



# SUSTAINABLE LIVING TASMANIA

## TV Buying Guide

Television technology has been changing dramatically over the last 10 years – so much so that of Australia's estimated 18 million televisions more than a million are now being dumped each year and at least twice that number of new ones are being bought. With aggressive marketing, advertising and the advent of digital transmission, flat screen TVs have become consumer objects.

This consumer trend is causing major environmental problems. We've produced this guide to help explain how your choice of television impacts on our domestic and national energy consumption, on greenhouse gas emissions and on toxic wastes.

We provide a very brief update of modern TV technology. However, rather than recommend any particular model (as there are so many rapidly changing models to choose from) we direct you to the following website that allow comparison of different models – including efficiency. (<http://www.comparison.com.au/articles/8-energy-efficiency-ratings-for-plasma-and-lcd-tv-s> (1))

### Spiralling energy demand

TVs have very recently become the fourth largest user of electricity in the typical Australian household (behind water heating, refrigeration and lighting<sup>(2)</sup>). The following example helps to understand why:

#### *Old style 51 cm 50 Watt CRT TV*

Running cost: \$20 /year; CO2 emitted: 13kg/yr<sup>(3)</sup>

#### *New 108 cm 500 Watt plasma screen TV*

Running cost \$200/year, CO2 emitted: 130kg/yr<sup>(3)</sup>

Newer TVs use more energy, there are more of them, they are being watched for longer (average of 5 to 8 hours per household per day) and there are more TV units per household. One in four Australian families buys a new TV each year. At present we average 2.4 receivers per household and very soon we will be able to “boast” one per person<sup>(4)</sup>.

Unfortunately the uptake of power hungry technologies such as large LCD and plasma flat screen TVs effortlessly overwhelm hard won advances in household energy efficiency.

Newer technology TVs do have some attractive features such as thinner profile, wall mounting and widescreen format. TV manufacturers are also

scrambling to improve their models to comply with mooted new energy efficiency standards and discerning customers means we are now seeing some very efficient LCD units (e.g. 56 cm TV requiring only 50 watts) becoming available. The era of very poor TV energy efficiency is almost at an end.

### Energy Rating Scheme

The Australian government recognises the escalating contribution of TV's to domestic and national energy usage and growing contribution to the nations greenhouse gas emissions. A voluntary energy rating labelling scheme for TV's will be introduced in Australia in 2008 and this will be followed by mandatory minimum energy performance standards and star rating labelling (in 2009 - hopefully). The scheme will be similar to those used for other domestic appliances. A recent study found that only four out of more than 20 plasma TV's tested would meet good energy standards<sup>(2,4)</sup>.

The star rating system is being expanded to a 10 stars that will allow consumers to identify TV's (and other appliances) that will cost the least to run as well as encourage the continued improvement in energy efficiency.

Tasmanian Environment Centre Inc. trading as Sustainable Living Tasmania

1<sup>st</sup> Floor, 71 Murray Street, Hobart, Tas 7000, Phone (03) 6234 5566, Fax (03) 6234 5543

Email [info@sustainablelivingtasmania.org.au](mailto:info@sustainablelivingtasmania.org.au)

[www.sustainablelivingtasmania.org.au](http://www.sustainablelivingtasmania.org.au)

## **TV format**

We are in the midst of the transition from standard (4:3) to widescreen (16:9 or 15:9) format. The reasoning being the wider format better fits the human field of vision. The format refers to the ratio of width to height of the screen. The number of TV programs filmed in wide format is increasing while nearly all movies are filmed in this format. Many older models of TV allow you to select the formats, so 16:9 formats can be viewed on most 4:3 TV's. However there is the compromise of either cutting off the edge of the picture or having black bars top and bottom. Conversely black sidebars will be present on widescreen TV's when viewing programs filmed in 4:3 format.

## **Analogue and digital**

The Government is working towards a complete transition from analogue to digital transmission of TV signals by 2010. Most TV's receive analogue signal and require a set-top box to receive the digital signal. Many newer TV's are now incorporating digital receivers which makes a set-top box unnecessary.

The digital signal itself can be either standard or high definition. Most TV channels will continue to transmit in standard digital but other inputs such as DVD players will increasingly use high definition more and more as improved picture quality and sound can be bundled with the signal.

## **TV technology today**

Many of us still have the traditional box shaped cathode ray tube (CRT) TV units. Historically CRT TV's have been energy efficient for a number of reasons including the difficulty of making larger screens, their ability to last a very long time, and no remote control or minimal

energy consumption when in standby mode. Also in their favour is the fact they produce very good picture, contrast and colour quality. Newer high definition CRT TV's can provide some of the best TV screen picture quality.

It is the limited screen size (max size 98 cm) and excessive weight and bulk of CRT's that have led to the development of the newer technologies of liquid crystal display (LCD) and plasma screens.

LCD are produced in a large range of sizes (33 to 150 cm). They are made from two thin, polarized panels sandwiching a thin liquid-crystal gel that is divided into individual pixels. A powerful fluorescent backlight punches through the LCD panel that has three colour filters. LCD's can have outstanding picture quality although the edges of the viewing range of about 178 degrees may become distorted. Strong blacks are difficult to achieve with LCD screens but very good brightness can be achieved. "Burn-in", a problem with many plasma screens, does not occur with LCD screens.

Plasma screens tend to start at 96 cm (coinciding with the largest CRT screens) and can be as large as 165 cm. Even larger screens are available but very expensive. The technology is based on hundreds of thousands of cells containing the inert gases of neon and xenon. Electrodes at the front and back of each cell allow a voltage across the cell that ionises the gases and forms a plasma. The gas ions collide with the electrode and emit photons (or light). Colours result from the blend of red, green and blue cells grouped into pixels. This is similar to the CRT so there is good colour matching between CRT and plasma screens.

Although plasma screens are perceived to be the ultimate in TV experience the quality does not always live up to expectation. Heat is produced during normal running of plasma screens,

especially in cheaper models, and leads to damage and reduced picture quality. The ability to generate strong black deteriorates with time, often rapidly, affecting the contrast of the picture. Image “burn-in”, where a static image such as a logo burns into the screen and doesn’t fade is also a heat related problem for plasma screens.

In a recent review of 106 cm LCD and plasma TV screens, Choice (July 2007) were unable to identify one technology over the other in terms of superior viewing experience, nor was there a significant difference in price between the technologies.

Some other features considered in the marketing of TVs are considered below. Plasma screens can be produced in larger screen sizes than LCD's. Plasma screens tend to be thicker, heavier, produce significant heat and often use more power than LCDs. Plasma and LCD screens are both fragile preferring to be wall mounted so they are out of harms way, but plasma screens are probably more prone to damage overall. It is a little difficult to compare longevity between TV types as their longevity is reported in different ways. Plasma screens have a **half life** of 30 000 to 60 000 hours, meaning that the picture quality is only half what it was when new. For LCDs the backlight has a life span of 30 000 to 60 000 hours. Generally plasma screens refresh and handle fast moving images better than LCD screens however LCD screens are improving with less blur occurring in newer models.

Other technology such as rear or over head projection screens is also available. Overhead projection tends to be used when a very large screen is required and rear-projection when a larger free standing unit is required.

## Energy consumption of different TV technologies

The measure of how much electricity a TV will use is watts (W). If the TV specifications do not report it directly it is very easy to calculate from the voltage and the current as specified on the compliance tag. The formula is simply:

**Power (Watts) = voltage (volts) x current (Amps)**

(Take care that the value for current is in amps and not milliamps).

Below is a guide to how well your TV is rated.

Power (Watts)	Rating
50 – 70	Excellent
70 - 100	Good
100 – 200	OK
300 – 400	Feeling guilty?
>500	Unacceptable!

Once the energy requirement of the TV is known it can be compared to other models. Remember to compare the standby values too if you plan to leave your TV on this mode. A standby mode of more than 2 or 3 watts will become a significant cost of running your TV.

Unfortunately with the lack of requirement for TV manufacturers to incorporate energy efficiency into their products an enormous range in energy consumption between different brands and models for any given size exists. Therefore it is not possible to say LCD screens are more efficient than plasma screens or vice versa. However as a generalisation if all screen sizes and brands are averaged together for each technology then plasma screens are generally the most power hungry (0.35 watt per square inch ), followed by LCD technology (0.29 watt per square inch ).

Rear-projection technology is the clear leader for energy efficiency for larger screens (0.14 watt per square inch), but these units are not common in Australia.

As regulation of TV efficiency begins most TV manufacturers are focusing on improving energy consumption. The following website allows a direct comparison of energy efficiency on a large range of LCD and plasma TV's available in Australia. The site is very easy to use and also reports running costs in dollars and greenhouse gas emissions for each model.

[http://www.comparison.com.au/digital\\_tv\\_elevisions](http://www.comparison.com.au/digital_tv_elevisions)

**Standby:** Standby mode allows the TV to respond to the remote in an instant. Models can range between 1 to 70 Watts.

Ancillary devices also contribute to power use. TVs today accept inputs from many sources such as DVD player, A/V receiver, gaming consoles, set-top boxes, satellite receiver and digital recorders. Keep in mind the sum of all their power requirements, especially in standby mode.

**Note:** LCD screens often have a store mode which needs to be reset once the unit is purchased. The store mode uses more energy and is designed to enhance the models brightness "in store".

## Embodied energy

The embodied energy and the life cycle analysis of a TV should be kept in mind. Rather than going into the limited analyses available common sense tells us that the smaller the unit, the less resources required in its manufacture. The longer a TV is kept and used and the way in which it is disposed affect these values.

Unfortunately a potent greenhouse gas called nitrogen trifluoride is produced in

the manufacture of flat screens. This gas is 17000 times more potent than CO<sub>2</sub>, but was not included in the Kyoto Protocol as its use before 1997 was almost non-existent as its use is associated with the manufacture of screens.

## What size and technology should I buy?

The following should be considered when deciding on a TV.

- 1) *Do you really need a new TV?*  
Can you buy a second hand unit? Keeping your TV for as long as possible minimises the impact of the embodied energy of the TV.
- 2) *Priority of TV entertainment in household* – perhaps the most important factor on deciding on TV size is how much importance you place on watching TV. Choose the smallest screen size you are comfortable with.
- 3) *Size of room* – for many Australian living rooms, the larger widescreen TVs are too large and dominate the living environment.
- 4) *Cost of running TV and peripheral devices.* If you are watching your power bill increase with despair, then keeping your TV and peripheral devices small and efficient is imperative. Look for voluntary energy star rating label (from late 2008) and in 2009 the mandatory energy star rating labels. Remember a TV may have a higher up front cost but may more than pay for itself by using less power in the long run.
- 5) *Quality of picture* – select a TV that has good brightness and crisp picture from a number of sources (eg, set top box, DVD).
- 6) *Donate any old TVs* that still work to a worthy cause or pass on to your local second hand store or tip shop. Recycle a

broken unit. Visit Planet Arks' "Recycling NearYou" website to locate a local depot.

<http://www.recyclingnearyou.com.au/>

If you are considering buying a new TV, then going into any retail store will be confronting for the energy (and money) aware consumer. To survive the bombardment of banks of ever increasing screen size and still come away with your modest purchase will be a small miracle. But remember that it is YOU that has to pay for the power your TV is going to consume over the coming years as the price of electricity rises inexorably.

### Further information

1. [Australian website comparing most manufacturers and models of TV.](#)

<http://www.comparison.com.au/articles/8-energy-efficiency-ratings-for-plasma-and-lcd-tv-s>

2. *Energy Efficiency-Televisions.* Department of the Environment, Water, Heritage and the Arts publication, Australian Government.

<http://www.environment.gov.au/about/media/events/wed/pubs/fs-tenstars.pdf>

3. [Television energy performance standards and comparative energy. Equipment Energy Efficiency Committee publication. Department of Environment, Heritage, Water and the Arts. Australian Government.](#)

<http://www.energyrating.gov.au/library/pubs/2007-factsheet-tv.pdf>

4. CO2 equivalents calculated from the national Greenhouse Accounts Factors, January 2008. Department

of Climate change, Australian Government.

5. Pearce, F. *Rogue greenhouse gas should be covered by climate plans.* New Scientist. Vol 199, Number 2663. page 10.

6. Choice July 2007 page 45 –47

7. Useful or interesting website used for this guide:

<http://renovate.realestate.com.au/home-e-living/home-entertainment/tips-and-guides/lcd-and-plasma-tv>

[http://en.wikipedia.org/wiki/Plasma\\_display](http://en.wikipedia.org/wiki/Plasma_display);

[http://en.wikipedia.org/wiki/Liquid\\_crystal\\_display\\_television](http://en.wikipedia.org/wiki/Liquid_crystal_display_television)

[http://en.wikipedia.org/wiki/Cathode\\_ray\\_tube](http://en.wikipedia.org/wiki/Cathode_ray_tube)

<http://reviews.cnet.com/tv-power-consumption/>

8. To recycle an old TV (or anything) check Planet Arks "Recycling Near You" website to find a local repository

<http://www.recyclingnearyou.com.au/>

9. Harrington, L; Jones, K and Harrison, B. *Trends in television use: where it is and where it's going.*

<http://www.energyrating.com.au/library/pubs/2006-aceee-paper-harrington.pdf>