



## TV Ecosystem Conference

TV After the Digital Transition - Finding the Next Big Thing

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

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ENERGY INNOVATIONS

September 2, 2009

# 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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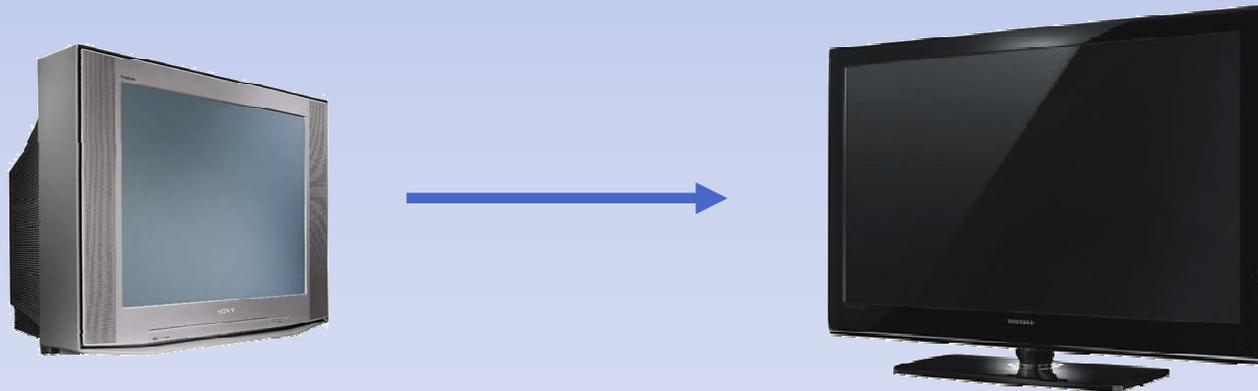
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# Outline

- 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



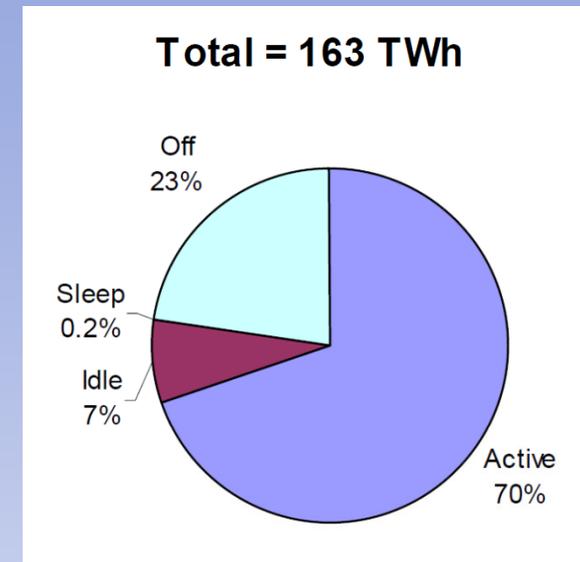
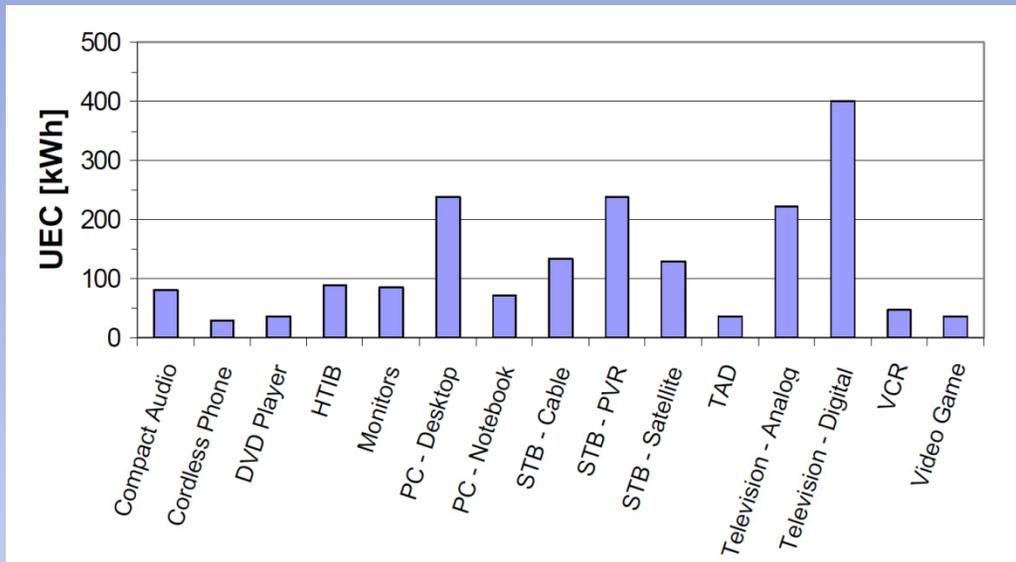
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- *Realizing energy savings from televisions will require changes*

# Where are we today?

- Current television stock, replacement, growth rate
  - Technical characteristics of current television stock that result in excess energy consumption
  - Consumer behavior
  - Television power consumption trends
- Energy Star today
  - Energy Star 3.0 in place
  - IEC 62087 now defines how to measure “on mode” power consumption

# How do TVs fit in the CE big picture?

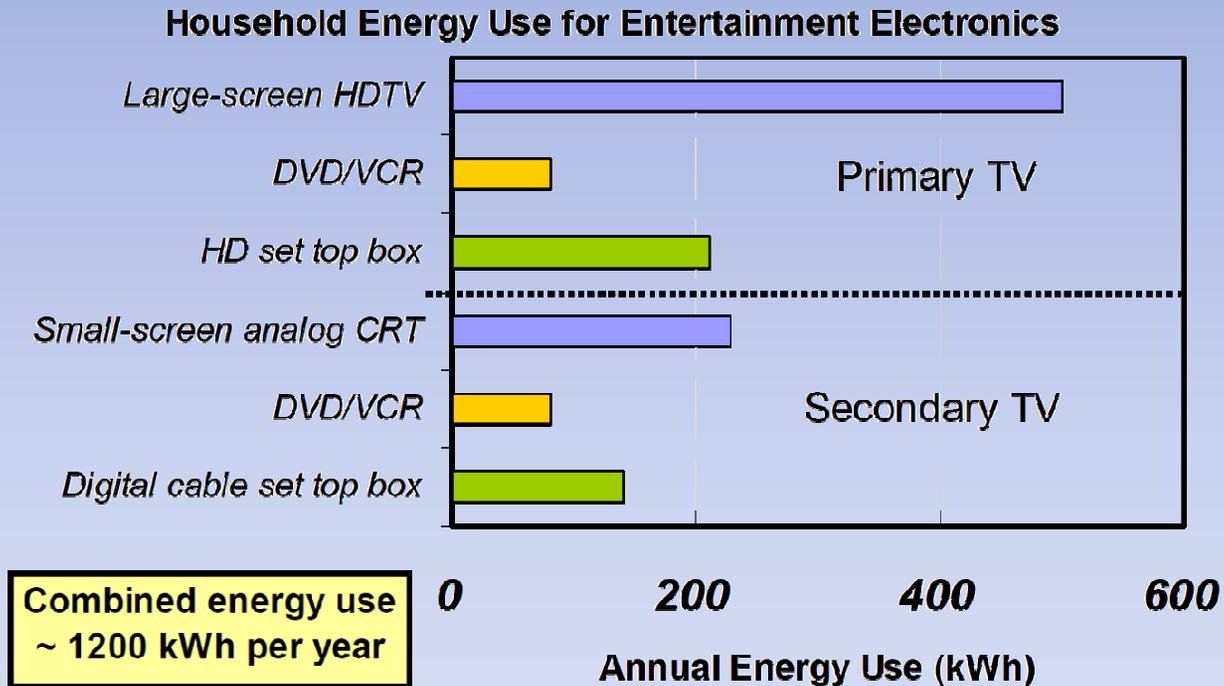


Source: CEA, 2007

- 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:

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

# Strawman Television Energy Savings Roadmap

Direction	2009	2012	2016	2020
<b>Set Technology</b>	0.45 W /sq inch	0.4 W /sq inch	0.3 W /sq inch	0.28 W /sq inch
	Limited availability - penetration 40%	65%	80%	95%
	0.5 W /sq inch	0.45 W /sq inch	0.35 W /sq inch	0.29 W /sq inch
	2.5 Lm/W	5.0 Lm/W	7.5 Lm/W	10 Lm/W ?
LCDs	11" 15"	27" 40"	50"	?
	0.5 W /sq inch	0.3 W /sq inch	0.2W /sq inch	0.1 W /sq inch
LED Backlight				
Plasma				
Luminous eff.				
AMOLED				
<b>Energy Conserving Features</b>				
Video mode opt.	Limited availability - penetration 40%	50%	80%	95%
Ambient light sense	Limited availability - penetration 50%	80%	95%	100%
User sense	Limited availability - penetration 20%	30%	40%	75%
Picture off	Limited availability - penetration 5%	15%	35%	55%
Power Management	Limited availability - penetration 85%	90%	95%	100%
<b>Energy Consuming Features</b>				
Connectivity wired	Penetration/power 40%/10W	60%/7W	80%/4W	95%/4W
	wireless Limited availability – penetration/pwr 40%/12W	80%/9W	95%/4W	65%/4W 97%/2W
Convergence	Operating hours/year 1850h	2200h	3100h	3300h
	Impacts? Increased or decreased energy consumption ?	Increased unit sales, ASPs ?		
Figures of Merit?	Number of screens/home, tot screen area per household ?	Operating hours x Screen Area x Power/Area ?		
<b>Policy</b>				
Voluntary programs	Energy Star 4.0	Energy Star 5.0		
	Standards TopTen USA			
Regulation?	IEC	IEC – next gen?		
		Initial municipal and state regulations		National regulation?
Subsidy Programs	Utility rebate pilots	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 participation in this effort

# Thank You!

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