

Report 2008/12

# *Standby Power Store Survey 2008-09: Interim Report*

*Prepared for  
Energy Efficiency Branch, Department of the  
Environment, Water, Heritage and the Arts*

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# *Introduction*

## *Background*

This survey of standby power consumption of appliances is conducted as part of the Alignment of National Standby Power Approaches Project, which is being driven by the Australian Government's Department of Environment, Water, Heritage, and the Arts with assistance from Korea, as part of the Asia Pacific Partnership on Clean Development and Climate Change (APP). The APP members include Australia, Canada, China, India, Japan, Republic of Korea, and the United States of America. The purpose of this union is "to address the challenges of climate change, energy security and air pollution in a way that encourages economic development and reduces poverty". The standby project is one of several being undertaken by the APP's Building and Appliances Taskforce (BATF).

Standby power consumption, which is the power used by appliances when they are not performing their primary function, has been recognised as one of the most cost effective potential end-use energy efficiency measures. While the amount of standby power varies markedly between countries, the global energy consumption from standby has been estimated by the International Energy Agency (IEA) at between 200 TWh and 400 TWh per year.

Australia is undertaking surveys in line with the Basket of Products Approach. This survey is the key component of the Alignment of National Standby Power Approaches Project and has been designed to enable consistent collection of data on standby power, resulting in a representative set of standby measurements. The data will be gathered for a common set of products in different regions and countries around the world. Such a comprehensive set of data will facilitate international comparisons, allowing trends in standby consumption, by products and/or by countries, to be tracked over time. The benefit of such a high quality data set is to enable benchmarking for success and to provide a sound basis for policy development and analysis.

This international survey method uses the principles set out in the test procedure IEC62301 and is based on the experience Australia has gained by conducting in-store surveys in the Australian marketplace since 2001. The Australian surveys target new appliances being offered for sale in selected major retailers (measured in situ) and complement related surveys of individual homes measuring all electronic products. This information has been extremely valuable because it provides trend data in standby power for new products. The database of over 7,000 measurements has enabled policy makers to very quickly establish which appliance types have increasing or decreasing standby trends.

## Purpose of Report

This report summarises the results of the in-store standby measurements for almost 300 new household appliances that were undertaken in July/August 2008. This survey constitutes the first round of measurements; subsequent surveys will be completed up to June 2009 to ensure that a representative sample of products is measured each year. It is estimated that approximately 600 - 700 measurements will be undertaken during 2008/09. The current results are summarised by product group and are compared with readings undertaken since 2003 in similar surveys. Measurements have been undertaken since 2001, however only the most recent 6 years are presented to ensure that the charts are readable.

This report provides an overview of the early results of the latest survey of standby power consumption. As further data collections are still planned these early results are entirely indicative. In some cases the result show sample sizes of less than 5 products, which is too low to use for comparison purposes. Therefore the results should be qualified as indicative if they are cited or used in other studies.

At the beginning of 2007 a discussion paper “Basket of Products” was released identifying 14 core products and 29 secondary products. These products were seen to be relatively common in most markets and readily available in retail outlets, making them easily measured in any country around the world. This core group of products form the basis of this survey, however where possible products form the secondary basket and/or other products of interest are also measured. Table 1 below lists the 14 core products while the complete list of products measured can be found in Appendix A.

**Table 1: Basket of Core Products**

Appliance Name	
1	Clothes washers
2	Microwaves
3	Televisions – CRT
4	Televisions – LCD
5	Televisions – Plasma
6	DVD players
7	Integrated stereos,
8	Portable stereos
9	Computer monitors – CRT
10	Computer monitors - LCD
11	Computer Printers Laser
12	Computer Printers Inkjet
13	Multi-Function Devices (MFD's)
14	External Power Supplies

## *Interpreting the Results*

### *Definition of Standby Modes*

Appliances and equipment with a “standby mode” may include any 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 the international basket of products survey the following definitions were used:

***Power – In Use (on):*** the power used by the product when performing its primary function.

***Power – Active standby*** Active standby is when the appliance is on but not performing its main function. For example, the DVD may be on but is not playing or recording. This mode is usually only present in devices (a) where there is a mechanical function which is not active (e.g. DVD drive or motor) but where power circuits are on, or (b) where a device has a battery and the device is charging

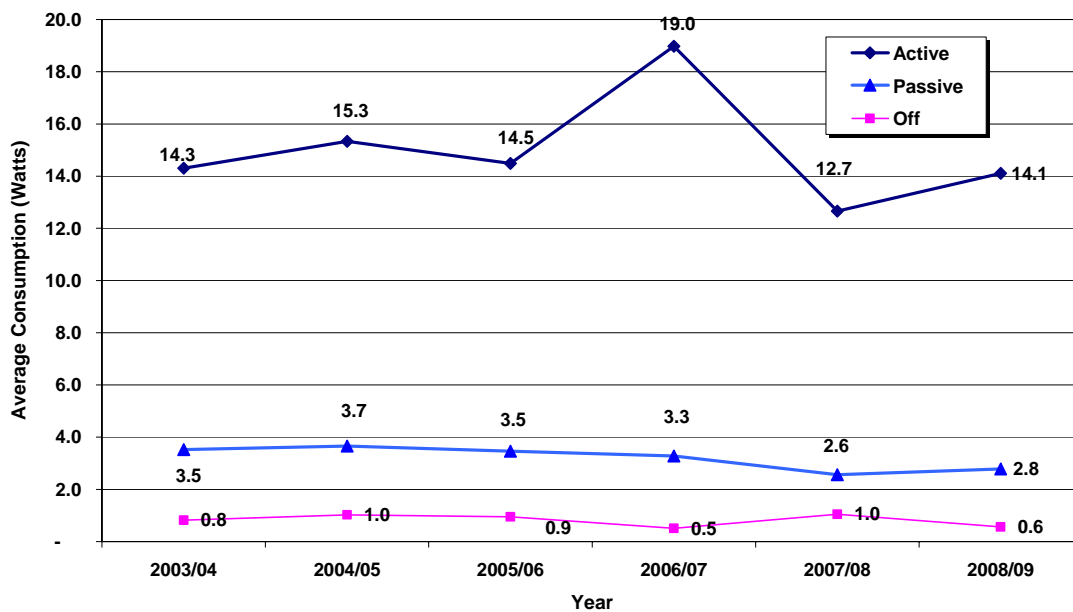
***Power – Passive standby*** When a product or appliance is not performing its main function (sleeping) but it is ready to be switched on (in most cases with a remote control) or is performing some secondary function (e.g. has a display or clock which is active in this mode). This mode also applies 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 (disconnected).

***Power – Off*** The product must have a power switch located on the product. Off mode is 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 – it can only be activated via the power switch on the product. No display should be active in 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. An LED may be present to indicate off mode.

## Summary of Results

Figure 1 presents the average power consumption by mode for all the surveys since 2003/04 and the interim 2008/09 results. Average passive standby is shown to increase slightly to 2.8 watts, reversing a downtrend since 2004/05. As this is based on only 300 measurements from the first round of data collection for 2008/09, this trend can not be verified. It should be noted that the number and mix of products measured in each year of the survey were somewhat different so the results need to be taken as indicative and trends within each product need to be examined separately.

**Figure 1 Summary of average consumption across all products – interim results**



The Table 2 on the following pages presents the average summary results by product category for this interim 2008/09 survey.

The Product groups are examined in detail in the following sections. Where there are sufficient measurements for 2008/09, the time series data for that product group is extended to 2008/09 and where there are not sufficient results for this product group, the time series data extends to 2007/08.

**Table 2 Summary of Interim Measurement Results 2008-09**

Appliance	Total Appliances	Passive Standby Mode				Active Standby Mode				Off Mode			
	Number	Valid Readings	Average (W)	Max (W)	Min (W)	Valid Readings	Average (W)	Max (W)	Min (W)	Valid Readings	Average (W)	Max (W)	Min (W)
Air Conditioner	5	4	2.6	5.1	0.7					1	0.0	0.0	0
AV Receiver	4	4	0.7	0.9	0.12	4	43.2	58.5	33.7				
Dishwasher	19					15	3.0	7.9	0.7	19	0.6	4.3	0
Dryer	5					4	3.4	5.0	1	5	0.9	2.5	0
DVD Player	20	19	1.2	3.9	0	20	7.7	17.9	3.3	3	0.0	0.0	0
DVD Recorder	4	4	2.6	4.4	1.3	4	17.1	19.4	13.8				
Espresso Machine	10									10	0.7	2.5	0
External Power Supplies	4	4	0.4	0.7	0.2								
Fan	7	3	1.0	1.2	0.7					4	0.0	0.0	0
Gas Water Heaters	6	6	4.9	8.3	1.5								
Hard Disk Recorder	15	15	6.6	15.8	1.3	15	23.2	28.5	11.1	1	0.0	0.0	0
Heater - Electric portable	7	3	0.9	1.5	0.5					5	0.2	0.9	0
Heater - Gas	12	4	3.1	4.7	0.9					8	0.8	6.3	0
Home Entertainment Other	3	2	3.3	5.6	1	2	9.6	13.8	5.3	1	0.0	0.0	0
Home Theatre System	16	14	0.7	3.2	0.1	16	33.7	78.0	16.7				
Juicer	9					2	2.3	2.3	2.2	9	0.6	2.3	0
Microwave	24	24	2.4	4.6	0.5								
Set Top Box	6	6	6.4	9.8	2.5					4	0.0	0.0	0
Stereo - Integrated	20	18	2.8	12.6	0.2	20	19.4	41.9	3.8				
Stereo - Portable	5	5	2.2	3.4	1	5	6.4	10.3	3.3				
Subwoofer	5	1	6.4	6.4	6.4	5	11.0	14.5	8.7	4	2.6	10.5	0
Toaster	13									13	0.1	1.2	0

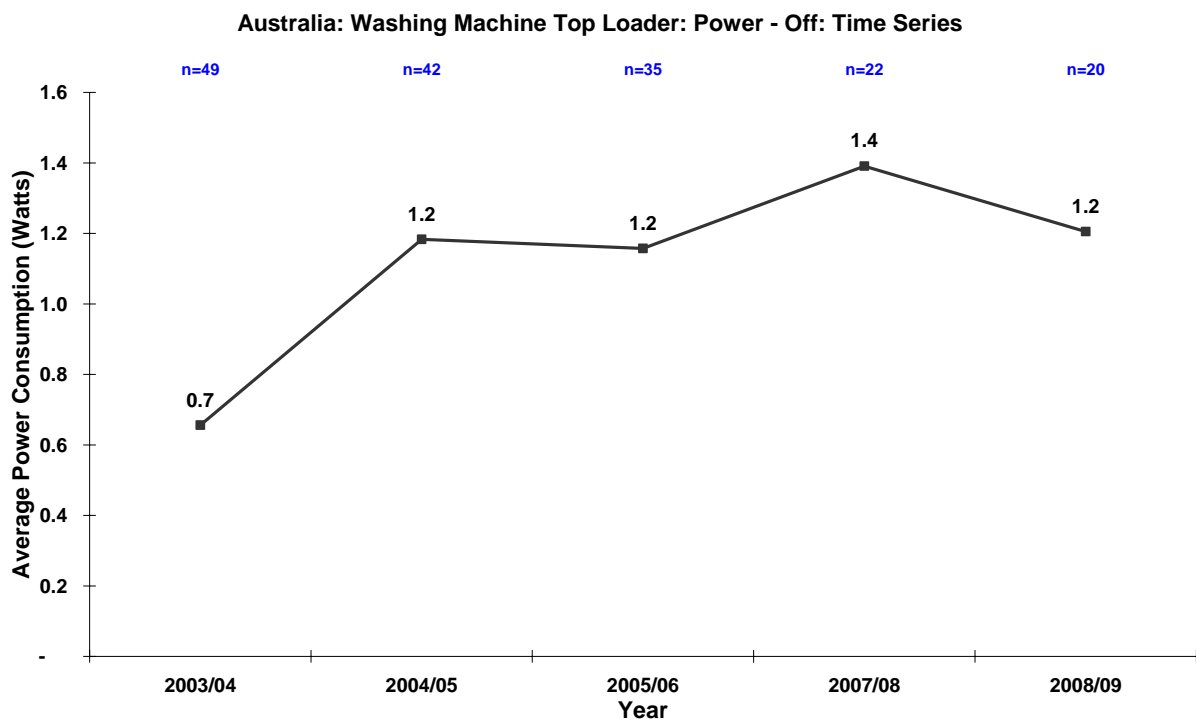
Appliance	Total Appliances	Passive Standby Mode				Active Standby Mode				Off Mode			
	Number	Valid Readings	Average (W)	Max (W)	Min (W)	Valid Readings	Average (W)	Max (W)	Min (W)	Valid Readings	Average (W)	Max (W)	Min (W)
TV - CRT	8	8	3.1	6.7	0.4					8	0.0	0.0	0
TV - LCD	20	20	3.1	27.0	0.04					11	0.1	0.1	0
TV - Plasma	9	9	0.4	0.5	0.06					3	0.0	0.0	0.02
TV/VCR/DVD	6	6	5.7	18.5	0.6	4	33.9	51.5	18.5				
VCR	4	4	2.0	2.0	2	4	6.9	7.8	6.1				
Washing Machine Front Loader	8					8	3.8	8.9	0.7	8	0.5	2.4	0
Washing Machine Top Loader	20					20	3.8	5.6	2.5	20	1.2	3.5	0
Grand Total	294	183	2.8	27.0	0	148	14.3	78.0	0.7	137	0.6	10.5	0

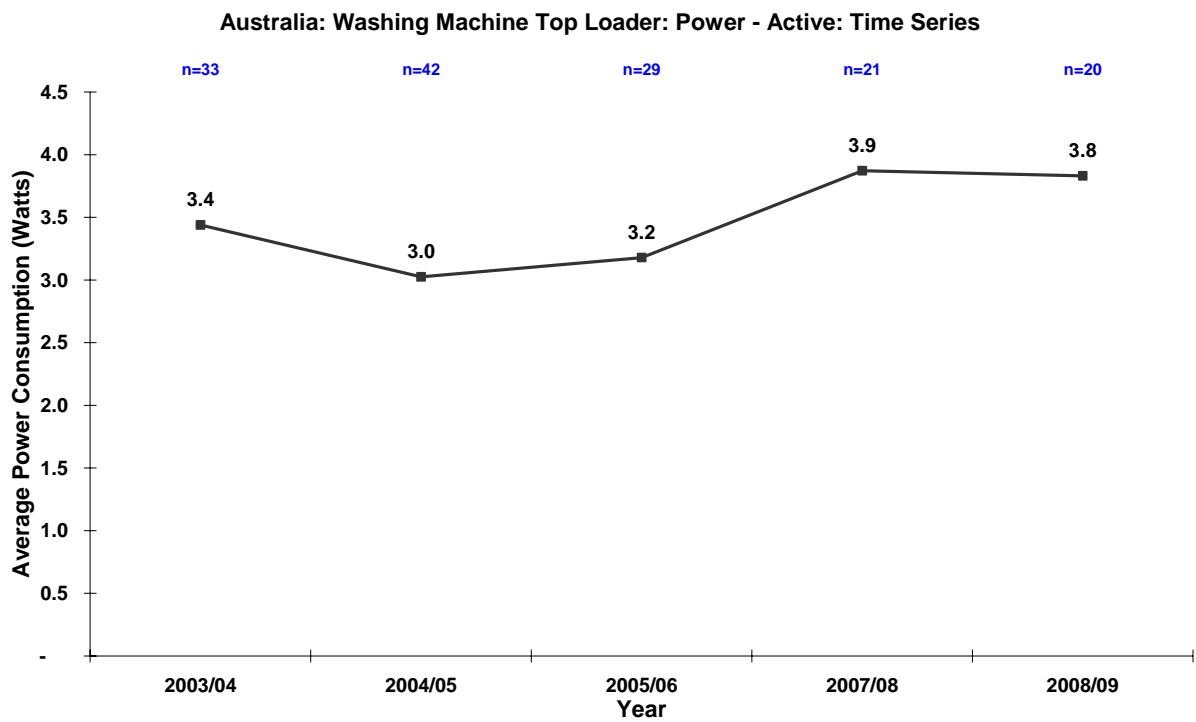
## Product Trends in Australia

### Clothes washers – Top Loaders

Average consumption for top loading washing machines in Australia has been stable for the last six years with no significant increase in off or active mode consumption during this time. These results are presented in Figure 2 and Figure 3. No washing machines were surveyed in 2006/07 year.

**Figure 2 Australian Time Series Data – Washing Machine Top Loader Off Mode**

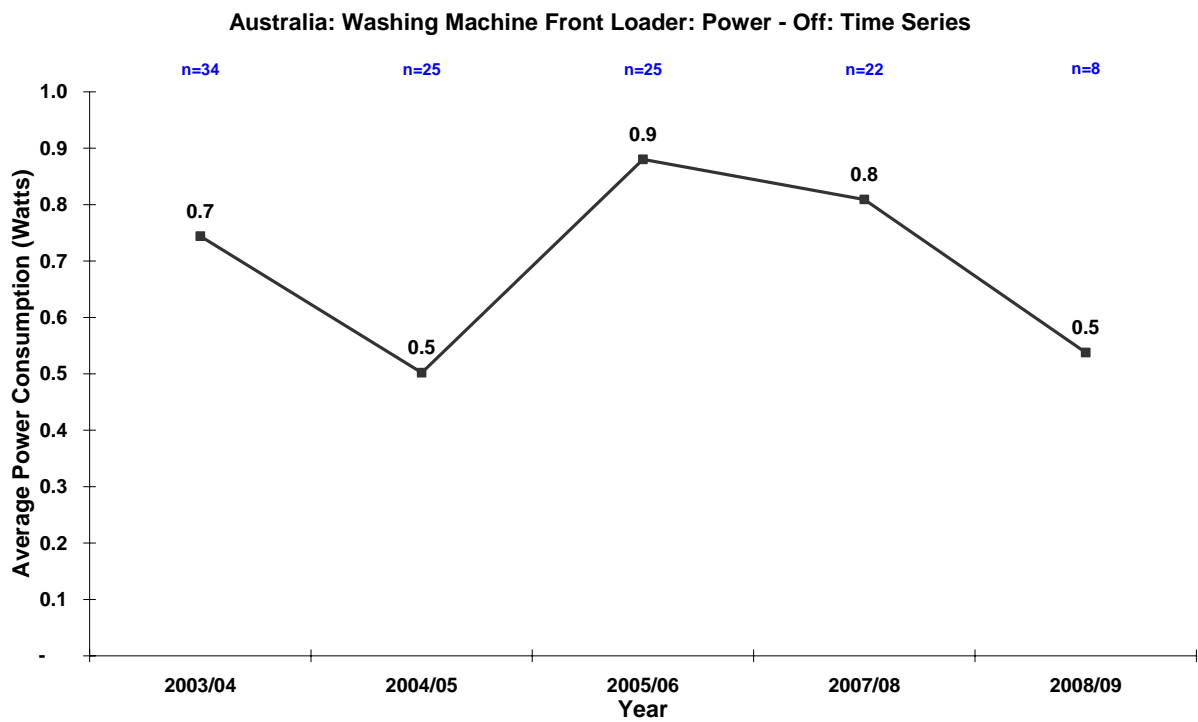


**Figure 3 Australian Time Series Data – Washing Machine Top Loader Active Mode**

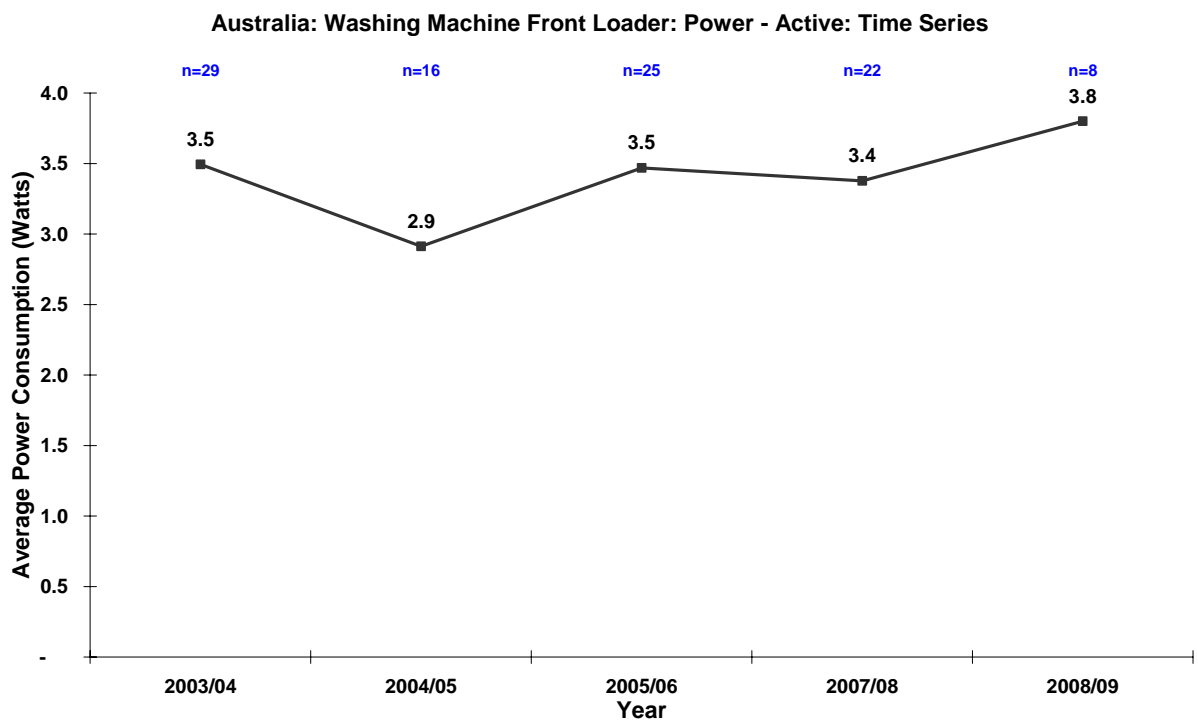
### *Clothes washers – Front Loaders*

Off mode consumption for front loading clothes washers in Australia has averaged at less than 1 watt for the last six years. Average active mode has remained stable at around 3.5 watts. No washing machines were surveyed in 2006/07 year. The results for off mode are presented in Figure 4, while Figure 5 represents active standby mode.

**Figure 4 Australian Time Series Data – Washing Machine Front Loader Off Mode**



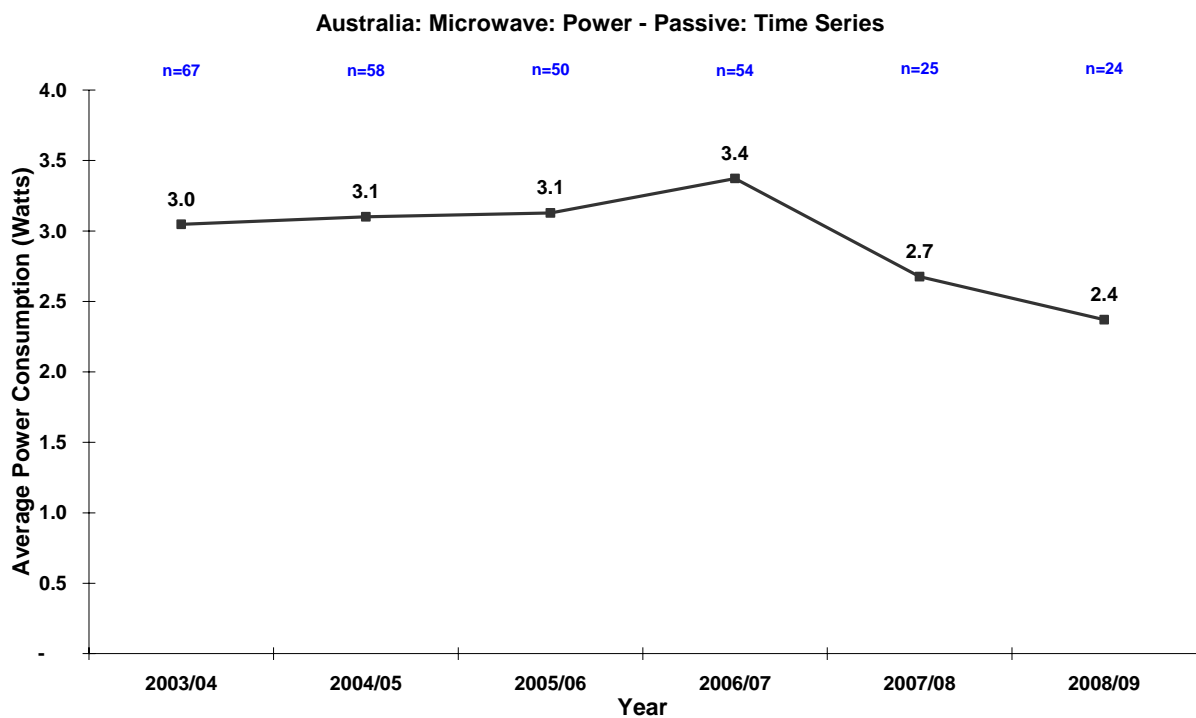
**Figure 5 Australian Time Series Data – Washing Machine Front Loader Active Mode**



## Microwaves

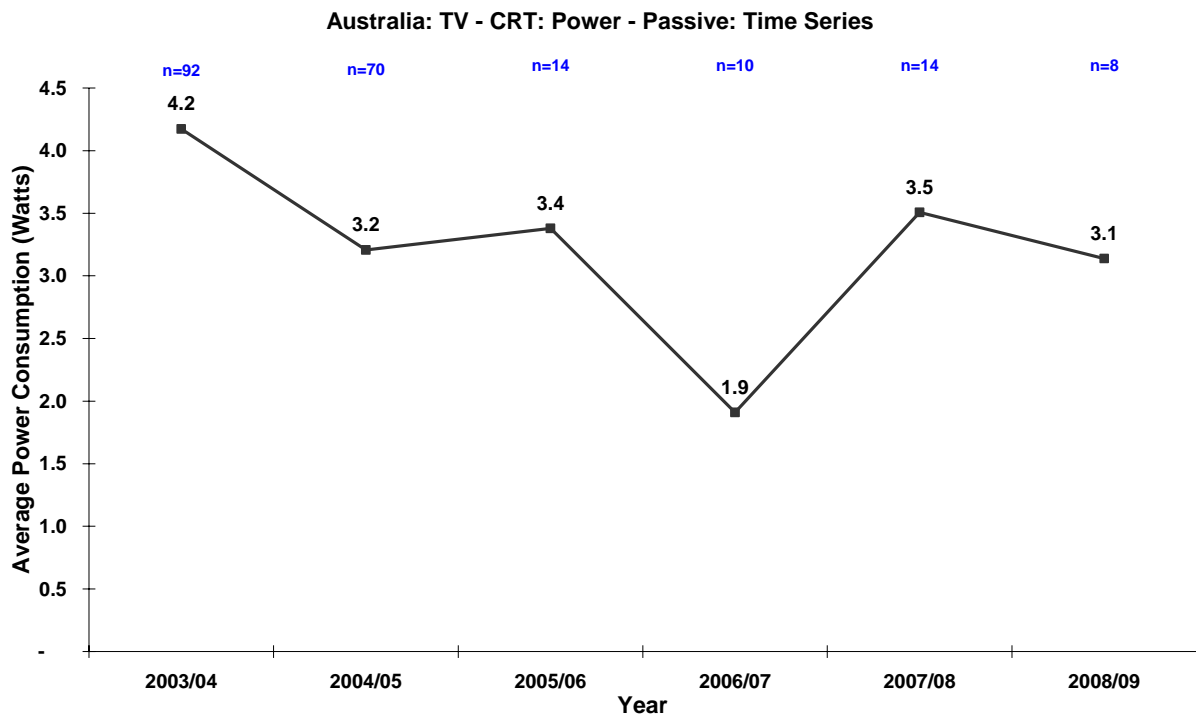
As shown in Figure 6 passive standby for microwave ovens has remained stable since 2003/04. However the latest survey recorded a statistically significant decrease in consumption which if validated in the next data collection period may be the beginning of a downward trend.

**Figure 6 Australian Time Series Data – Microwave Passive Mode**



## Televisions – CRT

Average passive standby consumption for CRT televisions reduced significantly in 2004/05 from around 4.2 watts to 1.9 watts in 2006/07. However recent data has shown levels remain stable at around 3 watts.

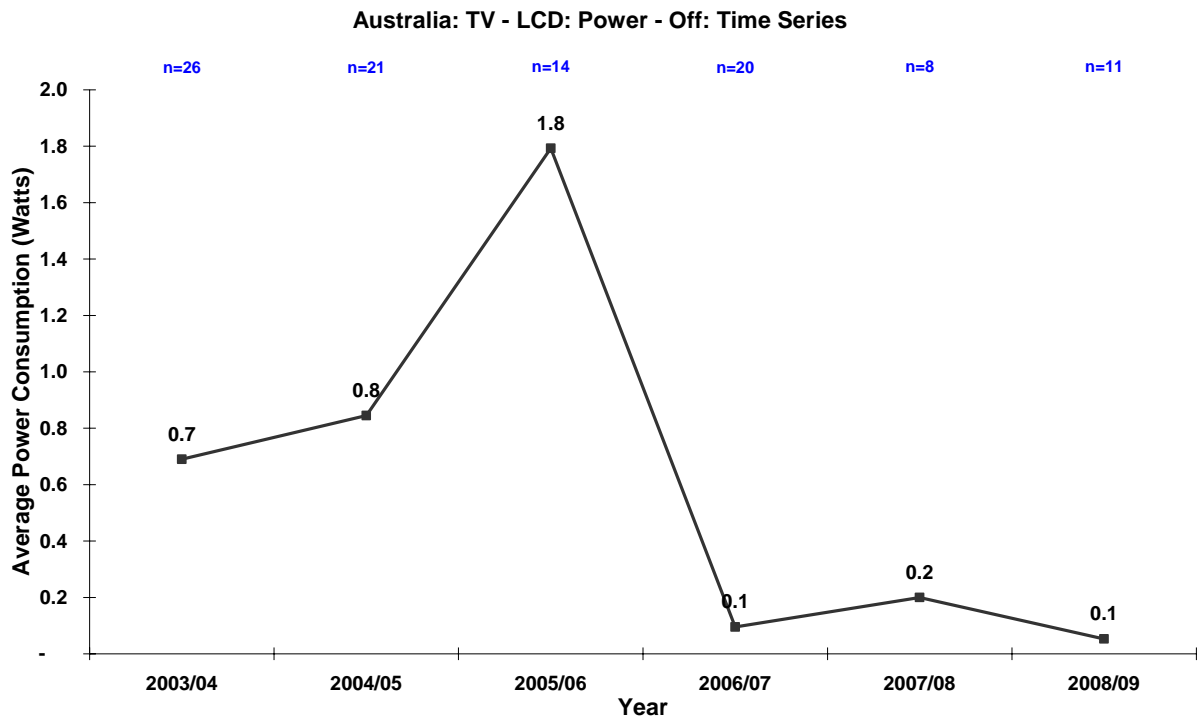
**Figure 7 Australian Time Series Data – CRT TV Passive Mode**

### Televisions – LCD

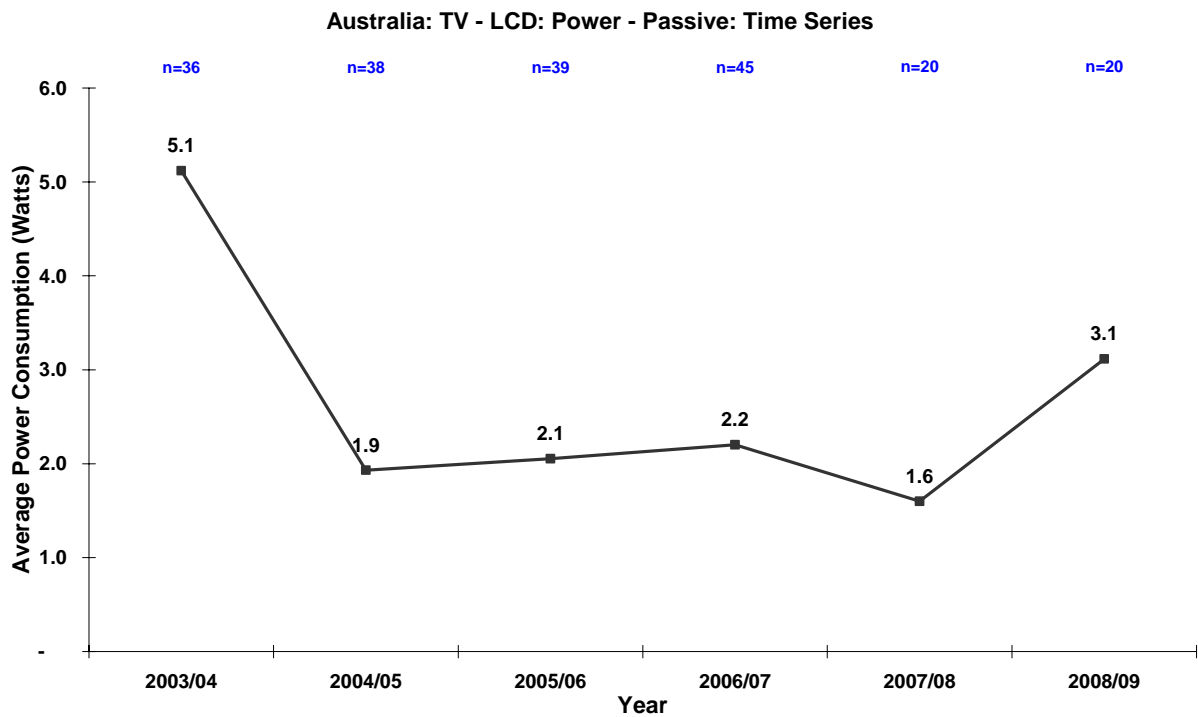
Average consumption for LCD televisions has dropped significantly over the past six years to be close to zero. As demonstrated in Figure 8 average consumption for last three years has been below 0.2 watts.

After taking a significant drop in average consumption in 2004/05 the passive mode for LCD has increased to around 3 watts. The 2008/9 data shows a small decline in earlier years has not continued. As shown in Figure 9 the latest survey found average passive standby for LCD televisions to be 3.1 watts. This is however the interim survey results and two outlying measurements were found to cause this increase in average passive standby power consumption. If these two outlying measurement are removed from the data set, the average passive standby power would have reduced to 0.5 watts. Further investigations and measurements will be undertaken during the next round of data collection.

**Figure 8 Australian Time Series Data – LCD TV Off Mode**



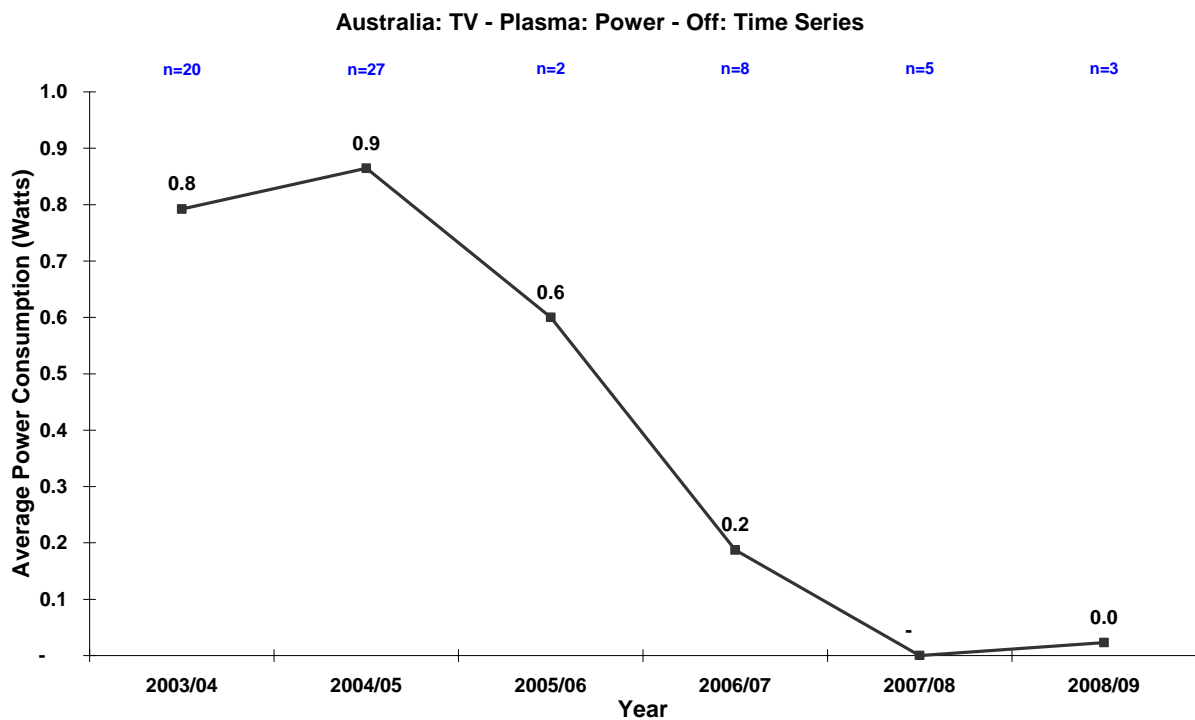
**Figure 9 Australian Time Series Data – LCD TV Passive Mode**



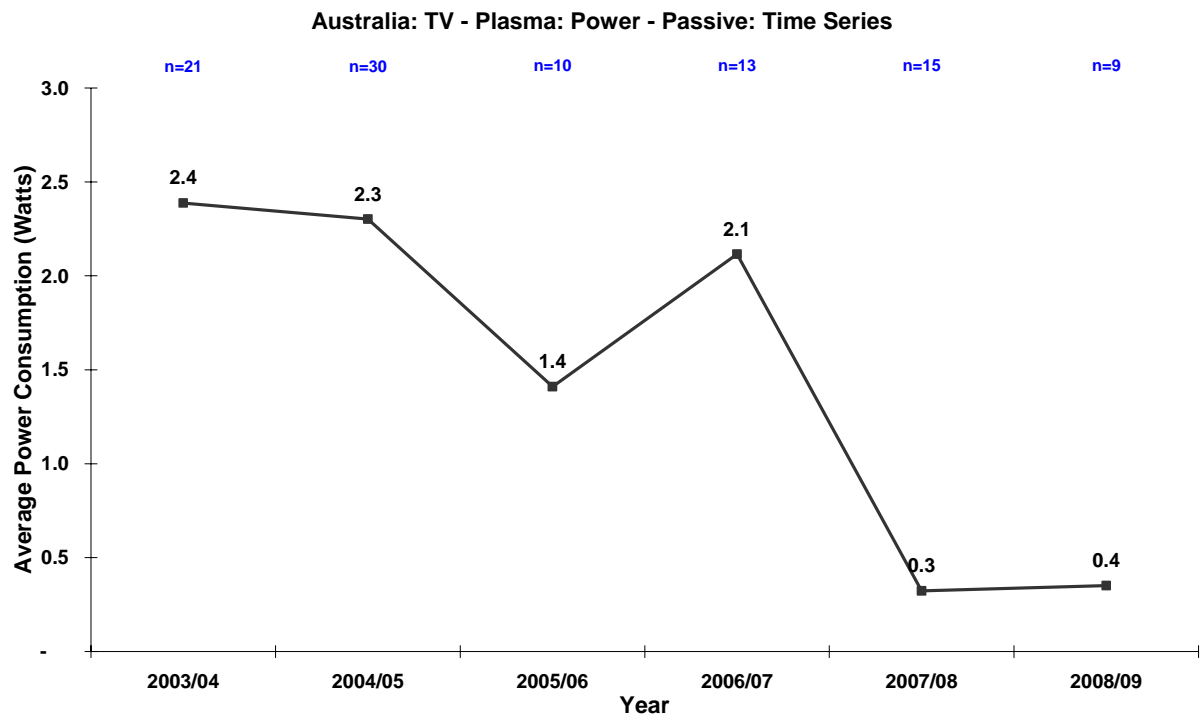
## Televisions – plasma

The presence of off mode on plasma televisions has been declining over the past 6 years. Additionally the amount of consumption in off mode has been declining constantly to the point in 2007/08, where no models were found consuming energy in off mode. This steady decline is clearly visible in Figure 10.

**Figure 10 Australian Time Series Data – Plasma TV Off Mode**



Passive standby consumption in plasma televisions has been declining since 2003/04, with a dramatic reduction in average consumption from 2007/08 to under 1 watt. The data contains two models in 2006/07 and 5 models in 2007/08 that have been removed as they were measured with passive standby of over 15 watts. These models are being re-evaluated as they may have been downloading an EPG at the time of the measurement and hence not in passive standby mode.

**Figure 11 Australian Time Series Data – Plasma TV Passive Mode**

### *DVD players*

The time series data for DVD players in passive standby mode is shown in Figure 12. This chart demonstrates the constant decline in average passive standby consumption which was 2.6 watts in 2003/04, decreasing to 1.2 watts in 2007/08.

In the area of active standby it would appear that the trend is down over the last five years, however the introduction of new Blue Ray and HD-DVD players increased the average consumption in 2007/08 to above 11 watts. These results are shown in Figure 13.

Figure 12 Australian Time Series Data – DVD Player Passive Mode

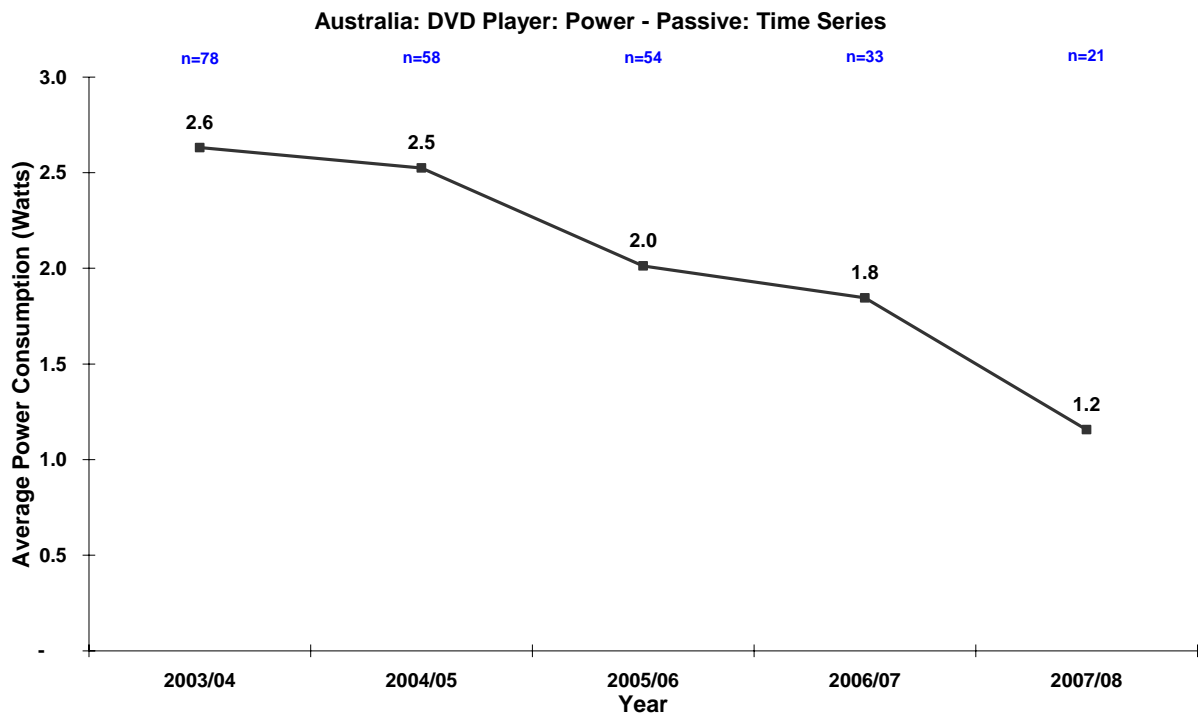
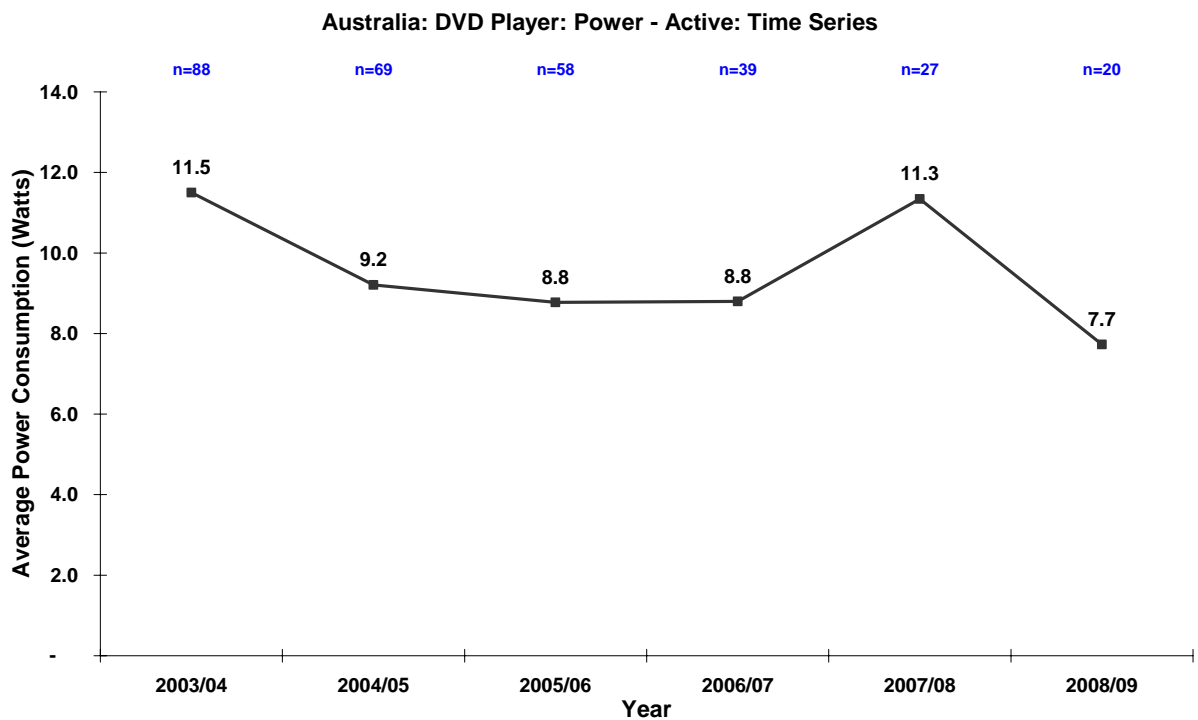


Figure 13 Australian Time Series Data – DVD Player Active Mode

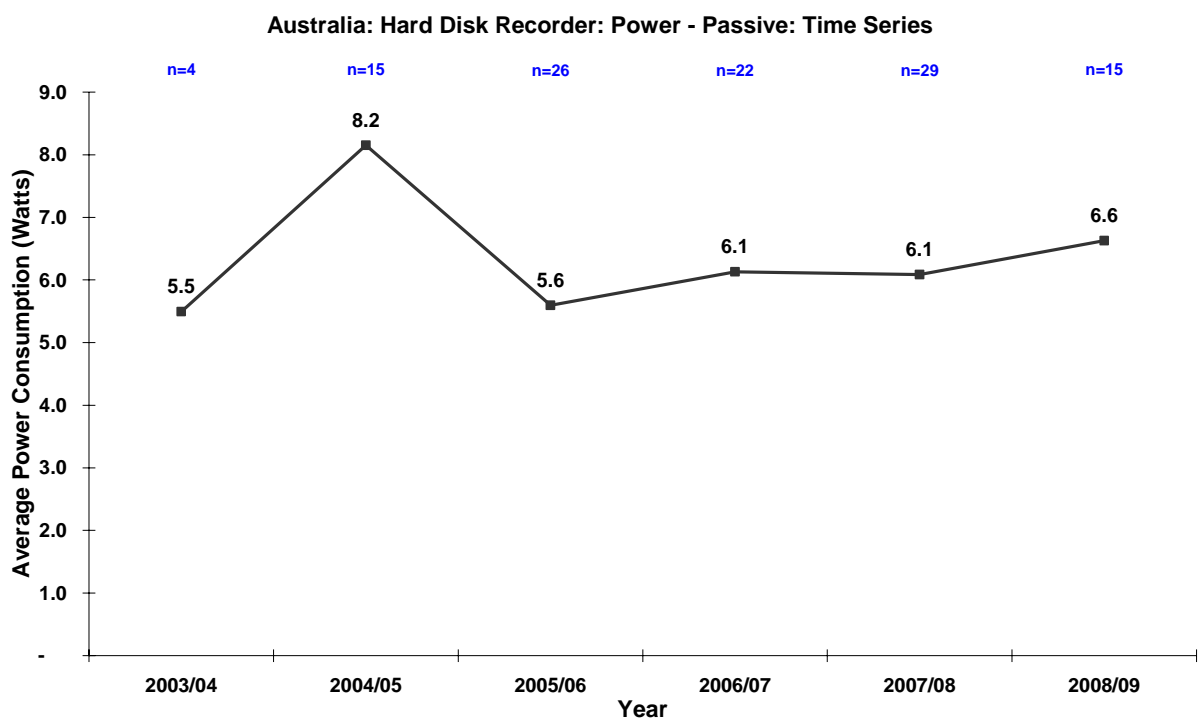


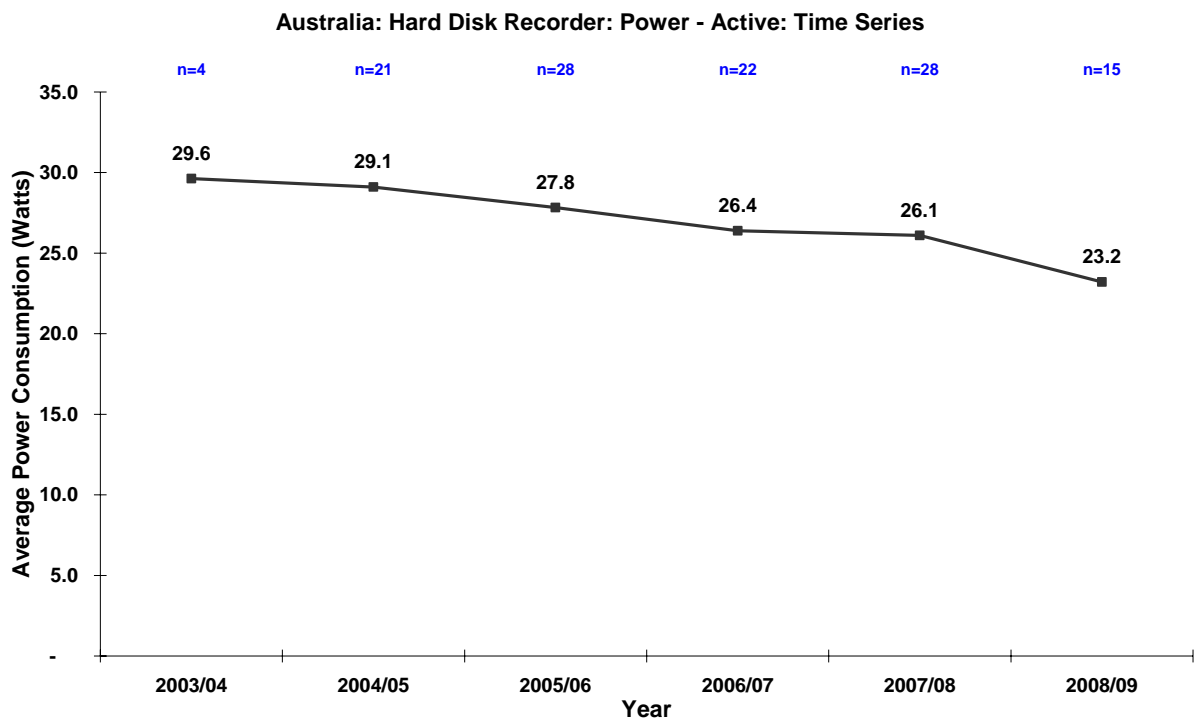
## Hard Disk Recorders

The time series data for Hard Disk Recorders in passive standby mode is shown in Figure 14. Average passive consumption has varied between 8.2 watts and 5.5 watts, with a slightly increasing trend.

Average active standby shown in Figure 15, appears to have decreased over the last six years; however it is relatively high compared to other home entertainment appliances.

**Figure 14 Australian Time Series Data – Hard Disk Recorder Passive Mode**

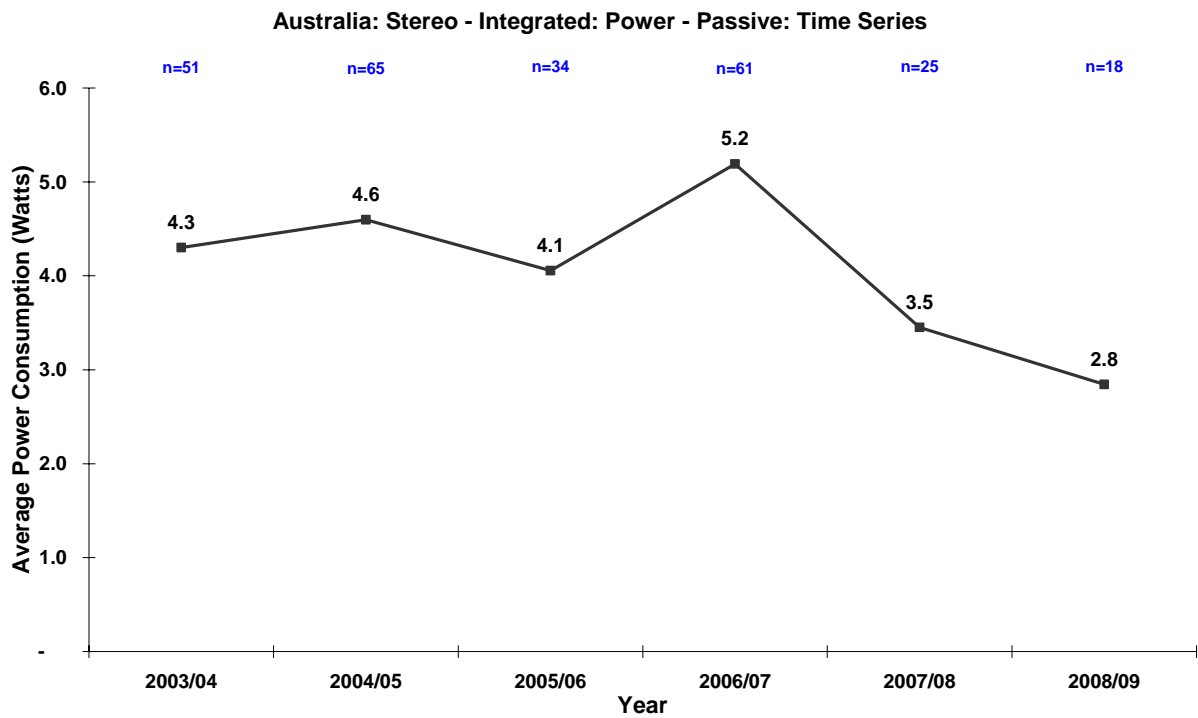


**Figure 15 Australian Time Series Data – Hard Disk Recorder Active Mode**

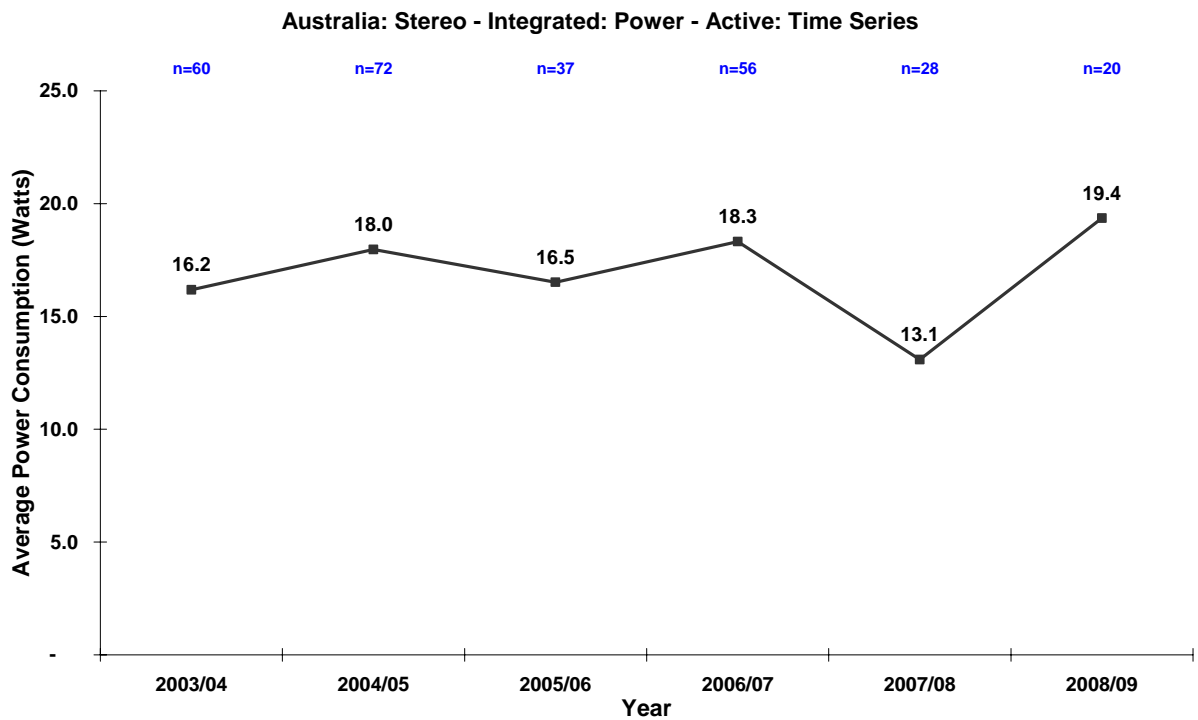
### *Integrated Stereos*

The time series data for integrated stereos shows that both passive and active mode consumption have been stable since 2003/04. However as can be seen in Figure 16 and Figure 17, a significant drop in average passive consumption was seen from 2007/08, while average active consumption is increasing.

**Figure 16 Australian Time Series Data – Integrated Stereo Passive Mode**



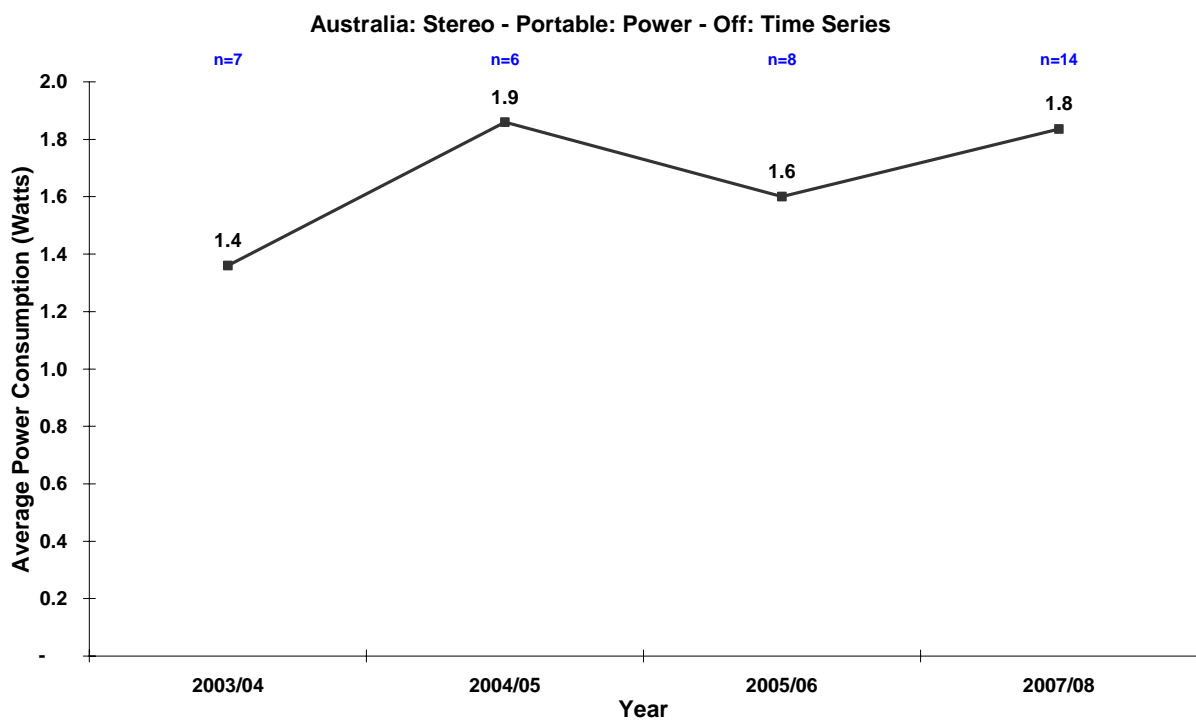
**Figure 17 Australian Time Series Data – Integrated Stereo Active Mode**



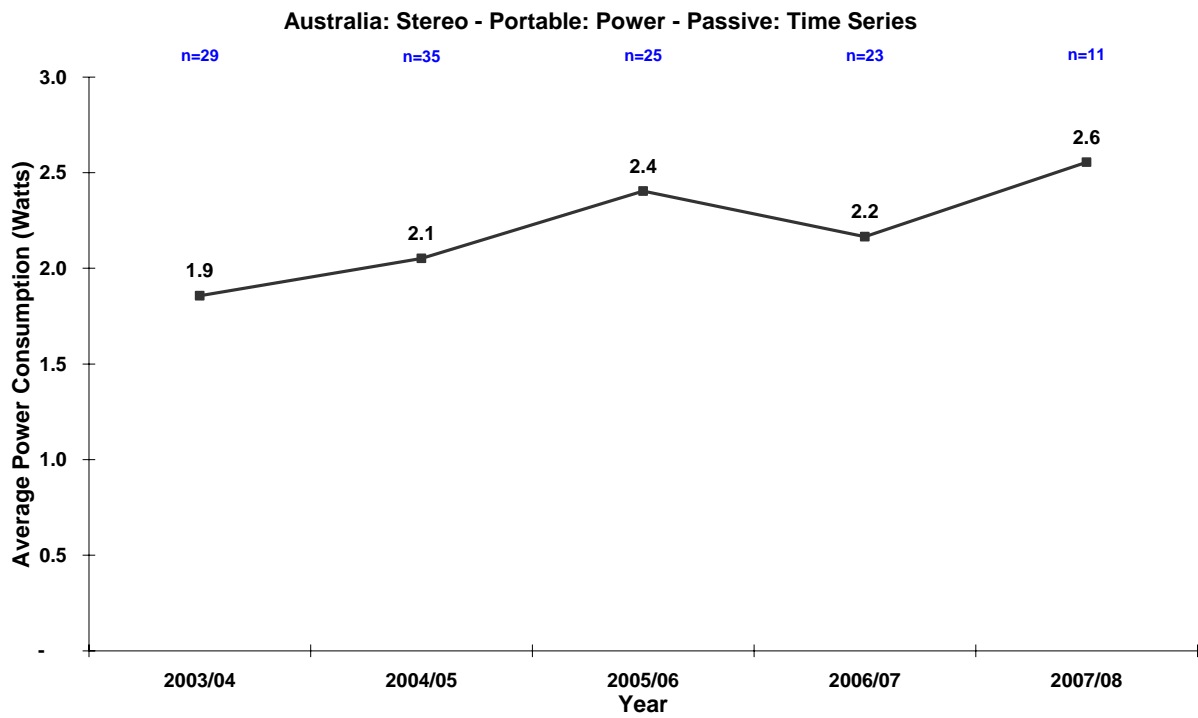
## Portable Stereos

Off mode consumption for portable stereos is shown in Figure 18 and demonstrates that consumption for this mode has been stable at less than 2 watts since 2003/04. (No units surveyed in 2006/07 had off mode). In contrast Figure 19 shows passive consumption has been slowly increasing over time, rising from 1.9 watts to 2.6 watts. This increase is only marginal and not yet statistically significant; however it is constant and may be due to the increasing use of clocks and digital displays on portable stereo units. Active data as shown in Figure 20 has also remained stable for the past five years.

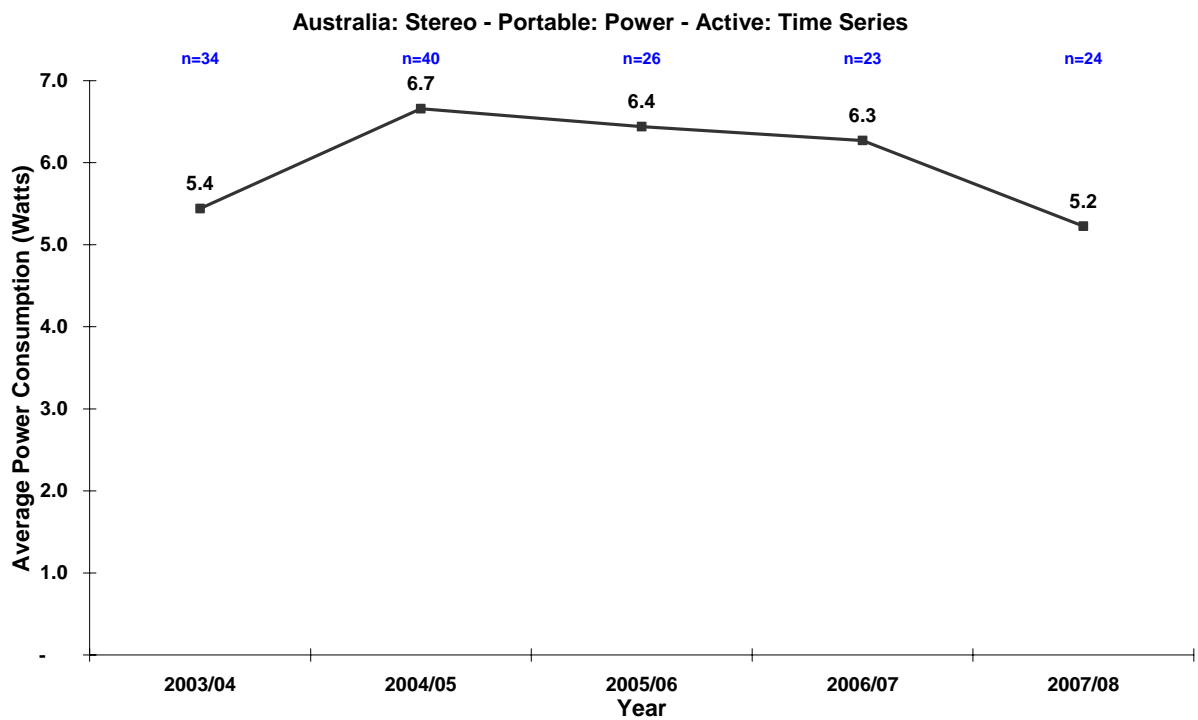
**Figure 18 Australian Time Series Data – Portable Stereo Off Mode**



**Figure 19 Australian Time Series Data – Portable Stereo Passive Mode**



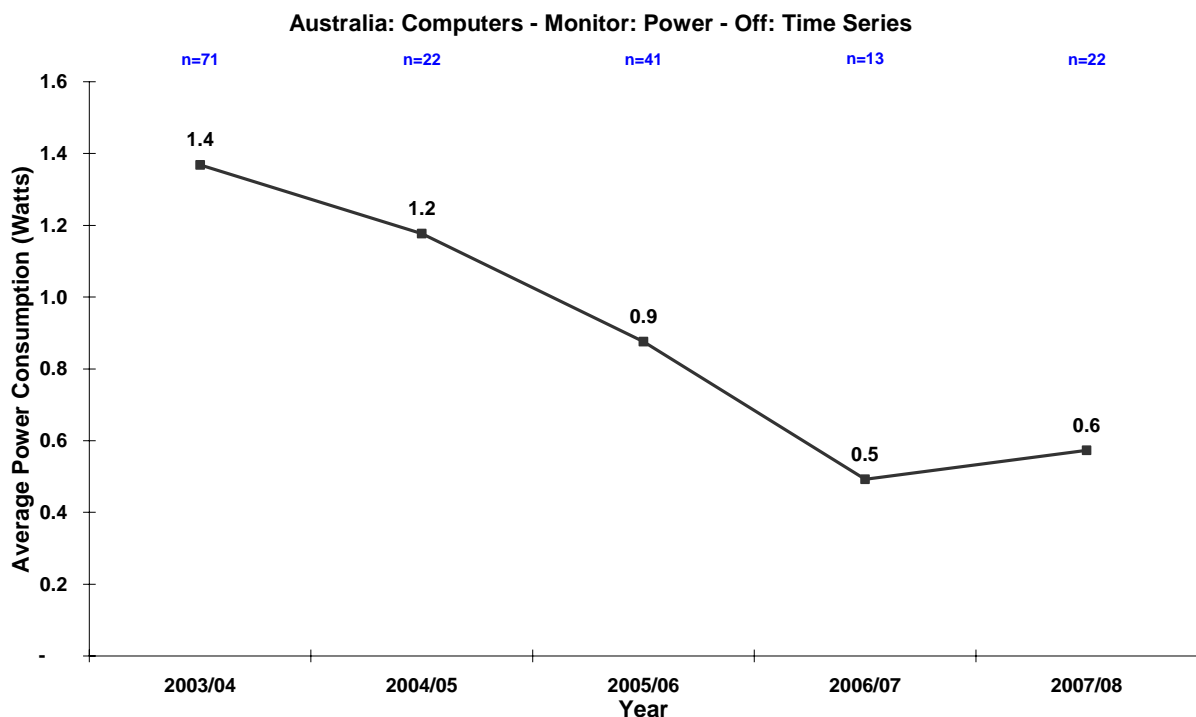
**Figure 20 Australian Time Series Data – Portable Stereo Active Mode**



## Computer Monitors

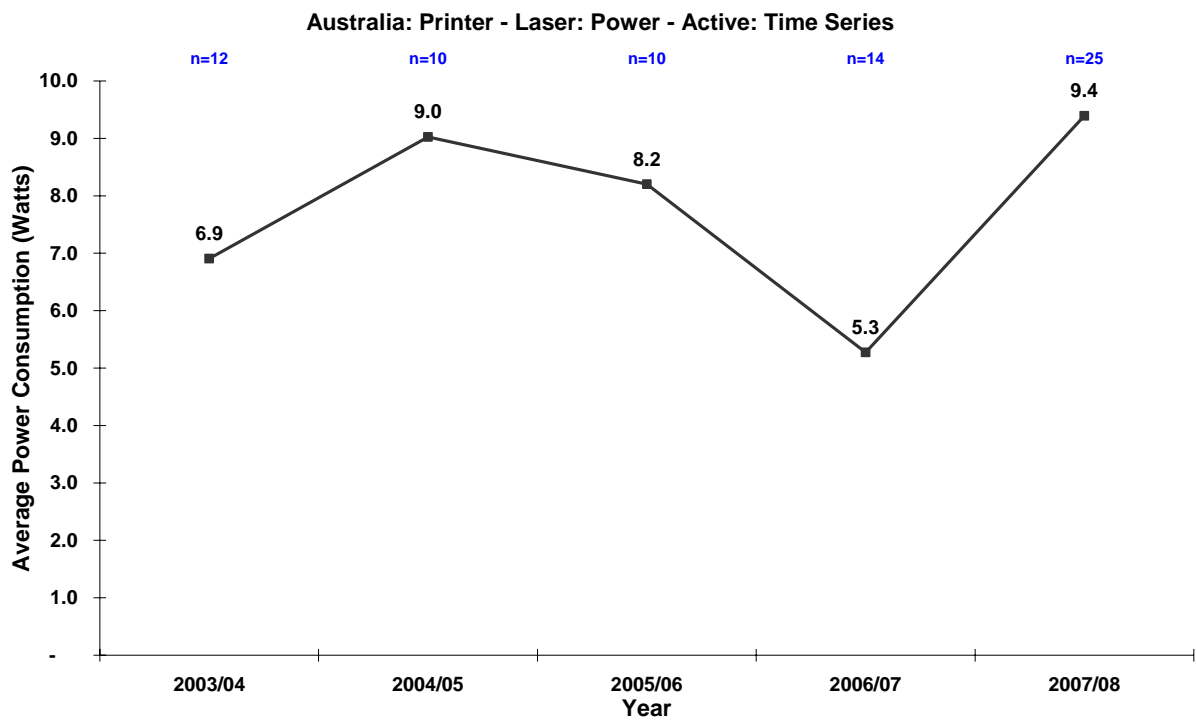
Figure 21 shows the average consumption of Computer Monitors appears to be stabilising after experiencing a constant decline since 2003/04. This decline can be attributed to the decrease in CRT monitors, to the point where all monitors found in the last two surveys were LCD Screens. The current average consumption in off mode is now around half a watt.

**Figure 21 Australian Time Series Data – Computer Monitor Off Mode**



## Printers – Laser

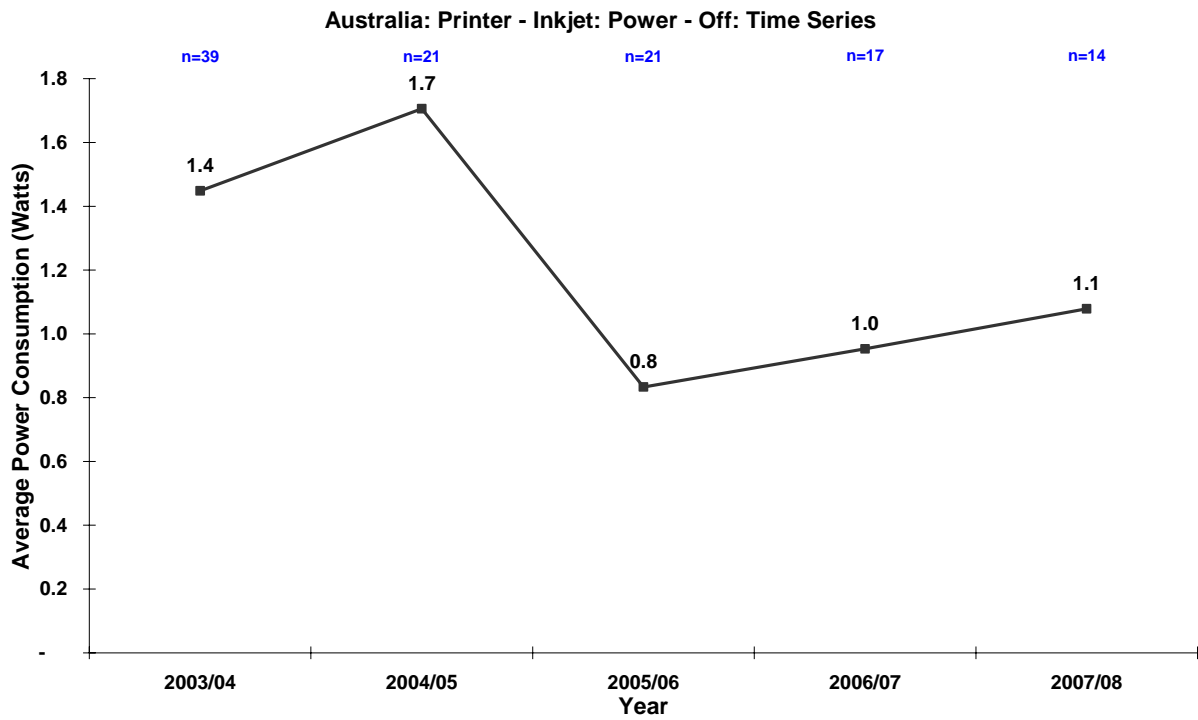
Laser printers have consistently had no consumption in off mode and as shown in Figure 22 the active mode consumption for these products must also be considered stable over the last five years. Results have provided no constant patterns thus indicating that the fluctuations in consumption data are a result of sampling variations rather than any trend.

**Figure 22 Australian Time Series Data – Laser Printer Active Mode**

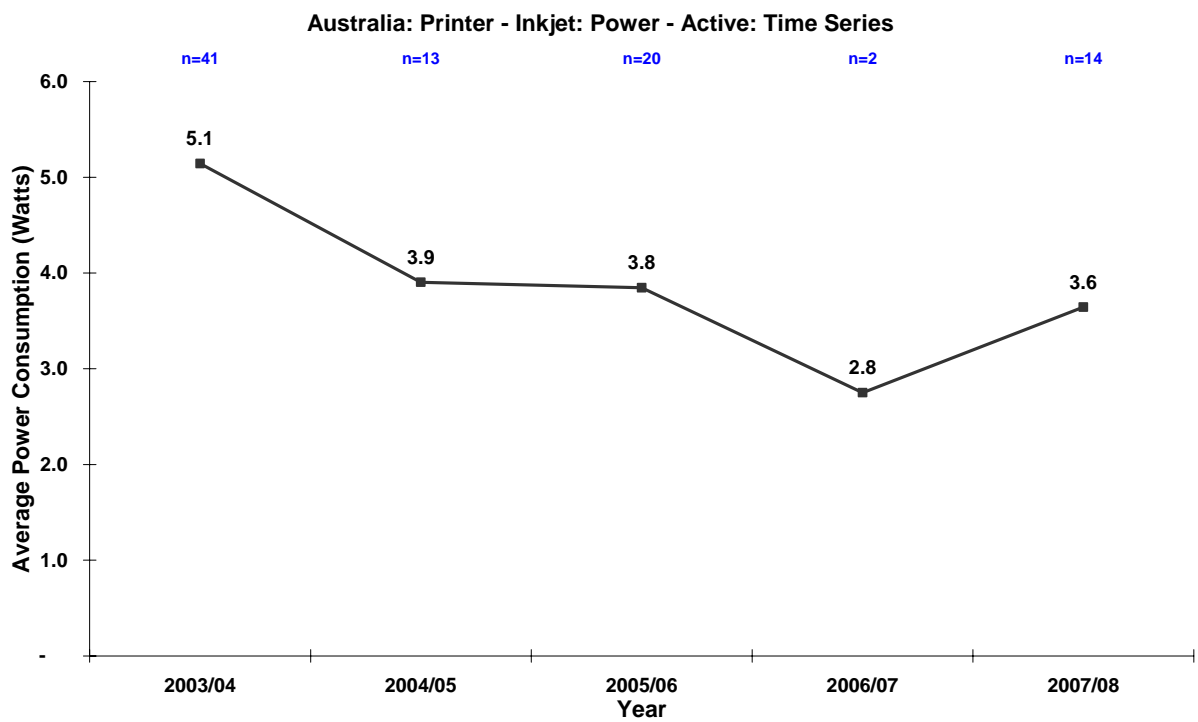
### *Printers – Inkjet*

Off mode consumption for inkjet printers declined significantly since 2004/05, with average consumption sitting around 1 watt for the past 3 years. Active mode consumption for these printers also declined around the same time from 5 watts to less than 4 watts. It should be noted that since 2005/06 it has not been possible to test two major brands of printers as they swapped to external power supplies which are not displayed in stores. Analysis of the data would suggest that the decline in consumption cannot be solely attributed to this and improved technology has also played a part in the shift. There has also been a decrease in the amount of inkjet printers available in stores with many of the shelves once reserved for printers now being filled with multi function devices. Figure 23 and Figure 24 demonstrate these results.

**Figure 23 Australian Time Series Data – Inkjet Printer Off Mode**



**Figure 24 Australian Time Series Data – Inkjet Printer Active Mode**



## Multi-Function Devices (MFD's)

Multi function devices have become more common place over the survey period. As clearly demonstrated in Figure 25 average off mode consumption for multifunction devices has steadily declined since 2003/04 from 6.8 watts to 1.4 watts in 2007/08.

**Figure 25 Australian Time Series Data – Multi Function Device Off Mode**

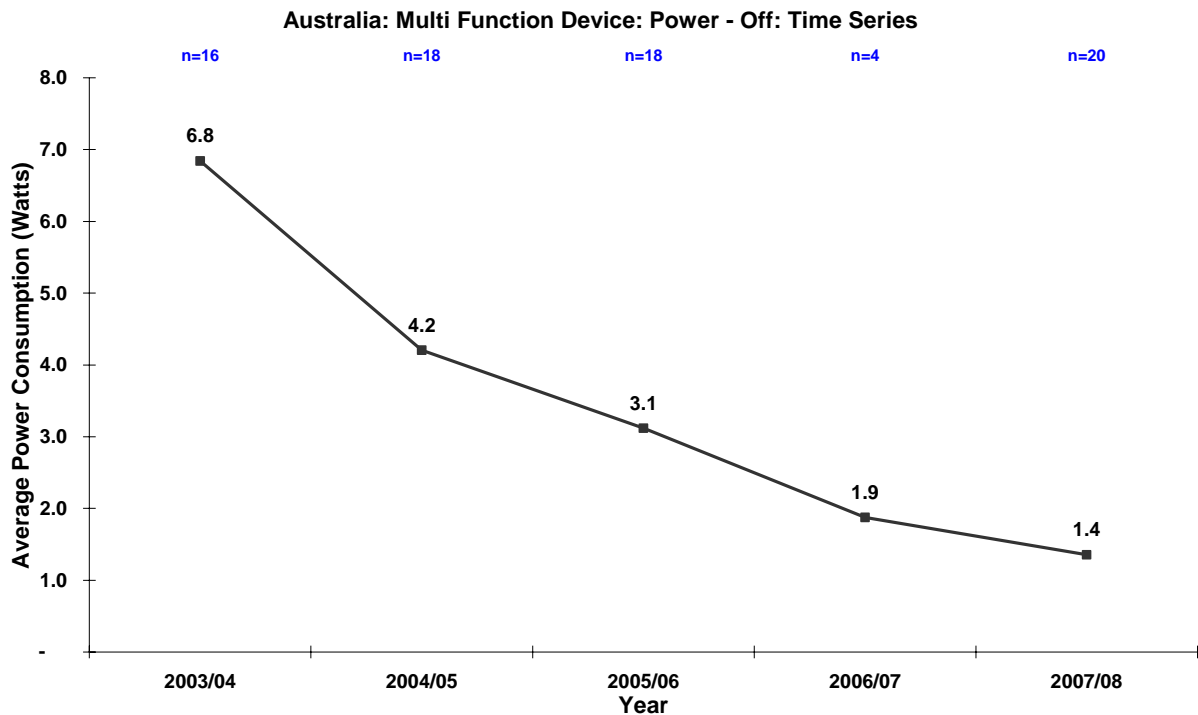
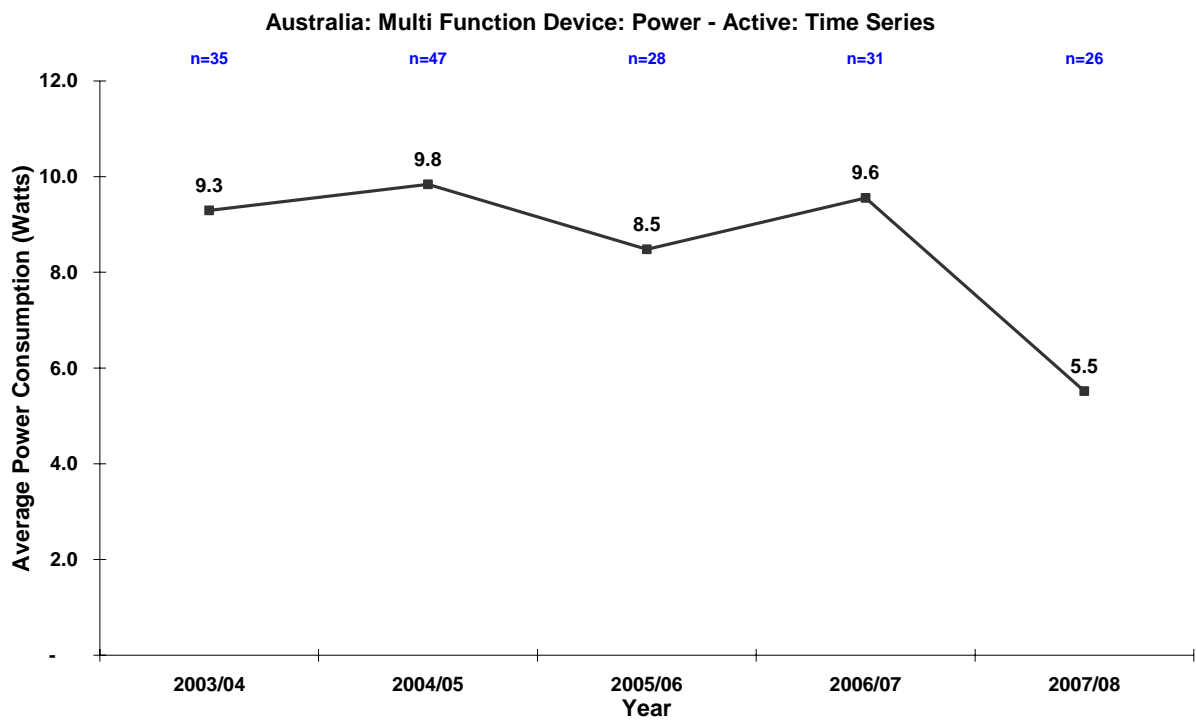


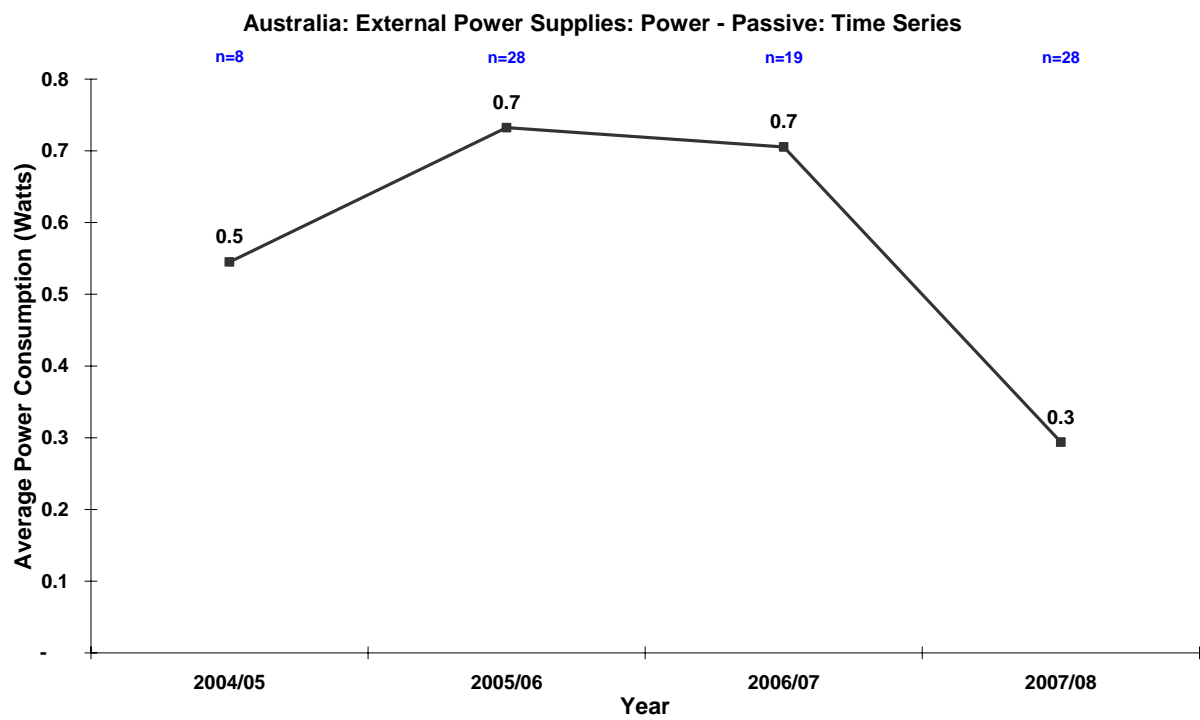
Figure 26 shows that until this year the average active power consumption for multifunction devices was stable. The 2007/08 survey saw this drop from around 9 watts to just 5.5 watts. This is a statistically significant decrease however it is likely that it is simply a reflection that this year's sample did not locate any laser printer MFDs .

**Figure 26 Australian Time Series Data – Multi Function Device Active Mode**

### *External Power Supplies*

External power supply consumption has been less than 1 watt for the past five years. In 2007/08 it has reached its lowest average consumption at 0.3 watts. The results for this product are presented in Figure 27

Figure 27 Australian Time Series Data - External Power Supplies Passive Mode



## Appendix A

### **Basket of 29 Secondary Products**

- Clothes dryers
- Dishwashers
- Clothes washer/dryer combination units
- Air conditioners
- Instantaneous (non storage) gas water heaters (with electronic ignition)
- Microwave ovens – manual timer
- Televisions – rear projection
- Set top boxes (including variations – digital/analogue tuners, hard drive)
- DVD recorders without hard drive (digital/analogue tuner)
- DVD recorders with hard drive (digital/analogue tuner)
- DVD/VCR combinations
- Video Cassette Recorders
- Audio visual receivers (home theatre)
- Subwoofers
- Computers (off mode only)
- Computer speakers
- Network switches (including hubs)
- Routers
- DSL or ADSL modems
- Scanners
- Facsimiles (fax machines)
- Photocopiers – black and white (categorise by copy speed)
- Photocopiers – colour (categorise by copy speed)
- Telephone answering machines
- Cordless phones – primary base station
- Cordless phones – secondary base station
- Cordless phones – with answering machine

### **Other Products Measured**

- Breadmakers
- Computers - Home Theatre Box
- Cook tops (Hob), Ovens and Stoves (upright Cooker)
- Digital Photo Frames
- Espresso Machines
- Fans
- Game Consoles
- Hand-held Vacs
- Heaters - Electric Portable
- Heaters - Gas
- Assorted Home Entertainment products
- Home Theatre Systems
- Juicers
- Range Hoods
- Rice cookers
- Shredders
- Slow Cookers
- Speakers
- Toasters
- Treadmills
- Typewriters
- Variety of small bench top Kitchen appliances
- Wine Chillers