



# *“Realizing Energy Savings from Lower Power Televisions”*

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# Acknowledgement

- I would like to acknowledge my colleague Jonathan Livingston of Livingston Energy Innovations as the co-author of this presentation and our upcoming white paper of the same title.

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# Outline

- Potential for energy savings from televisions
- Where are we today?
- Trends in television technology and power consumption
- Where are we going and how we will get there?
- Television Roadmap – mapping the territory
- Putting it all together and “realizing energy savings from televisions”

# Why Energy Savings from Televisions?

- [Energy Star](#) points out there are 275 million TVs in U.S. consuming >50 billion kWh (TWh) of energy each year
  - 4 % of all household electricity use
  - Enough to power all the homes in New York state for a year
- Consumers have/are upgrading their sets to digital and the long term trend has been to more and larger screens



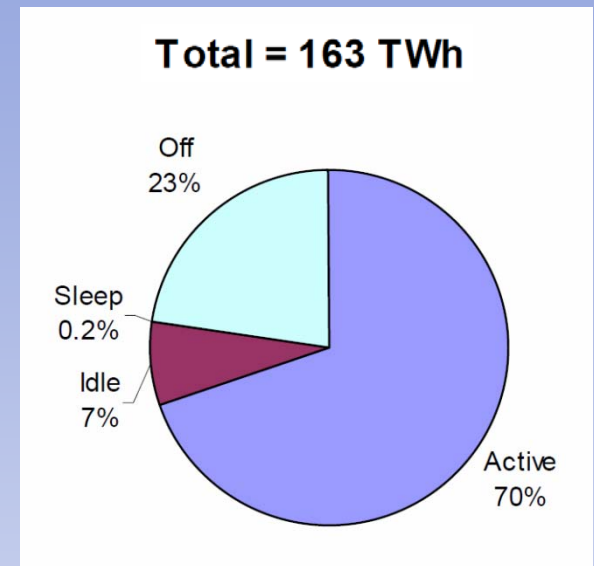
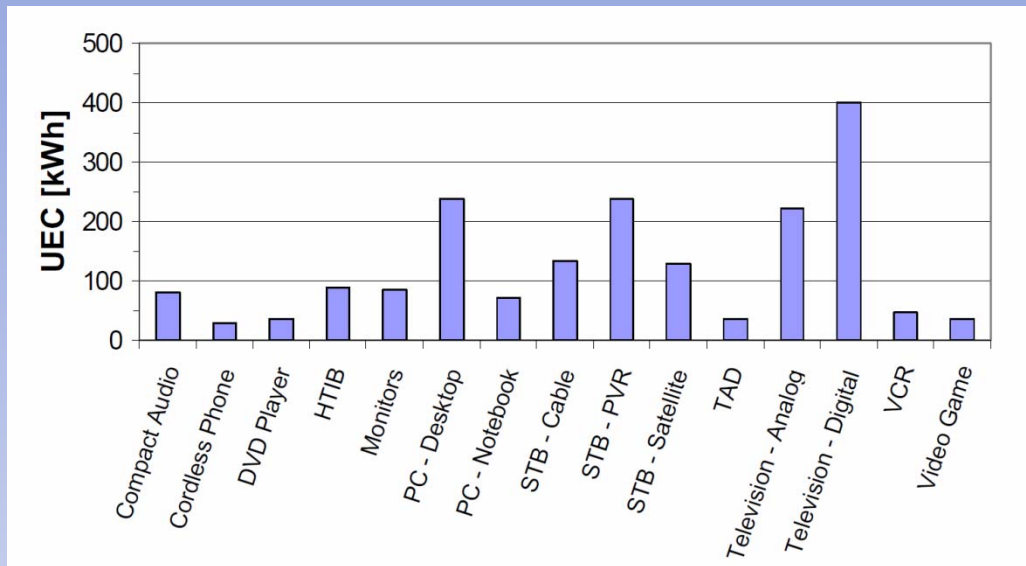
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- Consumers have/are upgrading their sets to digital and the long term trend has been to more and larger screens
- ***However, realizing energy savings from televisions will require changes***

# Where are we today?

- Current television stock, replacement, growth rate
  - Technical characteristics of current television stock that result in excess energy consumption
  - Consumer behavior is a key element
  - Television power consumption trend – down for many new models
- Energy Star 3.0 in place today
  - IEC 62087 now defines how to measure “on mode” power consumption
  - Energy Star 4.0 and 5.0 under development

# How do TVs fit in the CE big picture?

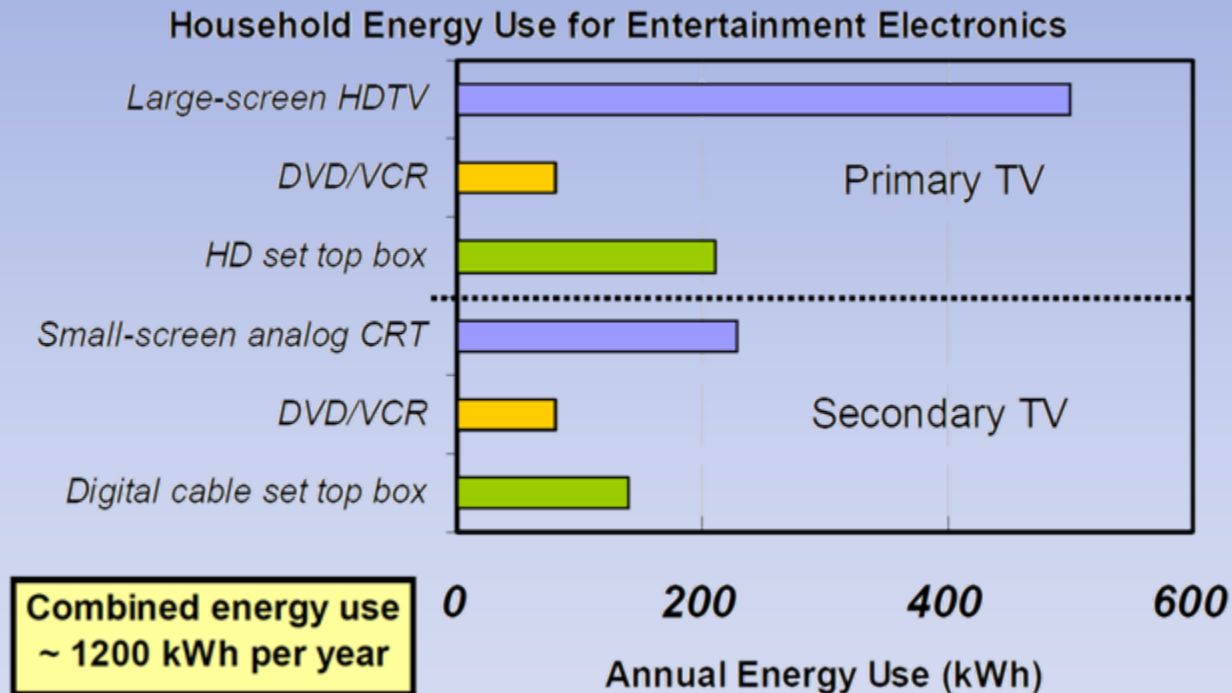


Source: CEA, 2007

- Digital television is largest home CE energy consumer
- Consumer electronics consumed 163 TWh of electricity in US homes in 2006 - 12% of US residential electricity
- Active mode energy consumption of all CE dominates but “off” mode also significant

# Today's TV Ecosystem

- Televisions are one of the largest consumers of electricity in the American home



Source: NRDC and Ecos Consulting, 2005



# Energy Saving Television Trends

- Average television set power consumption per in<sup>2</sup> has peaked – new LCD and Plasma sets have lower power per in<sup>2</sup>
- Technical Improvements
  - Improved optical films and LCD transmission
  - Improved backlighting, especially LED BLUs
  - Higher luminance plasma TVs
- Features - enable significant energy savings **IF** features become widespread **AND** are used effectively by consumers
  - Video mode – Vivid, movie, sports, game, energy saving, ...
  - Video mode optimization
  - Ambient light sensors
  - Presence detectors
  - Picture off mode (“Video mute,” “Radio mode,” ...)
- Long term sales trend is larger numbers of larger screen sets

# Where are we going, how will we get there?

- Need a television energy savings roadmap
  - To chart the course and quantify achievable energy savings
  - Alternatives for energy savings
    - Technical approaches
    - Behavioral (consumer actuated) approaches
    - Win-win policy approaches
  - Identify energy saving technical approaches, features, policies, introduction and availability
  - Time span from 2012-2020

# One More Thing - Screen Convergence

- Display usage for work and entertainment per individual is ~75 hours with other household members watching secondary displays for similar periods
- Increasingly information and entertainment is being delivered over internet to individuals at their computers
- New applications including energy, health and security monitoring, and more will drive further display usage
- Display usage will grow sharply – more screens, larger screens, more screens operating simultaneously
- *Screen Convergence* could drive *increased* energy consumption and is another compelling argument for:

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# Strawman Television Energy Savings Roadmap

Direction	2009	2012	2016	2020	
<b>Set Technology</b>	LCDs	0.45 W /sq inch	0.4 W /sq inch	0.3 W /sq inch	0.28 W /sq inch
	LED Backlight	Limited availability - penetration	40%	65%	80%
	Plasma	0.5 W /sq inch	0.45 W /sq inch	0.35 W /sq inch	0.29 W /sq inch
	Luminous eff.	2.5 Lm/W	5.0 Lm/W	7.5 Lm/W	10 Lm/W ?
	AMOLED	11" 15"	27" 40"	50"	? ?
<b>Energy Conserving Features</b>	Video mode opt.	Limited availability - penetration	40%	50%	80%
	Ambient light sense	Limited availability - penetration	50%	80%	95%
	User sense	Limited availability - penetration	20%	30%	40%
	Picture off	Limited availability - penetration	5%	15%	35%
	Power Management	Limited availability - penetration	85%	90%	95%
<b>Energy Consuming Features</b>	Connectivity wired	Penetration/power	40%/10W	60%/7W	80%/4W
	wireless	Limited availability - penetration/pwr	40%/12W	80%/9W	95%/4W
	Convergence	Operating hours/year	1850h	2200h	3100h
	Impacts?	Increased or decreased energy consumption ?	Increased unit sales, ASPs ?		
<i>Figures of Merit?</i>	Number of screens/home, tot screen area per household ? <i>Operating hours x Screen Area x Power/Area ?</i>				
<b>Policy</b>	Voluntary programs	Energy Star 4.0	Energy Star 5.0		
	Standards	TopTen USA			
	Regulation?	IEC	IEC - next gen?		
	Subsidy Programs	Utility rebate pilots	Initial municipal and state regulations		National regulation?
		Statewide and regional rebate programs	National rebate program?		

*Slanted Font: Major industry efforts are required for commercialization*      *Technology & Features: Commercial Availability in Year Indicated*

# Realizing Energy Savings - Summary

- Lower power per in<sup>2</sup> TVs good but not sufficient
- Features that encourage consumers to reduce their energy consumption
- Need to develop the television energy savings roadmap
  - Technology
  - Features
  - Partnerships
  - Policy
  - Utility and government funding programs
  - Screen Convergence
- We welcome your input and participation in this effort

# Thank You!

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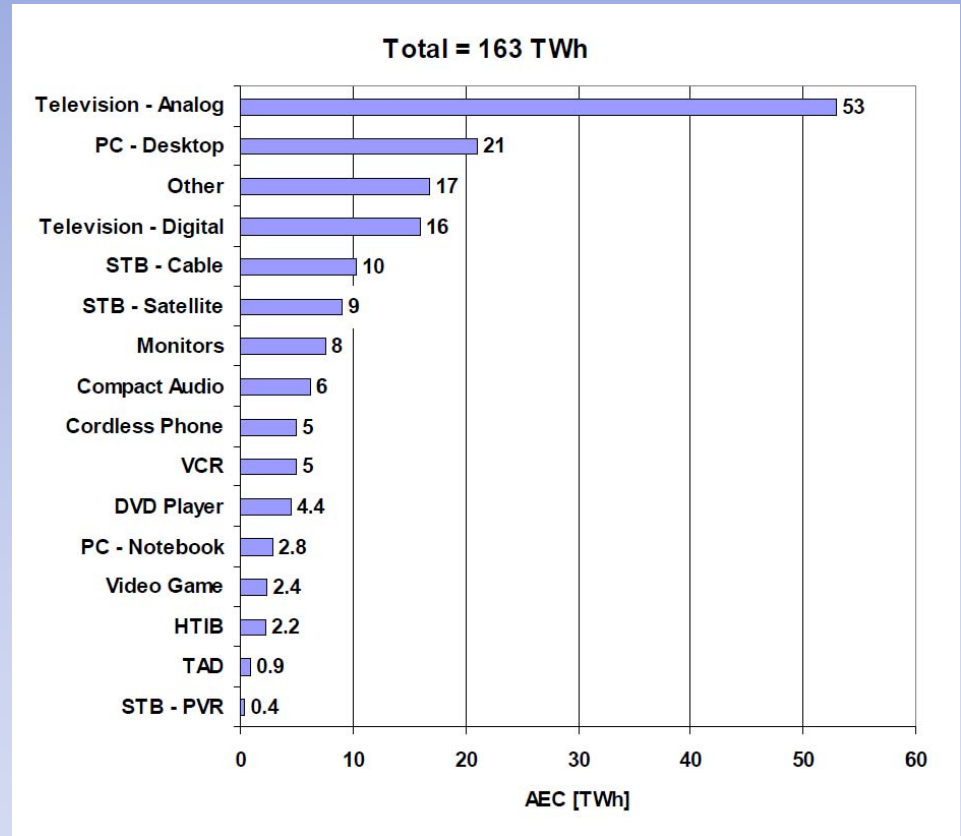
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# Energy Consumption of Consumer Electronics in US

- Consumer electronics consumed 163 TWh of electricity in US homes in 2006
- Consumer electronics consumed 12% of US residential electricity



Source: CEA, 2007