

# Standby Trends in Australia and Mandatory Standby Power Proposals

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## ABSTRACT

In 2002, Australia was one of the first countries to officially adopt a maximum standby power goal of 1 Watt for all appliances and equipment types. Australia has since released 30 standby “profiles” for different products, setting short and long term targets that need to be met, to avoid product regulation. In assessing industry progress toward these targets two monitoring tasks have been undertaken. The first is an intrusive survey involving the measurement of standby states and power levels for all plug-loads present in homes. The second is an ongoing measurement of standby modes for new appliances on sale in retail outlets, which has provided a time series database of standby consumption of over 5,000 products. One of the key outcomes of this is a generic horizontal approach to deal with the amorphous nature of equipment under constant development, like home entertainment equipment.

These home entertainment products were initially identified with voluntary targets, however, due to industry group requests, consideration is being given to a proposed mandatory regulation that may provide potential energy savings of 1.7 GWh pa and greenhouse emission reductions of 1.7 Mt CO<sub>2</sub>-e pa by 2020. Maximum passive standby power levels of between 4 and 6 watts are proposed by 2008 with 1 watt being required for all home entertainment products by 2012. Evidence suggests that these products remain in active standby for extended periods of time so the regulation includes the requirement that devices automatically switch to passive standby after 30 minutes of inactivity. This requirement represents approximately 75% of the projected impacts and the benefit of this will increase as the proliferation of such devices rises.

## Introduction

Almost ten years ago energy policy circles began discussing the issue of standby power. In the early 1990s there was little knowledge of the issue and fewer products used power when not in use (i.e. while NOT performing their primary function) than today. However, in the mid 1990’s some laboratories noticed that products were in fact using small amounts of power when off or in “standby mode”. It was at this time the issue began to be canvassed more widely with further investigations being undertaken. The International Energy Agency (IEA) in the late 1990’s looked at the issue and conducted a series of three international workshops. As a result the report *Things That Go Blip In The Night* (IEA 2001) was published.

While awareness of standby power issues was growing there was limited data with anecdotal information being the primary source in the late 1990’s. There was virtually no data from anywhere in the world that covered the wide range of equipment installed in households making it difficult to estimate the likely magnitude of standby power. While there were growing concerns about the issue concrete data was necessary on which to base firm policy actions, with theoretical estimates of product energy consumption in standby mode ranging from a few percent of household energy consumption to 10% or more.

## Definition of Standby Modes

The following definitions apply to standby power modes (EnergyConsult 2006):

**Off:** When a product 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.

**Passive Standby:** When a product 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).

**Active standby:** When a product is on but not performing its main function. This is mostly applicable to consumer electronic equipment where operating involves some mechanical drive (such as VCRs, DVD and CD players and some stereo equipment). For example, the DVD may be on but is not playing.

**Delay start:** When a product can be programmed to begin functioning at a later time; in some cases up to 24 hours later.

## Standby Power in Australia

### Australia’s Standby Power Strategy

In the year 2000 standby power issues gained a great deal of attention in Australia. A forum was held in March, where the Australian Government in consultation with key industry representatives identified key issues. It was decided that these issues would need to be tackled in order to move forward on standard power. In response to the forum outcomes, Australian Governments went on to develop a four-pronged plan to address excessive standby power:

- A clear statement of policy from the highest levels of government;
- A commitment to participate (and lead if necessary) international endeavors to develop international standards and definitions for standby;
- A commitment to benchmark standby figures for Australia over time; and
- A long-term strategy that develops and applies agreed standby policies to particular problem products.

In August 2000, Australia became the first national government to agree to the formal target of “One Watt” standby for all consumer appliances and office equipment. The Council of Commonwealth, State and Territory Ministers in charge of energy matters endorsed a program of work that would enable Australia to achieve this goal. The Council gave a commitment to developing policies that would ensure all appliances manufactured in or imported into Australia would have a maximum standby power of One Watt. This development clearly set out the Australian agenda for industry and provided a solid framework in which a diverse range of policies could be developed to reduce standby power consumption.

Additionally, the Australian state and federal governments commissioned a survey in 2000 of some 61 households to establish the magnitude of standby power in Australia and to help identify key products and potential problems. The report, which was published in early 2001,

made it clear that “standby” (in a broad sense) was an issue of significant concern that required a coordinated government response.

In October 2001 the Commonwealth Government strengthened its commitment to reducing standby power, announcing a policy to purchase only equipment that complies with the US Environmental Protection “ENERGY STAR” standard, where it is available and fit for the purpose. Australia also contributed to International work on the development of a test method for the measurement of standby power.

The culmination of these activities was the development of a ten-year strategy released in 2002 in the document *Money isn't all you're Saving – Australia's standby power strategy 2002 – 2012* (MCE 2002). The document establishes the Australian Government's commitment to stamp out unnecessary standby power and was the result of in depth consultation with industry and the community. The ten year plan includes:

- a long-term strategy to implement measures to combat excessive standby consumption;
- a list of 40 product types to be initially targeted in the period 2003 and 2004 and a process for identifying new product which may need to be targeted in the future;
- the procedures for setting standby targets; and
- an outline of the potential sanctions that could be applied should suppliers not meet targets.

Since the introduction of the strategy 30 product profiles have now been publicly released. The profiles investigate each product type and identify measures that could reduce standby power consumption for that product. Additionally the profiles set voluntary standby targets for each product type. An assessment of performance will be made against the voluntary standby target for most product types during the period 2006 to 2008. The measurement and assessment of standby power changes in Australia has been undertaken by surveying products in both retail outlets and residential homes.

## **Store Surveys**

Since 2001, Australia has been monitoring the standby power consumption of new products on display in retail outlets. These studies were developed to establish a standby performance benchmark and to identify trends for each of the major product types. The information gathered during these studies can also be used to assess the progress manufacturers are making toward meeting the government's voluntary standby targets.

The store survey employs a simple methodology that involves visiting a number of retail outlets and measuring the consumption in relevant modes of all products that are on display. Store participation is voluntary, however most retailers have given their full cooperation and been willing to participate in this government initiative. Each survey takes from 5 to 8 days and measurements are made on 500 to 1,000 new products. Care is taken to only measure each model once during the survey period. Prior to 2003 the surveys were conducted annually, but since then two to three surveys have been conducted per year. This enables a broader range of products to be captured especially for those items that are seasonal such as heating and cooling products.

The store surveys have resulted in just over 5,000 different appliances being measured since 2001 making the database one of the most comprehensive in the world. The products are measured in different modes (sometimes up to 4) depending on the relevance of the mode and

design features of the product. The modes measured include in-use, active standby, passive standby, delay start and off mode. While comparisons between years are undertaken as part of the survey analysis it must be noted that the mix of products measured in each year is not identical. Overall results need to be taken as indicative and trends within each product need to be examined separately to give a more concise picture

Looking at the store data from 2001 to 2004/05 provides some interesting insights into the status of standby power. The surveys have found that when looking at consumption for all appliances, a statistically significant<sup>1</sup> decline in average consumption was evident in passive standby mode from 2001 to 2003. Since this time passive standby levels appear to have stabilised. Off mode consumption has followed a similar pattern with a significant decrease from 2001 to 2002 and continuing at these lower levels since. At present no trend can be identified in consumption for active standby. This mode showed 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 slightly in 2004/05, with a rise of 0.6W. Table 1 below summarizes the results while Figure 1 graphs these results. Trends within product categories are examined in detail in the store survey reports (EES & EnergyConsult 2001, 2002, 2003, 2004, 2005).

**Table 1. Summary of Average Consumption across all Products Surveyed**

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

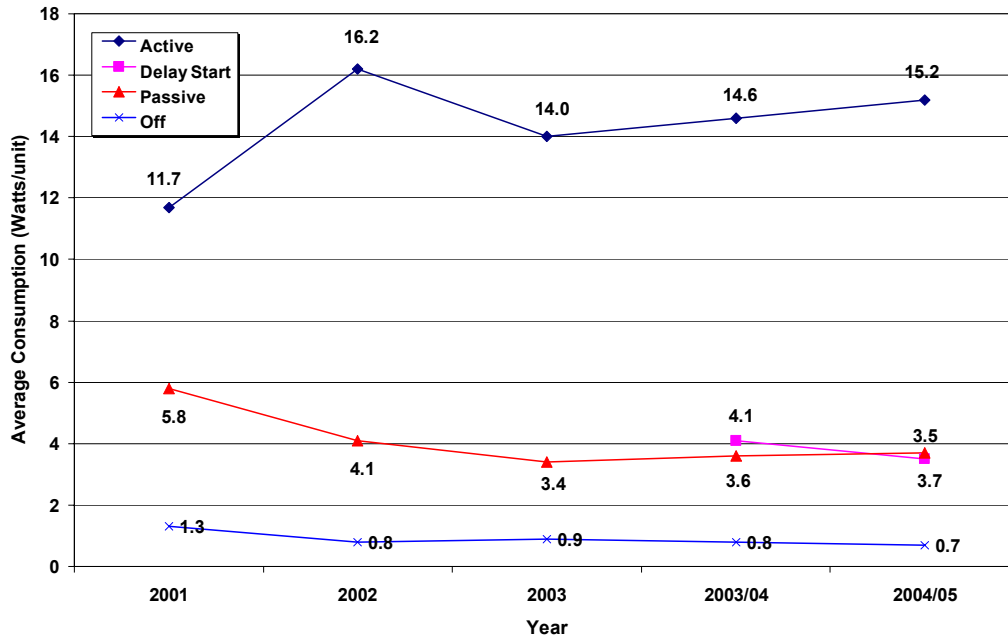
Source: EES & EnergyConsult 2005

In addition to the decrease in average passive standby, the proportion of products consuming less than 1W has steadily increased from 8% in 2001 to 21% in 2004/05. This steady improvement in standby levels can be seen in Figure 2.

Delay start was first measured in appliances in the 2003/04 survey and was subsequently measured in the 2004/05 survey, as shown in Table 2. Delay start allows the consumer to preset the appliance to begin functioning at a time in the future and appears to be becoming more common. 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 behavior 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.

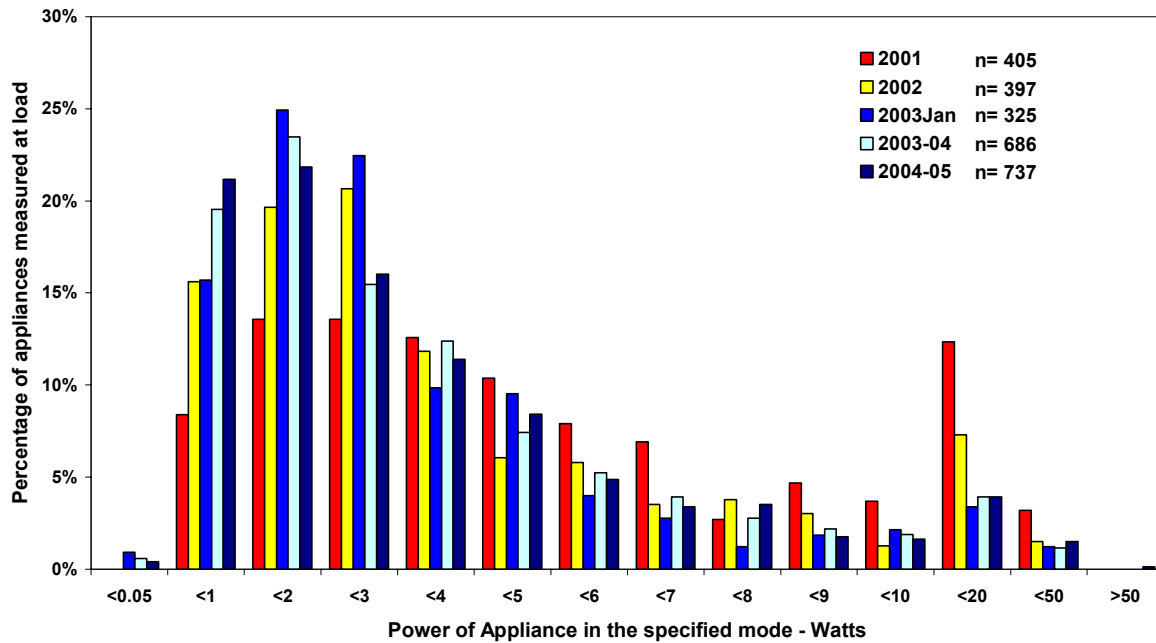
<sup>1</sup> Significant at the 95% confidence level.

**Figure 1. Summary of Average Power Consumption across all Products Surveyed**



Source: EES & EnergyConsult 2005

**Figure 2. Distribution of “Passive Standby Mode” Power – All Products**



Source: EES & EnergyConsult 2005

**Table 2. A Summary of Delay Start Mode Results**

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

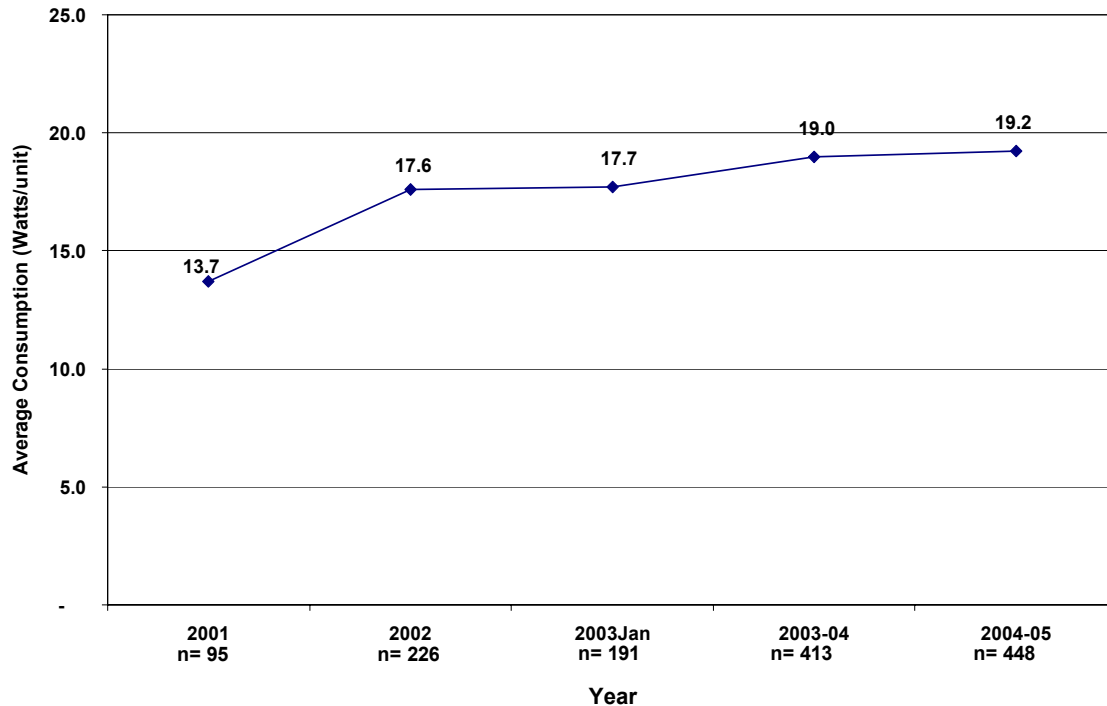
Source: EES & EnergyConsult 2005

It has been possible to track trends in individual product categories across the five surveys. While some appliances appear to be making improvements most have remained static. The products that are related to the home entertainment category (home theatre systems, DVD recorders, amplifiers, etc) have exhibited improvements in passive standby power, but not active standby power usage.

Total energy consumption of all home entertainment equipment in active standby in 2005 ranged from half a watt to 112.3 watts, with an average of 19.2 watts. These figures are consistent with those recorded in the last five store surveys. Average active standby has increased slightly over the years; however there is no statistical significance in this growth and may be a result of increasing sample size. Active standby results are presented in Figure 3

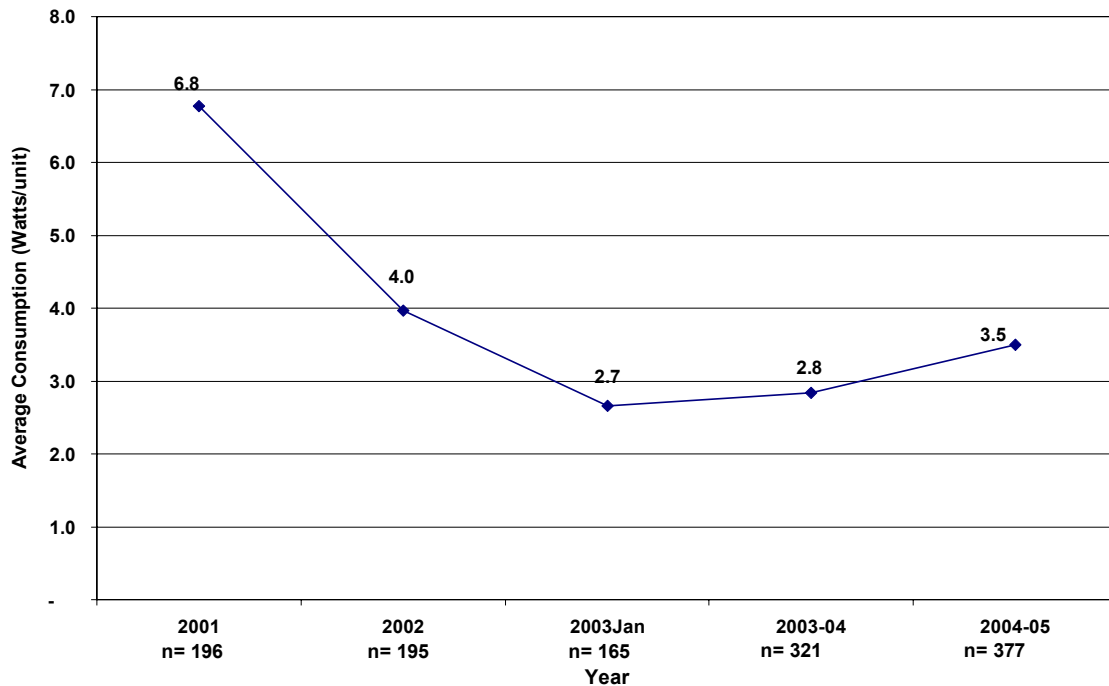
Average passive standby decreased significantly from 2001 but has remained stable below 4 watts for the last few years. Figure 4 displays the passive standby results from 2001.

**Figure 3. Average Active Standby Consumption: Home Entertainment Products**



Source: EES & EnergyConsult 2005

**Figure 4. Average Passive Standby Consumption: Home Entertainment Products**



Source: EES & EnergyConsult 2005

These home entertainment products have been identified as a potential problem product group under the Standby Strategy

The average standby power consumption by mode for home entertainment products was measured during recent surveys in Australia (EnergyConsult 2005). The survey results generally showed a wide variance in power consumption within product categories. The variance in off mode and passive standby mode results could not be validated by any difference in price, performance, or functionality between these products. This would suggest that there are substantial opportunities for manufacturers to reduce standby power consumption, probably at low marginal cost.

The average active, passive and off mode power consumption for home entertainment products is shown in Table 3. The results demonstrate that many of these products have relative high active standby power consumption. Table 3 also illustrates the large variation in standby power consumption across a range of products and within product categories. The largest differential was found to be AV receivers, with active standby that varies by over 100W. In addition, no relationship was found for price vs energy performance indicating that poor performers could be improved without a significant effect on cost.

It is clear from this data that the proposed MEPS on standby power for home entertainment product is necessary given the clear proliferation of sales of these types of products. This category of product will significantly add to both the future energy requirements and Greenhouse Gas emissions. It is also obvious from the field surveys that energy efficiency improvements can be made to product at little or no cost; and that much product already meets or exceeds the requirements imposed by the MEPS.

**Table 3. Summary of Store Survey Average and Ranges of Measurements 2004/05**

Home Entertainment Product	Active Standby (W)			Passive Standby (W)			Off Mode (W)		
	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
AV Receivers	41.2	112.3	11.1	1.3	6.4	0.2	0.2	0.7	0
Home Theatre Systems	31.5	55.7	12.1	2.2	18.1	0.2	0.1	0.9	0
Integrated Stereos	18	52.2	5.1	4.6	34.9	0.2	2.4	4.8	0
Portable Stereos	6.7	20.5	2.8	2.1	5.1	0.7	1.9	3.5	0
Audio Components	9	15.8	4.2	3	5.6	0.4	0	0	0
Sub Woofers & Speakers	9.7	20.4	0.5	4.7	17.8	0.1	0.6	10.2	0
DVD Players	9.2	21.5	4.4	2.4	9.8	0.1	0	0	0
DVD Recorders	23	36.5	15.9	7.5	24.4	2.8	NA	NA	NA
Hard Disk Recorders	29.4	36	20.8	7.2	20.1	2.9	0	0	0
VCR's	7.7	11.3	6.1	2.9	6.3	1.2	NA	NA	NA
All Home Entertainment Products	19.2	112.3	0.5	3.5	34.9	0.1	0.5	10.2	0

Source: EES & EnergyConsult 2005

### Household Surveys

The first intrusive survey of Australian homes was conducted in 2000. The survey covered 61 homes and involved direct power measurements of some 2,400 products in a range of modes using a power meter that was accurate down to 0.1 Watt. This intrusive survey was repeated in late 2005 and the sample was expanded to cover 120 houses and 8,000 individual appliances were recorded and measured. A full description of the intrusive survey and comparison with the 2000 survey can be found at [www.energyrating.gov.au](http://www.energyrating.gov.au), under the Standby section.

The 2005 intrusive survey has found that average standby power usage in the household sector has increased to 85.3 Watts/house compared to 74.2 Watts/house in 2000 (EES 2006). This increase equates to a 15% increase in standby power consumption over the period (an increase of 3.0% per annum). Overall, standby power represents 10.3% of Australia's 2005 residential electricity use (EES 2006), and hence the need to consider strategies to lower standby power consumption is vital.

### Future Focus of Australia's Standby Power Strategy

The 10 year Standby Power Strategy noted that an assessment of performance will be made against the voluntary standby target for most product types during the period 2006 to 2008. Already, digital set top boxes (STBs) and televisions (TVs) (EnergyConsult 2004) have proposed regulatory action, and similar action is now occurring for home entertainment products. This assessment will involve a two stage analysis:

**Stage 1.** Analyse all product types to determine the proportions that will meet the 2007/08 targets and 2012 targets.



**Stage 2.** Conduct further analysis by brand type to determine whether there are particular brand types that have a poor standby profile or if there are certain product features that cause a brand of product to have a poor profile. It is anticipated that Stage 2 analysis would only take place for those products categories which show that less than 20% will meet the target in 2007.

Stage 2 is expected to be completed by mid 2006 and a plan of action will be developed to provide greater direction for the forthcoming store surveys and the standby power strategy.

## **Trends and Potential MEPS for Home Entertainment Products**

The Australian government is considering a report that proposes a mandatory maximum standby power for home entertainment products (EnergyConsult 2006). As illustrated earlier, the focus of the Australian standby power strategy is now moving towards regulatory action for those products that are identified with problem standby power trends. The proposed Minimum Energy Performance Standard (MEPS) regulation is estimated to provide potential energy savings of 1.7 GWh pa and greenhouse emission reductions of 1.7 Mt CO<sub>2</sub>-e pa by 2020. This represents potential savings of 0.35% of the national emissions from the stationary energy sector in 2020. There are currently over 4 million home entertainment products sold annually in Australia and the sales are increasing rapidly. Home theatre systems, DVD players/recorders, portable and integrated sound systems are some of the products included in the broad scope of the proposed requirements. Digital set top boxes (STB) and TVs are not included in the proposed MEPS as they are subject to specific MEPS for both in-use power and standby power consumption. It is intended to develop a horizontal requirement for standby power that will apply to the entire group of products. In this way, emerging new product categories will be included in the coverage of the proposed regulation without the need to continually update the definitions.

Depending on the product group, maximum passive standby levels of between 4 and 6 watts are proposed by 2008 with 1 watt being required for all home entertainment products by 2012. These levels are based on international standby programs and aim eventually to meet the IEA long term target. In addition given that recording products such as DVD recorders and personal video recorders (PVRs) are emerging with Digital Tuners consideration is being given to treating these in the same way as STBs and specifying in-use MEPS standards as well.

Australia's standby strategy is part of the IEA plan for standby, which encourages all member nations to address standby in a coordinated manner, and achieve a common long-term target for 2012 – "1 Watt" maximum for all low power modes. The IEA standby target however relies upon the user to switch the product off or into standby mode. Evidence from Australian surveys suggests that many products are not switched into this mode and remain in active standby for extended period of time. A recent survey of standby power in Australian households found from 7% to 56% of units were left in active standby mode (EES 2006). The Australian proposal includes the requirement that the device automatically switches to passive standby after 30 minutes of non-use and no user activity.

Some products already include the auto power down feature as suppliers respond to the challenge set by various international and national standby programs. The impact of this requirement represents approximately 75% of the projected impacts and the benefit of auto power down will be more significant as the proliferation of such devices increases.

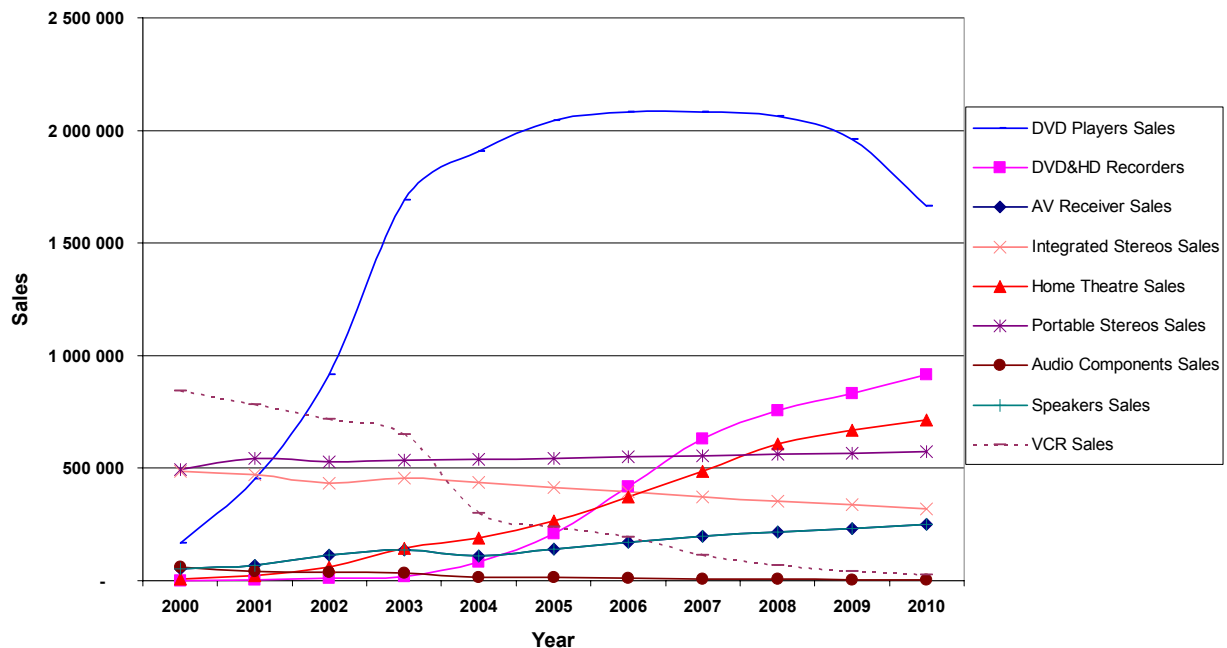
## Rational for MEPS

Home Theatre Equipment is a rapidly expanding product group. As the potential impact of a MEPS policy is highly dependent on the sales of the products, actual and forecast sales by product group were developed. Based on actual data from 2000 to 2004, projections were made for the various categories of equipment, as shown in Figure 5.

The sales of home entertainment equipment are related, as some products replace or substitute the functions of other products, such as the decrease in VCRs which are being replaced by DVD & HD Recorders. Also, it is likely that sales of DVD Players will plateau and decrease as both Home Theatre Systems and DVD & HD Recorders increase. In 2005, it is estimated that approximately 4 million home entertainment products will be sold in Australia.

The sales projection model does not yet considered the impact of product convergence, such as including digital TV tuners in recording product. As more product emerges in this form, it is likely to impact on the sale of simple STBs. The inclusion of digital TV tuners in these products will also further increase the sales of DVD recorders and Personal Video Recorders (PVR). The savings that have been predicted as a result of the STB MEPS could be diluted as more sales of STBs are substituted by PVR/DVD products. At present only standby power is considered for these products. For this reason consideration is being given to treating recording product with a digital TV tuner as a special class of product with the in-use power also subject to limits. In fact from an energy consumption view this class of product should be encouraged because it will reduce the actual number of pieces of equipment within the household that are consuming standby power.

**Figure 5. Annual Sales Forecast for Home Entertainment Equipment**

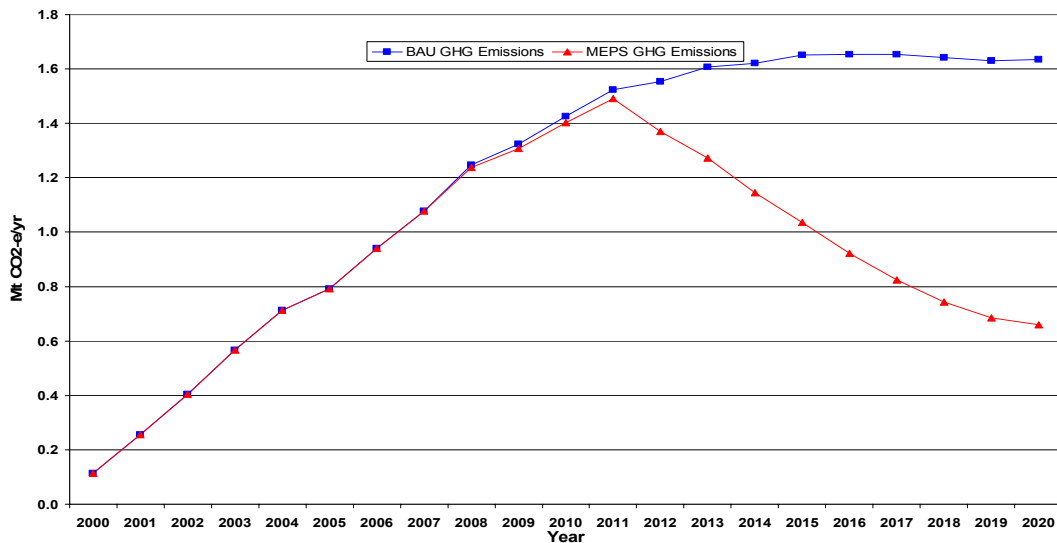


Source: EnergyConsult 2006

## Potential for Energy Savings and Greenhouse Gas Reductions

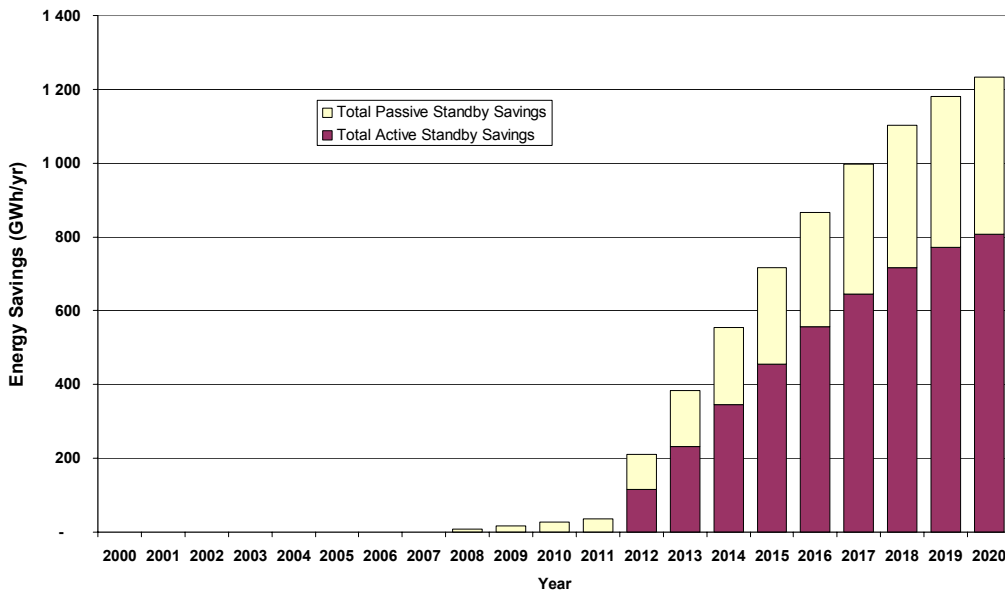
By implementing MEPS on standby power for home entertainment products it has been estimated that CO<sub>2</sub> emissions will be reduced by 970 kt pa and 1,200 GWh of electricity will also be saved by 2020. Figure 6 shows the estimated Business as Usual and MEPS Policy GHG emissions due to home entertainment. Figure 7 shows the potential energy savings by standby power mode, with the greatest contribution – of 800 GWh pa by 2020 – associated with active standby power.

**Figure 6. BAU vs. MEPS Policy – GHG Emissions for Home Entertainment Equipment**



Source: EnergyConsult 2006

**Figure 7. MEPS Potential Energy Savings by Standby Mode**



Source: EnergyConsult 2006

## International Trends

It is necessary when considering a MEPS regime for Australia that the requirements and levels are consistent with international thinking. It is clear that although implementations of schemes may differ, many other countries have considered these products as having the potential to provide energy savings. The Australian MEPS regime is entirely consistent with other schemes, as shown in Table 5.

**Table 5. Brief Overview of Energy Efficiency Programs**

Program	Voluntary Programs							Mandatory Programs	
	Energy Star	GEEA	EICTA	Home-Speed	Nordic Swan	Energy Boy	IEA 1W	CEC	Top Runner
Countries	USA/world	Europe			Nordic	Korea	All	California	Japan
Type	Label	Label	Agreement	Database	Label	Label	Target	MEPS	Target
AV Receivers	✓	✓	✓	✓		✓	✓		
Home Theatre Systems	✓					✓	✓		
Integrated Stereo	✓	✓	✓	✓	✓	✓	✓	✓	
Portable Stereo	✓	✓	✓	✓		✓	✓		
Stereo Components	✓	✓	✓	✓		✓	✓	✓	
Sub Woofers	✓						✓		
Speakers	✓						✓		
DVD Players	✓	✓	✓	✓	✓	✓	✓	✓	
DVD Recorders	✓	✓	✓	✓	✓		✓	✓	
Hard Disk Recorders			✓				✓	✓	
VCRs	✓	✓	✓	✓	✓	✓	✓		✓

Source: EnergyConsult 2006

These international programs establish a consistency in the approach Australia is taking with what other countries have done, indicating that the Australian requirements are achievable without any cost impact or limiting available product.

## Proposed Mandatory MEPS for Home Entertainment Equipment

A broad “horizontal” definition of products is proposed to be targeted by the MEPS, aiming to simplify the issues associated with determining coverage. The proposed definition is shown following:

*Commercial available consumer equipment that produces, records or assists in producing an audio or video signal/output.*

Products that are specifically covered by other MEPS requirements (such as TVs and set top boxes and possibly video recording equipment with DTV tuners), would be excluded from this MEPS.

**Stage 1 MEPS – 2008.** The MEPS for implementation in 2008 is suggested at 4 watts for all home entertainment products without video recording capabilities and at 6 watts for those with video recording capabilities. Additionally all products with an off mode would be required to have consumption less than 0.3W. Approximately 30% of all models surveyed in 2005 would not meet this MEPS level as demonstrated in Table 6.

**Table 6. 2005 Home Entertainment Products that Are Not Currently in Conformance with Proposed MEPS Stage 1**

<b>Product</b>		<b>Passive Standby ≥4W</b>	<b>Passive Standby ≥6W</b>	<b>Off Mode ≥0.3W</b>
AV Receiver	No of Models	2	-	3
	% of Models	4%	-	6%
DVD Player	No of Models	18	-	0
	% of Models	27%	-	0%
Home Theatre System	No of Models	8	-	1
	% of Models	15%	-	2%
Stereo Component	No of Models	2	-	0
	% of Models	25%	-	0%
Integrated Stereo	No of Models	21	-	1
	% of Models	32%	-	1%
Portable Stereo	No of Models	2	-	6
	% of Models	10%	-	14%
Sub Woofer & Powered Speakers	No of Models	4	-	7
	% of Models	15%	-	13%
DVD Recorders	No of Models	-	17	NA <sup>1</sup>
	% of Models	-	40%	NA <sup>1</sup>
Hard Disk Recorders	No of Models	-	10	0
	% of Models	-	53%	0%
VCRs	No of Models	-	1	NA <sup>1</sup>
	% of Models	-	4%	NA <sup>1</sup>
<b>Total of all Home Entertainment</b>		<b>106</b>	<b>-</b>	<b>33</b>
<b>Total % of all Home Entertainment</b>		<b>29%</b>	<b>-</b>	<b>7%</b>

<sup>1</sup> No products were found with off mode

Source: EnergyConsult 2006

A MEPS level that removes 30% of the least efficient models surveyed is consistent with the method used to determine the MEPS levels for other products, such as three-phase air conditioners and motors, while still somewhat consistent a significant trading partners.

**Stage 2 MEPS – 2012.** It is anticipated that by 2012 the market would be ready to achieve a MEPS level of 1 watt or less in passive standby for home entertainment equipment. This would be consistent with the levels expected by international programs. To reduce the impact of active standby, all home entertainment products would be required to power down to passive standby within 30 minutes of inactivity. Video recording equipment would be exempt from this due to the requirement for equipment to be preset for future recording. This level would currently exclude 70% of the market. However, given that the EU agreement requires manufactures to meet the 1 Watt level by 2007, it is not unrealistic to assume the Australian market will be able to adjust by 2012.

## Conclusions

Standby power is continuing to represent a significant 10% of residential electricity consumption. The measurement that is on-going in Australia is essential to target the problem product categories. The surveys reported in this paper provide up-to-date monitoring of the standby power trends for various products and allow analysis of policy options.

The home entertainment products that are targeted for regulatory action by Australia have demonstrated an increasing trend in active standby mode power levels since 2001 and increasing passive standby power levels since 2003. The high sales of these product warrant intervention to ensure that all products strive to lower standby power. In addition, the encouragement of automatic features that power the product to a passive standby mode from active standby is required.

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