable to VCRs and some stereo equipment where operating involves some mechanical drive (such as DVD and CD players). Active standby is when the appliance on but not performing its main function. For example, the VCR may be on but is not playing or recording. This mode also applies to power supplies for battery operated equipment (portable appliances) when the appliance is being charged (various sub-modes).

Delay Start:

Delay start mode was measured for the first time in the 2003/04 survey. This feature is fast becoming common place on many major appliances. Essentially the appliance can be programmed to begin functioning at a later time; in some cases up to 24 hours later. Appliances left in this mode are in neither active nor passive standby and therefore it was decided to measure this mode as a separate category. The effect this mode will have on consumption will largely be determined by consumer behaviour.

Aims & objectives

The Australian Greenhouse Office (AGO) and the National Appliance & Equipment Energy Efficiency Committee (NAEEEC) commissioned this research as part of its program to reduce the standby consumption of all electronic appliances to less than 1W. This research was primarily undertaken to monitor changes in standby power consumption with the results of previous annual surveys undertaken since 2001. The main objectives of this survey were to:

- Quantify the magnitude of electricity used in standby mode by new appliances offered for sale in the Australian market in November 2004 and May 2005
- Compare the results of this study with those from the three previous in store surveys in order to track the industry's progress in reducing standby power consumption.

This survey was done in two separate time blocks to ensure a broader range of appliances were included. This enabled the survey to include seasonal products such as heaters and air conditioners.

The survey also collects information on the sale price of appliances, allowing an analysis of standby power consumption in relation to the cost of the appliance, to determine if there is a relationship between poor standby performances and “budget” priced appliances.

The survey also records the presence of an Energy Rating label or an ENERGY STAR label on appliances. Products (excluding white goods) that displayed an ENERGY STAR label were cross examined to reveal if the ENERGY STAR requirements to display the label for that product type were met. For white goods, only the presence or absence of the Energy Rating label has been noted in the analysis as a more complex and rigorous testing procedure (that includes factors other than standby performance) is used when labelling such products.

Research Methods

Equipment and Preparation

The meter used for measuring most of the appliance’s energy usage was a Yokogawa¹ digital power analyser Model WT200. However, for a small number of appliances, where access was difficult, a smaller portable meter was used. (Sparmeter Model NZR 230)

Seven major Melbourne retail stores were approached to take part in the study. This allowed measurements of a large range of appliances, across a number of manufacturers to be taken. The metering device was systematically plugged into the floor stock across 43 appliances categories. This year some appliance categories were redefined and/or combined to better reflect the changes in the market. This particularly applied to products in the home theatre area where multi task products have become common place. Where products have been redefined these details are included about the results section of the report. Appliance brand and model number were recorded to prevent duplication of measurements. There was no selection process, with most of the available stock on display in the store being measured. The reasons for some appliances not being measured as part of this survey were as follows:

- Appliance power cord missing;
- European or US power cord;
- Appliance difficult to access without disturbing the store display (this was particularly the case for some home theatre displays, plasma TVs and computers and peripherals);

¹ Calibrated in February 2002. Fundamental power accuracy of 0.25%.

- Shop Fixture design does not allow access to power cords with out removing shelving and panels. (This seems to be more common with stores seeing this as an anti theft solution)
- No display model available at the time or only appliance casing displayed (not a working model);
- Appliance locked in cabinets for security reasons.
- Display appliances are hard wired or built in. (this was the case particularly for cooking and air conditioning appliances.

For each appliance, power consumption was measured while the appliance was in use, in standby (passive and/or active) and off, where applicable. Clearly for many appliances such as washing machines and dishwashers, it was impractical to measure the appliance in use. For most of these products there is an Australian Standard that adequately covers the ‘in use’ mode consumption.

For televisions power factor, crest factor and supply voltage information was also recorded during measurements.

Power factor traditionally means any phase shift between a sinusoidal voltage supply waveform and a sinusoidal current waveform (power factor is 1.0 when these are perfectly aligned). However, in the case of standby measurements where the current waveform is often distorted and non-sinusoidal in shape, the power factor is the ratio of the active power (Watts) to the average VA (volt-amps). The power factor is a measure of how much of the current is performing useful work (contributing to active power use). Values for power factor are low <0.5, moderate 0.5-0.8, high >0.8-1.0.

The crest factor is defined as the ratio of peak current to RMS current (or peak voltage to RMS voltage). For a pure sinusoidal wave shape the crest factor is 1.414, while for a pure constant DC load the crest factor is 1.0. The parameter of particular concern from a metering perspective for standby power is current and its waveform. During the measurement, it is critical that the crest factor available on the meter is greater than the actual crest factor of the load; otherwise the peak value of the current will be “lopped off”. Note that the current crest factors for standby loads are typically 3 and can be as high as 10 in some circumstances. Crest factor is a measure of the level of distortion of the current waveform (and the difficulty in performing an accurate power measurement). Values for crest factor are low <2.5, moderate 2.5-4, high >4.

As indicated in Table 1, appliances were measured in various combinations of in-use, in standby (passive or active, where applicable) and off mode. As previously mentioned it was not always practical to measure appliances in normal use during an in store survey. The modes measured for each product type reflect the design and operation of the product. While some products types will have passive or active standby modes (e.g. a dishwasher can be switched on prior to the start of a program – this would be passive standby), not all of these modes were measured or are relevant to this study.

Table 1 – A summary of modes tested by appliance

Appliance List	In Use	Active	Passive	Delay Start	Off
Air Conditioner				✓	✓
AV Receiver		✓	✓		✓
Breadmaker		✓			✓
Computers – Box					✓
Computers – Home Theatre Box					✓
Computers - Laptop					✓
Computers - Monitor				✓	✓
Computers - Speakers		✓			✓
Computers - Other		✓		✓	✓
Cook top					✓
Cordless Phone		✓	✓		
Dishwasher				✓	✓
Dryer				✓	✓
DVD Player		✓	✓		✓
DVD Recorder		✓	✓		✓
Espresso Machine					✓
Facsimile		✓			
Game Console		✓			✓
Gas Water Heaters					✓
Hand-held Vacuum		✓	✓		
Hard Disk Recorder		✓	✓		✓
Heater - Electric Portable			✓	✓	✓
Heater - Gas			✓	✓	✓
Home Entertainment Other		✓	✓		✓
Home Theatre Systems		✓	✓		✓
Juicer					✓
Microwave			✓		
Mobile Phone		✓	✓		
Modem		✓	✓		✓
Multi Function Device		✓			✓
Oven					✓
Printer – Inkjet			✓		✓
Printer – Laser			✓		✓
Range Hood					✓
Set Top Box		✓	✓		✓
Stereo - Integrated		✓	✓		✓
Stereo – Portable		✓	✓		✓
Stereo - Component		✓	✓		✓
Stove					✓
Subwoofer		✓	✓		✓
TV – LCD	✓		✓		✓
TV – Plasma	✓		✓		✓
TV – Projection	✓		✓		✓
TV – CRT	✓		✓		✓
TV/VCR	✓	✓	✓		✓
VCR		✓	✓		✓
Washer/Dryer				✓	✓
Washing Machine			✓	✓	✓
Mode tested		✓			

In total 1313 products were measured, resulting in 2404 measurements being recorded during the survey. These results were analysed and compared with outcomes from the in-store surveys carried out between 2001 and 2004 where possible.

Problems encountered during data collection

Not all products could be measured in all of the desired modes. For example, security reasons prevented many remote controls being displayed with items. As a result, appliances reliant on remote controls for operation into some modes were unable to be measured across all modes. This problem should be minimised in future surveys as a universal remote was trialled in last two days of the survey and was able to activate most home entertainment appliances tested. In some cases comparisons with previous surveys are not possible due to the changing market, for example, in 2003 individual stereo components were not found in retail outlets, having been replaced in the market by home theatre systems.

Other problematic appliances included stereo units, such as integrated stereo equipment, where active standby power varied depending on the part of the unit “waiting to be used”. For example, active standby could be higher for some units when a CD was present (but not playing) within the unit. To overcome the variation in standby measurements for integrated stereo equipment, measurements were taken in CD mode when the unit had finished searching for the disc. In most units a “No Disc” message was displayed. For integrated stereo equipment without a CD player, measurements were taken with the unit set to aux. Many appliances are no longer being made with an off mode.

Acknowledgements

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- The Good Guys, Airport West;
- Myer Mega Mart, Sunshine;
- Clive Peeters Braybrook;
- Retravision, Preston
- Betta Electrical, Broadmeadows
- Warehouse Sales, Braybrook

The study was coordinated by Melissa Damnics of EnergyConsult with support from Lloyd Harrington of Energy Efficient Strategies. Melissa Damnics and Debra Frey of

EnergyConsult were responsible for undertaking field measurements on appliances and the recording of data. Paul Ryan of EnergyConsult was responsible for setting up the data collection instrument used in the field and subsequent data analysis software. Paula Kleverlaan of EnergyConsult and Melissa Damnic were responsible for the preparation of the main report.

Notwithstanding the many individuals and organisations that have assisted during this project, the content and form of this report, and all of the views, conclusions and recommendations expressed in it, are those of EnergyConsult.

Results

Overview

The following 43 appliance types were tested during the 2004/05 in store survey:

- Air Conditioner
- Breadmaker
- Computers – Home Theatre Box
- Computers - Monitor
- Cook top
- Dishwasher
- DVD Player
- Espresso Machine
- Hand-held Vacuum
- Heater - Electric Portable
- Home Entertainment Other
- Juicer
- Multi Function Device
- Printer – Inkjet
- Range Hood
- Stereo - Integrated
- Stereo - Component
- Subwoofer
- TV – Plasma
- TV – CRT
- VCR
- Washing Machine
- AV Receiver
- Computers – Box
- Computers - Laptop
- Computers - Speakers
- Cordless Phone
- Dryer
- DVD Recorder
- Facsimile
- Hard Disk Recorder
- Heater - Gas
- Home Theatre Systems
- Microwave
- Oven
- Printer – Laser
- Set Top Box
- Stereo – Portable
- Stove
- TV – LCD
- TV – Projection
- TV/VCR
- Washer/Dryer

The following section details the results by appliance type.

Product Profiles

Major Appliances

Air Conditioners

A total of 33 air conditioner units were measured; 13 were window-wall models, and 18 were portable appliances. Most of the split system units found in stores were either hard wired or had 15 amp power plugs so only 2 units could be measured. Twelve of the portable units used evaporative cooling. Of the 12 window wall units, the 2 Split systems and 1 portable unit displayed an Energy Rating label.

Air conditioners were measured in off, passive and delay start mode. The majority of these appliances had a hard off switch on the unit, however 6 units had electronic controls with digital displays or clocks constantly displayed that meant passive standby was the lowest possible state. Six units had remote control operation while four had a delay start mode. The average power consumption in passive mode was 2.2W with a high of 4.9W and a low of zero. In off mode average consumption was 0.5W with 2.9W being the highest and 0.0W the lowest. Delay start consumption ranged from 0.8W to 2.9W with an average consumption of 2.1. The results for air conditioners are summarised in Table 2 below.

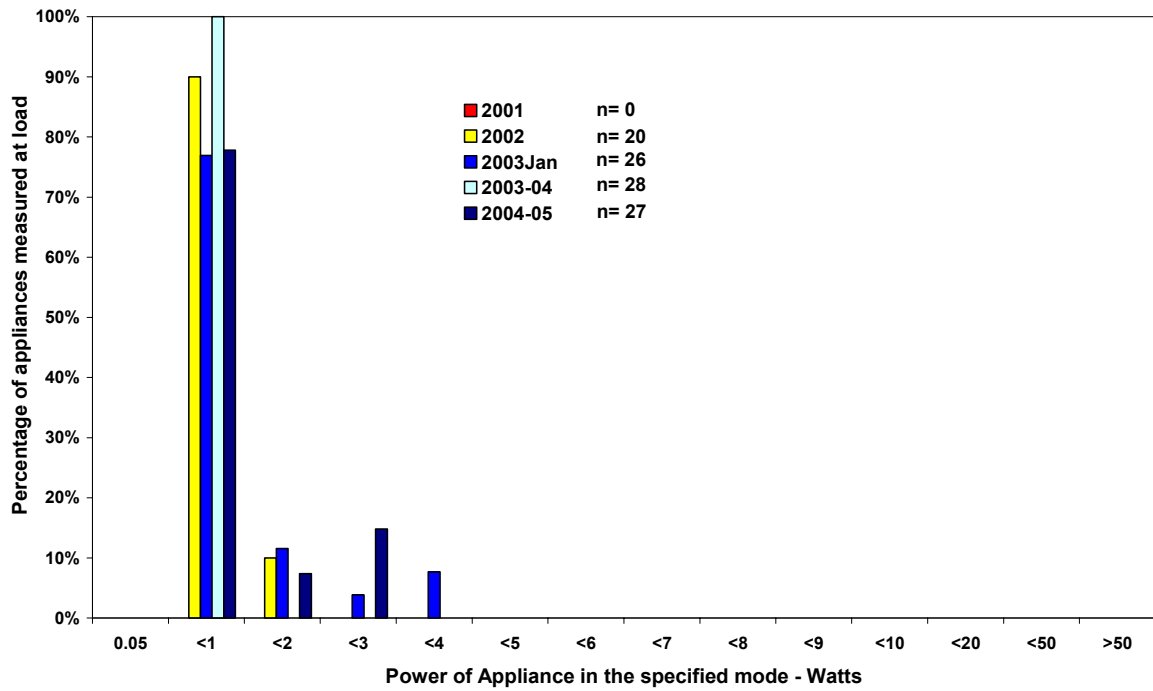
Table 2 – A summary of air conditioner results

Appliance:	Air Conditioner			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
Delay Start	4	2.1	2.9	0.8
Active	0	NA	NA	NA
Passive	8	2.2	4.9	0.0
Off	27	0.5	2.9	0.0
Total Number of Units	33			

Figure 1 and Figure 2 presents the data recorded for air conditioners during the annual surveys undertaken thus far. The 2004/05 data shows that an overwhelming majority of units still use less than 1W in off mode. However the decrease in consumption found in the last survey was not maintained this year.

The type of air conditioner appears to have no affect on consumption in off mode, although the highest consuming models were all refrigerated units. Air conditioners were not measured in the 2001 survey.

Figure 1 – Power measurements for air conditioners: off mode



Note: All histograms included in this report use the same bin definitions for the first bin, which indicates the number of units with no power consumption in the mode specified (i.e. equal to 0.0 Watts, or effectively less than 0.05 Watts in terms of metered data). Subsequent bins are labelled accordingly however it should be noted that some bin sizes are non linear.

Figure 2 – Average power measurements for air conditioners: off mode

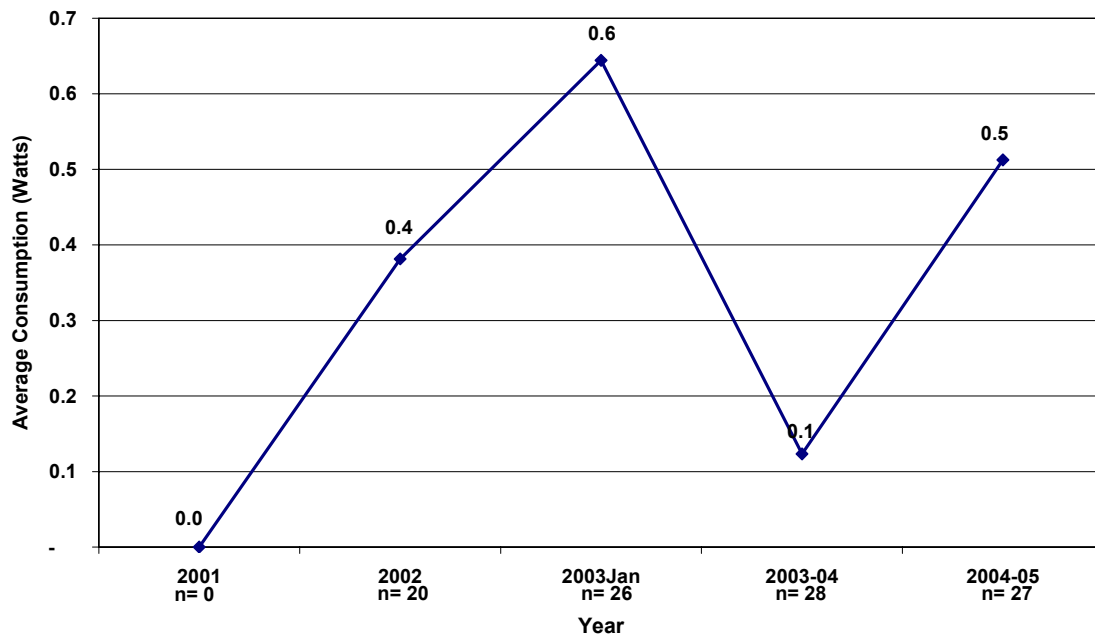
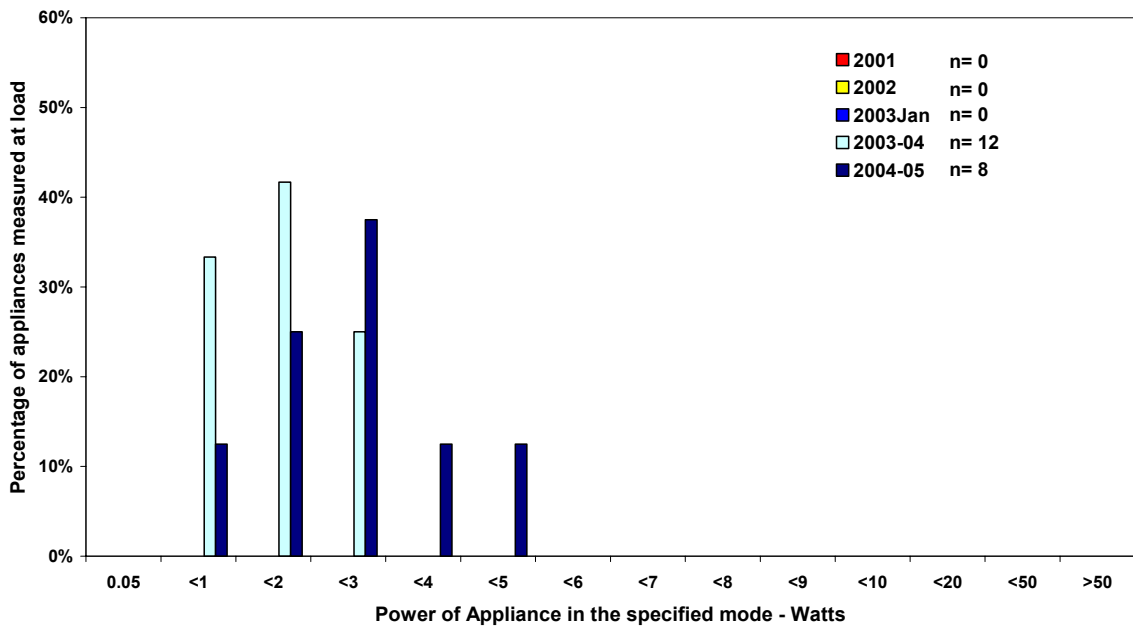


Figure 3 shows passive standby results have increased for air conditioners since the last store survey with average passive standby increasing from 1.5W to 2.2W. However due

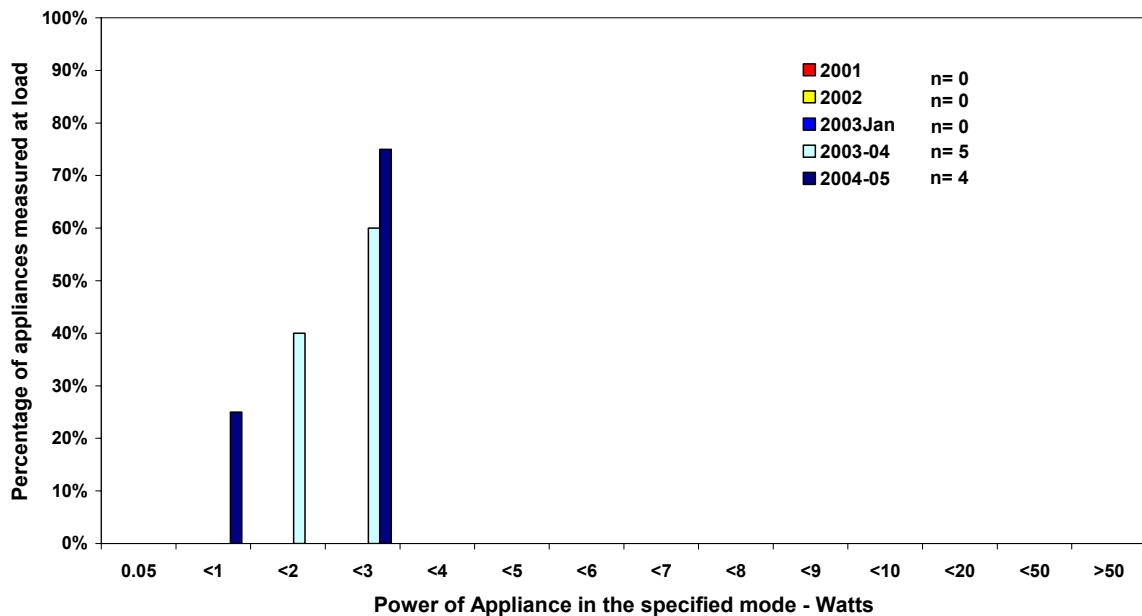
to the small sample size there is no statistical significance in this change. An important point to note regarding air conditioners is that the most popular type of air conditioners are split systems (many of this type use remote controls and will therefore have some standby) and almost all are “hard wired”, so in-store measurements were limited. Lab measurements (e.g. during energy labelling and MEPS tests) will be necessary to collect data.

Figure 3 – Power measurements for air conditioners: passive mode



Delay start mode remained stable with the average being 2.1W for both the years it has been measured. Again with small sample numbers (4 and 5 respectively) it is difficult to draw conclusions. These results are shown in Figure 4 below.

Figure 4 – Power measurements for air conditioners: delay start mode



Clothes Dryers

The survey measured 24 clothes dryers in total. All units displayed an Energy Rating label. This survey found only 17% (4) models had an on/off switch compared with 32%

(12) last survey. Two models had a delay start function. This allowed measurements to be taken in active standby, off and delay start mode.

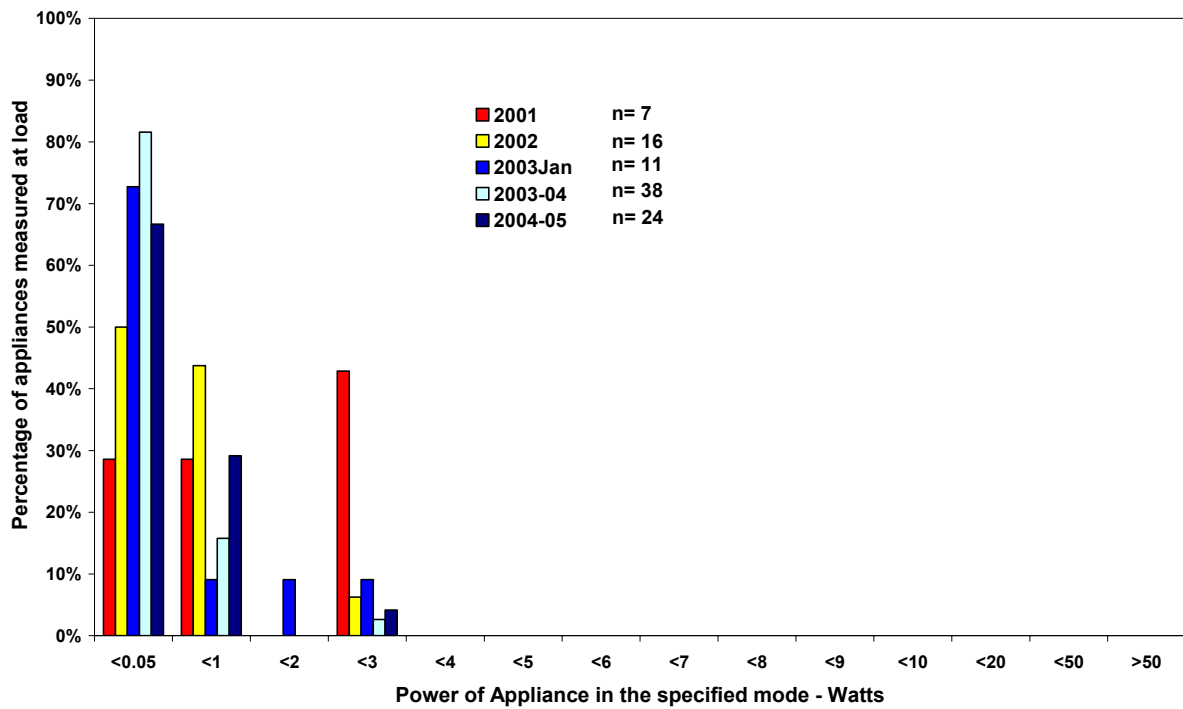
In active standby the average power consumption was 2.3W with a maximum of 4.1W and a low of 1.5W. The average power consumption in off mode was 0.2W with the maximum reading being 2.7W and the minimum zero. The two units with delay start function recorded consumption of 4.4W and 2.0W in this mode. Table 3 below summarises the results for clothes dryers.

Table 3 – A summary of clothes dryer results

Appliance:	Dryer			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
Delay Start	3	2.9	4.4	2
Active	4	2.3	4.1	1.5
Passive	NA	-	-	-
Off	24	0.2	2.7	0
Total Number of Units	24	NA	-	-

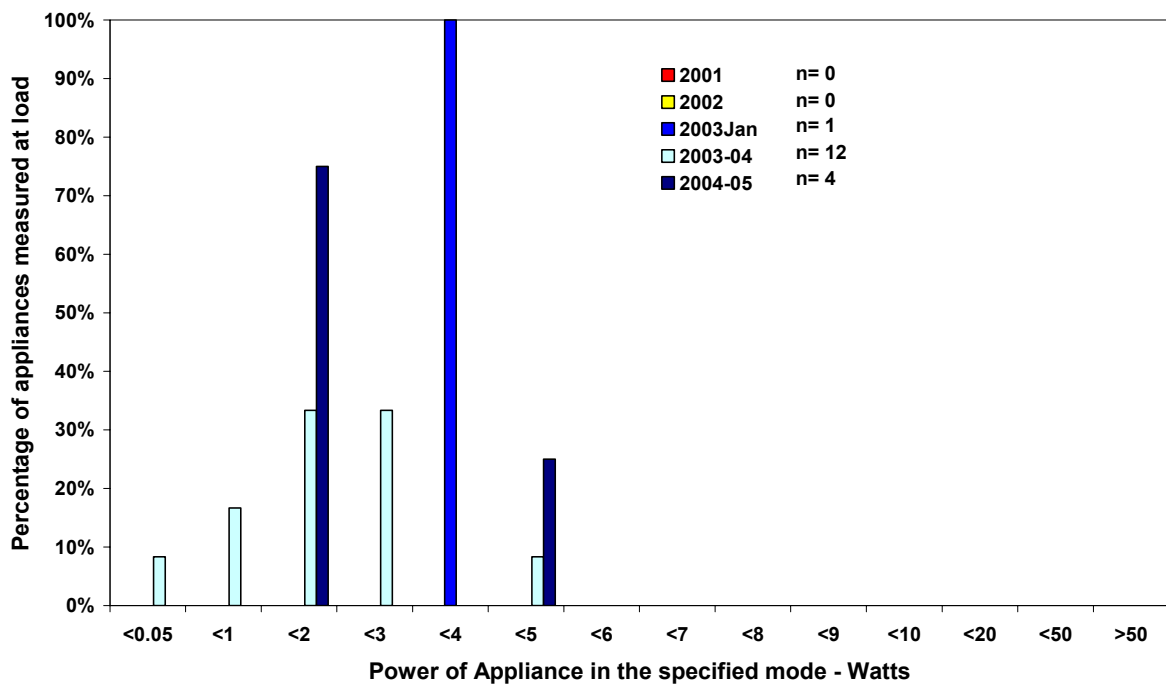
As presented in Figure 5 below the vast majority of clothes dryers consume less than 1W in off mode. 67% of units measured in 2004/05 consume zero energy when in off mode and for the second year in a row only one model consumed greater than 1W. While the percentage of products consuming zero is lower than previous 3 years the range of results over the five surveys has been almost identical, with 0.0W being the minimum and the maximum consumption ranging from 2.5W to 2.9W. It would seem that the trend of decreasing standby consumption has stabilised.

Figure 5 – Power measurements for clothes dryers: off mode



Only 4 clothes dryers with on/off controls were found this survey compared with 12 last survey. This may be due to many of the models being displayed in under the bench cabinets with no access to plugs; hence we were unable to measure them during the survey. Whilst the small sample size limits comparison of active standby the models all fell within the upper and lower limits of last years survey. Figure 6 shows the distribution of clothes dryers in active standby.

Figure 6 – Power measurements for clothes dryers: active standby mode



Clothes Washer/Dryers

Clothes washer-dryers are units that are capable of both washing and drying clothes in single or separate cycles. A total of 2 washer-dryers from different manufacturers were tested in this survey and both displayed Energy Rating labels. The two models were front loaders with a power on/off switch; one had a delay start function. They were tested in off, active standby and delay start mode. One machine had manual controls and recorded less than 1W power consumption in both off and active standby mode. The other model recorded much higher readings with 3.9W in off; 8.8W in active and 8.4W in delay start. A summary of these results can be found in Table 4.

Table 4 – A summary of clothes washer/dryer results

Appliance: Mode	Washer/Dryer		Power Max	Power Min
	Number of Measurements	Average Power (W)		
Delay Start	1	8.4	8.4	8.4
Active	2	4.7	8.8	0.6
Passive	0	NA		
Off	2	2.0	3.9	0.2
Total Number of Units	2			

Dishwashers

During the survey 52 dishwashers were measured. Eight models were found not to have an Energy Rating label displayed. The operating controls on the dishwashers varied, with some having mechanical dials while others had soft touch electronic controls. Over a quarter of units (27%) did not have a power on/off button and 13 models were identified as having a delay start function.

These appliances were measured in delay start, active standby and off mode. Power consumption in delay start ranged from 1.4W to 8.4W, with the average being 2.9W. The consumption range for dishwashers in active standby was quite wide with the minimum 0.4W and the maximum 8.1W averaging out at 2.6W. In off mode consumption was mostly below 1W with average consumption of 0.4W. Table 5, below summarises the in store results for dishwashers.

Table 5 – A summary of dishwasher results

Appliance:	Dishwasher			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
Delay Start	13	2.9	8.4	1.4
Active	38	2.6	8.1	0.4
Passive	0	NA	-	-
Off	52	0.4	2.8	0.0
Total Number of Units	50			

Figure 7 demonstrates that 89% of dishwashers in the 2004/05 survey consumed less than 1W maintaining the improvement gained in 2003/04. Average consumption was also maintained at 0.4W in 2004/05. Average consumption data is presented in Figure 8.

Figure 7 – Power measurements for dishwashers: off mode

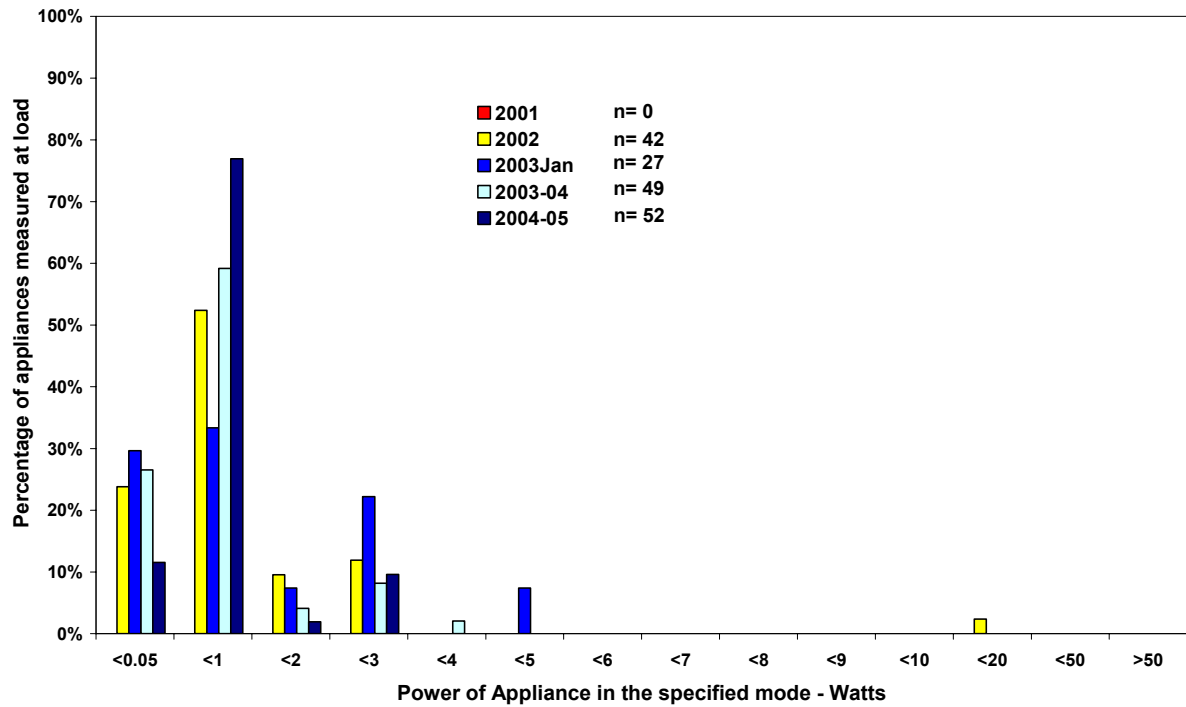
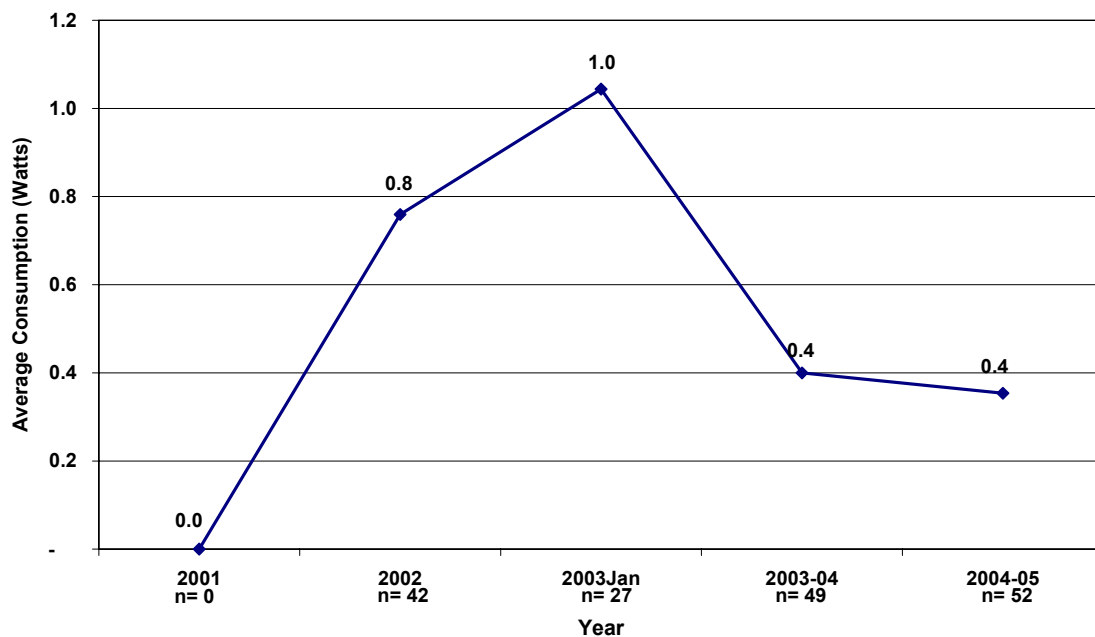


Figure 8 – Average power measurements for dishwashers: off mode



Active standby remained relatively stable in 2004/05. Average standby decreased marginally from 3W to 2.6W and the distribution being similar between the two years. Delay start mode was also stable with the distribution range being almost identical across the last two surveys. However the average delay start consumption dropped over half a watt from 3.6W in 2003/04 to 2.9W in 2004/05. These results are presented in Figure 9 and Figure 10.

Figure 9 – Power measurements for dishwashers: active standby mode

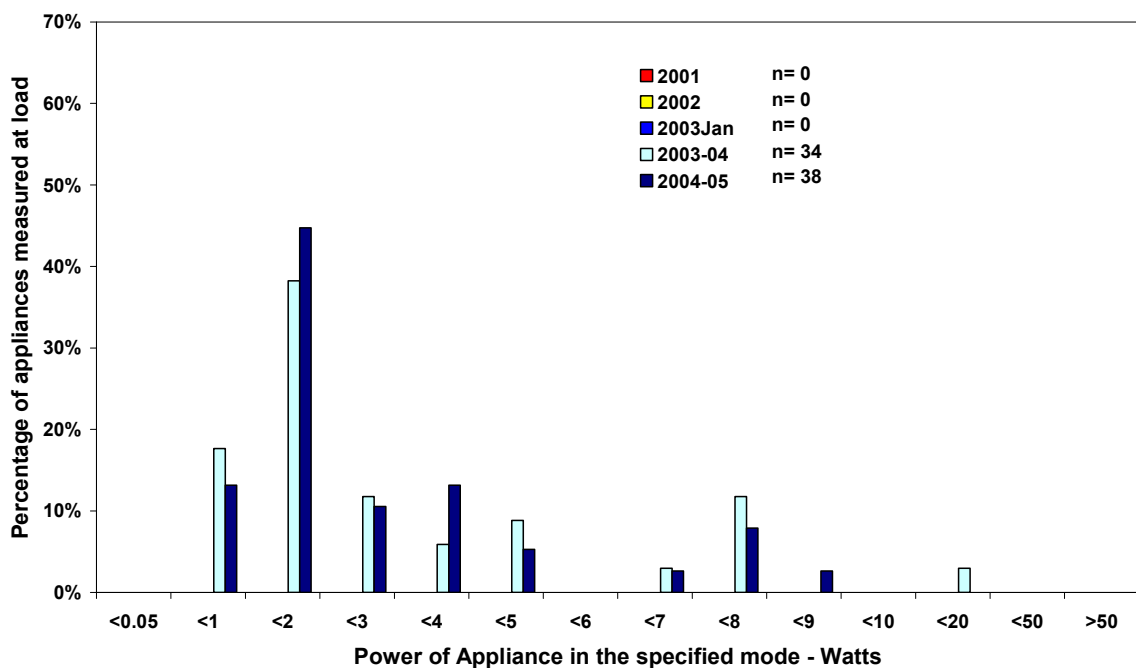
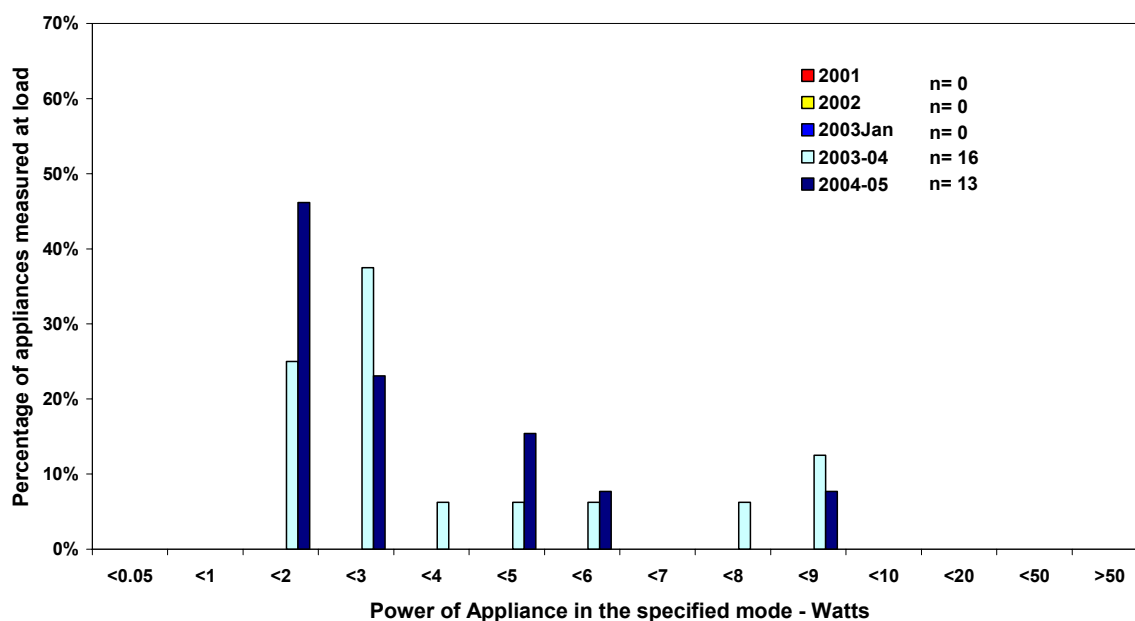


Figure 10 – Power measurements for dishwashers: delay start mode



Washing Machines

The washing machine category includes both top loading models and front-loading machines. The machines varied in their rated capacity and most machines had power on/off switches. Nearly half of the units surveyed offered the delay start mode. All models displayed an Energy Rating label.

In total, 82 washing machines were tested in the store survey. All machines were measured in off mode. Those models with an on/off switch and delay start function were measured in active standby and delay start mode as well. In active mode the average consumption was 3.0W with most machines (72%) consuming between 1W and 4W, which is lower than last survey. In off mode the range of consumption was 0W to 4.7W with an average consumption of 0.9W. While there was no common link between consumption and electronic controls in this mode, all the highest consuming models did have electronic rather than manual dials. Delay Start consumption ranged from 0.9W to 8.3W with an average of 4.0W. For a summary of these results see Table 6.

Table 6 – A summary of washing machine results

Appliance:	Washing machine			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
Delay Start	28	4.0	8.3	0.9
Active	58	3.0	8.7	0.0
Passive	NA	-	-	-
Off	82	0.9	4.7	0.0
Total Number of Units	82			

The results for active standby mode are displayed in Figure 11 and Figure 12 and indicate this mode to be stable with average consumption at 3.2W in 2003 and 3.5W in 2003/04 and 3W in 2004/05.

Figure 11 – Power measurements for washing machines: active mode

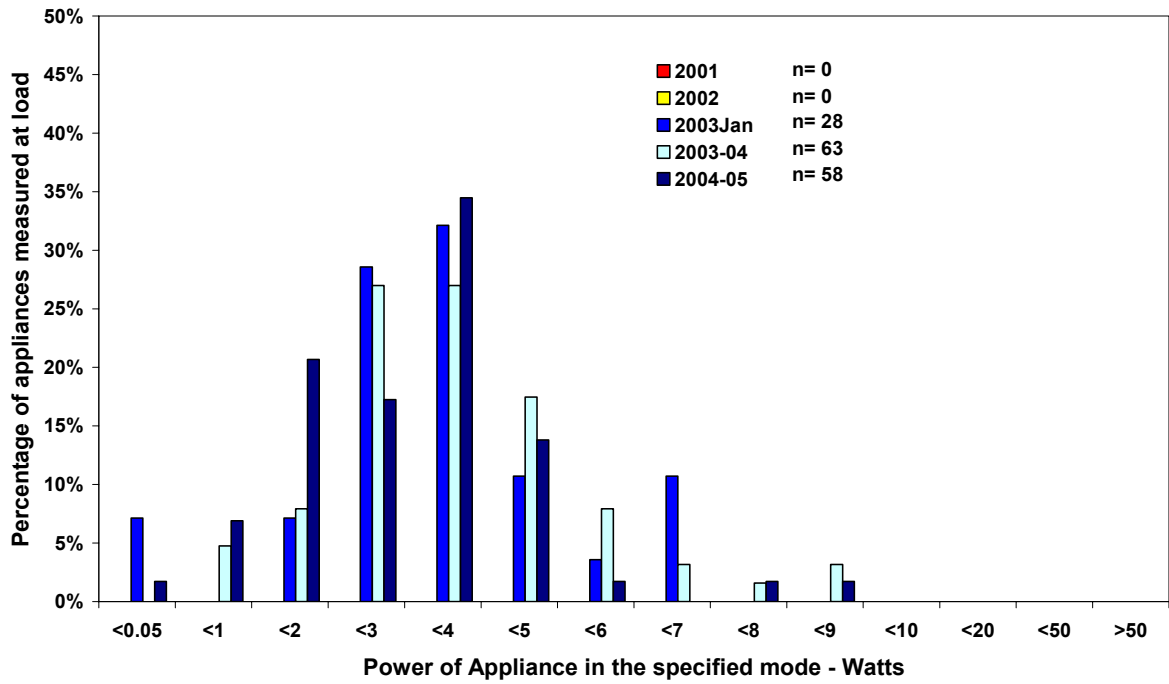
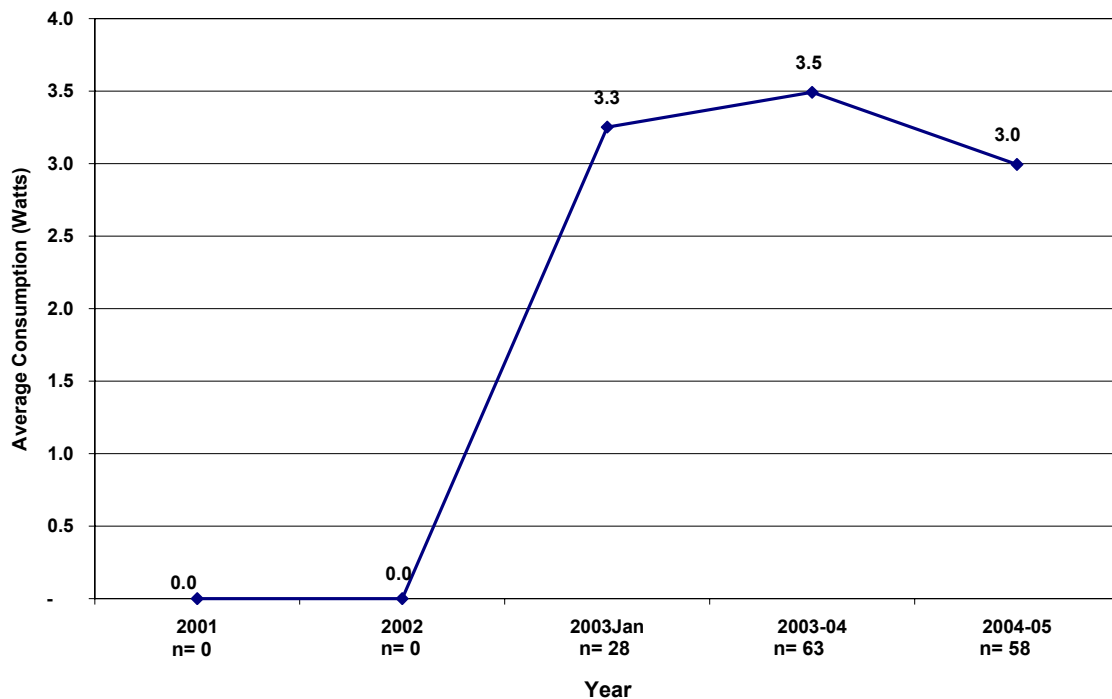


Figure 12 – Average power measurements for Washing Machines: Active Standby mode



As demonstrated in Figure 13, most (59%) washing machines in 2003/04 consumed less than 1W when in off mode, which is down from the previous survey (70%). The proportion of models recording zero consumption decreased for the first time with only 35% having no consumption in off compared to last years high of 54%. However the distribution range of readings has not changed with no models consuming more than 5W and these results do not represent a statistically significant change.

A comparison of the average power consumption of washing machines indicates that average off mode consumption has reduced from 1.7W in 2002 to 0.9W in 2004/05. (see Figure 14) This result is statistically significant² indicating that the decrease in standby consumption observed from the 2001 data has continued. The type of washing machine i.e. front loader versus top loader seemed to make no impact on the consumption results. However it should be noted that front loader sales are around 20% of total sales yet front loaders made up 33% of the 2004/05 sample.

² Throughout this report, significance has been tested at 95%.

Figure 13 – Power measurements for washing machines: off mode

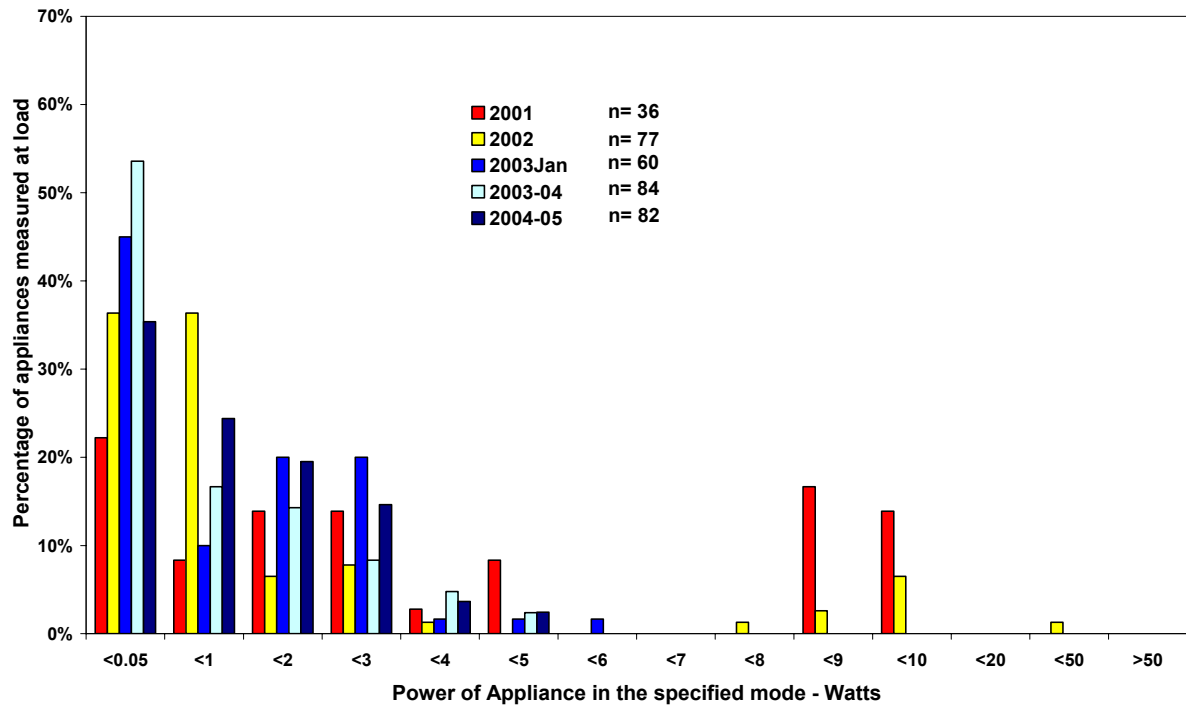
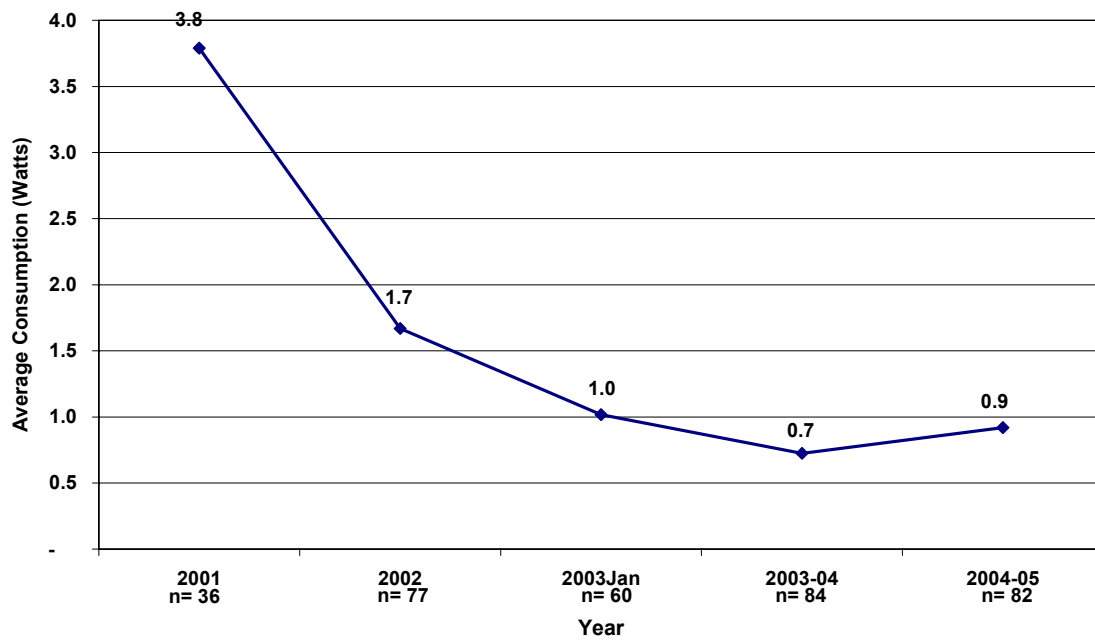
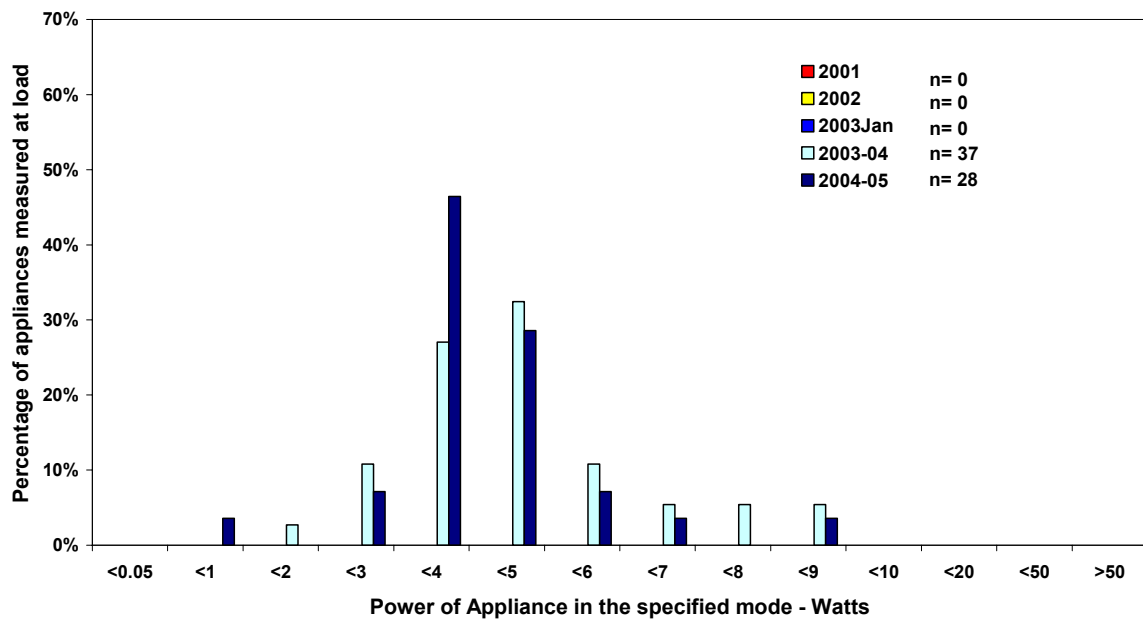


Figure 14 – Average power measurements for washing machines: off mode



In delay start mode there was an increase in the number of lines using less than 4W in the 2004/05 survey. However the distribution range remained the same as the 2003/04. Results are presented in Figure 15 below.

Figure 15 – Power measurements for washing machines: delay start mode



Cook Tops

Often also referred to as a hot plate or a hob, cook tops are available in gas or electric with varying number of burners. Gas cook tops use electricity for ignition and/or clock functions. All 26 appliances measured were gas and had between two and five burners. None had a clock function. Cook tops were measured in off mode and as in 2003/04 no consumption was recorded for any model. Table 7 presents these results.

Table 7 – A summary of cook top results

Appliance:	Cook Tops			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	NA	-	-	-
Off	0	0.0	0.0	0.0
Total Number of Units	26			

Ovens

An oven refers to either a gas or electric oven that has no cook top burners. Gas ovens use electricity for ignition, fan, and/or clock functions. Ovens varied in size and were both fan-forced and conventional. Five ovens were measured in off mode; all were electric. All had the fan forced function available and four models had clocks. One oven also had a built in microwave function. The ovens average consumption in off mode was

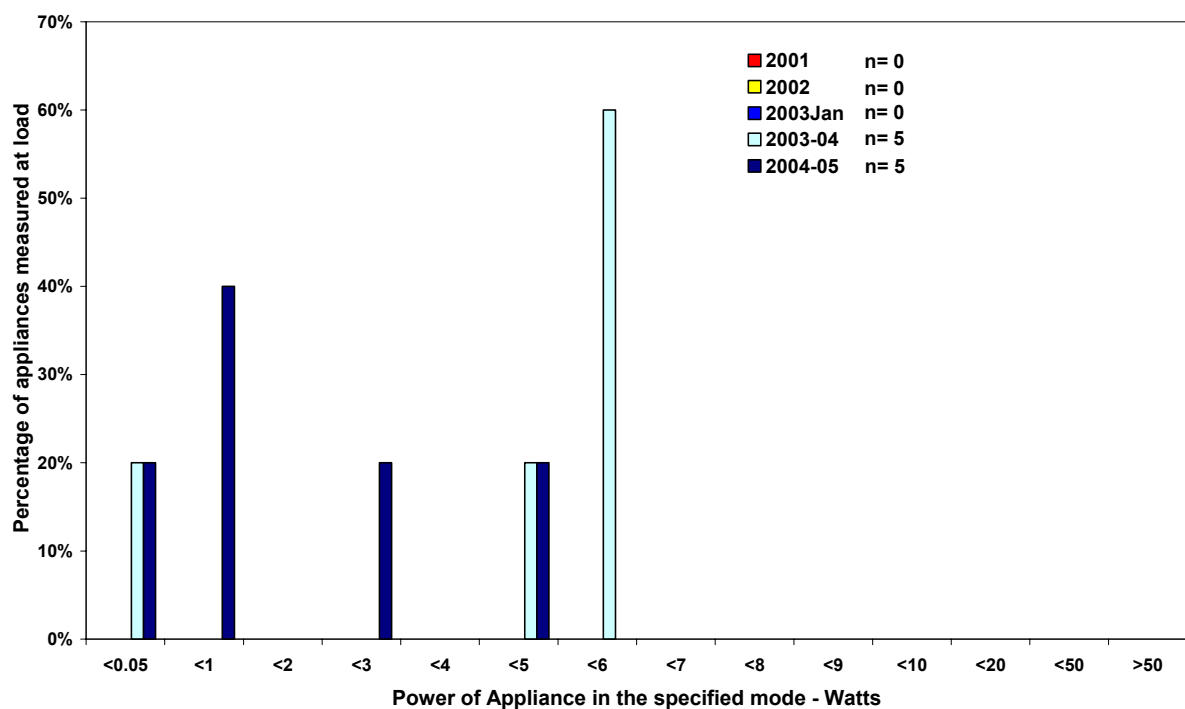
1.8W, with a maximum of 4.8W. One oven had zero consumption. Results for ovens are summarised in Table 8.

Table 8 – A summary of oven results

Appliance:	Oven			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	NA	-	-	-
Off	5	1.8	4.8	0.0
Total Number of Units	5			

The average standby of 1.8W recorded in 2004/05 is much lower than the 4.3W recorded in 2003/04 however given that both surveys found only 5 ovens to measure little can be drawn from these results. Both surveys found that ovens consumed between 0W and 6W in off mode. Figure 16 presents this data.

Figure 16 – Power measurements for ovens: off mode



Stoves

A stove refers to an appliance that combines both an oven and a cook top in the one unit. Stoves can be either gas or electric and use electricity for ignition, fan, and/or clock functions. Stoves were measured for the first time in the 2003/04 survey. Eight Stoves were measured in off mode; and all had gas cook tops. Five models had gas oven while

three had electric ovens. Two of the eight models featured a clock. The stoves' average consumption in off mode was 0.0W. Results for stoves are summarised in Table 9.

Table 9 – A summary of stove results

Appliance:	Stove			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	NA	-	-	-
Off	8	0.0	0.0	0.0
Total Number of Units	8			

Range Hoods

A range hood is an extraction fan designed to remove steam and odours from above a cook top or stove. Range hoods can be operated by buttons (manual or electronic) or will automatically start when the hood is opened. Range hoods were measured for the first time in the 2003/04 survey. Twenty three range hoods were measured in off mode only. The range hoods average consumption in off mode was 0.1W, with a maximum of 2.4W. Only one range hood measured a consumption level greater than zero. Results for range hoods are summarised in Table 10.

Table 10 – A summary of range hood results

Appliance:	Range Hood			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	NA	-	-	-
Off	23	0.1	2.4	0.0
Total Number of Units	23			

Heaters – Electric Portable

A portable electric heater is an appliance that is plugged in rather than hard wired and therefore can be easily moved. Appliances in this category included fan or blow heaters, radiant heaters and fan assisted radiant heaters. Heaters were measured in delay start mode where applicable, passive standby and off mode. Portable electric heaters were measured for the first time in the 2003/04 survey. A total of 64 heaters were measured and 61 had off mode. While over 70% of heaters had zero consumption, the maximum recorded was 2.1W. No models measured had delay start function. Results for portable electric heaters are summarised in Table 11.

Table 11 – A summary of Heaters – electric portable results

Appliance:	Heaters – electric portable			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
Delay Start	0	-	-	-
Active	NA	-	-	-
Passive	7	1.5	2.3	0.6
Off	61	0.5	2.1	0.0
Total Number of Units	64			

Heaters - Gas

In the 2003/04 survey gas space heaters were measured for the first time. Electricity is used in gas heaters for the operation of fans and/or ignition and/or electronic controls. Heaters were measured in passive standby, delay start and off mode. Only 2 heaters were measured in this year's survey. In off mode one model had a maximum of 13.3W, although it was not possible to determine if this was in fact delay start mode as the passive standby for this unit was recorded at being significantly lower at 6.4W. Gas heater results are summarised in Table 12.

Table 12 – A summary of Heaters – gas results

Appliance:	Heaters – gas			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
Delay Start	0	-	-	-
Active	NA	-	-	-
Passive	1	6.4	6.4	6.4
Off	2	6.7	13.3	0.0
Total Number of Units	2			

Gas Water Heaters

While in the 2003/04 survey, gas hot water units were measured for the first time, no gas hot water units were measured in the 2005 survey. Electricity is used in gas water heaters for ignition and/or electronic controls and water heaters in 2003/04 were measured in off mode. Gas water heaters will still be measured in forthcoming surveys to monitor standby power usage.

Small Appliances

Breadmakers

Most breadmakers when switched on are in active standby as a display is lit up and the machine is awaiting instructions from the user. In this survey no units were found to have a power on/off button and as such the units were measured in active standby mode only. The average power used by breadmakers in active standby mode was 1.8W with a

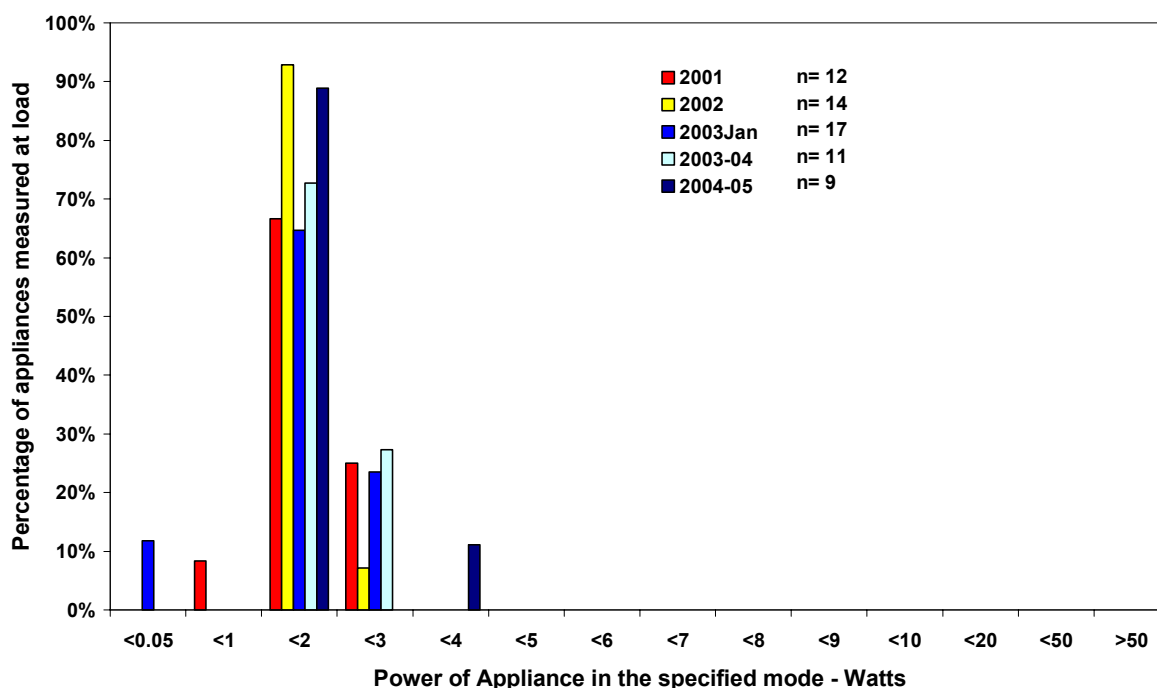
low of 1.2W and a high of 3.6W. The results have been similar for the last four surveys. Table 13 below summarises the results for breadmakers.

Table 13 – A summary of breadmaker results

Appliance:	Breadmaker			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	0	NA	-	-
Active	9	1.8	3.6	1.2
Passive	0	NA	-	-
Off	0	NA	-	-
Total Number of Units	9			

With a very small sample size, it is difficult to predict trends with any certainty; however Figure 17 indicates that power consumption for breadmakers in active standby is relatively stable with most consuming less than 2W.

Figure 17 – Power measurements for breadmakers: active standby mode



Hand-held Vacuum cleaners

A total of 9 hand-held vacuum cleaners were measured during the in-store survey. The most obvious differences that exist between models are based on size and whether the unit can vacuum wet as well as dry. The hand-held vacuum cleaners were measured in active standby, that is, plugged in and charging, and in passive standby, with the base station plugged in but not charging the portable unit. When in passive standby the units

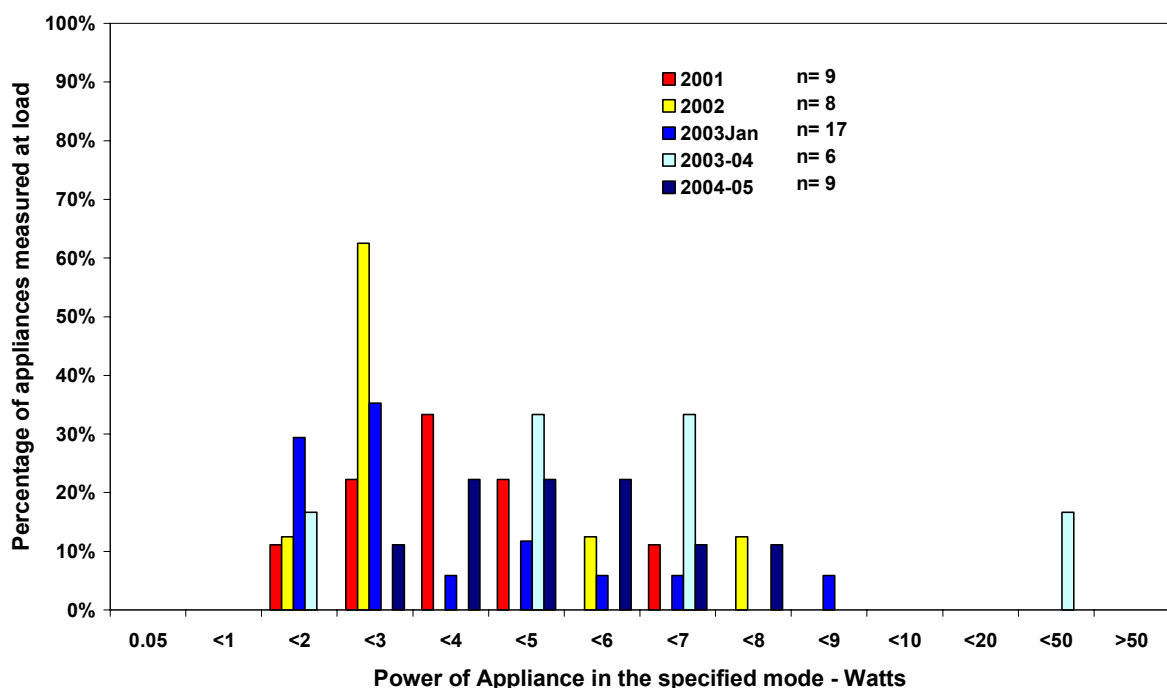
recorded an average power consumption of 1.3W with a low of 0.7W and a high of 2.0W (standing losses of the low voltage power supply – typically a transformer). These results are summarised below in Table 14.

Table 14 – A summary of hand-held vacuum cleaner results

Appliance:	Hand-held Vac			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	0	NA	-	-
Active	9	4.9	7.9	2.7
Passive	9	1.3	2.0	0.7
Off	0	NA	-	-
Total Number of Units	9			

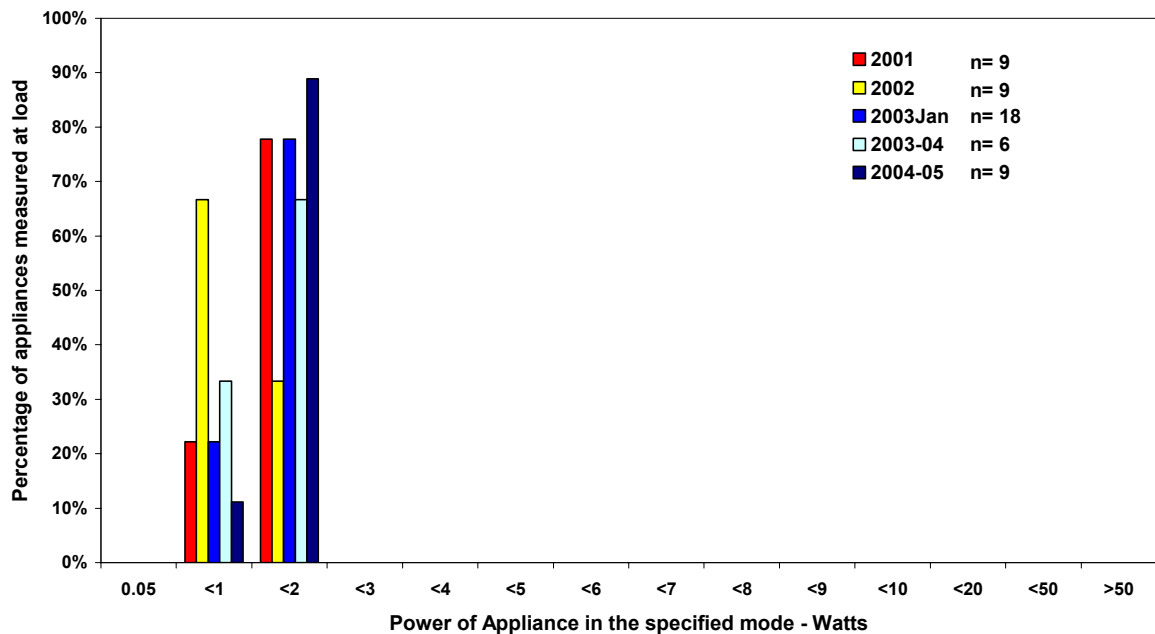
Figure 18 below shows the distribution of measurements for hand-held vacuum cleaners in active standby mode for the past 5 surveys. The graph demonstrates that there is a fairly large variation in active standby measurements for hand-held vacuums from around 1W to 8W and this variation is noted over the past 5 years.

Figure 18 – Power measurements for hand-held vacuum cleaners: active standby mode



In passive standby mode, all hand-held vacuum cleaners consumed less than 2W and this is consistent over the years as shown in Figure 19 below. Average passive standby for each of the years has also remained stable at around 1.0W.

Figure 19 – Power measurements for hand-held vacuum cleaners: passive standby mode



Microwave Ovens

The majority of microwave ovens measured in the surveys have a digital clock display and electronic controls. A very small number rely totally on mechanical controls (only two unit in this year's sample). The microwaves varied in size and included both combined convection/microwave and microwave only models.

Microwave ovens were measured in passive mode only (even though strictly models with mechanical controls should be classified as off mode). As demonstrated below in Table 15 the average power measured for microwaves was 3.0W with a minimum of 0.1W and a maximum of 5.6W.

Table 15 – A summary of microwave results

Appliance:	Microwave			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	60	3.0	5.6	0.1
Off	NA	-	-	-
Total Number of Units	60			

Figure 20 shows the distribution of average passive standby power measurements taken over the past five surveys. Some slight improvement in the number of measurements at the higher end (more than 5W) is visible.

Figure 20 – Power measurements for microwaves: passive standby mode

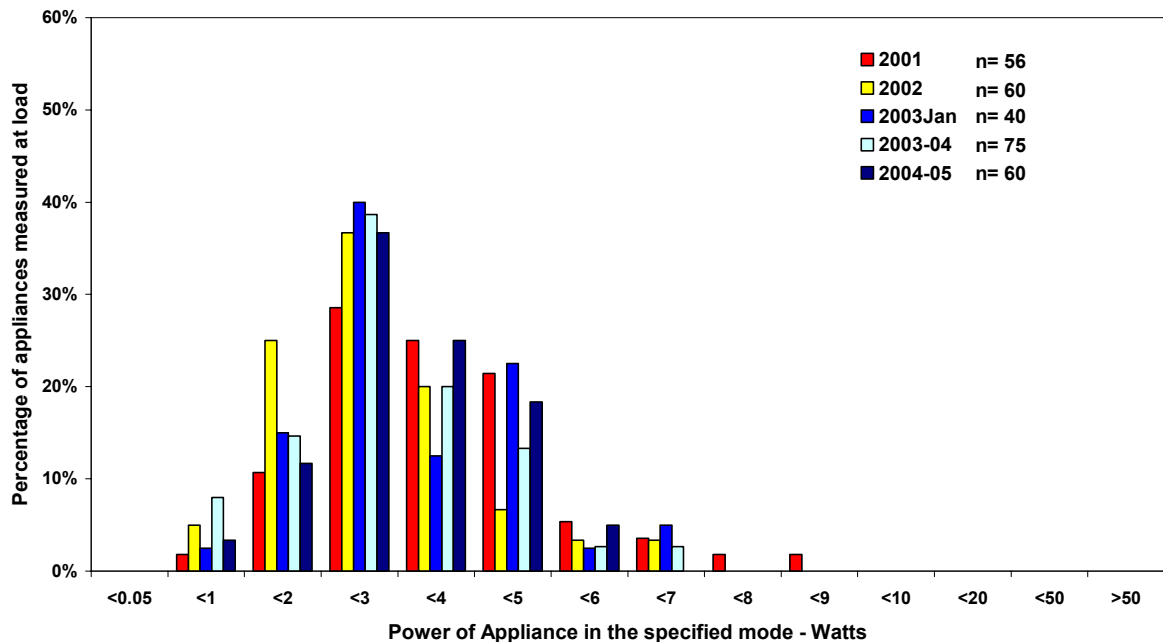
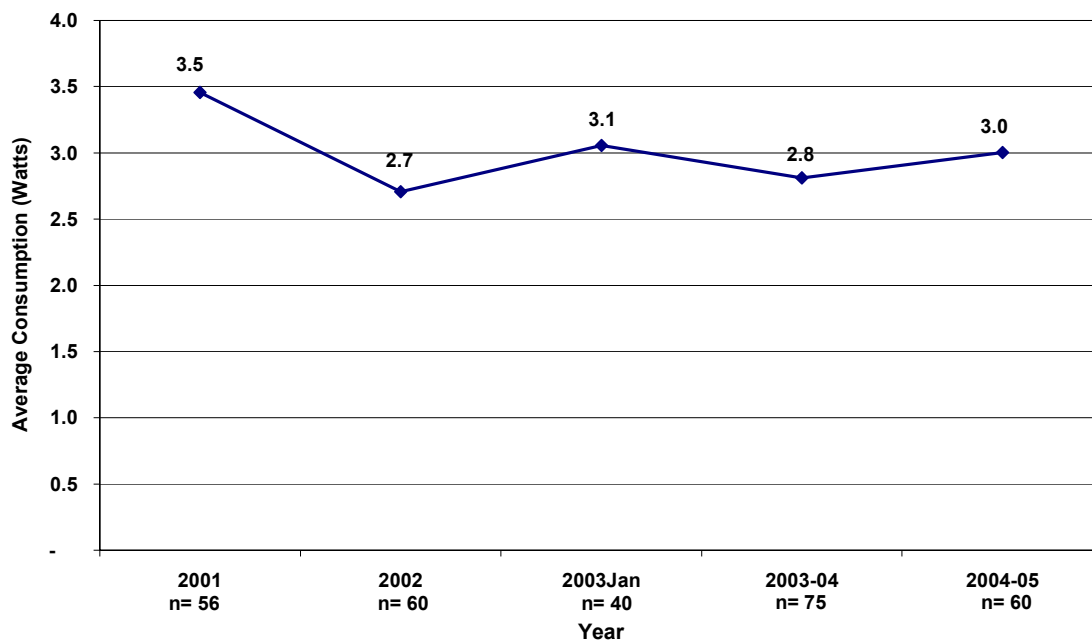


Figure 21 shows the average power consumption for microwaves in passive standby. The last three surveys suggested that passive standby for microwaves was trending downwards although Figure 21 shows that this may not be the case. While the average passive standby was 3.5W in 2001, in 2004/2005, this had decreased to 3.0W. The difference is not statistically significant indicating that passive standby consumption has not improved for this product.

Figure 21 – Average power measurements for microwaves: passive standby mode



Espresso Machines

Espresso machines were first measured in January 2003. Thirty one espresso machines were measured in the 2004/05 survey including both a mixture of pump operated and steam operated machines. Units were measured in off mode with 31 machines measuring an average 0.8W. Results ranged from a minimum of zero and a maximum of 4.4W. See Table 16 below for more details. A variety of machine types were measured with some that were fully automatic (brewing coffee and frothing milk, 20%) and some that required pre-portioned coffee to be used (10%). The majority (70%) were manual operated machines which requires the user to brew the coffee and froth the milk. Table 16 presents a summary of the results.

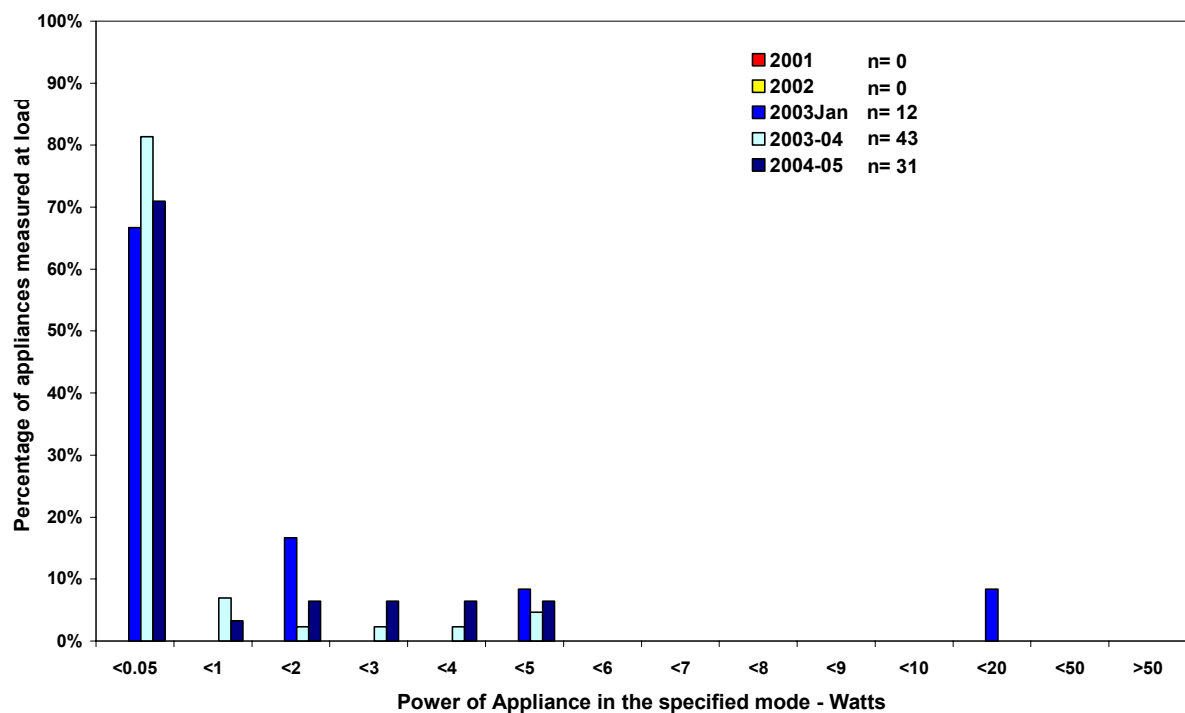
Machines were not measured in active standby due to the cyclic nature of the machines in this mode. In active standby, all machines consume a great deal of energy. Most machines use this mode to heat the machine to its optimum operating temperature and then perform a power on, power down cycle to maintain the temperature. As the length of the cycle varies for each machine, measuring this mode in stores cannot provide a reliable indication of the active power consumption of this product.

Table 16 – A summary of espresso machine results

Appliance:	Espresso Machine			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	0	NA	-	-
Active	0	NA	-	-
Passive	0	NA	-	-
Off	31	0.8	4.4	0.0
Total Number of Units	31			

Figure 22 below demonstrates that the overwhelming majority of machines have no consumption in off mode, although a few units still consume power in this mode. There is no correlation between brand type and consumption of power in off mode.

Figure 22 – Power measurements for Espresso Machines in off mode



Multi Function Device

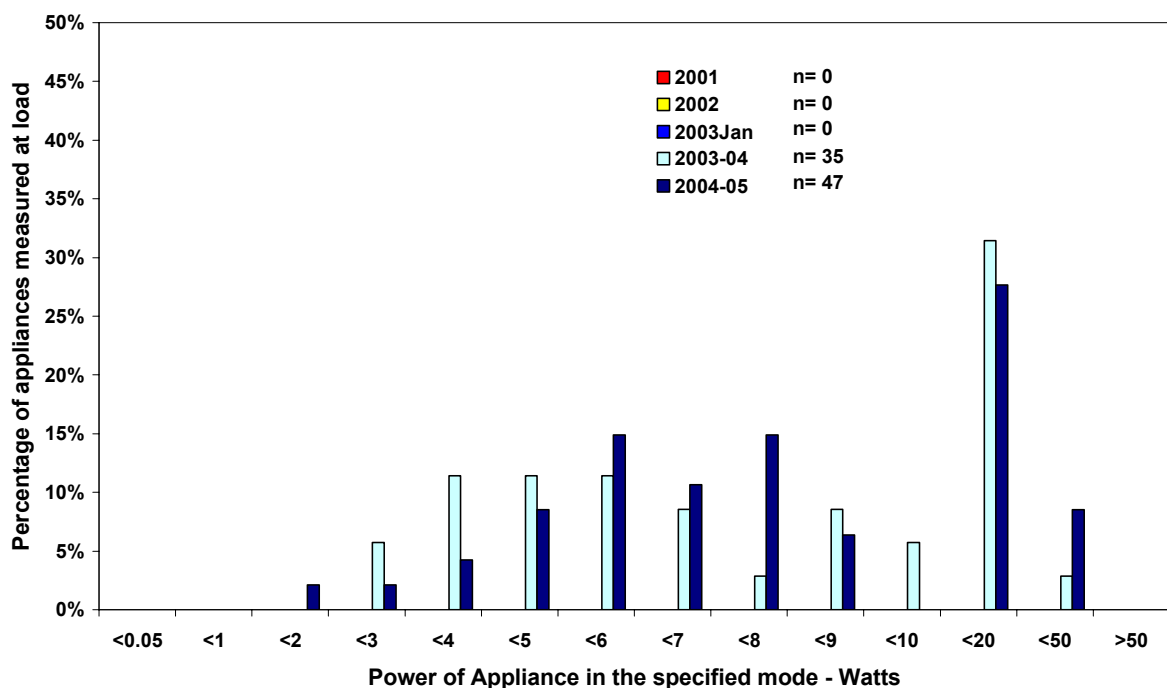
A multi function device (MFD) is a piece of equipment that can perform a variety of office tasks. These may include any combination of the following: telephone, facsimile, printer, photocopier, email, scanner, and answering machine. The 2003/04 survey was the first time MFD's have been measured. These appliances were measured in active mode as this is the lowest possible state for many models (especially those with telephone function). Where appropriate the units were also measured in off mode.

Forty seven MFD's were measured in the 2004/05 survey. They consisted of six different combinations of functions with copier, printer fax the most common. However function appeared to have no impact on consumption. In active mode the average consumption was 9.8W with a minimum of 1.2W and a maximum of 25.7W. Figure 23 shows the distribution of measurements. As demonstrated in Table 17, twenty six units were measured in off with an average consumption of 4.5W.

Table 17 – A summary of multi function device results

Appliance:	Multi Function Device			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	47	9.8	25.7	1.2
Passive	NA	-	-	-
Off	26	4.5	15.5	0.0
Total Number of Units	47			

Figure 23 – Power measurements for Multi-function Devices in Active Standby



Other Small Appliances

Four other small appliance groups were measured (2 for the first time) but have not been reported on individually due to lack of results. One cordless phone was measured with an active standby measurement of 1.1W. Only 1 facsimile machine was found in 2004/05 registering 8.8W in active. Three juicer machines were measured as these products were being promoted in stores as the new appliance to own. In off mode, two of these items

had consumption, both being less than 1W. Additionally fans were measured for the first time to assess if standby was present recorded at 1W and 1.3W. No consumption was found in off mode.

Computers and Peripherals

Computers - Hard Drive/CPU Box

A total of 16 computers were included in the 2004/2005 store survey. The measurements included only the hard drive/CPU box with peripherals such as monitors and printers measured separately. As in the previous survey, none of the products measured displayed an ENERGY STAR label. Portable/laptops were measured separately and are reported on in the following section.

Computers were measured in off mode only with one exception: One model was recorded as passive because it had a constant visual display including clock built in. Generally active and passive operating modes are not recorded for computers as they are complex and are dependent on hardware and software settings. In addition, these modes are adequately covered by existing standby related programs such as ENERGY STAR.

The average off mode power consumption was 2.0W with the highest consuming unit using 3.1W and the lowest using 0.0W. These results are summarised in Table 18 below.

Table 18 – A summary of Hard Drive/CPU Box results

Appliance:	Computers - Box			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	1	2.2	2.2	2.2
Off	16	2.0	3.1	0.0
Total Number of Units	16			

As illustrated in Figure 24, the majority of computers consume between 2W and 5W in off mode.

Figure 24 – Power measurements for computers: off mode

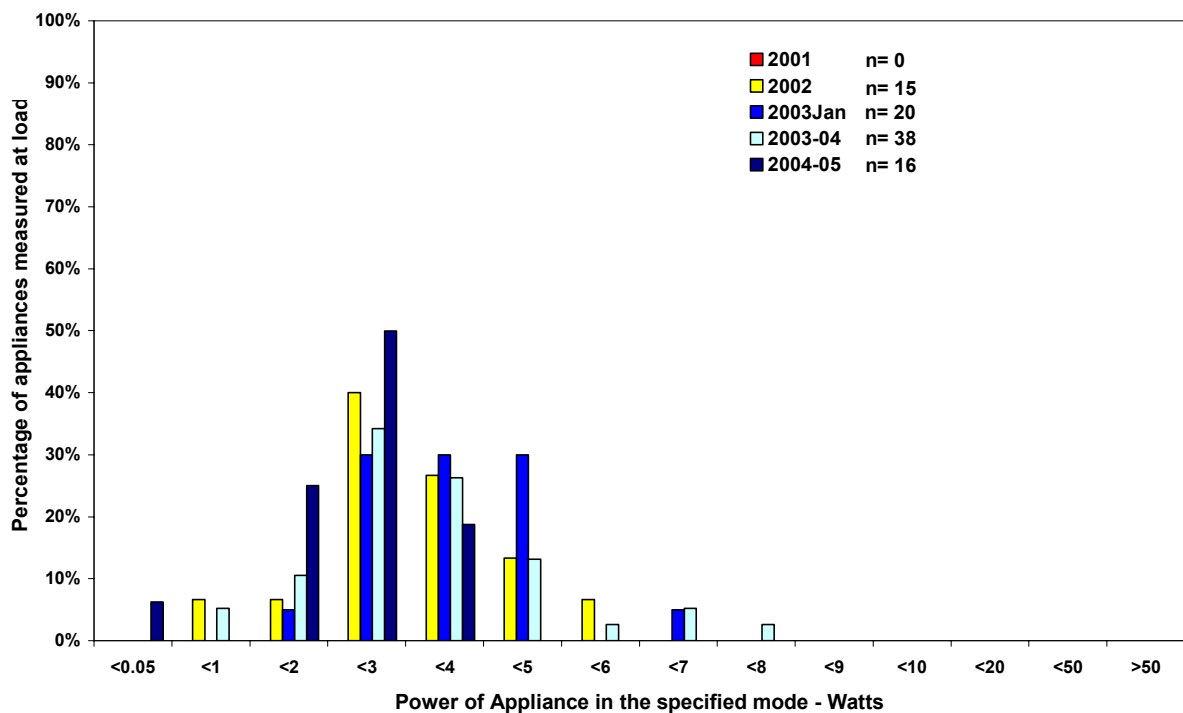
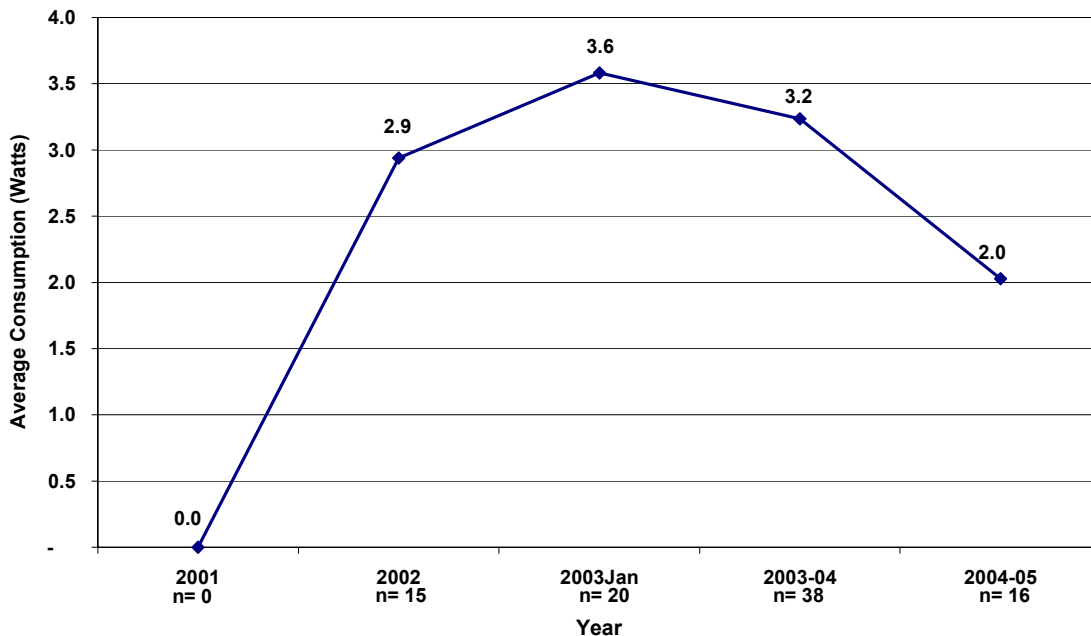


Figure 25 shows the average measurements for computers in off. While the average consumption appears to be declining compared to the 2003 average, the data from the 2003 survey contained a larger proportion of models at the high end with one model recording more than 7W. As such, the average for that year will be slightly skewed. However, average results do indicate a positive trend for computers in that standby consumption in off appears to be declining. Furthermore, a statistically significant decline in off mode consumption was noted from the 2004/05 survey compared to the 2003/04 survey where average off mode consumption fell from 3.2W to 2.0W.

Figure 25 – Average power measurements for computers: off mode



Computers- Portable/Laptop

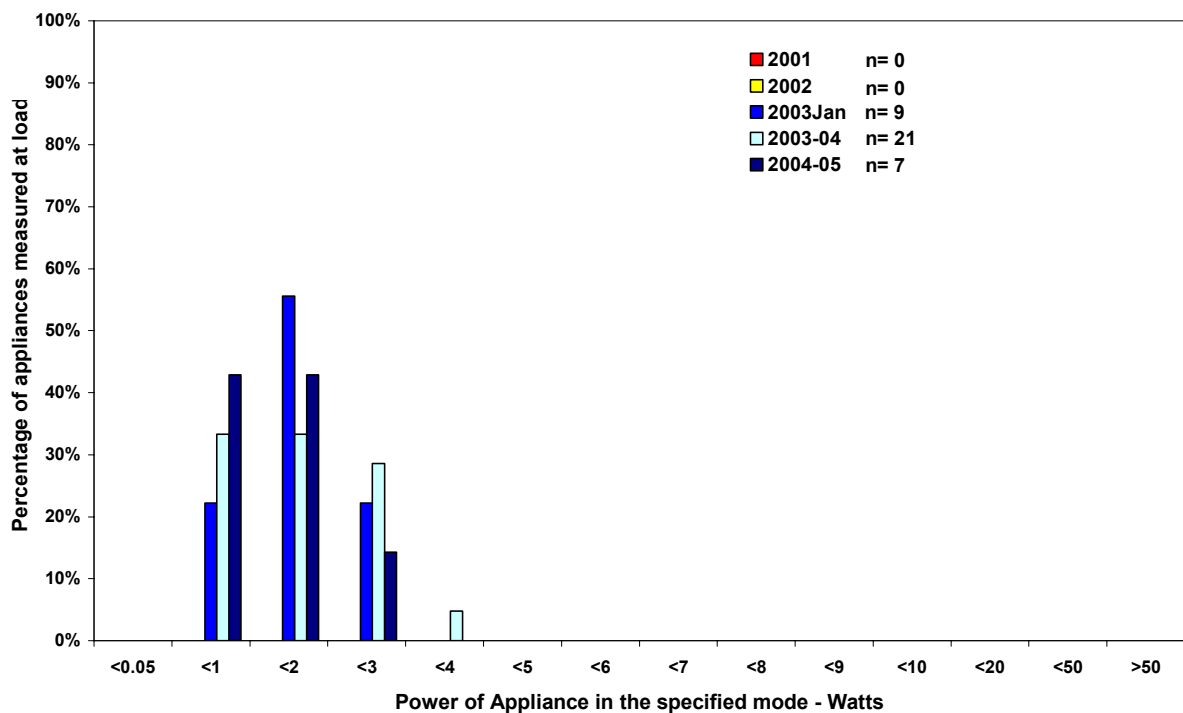
A total of seven portable computers were included in the in store survey. None of these displayed an ENERGY STAR label. The units were measured in off mode only. A minimum power consumption of 0.8W was recorded with an average consumption of 1.2W. The results are summarised in Table 19 below.

Table 19 – A summary of laptop computer results

Appliance:	Computers - Laptop			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	0	NA	-	-
Active	0	NA	-	-
Passive	0	NA	-	-
Off	7	1.2	2.3	0.8
Total Number of Units	7			

Figure 26 below shows the distribution of off mode consumption for portable computers from the last three surveys. There is little difference between the results especially when taking into account the large difference in sample sizes.

Figure 26 – Power measurements for portable computers: off mode



Computer Monitors

Forty four computer monitors were measured in the 2004/05 survey. They ranged in size from 15 inch to 19 inch screens and included both LCD (70%) and CRT (30%) monitors. Six monitors were recorded as having transformer boxes for their power source. All were measured in off mode however four models were also measured in passive standby. This survey also measured fifteen units in use. Additionally four models were measured in passive standby as they had both standby and hard off switches. Four of the monitors measured displayed an ENERGY STAR label. The average off mode power consumption was 1.2W with a minimum of 0.0W and a maximum of 4.7W. The results for computer monitors are summarised in Table 20 below.

Table 20 – A summary of computer monitor results

Appliance:	Computers - Monitor			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	15	31.3	60.5	17.8
Active	0	NA	-	-
Passive	4	1.9	4.7	0.8
Off	44	1.2	4.7	0.0
Total Number of Units	44			

The overwhelming majority of monitors consume energy in off mode. As shown in Figure 27 only 3 monitors in the past three years have had zero off mode consumption.

Figure 27 – Power measurements for monitors: off mode

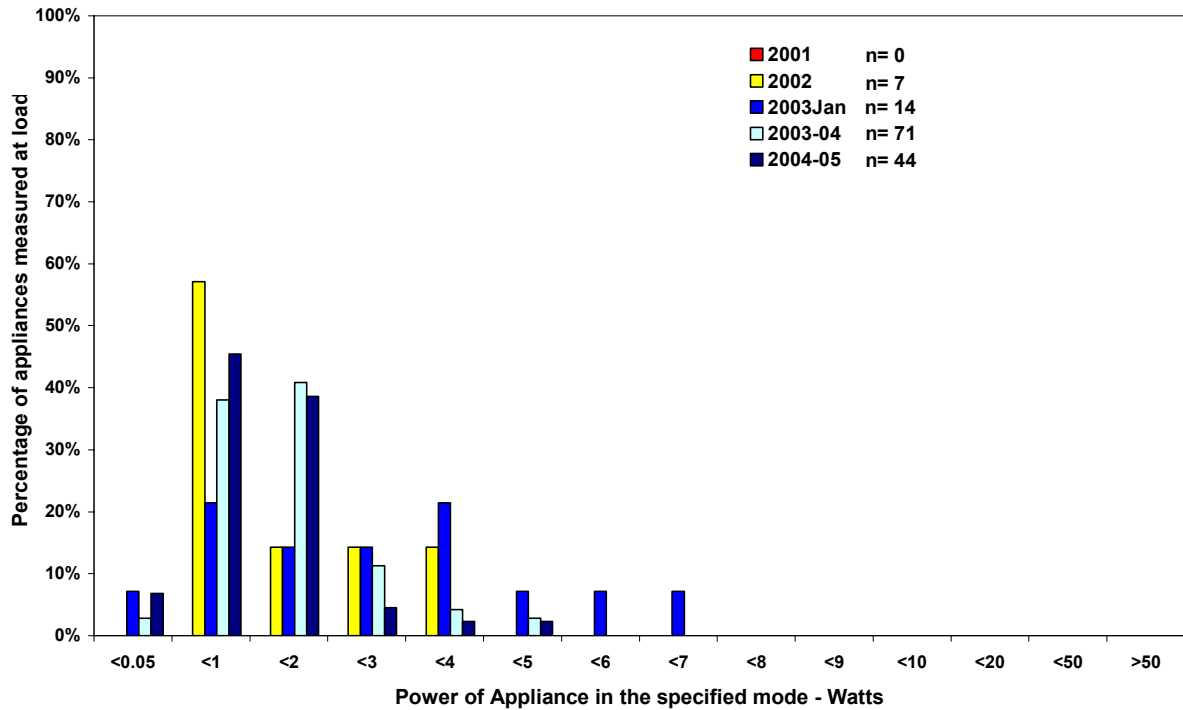
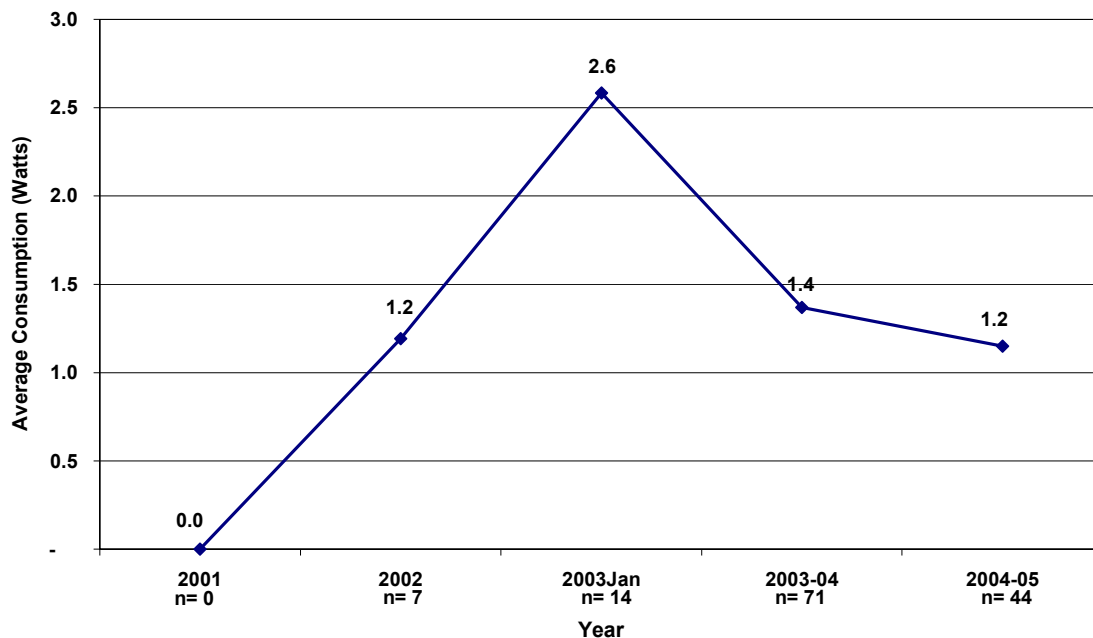


Figure 28 shows the average off consumption for monitors for the past four surveys. The 2003 survey saw a statistically significant decline in off mode consumption with the average reducing from 2.6W in 2003 to 1.4W in 2003/04. This difference has been sustained (and declined slightly lower to 1.2W) in the 2004/05 survey. Additionally the distribution of values has also shrunk from a maximum in 2003 of 6.3 becoming 4.7 in 2004/05. However, this may be due to the higher number of LCD screens sampled in the past two surveys.

Figure 28 – Average power measurements for monitors: off mode



Computer – Speakers

Prior to the 2003/04 survey only two computer speakers had been measured. This resulted largely from the fact that many speakers are powered directly from the computer box and that most products were packaged rather than displayed. With the emergence of the computer as a home entertainment unit the sound quality and type of computer speakers are of more interest to consumers and may include sub woofer and surround sound packages. The 2004/05 survey was able to test only 5 units, 4 in off mode and 3 units in active standby, that is turned on with no sound being produced. One of the computer speakers tested would only power down to off when the computer was turned off and as such, an in-use measurement was recorded for this unit. However, the remainder were measured in active standby.

Average active standby consumption was 5.6W with a minimum of 1.9W and a maximum of 7.5. The average consumption in off mode was 2.9W with a minimum of 1.1W and a maximum of 5.9W. The results are summarised in Table 21.

Table 21 – A summary of computer speaker results

Appliance:	Computer speakers			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	1	65.0	65.0	65.0
Active	3	5.6	7.5	1.9
Passive	0	-	-	-
Off	4	2.9	5.9	1.1
Total Number of Units	5			

Computers - Home Theatre Box

This product was measured for the first time in 2003/04. A home theatre box is a PC box that has the ability to receive TV transmission and usually incorporates an am/fm tuner as well. These units are marketed as home theatre packages and can record TV directly onto the hard disk. Nine of these units were able to be measured during the survey and all were measured in off mode. One Home Theatre Box was measured in on mode. Consumption ranged from 1.3W up to 4W averaging out at 2.5W.

Table 22 – A summary of Home Theatre Box results

Appliance:	Computers - Home Theatre Box			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	1	104.4	104.4	104.4
Active	NA	-	-	-
Passive	NA	-	-	-
Off	9	2.5	4.0	1.3
Total Number of Units	9			

Printers – Inkjet

A total of 21 inkjet printers were tested during the in-store survey. None of the printers measured displayed an ENERGY STAR label. The units were differentiated by the quality of print they were able to produce and the speed at which they could print. These results now incorporate small photo type printers that use inkjet technology in this category.

During the survey inkjet printers were measured in off mode and in passive mode - that is, switched on ready to print (but not printing). All models had a power on/off switch. When in passive standby the average power consumption was 3.6W. The highest power consumption was 7.3W and the lowest was 1.2W. In off mode the average power was 0.8W with a maximum of 2.8W and a minimum of 0.3W. No photo printers were found this year. Table 23 summarises these findings.

Table 23 – A summary of inkjet printer results

Appliance:	Printer - Inkjet			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	21	3.6	7.3	1.2
Off	21	0.8	2.8	0.3
Total Number of Units	21			

The power measurements for inkjet printers in passive mode are displayed in Figure 29. The graph clearly shows that consumption is trending downwards with a greater proportion of units bunching in less than 4W in 2004/05. Figure 30 clearly shows that average passive standby power consumption has been declining since 2002. A statistically significant decline was noted from 5.1W in 2003/04 to 3.6W in 2004/05.

Figure 29 – Power measurements for inkjet printers: passive standby mode

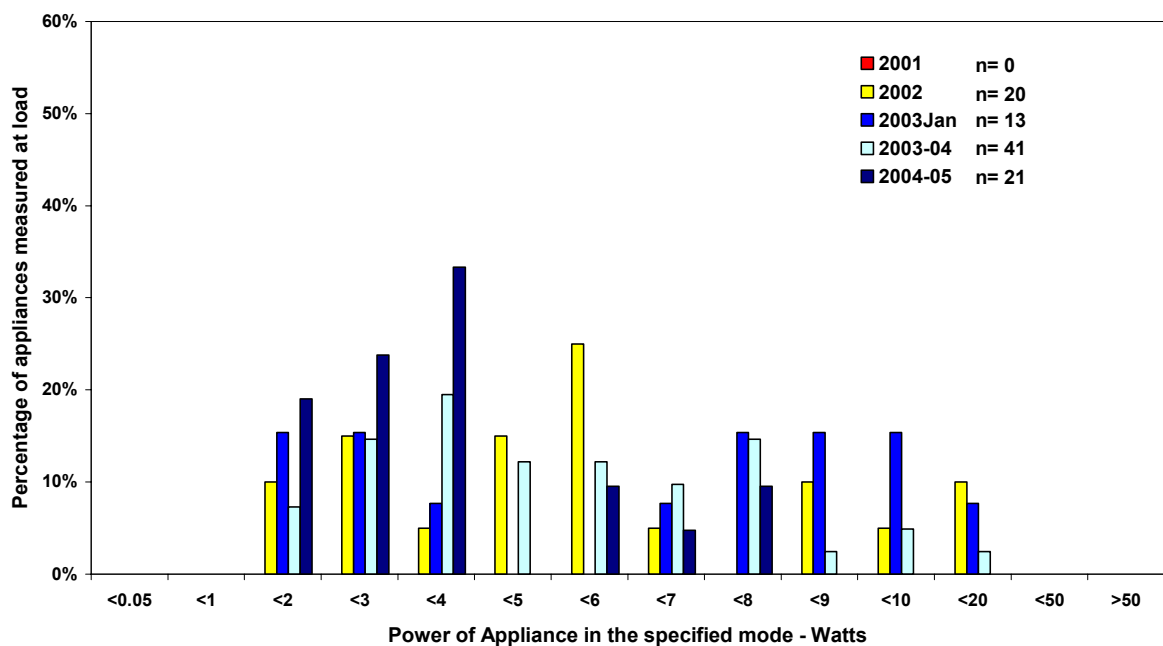


Figure 30 – Average power measurements for inkjet printers: passive standby mode

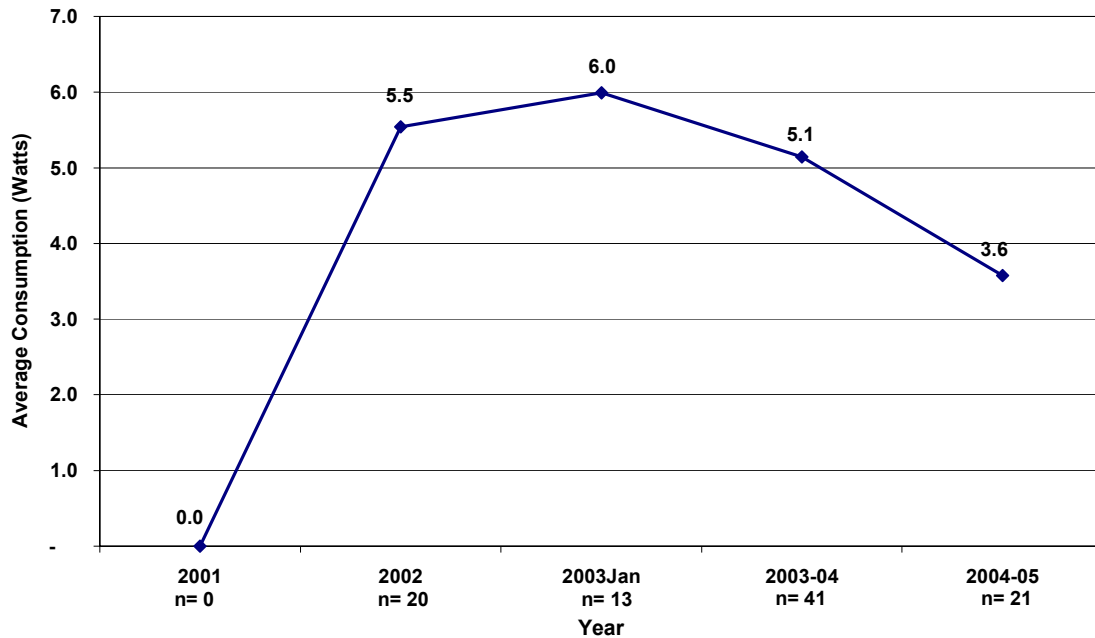


Figure 31 presents the power consumption results for inkjet printers in off mode. Encouragingly, it can be seen that the majority of inkjet printers measured in the 2004/05 survey are using less than 1W in off.

The results indicate that off mode consumption may also be trending downwards, i.e. decreasing. Average power consumption has been lower for each survey undertaken over the past 4 years and a statistically significant decline has again been noted this year. Figure 32 illustrates the results.

Figure 31 – Power measurements for inkjet printers: off mode

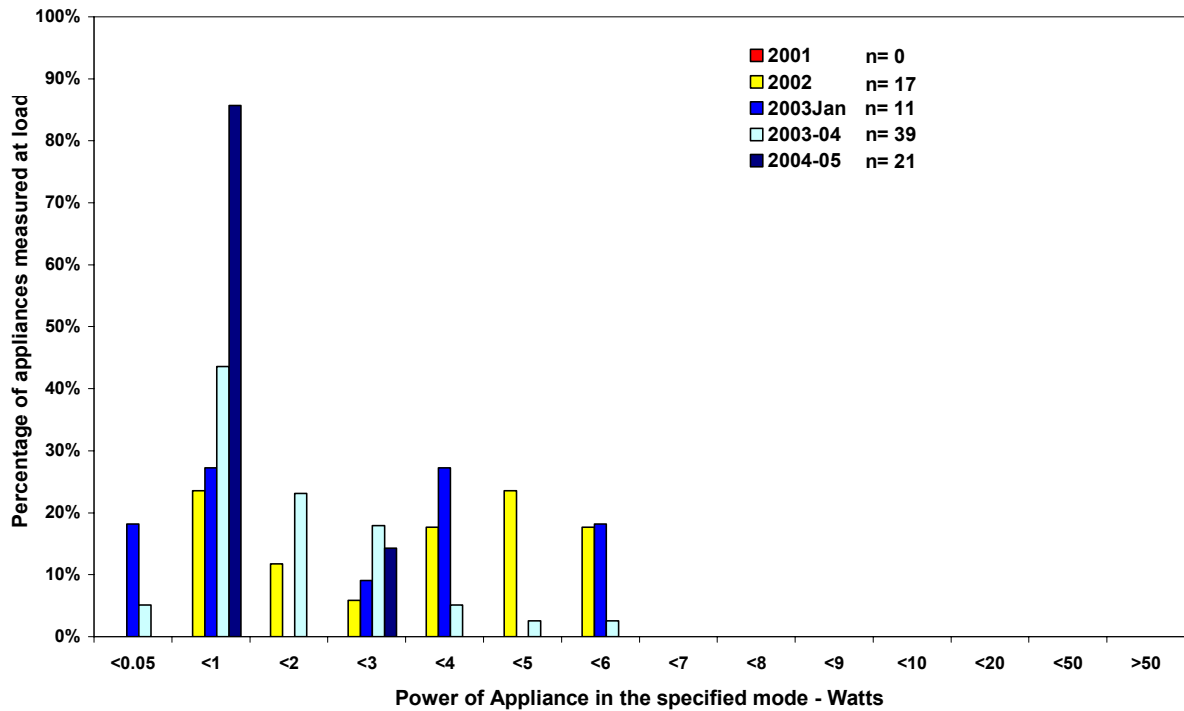
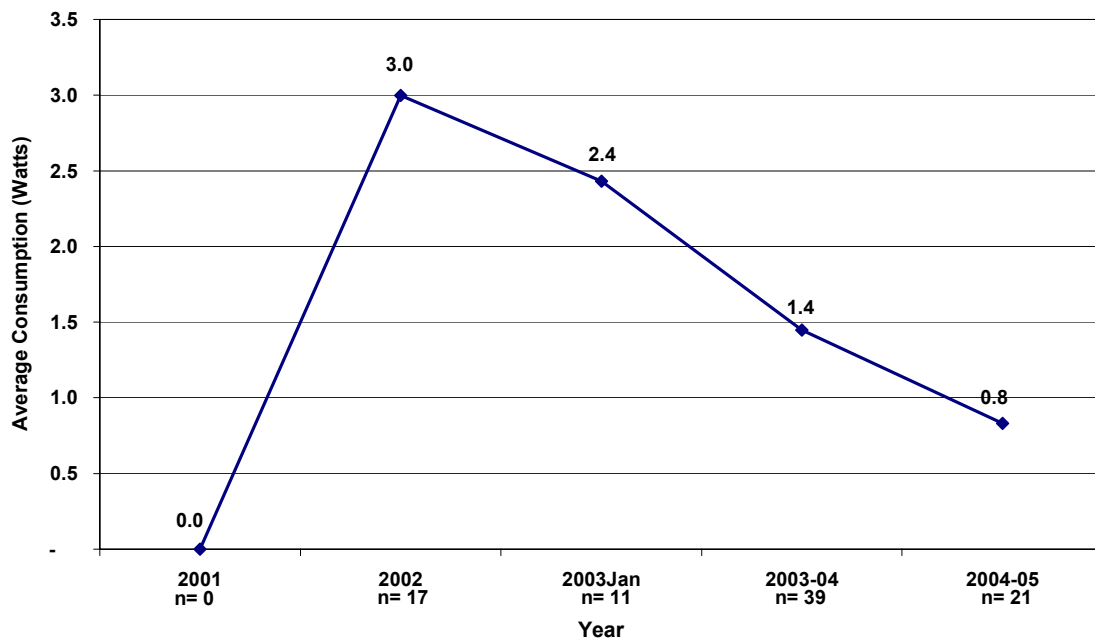


Figure 32 – Average power measurements for inkjet printers: off mode



Printers – Lasers

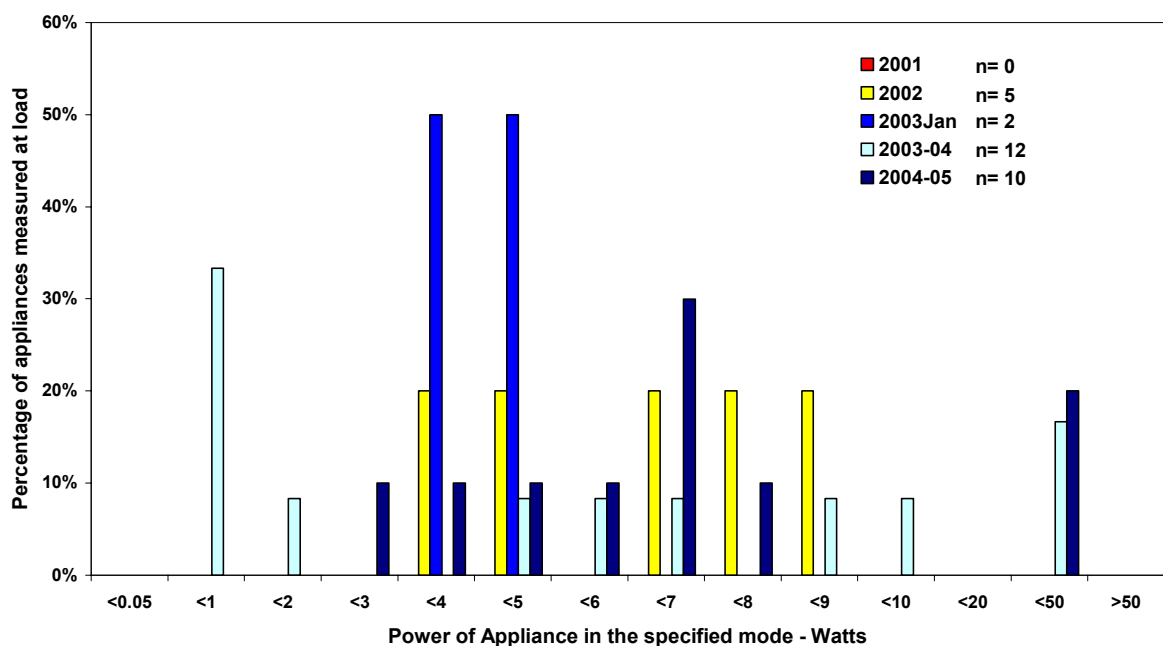
Ten laser printers were measured in passive standby and in off mode. Two models measured were colour laser printers with the remainder black and white printers. No models displayed an ENERGY STAR label. The average power consumption in passive standby mode was 9W with a maximum of 25.9W and a minimum of 2W. In off mode laser printers recorded an average of 0.1W.

Table 24 – A summary of laser printer results

Appliance:	Printer - Laser			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	NA	-	-	-
Passive	10	9.0	25.9	2.0
Off	10	0.1	0.4	0.0
Total Number of Units	10			

Figure 33 presents the distribution of passive standby measurements over the past three surveys. With such a small sample it is difficult to determine if any trends are appearing. However, it should be noted that the two colour units measured in this year's survey recorded a much higher passive standby reading at more than 20W compared to less than 9W for the remainder. Two colour laser printers were also measured in the 2003/04 survey and these units also recorded a passive standby reading of more than 20W.

Figure 33 – Power measurements for laser printers: passive standby mode



Home Entertainment Equipment

CRT Televisions

This category covers standard cathode ray tube (CRT) models for UHF and VHF reception and excludes those models with LCD, plasma or rear projection screens as well as those with in built VCRs. While all models had remote control operation it was not possible to access this for all models. The televisions ranged in size from 34cm to 86cm, with the average size on display being 66cm (up from 64cm in 2003/04 survey). The 2004/05 survey tested 95 televisions all of which were colour sets.

Televisions were tested in 3 modes: in-use, passive standby and off. Some units could not be measured in use as the remote could not be located and it had no controls of any description built into the unit. The average power consumption for a television in use was 87.3W with the maximum being 164.3W and the minimum being 35W. The average crest factor (2.53) and average power factor (0.68) were both moderate.

Eighty eight televisions were measured in passive standby mode, 2 units could not be measured due to remote controls not being available and a manual standby function not present. In this mode the average power consumption was 3.5W with a maximum of 12.7W and a minimum of 0.1W. Low average power factor was recorded at 0.30 with a moderate average crest factor of 3.39.

The average off power consumption recorded was 0.1W. The highest reading was 0.2W. Both average power factor and average crest factor were low at 0.32 and 3.14 respectively. Table 25 summarises these results.

Table 25 – A summary of CRT television results

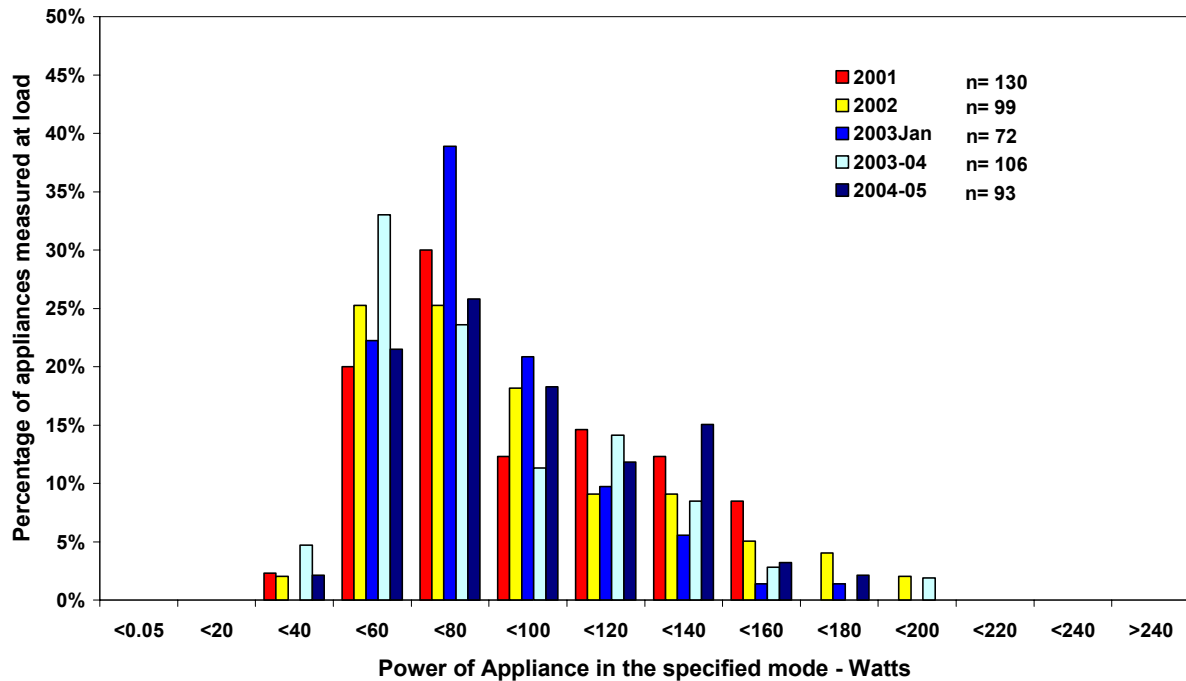
Appliance:	TV - standard					
Mode	Number of Measurements	Average Power (W)	Average Power Factor	Average Crest Factor	Power Max	Power Min
In Use	93	87.3	0.68	2.53	164.3	35.0
Active	NA	-	-	-	-	-
Passive	88	3.5	0.30	3.39	12.7	0.1
Off	94	0.1	0.32	3.14	0.2	0.0
Total Number of Units	95					

Eleven televisions from the sample displayed an ENERGY STAR label. Only five models recorded a passive standby reading of less than 1W which is the minimum criteria required to display the label. As of 1 July 2004 the energy star criteria was reduced from <3W to 1W and it is possible that some of the models tested pre-date 2004.

Figure 34 shows the distribution of power measurements for televisions when in use for the years 2001 through to 2004/05. The chart shows that the majority of televisions use between 50W and 100W. The 2004/05 survey shows a large increase in the proportion of

televisions using <140W and this increase has impacted significantly on average in-use power as shown in Figure 35 below.

Figure 34 – Power measurements for CRT televisions: in-use mode



Average in-use power consumption fell significantly from 2001 and 2002 to 2003 and 2003-04 from around 88W to 79W. However, any improvements noted in the 2003 and 2003/04 surveys have been diminished by a large increase from 2003/04 to 2004/05. The difference however is not statistically significant. Previous reports have suggested that the decrease in consumption may have been effected by the larger number of small screen size models being measured. Screen size may be the driver in this instance as the average screen size in the 2004/05 survey was 66cm compared to 64cm in 2003/04.

Figure 35 – Average power measurements for CRT televisions: in-use mode

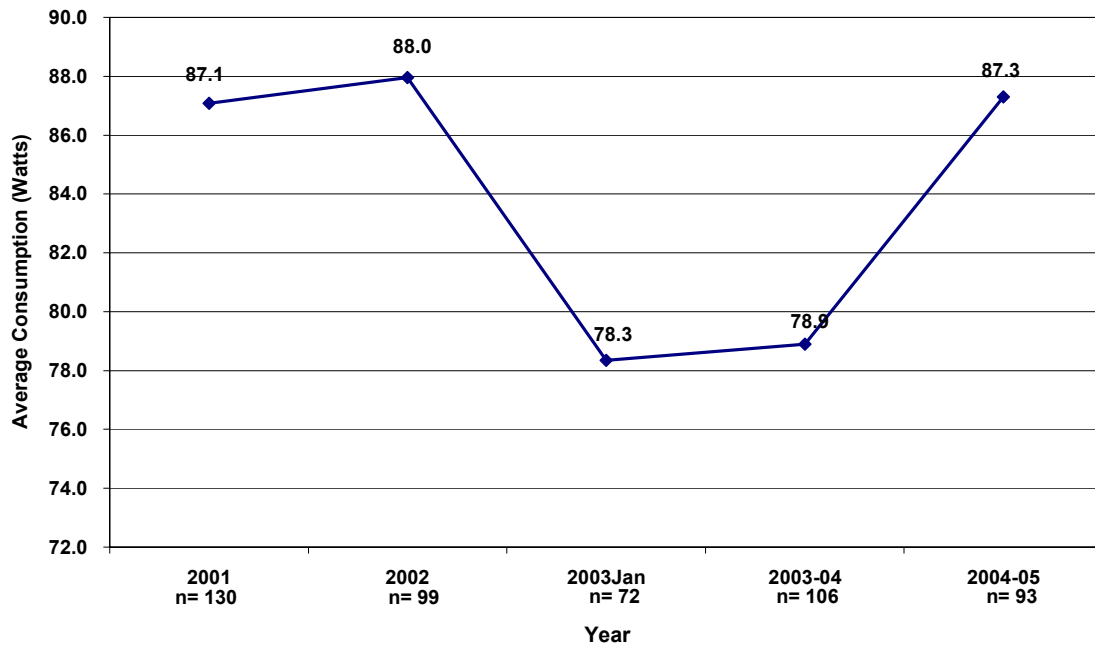


Figure 36 shows there are a greater proportion of TV's among the categories less than 5W compared to the surveys undertaken in 2001 and 2002. Passive standby mode appears to be trending downwards with a significant decline in the average from 2004/05 compared to 2003 (significance was not detected from 2003/04 to 2004/05). Figure 37 illustrates these results.

Figure 36 – Power measurements for CRT televisions: passive standby mode

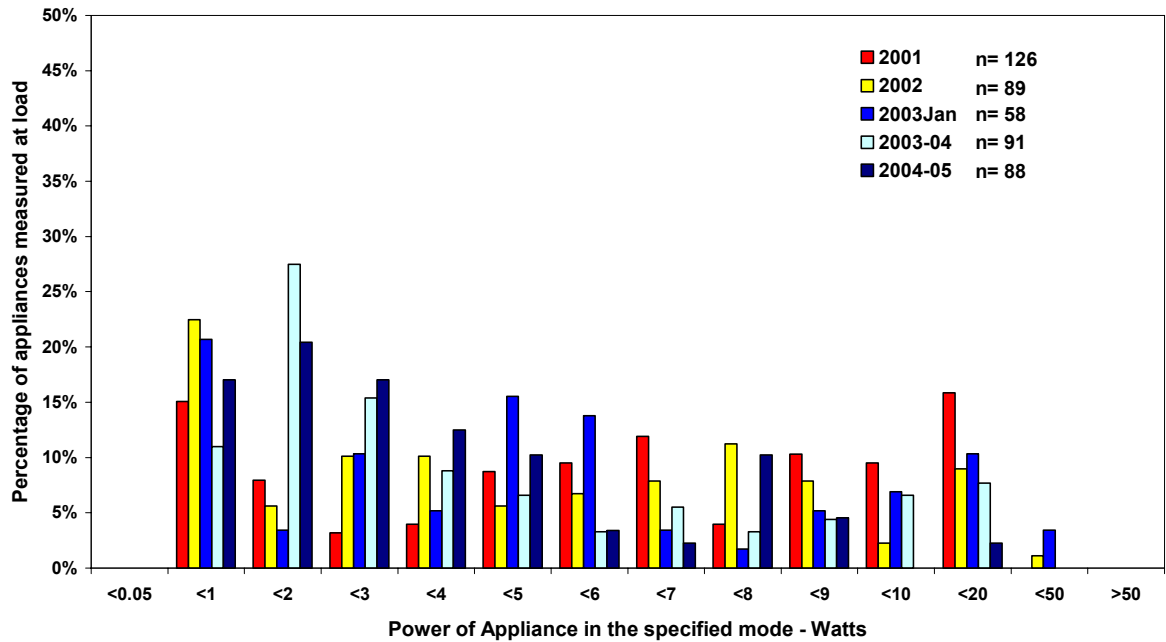
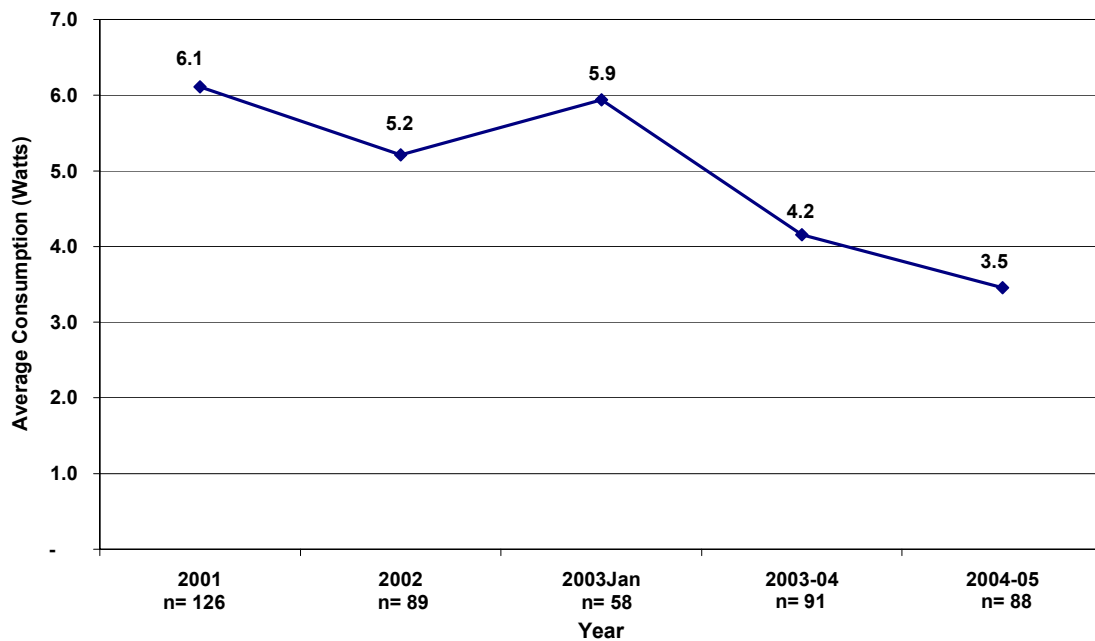
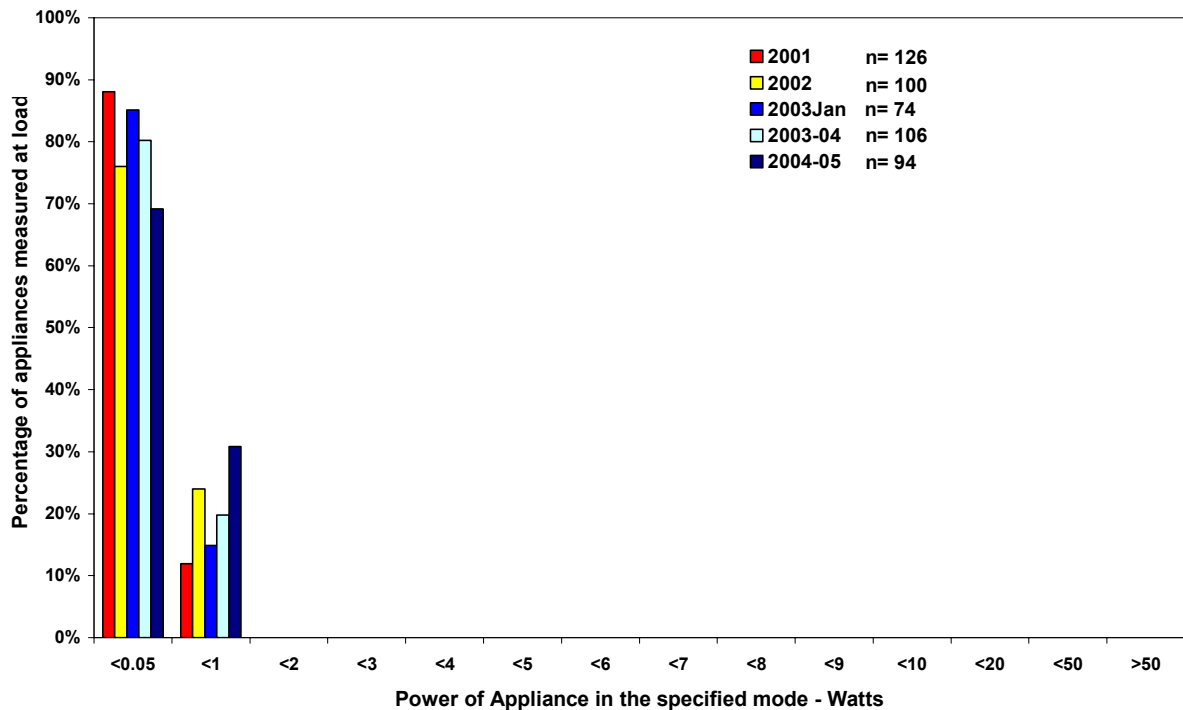


Figure 37 – Average power measurements for CRT televisions: passive standby mode



In off mode all televisions consume less than 1W with zero consumption recorded for the vast majority. This is illustrated in Figure 38.

Figure 38 – Power measurements for televisions: off mode



LCD Televisions

In the 2004/05 survey, 41 LCD (liquid crystal display) televisions were measured. The units were measured during in use, passive standby and off modes. The screen size ranged from 33cm to 114 cm. Average in-use consumption was 94.8W with models ranging over a large scale from 27.7W to 222.4W. In passive standby average consumption was 1.9W reaching a maximum of 6.8W. Average off mode consumption for LCD televisions was 1W with a maximum of 5.8W. Only two models recorded zero consumption in off mode. For 44% (18) of models passive standby was the lowest possible state. Table 26 summarises these results.

Table 26 – A summary of LCD TV results

Appliance:	TV - LCD					
Mode	Number of Measurements	Average Power (W)	Average Power Factor	Average Crest Factor	Power Max	Power Min
In Use	39	94.8	0.78	2.36	222.4	27.7
Active	NA	-	-	-	-	-
Passive	40	1.9	0.13	2.82	6.8	0.3
Off	22	1.0	0.09	2.48	5.8	0.0
Total Number of Units	41					

The distribution range for LCD television consumption remains similar to 2003-04 with the exception of one model which consumed more than 220W when in-use. However, as demonstrated in Figure 39, there has been a statistically significant increase in consumption in this mode, with a noticeable increase in the numbers of units consuming more than 100W. This increase relates directly to the screen size of the LCD televisions measured in each survey. Figure 40 indicates that for LCD televisions, larger screen sizes have higher consumption when in use. The average screen size for LCD televisions measured in 2003/04 was 56cm increasing to 63cm in 2004/05. While trend prediction can not be based on two samples, experience would suggest that the increase in LCD television screen size is likely to continue mimicking the broader TV market's movement to larger screens.

Figure 39 – Power measurements for LCD televisions: in-use mode

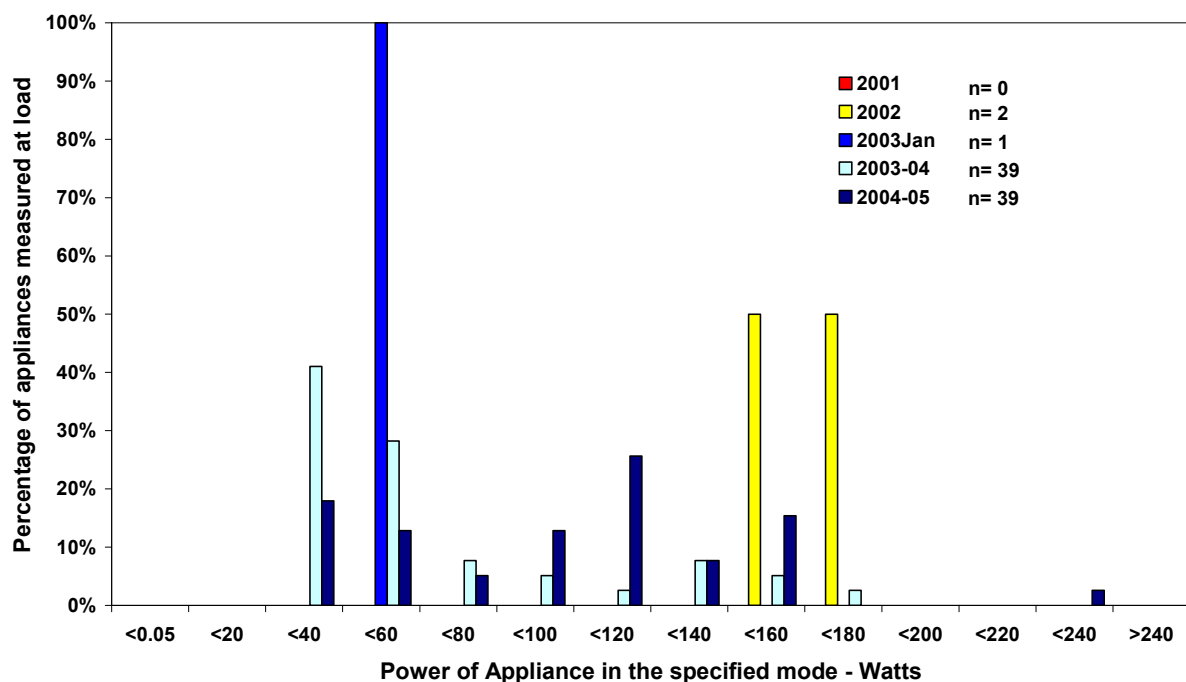
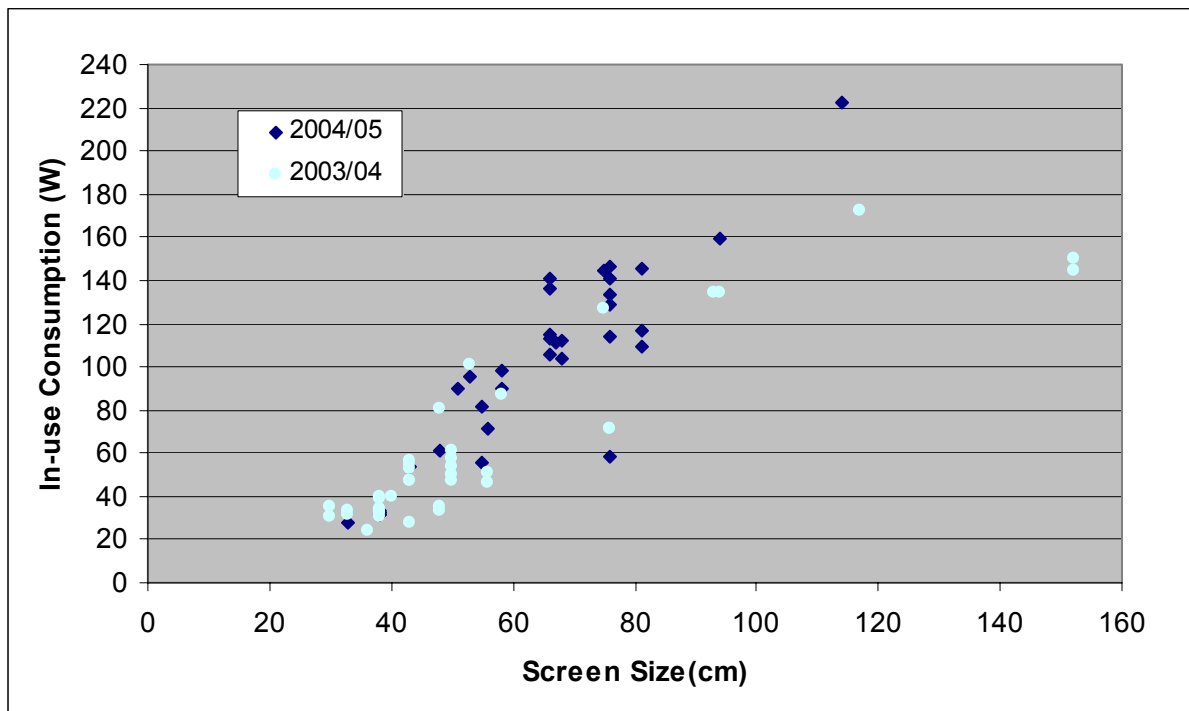
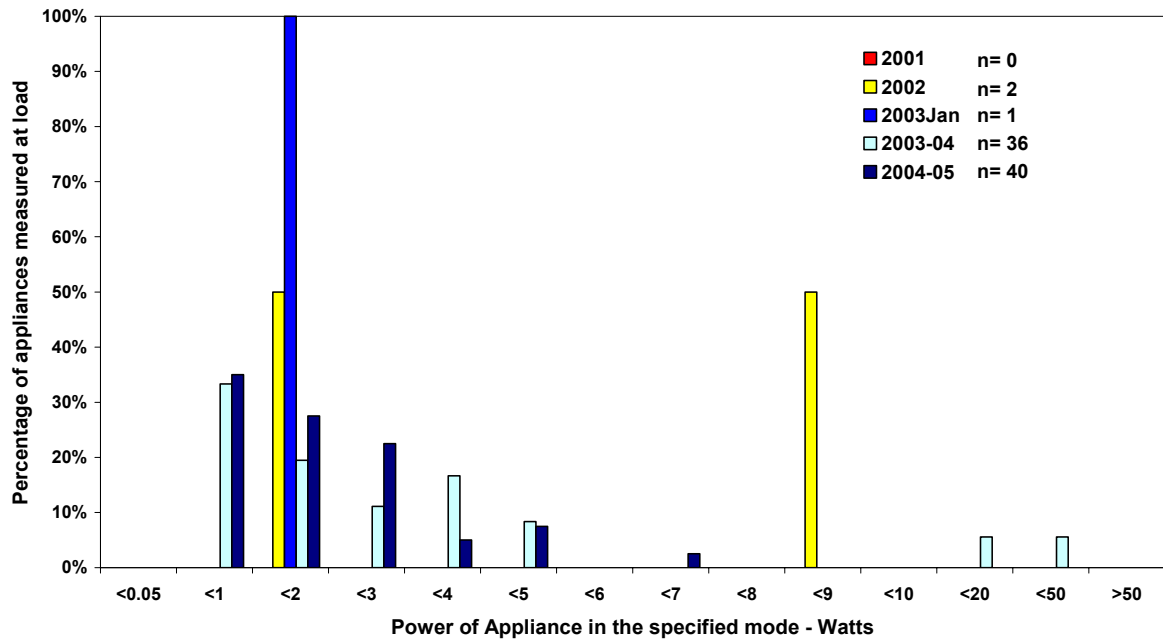


Figure 40 – In-use mode consumption for LCD televisions by screen size



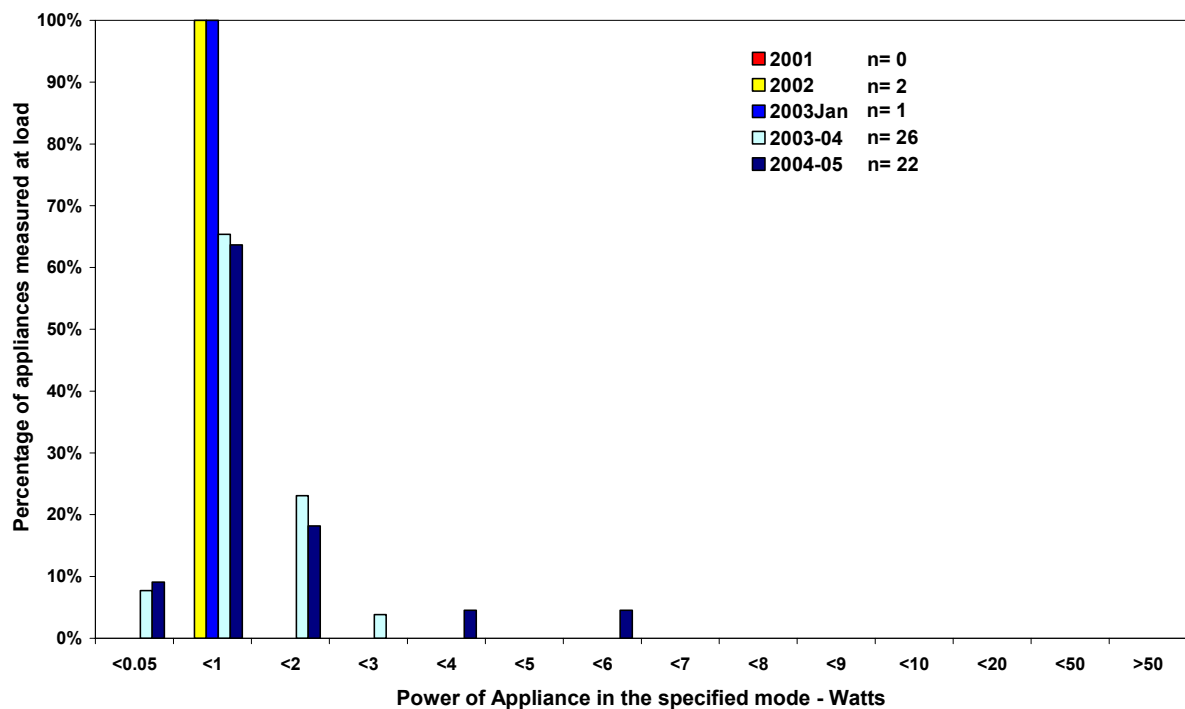
More than one third (35%) of LCD televisions recorded consumption less than 1W in passive standby mode, with 86% of models using less than 3W. As demonstrated in Figure 41 there was a decrease in the consumption recorded for LCD televisions in passive standby with averages dropping from 5.1W in 2003/04 to 1.9W in 2004/05. While this reduction is encouraging, it does not have any statistical significance and would need to be maintained in future surveys to be considered a positive trend.

Figure 41 – Power measurements for LCD televisions: passive mode



Off mode consumption for LCD televisions was recorded at less than 1W for most units, however only 9% (2) of units had zero consumption in off. There is little change from the previous survey with average off mode consumption increasing slightly from 0.7W in 2003/04 to 1.0W in 2004/05. Off mode results are presented in Figure 42 below.

Figure 42 – Power measurements for LCD televisions: off mode



Projection Televisions

Projection televisions are made as either a front or rear projection type and may have an LCD display. Three models in the survey were front projectors while eight had LCD display screens. The models in the survey ranged in size from 76cm to 157cm. Of the 32 units measured in total, 4 displayed an ENERGY STAR label. Only 1 complied with the specifications required to display the label (passive consumption was <3W), the other three were recorded at 3.77W, 3.83W and 3.98W respectively.

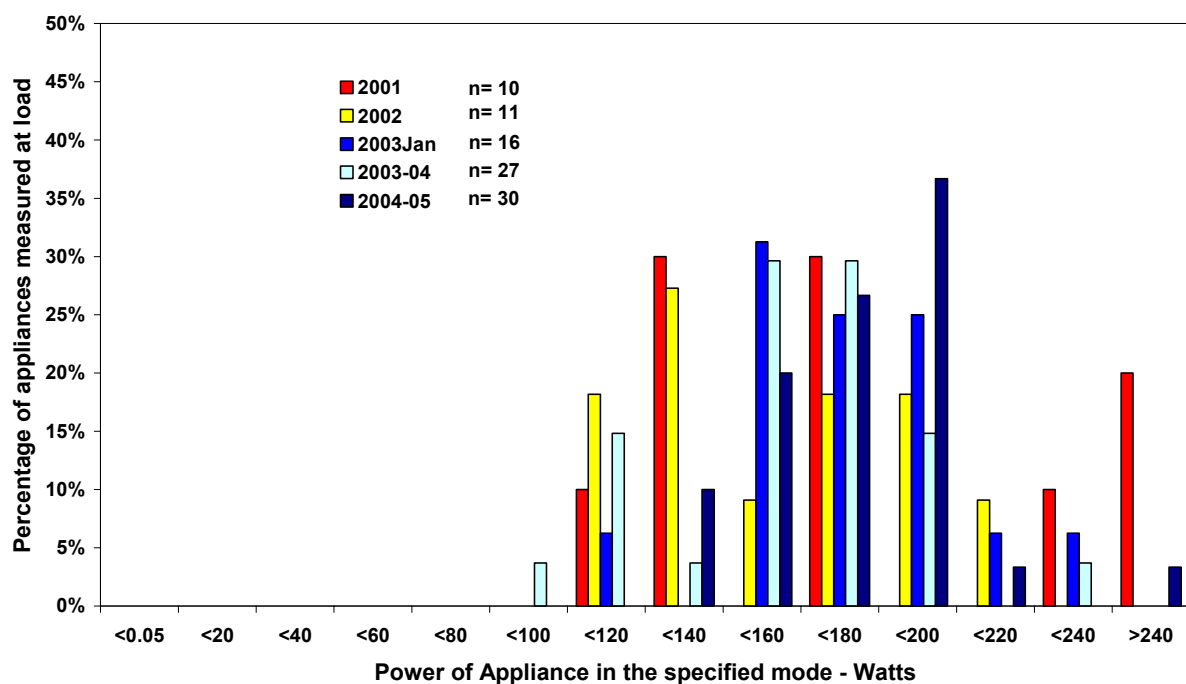
Projection televisions were measured when in-use, passive standby and off. When in-use (see Table 27) the average power consumption in the 2004/05 store survey was 173.5W, with a maximum of 250.5W and a minimum of 131.8W. When in passive standby the range of consumption in 2004/05 extended from 0.4W to 86.9W producing an average of 5.8W. In off mode the average power consumption was 0.1W with a maximum of 0.2W and a minimum of zero.

Table 27 – A summary of projection TV results

Appliance:	TV - Projection					
Mode	Number of Measurements	Average Power (W)	Average Power Factor	Average Crest Factor	Power Max	Power Min
In Use	30	173.5	0.79	2.1	250.5	131.8
Active	NA	-	-	-	-	-
Passive	32	5.8	0.19	3.01	86.9	0.4
Off	28	0.1	0.01	2.98	0.2	0.0
Total Number of Units	32					

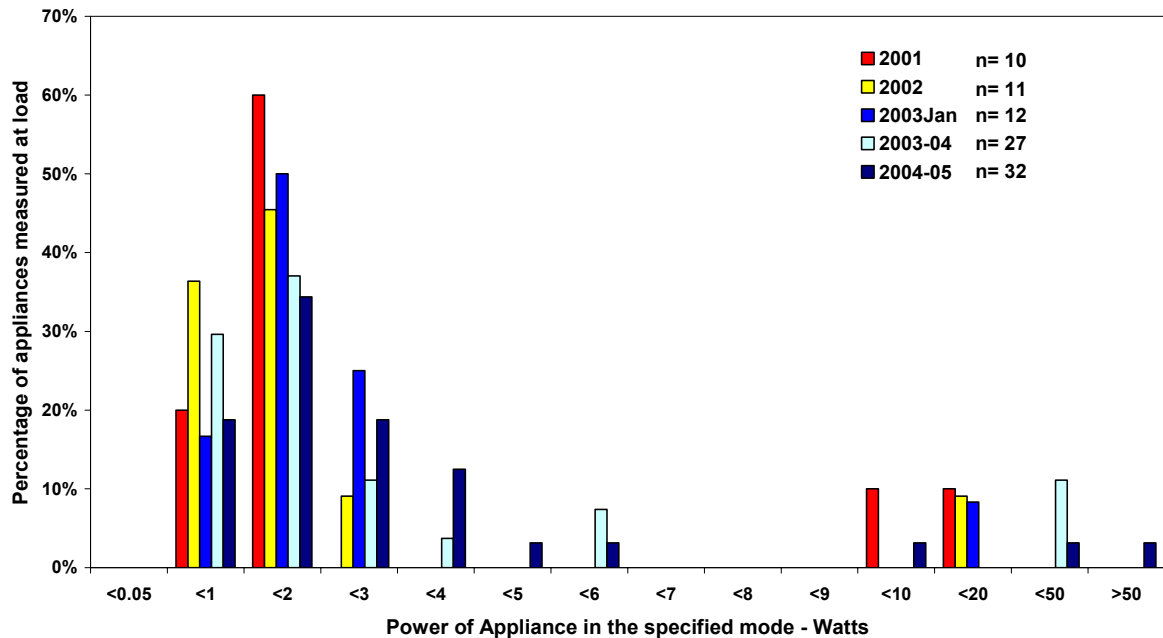
Although the in-use power consumption has increased from 2003/04 to 2004/05, a comparison with the survey data from the previous three surveys shows no trend. In fact looking at the data over the five year period indicates that consumption in this mode is quite stable. There appears to be no relationship between screen size and in-use consumption for projection televisions.

Figure 43 – Power measurements for projection televisions: in-use mode



As presented in Figure 44 most projection televisions consume less than 2W when in passive standby and this is consistent across all years. While average consumption in passive standby has been just under 6W for the last two years, up from around 2W previously there is still no statistical significance in this result. These averages are likely to be distorted by the small number of models that are consuming very large amounts of energy in this mode. In 2004/05 two models (6%) measured passive standby was over 30W.

Figure 44 – Power measurements for projection televisions: passive standby mode



All projection televisions consume less than 1W when in off mode and this is consistent with previous surveys. In 2004/05 one model recorded zero consumption in off mode.

Plasma Televisions

This year 35 plasma televisions were measured. The plasma televisions in the survey were measured in use, in passive standby and in off. Two of the plasma televisions displayed an ENERGY STAR label with both recording passive standby readings within the required Phase I levels.

In use, plasma televisions were found to use a considerable amount of energy. The maximum power usage was 453.6W while the minimum measurement was 84.2W. The average in use consumption was 240.3W. Passive standby performance was vastly better with the maximum at 4.9W and the minimum at 0.4W. The average consumption for this mode is 2.3W. Two plasma televisions did not have passive mode recorded as remote controls could not be located. Eight units did not have an on/off switch so only 27 units could be measured in off. The average consumption for off was 0.6W with the maximum at 3.2W and minimum at 0.0W. Table 28 presents the results for the plasma televisions measured.

Table 28 – A summary of plasma TV results

Appliance:	TV - Plasma					
Mode	Number of Measurements	Average Power (W)	Average Power Factor	Average Crest Factor	Power Max	Power Min
In Use	34	240.3	0.84	2.17	453.6	84.2
Active	NA	-	-	-	-	-
Passive	33	2.3	0.11	1.69	4.9	0.4
Off	27	0.6	0.04	1.88	3.2	0.0
Total Number of Units	35					

The 2004/05 survey results saw plasma televisions returning to previous levels recorded for in use mode. The previous years data had suggested there may be a declining trend in consumption however it appears that this occurred as a result of a biased sample. The maximum power usage measured in the 2004/05 survey was 453.6W and the minimum measurement was 84.2W. The average in-use consumption was 240.3W in 2004/05 compared to 147.3W in 2003-04, 292.4W in 2003. Figure 45 shows the range of in-use power consumption of plasma screens and TVs.

Figure 45: Power measurements for plasma screens: in-use

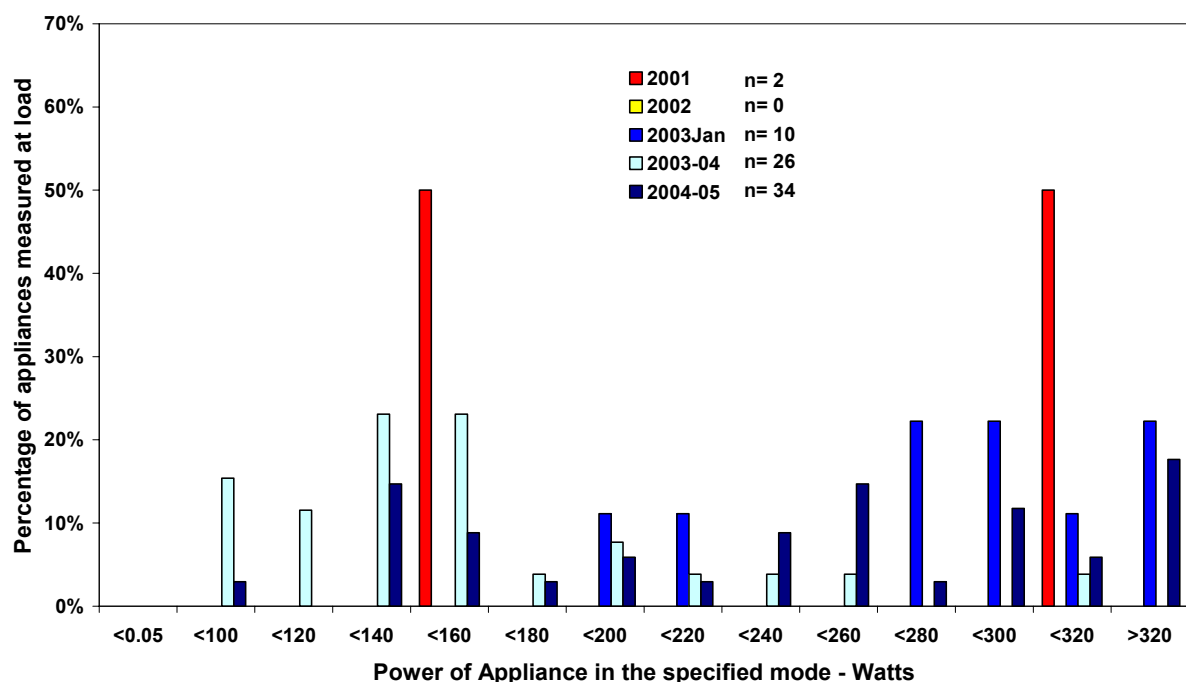


Figure 46 below shows the distribution of measurements for plasma televisions in passive standby is consistent across both years. Most units registered less than 3W and average standby has remained consistent at just over 2W for the past 3 surveys.

Figure 46 – Power measurements for plasma televisions: passive standby mode

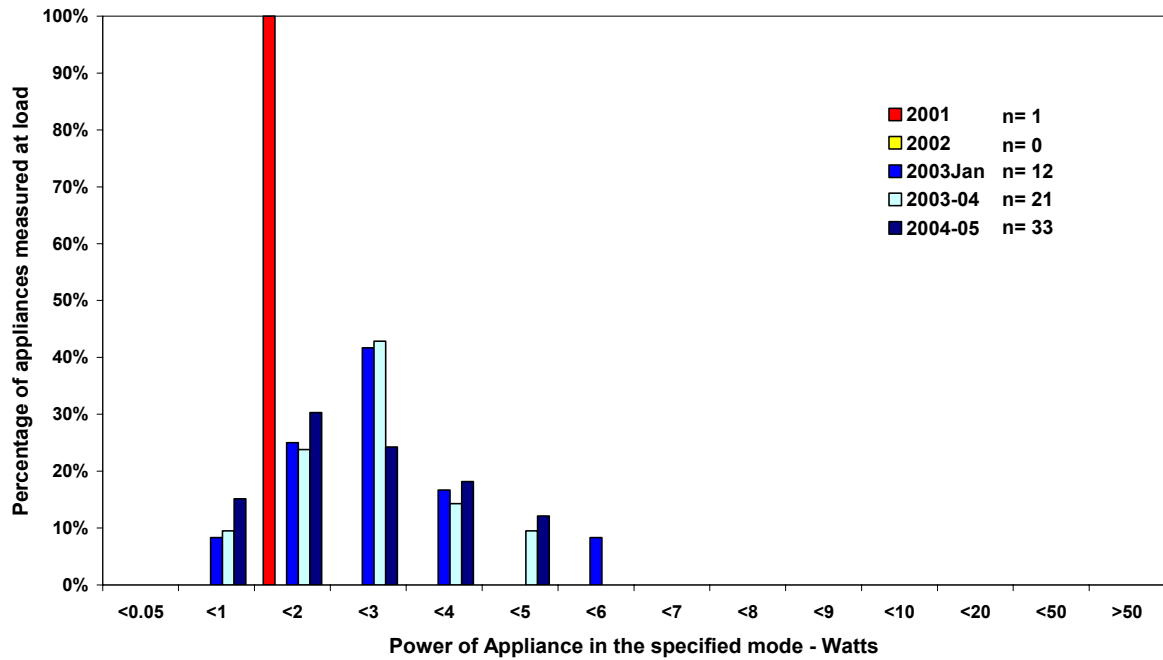
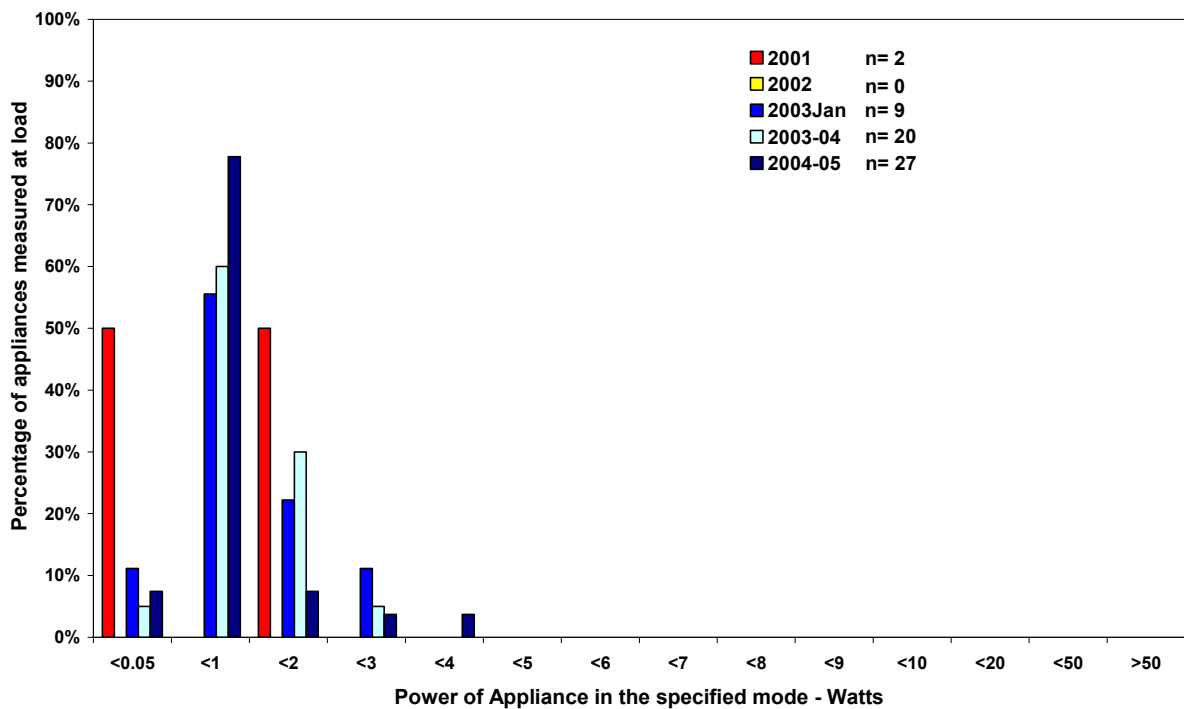


Figure 47 shows the distribution of readings for plasma televisions in off. This too has remained consistent over the 3 samples with most units consuming less than 1W.

Figure 47 – Power measurements for plasma televisions: off mode



VCRs

Although VCRs are expected to be superseded by DVD recorders there are still plenty of models in the market place. In 2004/03 a total of 28 VCRs were measured. Fourteen units displayed an ENERGY STAR label and all complied with the ENERGY STAR phase I criteria for passive consumption less than 4W. None of these VCRs will meet the July 2005 standard of less than 1W. All models in the study had remote control operation; none of the models could be turned off. The VCRs were measured in active standby that is, on but not playing and in passive standby, that is, ready for remote operation and still displaying the clock. Average active standby was 7.7W with a maximum of 11.3W. Passive standby ranged from 1.2W to 6.3W averaging out at 2.9W. Table 29 summarises the results.

Table 29 – A summary of VCR results

Appliance:	VCR			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	28	7.7	11.3	6.1
Passive	28	2.9	6.3	1.2
Off	NA	-	-	-
Total Number of Units	28			

Figure 48 shows the distribution of power consumption for VCRs in active standby mode. The results show that the distribution range for VCRs has remained static over the years; however more units are registering at the lower end of the scale. Furthermore as seen in Figure 49 the downward trend of average active standby appears to have stabilised for the time being. The 2004/05 average was 7.7W compared with 7.6W last year.

Note: Care is needed in the interpretation of this result, as most VCRs will go to “sleep” when left in active standby mode without playing a tape for some period (typically 20 minutes). For practical reasons it was not possible to make this measurement during the in store survey (as the power has to be re-connected to make a power measurement). Experience indicates that a VCR which is left on but allowed to go to “sleep” will consume less than active standby but more than passive standby (typically sleep mode consumption will be about an average of active and passive standby). This “sleep” mode would be a common mode in normal use in households.

Figure 48 – Power measurements for VCR: active standby mode

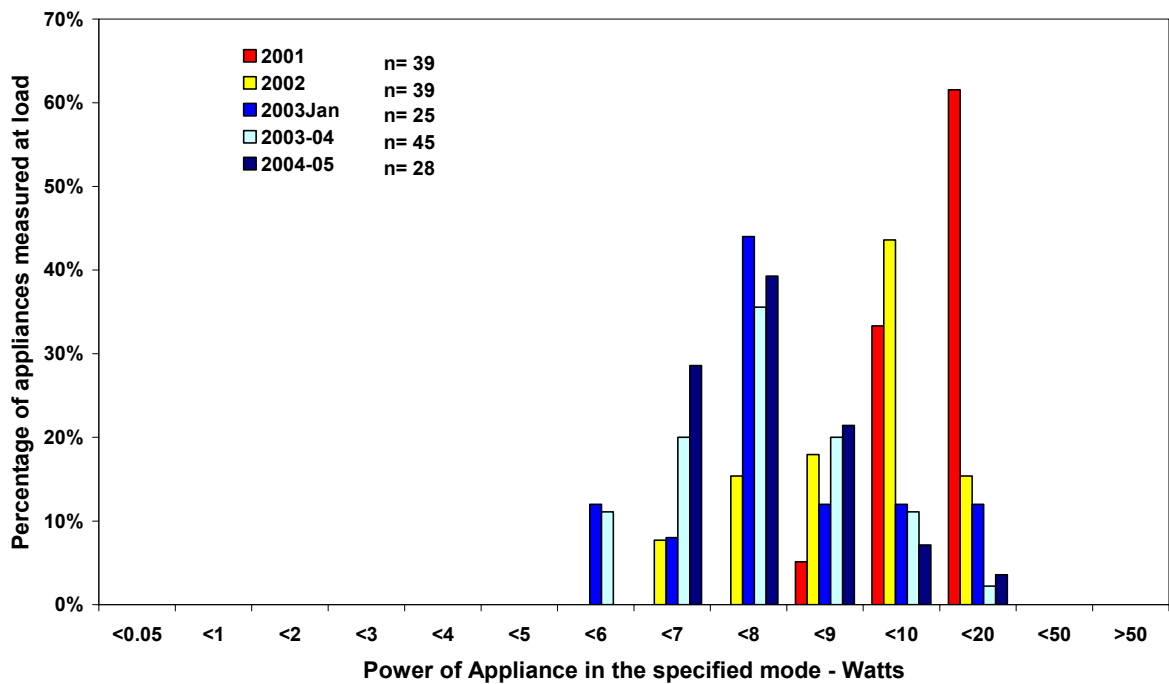
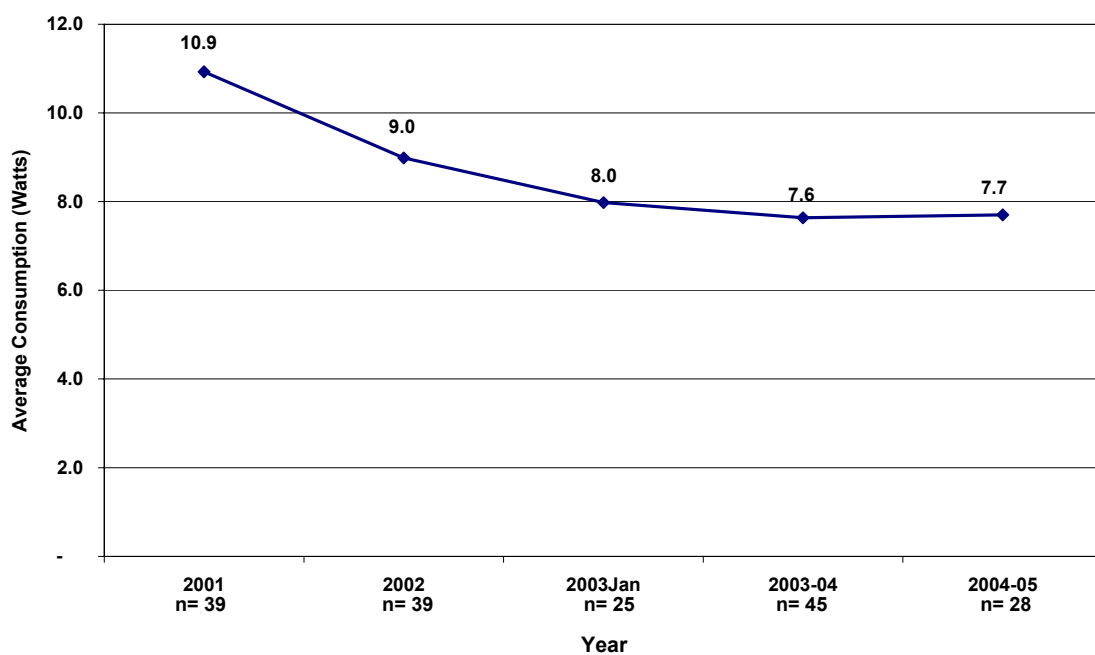


Figure 49 – Average power measurements for VCRs: active standby mode



No VCRs measured in any of the four surveys were found to consume less than 1W in passive standby mode. In 2004/05 the proportion of models less than 2W increased to 32%, from 29% last year, 16% in 2003 and 0% in previous years. Most models still

consumed between 2W and 4W with only a few units above this range. These results are presented in Figure 50. As with active standby, average passive standby appears to be trending downwards with the average at 3.8W in 2001 and 2.9W this year. These results shown in Figure 51 demonstrate a statistically significant decrease since 2001.

Figure 50 – Power measurements for VCR: passive standby mode

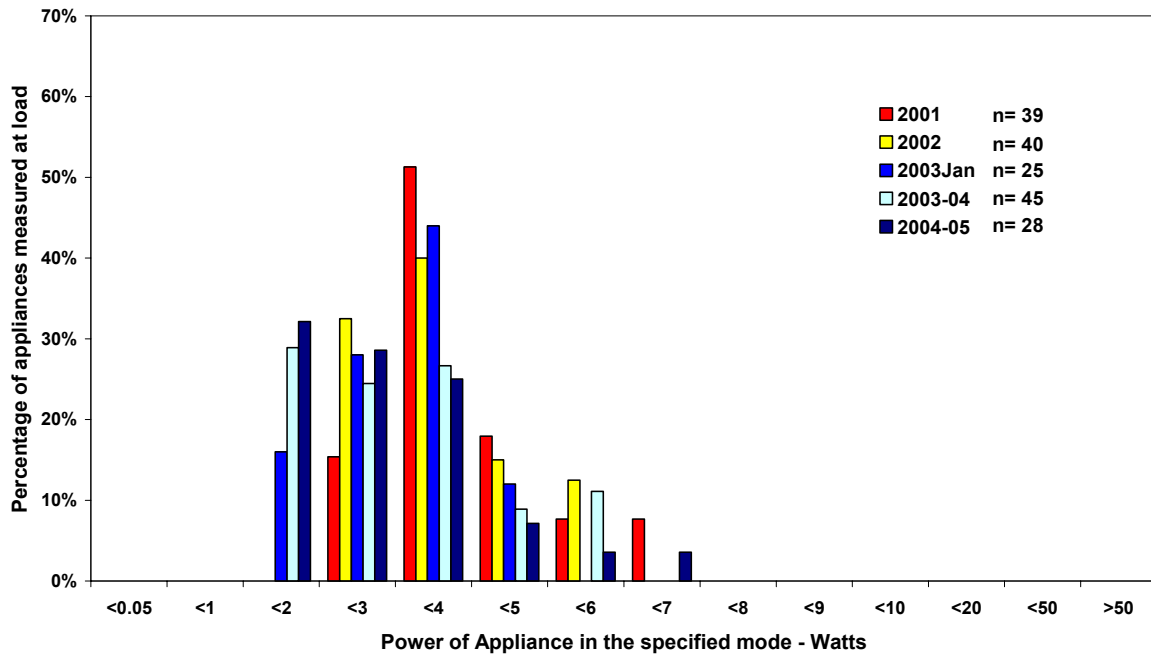
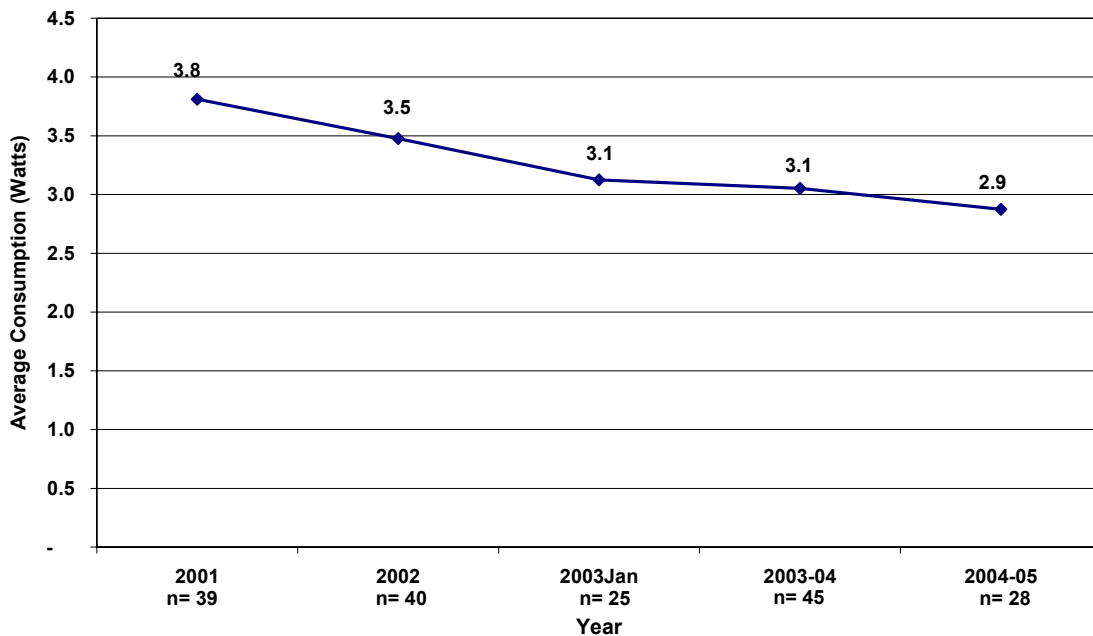


Figure 51 – Average power measurements for VCRs: passive standby mode



DVD Players

Digital Video Disk players are now common place in Australia, having been one of the fastest selling products in the last few years. For the purpose of this study the DVD player definition has been altered so that it may include a VCR component but can not record to DVD disk or provide a decoder (set top box) function for transmitting images. Additionally Portable DVD players will also be included in this category. Past results have been altered to reflect this. Sixty-nine units were tested and of those, 8 displayed an ENERGY STAR label. All eight units complied with Phase I criteria of less than 4W. Five of these units also complied with Phase II criteria (less than 1W from July 2006).

DVDs were measured in 3 modes: active standby, that is, ready to play a disc, passive standby, that is, ready to be activated and off (where present), that is, powered down but not able to be activated by a remote. All 69 units measured in 2004/05 could be tested in active standby with the average consumption being 9.2W. The range varied from a minimum of 4.4W to a maximum of 21.5W. Passive standby could be measured on 66 units as remote controls were not always available. The average power consumption was found to be 2.4W in passive standby with a minimum of 0.1W and a max of 9.8W. Only thirteen DVD players had a power on/off control. All of these modes had zero consumption in off mode. For a summary of these results see Table 30 below.

Table 30 – A summary of DVD player results

Appliance:	DVD Player			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	69	9.2	21.5	4.4
Passive	66	2.4	9.8	0.1
Off	13	0.0	0.0	0.0
Total Number of Units	69			

DVD players have been showing improvements in active standby power consumption in the short time that they have become available. Figure 52 below shows how power consumption between 10W and 20W has declined since 2001 and how the distribution has shifted into categories less than 10W. In 2004/05 there was a dramatic increase in the number of models consuming less than 8W which climbed from 10% in 2003/04 to 41% this year. As shown in Figure 53, average active standby has been decreasing since 2001. In 2004/05 average active standby reached a new low level of 9.2W. This result indicates a statistically significant decrease from the 11.5W recorded in 2003/04 and provides a strong indication that active standby is trending downwards.

Figure 52 – Power measurements for DVD players: active standby mode

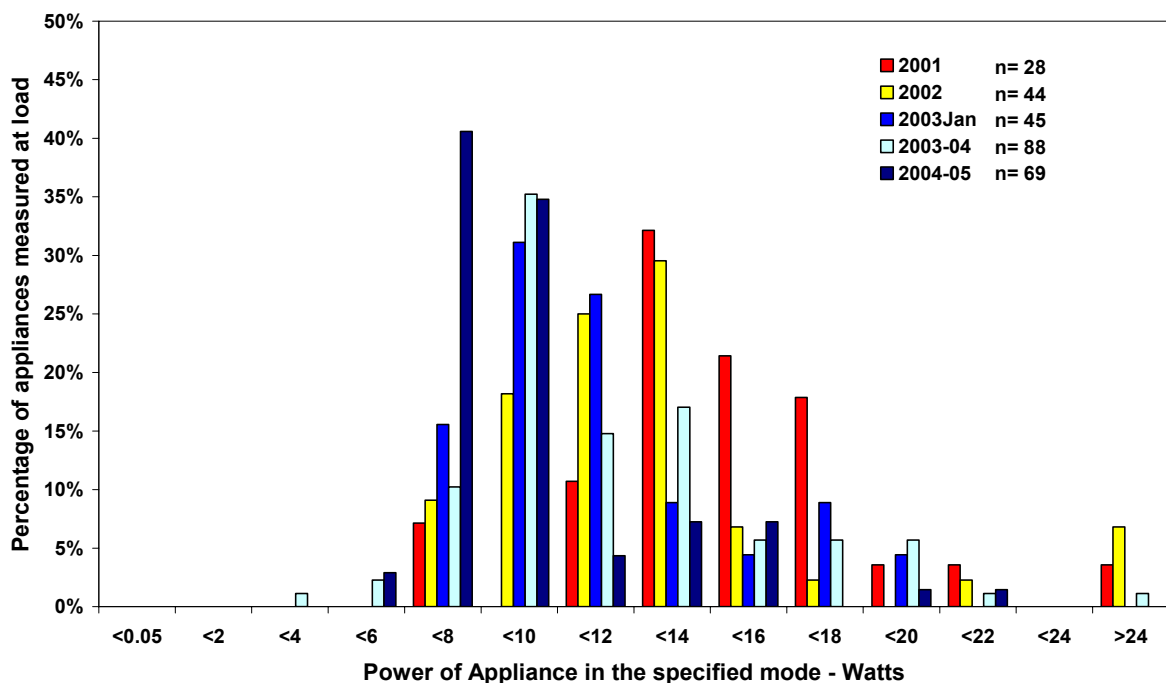


Figure 53 – Average power measurements for DVDs: active standby mode

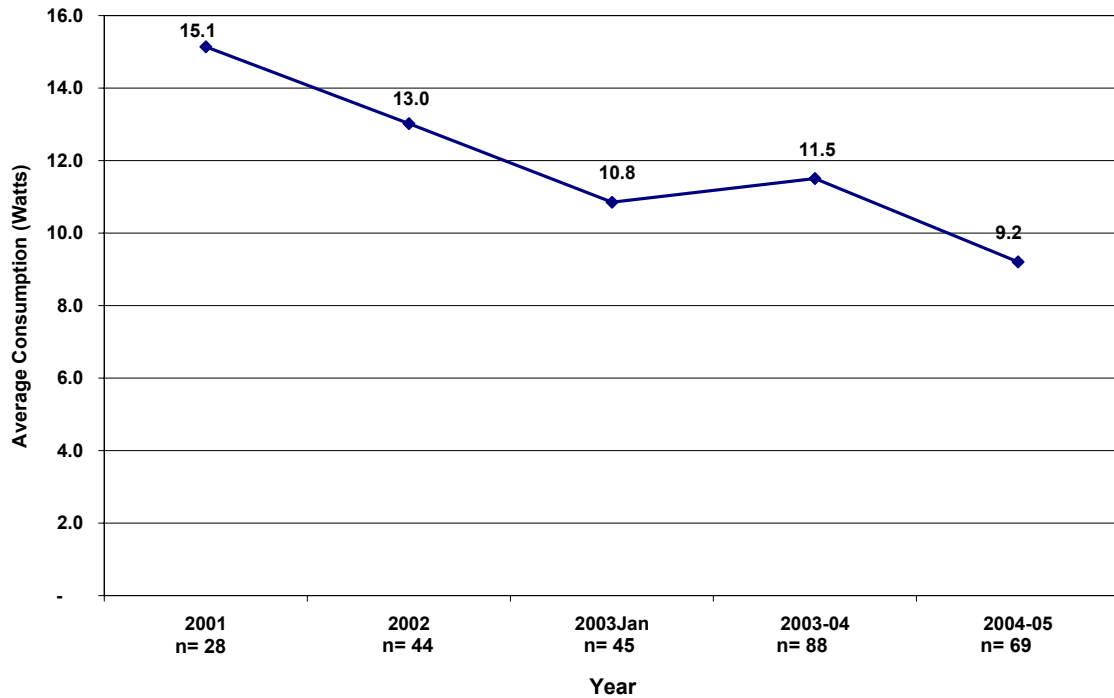


Figure 54 shows that a greater proportion (66%) of DVD players consume less than 2W in 2004/05 compared to previous years. There was also an increase in the number of models registering passive standby greater than 4W. Figure 55 shows average power consumption in this mode has stabilised at just over 2W since the statistically significant decrease in 2002.

Figure 54 – Power measurements for DVD players: passive standby mode

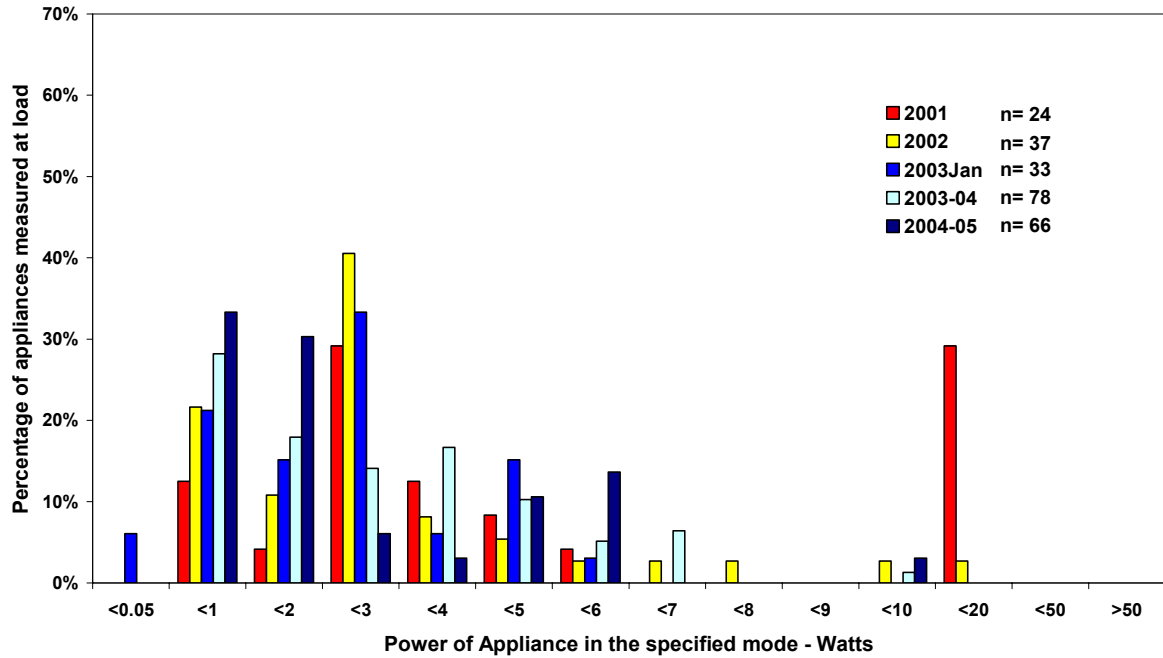
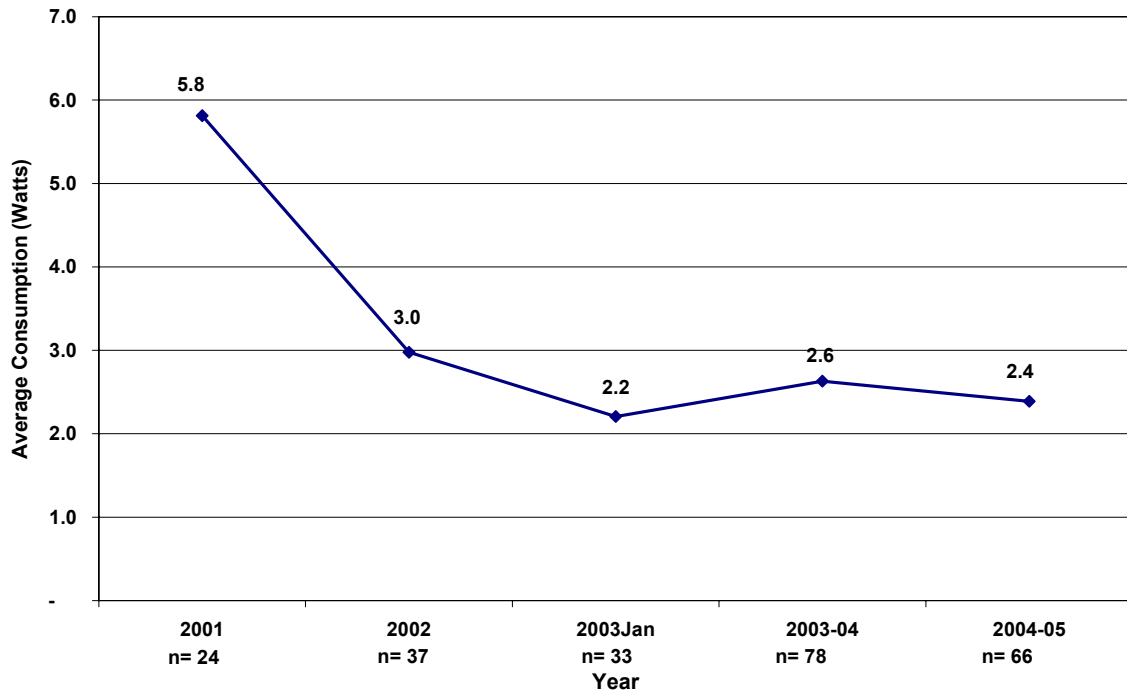


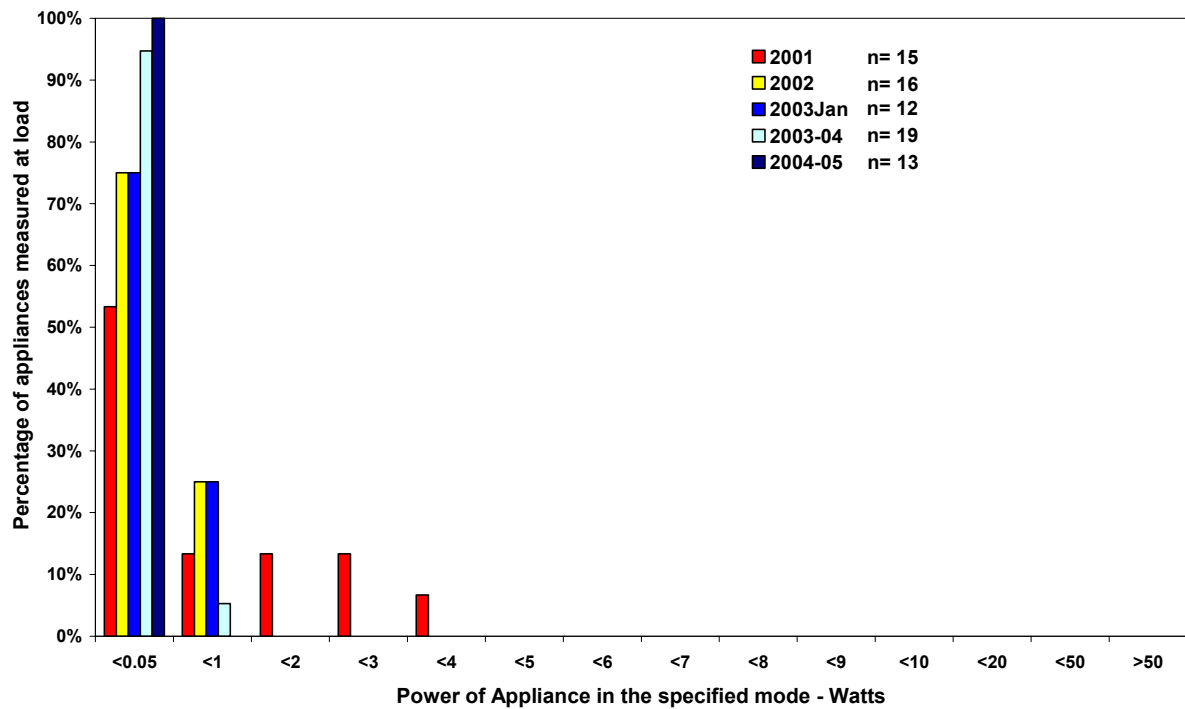
Figure 55 – Average power measurements for DVDs: passive standby mode



Thirteen units (19%) had an on/off switch. All units measured in off mode 2004/05 registered zero consumption. While the consumption of DVD players in off mode has

steadily decreased so has the proportion of units with this mode. Figure 56 illustrates the results.

Figure 56 – Power measurements for DVD players: off mode



These results indicate a downward trend is evident in DVD players in active, passive standby and off modes.

Note: Portable DVD players are now readily available. These machines can be charged allowing a DVD to be viewed away from the power source. Most stores had these products securely locked in cabinets to prevent theft making access for measurement during the store survey unlikely.

DVD Recorders

DVD Recorders allow the user to play DVDs as well as record from television onto a DVD. Basic functions vary from unit to unit but essentially they are same as a VCR. For the purpose of this study DVD recorders now do not include models with a hard disk or those that provide a decoder (set top box) function for transmitting images. Past results have been altered to reflect this.

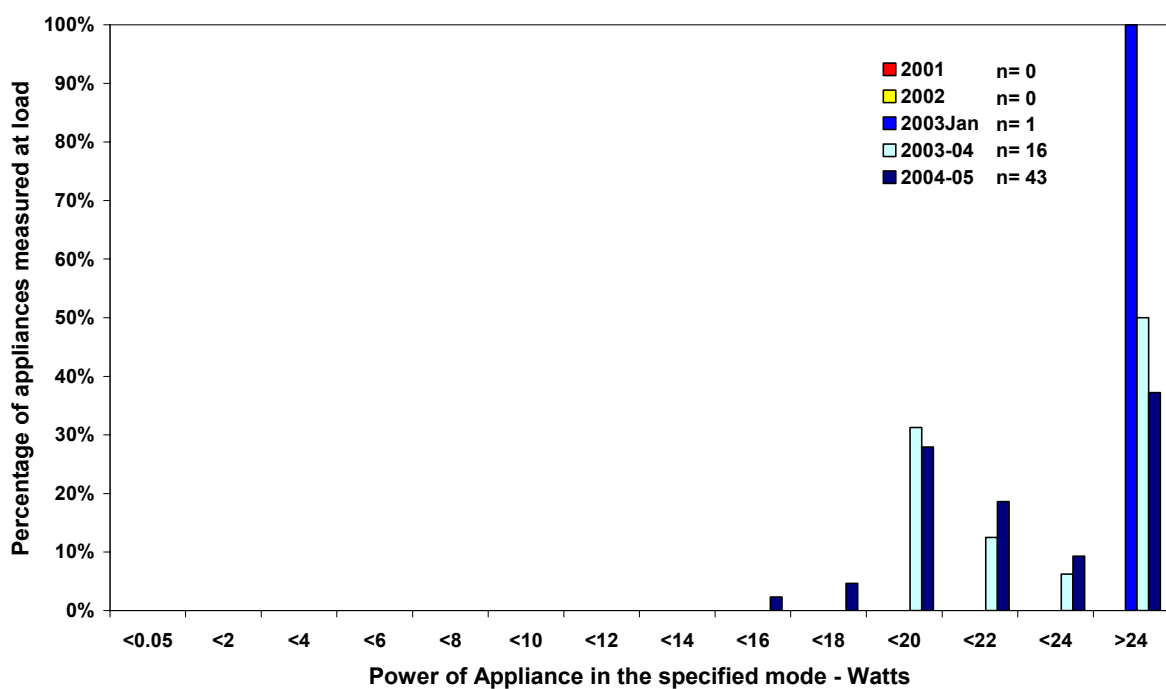
Forty-three DVD recorders were measured in the survey, in active, passive standby and off mode. One of the units had an ENERGY STAR label and met the phase I criteria. In active standby the average power consumed was 23W with a maximum of 36.5W and a minimum of 15.9W. Average passive standby was 7.5W with measurements ranging from 2.8W to 24.4W. The results are summarised in Table 31.

Table 31 – A summary of DVD recorder results

Appliance:	DVD Recorder			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	43	23	36.5	15.9
Passive	43	7.5	24.4	2.8
Off	0	-	-	-
Total Number of Units	43			

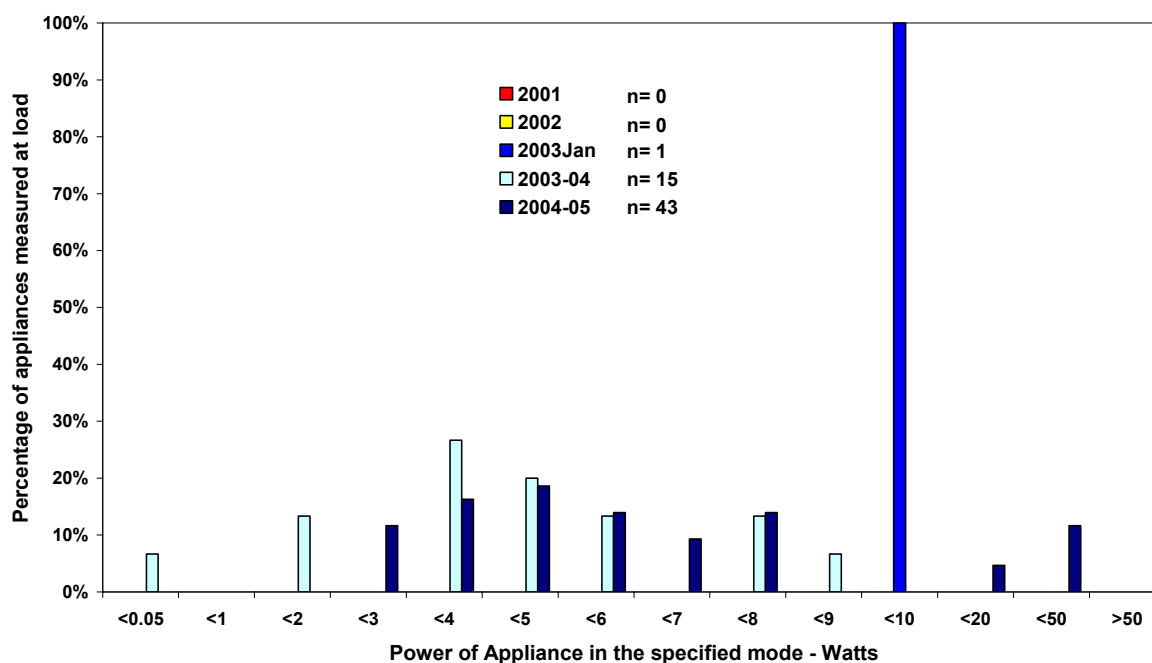
In active standby the distribution range of DVD recorders has remained relatively stable. Average consumption in this mode decreased slightly in 2004/05, down from 25.7W last year to 23W this year and most models are now consuming less than 24W in this mode. However there is no statistical significance in this result and further records will be needed to establish if there is a trend.

Figure 57 – Power measurements for DVD recorders: active standby mode



Passive standby consumption is distributed over a large range with the worst performers using 24.4 watts. In 2004/05 the consumption was concentrated between 3W and 8W. However for the first time a number of models (17%) were found to consume more than 15W in this mode. The average passive standby has varied greatly over the three years from 9.1W to 4.3W and 7.5W in 2004/05. No statistical significance can be drawn from these figures

Figure 58: Power measurements for DVD Recorders: Passive standby



Hard Disk Recorders

Hard disk recorders (HDR) also known as Personal Video Recorders, Digital Video Recorders or DVD hard disk recorders are the latest development in the home entertainment product range. These units enable the user to record video images onto a hard disk from an external source such as a television, VCR or Video Camera. These units may include a DVD recorder/player. For the purpose of this study HDRs do not include models with a decoder (set top box) function for transmitting images. Last survey four units were measured but were included in the DVD recorder category.

Twenty units were measured in the 2004/05 store survey recording an average active standby of 29.4 watts with consumption ranging from 20.8 watts to 36 watts. Most models used less than 30 watts. Passive standby consumption was spread from 2.9 watts to 20.1 watts, averaging 7.2 watts. Off mode was found in only one unit. No consumption was recorded in this mode. Table 32 details these results.

Table 32 – A summary of hard disk recorder results

Appliance:	Hard Disk Recorder			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	20	29.4	36.0	20.8
Passive	19	7.2	20.1	2.9
Off	1	0.0	0.0	0.0
Total Number of Units	20			

Comparison with previous results is not warranted as only four HDRs have been measured previously.

Integrated Stereos

Integrated stereos are single units that perform more than one function such as CD player, tuner, tape deck, amplifier etc. Most units had remote control as well as manual operation. Variants included CD capacity, presence of a tape deck, and digital displays. The survey measured 72 of units in 2004/05. Nine displayed an ENERGY STAR label. Of the 9 units passive standby could only be measured for 4 as the other units were set to demonstration mode. In this mode when the appliance placed in standby it either automatically restarts or flashes advertising messages across the visual display. All four units complied with Phase II, where passive standby is required to be less than 1W.

Integrated stereos were measured in 3 modes: active standby, that is, ready to play a disc and passive standby, that is, ready to be activated and off mode. Only two integrated stereos had an on/off function reinforcing previous results that indicated the decline of this mode. In active mode there was a large variation in power consumption with an average of 18W and a maximum of 52.2W and a minimum of 5.1W. In passive mode only 65 stereos could be measured as there were a number of models set in demonstration mode. The average power consumption for passive mode was 4.6W with a maximum of 34.9W and a minimum of 0.2W. Off mode was present on two stereos, one recording zero consumption and the other 4.8W. These results are summarised in Table 33.

Table 33 – A summary of integrated stereo results

Appliance:	Stereo - Integrated			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	72	18	52.2	5.1
Passive	65	4.6	34.9	0.2
Off	2	2.4	4.8	0.0
Total Number of Units	72			

Figure 59 indicates that a high proportion of integrated stereos are consuming more than 10W in active standby with little change over the four samples. The improvement of fewer models consuming more than 20W noted in the last two years was not sustained in 2004/05. Based on average consumption, shown in Figure 60 there has been no significant improvement from 2001 to 2004/05 with average consumption being stable in this mode. In 2001 average active standby was 19.1W, and in 2004/05 it was 18W.

Figure 59 – Power measurements for integrated stereos: active standby mode

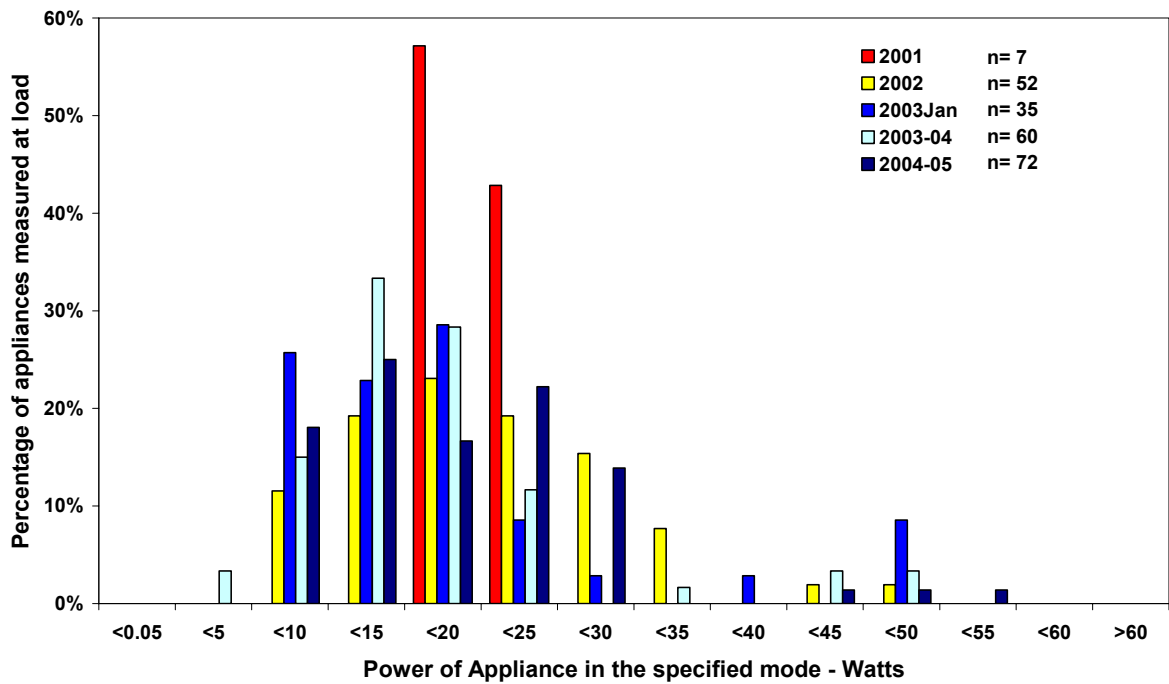


Figure 60 – Average power measurements for integrated stereos: active standby mode

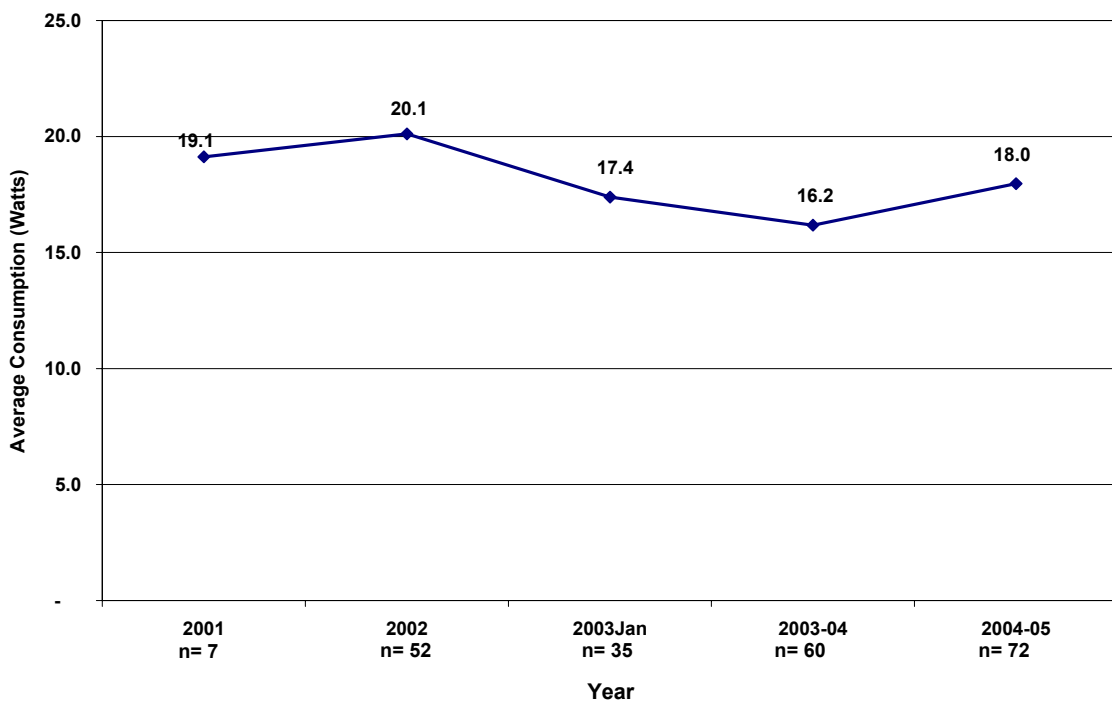


Figure 61 shows that for passive standby, some improvement can be seen in the distribution of measurements over time. A smaller proportion of units are registering passive standby of more than 10W and there has been a steady increase over the last five survey's in the units consuming less than 1W. The 2004/05 survey found 40% of models are now achieving passive standby readings of less than 1W. Based on average consumption there has been a statistically significant improvement (i.e. decrease) in passive standby consumption from 2002 (7.8W) to 2003 (4.1W). However there has been no further decline in 2004/05 with average passive standby static at 4.6W. Average passive standby results can be viewed in Figure 62.

Off mode is now present in less than 3% of models. With such low sample sizes comparison between years has no relevance.

Figure 61 – Power measurements for integrated stereos: passive standby mode

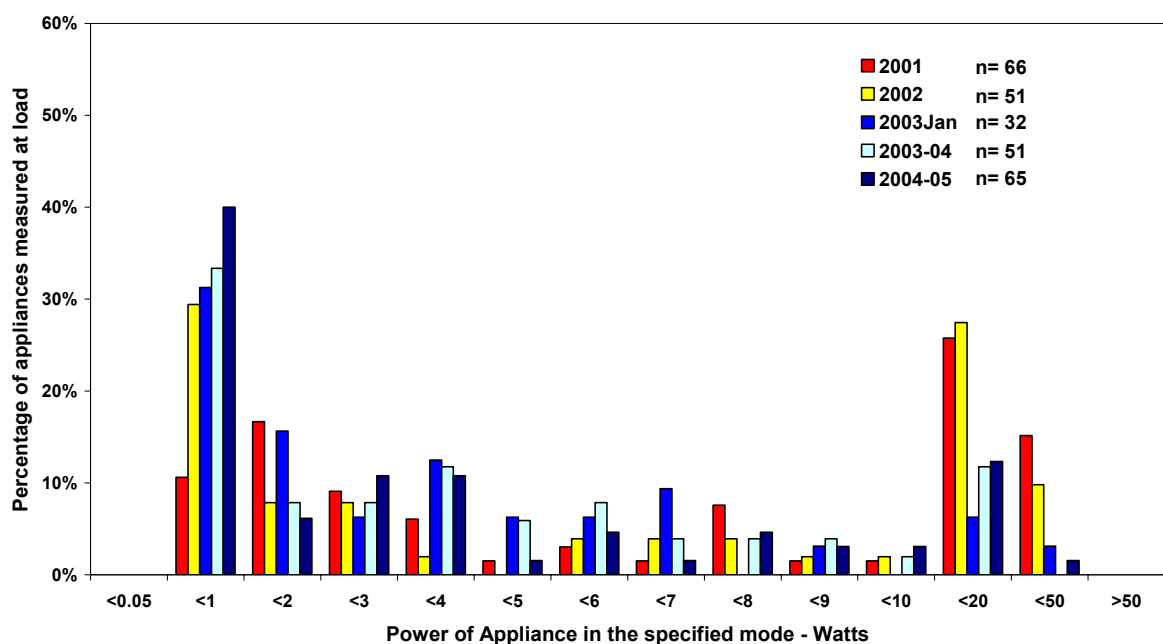
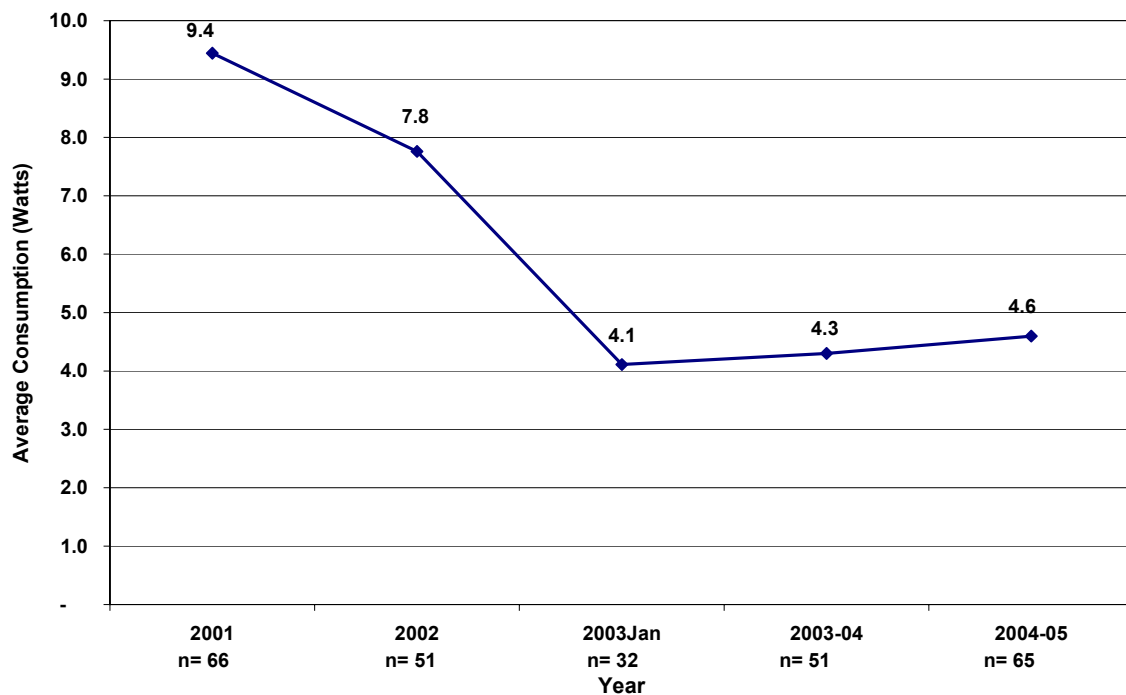


Figure 62 – Average power measurements for integrated stereos: passive standby



Portable Stereos

Portable stereos can be operated using mains power or batteries. They are mobile single units that can perform more than one function such as CD player, tuner, tape deck, etc. The survey measured 40 of these appliances and none displayed an ENERGY STAR label. Some units had remote control as well as manual operation. Variants included CD capacity (multi-disk), presence of a tape deck, and digital displays. Seven products tested had an off mode.

These appliances were measured in active and passive standby and off mode. In active mode the average power was 6.7W with maximum power measured at 20.5W and minimum at 2.8W. Two models were not measured in this mode as they had limited functions with only in-use and off mode present. Average power consumption in passive mode was 2.1W and the maximum power was 5.1W with a minimum of 0.7W. Seven stereos had no remote control function and no passive mode. All of these units had an off mode resulting in an average consumption of 1.9W and ranging from zero consumption to 3.5W. Table 34 presents these results.

Table 34 – A summary of portable stereo results

Appliance:	Stereo - Portable			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	40	6.7	20.5	2.8
Passive	35	2.1	5.1	0.7
Off	7	1.9	3.5	0.0
Total Number of Units	42			

Figure 63 shows the distribution of measurements for portable stereos in active standby. The graph shows that there has been little change in the distribution over the sample with the majority of models using less than 6 watts.. The 2004/05 survey saw a slight increase with the average being 6.7W however this is not statistically significant when compared with an average of 5.4W in 2003/04 and 2003 and 5.2W in 2002. The average active standby measurements shown in Figure 64 indicate that this mode is stable at present. Only one unit was measured in active standby in the 2001 store survey.

Figure 63 – Power measurements for portable stereos: active standby mode

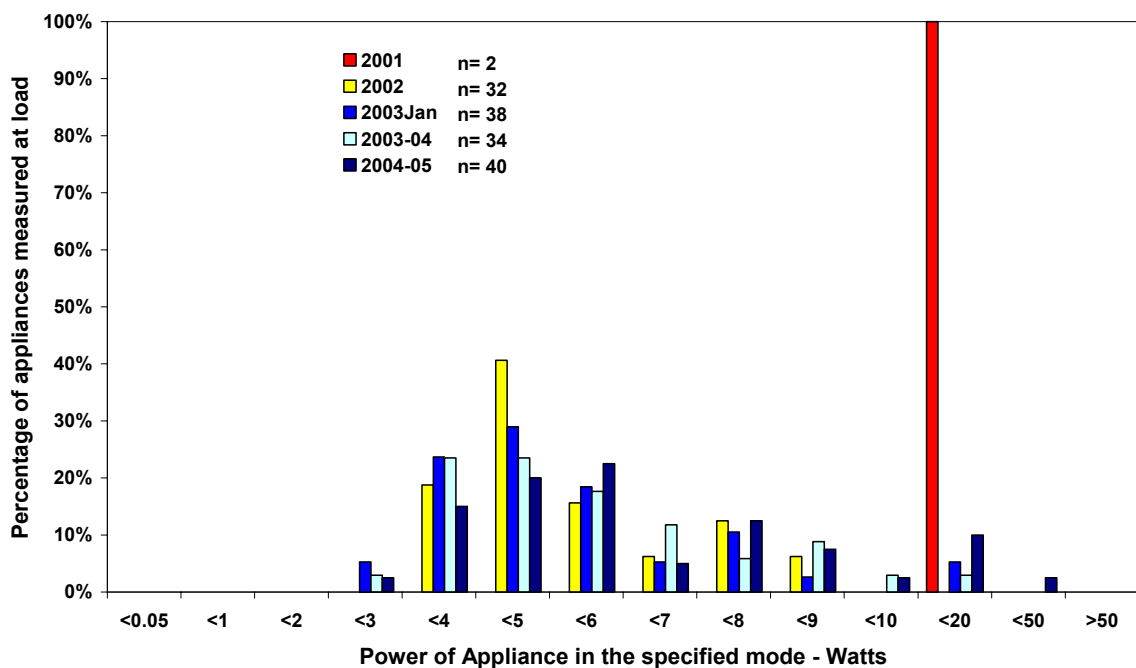


Figure 64 – Average Power measurements for portable stereos: active standby mode

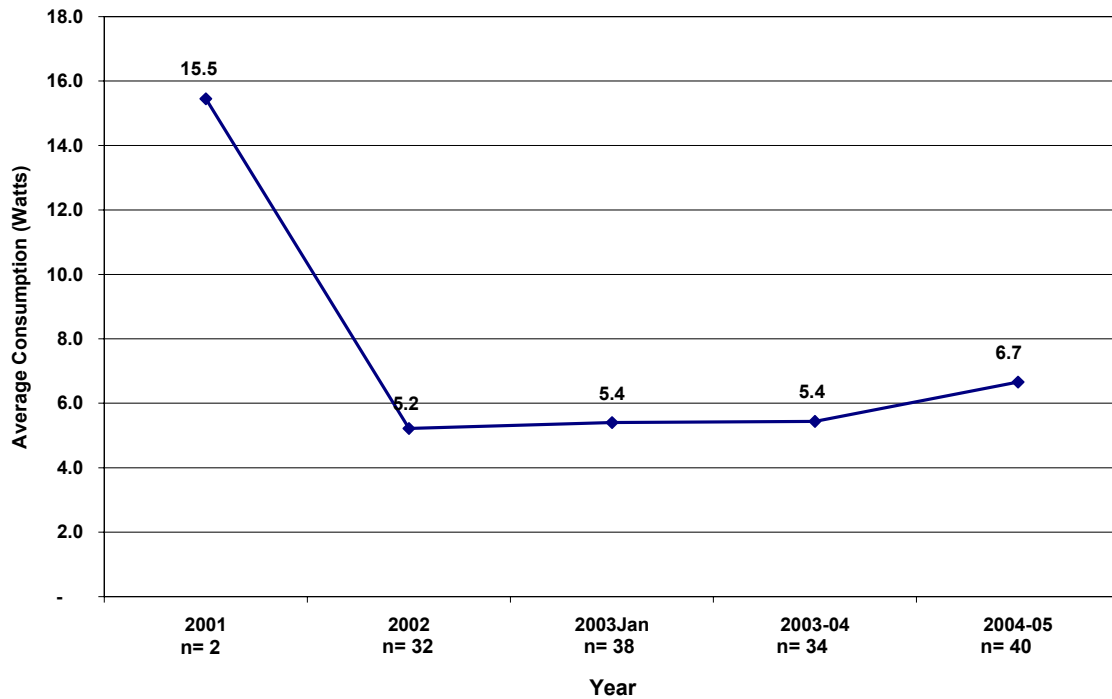


Figure 65 shows that in 2004/05 there was an increase in the proportion of units registering a passive standby greater than 3W compared to the last 3 years. This year it rose to 23% compared with 10% in 2003/04. Overall however, average passive standby shown in Figure 66 indicates that there has been little change. For the last 4 years it has ranged from 1.8W to the current 2.1W. Too few models have off mode to allow a comparison. Overall it appears that portable stereo consumption is relatively stable for all modes.

Figure 65 – Power measurements for portable stereos: passive standby mode

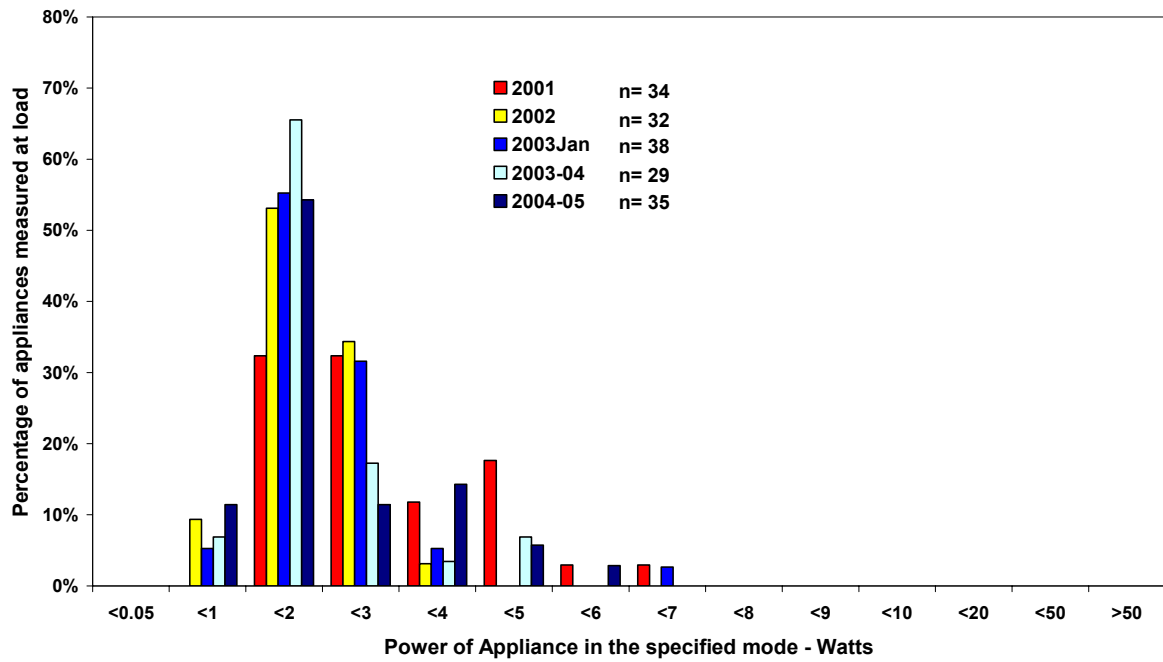
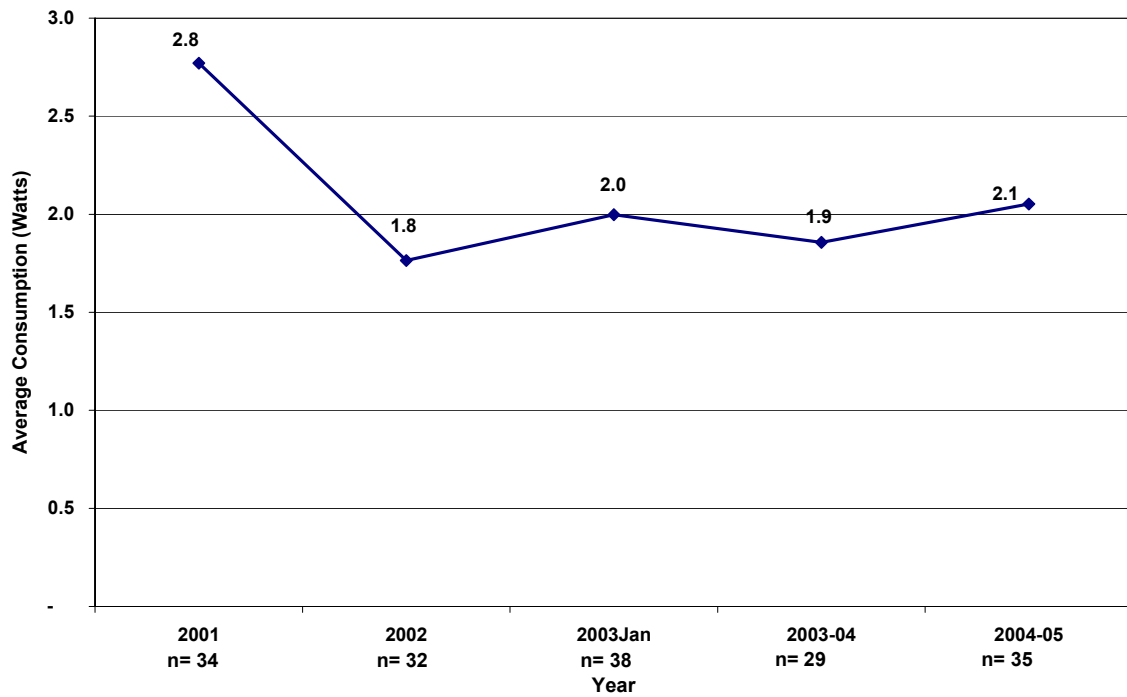


Figure 66 – Average Power measurements for portable stereos: passive standby mode



Separate Component Stereo Equipment

Previous store surveys conducted in 2001 and 2002 collected data on separate stereo components such as tuners, tape decks, CD players, receivers and amplifiers. The advent of “Home Theatre Systems” and DVD player technology has rendered separate stereo components almost obsolete. Limited numbers of appliances were offered for sale the stores visited in this year’s survey (2 mini disk recorders, 8 CD players, 1 receivers and 1 tape deck). Due to the small numbers of these products and declining popularity they have not been reported on individually.

Home Theatre – AV Receivers

AV Receivers or surround sound amplifiers³, consist of a number of output channels suitable for both audio and visual (VCRs and DVDs) equipment. Most of the models tested had inbuilt tuners while the others were purely amplification units. Most of the models had remote operation. This category also includes receivers that have built in DVD players but not those with decoders for accessing digital television signals. Previous studies have recorded in-use consumption for this product, however new definitions now view this state as active standby. As such past results have been redefined to reflect this and all future measurements will be recorded as active standby mode.

Fifty-one AV Receivers were measured in active, passive standby and off modes. There were 6 AV receivers displaying an ENERGY STAR label, and all complied with Phase II passive standby criteria. When in active standby the average power consumption was 41.2W with a maximum of 112.3W and a minimum of 11.1W. A total of 48 units could be tested in passive mode with the average power being 1.3W. The highest consumption in the mode was recorded at 6.4W with the lowest 0.2W. Off mode was present for 13 AV receivers. The average power consumption was 0.2W with a high of 0.7W and a low of zero. Table 35 provides a summary of the results for AV receivers.

Table 35 – A summary of AV Receiver results

Appliance:	Home Theatre - AV Receiver			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	51	41.2	112.3	11.1
Passive	48	1.3	6.4	0.2
Off	13	0.2	0.7	0.0
Total Number of Units	51			

Figure 67 shows that the distribution of measurements taken in active standby has remained relatively stable. The 2004/05 survey found that most units were consuming

³ In the 2002 store survey, AV receivers were reported on as “surround sound systems”. As the technology is new for these products, the market definitions are also changing and establishing themselves. At the time of writing this report “AV receivers” were considered to be the standard name for this product type.

between 35W and 50W in active standby. Average active standby increased slightly from 39.3W to 41.2W.

Figure 67 – Power measurements for AV receivers: active standby mode

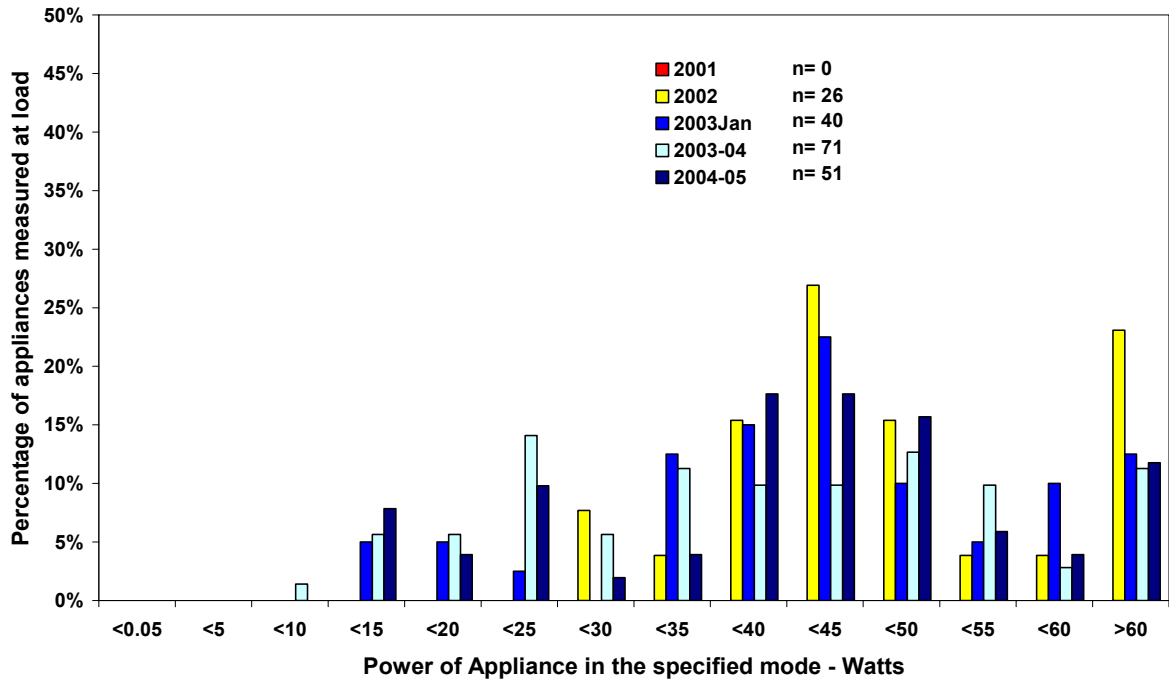


Figure 68 – Average Power measurements for AV receivers: active standby mode

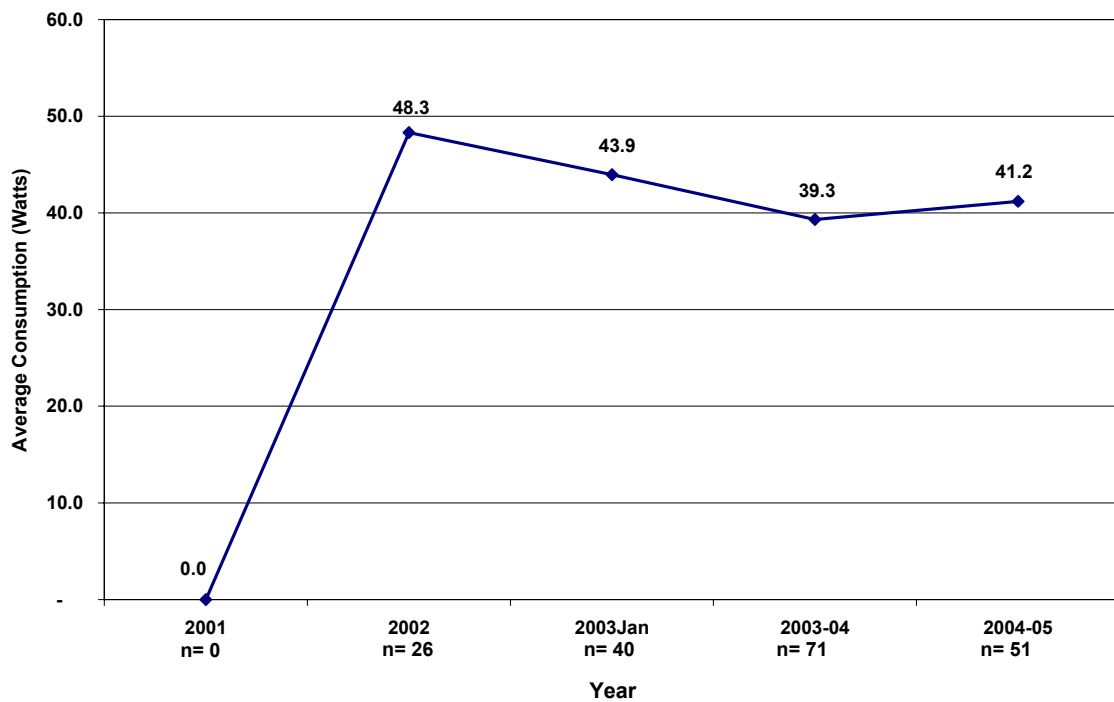


Figure 69 shows that the distribution of measurements taken in passive standby has remained stable in 2004/05. However unlike previous years there were no models consuming more than 7W. Average passive standby measurements show that there has been a slight improvement in standby consumption dropping again in 2004/05 to 1.3W. As demonstrated in Figure 70 there has been a small decrease in average standby each year since 2002. Whilst not statistically significant, when considered with the distribution data, suggests a positive indication for declining standby.

Figure 69 – Power measurements for AV receivers: passive standby mode

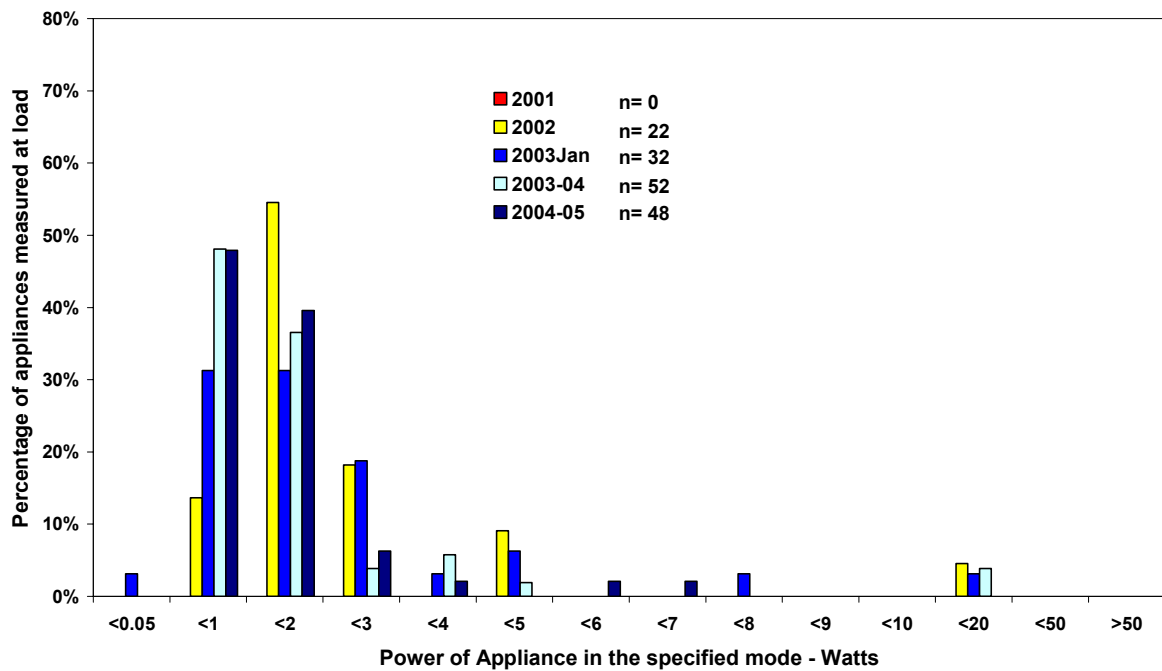
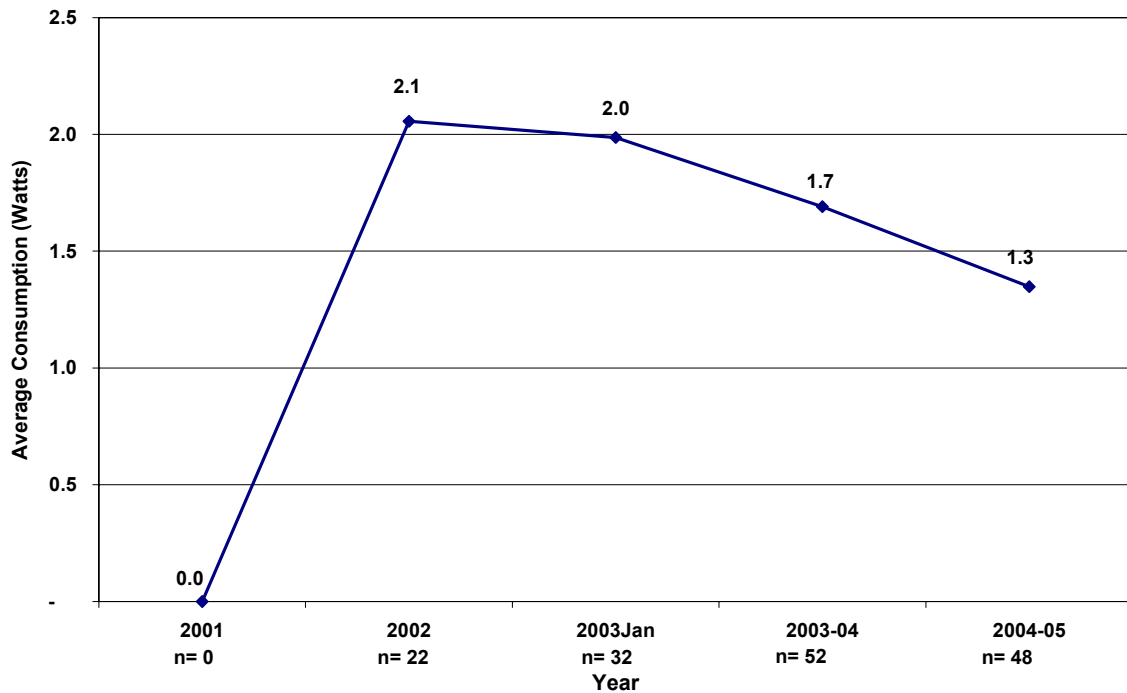
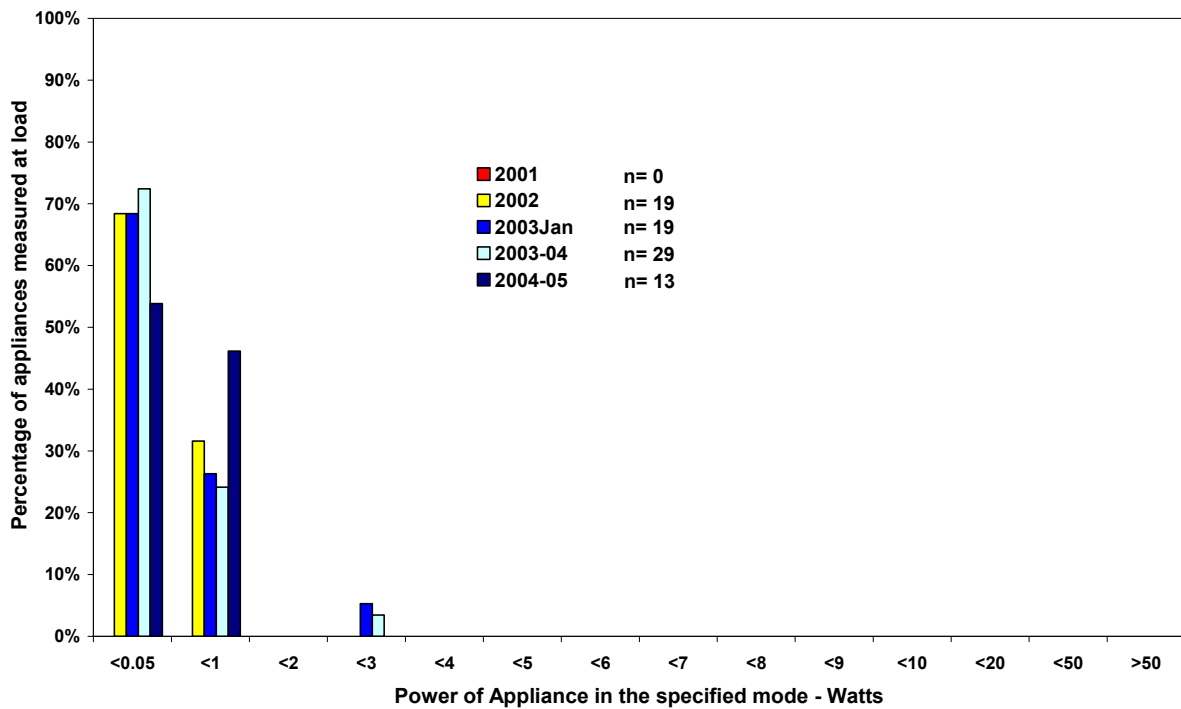


Figure 70 – Average power measurements for AV receivers: passive standby mode



The vast majority of AV receivers have no consumption when in off mode as demonstrated in Figure 71. In 2004/05 all units measured consumed less than 1W in this mode. Average off mode has remained constant at 0.2W for all 4 surveys.

Figure 71 – Power measurements for AV receivers: off mode



Home Theatre Systems

Home Theatre Systems generally include various combinations of an AV receiver, a DVD player, an amplifier, built in digital decoder and six speakers including a subwoofer for bass sounds. The key defining feature for the purpose of this study is that all components are powered by one power lead. Home Theatre Systems can be made up of separate components or include several functions in one housing case. This category does not include separate components packaged together and sold as a system if each component has a separate lead. Those items were measured individually and recorded in the appropriate category. Ten systems displayed an ENERGY STAR label. Five complied with the Phase II criteria (<1W) while three recorded passive standby between 1W and 4W. Two units could not be measured in passive standby.

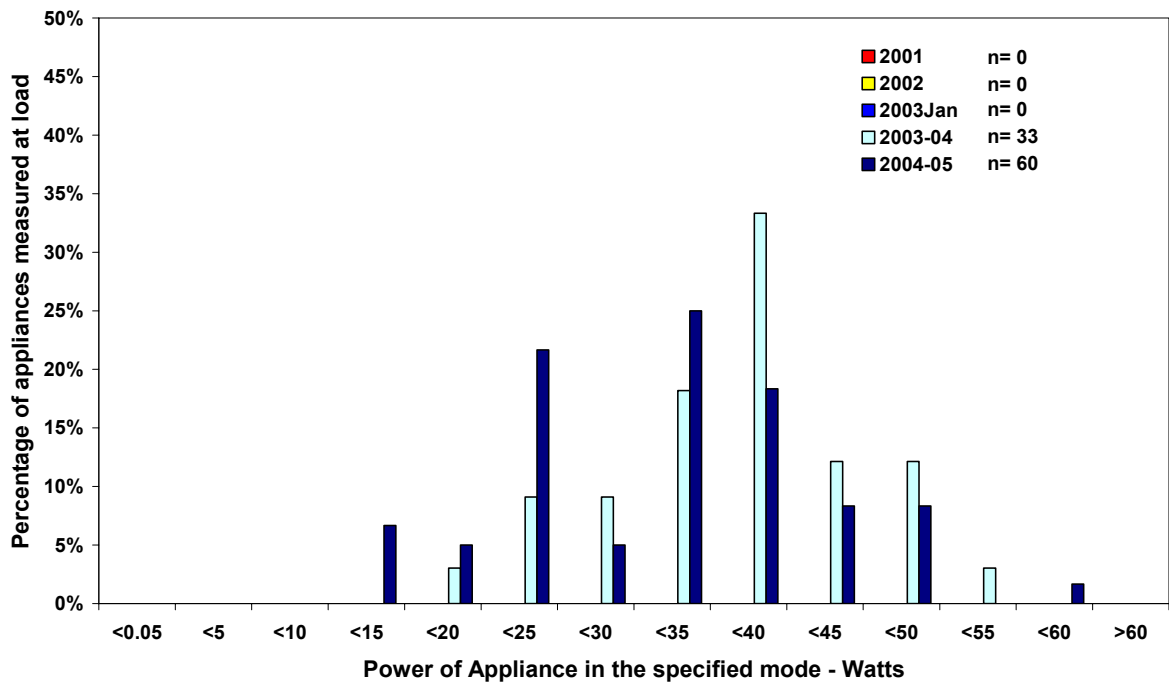
Home Theatre Systems were measured in active, passive standby and off mode. In total 61 units were measured. In active standby consumption ranged from 12.1W to 55.7W averaging out at 31.5W. One unit could not be measured in this mode due to a faulty switch. The average consumption for passive standby was 2.2W with a minimum was 0.2W and the maximum was 18.1W. Eleven home theatre systems had an off mode. All had consumption less than 1W in this mode. Table 36 summarises these results.

Table 36 – A summary of home theatre system results

Appliance:	Home Theatre –Systems			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	60	31.5	55.7	12.1
Passive	54	2.2	18.1	0.2
Off	11	0.1	0.9	0.0
Total Number of Units	61			

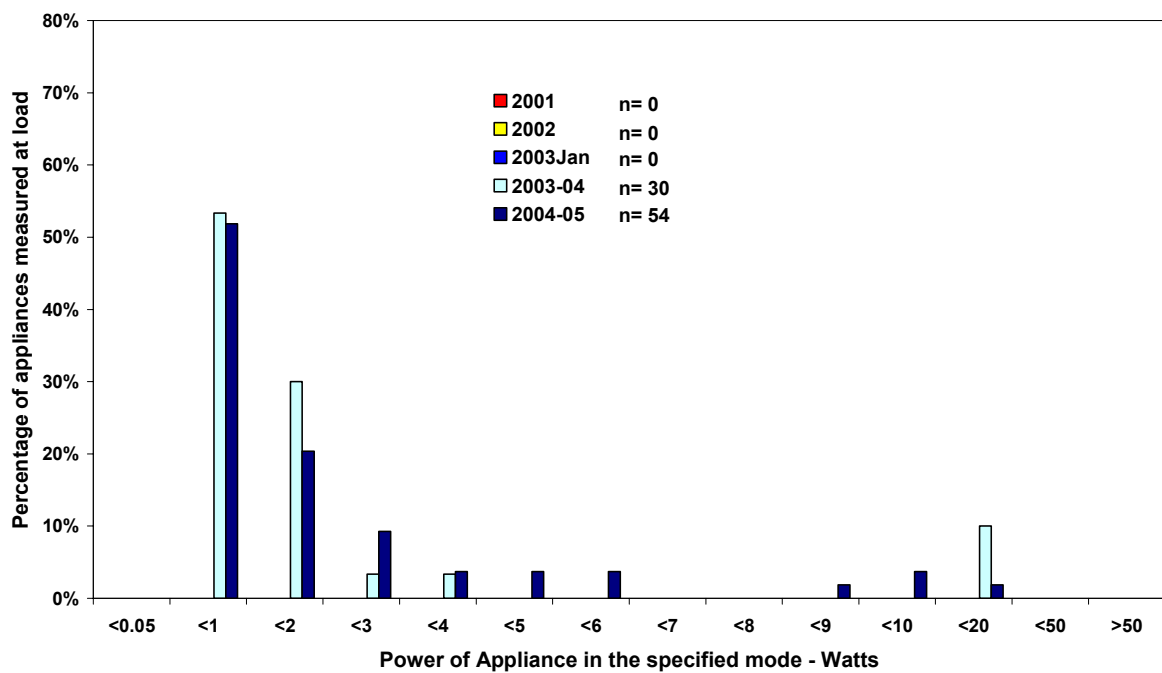
In active standby mode the 2004/05 survey found nearly 40% of Home theatre systems consumed less than 25W in standby compared with around 10% the previous year. Average active standby also dropped from 35.9 W to 32.5 W. However as Home theatre systems have only been measured in two surveys it is too early to suggest any trend. The results for the past two years are presented in Figure 72.

Figure 72 – Power measurements for home theatre systems: active standby mode



The distribution range of home theatre systems in passive standby was the same in both surveys. As shown in Figure 73 most products consume less than 1W in this mode. It is of concern that some products are using more than 8W in this mode. Average consumption in passive standby was 2.4W in 2003/04 and 2.2W in 2004/05. Off mode is only present in a small number of units. Over the 2 years only one unit has had any consumption in this mode and this was less than 1W. At this stage it would appear that the consumption patterns of the home theatre systems market are stable.

Figure 73 – Power measurements for home theatre systems: passive standby mode



Sub Woofers

Subwoofers are large speakers that produce low-frequency (bass) sounds. There are two types of subwoofers: passive subwoofers rely entirely on the main amplifier for power while active subwoofers have their own power source with a separate amplifier. A home theatre system will generally have five speakers and a subwoofer, although not all home theatre systems necessarily include subwoofers in the “package”.

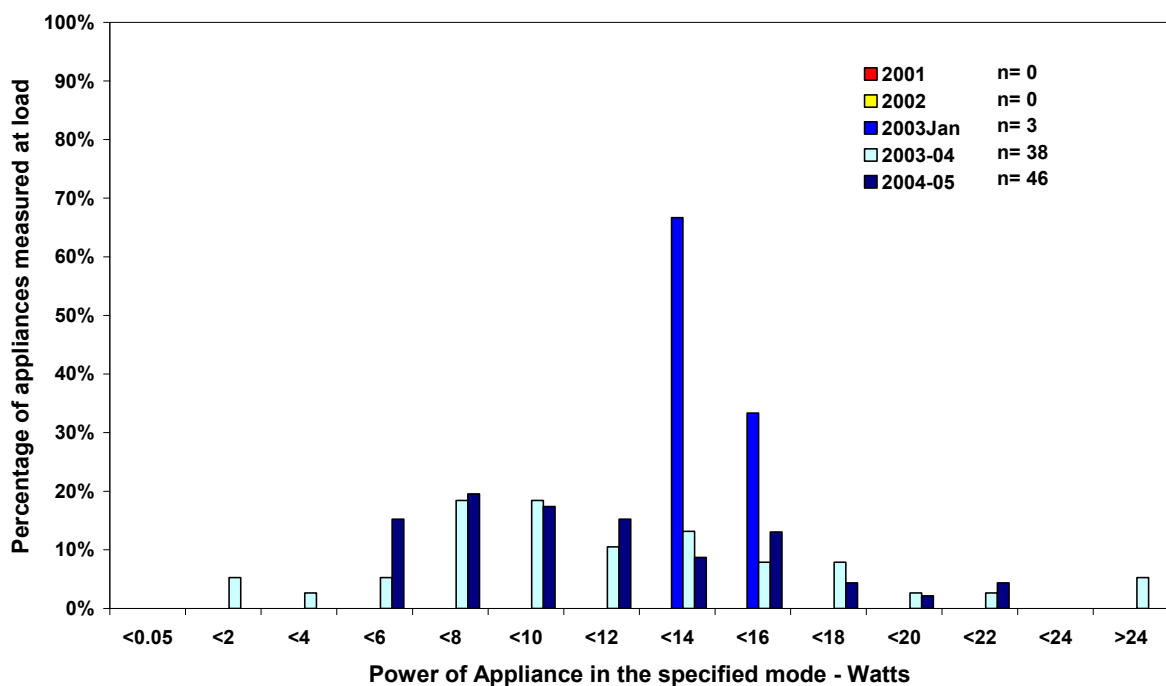
The 2004/05 survey found 49 subwoofers that could be measured in stores. They were measured in active, passive standby and off as appropriate. In active mode 46 models were measured with average active standby calculated at 10.4W. The distribution of results was quite wide with the minimum recorded at 4.5W and the maximum at 20.4W. Three units could not be measured in active as it required an AV receiver to be plugged in to activate it. Passive standby is not usually considered as subwoofers generally do not have remote control operation, however ten units were found to have passive as their lowest possible state. Two of the units were controlled by the AV receiver i.e. when the AV was in standby so were the subwoofers, seven units had a standby and a hard off button, the 1 unit had remote control off only. In passive standby the units registered between zero and 17.8W averaging 3.8W. In off mode 45 sub woofers were measured. The average was 0.7W with the vast majority having zero consumption and a total of 91% consuming less than 1W. The maximum consumption was 10.2W and the minimum was zero. It should be noted that the off switch for one third of sub woofers was at the rear of the appliance and difficult to access. This may reduce the likelihood of consumers using this mode. Table 37 summarises the results.

Table 37 – A summary of subwoofer results

Appliance:	Home Theatre - Subwoofer			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	38	10.9	26.3	0.1
Passive	5	1.7	7.4	0.0
Off	31	0.4	6.6	0.0
Total Number of Units	39			

The active standby results from the previous survey are similar to the 2004/05 results. Figure 74 shows and almost identical distribution pattern between the two years which is further reinforced by the average active standby results of 10.9W in 2003/04 and 10.4W in 2004/05. The overwhelming majority of sub woofers in all surveys have no consumption in off mode. In passive standby the small sample sizes make comparison impractical at this stage. The consumption pattern for subwoofers would appear to be stable.

Figure 74 – Power measurements for sub woofers: active standby mode



Set Top Box

In simple terms, a digital set top box converts digital signals from TV stations into a signal that an analogue television or display screen can broadcast. From 2008 homes with analogue televisions will require a set top box in order to view free to air broadcasts, therefore this market is expected to grow rapidly. Set top boxes were measured active, passive standby and off modes. Previous studies have recorded in-use consumption for

this product, however new definitions now view this state as active standby. As such past results have been redefined to reflect this and all future measurements will be recorded as active standby mode.

In 2004/05 the survey found 46 different models in the stores. The average consumption when in active standby was 14.2W with a minimum of 6.5W and a maximum of 32.9W. In passive mode 43 units were measured ranging from 2.2W to 20.7W. The average passive standby consumption was 8.6W. Fourteen set top boxes had an off mode. All of these had zero consumption in this mode. Table 38 summarises these results.

Table 38 – A summary of set top box results

Appliance:	Set Top Box			
Mode	Number of Measurements	Average Power (W)	Power Max	Power Min
In Use	NA	-	-	-
Active	45	14.2	32.9	6.5
Passive	43	8.6	20.7	2.2
Off	14	0.0	0.0	0.0
Total Number of Units	46			

The distribution range of set top boxes in active standby was identical over the last two surveys; however as can be observed in Figure 75, the 2004/05 sample had more models at the lower end of consumption. This translated into a lower average standby of 14.2W compared with last surveys 16.8W. There is no statistical significance to this data and with only two years of meaningful data to early to suggest a trend.

Figure 75 – Power measurements for set top boxes: active standby mode

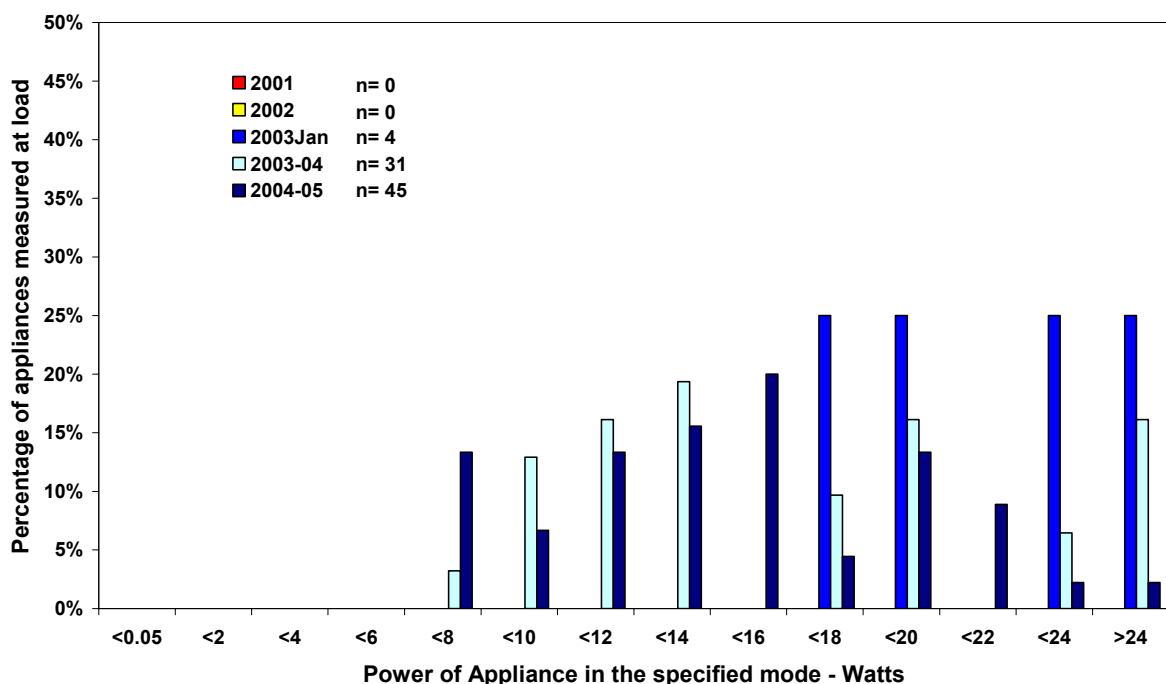
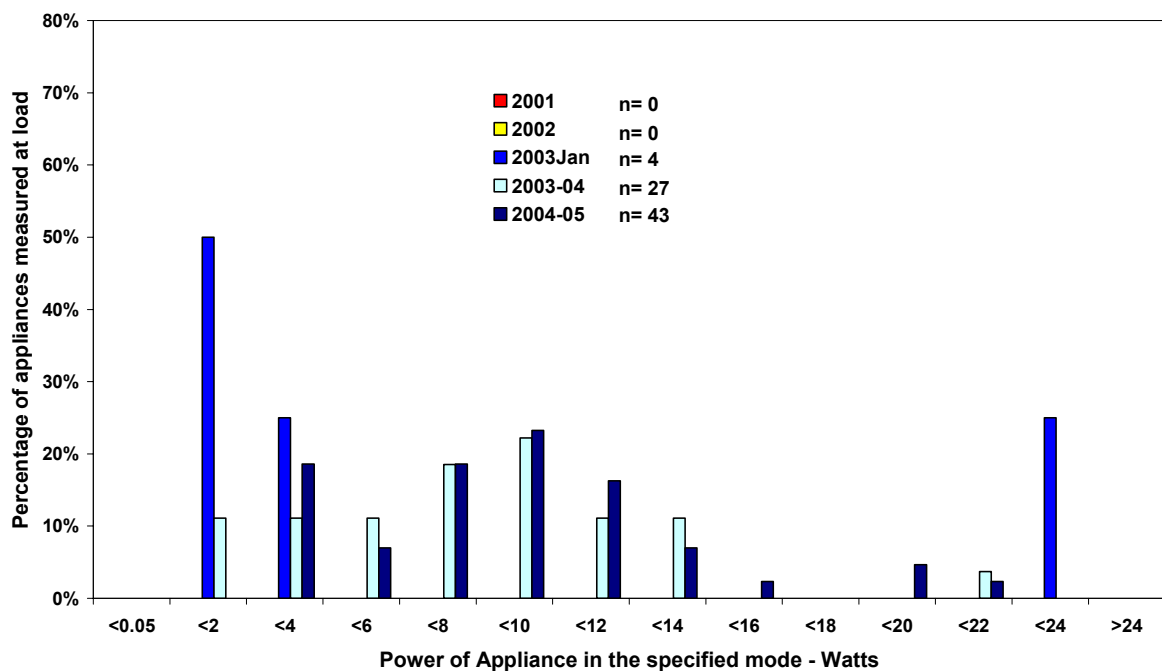


Figure 76 presents the passive standby data for set top boxes. The spread of results are similar for both years. Average passive standby rose slightly in 2004/05 to 8.6W from 7.7W in 2003/04. There is no statistical significance in these results and as there are no apparent trends at this stage. In off mode most set top boxes have no consumption. Over all the surveys only 3 set top boxes have been found to consume in off mode and all used less than 1W.

Figure 76 – Power measurements for set top boxes: passive standby mode



Other Home Theatre Components

A number of other home theatre components were measured however as each category contained less than five models they have not been reported individually. These included; wireless speaker components (4), Surround Processor (1), Speaker Tower (1) and Karaoke Machine (1).

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