2009 Appliance Efficiency Rulemaking
-Phase I, Part C-

Proposed Television Regulations and Draft Negative Declaration Report for Television Efficiency Standards

Energy Efficiency Committee Hearing

October 13, 2009

Overview

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Appliance Efficiency Program

Efficiency and Renewable Energy

California Energy Commission

Television Rulemaking–Milestones and Schedule

- Rulemaking documents (NOPA, ISOR, Express Terms) published by Office of Administrative Law on September 18, 2009.
- 45-day public comment period ending November 2, 2009; written comments will be accepted up to November 2.
- Possible adoption by Energy Commission at the November 4, 2009, Business Meeting.
- Modifications may be required following the November 4th hearing; modified text will be made available at least 15 days prior to noticed Energy Commission adoption.

CEQA
Initial Study
Negative Declaration

Initial Study/Proposed Negative Declaration for Proposed Television Efficiency Standards

The California Environmental Quality Act (CEQA) requires public agencies to identify and consider the potential environmental effects of their "projects," as that term is defined, and when feasible to mitigate any related adverse environmental consequences.

The proposed adoption of these regulations is a discretionary decision undertaken by a public agency and has the potential to result in a direct or indirect physical change in the environment. Thus, the proposed adoption constitutes a “project” under CEQA, and the Energy

Commission has prepared this Initial Study to assess the potential significant effects of the proposed regulations on the environment. The Initial Study demonstrates that the proposed regulations for television energy efficiency will not have any significant adverse effect on the environment.

Initial Study/Proposed Negative Declaration for Proposed Television Efficiency Standards

- Notice of Intent to Adopt a Negative Declaration & Environmental Document was published on October 1, 2009
- Comment period will be ending November 2, 2009.
- Possible adoption by Energy Commission at the November 4, 2009 Business Meeting.

Proposed Regulations

Energy Commission Television Staff Report and Proposed Regulations

The Staff Report provides:

- Background
- Television Energy Use Measurement
- Federal Regulations and Test Method
- Statewide Energy Use
- Current Estimated Energy Consumption for Televisions in California
- Savings and Cost Analysis
- Economic Impact of Television Standards
- Other Economic Analysis
- Technical Feasibility
- Power Factor, Policy Issues and Next Steps
- Stakeholder Comments and Responses
- Proposed Regulations

Standards Overview and Scope of Proposed Regulations

Overview

- Summarize the proposed standards
- **Is not a substitute** for express terms “45 day language” but rather is a summary

Scope

- Televisions of 1400 square inches or less
- This roughly translates to televisions of less than 58”

Television Definitions

Television (TV) means:

- an analog or digital device designed primarily for the display and reception of a terrestrial, satellite, cable, internet protocol TV (IPTV), or other broadcast or recorded transmission of analog or digital video and audio signals.

TVs Definition include:

- Combination TVs
- Television monitors
- Component TVs, and
- Any unit that is marketed to the consumer as a TV

Television does not include computer monitors

Television Energy Use Measurement Test Methods

- **Standby Test Method**
  - IEC 62301:2005 Edition 1.0
    "Household Electrical Appliances – Measurement of Standby Power"
- **On Mode Test Method**
  - IEC 62087:2008(E) Edition 2.0
    "Methods of Measurement for the Power Consumption of Audio, Video, and Related Equipment."

Test Method for Television in On mode IEC 62087

- Requires measurement of Audio and Video Energy Use
- **Requires that all built in additional functions such as**:
  1. DVD players,
  2. Blue Ray DVD Player,
  3. IPTV,
  4. IPOD docking stations, etc., **be turned off during the test**.
- Required to use the “Dynamic” test mode, not “Static” or “Internet” test modes.
- Required to measure power factor during test
- Defines testing requirements for TVs incorporating forced menus
- Defines reporting and testing requirements for televisions incorporating automatic brightness control

Luminance Testing

- Incorporates the latest Energy Star test procedure for luminance.

- Tests the luminance of televisions in both its default/home mode and the retail or brightest (aka torch) selectable mode.

Television Standards

Active Mode Energy Efficiency Requirements

Maximum On Mode Power Usage Effective January 1, 2011:

= 0.20 x Screen Area (inches^2) + 32 (watts)

Maximum On Mode Power Usage Effective January 1, 2013:

= 0.12 x Screen Area (inches^2) +25 (watts)

Power Factor:

- Minimum power factor required to be 0.9.

Television Standards

Additional Requirements:

- 1605.3(v)(3)(A) A television shall automatically enter TV standby-passive mode or standby-active mode after a maximum of 15 minutes without video and/or audio input on the selected mode
- Causes televisions to enter a standby mode in the absence of an input. Occurs when peripherals are turned off or enter standby modes.
- 1605.3(v)(3)(B) A television shall enter TV standby-passive mode when turned off by remote or integrated button/switch
- Requires televisions to go into standby-passive state when power buttons are pressed
- Does not limit or regulate “wake” events necessary for various television features.

Television Standards

Luminance Control

- 1605.3(v)(3)(C) The peak luminance of the product in “home” mode, or in the default mode as shipped, shall not be less than 65% of the peak luminance of the “retail” mode, or the brightest selectable preset mode, of the product.
- Helps to prevent the manufacture of inappropriately dim televisions instead of more efficient televisions.

Standby Mode:

- The current standard requires a maximum TV Standby-passive mode power usage of 3W
- The new standard requires a maximum TV standby-passive mode power usage of 1W

Data Reporting and Labeling Requirements

Data Reporting:

- Television information identified in Section1606 “Table X” of the proposed standards will be reported to the California Energy Commission
- Reported information will be used to determine compliance and will be publically listed.

Labeling:

- Section 1607(d)(11)(A) requires that televisions label modes within built in menus with their tested power consumption
- Only requires labels for tested modes, not all modes
- Digital label, not physical

Labeling Requirements Continues…

Data Reporting and Labeling Requirements

Labeling Requirements

- Section 1607(d)(11)(B) requires retailers and manufacturers list the power consumption (in default/home mode) for their televisions immediately following everywhere the physical dimensions of the television appears.
- Limited to sales materials for consumer information
- Includes websites, boxes, and retail displays.

Television Standards

Staff analyzed all available relevant information and ENERGY STAR ® data within the Public Resources Code (PRC) and APA guidelines to determine and propose energy efficiency standards for televisions. Staff used the same criteria and methodology as was utilized for other appliances in the previous rulemakings.

Based on the analysis staff found that televisions across various sizes and technologies meet the proposed regulations. Staff has also determined that the proposed standards are technically feasible, cost effective, and save energy.

Technical Feasibility

This Section covers

- **Qualifying Televisions**
- **Examples of Tier 2 Compliant Television**
- **Television Innovation**

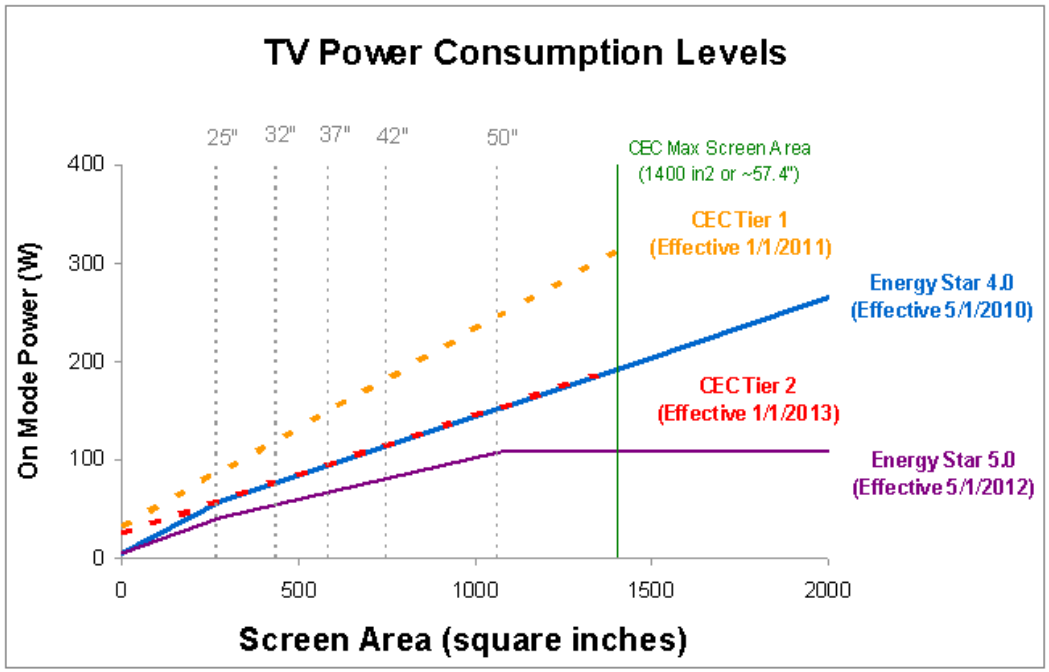
Qualifying Televisions

ENERGY STAR® qualified product list released October 2, 2009 shows:

Currently there are **1053** televisions that meet California Energy Commission's (CEC) Tier 1 levels

- There are **297** televisions that meet CEC's proposed energy efficiency regulations Tier 2 levels
- There are **32** brands of televisions with screen sizes of **10" up to 58"** which meet the proposed standards.

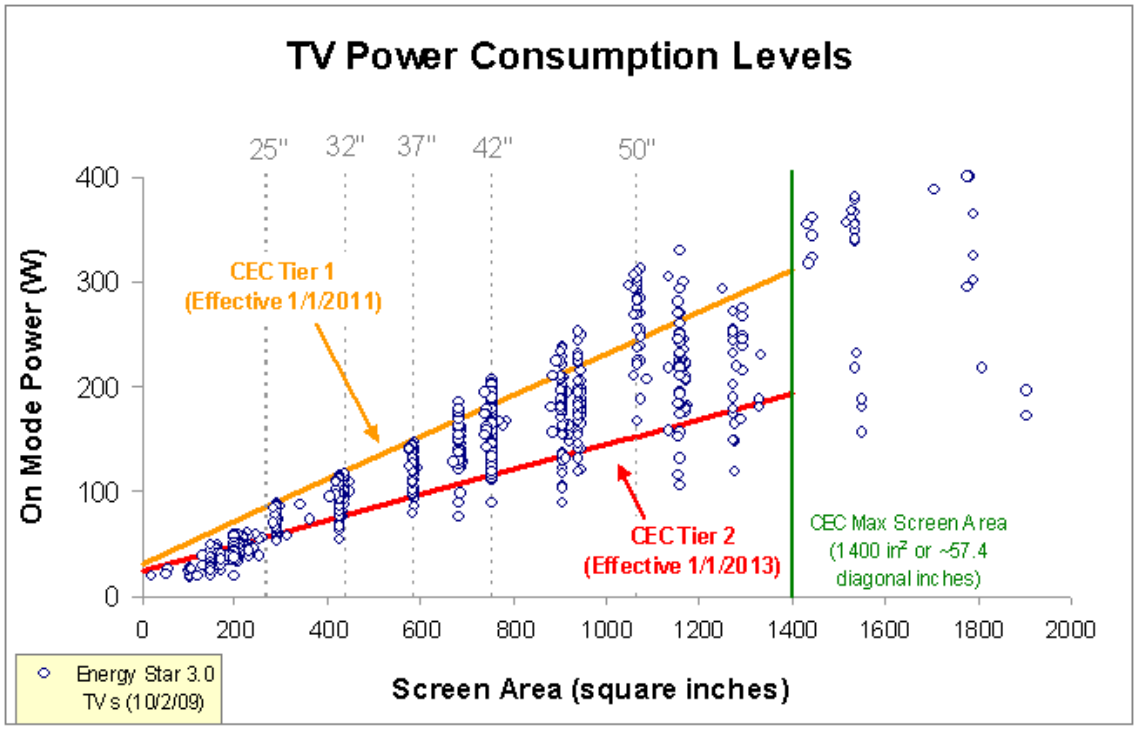
ENERGY STAR ® Specification 5 Exceeds Proposed Regulations



- California Proposed Tier 2 and the ENERGY STAR 4.0 television specifications are identical down to 275 square inches at which point ENERGY STAR® is more stringent. ENERGY STAR 4.0 goes into effect 30 months before Tier 2.

- ENERGY STAR® 5.0 is much more stringent than the proposed Tier 2. The ENERGY STAR® 5.0 specification will be effective 7 months prior to Tier 2.

Qualifying Televisions



In addition to the 297 TVs that already meet Tier 2, many are already very close:

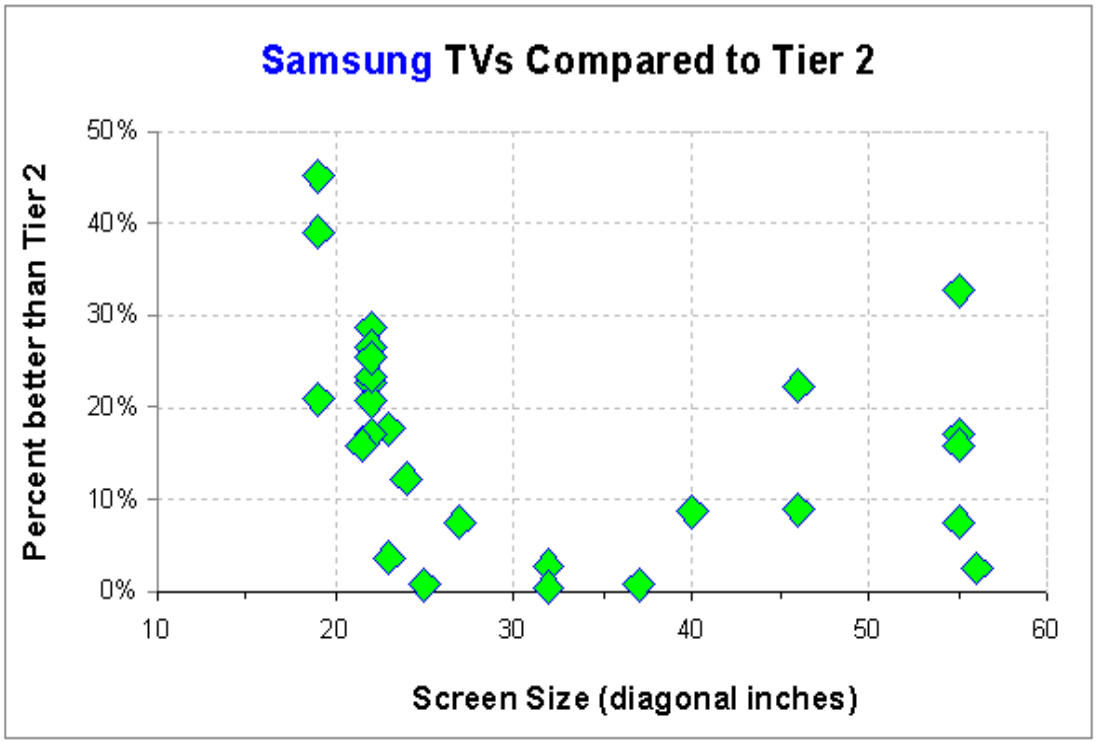
66 are within 5%
124 are within 10%
185 are within 15%
248 are within 20%
318 are within 25%

Each point may represent several models of TVs

Source: PG&E, based on the most recent Energy Star 3.0 list (published October 2, 2009):

Examples of Tier 2 Compliant Televisions

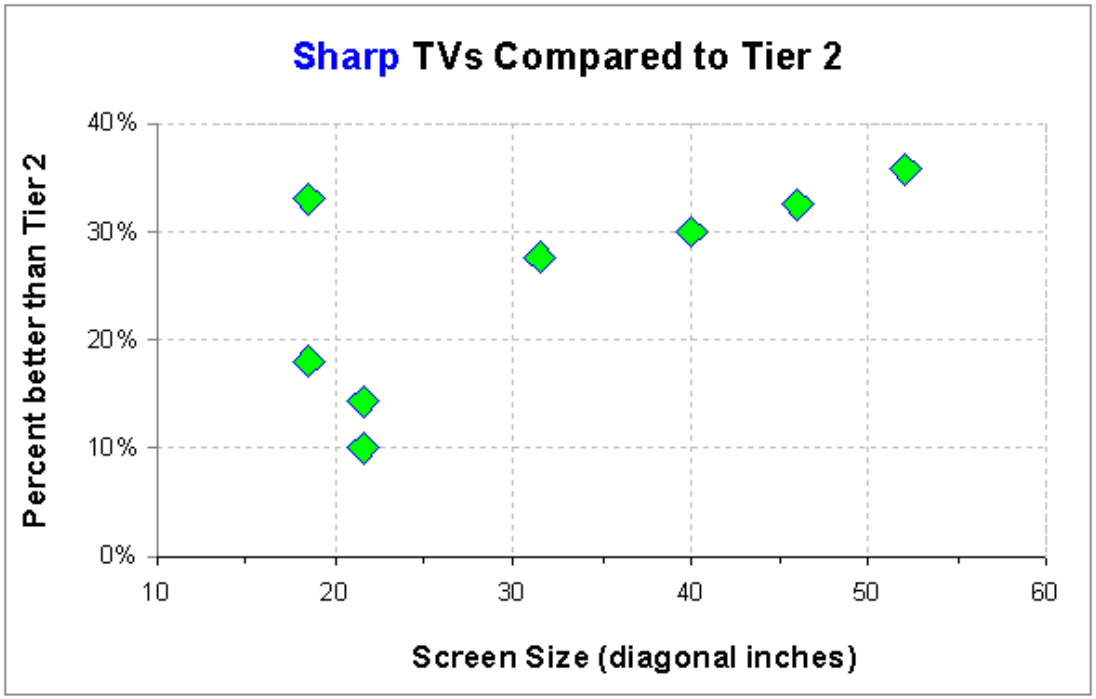
Examples of Tier 2 Compliant Televisions



Samsung	
42	Current Tier 2 TVs
19”–56”	Screen Size range
45%	Maximum percent better than Tier 2

Source: PG&E, based on the most recent Energy Star 3.0 list (published October 2, 2009). Some data points may overlap and appear as one point.

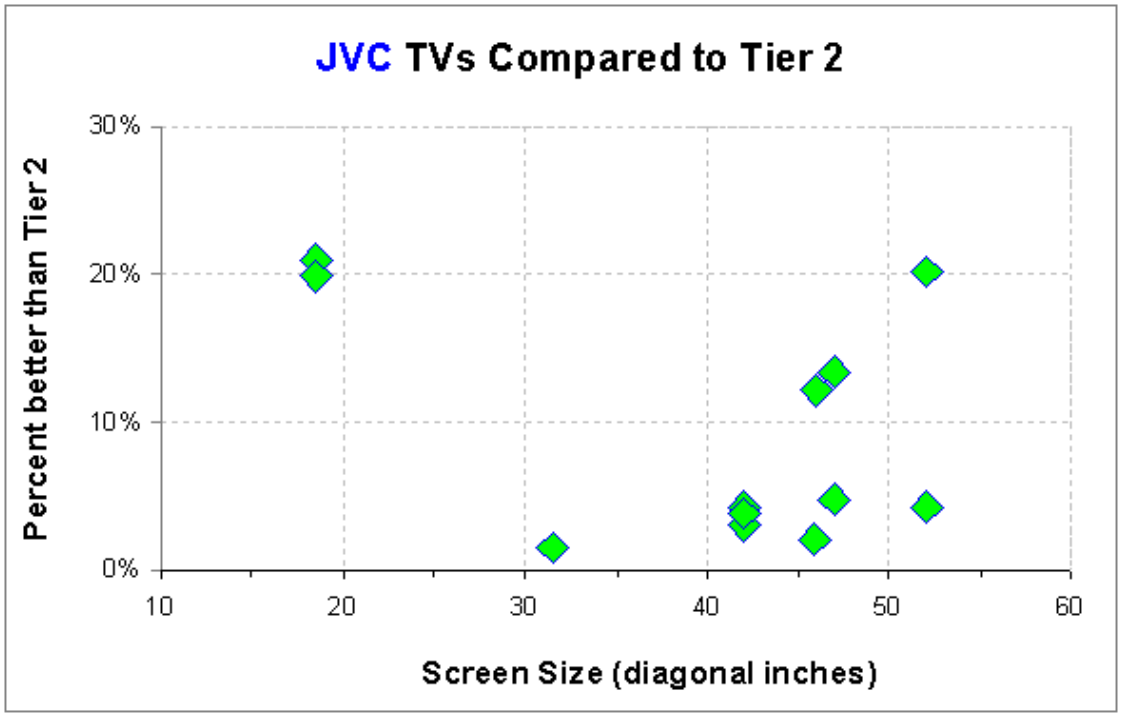
Examples of Tier 2 Compliant Televisions



Sharp	
13	Current Tier 2 TVs
19”–52”	Screen Size range
36%	Maximum percent better than Tier 2

Source: PG&E, based on the most recent Energy Star 3.0 list (published October 2, 2009). Some data points may overlap and appear as one point.

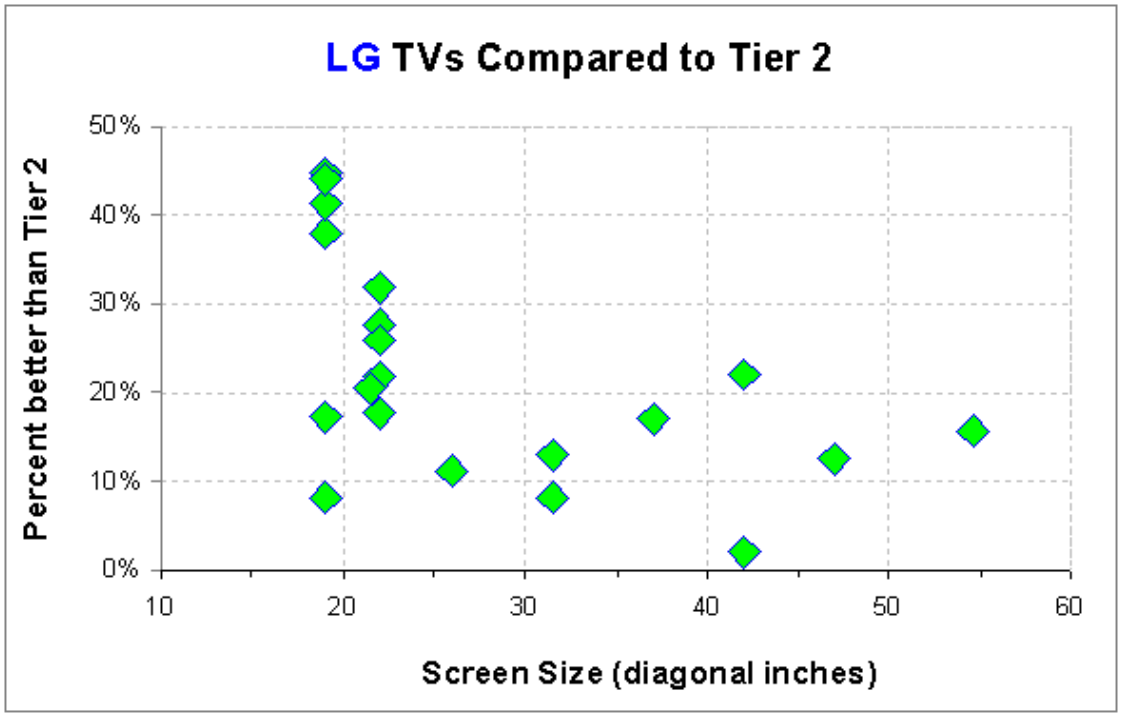
Examples of Tier 2 Compliant Televisions



JVC	
20	Current Tier 2 TVs
19”–52”	Screen Size range
21%	Maximum percent better than Tier 2

Source: PG&E, based on the most recent Energy Star 3.0 list (published October 2, 2009). Some data points may overlap and appear as one point.

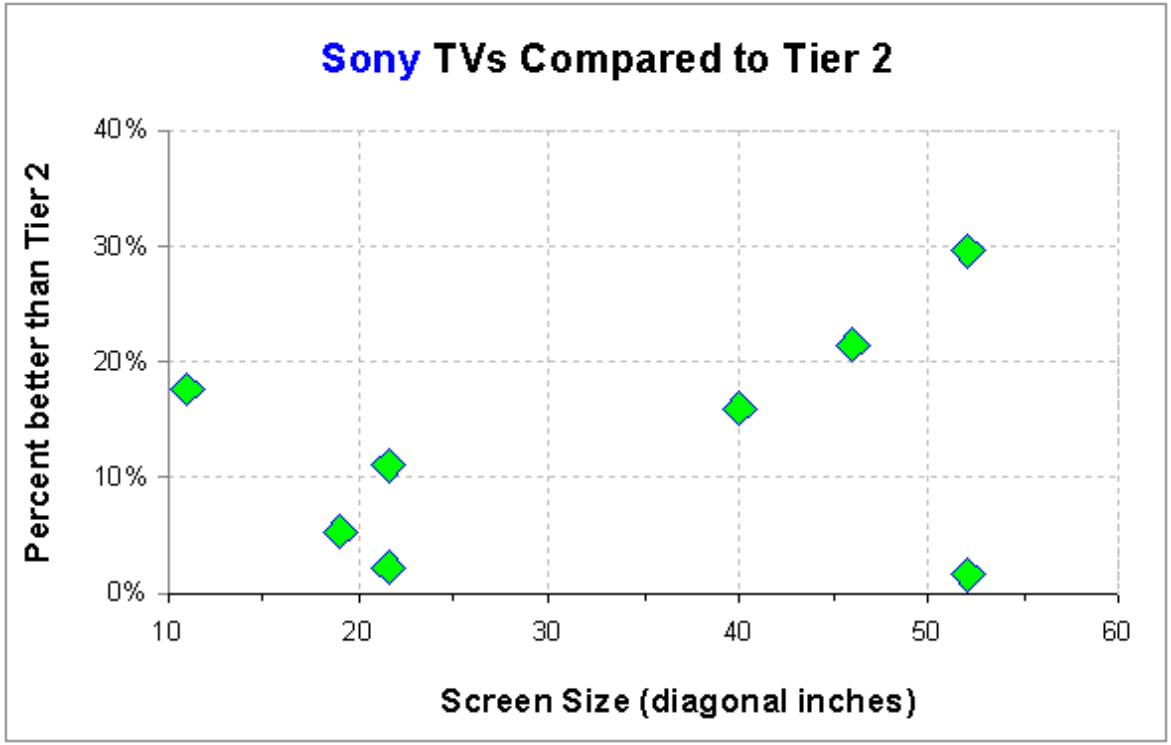
Examples of Tier 2 Compliant Televisions



LG	
25	Current Tier 2 TVs
19”–55”	Screen Size range
45%	Maximum percent better than Tier 2

Source: PG&E, based on the most recent Energy Star 3.0 list (published October 2, 2009). Some data points may overlap and appear as one point.

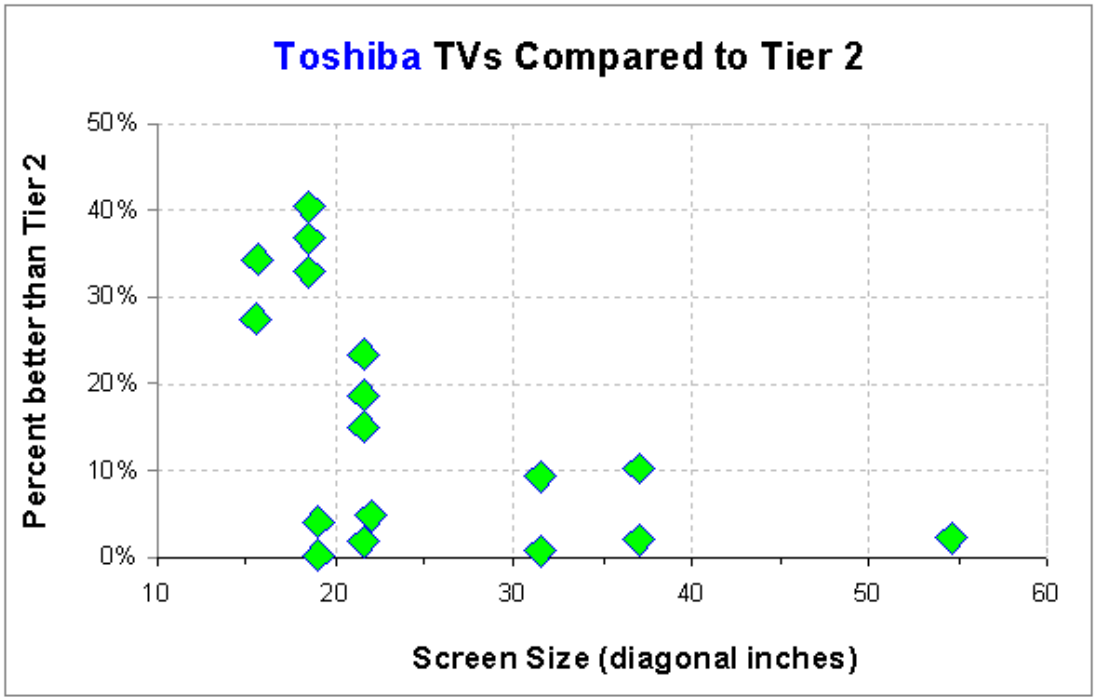
Examples of Tier 2 Compliant Televisions



Sony	
8	Current Tier 2 TVs
11”–52”	Screen Size range
30%	Maximum percent better than Tier 2

Source: PG&E, based on the most recent Energy Star 3.0 list (published October 2, 2009). Some data points may overlap and appear as one point.

Examples of Tier 2 Compliant Televisions



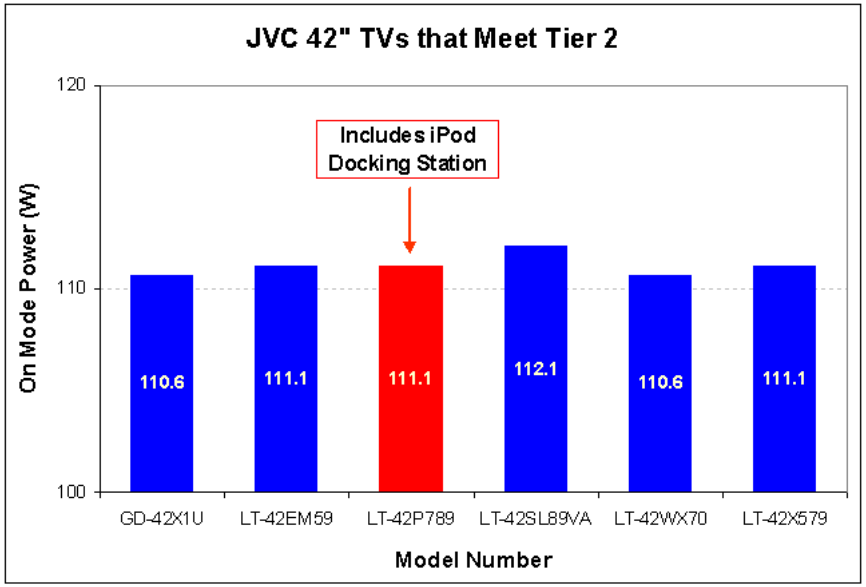
Toshiba	
42	Current Tier 2 TVs
15”–55”	Screen Size range
40%	Maximum percent better than Tier 2

Source: PG&E, based on the most recent Energy Star 3.0 list (published October 2, 2009). Some data points may overlap and appear as one point.

Television Innovation

TV Innovation: – iPod docking stations

- This figure shows six JVC 42” TVs that meet Tier 2 levels today.
- On mode power for TV with iPod Docking Station is roughly equal to other TVs without.
- This graph demonstrates that IEC 62087 test procedure only measures the energy consumption of the display and not the energy use of additional functions such as an IPOD docking station.



Source: Energy Star 3.0 list (published October 2, 2009).

TV Innovation – Internet Enabled TVs

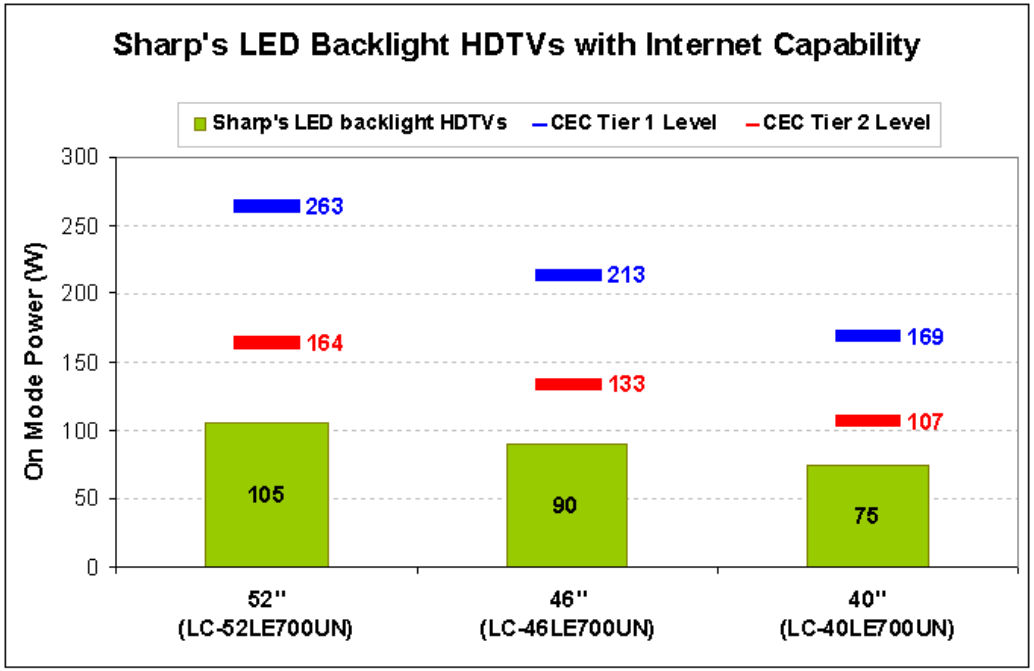
From Sharp press release:

SHARP INTRODUCES AQUOS® LED

Breakthrough New Line of LED Backlit LCD TVs Bring Superior Brightness and Image Quality Combined with Industry's Lowest Power Consumption for True Value

07/07/2009

- The 52", 46", and 40" TVs have internet capability even while easily surpassing Tier 2 levels.
- AQUOS Net is an internet-based service that gives Sharp AQUOS customers access to personalized information. These televisions incorporate fully featured internet capabilities.



Source: PG&E graphic based on Energy Star 3.0 list (published October 2, 2009) and Sharp press release: http://www.sharpusa.com/AboutSharp/NewsAndEvents/PressReleases/2009/July/2009_07_07.aspx

TV Innovation – LED Backlight TVs

Toshiba, whose slogan is "*Leading Innovation*," has introduced a 55" HDTV that they call "*the most advanced, most beautiful TV we've ever produced.*"

Meets Tier 2 level more than three years before the effective date.

"The latest generation of LCD television technology is approximately 40% more energy efficient than last years models. Samsung, Sony and Toshiba have all introduced TV models utilizing LED backlighting, replacing the more power hungry CCFL backlight used in previous years. To verify power consumption, Techtree.com performed measurements on a **46" LED TV** using a power meter with different levels of Energy saving. The measured power usage was between **72W and 116W** depending on energy savings level."

From Toshiba website:

TOSHIBA
Leading Innovation

http://ezinearticles.com/?LED-Backlighting---TVs-Are-Going-Green&id=2917802

Source: http://www.tacp.toshiba.com/regza/models/55sv670u/ (current as of 10/8/09)

TV Innovation – Color Sequential Technology

- “In 30 to 40 inch LCD panels, the color filter accounts for some 25% of the total cost of the LCD display panel. Color sequential is a method of eliminating the color filters in LCDs. Thus, eliminating the color filters represents a significant way of reducing costs and simplifying the production process.”

- “Red, green, and blue color filters used on sub-pixels absorb up to some 70% of light output from the backlight - thus eliminating the color filters implies that it is possible to use a lower brightness light source to achieve the same display brightness level. The end result is a significant reduction in power consumption.”

- “The use of color sequential technology eliminates the need for color sub-pixels; instead, the LCD panel can be redesigned so that it has three times as many regular pixels. In effect, each sub-pixel will become a pixel, which means that the resolution can be increased by a factor of 3.”

http://www.practical-home-theater-guide.com/lcd-panel.html#colr--field-seq

TV Innovation – Optical Compensated Bend (OCB) Technology

"Up to very recently, a typical problem associated with standard LCD panels was the deterioration of the image as one moves away from the supported field of view. A lot of improvement has been going on in this direction. Most of today's LCD TV set support 170 degrees both horizontally and vertically. There are various ways that can help support a wider angle of view - Optically Compensated Bend is one of them."

Toshiba Matsushita Display (TMD) combined OCB with the Field Sequential technology to achieve the development of a LCD that has:

- **High Transmittance (2.6 times higher than our former OCB panels)**
- **Low Power Consumption**
- **Wide Viewing Angle (Upper/Lower 170 degree, Left/Right 170 degree)**
- **High Speed Response (3.3ms)**
- **Also LCD can realize High Brightness and Ultra High Resolution.**
- **This development product can meet customer's needs such as Low Power Consumption, Wide Viewing Angle, High Resolution so that it is suitable for mobile AV use.**

http://www.practical-home-theater-guide.com/lcd-panel.html#colr--field-seq
http://www.tmdisplay.com/tm_dsp/press/2006/06-04-17.html

TV Innovation - “Triple Efficiency” Plasma

Next Generation Plasma TVs

Panasonic announced “triple efficiency” plasma TVs at the 2009 Consumer Electronics Show (see photos and press release below).

The “double efficiency” models were showcased at the 2008 CES. Some are available now and others will be introduced throughout 2009.

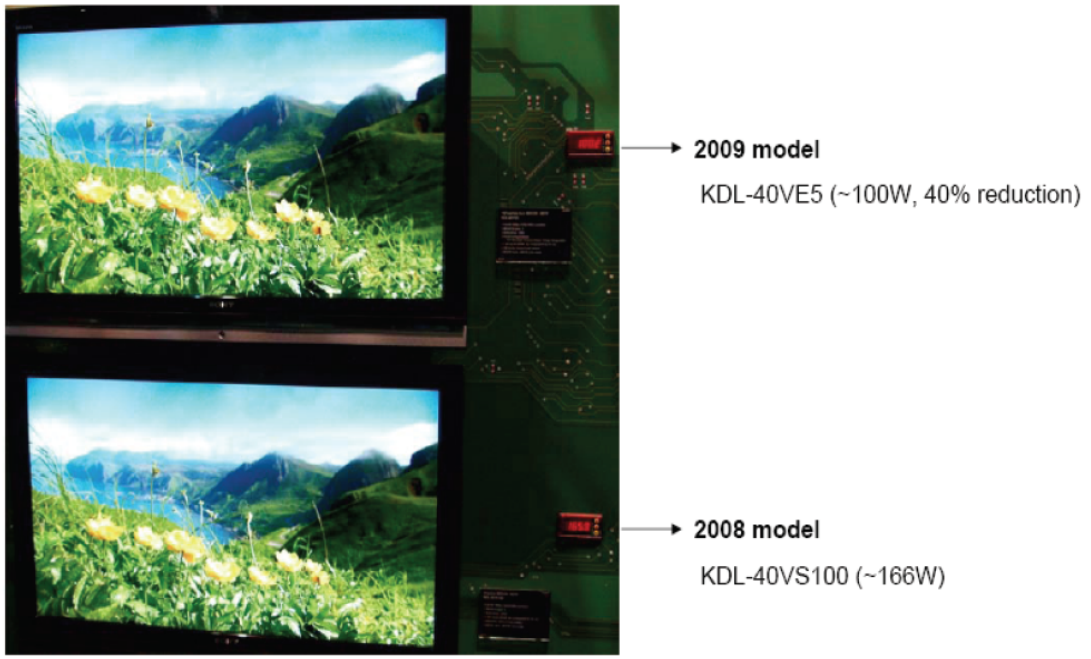
“The newly developed NeoPDP technology has been incorporated into two types of PDPs. The first is a super high-efficiency 42-inch PDP that **achieves triple luminance efficiency, while reducing the power consumption to 1/3 of the 2007 models yet achieving the same brightness**.” –Panasonic 2009 CEA Press Release
Full Press Release: http://panasonic.co.jp/corp/news/official.data/data.dir/en090108-8/en090108-8.html

8

Source: Slide from “Future ENERGY STAR®TV Levels: Perspective from the Business and Consumer Electronics Program”. Presentation by Tim Michel (PG&E) and Alex Chase (Energy Solutions) at April 24, 2009 Energy Star stakeholder meeting. http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/tv_vcr/PG_E_Presentation.pdf

TV Innovation: Advanced Backlights

Sony's BRAVIA VE5 series



- Sony prominently displayed new models at the January 2009 CES show that deliver 40% on mode power savings which was achieved in large part through the use of HCFLs, a more efficient backlight.
- Met Tier 2 a full 4 years before effective date.

Source: NRDC's May 19, 2009 comments to Energy Star.
http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/television/D1_V3.1_NRDC_Comments.pdf

TV Innovation: Digital Ambient Light Sensing

- Automatically Adjusts Display Brightness
  - Saves Power
    - Reduce Display Power By As Much As 30%
  - Improves Display Quality
    - Displays Degrade With Time
    - Higher Brightness/Faster Degradation
    - No Washout
    - No Overdriving Of The Display
  - Supports LCD and Plasma Displays

TV Innovation – 3D TVs

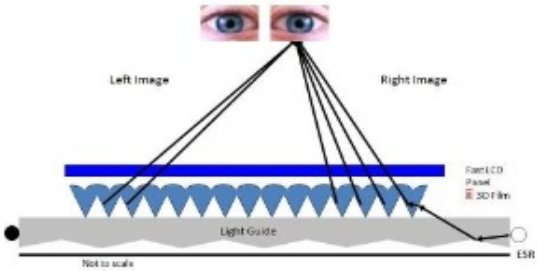
- Mitsubishi has introduced its 65 inch LASERVUE television that is 3D ready and uses only 135 watts and consumes less than the proposed Tier 2 power requirements for 50 inch televisions.
- Some 3D televisions require a conversion box or computer with a PC video card to operate and requires the use of 3D glasses. These 3D televisions require special setup.
- The conversion box can be disconnected or turned off during the test for measuring on-mode energy consumption, as stated in the IEC 62087 test procedure.

TV Innovation – 3D TVs

Vikuiti Films:

3M has developed a Vikuiti 3D optical film that can be easily integrated into a television's backlight module—providing 3D viewing without the use of 3D glasses.

Figure 1. 3M's New Vikuiti™ 3D Display Film



3M's Vikuiti optical film is integrated into the backlight of many flat panels of LCD televisions. 3M film alone can reduce their power consumption by 37 percent.

Furthermore, the film only requires one LCD panel and operates at a 120Hz refresh rate. Backlight module assembly is nearly identical to existing systems--allowing for simple integration at the assembly stage. The standard optical film stack is replaced with a reflective film, custom light guide, and 3D film. By using directional backlight technology, left and right images are focused sequentially into the viewer's eyes--enabling a full resolution display of the panel.

Source:
http://solutions.3m.com/3MContentRetrievalAPI/BlobServlet?locale=en_US&lmd=1249939502000&assetId=1180616700377&assetType=MMM_Image&blobAttribute=ImageFile

Cost-effectiveness

Incremental Cost

The Commission has determined that the on mode proposed standards have zero incremental cost to consumers:

- More efficient films
  - Decrease the number of lamps required
  - Allow the use of smaller power supplies
  - Use less material and simpler manufacturing processes
- Competition will mitigate incremental cost
- Improved phosphors and gasses for plasma TVs will lead to a reduction in overall material costs.

TV Cost-effectiveness

Input from Display Search "Increasing LCD Transmissivity, Key to Lower Costs"

- *"LCD prices are on a relentless downward trend. "*

- *"Accounting for 15-25% of total module costs, the backlight unit and inverters are the most expensive components in an LCD. For this reason, it is not surprising that the backlight assembly is an important focal point of cost reduction. CCFL lamps are the most expensive components in the BLU (Backlight Unit) accounting for 30-40% of the bill of materials. And in the case of LED-based BLUs, the lamps are substantially more expensive.* ***Increasing LCD panel transmissivity has now become an industry wide goal; not for the purpose of increasing on screen brightness, but rather to maintain brightness and reduce backlight lamps, inverters and optical films in order to lower panel costs. Another benefit of improved transmissivity is power reduction, which makes it better for the environment."***

-Charles Annis, VP of Manufacturing Research , DisplaySearch

Source: http://www.displaysearchblog.com/2008/12/increasing-lcd-transmissivity-key-to-lower-costs/

TV Cost-effectiveness

Input from: VIZIO

"The incremental costs involved in achieving the greater energy efficiency are tempered by the unrelenting innovation in technology. We have just introduced a new 32 inch class LCD TV that uses significantly less power by a combination of reducing the number of CCFL Backlights and adding improved light filtering to maintain the same light output. This results in a net cost increase of a few tens of dollars."

-Ken Lowe, Mr. Kenneth R. Lowe, P. Eng., C. Eng., MIET

-Vice President and Co-Founder, Vizio, one of the three leading brands of Flat Panel HDTV sold in the USA

VIZIO

TV Cost-effectiveness

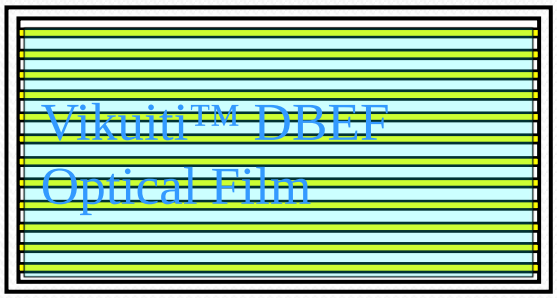
Input from: 3M

"Our estimates indicate that, for many set makers, there are minimal incremental costs because they can recover costs throughout the supply chain through removing components, smaller power supply units, etc. For those set makers that are unable to realize these additional savings, we estimate their incremental cost would be less than $20."

"From a consumer perspective, an average 42 inch set would save hundreds of dollars over the life of the TV base on reduced operating costs."

- James L Bauman, Vice President and General Manger, 3M Optical Systems Divisions

3M Vikuiti™ DBEF Optical Film improves LCD TV Energy Efficiency



TV efficiency increase up to 32%

DBEF improves efficiency of all LCD TVs – regardless of features and screen size
DBEF enables improved energy efficiency while maintaining picture quality
DBEF enables reduced components costs as a result of the lower power consumption

TV Cost-effectiveness

Input from: LCD TV Association

"Given the typical price structuring within the industry, the average Californian should not see a cost premium for compliant TVs compared to today's non-compliant TVs. They will however benefit from dozens to hundreds of dollars in energy cost savings over their TV's lifetime, thus making the proposed standard extremely cost-effective for the state of California."

- Bruce Berkoff, Chairman, LCD TV Association

TV Cost-effectiveness

Input from: McLaughlin Consulting Group

"We believe that the power efficiency gains can be delivered while sustaining the historical cost down trends of 10% cost reduction annually. Given the typical price structuring within the industry, the average Californian should continue to see price reductions for compliant TVs each year as they have seen in the past for non-compliant TVs. In addition, they will benefit from energy cost savings, thus making the proposed standard extremely cost-effective for the state of California."

"During the past several years, the MCG team has completed in depth performance and cost analysis of many of the key materials and components used in LCD backlights. Our studies and modeling of the polarization recycling films, brightness enhancement films, diffusers, and backlight architectures predict continuous improvement in performance as well as substantial cost reductions due to increased competition and production efficiencies."

-Charles McLaughlin , President of McLaughlin Consulting Group,
A display market and technology consulting team

TV Cost-effectiveness

Input from: Agoura Technologies

"We are an emerging technology provider to the LCD industry and the purpose of this memorandum is to state our support for the California Energy Commission Tier 1 and Tier 2 active power regulations that are being proposed for TV display technologies. We are confident that the regulation can be achieved at no manufacturing cost impact and in fact, at an overall cost savings to the industry."

- Steve Stephansen, CEO
Agoura Technologies, Inc.

agoura

TV Cost-effectiveness

Imagine Design Inc (IDI) Technology

IDI has developed two new optical technologies: Total internal reflection light-valve (TIR-LV) technology and Flat Panel Reflector (FPR) technology

- TIR-LV
  - High efficiency, low-cost, simplified implementation.
  - New technology with multiple applications displays, lighting, and solar.
  - TV displays are the largest market for this technology.
- FPR
  - New reflector technology that utilizes for flat, thin reflectors.
  - Applications include TVs, lighting, and automotive displays.

TV Cost-effectiveness

IDI Display Technology Highlights

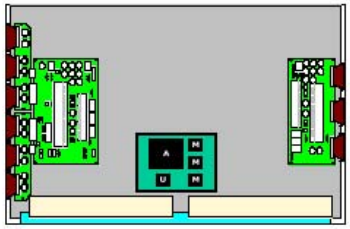
- **Architecture for Transmissive Displays**
  - Works for all sizes of displays, cell phone, laptop, TV and signage
- **Reflector Technology**
  - Does not use Semiconductor processing to manufacture reflector
  - Reflector is replicated from Master Tool (film) or Mold (thin plastic) from a variety of transparent polymers
- **Performance Advantages**
  - Display Efficiency - 55% transmittance vs. typical LCD transmittance of 6-8% i.e. 5-10 times less power
- **Cost Advantages**
  - Fewer components, mechanical and electronic
  - Costs 50 percent less to produce than current generation LED technologies

TV Cost-effectiveness

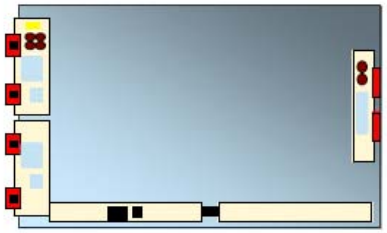
Efficient Plasma "Flat Panel TV Technology Advances" by Ross Young, Founder and Chief Research Officer, Display Search, March 2008

What Happens to Cost at 5 lm/W?

2.5 lumens



5 lumens



- **Driver IC costs expected to fall by 25%** - Address voltages decline by 40-50% to 30V. Driver IC channels can increase to 512-768 pins.
- **A and B drive board costs by 20%** - Sustain voltages would drop around 35% to 120-140V, reducing the cost of the components on the A and B drive boards as well as allow for increased integration and simpler PCBs.
- **Logic board/circuitry costs fall 10%** - Additional integration can be realized, PCB could even be eliminated.
- **Mechanical costs fall by around 25%** - Reduced heat allows for the elimination of expensive heat shields.
- **Power supplies fall by 50% due to lower voltages** - now similar to LCD power supply costs.
- **Costs fall by 9% - 11% depending on the size/resolution** – since device structure remains the same, no impact on depreciation or panel materials.

TV Cost-effectiveness

Efficient Plasma "Flat Panel TV Technology Advances" by Ross Young, Founder and Chief Research Officer, Display Search, March 2008

What Happens to Cost at 10 lm/W?

- **Lower depreciation, labor, indirect/production and panel material costs with spatial discharge:**
  - Front glass manufacturing process would be dramatically simplified due to elimination of patterning steps.
  - Rear glass process would also be cut to the elimination of the addressing electrode and a simpler barrier rib process. Barrier ribs could be cut into the glass with phosphors applied to the grooves.
  - 70% - 80% reduction in total process steps expected, from 50 to 10-15. TACT expected to be cut by 50%.
  - 40% reduction in depreciation costs expected, 30% reduction in electrode materials, 50% reduction in labor costs and a 50% reduction in indirect/product expenses.
- **30% reduction in glass costs** – At 10 lm/W, low cost soda-lime glass can be used due to reduction in high temperature process steps.
- **Lower electronics costs** – One driving board eliminated, address voltage reduced by another 20% - 30% to <20V reducing driver IC costs to similar levels as LCDs, a 50% reduction vs. 2.5 lm/W driver IC costs. Logic board cut by 30%, driving B board cut 20%.
- **Reduced mechanical costs –** Reduced heat and EMI results in lower thermal protection and mechanical costs, another 20% reduction.
- **Optical filter eliminated** – EMI shielding layer eliminated, other functions replaced by low cost coatings. Costs cut by 80%.
- **Manufacturing costs cut by 37% - 38%**

TV Cost-effectiveness

Tier 2 TV Examples: Methodology

- The following slides show Tier 2 TVs on the market now. Examples include multiple brands, small to large screen sizes, and diverse features.
- On mode wattage values taken from 12/8/08 Energy Star list
- Lifetime energy savings assumes 10-yr useful life, $0.14/kWh rate, and a 3% discount rate (per CEC methodology).
- Retail Cost
  - Tier 2 Televisions:
    - Individual retail costs were taken from NPD Group Inc. market research data for sales from August-October 2008. If average price was not available from NPD, then average retail costs were taken from Best Buy, Wal-Mart, and/or Fry's.
  - Non-Tier 2 Televisions:
    - Average price for non-Tier 2 televisions were collected in November 2008 from Best Buy, Wal-Mart, and Fry's and averaged for each screen size. Sample size (n) for the average prices in the following figures is shown in the table below.

Screen Size (in)	Sample Size (n)
19"	17
22"	7
32"	39
37"	21
42"	26
46"	32

16

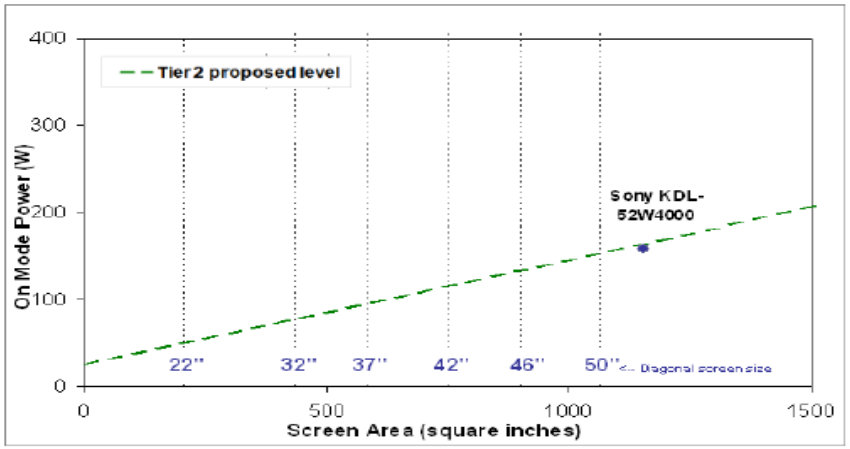
Source: Slide from "Proposed Efficiency Standards for Televisions ". Presentation by PG&E at 12/15/08 CEC TV workshop. http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-12-15_workshop/comments/PG+E_Follow-Up_Comments_TN-49793.pdf

TV Cost-effectiveness

Tier 2 TV Example

Sony 52” 1080p Full HD LCD

W-Series features: Full HD 1080p, Motionflow™ 120Hz, BRAVIA Engine 2™ digital video processing, Advanced Contrast Enhancer circuit (ACE), 24p True Cinema capable, enhanced XMB™ user interface, BRAVIA Sync capable, piano black gloss color
(Screen size measured diagonally)



Sony KDL-52W4000

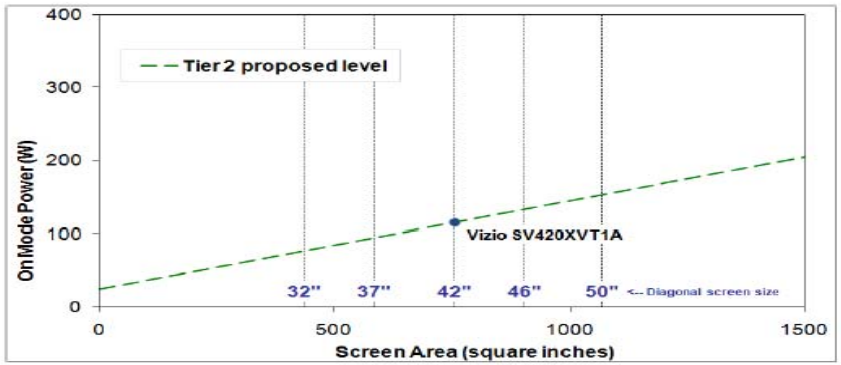
	Non-Tier 2 Average	Tier 2 TV Example
Retail Cost	$2,381.92	$2,225.00
On Mode Wattage	261.0	158.7
Lifetime energy (kWh)	4978	3026
Lifetime energy costs	$594.45	$361.33
Savings		
Retail Cost		$156.92
On Mode Wattage		102.4
Lifetime energy (kWh)		1952.0
Lifetime energy (%)		39%
Lifetime energy costs		**$233.11**

17

Source: Slide from “Proposed Efficiency Standards for Televisions ”. Presentation by PG&E at 12/15/08 CEC TV workshop. http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-12-15_workshop/comments/PG+E_Follow-Up_Comments_TN-49793.pdf

TV Cost-effectiveness

Tier 2 TV Example
Vizio 42" LCD 1080P Full HD



Vizio SV420XVT1A

	Non-Tier 2 Average	Tier 2 TV Example
Retail Cost	$1,121.02	$1,087.00
On Mode Wattage	180.9	115.0
Lifetime energy (kWh)	3450	2193
Lifetime energy costs	$411.98	$261.90

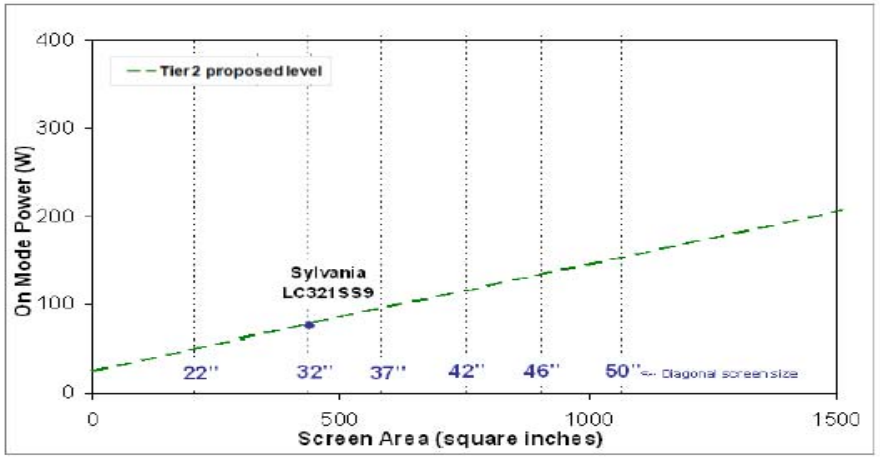
Savings	
Retail Cost	$34.02
On Mode Wattage	65.9
Lifetime energy (kWh)	1256.7
Lifetime energy (%)	36%
Lifetime energy costs	**$150.08**

18

Source: Slide from "Proposed Efficiency Standards for Televisions ". Presentation by PG&E at 12/15/08 CEC TV workshop. http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-12-15_workshop/comments/PG+E_Follow-Up_Comments_TN-49793.pdf

TV Cost-effectiveness

Tier 2 TV Example
Sylvania 32" LCD



Sylvania LC321SS9

	Non-Tier 2 Average	Tier 2 TV Example
Retail Cost	$783.92	$590.00
On Mode Wattage	117.6	74.8
Lifetime energy (kWh)	2243	1426
Lifetime energy costs	$267.87	$170.35
Savings		
Retail Cost		$193.92
On Mode Wattage		42.8
Lifetime energy (kWh)		816.6
Lifetime energy (%)		36%
Lifetime energy costs		**$97.52**

19

Source: Slide from "Proposed Efficiency Standards for Televisions ". Presentation by PG&E at 12/15/08 CEC TV workshop. http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-12-15_workshop/comments/PG+E_Follow-Up_Comments_TN-49793.pdf

TV Cost-effectiveness

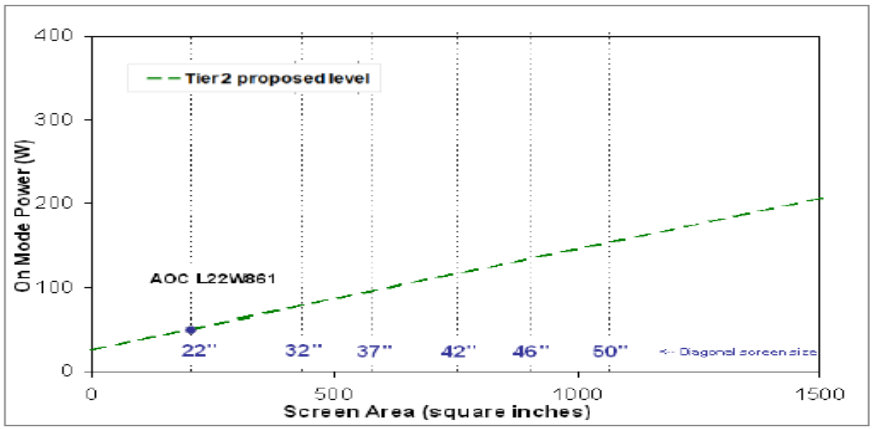
Tier 2 TV Example
Envision AOC 22" LCD

OVERVIEW

The AOC 861 television series is our newest for 2008. The 861 series provides the best picture and sound quality ever offered by AOC. In addition, the 861 series is also the best looking with a slim bezel design and piano black finish. The 22" is great for a bedroom, RV, or dorm room. With inputs such as HDMI for the best connectivity and NTSC/ATSC tuners with Clear QAM for high definition signal reception you'll be ready for the 2009 digital TV revolution.

HDMI DTV

ENVISION by AOC



Envision AOC L22W861

	Non-Tier 2 Average	Tier 2 TV Example
Retail Cost	$394.56	$307.91
On Mode Wattage	71.4	49.0
Lifetime energy (kWh)	1362	934
Lifetime energy costs	$162.65	$111.59
Savings		
Retail Cost		$86.65
On Mode Wattage		22.4
Lifetime energy (kWh)		427.5
Lifetime energy (%)		31%
Lifetime energy costs		**$51.06**

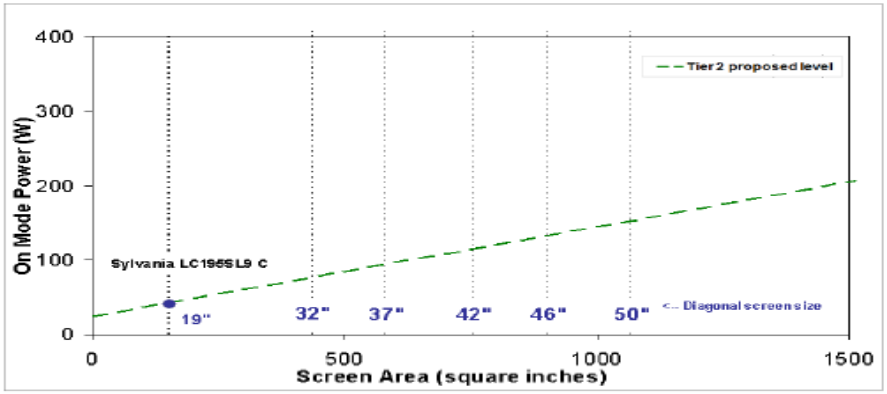
20

Source: Slide from "Proposed Efficiency Standards for Televisions ". Presentation by PG&E at 12/15/08 CEC TV workshop. http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-12-15_workshop/comments/PG+E_Follow-Up_Comments_TN-49793.pdf

TV Cost-effectiveness

Tier 2 TV Example

Sylvania 19” LCD HD TV



Sylvania LC195SL9 C

	Non-Tier 2 Average	Tier 2 TV Example
Retail Cost	$346.03	$299.99
On Mode Wattage	60.8	40.5
Lifetime energy (kWh)	1160	772
Lifetime energy costs	$138.51	$92.23
Savings		
Retail Cost		$46.04
On Mode Wattage		20.3
Lifetime energy (kWh)		387.5
Lifetime energy (%)		33%
Lifetime energy costs		**$46.28**

21

Source: Slide from “Proposed Efficiency Standards for Televisions ”. Presentation by PG&E at 12/15/08 CEC TV workshop. http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-12-15_workshop/comments/PG+E_Follow-Up_Comments_TN-49793.pdf

Energy Savings and Green House Gas Reductions

Energy and Dollar Savings

- Total Unit Savings
  - Annual unit energy savings: 216 kWh/year
  - Incremental cost: $0
  - First year cost savings: $30.24
- Statewide Energy Savings (with fully compliant stock)
  - 6,515 GWh annual saving
  - $912.1 million per year in avoided electrical utility bills.

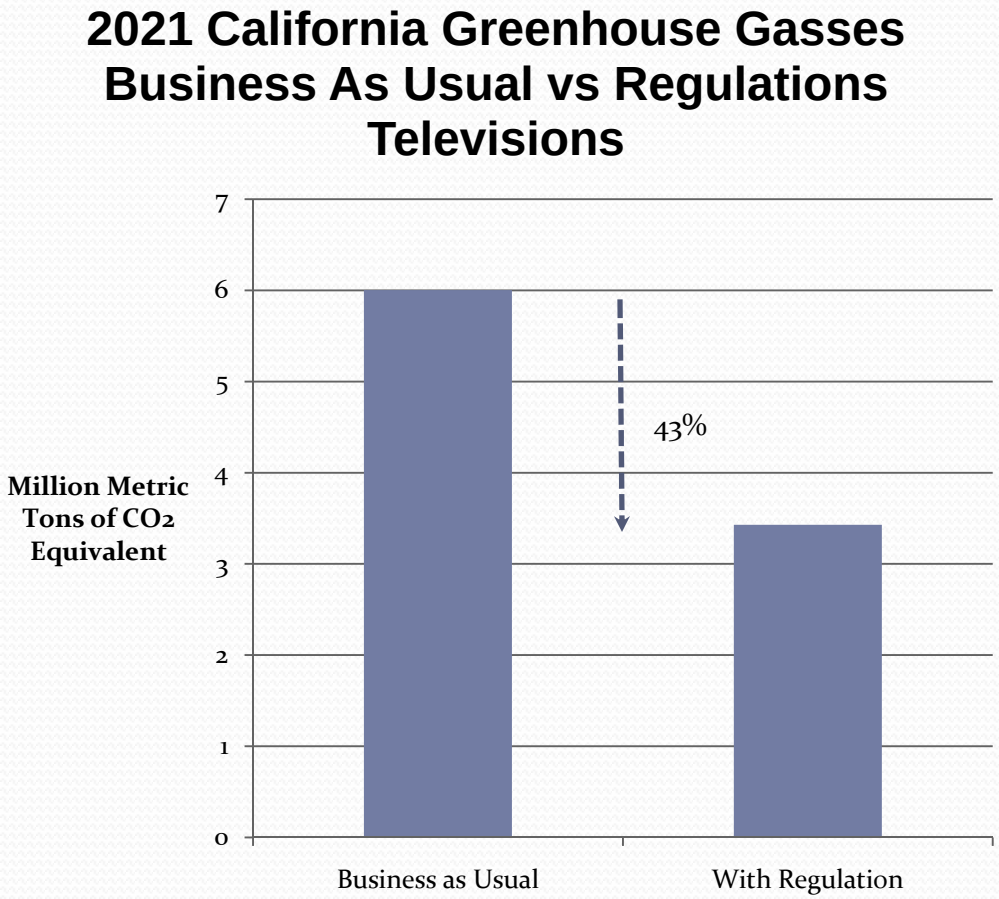
Demand Savings

- 615 MW peak demand reduction

- The cost to construct a natural gas power plant to cover this capacity is approximately $1 million per MW. A power plant to meet this television demand would cost $615 million.

Greenhouse Gas Reduction

- Negative declaration estimates greenhouse gas reduction to be 3.1 $MMTCO_2e/yr$
- Important to achieve these savings to meet the AB 32 goals.



Other Findings

Findings in the Rulemaking Documents

The proposed regulations will not:

- Lead to increased housing costs
- Lead to a loss of jobs in California
- Decrease the ability of in state businesses to compete with out of state businesses.
- Create significant costs to businesses and individuals
- Add significant costs to small businesses
- The proposed standards will have a positive economic impact due to its $8.1 billion value to the state.

Alternative Proposals

- The Commission considered alternative proposals that achieve equal or better energy savings and which are equally or less burdensome to businesses.
- Alternative proposals presented to the Commission were already incorporated in the proposed regulations or were not shown to save additional energy.
- Relying on the ENERGY STAR® program will not achieve the same energy savings. The ENERGY STAR® savings will occur with the existence of proposed standards. The proposed standards accomplish additional energy savings.

PUBLIC COMMENT PERIOD/WRITTEN

Written comments shall be e-mailed to [Docket@energy.state.ca.us], or mailed or delivered to the following address (e-mailing is preferred) by November 2, 2009:

California Energy Commission
Docket No. 09-AAER-1C
Docket Unit
1516 Ninth Street, Mail Station 4
Sacramento, California 95814-5504