Draft Appliance Efficiency Standards for Televisions (TV) in Active Mode

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Current Standards

California Appliance Efficiency Regulations have standards for televisions in standby mode.

Total estimated energy used by television viewing is 10 percent of residential electricity use

- including programming, recording, and playback equipment.

The Pacific Gas and Electric (PG&E) CASE Study April 2, 2008

- shows that significant energy can be saved by requiring the sale of energy efficient TVs, and
- proposes that Energy Commission adopt energy efficiency standards for televisions in active mode.

PG&E's Proposed Standards for TVs in Active Mode

PG&E proposed standards for TVs, TV Combination Units, Television Monitors, and Component Television Units as follows:

Native Vertical Resolution	Maximum On Mode Power Consumption (A=Area expressed in inches^2)	
	Tier I Effective January 1, 2011	Tier II Effective January 1, 2013
≤480 native vertical resolution (i.e., Non-High Definition TVs)	P_{MAX}=0.12*A + 25	P_{MAX}=0.12*A + 25
>480 native vertical resolution (i.e., High Definition and Full definition TVs)	P_{MAX}=0.12*A + 32	P_{MAX}=0.12*A + 25

After the existing stock is replaced (estimated year 2018):

- Tier I active mode TV standards would produce annual energy savings of approximately 3,831 Giga-watt-hours (GWh), and
- Tier II would save an additional estimated 2,684 GWh.

Power Use By TV Technology Type

Power used by existing TV technologies based on square inch of screen area, average size, and annual power use per unit is as follows:

TV Type	Power Use by Screen Size (per square inch)	Power Use by Average Size (wattage)	Annual Power Use per Unit (kWh/year)
Cathode Ray Tube (CRT)	0.23 watt	101 watts	192.6
Digital Light Projection (DLP) and Rear Projector	0.14 watt	245 watts	467.2
Liquid Crystal Display (LCD)	0.27 watt	144 watts	274.6
Plasma	0.36 watt	361 watts	688.4

Existing Stock and Energy Consumption

PG&E estimates that the existing stock of TVs is made up of:

CRTs: 63% LCDs: 30% Plasmas: 5% DLPs: 2%

and estimates average television use at 1907 hours per year.

The energy consumption of TVs has been growing rapidly over recent years, and this trend will continue in the near future as existing CRT TV stock will be replaced with LCD and Plasma TVs.

Television Type	Existing Stock (Million Units)	Power Use by Average Size TV (Watts)	Energy Consumption (GWh/year)
CRT	22.3	101	4,295
DLP and Rear Projection	0.7	245	327
LCD	10.6	144	2,911
Plasma	1.8	361	1,239
Total Stock	35.4	129.78	8,772

Replacement Scenario and Energy Consumption

PG&E's replacement scenario assumes the sale of TVs in the future will consist of: LCDs: 89% Plasmas: 11%
and estimates average television use to be 1907 hours per year.

Television Type	Existing Stock (Million Units)	Power Use by Average Size TV (Watts)	Energy Consumption (GWh/year)
CRT	0	101	0.0
DLP and Rear Projection	0	245	0.0
LCD	31.5	144	8,650
Plasma	3.9	361	2,685
Total Stock	35.4	168	11,335

In the absence of new standards, the additional energy consumption because of CRT replacement *without considering growth* is:

11,335 – 8,772 = **2,563 GWh/year**

Existing Stock and Energy Consumption

Estimated annual sales are 4 million for 2008.

Television Type	Sales
LCD	88.2%
CRT	0.5%
Plasma	10.5%
Rear Projection/DLP	0.8%

Sales are growing and will result in increased energy consumption in the future.

Other factors

- Continuous growth in sale of digital flat panel TVs
- Growth in number of TV units per household
- Drop in prices of high-definition flat screen digital TVs
- Increase in daily usage time
- Growth in average screen size
- Replacement TV screen sizes are much larger because of the design of old CRT casings

Standard 4:3 Aspect Ratio

Wide Screen 16:9 Aspect Ratio

Technological Feasibility

- 3M has developed its Vikuitiy™ display enhancement technology for LCD screens that increases the efficiency of the backlight's transformation into a picture.

- Phosphors are being developed to further enhance picture quality and energy efficiency of the displays.

- TV models are being manufactured with photo-sensors that automatically adjust the brightness and contrast of a screen based upon the ambient light conditions.

- Some TVs now sold are programmed with an energy-saver mode that users may select in order to reduce energy consumption.

- New display technologies such as Organic Light Emiting Diode (OLED) and laser televisions will present energy efficient alternatives in the future.

Draft Standards for TVs

All televisions manufactured on or after January 1, 2006, shall meet the requirements shown in the next slide.
In addition, televisions manufactured on or after January 1, 2011, shall meet the requirements shown in Sections 1605.3(v)(2)(A), 1605.3(v)(2)(B), and 1605.3(v)(2)(C) of the Appliance Efficiency Regulations.

A. A television shall include a forced menu

or

A television shall have automatic brightness controls.

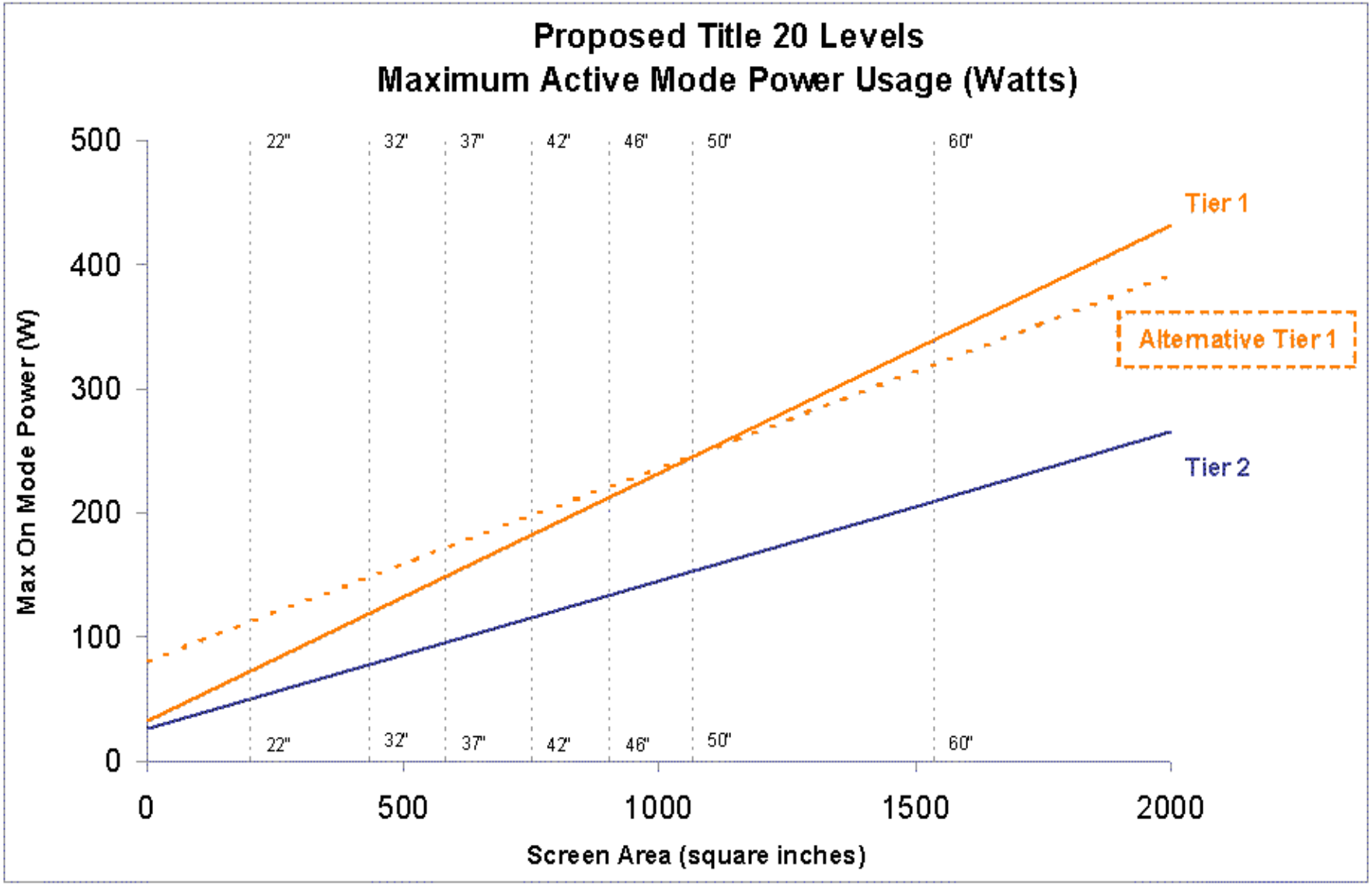
B. A television shall automatically enter passive-standby mode after a maximum of 15 minutes without signal input.

C. A television shall enter passive-standby mode when turned off by remote or integrated button/switch. A separate button, remote, or method including pressing the power button twice may be provided to enter other standby modes such as data acquisition mode.

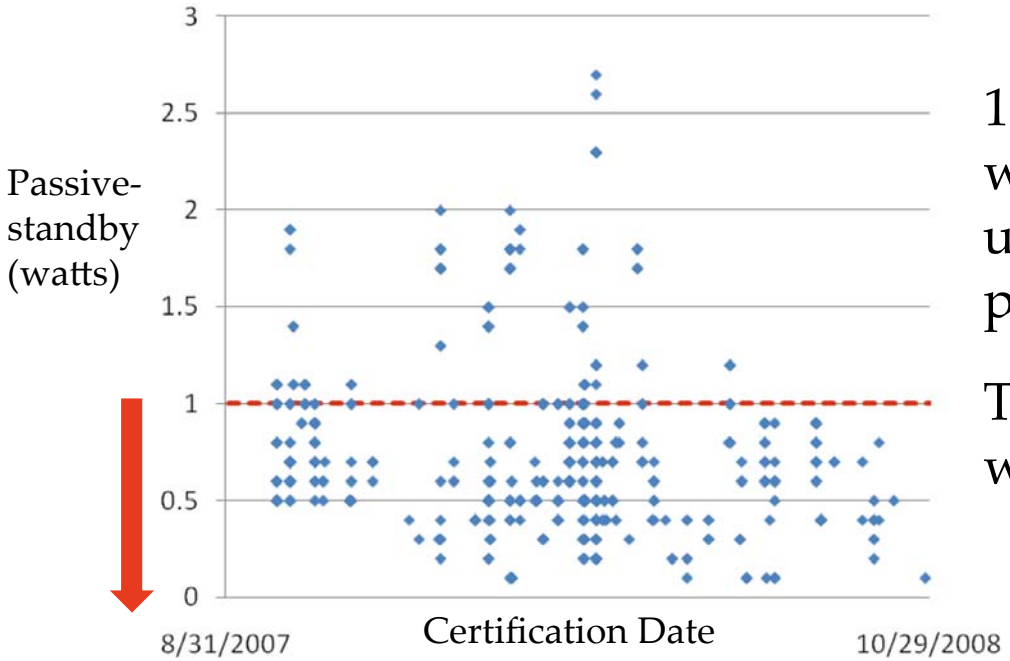
Draft Standards for TVs (cont'd)

Effective Date	Maximum TV Standby-passive Mode Power Usage (Watts)	Maximum Active Mode Power Usage (Watts)	Minimum Power Factor
January 1, 2006	3 W	No standard	No standard
Tier I: January 1, 2011	1 W	0.20* Screen Area (in^2) + 32	0.9
Alternate Tier 1: January 1, 2011	1 W	0.156* Screen Area (in^2) + 80	0.9
Tier 2: January 1, 2013	1 W	0.12* Screen Area (in^2) + 25	0.9

Draft Standards for TVs (cont.)



TV Standby Power Use

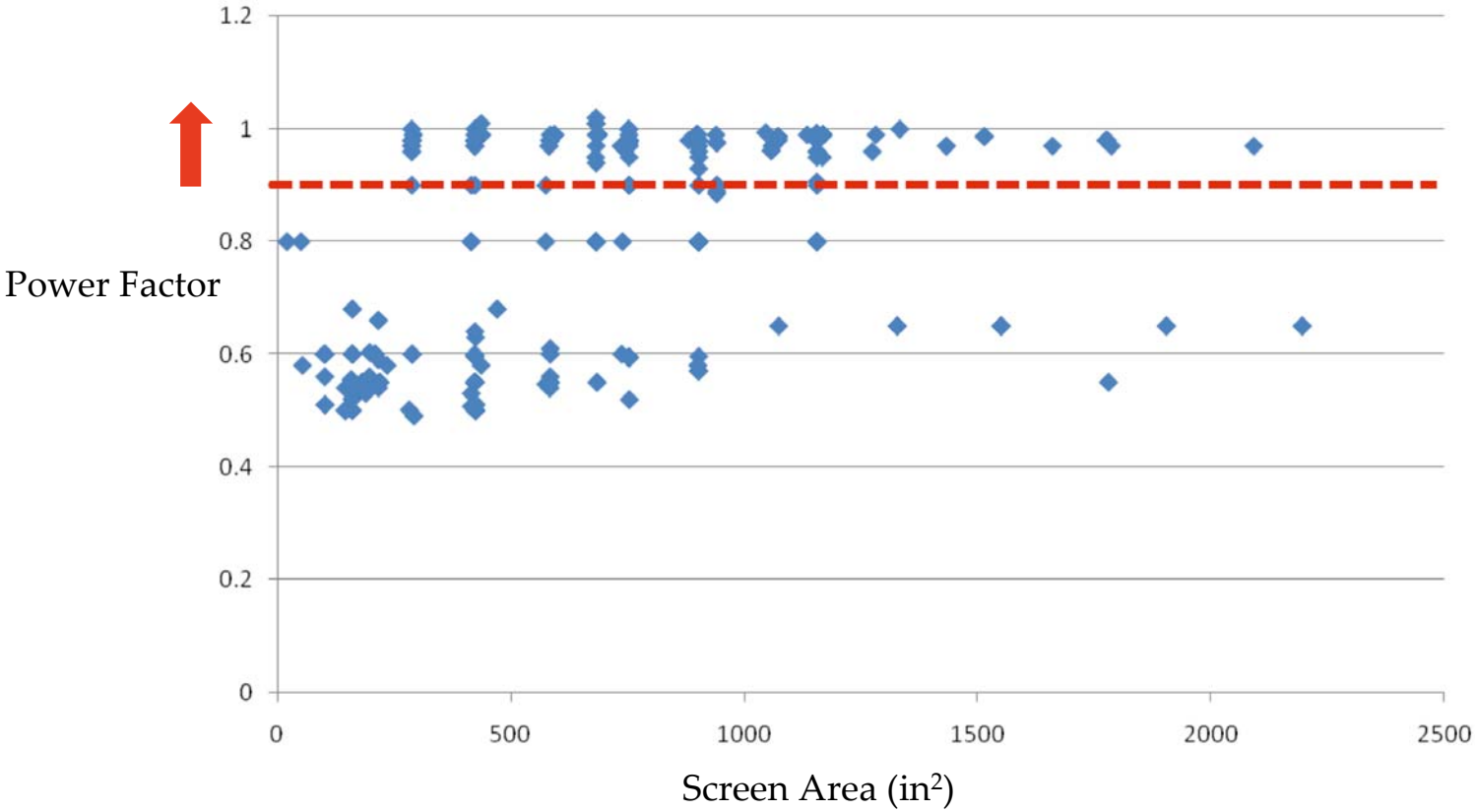


13.9% of televisions certified with the Energy Commission use more than 1 watt in passive-standby mode.

The average standby is 1.58 watts for those over 1 watt.

A 1 watt standby standard harmonizes with Energy Star and global standards.

Power Factor



- Data from models submitted to Energy Star.
- Power factor required to be greater than 0.9 under draft standards.
- 52.0% of Energy Star TVs meet this standard

California Energy Commission
www.energy.ca.gov