Report No: 2004/11

NATIONAL APPLIANCE AND EQUIPMENT ENERGY EFFICIENCY PROGRAM

Minimum Energy Performance Standards

TELEVISIONS

PREPARED FOR

THE AUSTRALIAN GREENHOUSE OFFICE UNDER
THE NATIONAL APPLIANCE & EQUIPMENT ENERGY
EFFICIENCY PROGRAM

Minimum Energy Performance Standards - Televisions

Energy consumption from televisions in 2003 is estimated at 1,055 GWh. Televisions constitute 5% of total household electricity use which is greater than other household appliances such as clothes washers and dryers that already carry the energy rating label.

Televisions (TVs) were among a group of products identified for immediate action in the standby power program. However recent research suggested a program that examined all modes of use including on mode might better meet Australian governments' efficiency goals. Televisions include all television screen types, such as wide screen, plasma, LCD, rear projection and Cathode Ray Tube (CRT). The vast majority of televisions sold in Australia are imported.

NAEEEC in-store surveys from 2001, 2002, 2003 and 2003-04 show that projection and plasma technology is highly energy intensive compared to other television technology types. The store surveys also show a considerable range in both in-use and passive standby energy consumption indicating that there is technological scope for improvements to energy efficiency.

INTERNATIONAL HARMONISATION

In the European Union and Japan, MEPS or labelling programs are aiming for efficiency improvements of at least 25% of in-use efficiency. In addition, the ENERGY STAR program has in place standby power consumption targets of 1 Watt. By modelling units sold in the Australian market (as measured in the NAEEEC store surveys) against both the Japanese and European targets, it is clear that television units in the Australian market fall far short indicating that greenhouse gas reduction potential is significant.

Internationally, Japan is currently the only nation that imposes a MEPS for televisions, however China is planning to do so in 2005. The US ENERGY STAR program sets voluntary targets for televisions but does not consider in-use consumption. The Group for Energy Efficient Appliances (GEEA) Energy Tick in Europe and European Eco-Label program includes the on mode consumption for televisions as does the European EITCA agreement with manufacturers.

A new standard that defines the methods of measurement for the power consumption of audio, video and related equipment has been published as AS/NZS 62087:2004. This standard is almost a direct copy of the international standard IEC 62087.

As utilised in Europe, the method of measuring energy efficiency should take into consideration the screen size, aspect ratio, type of receiver/processor, scan rate and other consumer-desired features. This will ensure that manufacturers are not unduly penalised for providing more features for consumers. The MEPS and labelling methodology used in Australia will be close to the approach used by

STAKEHOLDER COMMENT

NAEEEC invites comments from any interested person or organisation on the measures proposed in this study. Comments should be directed to energy.rating@greenhouse.gov.au by 31 December 2004. Information sessions for industry participants can be arranged during the comment period if requested.

Electronic copies of profiles and full reports released for public discussion can be obtained from www.energyrating.gov.au

the EU GEEA voluntary labelling program and the European Industry Self-Commitment.

Australia proposes to adopt the EU Energy Efficiency Index as the basis for the MEPS and labelling program. The EU program utilises a reference Energy Consumption (Er) and a measured Energy Consumption (E) of the television to produce the Energy Efficiency Index (EEI).

NAEEEC PLAN

NAEEEC proposes to introduce minimum energy performance standards (MEPS) and Energy Labelling regulations for televisions.

The key components of these regulations will be as follows:

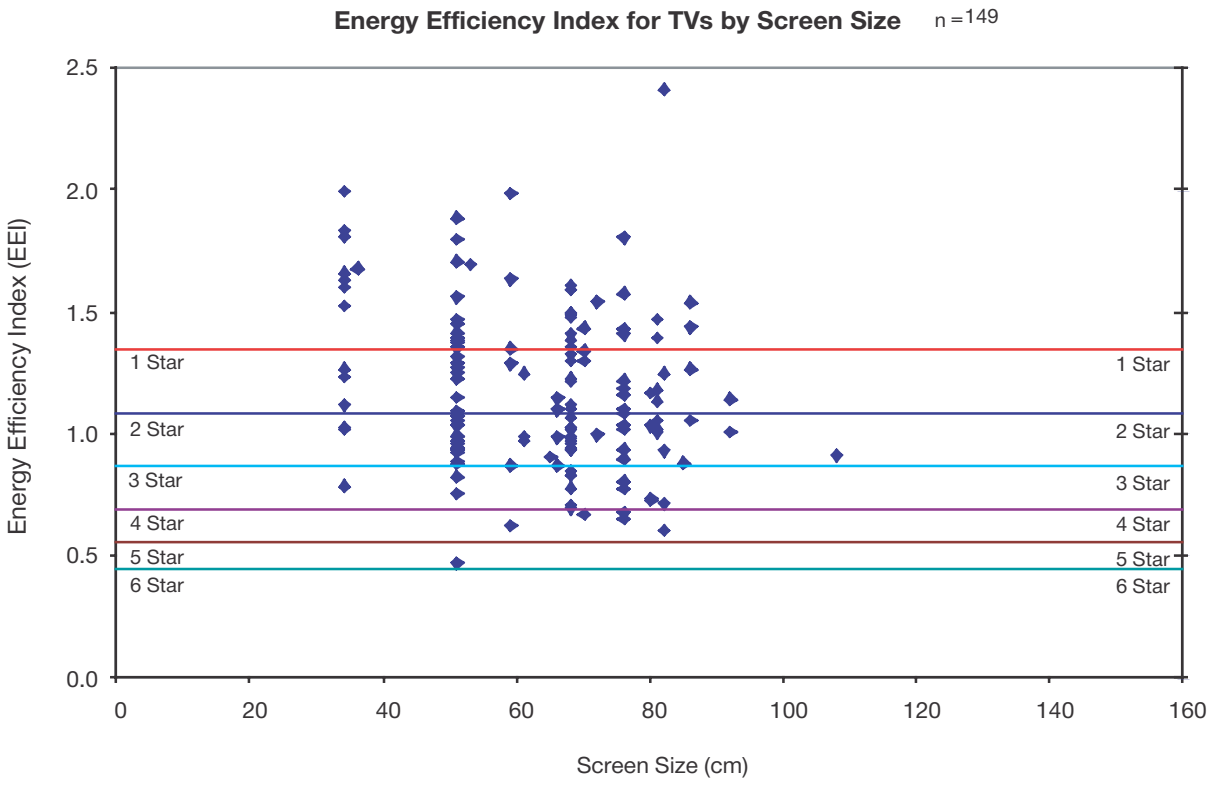
1. That a MEPS for televisions be implemented to ensure that the worst performing units are removed from the Australian market. Any MEPS approach should cover both in-use and standby energy consumption.

2. The suggested MEPS levels are based on the Energy Efficiency Index (EEI) developed in Europe for the Self Commitment on Energy Use.

3. The MEPS be introduced in stages with Stage 1 MEPS – April 2006. The MEPS for implementation in 2006 are targetted at below 1 Star or an EEI of greater than 1.35. This would represent an energy consumption of 1.35 times the reference television. Approximately 30% of all models surveyed since 2003 would not meet this MEPS level.

4. Stage 2 MEPS will be introduced at a date to be determined. This MEPS level could be staged to meet the targets of the EU and Japan, and Chinese who are aiming for improvements of 25% in the On mode energy efficiency. If this was implemented in Australia, the MEPS level would be closer to eliminating from sale all 2 Star appliances.

5. That a comparative labelling scheme be developed for televisions. It is considered that the most appropriate labelling scheme would be a six star energy rating label with no differentiation for screen types (i.e. plasma, CRT, LCD, etc.). All televisions are rated comparatively.



The range of Star Ratings for CRT televisions is shown in the following figure, where the distribution of CRT televisions is shown against the Star Rating, with 6 models achieving 4 stars and over 45 models less than 1 star.

The recommended MEPS and Star Rating Index and the relationship with EEI are shown in the following table.

TABLE 1: RECOMMENDED ENERGY EFFICIENCY INDEX AND STAR RATING INDEX

Star Rating	EEI – min	EEI – max
MEPS	>1.35	
1	1.08	1.35
2	0.86	1.08
3	0.69	0.86
4	0.55	0.69
5	0.44	0.55
6		=<0.44

Table 2 shows the timetable for implementation of MEPS and labelling. The Regulatory ("Part 2") Standard will be published at least 12 months in advance of the date in which the MEPS come into force, in order to provide industry with sufficient time to make the necessary purchasing decisions.

TABLE 2: TIMETABLE FOR IMPLEMENTATION OF PROPOSED MEPS

October 2004	Government publication of MEPS/labelling proposals for Televisions
October 2004 - March 2005	Consultation on the MEPS with stakeholders (including manufacturers and consumers) and consumer research
January 2005 - March 2005	Product Testing including international collaboration
October 2004 - March 2005	Consultation on Draft Standard(s) Part 2 by Standards Australia
April 2005	Publication of Standard by Standards Australia
2005	Regulatory Impact Statement(s) undertaken
April 2006	Voluntary labelling start
April 2006	Introduce MEPS
October 2006	Mandatory labelling

IMPACT OF MEPS

Since the MEPS criteria apply only to new products entering the market, it will be a number of years before these measures impact on the stock of existing products. By 2012, the proposed MEPS criteria (stage 1 and 2) is estimated to reduce annual energy consumption by 460 GWh, and by 2020 the annual savings will total approximately 1100 GWh. This is equivalent to reducing annual greenhouse emissions by 400 kt CO_2-e and 900 kt CO2-e respectively. The total cumulative savings in emissions by these dates are approximately 1.4 Mt CO2-e and 7 Mt CO_2-e.

NAEEEC MEMBERS

The Commonwealth, New Zealand, and all State and Territory governments are part of NAEEEC. Representatives are senior officials from various government agencies and statutory authorities or persons appointed to represent those bodies.

The *Australian Greenhouse Office (AGO)* is the Australian Government agency responsible for monitoring the National Greenhouse Strategy in cooperation with State and Territory Governments and with the support of local government, industry and the community. The AGO chairs NAEEEC and other members provide support for its activities.

The NSW *Ministry of Energy and Utilities* (incorporated within the Department of Energy, Utilities and Sustainability since 1 January 2004) provides policy advice to the NSW Government and operates a regulatory framework aimed at facilitating environmentally responsible appliance and equipment energy use. The Ministry is represented on the Energy Efficiency and Greenhouse Working Group, through which the appliance and equipment related elements of the National Greenhouse Strategy are being progressed.

The NSW *Sustainable Energy Development Authority* was established in February 1996 with a mission to reduce the level of greenhouse emissions in New South Wales by investing in the commercialisation and use of sustainable energy technologies.

The *Office of the Chief Electrical Inspector* is the Victorian technical regulator responsible for electrical safety and equipment efficiency. Its mission is to ensure the safety of electricity supply and use throughout the State. The corporate vision of the Office is to demonstrate national leadership in electrical safety matters and to improve the superior electrical safety record in Victoria. The Office's strategic focus is to ensure a high level of compliance is sustained by industry with equipment efficiency labelling and associated regulations.

The *Sustainable Energy Authority* was established in 2000 by the Victorian Government to provide a focus for sustainable energy in Victoria. The Authority's objective is to accelerate progress towards a sustainable energy future by bringing together the best available knowledge and expertise to stimulate innovation and provide Victorians with greater choice in how they can take action to significantly improve energy sustainability.

The *Electrical Safety Office*, Department of Industrial Relations, is the Queensland technical regulator responsible for electrical safety and appliance and equipment energy efficiency. The office ensures compliance with electrical safety and efficiency regulations throughout Queensland.

The *Department of Energy* is the lead agency with regard to sustainable development within the Queensland energy sector and is involved in a range of activities that reflect the importance of a sustainable approach. These activities involve developing and evaluating policies and initiatives through flexible and responsible decision making that allows economic, environmental and social outcomes from the energy sector to be maximised.

The Western Australian electricity regulator *Energy Safety* (a Division of the Department of Consumer and Employment Protection) is responsible for the technical and safety regulation of the electrical industry in WA. This includes the safety of consumers' electrical installations and appliances and the auditing of appliances and equipment to check compliance with energy efficiency and prescribed safety requirements.

The Western Australian *Sustainable Energy Development Office* promotes more efficient energy use and increased use of renewable energy to help reduce greenhouse gas emissions and increase jobs in related industries.

The *Office of the Technical Regulator* seeks to ensure the coordinated development and implementation of policies and regulatory responsibilities for the safe, efficient and responsible provision and use of energy for the benefit of the South Australian community.

The Tasmanian Government's interest is managed by the Department of Infrastructure, Energy and Resources' *Office of Energy, Planning and Conservation (OEPC)*. The OEPC provides policy advice on energy related matters including energy efficiency. Its web site is www.dier.tas.gov.au/energy/indext.html.

Electricity Standards and Safety is the technical regulator responsible for electrical safety throughout Tasmania. Regulatory responsibilities include electrical licensing, appliance approval and equipment energy efficiency.

The Australian Capital Territory's interest is managed by the *Energy Policy Unit, Economic Management Branch*, Department of Treasury. The primary function of this Unit is to provide the ACT Government with advice on National and Territory energy related matters including energy efficiency.

The *Department of Infrastructure, Planning and Environment* is responsible for the administration of regulations in the Northern Territory regarding various aspects of safety, performance and licensing for goods and services including electrical appliances.

The *Energy Efficiency and Conservation Authority (EECA)* is the principal body responsible for delivering New Zealand's National Energy Efficiency and Conservation Strategy (NEECS). EECA's function is to encourage, promote and support energy efficiency, energy conservation and the use of renewable energy sources.

Analysis of the Potential Policy Options for Energy Efficiency Improvements to:

Televisions

Prepared for

The Australian Greenhouse Office under the National Appliance & Equipment Energy Efficiency Program

October 2004

EnergyConsult PTY LTD
655 Jacksons Track
Jindivick, Victoria 3818
Australia
ABN: 18 090 579 365
Tel: +613 5628 5449
Fax: +613 9923 6175
Email: info@energyconsult.com.au

Contents

List of Tables

List of Figures

Glossary

ABS	Australian Bureau of Statistics
Comparative label	A type of product label that indicates not only that the product meets specific criteria (ie. energy or environmental), but also allows comparison between products by providing some form of ranking.
CRT	Cathode Ray Tube
DVD	Digital Video Disk
Endorsement label	A type of product label which indicates that the product meets specific criteria (ie. energy or environmental). The label does not allow comparison between eligible products.
HDTV	High-definition television
LCD	Liquid Crystal Display
Ownership	The ratio of stock to the total number of households.
Penetration	The proportion of households in which a particular appliance type is present (irrespective of the number of units of that appliance in the household).
Saturation	The number of specified appliances per household for those households that have the appliance.
SDTV	Standard-definition television

Introduction

Background

Over the past three years the National Appliance and Equipment Energy Efficiency Committee (NAEEEC) has been tracking the energy usage, in particular standby power consumption of appliances offered for sale in retail outlets across Australia. Additionally NAEEEC has commissioned an intrusive survey of standby consumption in households and a telephone survey of 800 households to determine appliance ownership and usage. This research has been the backbone of standby policy development in that finally the Australian Government has meaningful data on the extent of standby power consumption in Australian households.

Leading on from this earlier research, the Ministerial Council on Energy in 2002 released the policy document *Money Isn't all You're Saving* outlining Australia's Standby Power Strategy 2002 – 2012. The strategy outlined the products and appliances that require "immediate" or "subsequent" action in the standby power program. Televisions[1] were among a group of products identified for immediate action. Part of this action included the development of "product profiles" to "provide an overview of the product in terms of its standby characteristics, the purpose and functionality of their standby function, market status, ownership levels and trends in sales and product types."[2]

However, recent research for NAEEEC[3] suggested after preliminary analysis, that a program that examined all modes of use including on mode and not just standby modes might better meet the government's efficiency goals. As such, the development of a product profile for televisions was not going to achieve a full insight into the product types, nor would it be able to cover all of the policy options available for televisions. As such this report was commissioned to consider a range of policy options including mandatory measures like appliance energy rating labelling and Minimum Energy Performance Standards (MEPS) to achieve that outcome. Moreover, the potential for energy and greenhouse savings through the use of a combination of policy tools will also be investigated in this report.

---

1 Where ever the term "televisions" appears in this report without further descriptive information on the type of television, the term is intended to encompass all television types, including digital, wide screen, plasma, rear projection, CRT, etc. television types.

2 *Money Isn't All You're Saving* Australia's Standby Power Strategy 2002-2012. MCE

3 Sustainable Solutions *A Study of Home Entertainment Equipment Operational Energy Use Issues*. NAEEEC 2003

Product Description

Analog colour televisions are currently the most common form of television used in the residential sector in Australia. They are based on the European PAL system with free to air broadcasts using VHF and UHF bands. There are also some free to air broadcasts made from satellite and various pay TV broadcasts made via microwave, satellite and cable (these usually go through a converter/decoder to product a suitable analog output).

The most significant change coming to television in Australia since its introduction in 1956 is the introduction of digital television which was launched in Australia in the five mainland metropolitan areas (Sydney, Melbourne, Adelaide, Perth and Brisbane) on 1 January 2002. For consumers, digital television means clearer, sharper pictures and a reduction in the interference and ghosting that currently affect many viewers in built-up areas or where there is hilly terrain. The change to digital television will also enable viewers to receive datacasting and enhanced television services that may include subtitles, captioning, further information on programming and a choice of viewing angles. In 2008, analog transmission is set to cease and so to be able to watch television, consumers will either have to purchase a set top converter box which will convert digital broadcasts to analog, or purchase a TV that will enable them to receive or display digital signals.

Digital television signal can be transmitted in either standard definition or high definition. Standard-definition television (SDTV) reportedly has improved reception capability when compared to the existing analog service while High-definition television (HDTV) provides cinema-quality viewing with surround sound. Digital television will be broadcast in wide-screen format in both SDTV and HDTV (HDTV broadcasting began only recently). A summary of the options available to consumers who want to be able to receive digital broadcasts without a set top box is as follows:

Transmission Types

Analog

Currently the most widely available transmission option that comes at no additional cost to the consumer other than the initial purchase of a television unit. Television units using this method of transmission will require a set top box to receive a signal as analog is phased out and digital transmission phased in around 2008.

Standard-Definition TV (SDTV)

SDTVs give the consumer all of the benefits of the basic set-top box as well as a digital picture in widescreen format.

High Definition TV (HDTV)

HDTVs receive both HDTV and SDTV signals and display digital HDTV pictures in cinema quality, wide-screen 16:9 format. A HDTV set will also provide all of the benefits

of a basic set-top box. More common in the market are Digital Display Devices, which will display both SD or HD signals in a 16:9 wide-screen format. Digital Display Devices are typically LCD or Plasma screens which will only display digital signals and require a set-top box to receive the digital or analog TV transmission and convert it to digital.

Television Types

A brief description of television types are provided below. All of the television types described below with the exception of CRT television types may have the standard analog, SDTV or HDTV receiver types. More detail on the technology used is provided in Appendix B: Television Technology Types on page 17.

Standard Cathode Ray Tube (CRT)

Most existing televisions in Australia use cathode ray tube (CRT) technology and these existing televisions are usually set up to receive analog broadcasts. Standard analog colour televisions are currently the most common form of television used in the residential sector in Australia. They are based on the European PAL system with free to air broadcasts using VHF and UHF bands. There are also some free to air broadcasts made from satellite and various pay TV broadcasts via microwave, satellite and cable (these usually go through a converter/decoder to produce a suitable analog output). CRT TVs can also purchased in wide screen format (see below)

Wide-screen Televisions

Regular televisions have a width to height ratio (or aspect ratio) of 4:3, whereas wide-screen televisions have an aspect ratio of 16:9, making the unit almost twice as wide as it is high. A VCR will also show videos in the standard format, although a DVD player will enable the user to watch movies in wide-screen format. The wide-screen is designed to give the user a greater television experience by making the television appear more like a cinema screen. The actual screen size of wide-screen televisions varies and usually start at around 66cm. There are many variations on the types of wide-screen televisions available and these are described in detail below.

Rear Projection

Rear projection televisions are wide-screen televisions that beam images from three picture tubes (CRTs) or LCD projectors to the back of a 102 cm to 150-plus-cm screen. The main attraction of rear projection televisions is that they provide a wide-screen or cinematic view for a more comparable price to plasma or LCD wide-screen television technologies. These screens can be in the 4:3 or 16:9 format

Plasma Screen

In simple terms plasma screens are made up of lots of tiny fluorescent lights to produce a high quality image for television viewing. The technology allows for a greater viewing angle – 160 degrees compared to about 60 degrees in the standard CRT televisions. As

such, it isn't necessary to be directly in front of the television to be able to view the picture. Plasma screens boast a wide-screen format, light weight and low radiation compared to CRT television types. Many of the plasma screens available require a set top box, VCR or home theatre package to produce images, as they do contain a TV tuner, however more models are now being produced that do contain an integrated digital or analog tuner.

Plasma Television

Plasma televisions are plasma screens (see above) with built in television tuners. There are very few products on the market that fit into this category.

Liquid Crystal Display (LCD)

LCD televisions utilise the same technology as computer monitors and until very recently have had smaller screens compared to plasma units. They are also considerably more expensive than plasma screens. However, LCD televisions are brighter, crisper, have a better contrast ratio and a better viewing angle compared to plasma units and a much greater life expectancy. While the sales volume of LCD televisions in Australia has been low to date, largely because of their cost, recent improvements to LCD technology and an international trend toward LCD televisions may see prices fall and the market share increase. LCD televisions boast very low energy consumption levels compared to other television types.

Sources of Product

Australia is an importer of televisions with the exception of one brand that manufactures in NSW. Companies originating in Japan, Korea and China manufacture the vast majority of televisions sold in Australia. However the place of manufacture is diverse leading to televisions being imported from a range of countries, mainly throughout Asia. A limited number of televisions are manufactured in Europe and the United States.

Market Profile

All Television Types

Colour televisions first appeared on the market in Australia in 1974 (black and white TV was introduced in Australia in 1956). The overall ownership profile for televisions in Australia is limited with data collection on ownership sporadic. Little state data is available, so a uniform national ownership and penetration has been assumed. In the 1960's and early 1970's, the ABS census asked households whether they owned a television. The available data suggests that television penetration probably increased linearly from 0% in 1956 (the date of introduction) to about 90% by 1975. It can safely be assumed that the average number of units per household would be limited to 1 in almost all cases until the mid 1970's so penetration would be equal to or close to ownership at that time.

In 1996, an ABS survey found some 98.9% of households had at least one TV (ABS 4172.0-1997) and also recorded some data on ownership (number of TVs per household). ABS 4602.0-1999 also recorded the penetration of TVs at 98.9% but no figures for ownership were provided. In 2001, NAEEEC commissioned a household telephone survey recording the penetration and ownership of TVs based on a sample of 801 households. A summary of these surveys is shown in Tables 1 and 2.

Table 1: Penetration of Television Ownership - Australia

Year and Source	Penetration
1955	0%
1961 (census – NSW)	48%
1966 (census – NSW)	70%
1970 (census – NSW)	90%
1996 (ABS4172.0)	98.9%
1998 (Bis Shrapnel)	98.5%
1999 (ABS 4602.0)	98.9%
2000 (NAEEEC)	99.5%
2002 (ABS 4602.0)	99.2

Source: Census data re-quoted from Wilkenfeld 1999.

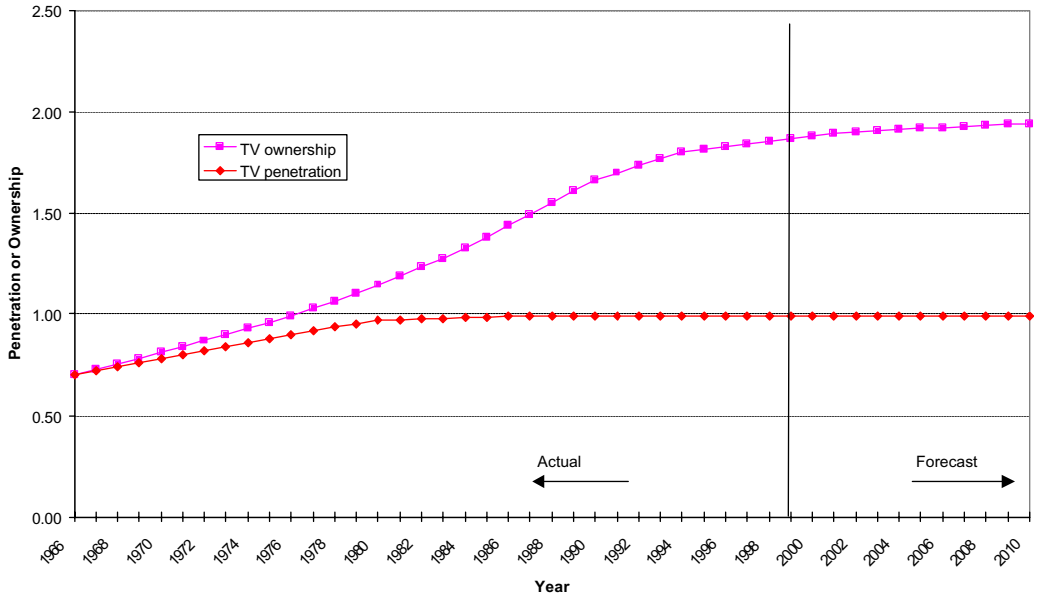
Table 2: Ownership data for Televisions - Australia

TVs	1996 (ABS4172.0)	2000 (NAEEEC)
None	1.1%	0.5%
1 TV	40%	38.6%
2 TVs	40%	39.4%
3 TVs	13.9%	15.3%
4 or more TVs	5%	6.2%
Ownership	1.827	1.895
Saturation	1.847	1.905

Note: 2000 NAEEEC survey found that 4.8% households had 4 TVs and 1.4% had 5 TVs. 1996 values for ownership and saturation assume 4% with 4 TVs and 1% with 5 TVs.

A graphical overview of TV penetration and ownership trends are shown below.

Figure 1: TV Penetration and Ownership in Australia



Source: EES estimates using ABS data

The average age of TVs in the stock was found to be 8 years in the 2000 telephone survey. This compares closely with an average age of 9 years in the standby measurement survey of households in the same year.

Table 3 below shows the market share for all televisions sold in Australia in 2002 by brand. It also shows sales value by brand. It shows that television sales in 2002 were over a billion dollars, with a range of market players. LG and Teac captured more than 10% of the market respectively in terms of sales in 2002, while Sony and Panasonic each

with around 7% of sales achieved a substantial sales volume of $141 million and $128 million in sales value respectively in 2002.

Table 3: Percent of Television sales and sales value by brand in Australia 2002 (all televisions)

Brand	Total Sales	Percent of sales	Sales Value ($000)
LG	137,046	12.0%	$ 144,305
Teac	117,782	10.3%	$ 60,653
Sony	90,958	7.9%	$ 141,143
Panasonic	83,054	7.2%	$ 128,368
NEC	80,341	7.0%	$ 52,546
Palsonic	79,548	6.9%	$ 29,149
Sanyo	72,425	6.3%	$ 25,635
Philips	50,006	4.4%	$ 67,147
Samsung	49,886	4.4%	$ 46,193
Sharp	45,284	4.0%	$ 28,943
Akai	23,799	2.1%	$ 12,499
JVC	14,678	1.3%	$ 13,306
Centrex	14,450	1.3%	$ 5,427
Grundig	12,623	1.1%	$ 33,591
Toshiba	11,841	1.0%	$ 45,256
Fujitsu	3,351	0.3%	$ 44,592
Other	258,701	23%	$ 148,103
Total	1,145,773	**100%**	**$1,026,898**

Market Data Sourced from: GfK Marketing Services Australia

Wide-screen Televisions

Sales data suggests that wide-screen televisions are increasing their market share in Australia. Very little data exists on penetration and ownership of wide-screen televisions in Australian households. Sales figures quoted from Digital Broadcasting Australia (DBA) show a sharp increase in wide-screen televisions including wide-screen conventional tube (CRT), Rear Projection, Plasma and LCD displays from 28,000 units in the March 03 quarter to 40,000 units in the June 03 quarter. More than 124,000 units were sold to retailers in the 12 months to June 2003, up from 59,000 for the same period in 2002. Table 4 below shows the total sales of wide-screen televisions for each of the June quarters since 2001. The figures show that sales have increased rapidly since June 2001.

Table 4: Sales of 16:9 Screens to Retailers

Quarter	CRT	Plasma	LCD
June 01	7,500	<1,000	0
June 02	20,000	2,500	0
June 03	31,000	5,500	3,500

Source: DBA July 2003

Table 5 below shows the total sales of wide-screen (16:9 aspect ratio) televisions for each of the years 2000, 2001 and 2002. Sales increased 6 fold from 2000 to 2001, while sales from 2001 to 2002 more than tripled. In 2002, 16:9 television sales constituted 7% of all television sales, up from 2% in 2001 and just 0.4% in 2000. The growth of wide-screen televisions is clearly showing a steady increase within Australian households.

Table 5: Total Annual Sales for 16:9 Televisions

Full Year	16:9 Sales Volume
2000	4,203
2001	23,230
2002	76,987

Source: GfK Marketing

While the growth in sales of wide-screen televisions is notable, the sales value from wide-screens televisions is proving to be a highly lucrative market. As mentioned above, wide-screen television sales constituted 7% of total television sales in 2002, however, this represented more than 30% of the total value of all televisions sold.

Table 6: Proportion of all Television Sales that are 16:9 Televisions

Full Year	Sales Value ($)	Percent
2000	$ 22,232,703	3%
2001	$ 93,813,689	12%
2002	$ 307,997,632	30%

Source: GfK Marketing

Free-to-air television broadcasters and national broadcasters are required to continue their existing analog broadcasts for at least 8 years after the start date for digital services in their areas. The duration of this simulcast period is to be reviewed by 2006. Nevertheless, as the advantages of wide-screen television and digital broadcast services become known, this awareness will serve as an additional catalyst to the sales of wide-screen televisions.

Summary

Overall television penetration is around 99%, while television ownership is around 1.89 televisions per household and increasing slightly. Overall television sales in 2002 constituted more than a billion dollars, with a range of market players. Wide-screen televisions are rapidly increasing their market share with a six-fold increase in sales from 2000 to 2001 and an almost three-fold increase in sales from 2001 to 2002. While wide-screen television sales constituted 7% of total television sales in 2002, this represented more than 30% of the total value of all televisions sold.

Energy Consumption

Total energy consumption of all televisions in Australia is estimated at 1,055 GWh pa in 2003 (Harrington & Foster 1999). This is estimated to increase to 1,361 GWh in 2010. Harrington & Foster estimate that the proportion of total household energy use attributed to televisions is 5%. This is considerably greater than that of a clothes washer (1%), clothes dryer (1%) or dishwasher (1%) and only marginally less than freezers (6%). All of these household appliances already carry an energy rating label and freezers are subject to MEPS.

The effect of policies targeting standby power consumption and in-use power consumption of televisions will increase the efficiency of stock over time. Hence, the analysis of energy consumption characteristics and related GHG emissions is presented from the perspective of sales of new equipment. Over a period of 20 years, it can be assumed that the sales of these equipment will completely replace the current stock, as most of these technologies have a useful life in the order of 10-15 years.

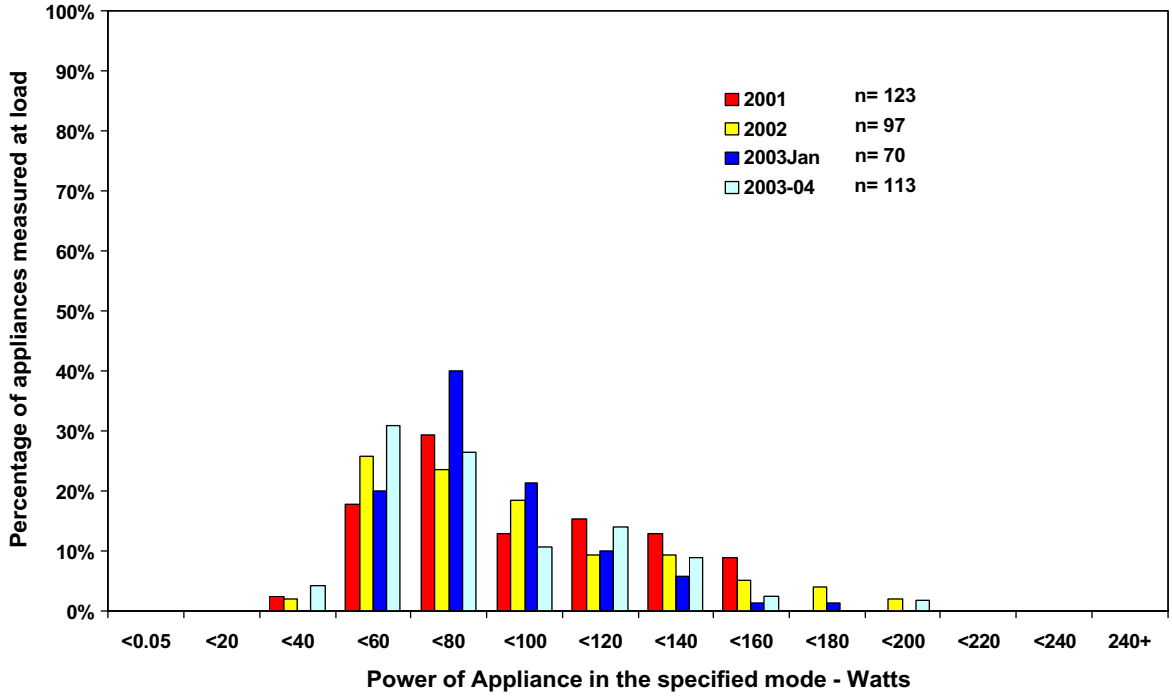
The following energy consumption characteristics are based on the store survey and intrusive surveys commissioned by NAEEEC[4] over the last 4 years and previous studies of residential appliances. However, the impacts of policies to improve the efficiency of televisions is modelled on the basis of sales of, and changes to the efficiency of these technologies over the next 15 to 20 years.

Standard CRT Televisions

The NAEEEC in-store surveys conducted in 2001, 2002, 2003 (January) and 2003-04 show that in-use energy consumption for CRT televisions is around 80W. Figure 2 shows the distribution of power measurements for televisions when in-use for the years 2001, 2002, 2003 and 2003-04. The chart shows that the majority of televisions use between 50W and 100W although 2003 has seen an increase in those using less than 50W in-use. Average in-use power consumption fell significantly from 2001 and 2002 to 2003 and 2003-04 from around 88W to 79W. The trend to lower power consumption between the years 2001, 2002 and 2003, 2004 is supported by the data shown later in this report on the change in energy efficiency over time, but it should be treated with careful optimism as many factors influence the survey and only future monitoring will reveal if in-use consumption is actually trending downwards.

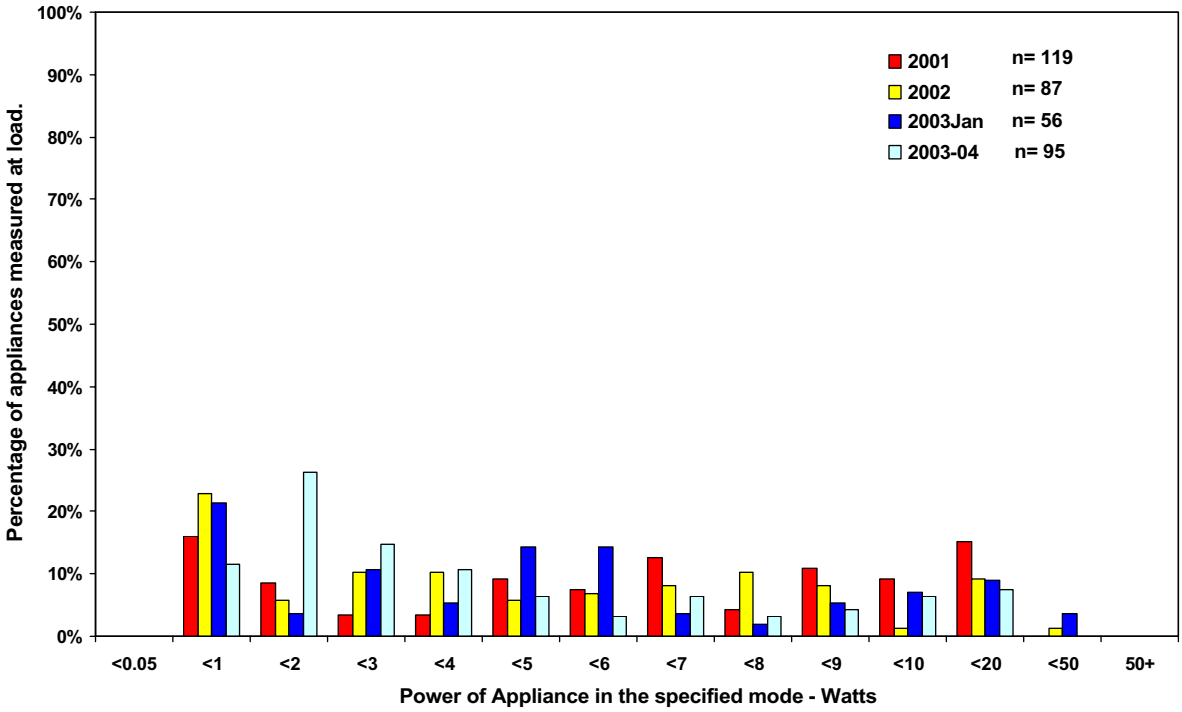
[4] The data from the last store survey – conducted in May/June 2004 – was used in this report and small variations compared to Annual Standby Survey report may be expected, as the data used for publishing this report is currently being checked.

Figure 2: Power measurements for CRT televisions: in-use mode



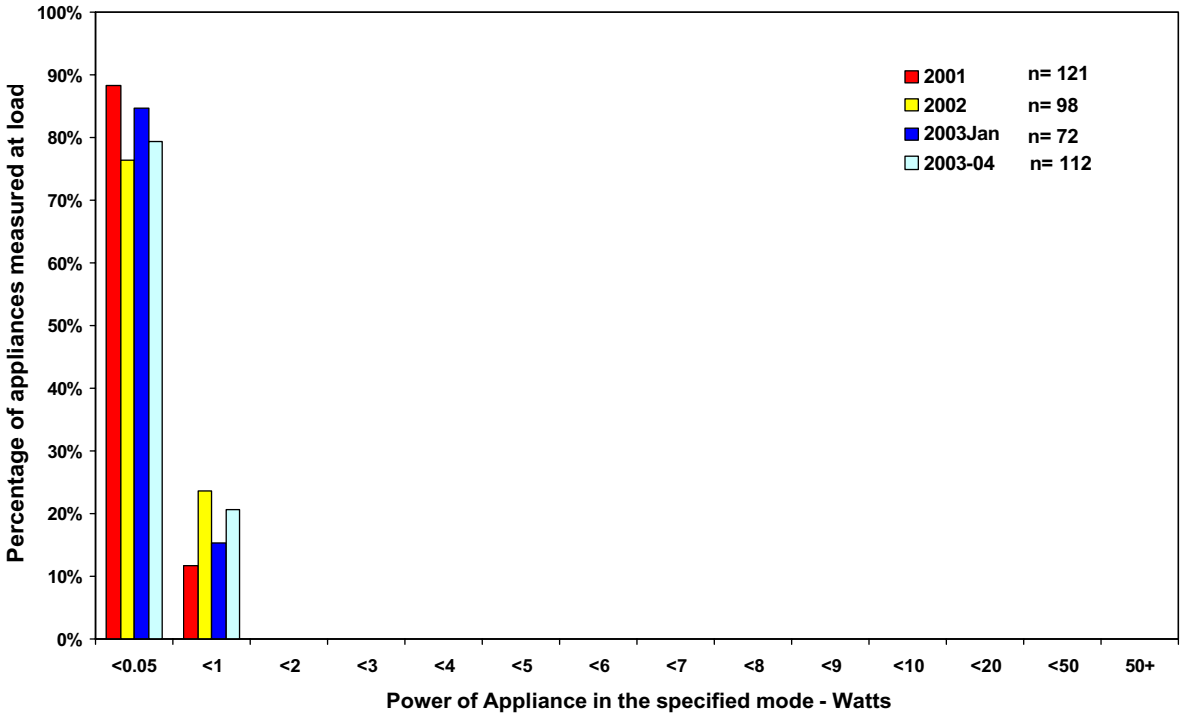
Passive standby mode in 2003-04, as in previous years, showed readings that were widely distributed. Around 10% of televisions consumed less than 1W, which is less then earlier surveys and trending away from the national target of 1W standby power consumption. As Figure 3 shows, there is still a high proportion of units between 2W and 7W (67%). Average consumption in 2003-4 was 4.1W which is lower than 2001 which was 6.0W. No clear trend can be determined as the average power consumption in passive standby mode varies each year (5.1W in 2002, 5.9W in 2003).

Figure 3: 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 4.

Figure 4: Power measurements for CRT televisions: off mode

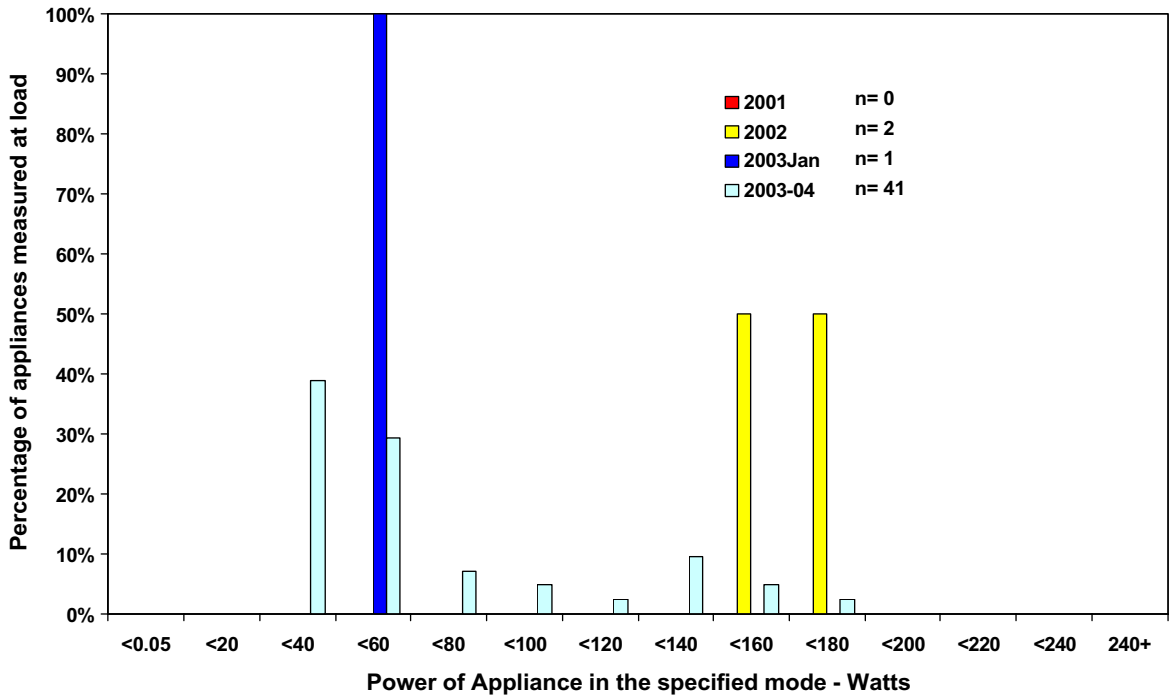


LCD Televisions

In the 2003 store survey only 1 LCD television was measured and only 2 were measured in the 2002 store survey. However, in the 2003-04 survey, 41 units were measured. Due to the limited number of units measured, the 2002 and 2003 results cannot be compared with those in 2003-4. The screen size ranged from 30cm to 94 cm.

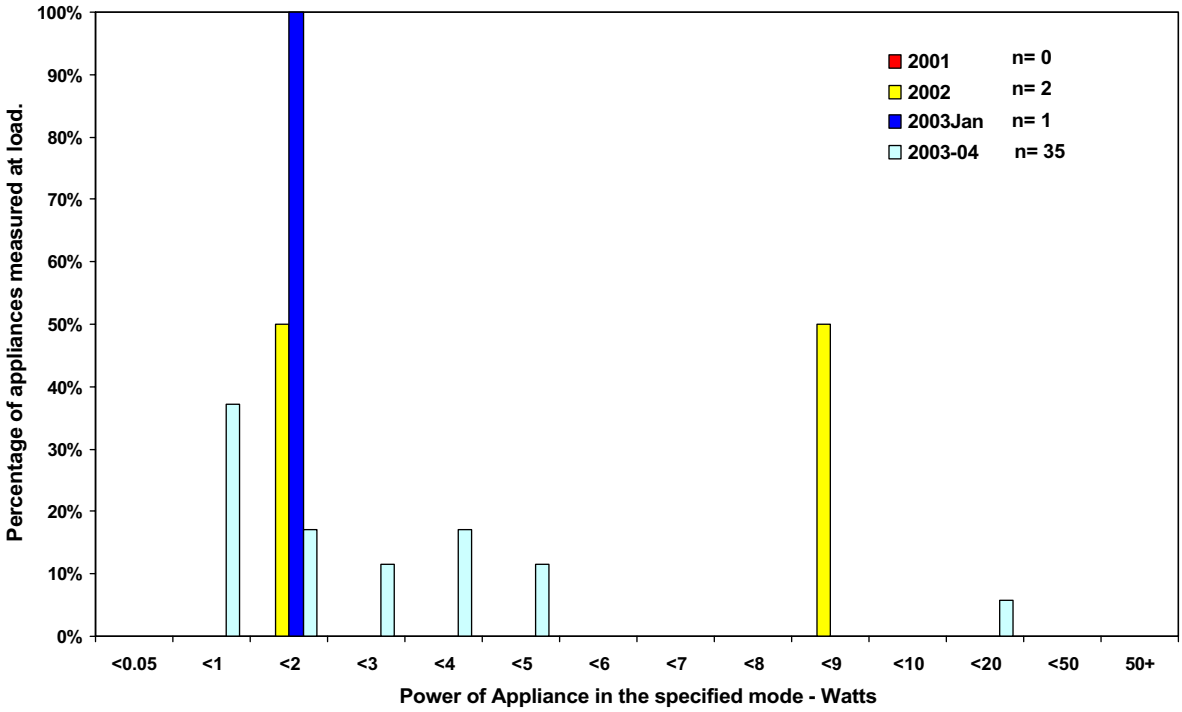
The average in-use power consumption of units measured in the 2003-04 store survey was 56.4W with a range from 24W to 134W, as shown in Figure 5.

Figure 5: Power measurements for LCD televisions: in-use



The units measured in 2003-04 showed that there was a large difference in passive standby with the maximum being 18.5W, the minimum being 0.6W and an average of 2.8W, as shown in Figure 6. Over half (24) of the units had an off switch and the range of power consumption measured in off mode was from 0.0W to 2W, with an average of 0.7W

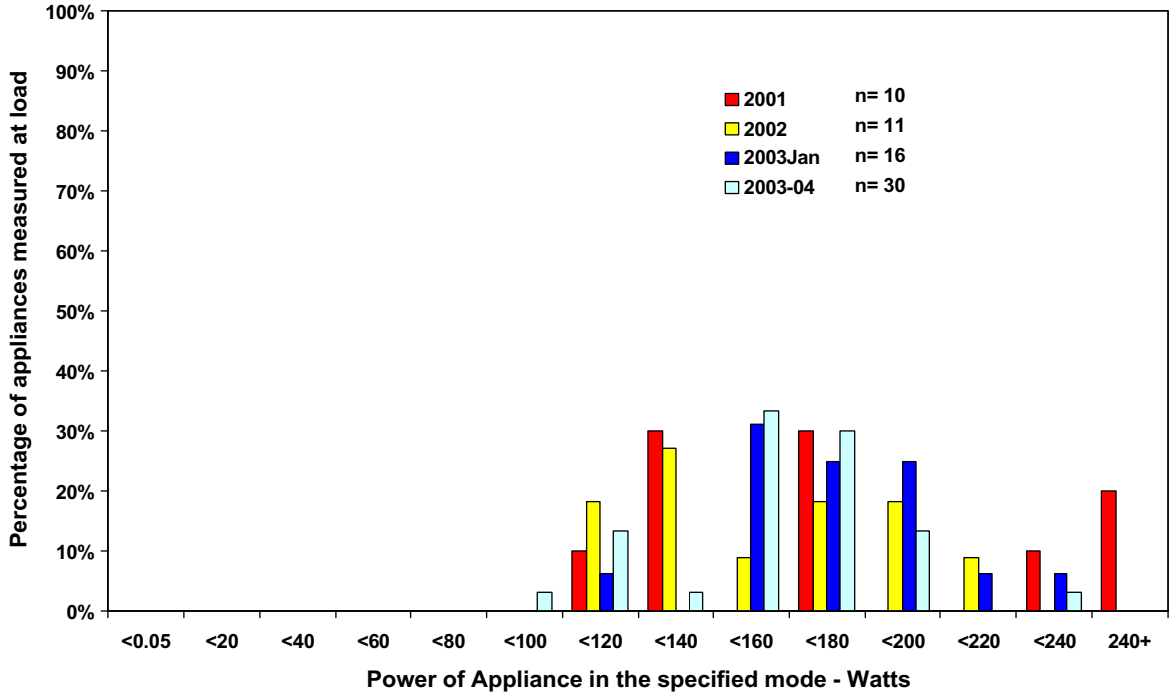
Figure 6: Power measurements for LCD televisions: passive standby mode



Projection Televisions

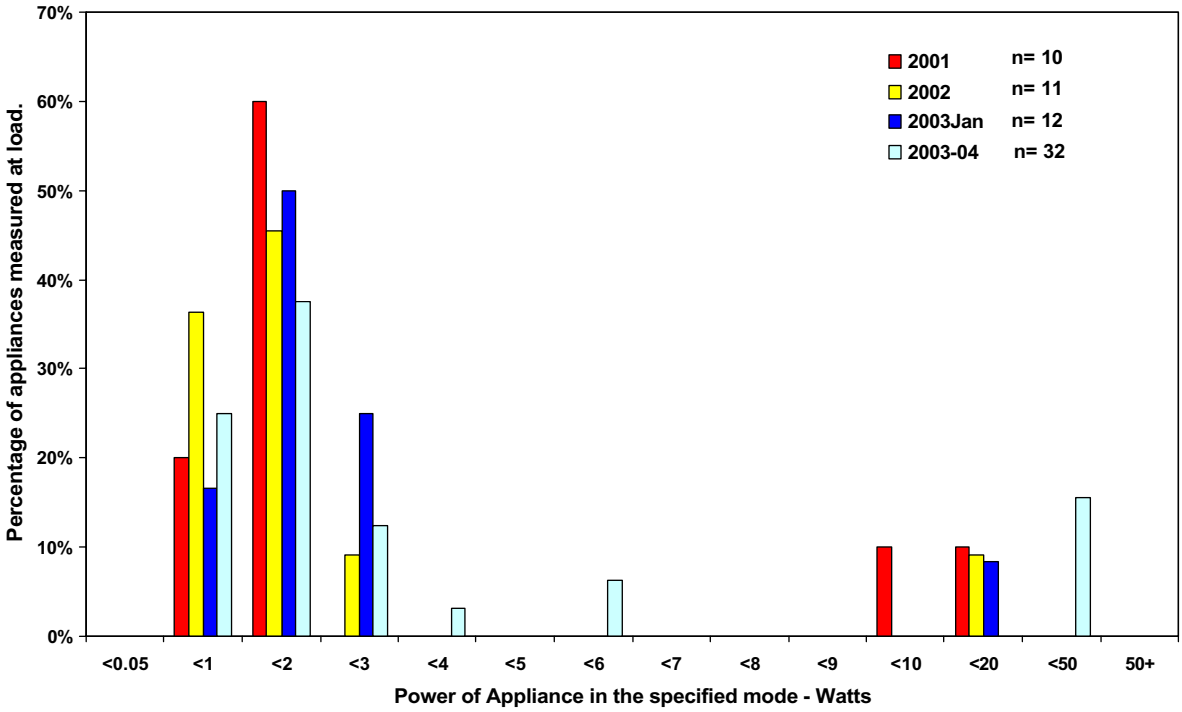
Projection televisions were measured when in-use, passive standby and off. When in-use (see Figure 7) the average power consumption in the 2003-04 store survey was 174.7W, while in 2003-04, the preliminary data shows an average power consumption of 156W, with a maximum of 223W and a minimum of 94W. Although the in-use power consumption has decreased from 2003 to 2004, a comparison with the survey data from 2001 and 2002 shows no trend. When in passive standby the range of consumption in 2003-04 extended from 0.4W to 45W producing an average of 7.7W. In off mode the average power consumption was 0.1W with a maximum of 0.3W and a minimum of 0.1W.

Figure 7: Power measurements for projection televisions: in-use



As presented in Figure 8 most projection televisions consume less than 2W when in passive standby and this is consistent across all years. A small number of units consume between 10W and 20W, however in 2003-04 more than 16% of measured passive standby was between 20W and 50W.

Figure 8: Power measurements for projection televisions: passive standby mode



Plasma

In-use, plasma screens and televisions use a considerable amount of energy. The maximum power usage measured in the 2003 store survey was 444W while in 2003-04 the maximum was 305W and the minimum measurement was 65W. The average in-use consumption was 150W in 2003-04 compared to 292.4W in 2003. Figure 9 shows the range of in-use power consumption of plasma screens and TVs. The survey data indicate a trend towards lower in-use consumption for plasma type TVs, which is encouraging, considering the high consumption characteristics of this technology. The measurement of the 4 of the plasma TVs with in-use power consumption of less than 100W will be checked in the next store survey, however the survey results show a low in-use power consumption trend.

Passive standby performance was vastly better with the maximum at 4.4W and the minimum at 0.7W in the 2003-04 survey and an average of 2.4W. 7 units out of 27 did not have an on/off switch and the average consumption for off was 0.8W with the maximum at 2.9W and minimum at 0.0W.

Figure 9: Power measurements for plasma screens: in-use

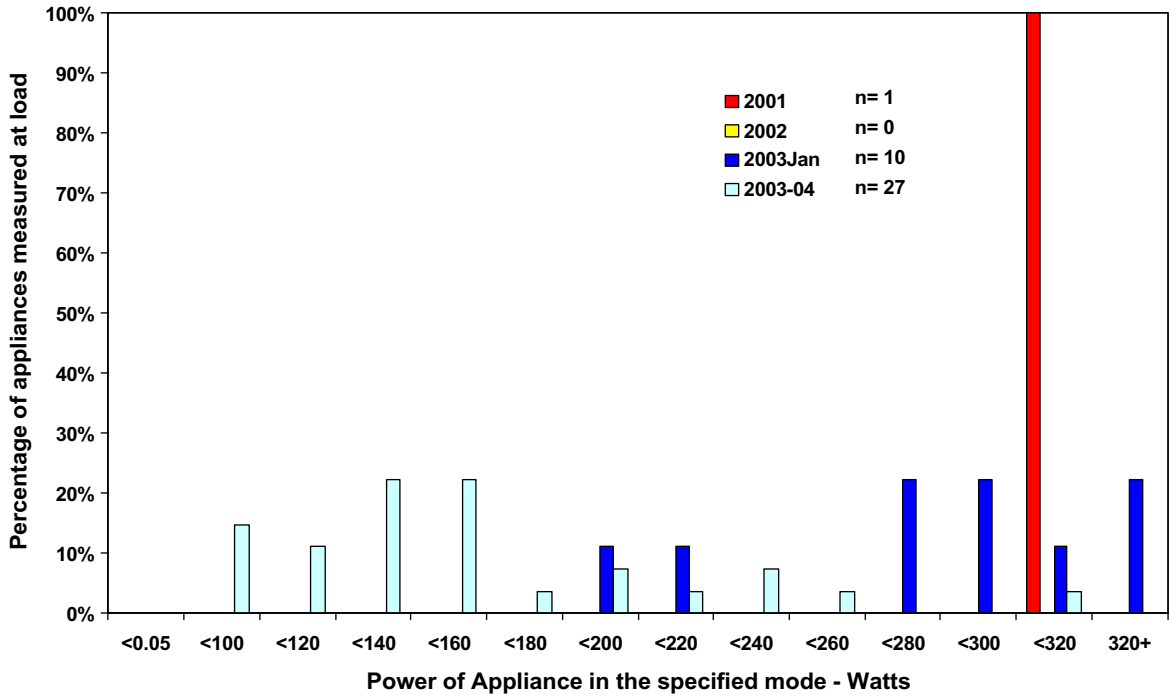


Figure 10 below shows the distribution of measurements for plasma televisions in passive standby. Most units registered less than 3W.

Figure 10: Power measurements for plasma televisions: passive standby mode

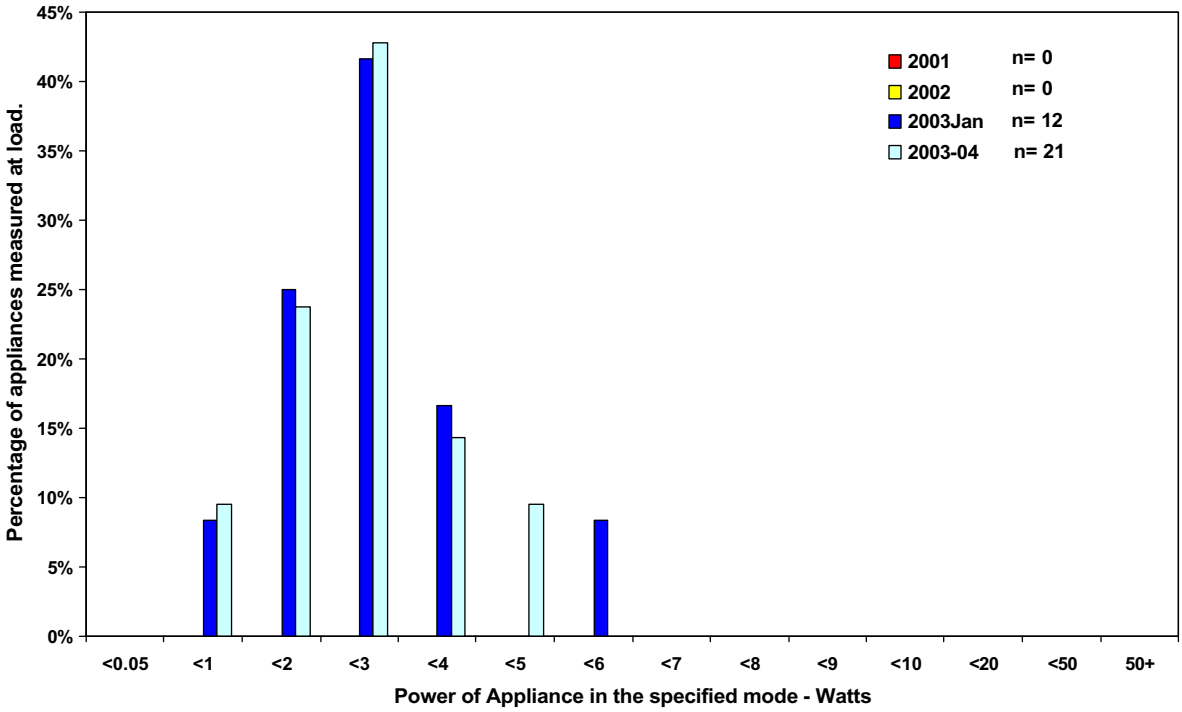
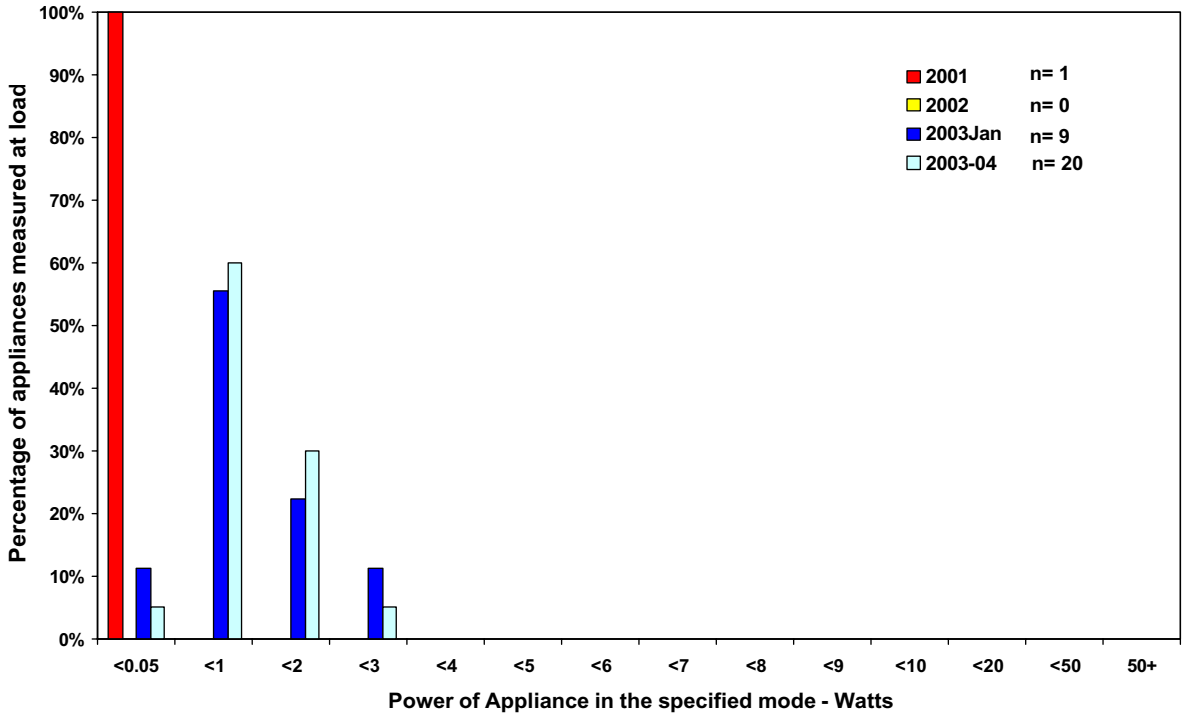


Figure 11 shows the distribution of readings for plasma televisions in off. The graph also shows that one plasma TV was measured in the 2001 store survey and that it registered less than 0.05W.

Figure 11: Power measurements for plasma televisions: off mode



Summary

Table 7 summarises the results for the 2003-04 NAEEEC store survey. The measurements clearly show that plasma and projection screens use a considerable amount of energy in-use compared to the other television types. The previous discussion highlighted the enormous range in energy consumption within each of the television types. Sustainable Solutions (2003) after conducting further analysis on the data collected from the 2002 store survey notes that for most screen sizes, the variation in energy use across the sample of models of identical size was at least a factor of 1.7. Comparing 68cm televisions, on the basis of 5 hours a day usage, the annual operating energy saving from using the best in the sample (57W) instead of the worst in the sample (159W) would be 186 kWh – a significant energy saving. Among plasma screens measured in the 2003 and 2004 store survey, the difference between the worst performing model in-use and the best performing model in-use was over 350W. These figures clearly indicate that there are technological or other possibilities for in-use energy savings.

Table 7: Summary of NAEEEC Store Survey Measurements 2003

Television Type	Mean In-use	Mean Passive	Mean Off
CRT	79.1W	4.1W	0.0W
LCD	56.4W	2.9W	0.7W
Projection	156.5W	7.7W	0.1W
Plasma	150.4W	2.4W	0.8W

Energy consumption from televisions in 2003 is estimated at 1,055 GWh. Televisions constitute 5% of total household electricity use which is greater than other household appliances such as clothes washers and dryers that already carry the energy rating label.

NAEEEC in-store surveys from 2001, 2002, 2003 and 2003-04 show that projection and plasma technology is highly energy intensive compared to other television technology types. The store surveys also show a considerable range in both in-use and passive standby energy consumption indicating that there is technological scope for improvements to energy efficiency.

Technology Scope for Energy Efficiency

Siderius (1996) states that it is relatively easy to reduce standby power consumption from Televisions. The components that have to be powered in standby mode are an infrared receiver for the remote control signal, a LED to indicate the standby mode and an IC to generate a 'wake-up' signal. Siderius suggests the following alternatives:

- Inclusion of a bridge rectifier which would allow these functions to be powered directly from the mains.

- Inclusion of a separate standby power supply that is designed for high efficiency at a small load. Using the main power supply for in-use function in addition to standby mode is generally inefficient as the power supply has to be designed for two different working points (e.g. 5W in standby and 90W in-use).

- Use of an auto power off feature in which the television switches itself off from the mains after a preset period (for example 1 hour in standby). The user would not be able to use the remote control to activate the television after it has switched "off".

Huenges Wajer and Siderius (1998) suggest that both improvements to design and the components of the unit will improve the energy efficiency of televisions in-use. The following options are listed:

- Improvement of the main switched mode power supply. This was considered to be the most effective means for improving efficiency.

- Integration of ICs, even when the number of features in televisions is increasing, the total small signal processing in a television is done with few ICs. The author notes that the introduction of digital television services will require manufacturers to develop new small signal boards at a higher cost than for analog televisions.

- Use of more efficient power amplifiers for the audio output. Energy savings would be most significant for televisions with surround sound amplifiers and sub woofers.

- Lowering IC supply voltages, although this option will have limited impact on reducing total consumption since it applies to small signal processing only.

- More efficient video large signal circuitry through component and software modifications.

- Improvements to design including minimising different voltages and voltage rails and power management options which are more advantageous when televisions adopt more computer-like functions that can subsequently be powered down.

- Lowering manufacturer default settings for luminance. Energy savings in the order of 8% to 18%, depending on the size of the unit, could be made by lowering luminance settings from the average factory default setting of 230 cd/m^2 to 130 cd/m^2.

Summary

Clearly there are several options for improving television efficiency. However, it is up to the manufactures to determine the most cost effective and consumer appealing approach.

Testing Standards Development

Current Australian Standards

Standards Australia International (SAI) advises that there are no standards applying to the energy consumption of analog TVs, digital TVs. A new standard that defines the methods of measurement for the power consumption of audio, video and related equipment has been published as AS/NZS 62087:2004. This standard is almost a direct copy of the international standard IEC 62087 discussed below. The Australian government is also currently communicating with the relevant committees on developing a standard that includes voluntary efficiency performance requirements for standby energy consumption. These initial voluntary requirements would be published by SAI in a new part of the AS/NZS 62301.

AS/NZS 62301(Int.):2003 was recently published to provide a test procedure to determine the power consumption of a range of appliances in standby mode. The appliances include mains powered electrical household appliances and to the mains powered parts of appliances that use other fuels such as gas or oil. The Interim Standard defines standby mode as the lowest power consumption when connected to the mains, although product committees will be responsible for the definition of the relevant low power modes to which this test procedure is applied. The Interim Standard is identical to the Standard currently being drafted by the IEC TC59 WG/9 (IEC 62301). The Interim Standard is a provisional Standard with the two year life and provides a guide to the direction that future standardisation may take. Within this period it is expected that the IEC standard (IEC 62301) will be published as an International Standard and it is expected that this will be subsequently adopted as the joint Australian/New Zealand standard.

Test Laboratory Capability

The ability of testing laboratories to perform the test in accordance with AS62087 is currently unknown as this standard is yet to be published, however the types of testing equipment and methodology is not very different to the standard type testing that is undertaken for various consumer/electronic equipment and hence Australian laboratory capability should not be an issue. However, after preliminary discussions with a major independent testing laboratory, they confirmed that they can test to the IEC standard. In addition, international suppliers have been testing to the IEC 62087 for a number of years and the acceptance of international testing laboratory test results would be probable.

International Standards

The International Electrotechnical Commission (IEC) has released an international standard that defines the methods of measurement for the power consumption of audio, video and related equipment (IEC 62087). This international standard which covers televisions, VCRs, Set Top Boxes, audio equipment (separate stereo components) and

multi-function equipment (such as integrated stereos) comprehensively defines all operating modes including:

- Disconnected
- Off
- Passive standby
- Active standby (low)
- Active standby (high)
- On (play)
- On (record)

International Energy Efficiency Programs

Voluntary Programs

Various voluntary programs that address standby and in-use power consumption exist internationally and these are summarised below. The international ENERGY STAR Program is the only voluntary program that operates in Australia and addresses standby power consumption but not currently in-use consumption.

USA and International

In the US, the ENERGY STAR Program run by the EPA aims to encourage industry best practice by forming partnerships with manufacturers and setting performance targets for appliances. The ENERGY STAR program is voluntary and is being implemented in three phases. Phase I which became effective on July 1, 2002 specifies that for a analog or digital TV to display the ENERGY STAR label, it must consume less than or equal to 3 Watts in standby. Phase II begins on July 1, 2004 and from this time analog televisions must consume 1W or less in standby. Around 21% of TVs on the market in the US currently meet this target. Specifications for digital TVs do not change until Phase III. Phase III becomes effective on July 1, 2005 and all TVs, including digital TVs must consume 1 Watt or less in standby to qualify for the ENERGY STAR label.

Australian governments participate in the ENERGY STAR Program with nearly all major manufacturers as signatories

Europe

In Europe, there are a number of initiatives that target power consumption in televisions. The Group for Energy Efficient Appliances (GEEA), which is made up of representatives from European national energy agencies and government departments, encourages industry best practice through a voluntary energy labelling scheme. The GEEA label for TVs uses an energy efficiency index that takes into consideration energy consumption in on mode. Manufacturers are required to meet the index value (of 0.75) in order to qualify for a GEEA label. At least 20% of analog TVs already on the market in Europe comply with this index.

In 1997, the European Association of Consumer Electronics Manufacturers (EACEM) established a voluntary agreement with the European Commission to reduce standby losses of TVs. This agreement has only recently been updated and EACEM has now merged its activities with the European Information & Communications Technology Industry Association and is now known as the European Information, Communications and Consumer Electronics Technology Industry Associations (EICTA). The updated agreement coverers CRT based televisions, non CRT based televisions and DVD's and now addresses on mode consumption in addition to standby. Signatories to the CRT based television agreement agree to comply with the following principles and targets:

- Achieve a sales weighted average of 3W in passive standby in 2005. By 2007, maximum standby power consumption will be 1W.

- Improve the sales-weighted "energy efficiency index" by a target of 10%, with a minimum of 5% improvement in energy efficiency by 2007. The energy efficiency index is a formula which takes into consideration numerous factors such as on mode consumption, standby consumption and screen size/format/type.

- To facilitate and encourage consumers to adopt energy efficient practices with the use of televisions and to provide information on efficiency to consumers.

Signatories to the non-CRT based (such as LCD, plasma and rear projection) television agreement agree to comply with the following principles and targets:

- Achieve a sales weighted average of 3W in passive standby in 2005. By 2007, maximum standby power consumption will be 1W.

- To improve the energy performance on non CRT based televisions by improving the "energy efficiency index" per appliance. The energy efficiency index will be derived after consultation with stakeholders.

- To facilitate and encourage consumers to adopt energy efficient practices with the use of televisions and to provide information on efficiency to consumers.

The agreements are a voluntary mechanism and the sanction for failing to meet the self commitments is publicity that the manufacturer of the product no longer does so.

The European Commission also fund a pan European database of energy efficient appliances called HomeSpeed. The database includes white goods, consumer electronics and office equipment. It provides information about the brand name (manufacturer, model name), availability in several European countries and the latest energy related information. Specific information such as size, speed, add-ons or labelling systems (e.g. Energy Star or GEEA Label) is given, depending on the appliance type. The database currently covers 24 active appliance groups containing details of 11,874 appliances. The database can be accessed by anyone, for more information see www.homespeed.org.

The EC have also developed an Eco-Label that applies to more environmentally friendly products and services. Over the past ten years, the "Flower" has become a European-wide symbol for products, providing simple and accurate guidance to consumers. All products bearing the "Flower" have been checked by independent bodies for complying with strict ecological and performance criteria. Since 25 March 2002, all types of TVs are eligible for the label and must meet the criteria, which includes in-use and standby energy consumption criteria as well as use of natural resources, recycling and environmental damage or risks related to the use of hazardous substances. The criteria for standby energy consumption of TVs is passive standby power consumption of less than or equal to 1 Watt or active standby power consumption of less than or equal to 9 Watts if the TV

includes a integrated digital receiver/decoder (IRD). The on-mode energy efficiency index (EEI) must be lower than 65% of the base-case consumption for a television of that format. The EEI formula is the same as the formula developed for the GEEA. There are currently no TVs registered for the Eco-Label on the web site (www.eco-label.com.

Korea – Energy Boy

The Energy-saving Office Equipment & Home Electronics Program has been implemented since April 1, 1999 to enhance the sales of the energy saving products that decrease electric energy consumption during standby. The agreement is based on the Article 13 of Rational Energy Utilization Act of Korea and Ministry of Commerce, Industry and Energy's Notification (Regulation on the Enhanced Spreading of the Energy-saving Office Equipments & Home Electronics). The purpose of the program is to save standby power consumption systematically by encouraging manufacturers to voluntarily produce and sell the energy saving products that meet the energy saving standard suggested by Ministry of Commerce, Industry and Energy (MOCIE) and Korea energy Management Corporation (KEMCO). The program is known locally as the "Energy Boy" and applies to energy-efficient products that meet the specifications. The specification applies to all TVs (Colour television with CRT, LCD and other Braun tube) and TV/VCR/DVD type combinations. The requirements for TVs are shown in Table 8.

Table 8: Korean Standby Power Specification from 2003

Classification	Standby Mode Power Consumption
Televisions	=3.0W
TV-VCR Combination Units	=4.0W
TV-DVD Combination Units	=4.0W
TV-VCR-DVD Combination Units	=4.0W

International Initiatives

The International Energy Agency (IEA) has been promoting the "One Watt Initiative" energy saving program to cut world-wide electricity losses from appliances in stand-by. Launched in 1999, this campaign aims to guide government policy-makers and appliance manufacturers towards equipment that consumes no more than one watt when in standby mode. The Australian Government has endorsed the one watt standby target for appliances sold in Australia.

Mandatory Programs

The only mandatory program to set minimum standards for TV energy efficiency is the Japanese Top Runner program. However the Peoples Republic of China is planning to introduce a labelling and MEPS program within the next year.

Japan – Top Runner

Japan's Top Runner program introduced criteria and energy efficiency standards for CRT TVs in 2003. Unlike the USA or Europe, the Japanese standards are mandatory. The standards, shown in Table 9, take into consideration, screen size, in-use power consumption, standby power consumption and estimated time in-use. As a result of the introduction of standards in Japan, average standby power consumption has been reduced by 88%, from 5W to 0.6W. Japan estimates that the new standards will produce a 16.6% improvement in power consumption compared to 1997 levels by 2003.

Table 9: Minimum efficiency standards of the Japanese Top Runner program

Category	Formula for calculating minimum efficiency standard E_m [kWh/year]
TV with deflection angle of tube < 100 degrees	
without flat picture tube	$E_m = 2.5S + 32$
with flat picture tube	$E_m = 2.5S + 42$
TV with deflection angle of tube > 100 degrees	
without flat picture tube	$E_m = 5.1S - 4$
with flat picture tube	$E_m = 5.1S + 21$
Wide screen TV	
without flat picture tube	$E_m = 5.1S - 11$
with flat picture tube	$E_m = 5.1S - 1$
TV with double scanning speed	$E_m = 5.5S + 41$

S: screen diagonal in inches

China – MEPS and Labelling

China National Institute of Standardization (CNIS) is planning to publish a new standard for Colour CRT to implement a MEPS and Labelling program. The draft unpublished standard is based on the measurement and calculation methodology of the European GEEA and is called *"Limited values of energy efficiency and evaluating values of energy conservation for color television broadcasting receivers*". The standard specifies the calculation of the Energy Efficiency Index (EEI) and includes minimum values for passive standby and maximum EEI for MEPS, endorsement labelling criteria and a target endorsement labelling EEI value. The standard is not yet published, but is expected by 2005. A preliminary interpretation of the main criteria is shown below:

Chinese Criteria	Minimum Passive Standby	Maximum EEI
MEPS	9W	1.5
Endorsement Labelling Criteria	3W	1.1
Endorsement Labelling Target	1W	0.75

Summary of Testing Standards and Energy Efficiency Programs

Table 10 provides a summary of the relevant standards and voluntary programs that address energy consumption from televisions. In terms of standards, the IEC standard

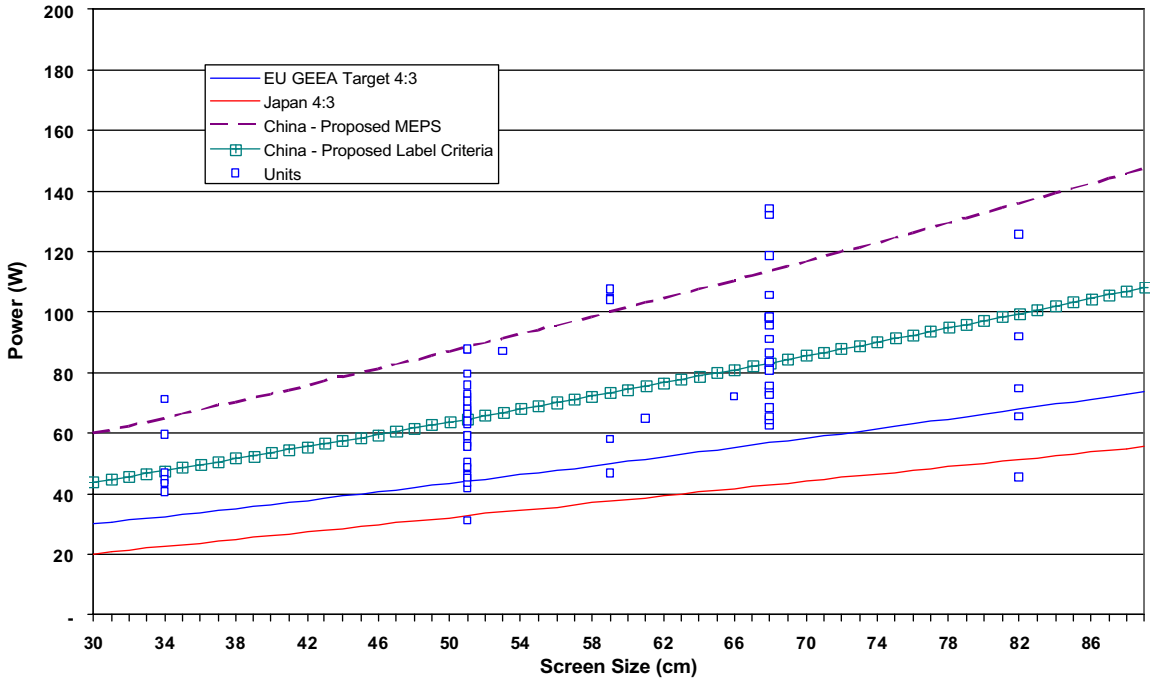
for audio, video and related equipment is the only standard that addresses energy consumption of appliances in all modes of operation. Both AS/NZS 62301(Int.):2003 and IEC 62301 are only concerned with standby power consumption. It should be noted that all three standards define a generic method of measurement for appliances in the range of modes. They do not provide any regulatory mechanism for reducing energy consumption, although the Australian Government is currently communicating with the relevant committees on developing a Part 2 to AS/NZS 62301(Int.):2003 that includes efficiency performance requirements for standby consumption. It is envisaged that these efficiency performance requirements be a voluntary mechanism with the option of calling them into law at a later point if deemed necessary.

Internationally, Japan is currently the only nation that imposes a MEPS for televisions, however China is planning to do so in 2005. The USA ENERGY STAR program sets voluntary targets for televisions but does not consider in-use consumption. The GEEA Energy Tick in Europe and European Eco-Label program includes the on mode consumption for televisions as does the European EITCA agreement with manufacturers.

There are a range of strategies for reducing energy consumption from televisions at an international level and all such initiatives seem to overlay each other to some degree. It seems evident that standby power usage is the main focus of voluntary initiatives that tackle energy consumption from televisions particularly those programs that are on an international level and those likely to influence the Australian market (eg. ENERGY STAR and the IEA One Watt Initiative). As such, it is unlikely that these mechanisms alone will influence the television market in Australia in fuelling industry best practice in regards to in-use energy consumption.

Figure 12 below shows the targets for in-use power consumption for 4:3 televisions in the EU, Japan and China, compared to units sold in the last 3 years on the Australian market as measured in the NAEEEC store surveys. Figure 12 shows also shows only two units were able to meet the more rigorous Japanese target while a further three units would be able to meet the GEEA target. The vast majority of units are well beyond the reach of either target.

Figure 12: In-use power consumption of 4:3 CRT TVs by screen size compared to EU, Chinese MEPS/labelling and Japanese targets



More wide-screen televisions were measured (compared to 4:3 televisions) in the recent store surveys. Figure 13 below shows the targets for in-use power consumption for wide-screen (16:9) televisions in the EU, Chinese MEPS/labelling and Japan, compared to the units sold in the last 3 years on the Australian market as measured in the NAEEEC store surveys.

Figure 13: In-use power consumption of wide-screen (16:9) CRT TVs by screen size compared to EU, Chinese MEPS/labelling and Japanese targets

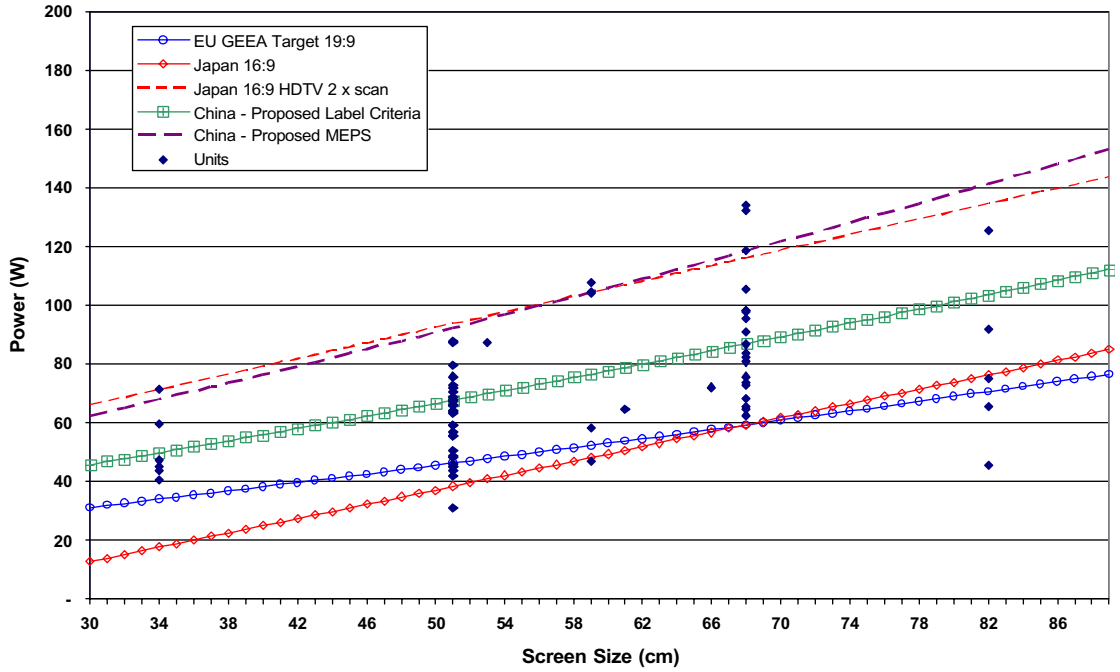


Table 10: Summary of Testing Standards and Energy Efficiency Programs

Equipment Type	Region /Country	Program/ Standard Name	Modes	Target
Standards				
All household mains powered appliances	Australia	AS/NZS 62301(Int.):2003	Standby	Standard defining methods of measurement
Audio, video and related equipment	Australia	AS 62087	All	Standard defining methods of measurement
Audio, video and related equipment	International	IEC 62087	All	Standard defining methods of measurement
All household mains powered appliances	International	IEC 62301	Standby	Standard defining methods of measurement (currently in Draft)
Voluntary Programs				
Televisions	USA & Australia	ENERGY STAR	Standby only	Analog: Standby ≤3W, on 1/7/04 ≤1W Digital: Standby ≤3W, on 1/7/05 ≤1W
Televisions	Europe	GEEA Energy tick	All	Meet index value of 0.75
Televisions	Europe	Eco-label	All	Meet index value of 0.65
Televisions (CRT type)	Europe	EICTA agreement	All	Achieve sales weighted average of 3W in passive standby Improve sales weighted energy efficiency index by 10%
Televisions (Non-CRT type)	Europe	EICTA agreement under development	All	Achieve sales weighted average of 3W in passive standby Improve sales weighted energy efficiency index
All	International	IEA “One Watt Initiative”	Standby only	Standby ≤1W
Mandatory Programs				
Televisions – CRT	China(2005)	Endorsement label	All	EEI ≤ 1.1, standby ≤ 3W
Televisions – CRT	China(2005)	MEPS	All	EEI ≤ 1.5, standby ≤ 9W
Televisions – CRT	Japan	Top Runner	All	Sales weighted MEPS levels based on formula.

Economic Implications

A full economic study has not been conducted, as this usually is undertaken as part of the Regulatory Impact Statement (RIS) process when more information is available. However, it is worth noting that when mandatory programs are implemented through regulations, the requirements apply equally to manufacturers and importers. As a result, any additional costs of compliance are borne by all competitors. This situation is not always the case for voluntary programs, where companies who 'do the right thing' might be undercut by other company's products which do not match their energy performance standards.

Policy and Program Approaches to Improve Energy Efficiency

Aside from the ENERGY STAR program, there are no other programs in Australia that aim to improve the energy efficiency of televisions. As such, there is substantial scope for information programs to not only improve consumer awareness of product energy efficiency, but also drive manufacturers to achieve 'best practice'.

This section aims to outline the variety of program approaches that could be used to improve the energy efficiency of televisions.

Information Programs

Information programs are designed to inform the consumer in making a purchase decision. They may include:

- Brochures or other point of sale material
- Articles/advertisements in popular media
- Appliance labelling

The list is by no means exhaustive and each has positive and negative attributes in terms of their success. Brochures and other point of sale material, while effective in that it prompts the consumer to think about the energy efficiency of the product at the time of purchase has a serious limitation in that it assumes that energy efficiency is an important factor in the decision making process. Research suggests that there are many other drivers before energy efficiency that consumers use to make a purchase decision, the most prominent being price[5]. Others recognise that if products are fairly similar, except for their energy performance, consumers may use this factor as a key differentiator (Sustainable Solutions 2003). Sustainable Solutions suggest that it is important that at least some information is made available to consumers on energy consumption of home entertainment equipment to demonstrate to manufacturers that governments are serious about encouraging improvement in energy performance.

[5] Research by BIS Shrapnel found that in selecting a television, 43% of respondents nominated "competitive price" as the outstanding determinant of brand selection. Other factors included "more/better features" (18%), "aesthetics/design" (16%), "brand reputation" (13%) and "quality" (13%). BIS Shrapnel 1998 *The Household Appliances Market in Australia, 1998-2000* Vol 4: Home Entertainment.

Labelling Programs

Labelling programs can be either mandatory or voluntary or both and may include:

1. A voluntary energy endorsement label that endorses a product that achieves a specified target. This type of label merely informs the consumer that the product meets the required standard. The ENERGY STAR program is an example of this.

2. A voluntary energy endorsement label that endorses a product that achieves a specified target but also provides comparative information to the consumer (more like an energy rating label).

3. A mandatory energy label that provides comparative information on energy consumption to the consumer (such as the energy rating label for whitegoods).

4. A warning label that alerts consumers to information on the poor energy performance of a product.

Each of these options is discussed below.

Voluntary Energy Endorsement Label

The ENERGY STAR label which is recognised internationally is also supported by the Australian Government. It covers all equipment types covered by this report and as such it would not be practical to introduce a new or similar scheme in Australia as there would be a risk of market confusion and overlap with existing ENERGY STAR coverage.

The main concern is that the ENERGY STAR program does not cover in-use energy consumption.

Voluntary Energy Endorsement Label with Comparative Information

A variation of just an endorsement label (such as ENERGY STAR) is one that provides more information to the consumer to allow comparison of the energy efficiency of different products. The energy rating label on whitegoods allows consumers to do this however, the energy rating label is mandatory.

A similar approach might be to adopt an "award label" for those appliances that are the "best" in their class. The comparative information might include the energy consumption of the product compared to the "average" product in its class. Only those manufacturers who meet the target criteria would be "awarded" the label.

The concept of an "award label" while voluntary, encourages industry best practice with the prospect of increased sales of efficient products.

The European Industry Self-Commitment to Improve the Energy Performance of Household Consumer Electronic Products (coordinated by the European Information,

Communications and Consumer Electronics Technology Industry Associations (EICTA)) is a further example of how a voluntary endorsement label might work. As with ENERGY STAR, this is a voluntary agreement with manufacturers, although unlike ENERGY STAR, it addresses both in-use and standby energy. Signatories agree to provide comparative information (in the form of a sticker on the television screen).

Mandatory Energy Label

A mandatory energy label would essentially aim to achieve the same for television equipment as that for whitegoods. The energy rating label for whitegoods shows comparative energy consumption information and summarises the performance of the product with "stars" where the more stars indicate a more efficient product in that class.

An option with a mandatory energy label is to integrate it with MEPS. Those products that fail to meet a minimum standard (for example "1 star") would be excluded from the market. Refrigerators, freezers and single-phase airconditioners (from 1 October 2004) are a few such products that are subject to a mandatory label and MEPS.

Warning Label

The concept of a "warning label" to alert consumers to the poor energy performance of a particular product offers essentially the opposite to that of an endorsement label yet aims to achieve market transformation in the same way. Manufacturers aiming to avoid the bad publicity of such a label would hopefully improve the performance of their products so as to avoid the warning label. Such a concept idea has been raised before in Australia but as yet not applied to any products. As such the concept is not one that is tested or proven.

MEPS

MEPS is a government regulatory program stipulated in state and territory law that excludes from the market products that do not meet the minimum energy performance standards. Sustainable Solutions (2003) suggests that MEPS for televisions should incorporate (rather than try to replace) existing programs such as the IEA "One Watt" initiative and that action taken in Australia should not conflict with international developments and as such use international test procedures. IEC 62087 already provides the standard test procedure.

With energy consumption of televisions estimated to be 1.06GWh and increasing, the case for addressing energy consumption from televisions with a MEPS is strong. Key considerations include:

- The vast majority of televisions sold in Australia are imported and there is an extensive range of market players selling into Australia. As other economies implement MEPS or promote more efficient TVs via labels, a MEPS becomes a

means for keeping lower efficiency products from being sold or "dumped" in the Australian marketplace that can not be easily sold elsewhere.

- High growth in the sales of wide-screen televisions (7% of all television sales in 2002) including those technologies with high in-use energy consumption, in particular plasma. Such growth will have a considerable impact on household energy consumption particularly as screen size has a significant impact on the total energy consumption of the unit. Manufacturers are likely to pursue the more lucrative wide-screen market which was estimated at 30% of the total sales value of all televisions sold in 2002. The phase out of analog transmission services will further impact the sales of wide-screen technologies which encompass the aspect ratio of digital transmission.

- Energy consumption from televisions is estimated at around 5% of total household consumption. This is greater than that of clothes washers, clothes dryers and dishwashers and only marginally less than freezers. All of these household appliances already carry an energy rating label and freezers are subject to MEPS.

- NAEEEC store surveys conducted in 2001, 2002 and 2003 have found that there is a considerable variation in the energy consumption (both in-use and standby) of the best and worst performing products on the market in each product group. Further analysis by Sustainable Solutions has found that the variation in performance is not a function of the screen size. This suggests that there is scope for efficiency improvements using existing technologies.

- The only program that addresses energy consumption from televisions in Australia is the ENERGY STAR program. This very important program has the opportunity to play a major role in promoting industry best practice and it is strategically significant in that it is an international program. Never-the-less, it does not cover in-use energy consumption.

- The existing European voluntary agreement with manufacturers (EITCA) and the mandatory Japanese Top Runner program both address in-use energy consumption in televisions. The forthcoming Chinese MEPS and label will highlight the need to address energy consumption of TVs, especially as China is a significant source of TVs. It seems logical that if a MEPS is introduced in Australia, that it be reasonably consistent with the targets imposed by these existing policy instruments.

- Consumer decision-making criteria for televisions does not take energy consumption into consideration. While information programs on energy consumption of televisions would enhance consumer knowledge, it does not ensure that the consumer will purchase the most efficient model available, particularly when there are a myriad of other features to consider in the purchase decision. As

such, to rely on information programs alone may be short sighted and not produce market transformation in the same way that a mandatory measure would.

Summary

Table 11 below summarises the positive and negative aspects of each of the policy tools discussed above. The table aims to highlight the strengths and weaknesses of each approach to enable a balanced evaluation to be made.

Table 11: Summary of program approaches/policy tools

Policy Tool	Positive elements	Negative elements
Information programs: Brochures & point of sale material	• Prompts the consumer at point of purchase • Is easy to disseminate (such as through retail outlets)	• Materials can become outdated • Assumes energy efficiency is part of decision making process
Information programs: Articles/ advertisements in popular media	• Receives wide-spread coverage	• Expensive • Requires continual repetition to maintain effectiveness
Appliance Labelling: voluntary endorsement label	• ENERGY STAR is supported by Aust Govt and already covers equipment types identified in this report • A positive marketing initiative for manufacturers producing energy efficient products	• Wouldn't be practical to introduce similar endorsement label due to market place confusion • ENERGY STAR does not currently cover in-use energy consumption
Appliance Labelling: voluntary endorsement label with comparative information	• Provides more information to the consumer on the energy performance characteristics • An award label that shows the best performing product compared to average is simple for consumers to interpret • Encourages industry best practice	• Effectiveness is diminished unless the label is mandatory as the consumer would need to compare the entire range of products • Comparative labels can be confusing to consumers • Information in the label not guaranteed to influence purchase decision
Appliance Labelling: Mandatory Energy Label	• Encourages industry best practice • Could be integrated with MEPS	• Information in the label not guaranteed to influence purchase decision, especially if $ savings are relatively small
Appliance Labelling: Warning label	• Encourages industry best practice • Potentially simple for the consumer to interpret	• A new concept not yet tested in Australia or internationally
MEPS	• Addresses both in-use and standby power consumption • Potential energy savings are significant • Results in immediate removal of poor performing products from the market • Encourages innovation in industry • Does not rely on consumer decision making	• Seen as being restrictive by some suppliers and adds additional testing burden and costs

Recommended Policy Options

Energy consumption from televisions in 2003 is estimated at 1,055 GWh. Televisions constitute 5% of total household electricity use which is greater than other household appliances such as clothes washers and dryers that already carry the energy rating label. Our major trading partners and sources of TVs are implementing policies that aim to improve the energy efficiency of TVs.

As such this report recommends the following:

- That **MEPS for televisions be implemented** to ensure that the worst performing television units are removed from the Australian market. Any MEPS approach should cover both in-use and standby energy consumption. Furthermore a MEPS for televisions should:
  - Involve consultation with industry stakeholders, particularly major product suppliers on the MEPS levels
  - Use a hybrid of policy settings that have been used in the past for determining MEPS levels for targeted products. These types of policy setting approaches are:
    - match worlds best regulatory practice levels of our trading partners
    - remove approximately 20 to 30 % of the least efficient units from the market place

    The proposed approach is to use both methods, firstly to remove 30% of the least efficient products in Stage 1 MEPS, then to move towards the Japanese MEPS levels and the EU targets as a Stage 2 MEPS. It will be difficult for Australia to match the Japanese levels in the first instance as they are very stringent MEPS and our product is primarily based on European product. The EU have not implemented a MEPS, but a targeted reduction with voluntary agreements with major suppliers. A voluntary agreement will most likely not work in Australia due to the large number of suppliers (greater than 40).
  - As utilised in Europe, the method of measuring energy efficiency should take into consideration the screen size, aspect ratio, type of receiver/processor, scan rate and other consumer-desired features. This will ensure that manufacturers are not unduly penalised for providing more features for consumers. The MEPS methodology should hence be close to the approach used by the EU GEEA voluntary labelling program and the European Industry Self-Commitment.
  - The EU has adopted a method of test, with the full support of the GEEA and EU, so there is no need to consider other testing methods. Australia should use the EU method-of-test standard (IEC 62087), which is about to adopted as an Australian New Zealand Standard

  - Ensure that the Australian Standards Committee TE 1 could act as the vehicle to manage the transition to a regulatory scheme, subject to industry endorsement

- **That a comparative labelling scheme be developed** for televisions. As with the introduction of a MEPS, the type of labelling approach should be developed in consultation with industry stakeholders, and in particular, consumers. Market research can be undertaken to provide information on consumer decision making with regards to aspects of labelling scheme. The most appropriate option for a labelling scheme is:
  - A six star energy rating label based on the EU Energy Efficiency Index (EEI) with appropriate adjustment factors to account for intrinsic features that increase energy usage, such as flat screen CRT TVs, digital signal processing and integrated hard drives. There is no differentiation for most screen types (i.e. plasma, CRT, LCD, Projection), except where the EEI is adjusted to account for the low EEI of Projection type TVs due to the very large screen size. All televisions are rated comparatively.

Recommended Labelling and MEPS Scheme

A Labelling and MEPS scheme is the recommended course of action. The following section discusses the potential algorithms and MEPS levels.

Labelling Scheme

The labelling scheme should follow the existing six star energy rating system, with an algorithm based on the EU model (European Industry Self-Commitment to Improve the Energy Performance of Household Consumer Electronic Products). An examination of the formulae and its application to the results of the Australian store survey follows.

The recommend labelling scheme is based on a comparison label across all screen types compared to the efficiency of a standard CRT TV. An alternative to this comparative label across screen types is to develop a label relative to the particular screen type. Each of these labelling schemes has advantages and disadvantages from a technical, marketing and consumer perspective. The rationale for a comparison label across all screen types is as follows:

- The consumer is comparing a TV within all technology/screen types, rather than deciding to purchase a particular screen type, hence the label should show a star rating compared to a common base.
- The most common TV sold in the market is currently the CRT. A comparison with the standard CRT TV is the most applicable reference point. The EU model provides a standard reference CRT TV.
- To create a separate algorithm for non-CRT screen type TVs, sufficient models need to be tested and compared to statistically arrange the Star Rating with a spread of values. There are currently 15 – 30 models sampled from the store survey for each of the non-CRT screen types which is too small a sample to create a highly applicable algorithm.
- As new screen technologies enter the market over time, a new labelling algorithm will need to be created to enable the labelling scheme to apply to this technology type. This will delay information being provided to the consumer as the algorithm may take some years to develop, as more and more models with that screen type appear on the market.

The rationale for comparison label according to screen type is that the consumer is comparing TVs within a screen type; hence the label should show a star rating comparing TVs within a particular screen type.

The EU model currently only rates CRT TVs with long term plans to create an algorithm for the calculation of a comparative Energy Efficiency Index for Plasma, LCD and Projection types of TVs. The EU model is not expected to cover these screen types within the next three years. Therefore, the label would use the CRT TV as the reference

for the comparative index and all TV types would use the same algorithm, with possible changes in the future as the EU system is progressed.

Energy Efficiency Index

The EU Energy Efficiency Index is the basis for the Australian Labelling program. The EU program utilises a reference Energy Consumption (E_r) and a measured Energy Consumption (E) of the TV to produce the *Energy Efficiency Index* (EEI). The index is:

$$\mathbf{EEI = E/E_r}$$

Where:

E is the annual energy consumption of the television based on a duty cycle of 20 hours in standby and 4 hours in the On mode.

$E = 365 (P_{on} \times 4 + P_{stb} \times 20)$ or if TV with auto power off $E = 365 (P_{on} \times 4 + P_{stb} \times 4)$

P_{on} is the On mode power consumption measured according to IEC 62087:2002

P_{stb} is the stand-by passive power consumption.

E_r is the reference energy consumption of the television calculated for a TV having certain features and size. For the calculation the following are relevant:

- screen size (in cm)
- screen format: 4:3 or 16:9
- screen type
- features offered

$E_r = 365 \times (P_{fs} \times 4 + 80)$ (for the reference TV, the Standby power is set to 4W)

P_{fs} (the feature/screen television power consumption) is calculated from the formula:

$$P_{fs} = 10 + [(0.75 \times format \times scrnsize \times digit) + (scrnarea \times screentype)] \times ProjAdj + feature$$

where:

- *format* is equal to 0.80 in case of a standard screen (4:3 aspect ratio), 0.87 in case of wide screen (16:9 aspect ratio)
- *scrnsize* is the screen's diagonal length in cm
- *digit* is equal to 1.2 if the television has digital processing for picture scanning, 1 if it does not have such processing.
- *scrnarea* is equal to $scrnsize \times scrnsize \times 0.48 / 100$ in case of a standard screen (4:3 aspect ratio) and $scrnsize \times scrnsize \times 0.427 / 100$ in case of wide screen (16:9 aspect ratio).

- *screentype* is for CRTs and equals to 1 for non flat screen and 1.3 for flat/superflat screen
- *feature* is equal to the sum of the index attributed to each of the features below:

  IEE 1394 – Master Configuration: *feature* = 5

  IEE 1394 – Slave Configuration: *feature* = 1
- *ProjAdj* is an adjustment factor for Projection TVs to equalise the advantage provided by the EU EEI formulae to large screen size TVs (i.e., those Projection TVs with screens of over 100 cm do not generally consume power in proportion to the square of the screen size as suggested by the EEI formulae).

  ProjAdj = 100/ scrnsize where *scrnsize >100 cm* for Projection TV only

Star Rating Index Algorithm

The EEI indicates the efficiency of TVs in both the On and Standby mode. The lower the EEI; the more efficient the TV, hence the Star Rating Index (SRI) should be inversely related to the EEI. The labelling scheme can use the same SRI to efficiency relationship as dishwashers and other appliance energy rating labelling, that is; a base efficiency with progressively more efficient criteria for each increase in the SRI. The formula for the SRI provides a set percentage reduction in efficiency (EEI) for each increment of Stars. In this case, a 20% improvement in efficiency is recommended to provide the necessary spread of efficiency levels.

$$SRI = 1 + \left[\frac{\ln\left(\frac{EEI}{EEI_{base}} \right)}{\ln\left(1 - \%_{red}\right)} \right]$$

Where:
SRI = Star Rating Index
EEI = Energy Efficiency Index of TV
EEI_{base} = 1.35 and is the EEI chosen for Star Rating of 1.0
$\%_{red}$ = 20% and is the percentage increase in efficiency for each star

The EEI_{base} value is determined as the minimum level to obtain a Star Rating and is hence the MEPS level. The derivation of this value is discussed later on page 17 relating to the chosen MEPS level. A star rating based on the EEI/SRI relationship proposed and the distribution of TVs in Australia is proposed in Table 12.

Table 12: Energy Efficiency Index and Star Rating Index

Star Rating	EEI – min	EEI – max
MEPS	>1.35	
1	1.08	1.35
2	0.86	1.08
3	0.69	0.86
4	0.55	0.69
5	0.44	0.55
6		=<0.44

The proposed relationship between SRI and the EEI provides a range of Star Ratings for CRT, Plasma, Projection and LCD screen types. The following figures show the proposed Star Rating for each of the different screen types with the measured EEI of TVs being sold in Australia. The Australian data is based on measurements taken in stores where the TV has no audio output and the channel is selected as AV (i.e., a dark screen is usually shown), hence the power measurements for the On mode are most likely lower than those if measured against IEC 62087. Where no other data is provided by the industry to support the development of the Energy Rating scale and MEPS levels, it is proposed to use these figures.

The proposed relationship between EEI and SRI provide a relatively even distribution of SRI's for TVs for each screen type. The formulae shown earlier for calculating the EEI does have the capacity to add or delete extra consumption to the Reference Energy as a "feature index" and TVs that incorporate additional features may require this adjustment, such as integrated STBs, hard drives or other features.

The following sections show the range of Australian TVs with both a comparative six star label without differentiating between screen types

The graphs show the range of measured TV EEI for each screen type.

Figure 14: Star Rating and EEI for CRT TVs by Screen Size

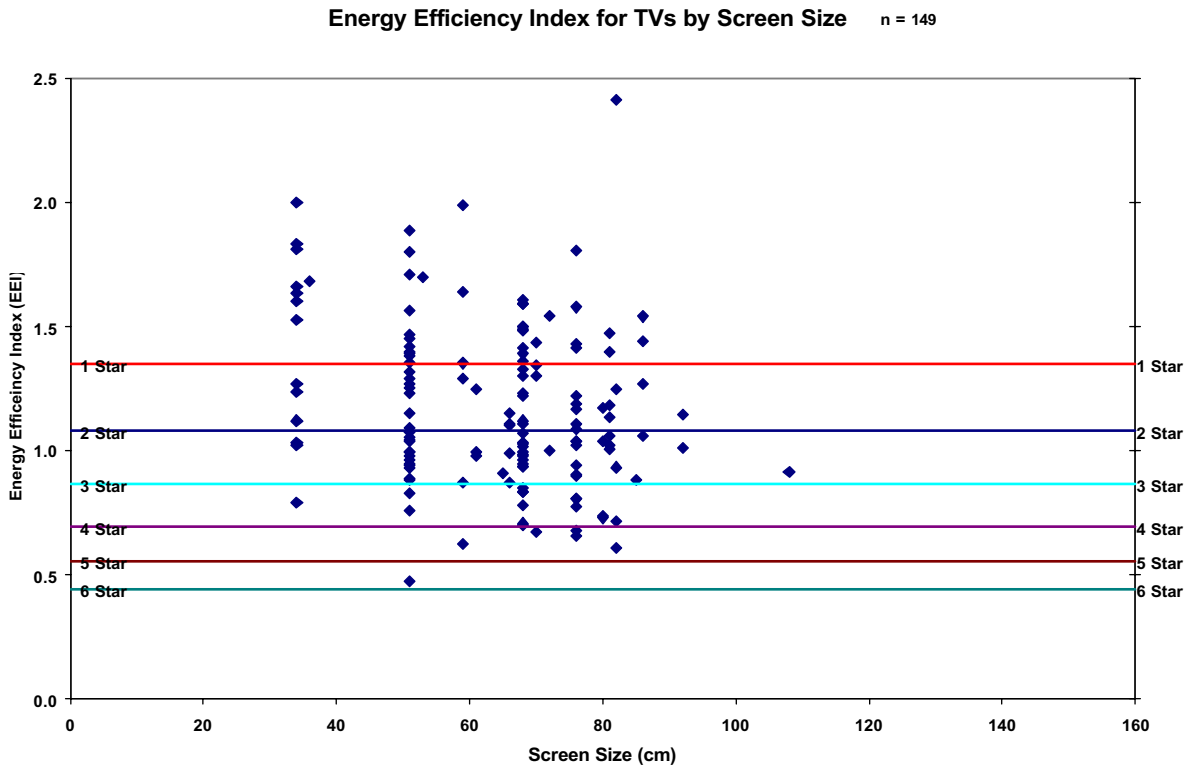


Figure 14 shows the distribution of CRT TVs with 21 models achieving 3 stars or more and 45 at less than 1 star.

Figure 15: Star Rating and EEI for LCD TVs by Screen Size

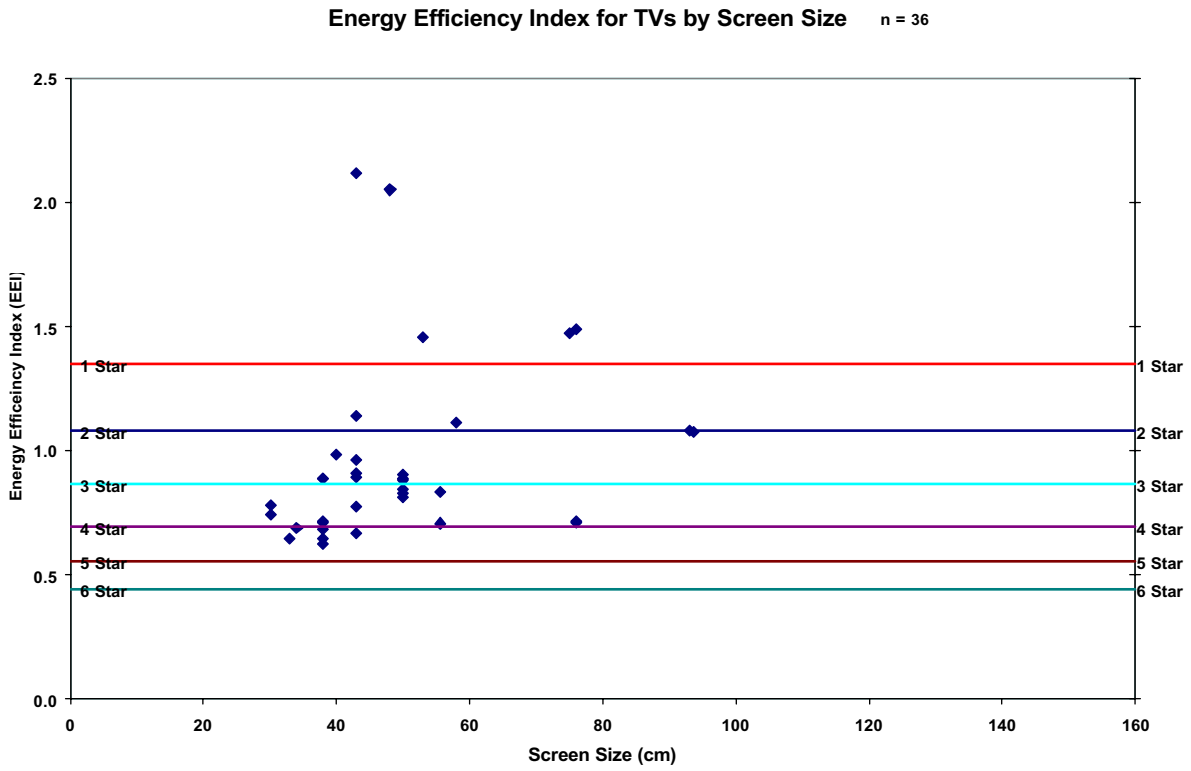


Figure 15 shows the distribution of LCD TVs with 6 models achieving 4 stars and 5 at less than 1 star (2 of these models' standby power consumption was approximately 15 W).

Figure 16: Star Rating and EEI for Plasma TVs by Screen Size

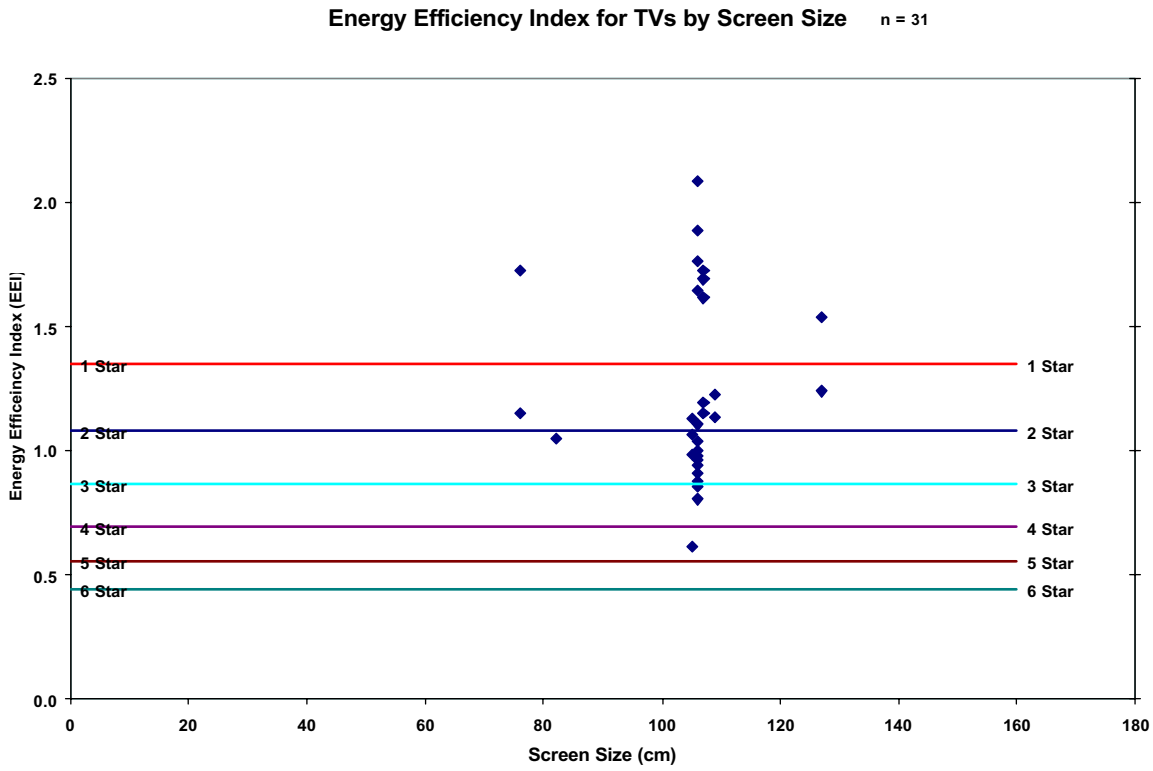


Figure 16 shows the distribution of plasma TVs with 1 model achieving 4 stars and 10 at less than 1 star (one model is off the scale at and EEI = 2.8). Some adjustment will need to be made to plasma TV's to account for those that do not have a tuner/receiver integrated into the unit. The survey data collected for these units does not specify this feature.

Figure 17: Star Rating and EEI for Projection TVs by Screen Size

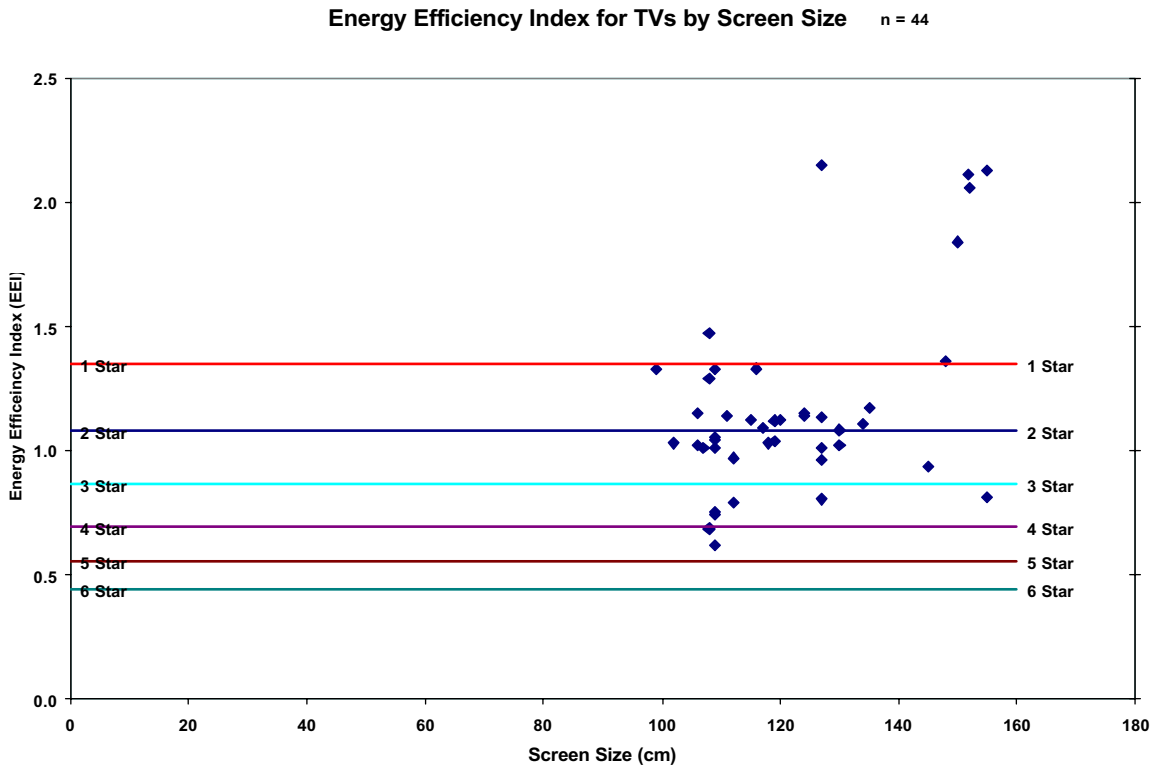
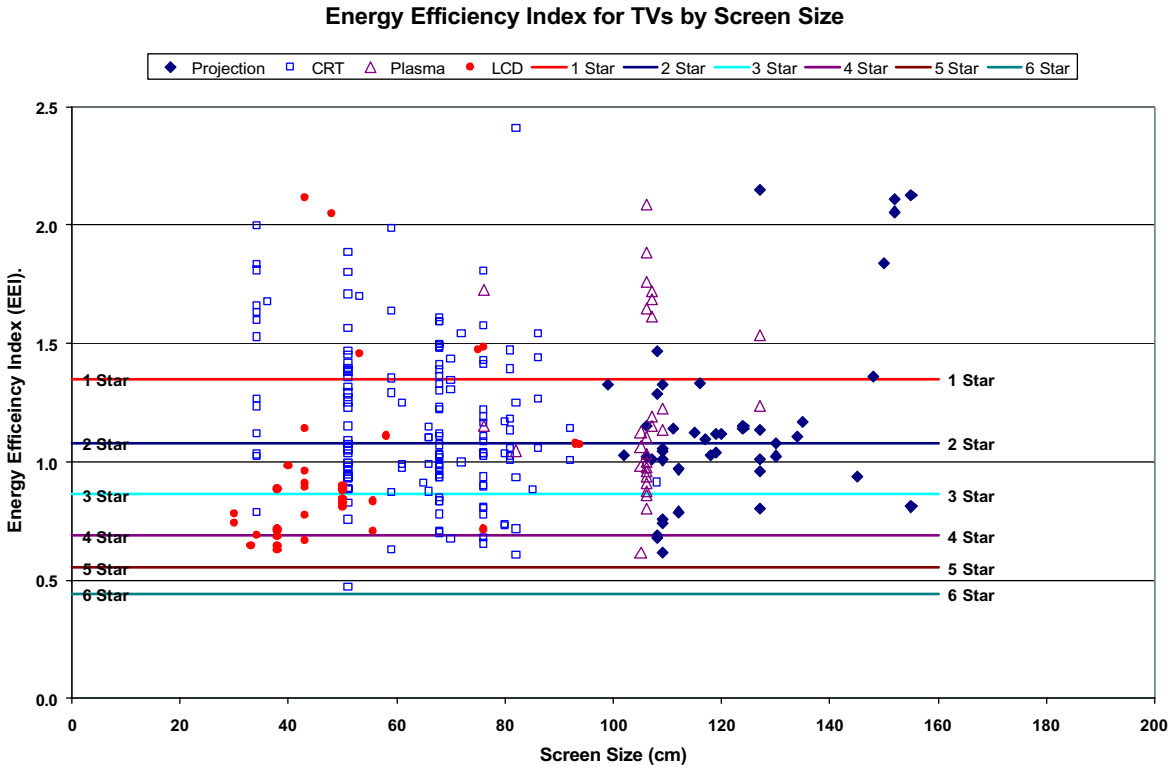


Figure 17 shows the distribution of Projection TVs with 5 models achieving 3 stars or more and 13 models less than 1 star.

Figure 18 shows the range of Star Ratings for all TVs by Screen type and size. The figure shows a range of SRI is available for all types of screen types and sizes. Above 100 cm, most CRT TVs do not compete with the projection and plasma screen types. LCDs are definitely in the same screen size market as CRT TVs while the star rating for the LCDs are generally in the 3-4 star range compared to the CRT range of 1 - 3 stars. The proposed SRI relationship still provides capacity for technology improvements to reach the range of 5 stars and above.

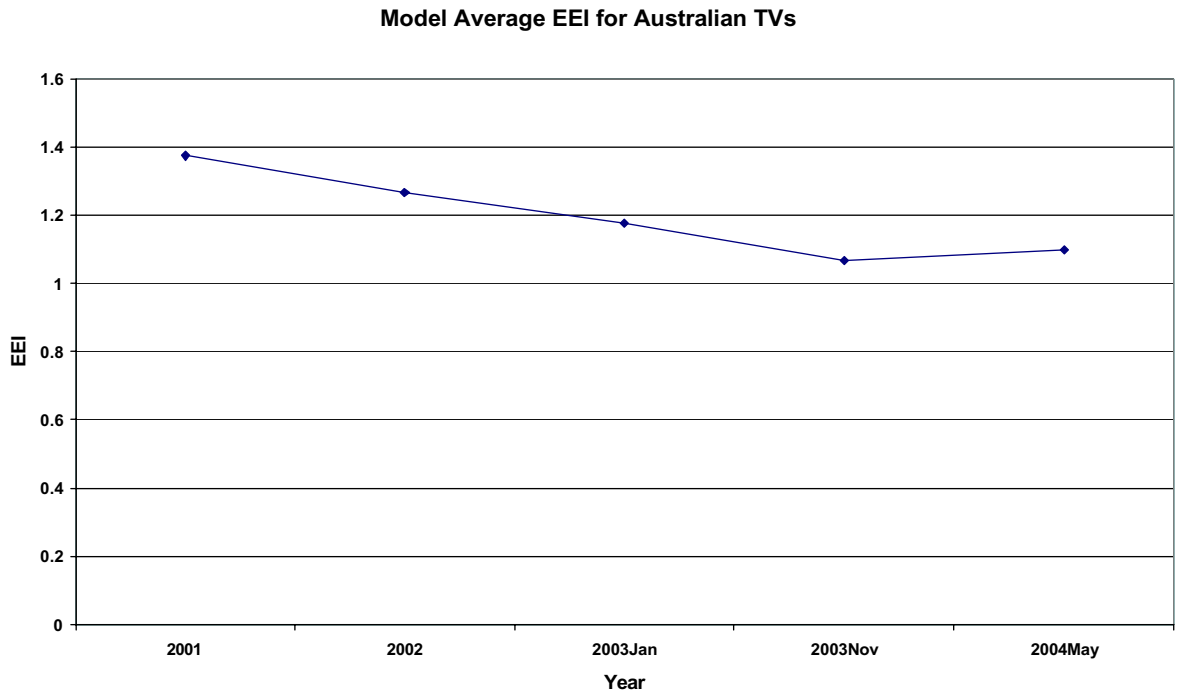
Figure 18: Star Rating Scheme A and EEI for All TVs by Screen Size and Type



EEI Trend

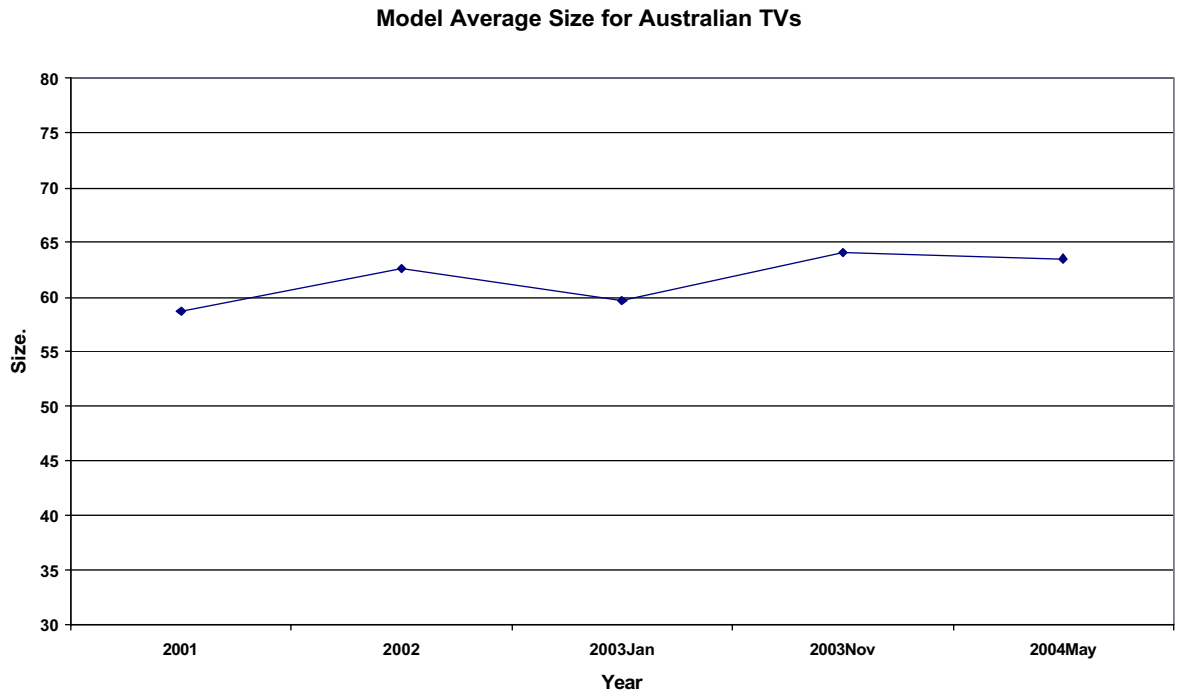
Using the EEI for CRT TVs over the last 4 surveys (with the 2003-04 survey data separated), as shown in Figure 19, a trend can be determined for the average EEI for CRT TVs. The trend is for lower EEI and hence a higher Star Rating, however the trend appears to have halted. If the trend continued, the average Star Ratings for CRT TVs will be approaching 3 Stars over the next two years.

Figure 19: Model weighted CRT EEI over time



Screen size of TVs is a factor in the decreasing EEI, as shown in Figure 20, which shows a gradual increase in the model average screen size from 58cm to about 63 cm in the last in-store survey.

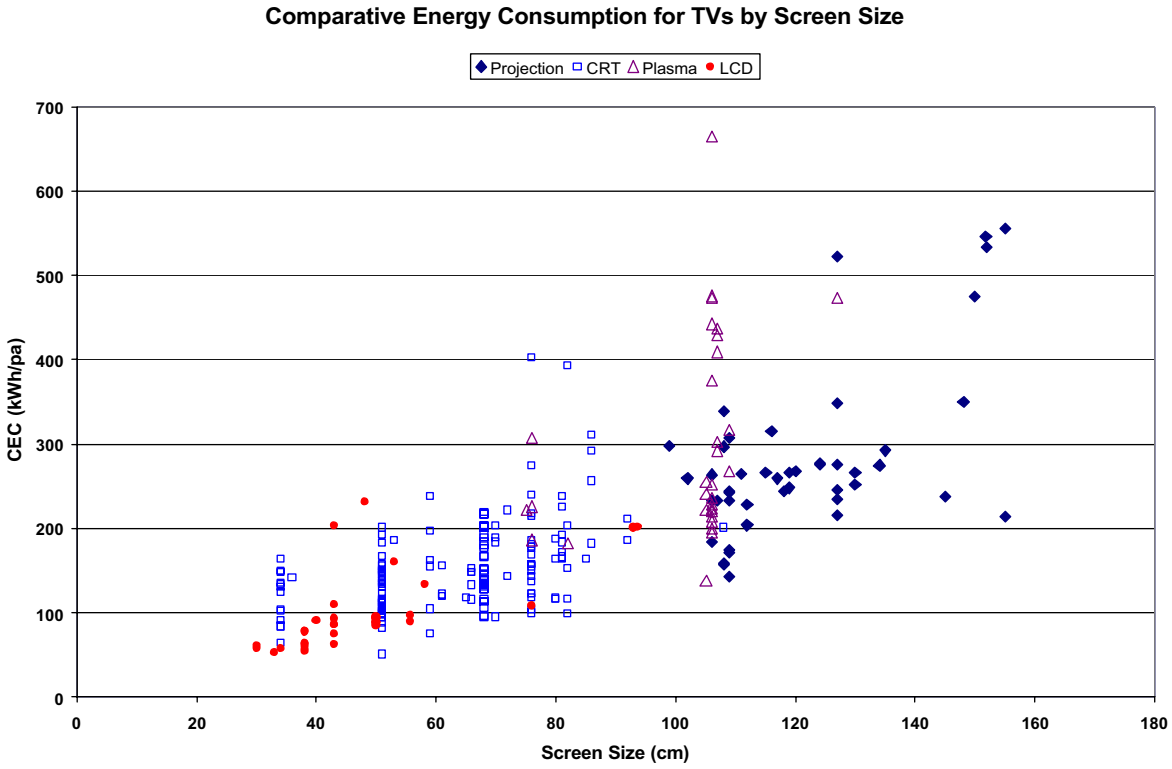
Figure 20: Model average screen size for CRT TVs over time



Comparative Energy Consumption (CEC)

Using the power consumption over 24 hours and the duty cycles described earlier, the Comparative Energy Consumption (CEC) is easily determined. Figure 21 shows the CEC for all TVs by screen size and type. This figure includes all star ratings (including those that fail to meet the MEPS levels specified later)

Figure 21: Comparative Energy Consumption for All TV Types.



MEPS

Stage 1 MEPS - 2006

The MEPS for implementation in 2006 is suggested at below 1 Star or an EEI of greater than 1.35. This would represent an energy consumption of 1.35 times the reference TV. Approximately 30% of all models surveyed in 2003 would not meet this MEPS level as demonstrated in Table 13.

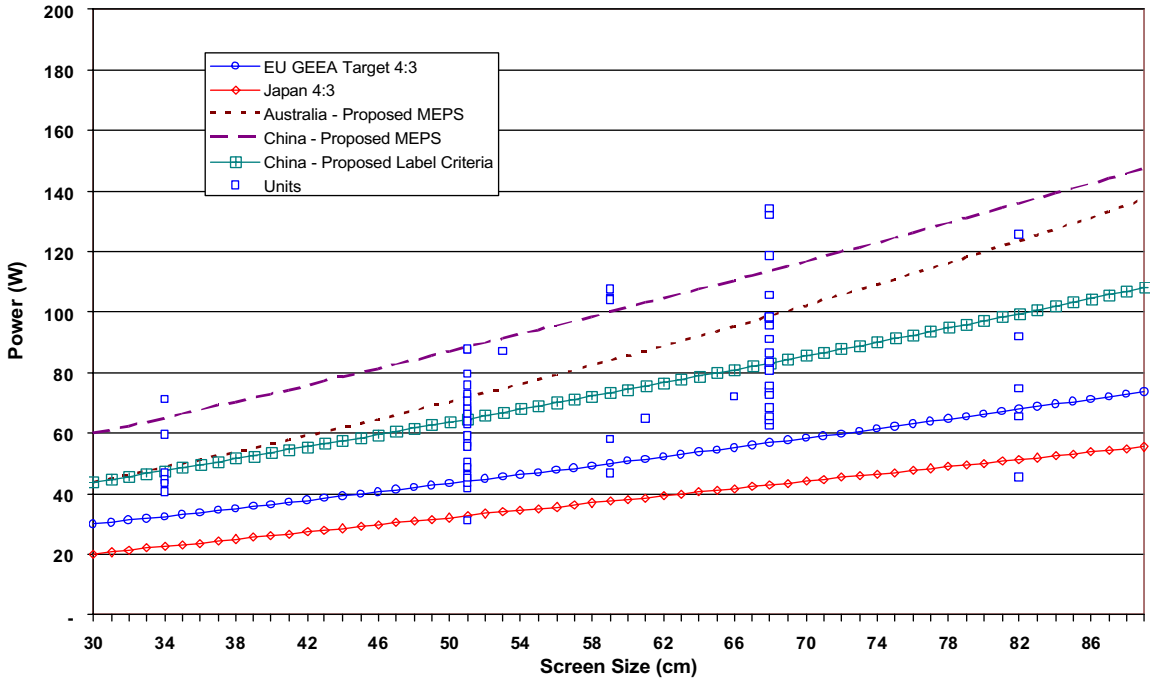
Table 13: Distribution of Models by Star Rating – Labelling Scheme

Screen	Star Rating Index	MEPS	1	2	3	4	5	6	Grand Total
TV - LCD	No of Models	5	2	11	12	6			36
	% of Models	14%	6%	31%	33%	17%	0%		100%
TV - Plasma	No of Models	10	11	8	1	1			31
	% of Models	32%	35%	26%	3%	3%	0%		100%
TV - Projection	No of Models	13	23	5	4	1			46
	% of Models	28%	50%	11%	9%	2%	0%		100%
TV - CRT	No of Models	45	34	49	15	5	1		149
	% of Models	30%	23%	33%	10%	3%	1%		100%
Total No of Models		73	70	73	32	13	1		262
Total % of Models		28%	27%	28%	12%	5%	0%		100%

As illustrated by Figure 22, the proposed Australian MEPS level is less than that chosen by the Japanese and the target of the EU for the GEEA, however as these levels specified in the EU are not mandatory, they can not be used as the basis of regulatory best practice. The proposed Chinese MEPS level is less stringent and will have only a marginal effect on the efficiency of TVs, however the proposed Chinese Energy label criteria is more stringent than the proposed Australian MEPS level.

A MEPS level that removes the 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 airconditioners and motors, while still somewhat consistent a significant trading partner

Figure 22: Comparison of Proposed MEPS level for 4:3 CRT TVs with China, EU and Japan



Stage 2 MEPS – Date to be Determined

The MEPS levels could be staged to meet the targets of the EU and Japan or the Chinese Energy Label criteria, who are aiming for improvements of 25% in the On mode energy efficiency. If this was implemented in Australia, the MEPS level would be closer to eliminating from sale all 1 Star models or lower (with an EEI of 1.1 or greater). This would remove approximately 50% of the models from the market. The date for the implementation of this Stage 2 MEPS level is to be determined.

Top Energy Saver Award Winner (TESAW)

The TESAW is a new award system that governments have created to recognise the most efficient star rated products on the market. It applies to both electric and gas products that carry a star rating energy label. It is an award system that helps consumers quickly identify the most efficient products on the market.

The TESAW is planned to be awarded for TVs in 2006. The proposed level for the TESAW is at the 5 Star Rating. Currently only one CRT TV would achieve this award in 2003, but it is expected that more models of LCD and CRT TVs will be likely to reach this level in 2006.

Greenhouse Reduction Potential

The GHG reduction potential of all televisions is a product of the sales of the equipment and unit energy consumption. Over time, the objective of the policy eventually chosen for implementation is to lower the unit energy consumption of equipment sold (both standby and in-use energy consumption). In assessing the GHG reduction potential, assumptions have to be made about the effect of the policy option (i.e., voluntary action by suppliers, targets, MEPS, labelling).

The potential for GHG emission reductions from improvements in efficiency of in-use and standby power consumption in CRT televisions is relatively large. In the European Union and Japan, targets or labelling programs are aiming for efficiency improvements of at least 25% of in-use efficiency. In addition, the ENERGY STAR program has in place standby power consumption targets of initially 3 Watts and eventually 1 Watt.

Overall, the estimated model weighted power consumption of all CRT TVs sold in Australia in 2003 was approximately 79W. As the average screen size was approximately 65 cm, the Japanese standard represents approximately 50% of the power consumption of current Australian models, while the EU GEEA label target is approximately 30% less than the Australian models.

The model weighted average standby power consumption in Australia of TVs in 2003 is approximately 4W, while the USA and the EU are targeting 3-4 W by 2002-3 and 1W by 2004.

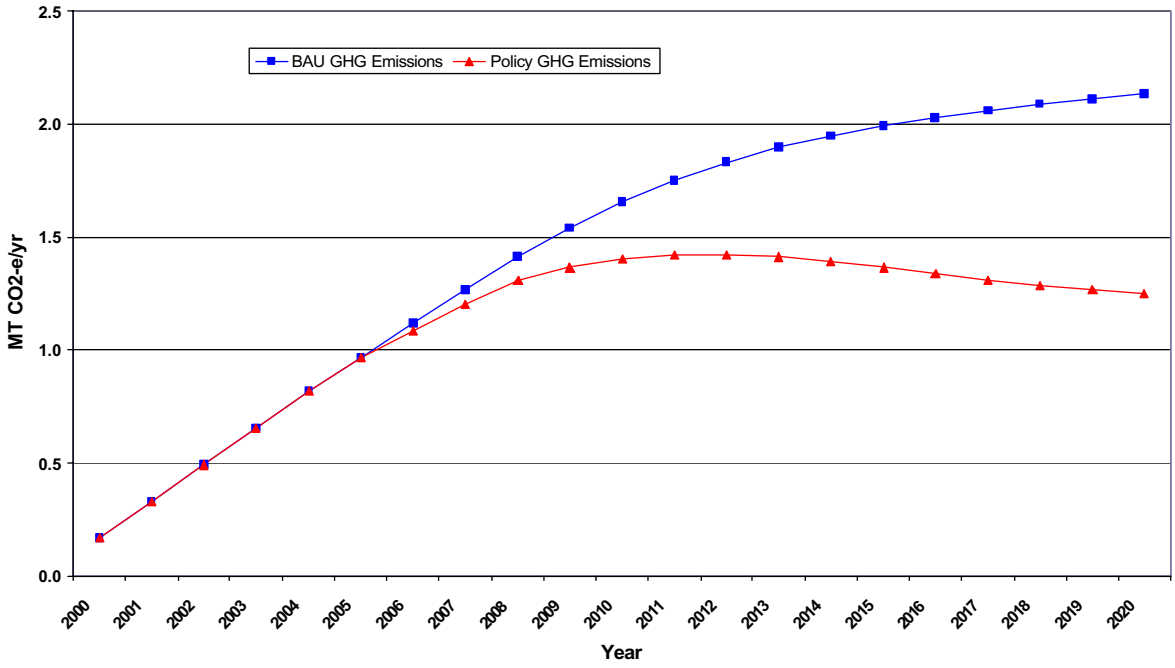
To examine the potential for greenhouse savings, two scenarios were modelled based on the potential MEPS levels. The MEPS levels are shown in Table 14. Stage 1 sets the policy target of in-use power consumption for CRT TVs to eliminate all models which do not achieve 1 star, while Stage 2 MEPS sets the power consumption to approximately EU GEEA target level target.

Figure 23 shows the potential GHG emissions reduction of these targets of 0.4 Mt CO_2-e per annum by 2012 and building to over 0.9 Mt CO_2-e per annum by 2020.

Table 14: Policy Targets CRT TVs

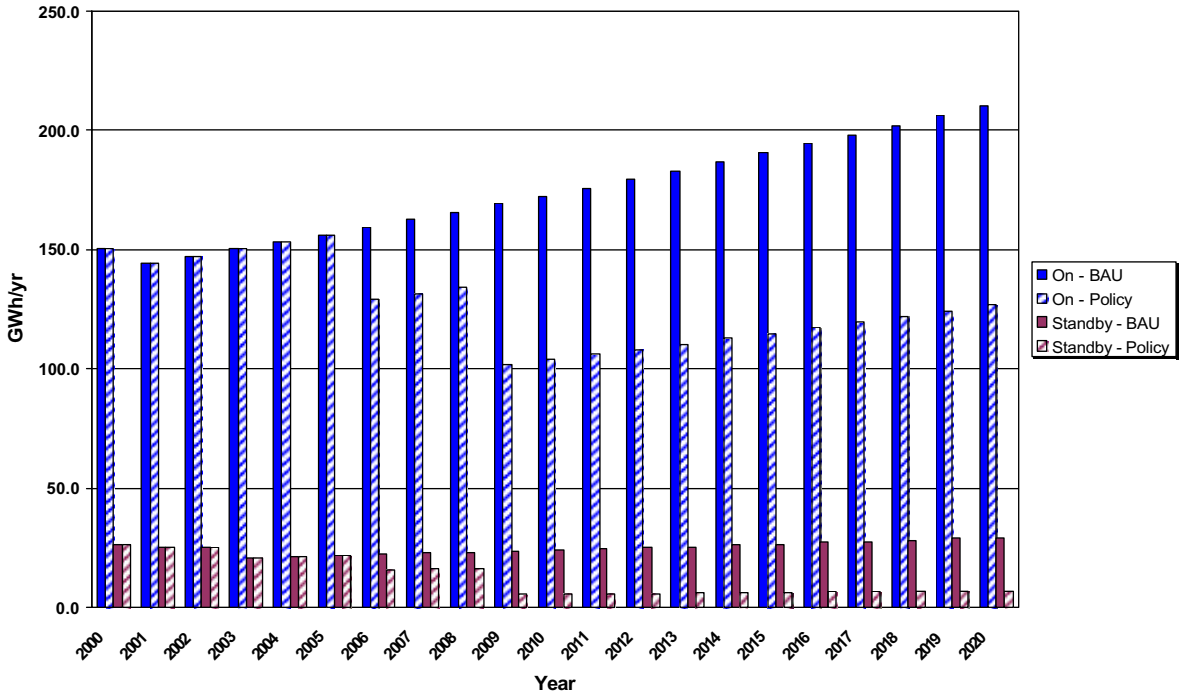
Power Target (average)	Stage 1 (2006)	% Market	Stage 2 (2009)	% Market
Min EEI	1.35	100%	0.75	100%
Standby	3 W	100%	1 W	100%

Figure 23: BAU vs. Policy Target – GHG emissions for CRT TVs



The projected effect on total energy consumption used annually by these televisions based on the implementation of these targets in Australia is shown in Figure 24. The GWh/yr consumption figures are based on annual sales of CRT televisions in each respective year. The GWh savings are clearly significant.

Figure 24: Annual effect on energy consumption of policy targets vs. BAU for CRT TV's



Summary

In the European Union, China and Japan, MEPS or labelling programs are aiming for efficiency improvements of at least 25% of in-use efficiency. In addition, the ENERGY STAR program has in place standby power consumption targets of initially 3 Watts and eventually 1 Watt. By modelling units sold in the Australian market (as measured in the NAEEEC store surveys) against both the Japanese and European targets, it is clear that television units in the Australian market fall far short indicating that greenhouse gas reduction potential is significant.

By modelling Australian units over time against the MEPS levels, savings of 0.4 Mt CO2-e pa are possible by 2012 and building to just under 0.9 Mt CO2-e pa by 2020. The case for a MEPS set at the targets modelled in this exercise is therefore compelling. A MEPS implemented using the targets in this modelling approach would not be designed to meet the technical potential, but to ensure that the worst performing products are naturally replaced by products with an improved performance.

Implementation

A timetable for implementing the major elements of these recommendations is shown in Table 15, including the various stages of consultation with industry and other stakeholders. A twelve month period has been included between the final publication date of the Australian Standards documents and the first implementation date.

Table 15: Proposed Implementation Plan for Recommendations

Item		Date(s)
1.	Presentation of consultant's initial Report to Steering Committee	1 October 2003 (completed)
2.	Consultant's revised Draft Report sent to Steering Committee	August 2004
3.	Industry response to recommendations	Mid September 2004
4.	Government publication of MEPS Proposals for Televisions	October 2004
5.	Consultation on the MEPS with stakeholders (including manufacturers and consumers)and consumer research	October 2004 - March 2005
6.	Product Testing including international collaboration	January 2005 - March 2005
7.	Consultation on Draft Standard(s) Part 2 by Standards Australia	October 2004 - March 2005
8.	Publication of Standard by Standards Australia	April 2005
9.	Regulatory Impact Statement(s) undertaken	2005
10.	Voluntary labelling start	April 2006
11.	Introduce MEPS	April 2006
12	Mandatory labelling	October 2006

References

Australian Bureau of Statistics 2002, *Environmental Issues: People's Views and Practices*, Cat. no. 4602.0, ABS, Canberra.

Australian Greenhouse Office 1999, *Australian Residential Building Sector Greenhouse Gas Emissions 1999-2010*, by Harrington, L. and Foster, R., of Energy Efficient Strategies Pty. Ltd. AGPS, Canberra.

Australian Greenhouse Office 2003, *A Study of Home Entertainment Equipment Operation Energy Use Issues*, by Sustainable Solutions Pty. Ltd., National Appliance and Equipment Energy Efficiency Committee, Canberra.

BIS Shrapnel 1998, *The Household Appliances Market in Australia, 1998-2000,* Vol 4(i) Home Entertainment - Consumer Survey, BIS Shrapnel Pty. Ltd. Sydney.

GfK Marketing Services Australia Consumer Electronics Survey Data 2000-2002.

Harrington, L & Damnics, M. 2003, *Energy Labelling and Standards Prgrams Throughout the World*, National Appliance and Equipment Energy Efficiency Committee, Canberra.

International Electrotechnical Commission TC 59/WG 9 2003, IEC 62301 Ed 1.0: Measurement of Standby Power Draft, International Electrotechnical Commission (IEC).

International Electrotechnical Commission Technical Committee 100: Audio, video and multimedia systems and equipment 2002, *International Standard IEC 62087 Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment*, IEC, Switzerland. Ministerial Council on Energy National Appliance and Equipment Energy Efficiency Program 2002, *Money Isn't All You're Saving: Australia's Standby Power Strategy 2002-2012*, AGO, Canberra.

National Appliance and Equipment Energy Efficiency Committee 2003, *Appliance Standby Energy Consumption: Store Report 2003,* by Energy Efficient Strategies Pty. Ltd. and EnergyConsult Pty. Ltd. National Appliance and Equipment Energy Efficiency Committee, Canberra.

National Appliance and Equipment Energy Efficiency Committee 2002, *Appliance Standby Energy Consumption: Store Report 2002,* by Energy Efficient Strategies Pty. Ltd. and EnergyConsult Pty. Ltd. National Appliance and Equipment Energy Efficiency Committee, Canberra.

National Appliance and Equipment Energy Efficiency Committee 2001, *Quantification Of Residential Standby Power Consumption In Australia: Results Of Recent Survey Work,* by Harrington, L. (Energy Efficient Strategies Pty. Ltd.) and Kleverlaan, P. (EnergyConsult Pty. Ltd.), NAEEEC Canberra.

Netherlands Agency for Energy and the Environment 1998, *Analysis of Energy Consumption and Efficiency Potential for TVs in on-mode*, by Huenges Wajer, B. & Siderius, P., NOVEM Netherlands Agency for Energy and the Environment, Sittard.

Netherlands Agency for Energy and the Environment 1996, *Study of Standby Losses and Energy Savings Potential for Television and Video Recorder Sets in Europe (Part B)* by Huenges Wajer, B., NOVEM Netherlands Agency for Energy and the Environment, Sittard.

Pine, C. 2002, 'Home Theatre Heats Up', *Appliance Retailer*, July 2002 p52-54.

Pine, C. 2002, 'Picture Perfect', *Appliance Retailer*, November 2002 p24-31.

Preston, M. 2002, 'The Bigger Picture', *Counterpoint*, December 2002 p24-28.

Preston, M. 2003, 'That's Entertainment', *Counterpoint*, May 2003 p34-36.

Preston, M. 2003, 'Fields of vision', *Sydney Morning Herald*, 26 June 2003. http://www.smh.com.au/articles/2003/06/25/1056449291368.html

Preston, M. 2003, 'Future Watchers', *Sydney Morning Herald*, 17 July 2003 www.smh.com.au/articles/2003/07/16/1058035060929.html

Standards Australia/Standards New Zealand Draft Standard 2003, Household Electrical Appliances – Measurement of Standby Power AS/NZS 62301(Int.):200X.

Websites

NAEEEC Energy Rating website: www.energyrating.gov.au

Australian ENERGY STAR website: www.energystar.gov.au

Digital Broadcasting Australia website: www.dba.org.au and associated Wide-screen Television information website: www.widescreentv.info

Department of Communications Information Technology and the Arts website: www.dcita.gov.au/Article/0,,0_1-2_10-3_469-4_106112,00.html

European Commission 2003, *Code of Conduct on Energy Efficiency of Digital TV Service Systems*, European Commission http://energyefficiency.jrc.cec.eu.int/html/standby_initiative.htm

Energy Conservation Centre Japan website: www.eccj.or.jp

Group for Energy Efficient Appliances website: www.gealabel.org/home.htm

Power Integrations website: www.powerint.com/greenroom/index.htm

USA ENERGY STAR website: www.energystar.gov

Appendix A: Identification of Stakeholders

Stakeholders with an interest in the future development of Television regulations include manufacturers, government agencies, retailers and industry associations. A list of stakeholders is provided below.

Importer/Manufacturers

BenQ
Fujitsu
Grundig
Hitachi
Hyundai
JVC
LG Australia (NSW)
Marantz
NEC Australia, (Vic)
Omni
Palsonic (NSW)
Panasonic Australia (NSW)
Philips Australia (NSW)
Pioneer
Samsung Electronics Australia (NSW)
Sanyo Australia (NSW)
Sharp Corporation Australia (NSW)
Sony Australia (NSW)
TEAC Australia, (Vic)
Thomson
Toshiba
Voxson
Yamaha

Government Agencies

Commonwealth/State/Territory energy agencies

Associations

Australian Consumers' Association
Australian Electrical & Electronic Manufacturers' Association (AEEMA)
Australian Subscription Television and Radio Association (ASTRA)
Australian Retailers Association
Consumer Electronics Suppliers Association

Appendix B: Television Technology Types[6]

Cathode Ray Tube (CRT)

In the black-and-white version of the cathode ray tube, an electron beam is fired by a heated cathode "gun" across a vacuum and on to a fluorescent screen. This screen is painted with phosphor, which glows with white light wherever it is hit by the electron beam. The ray is focused and accelerated by anodes and bent by two magnetic coils to illuminate different points of light on the screen line by line. These lines of points of light together make up the picture. In a colour TV there are three different phosphors painted on the inside of the screen. Each of the three emits a different colour. Three separate beams of electrons are then fired at the screen, each beam only exciting its own phosphor to emit its colour of light.

Liquid Crystal Display

All TV pictures are made up of points of light or pixels. The TV transmission basically tells the TV set which pixels need to be illuminated (or not) to make each picture. The human brain "fills in" and smooths out the gaps between the pixels to "see" an image. With an LCD, light is shone through a polarising filter, which then hits a matrix of cells. These cells are essentially liquid crystals that block the light. In a colour LCD, three cells - fronted by blue, green or red filters respectively - make up each pixel.

Plasma

The points of light that create the image on a plasma screen are created when glass-encased "pockets" of gas are "excited" by an electrical charge to give off ultraviolet rays. These makes the phosphor coatings on the inside of the "pockets" glow red, green or blue depending on that phosphor coating. So, basically, a plasma screen is made up of lots of tiny fluorescent lights.

With both plasma and LCD, there is no need for the cathode "gun", the magnetic coils, or the vacuum (that needs a heavy glass tube to contain it) of a Cathode ray tube TV. This means plasma and LCD displays can be extremely thin and much lighter than their traditional counterparts.

6 Preston, Matt *Fields of Vision* article from "Livewire", Sydney Morning Herald 26 June 2003