
Residential Consumer Electronics Energy Consumption in 2013

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2013 Consumer Electronics Energy Use Study



Fraunhofer USA Center for Sustainable Energy Systems

ENERGY CONSUMPTION OF CONSUMER ELECTRONICS
IN U.S. HOMES IN 2013

FINAL REPORT TO THE CONSUMER ELECTRONICS ASSOCIATION (CEA®)

June 2014

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Final Report available on CEA website:

<http://www.ce.org/CorporateSite/media/environment/Energy-Consumption-of-Consumer-Electronics.pdf>

Project Goals

Overall Goal: Quantify the energy consumed by consumer electronics in U.S. residences in 2013

- Third study of residential CE energy consumption
 - Prior years: 2006, 2010
- Provide high-quality data to inform energy policy decisions
 - Voluntary and mandatory
 - CE products – and their energy consumption – can change rapidly
- Identify trends in CE energy consumption

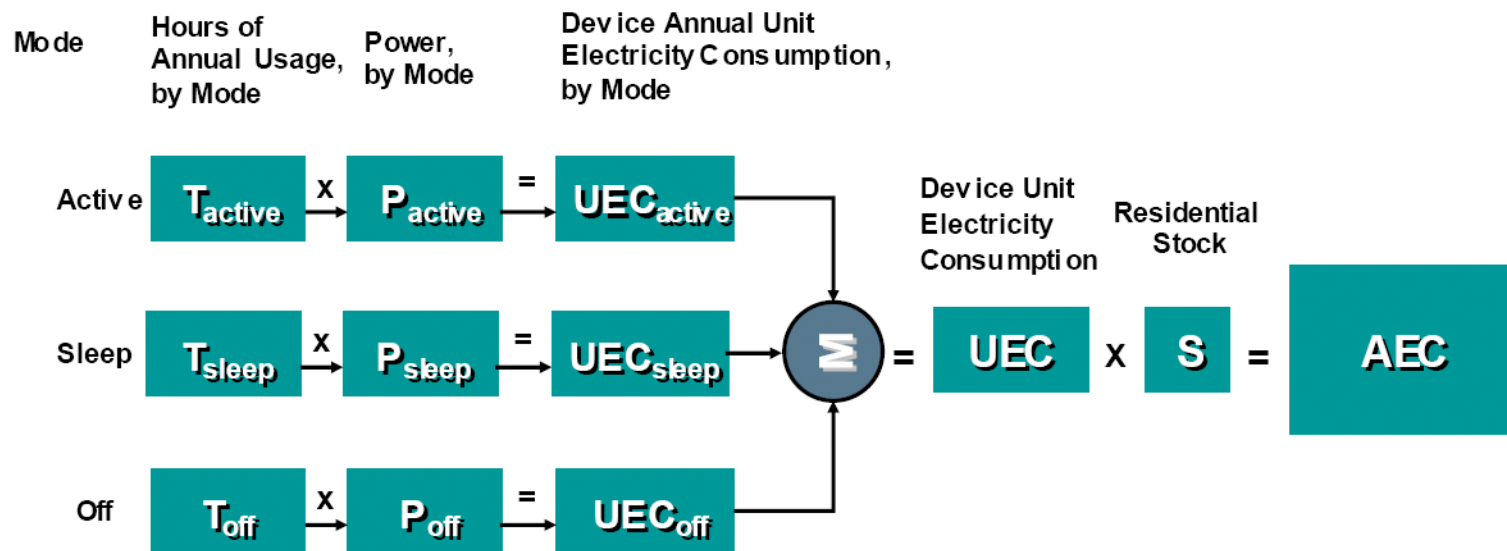
We selected seventeen (17) Priority Products for more detailed evaluation.

Selected based upon:

- Preliminary annual energy consumption (AEC) estimates
- Degree of uncertainty in preliminary AEC estimates

Audio-Visual Equipment		Computers & Peripherals	
Home Audio	Set Top Boxes (STB)	Computers	Networking Equipment
Speaker Dock	Cable	Desktop	Modem
Compact Stereo System	Satellite	Portable	Router
Televisions	Standalone	Computer Speakers	Integrated Access
Video Game Consoles	Telco	Computer Monitor	Device (IAD)
		Smart Phone	
		Tablet	

We used a bottom-up approach to evaluate energy consumption.



Key: Obtain good data!



Usage by Mode



Power by Mode



Number of Devices

- Surveys of 1,000 demographically representative households
 - Ask neutral questions to minimize potential biases
- Also use prior field measurement campaigns
 - Limited sample size,
 - Unclear how representative participating households are of larger population

Key: Obtain good data!



Usage by Mode



Power by Mode

- Prior field and laboratory measurement campaigns
- ENERGY STAR databases
- Fraunhofer in-store measurements



Number of Devices

Key: Obtain good data!



Usage by Mode



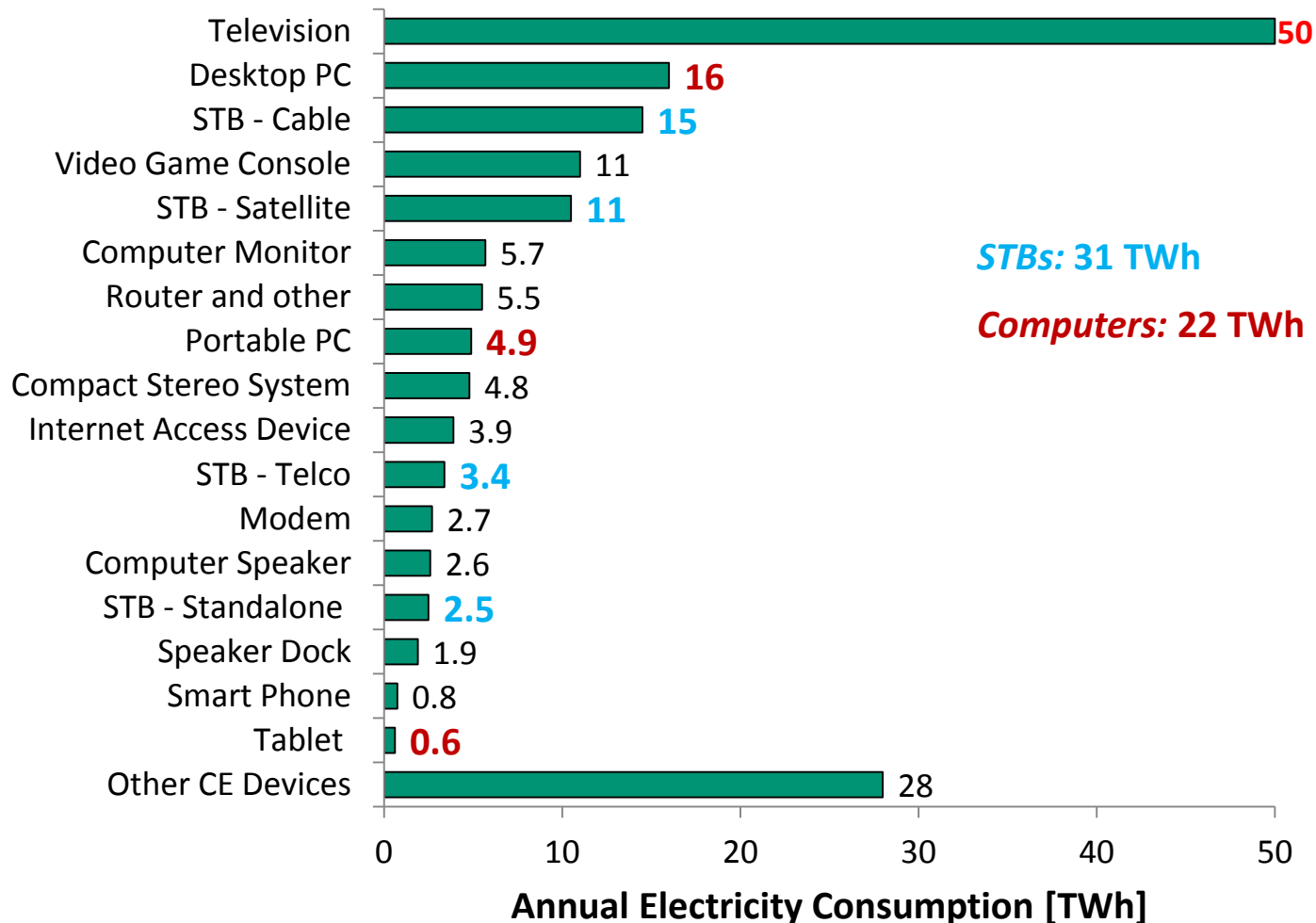
Power by Mode



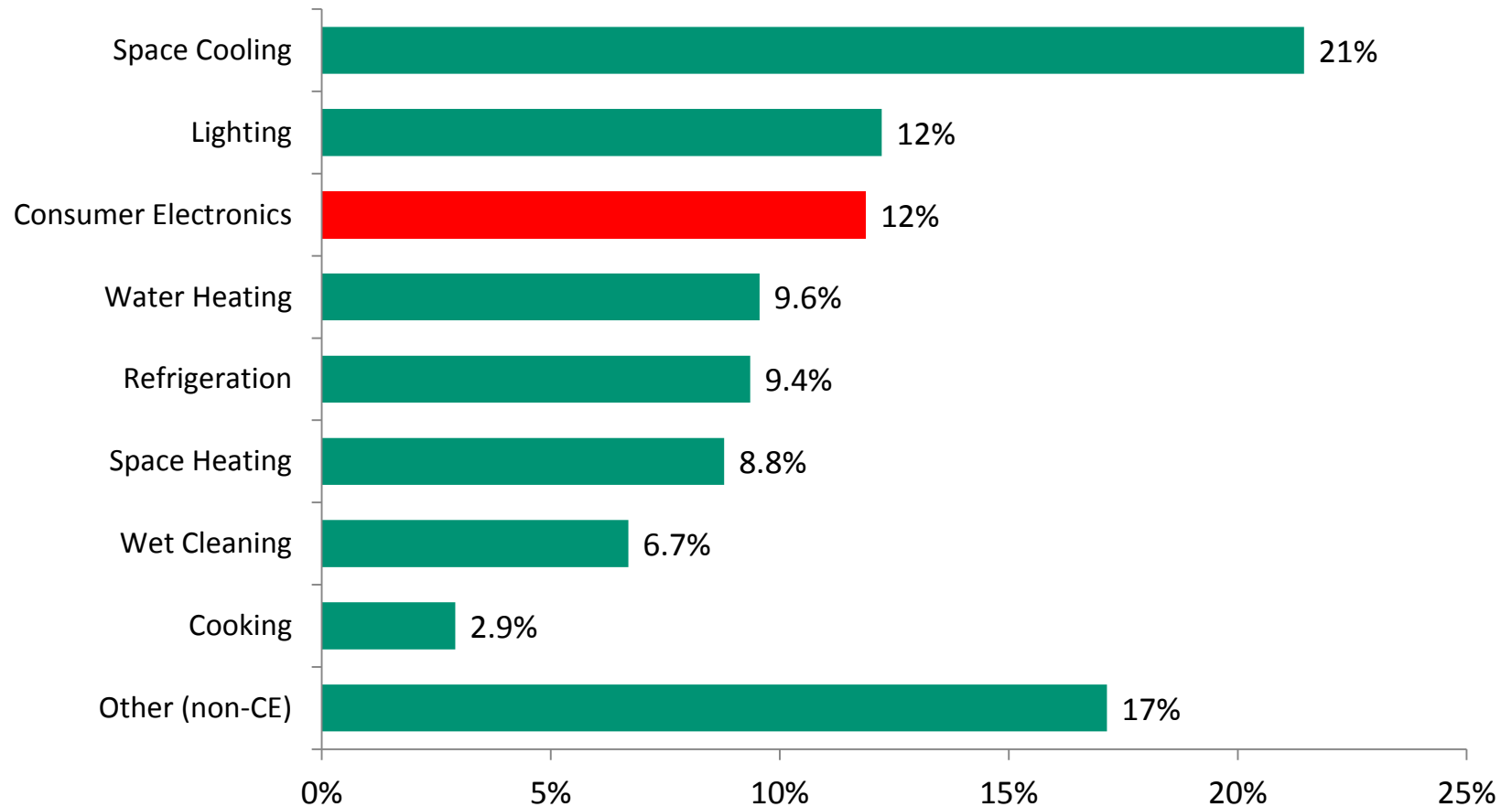
Number of Devices

- CEA Market Research studies
- Phone surveys
 - 1,000 representative households
 - **Plugged-in** devices
- Industry reports for STB and Displays

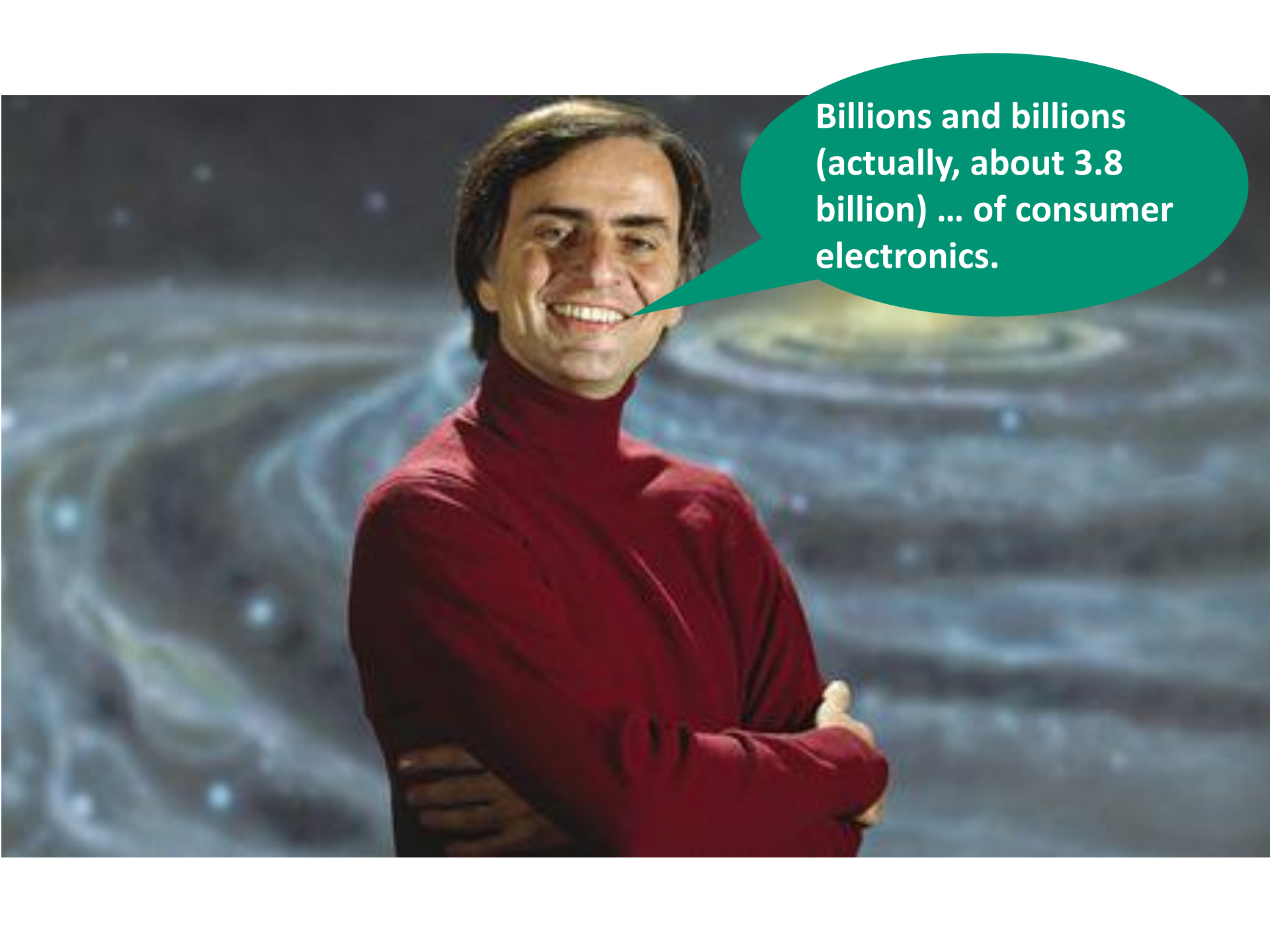
Residential consumer electronics consumed 169 TWh in 2013. TVs, set-top boxes, and computers account for 61% of the AEC.



U.S. Residential Electricity Consumption in 2013

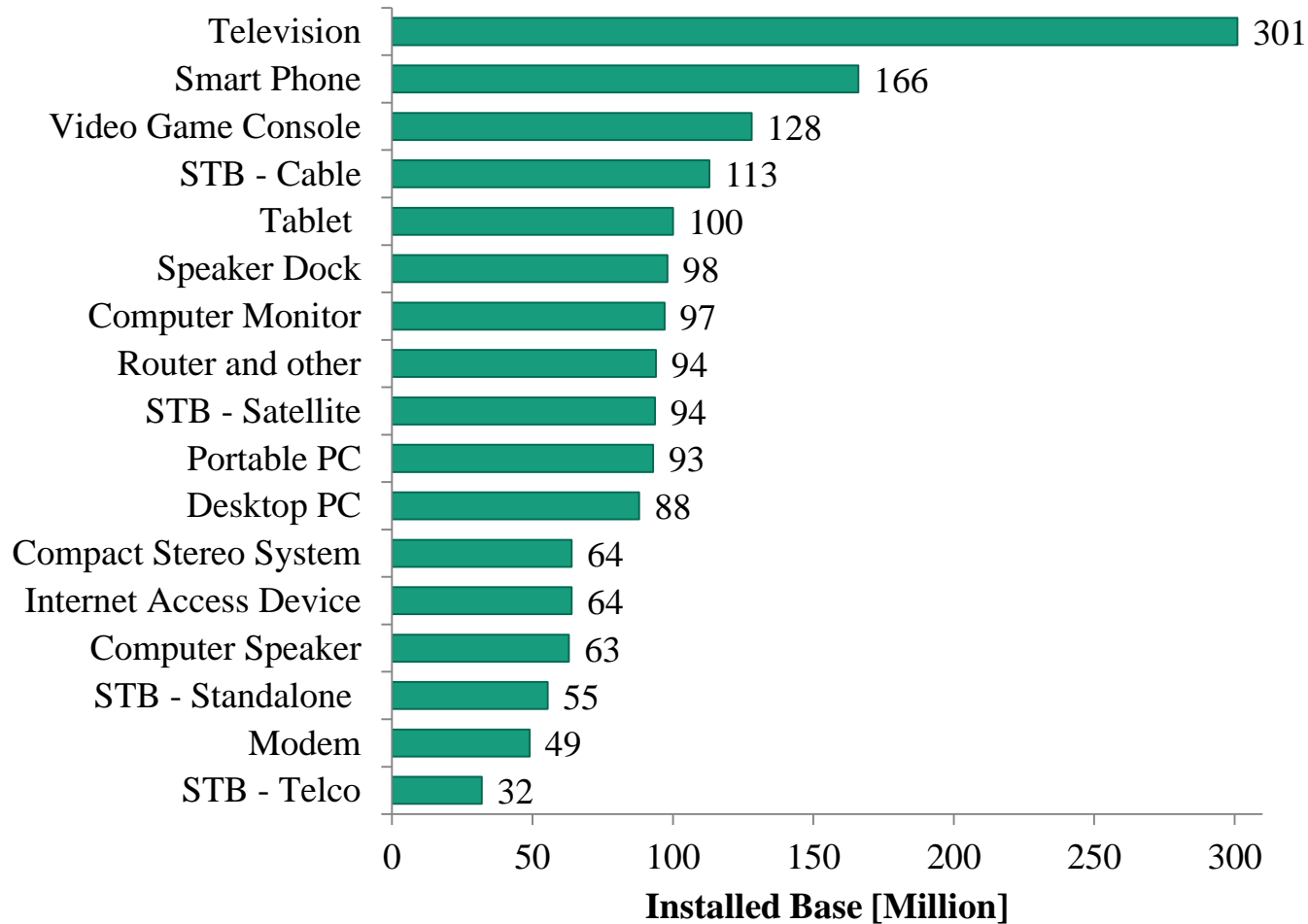


CE accounts for 8.4 percent of residential primary energy consumption.



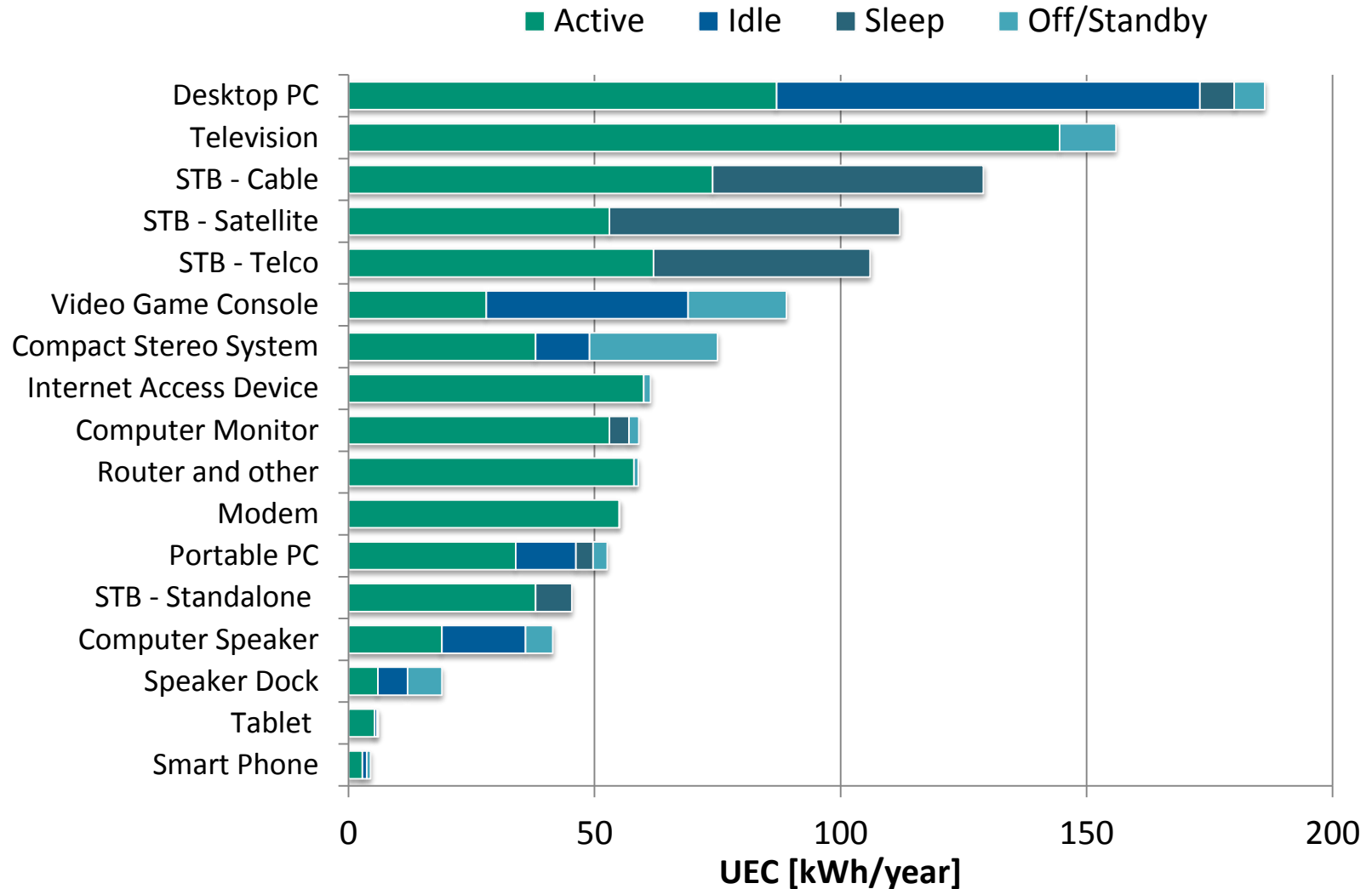
**Billions and billions
(actually, about 3.8
billion) ... of consumer
electronics.**

“Other” products dominated the installed Base of Residential CE in 2013.

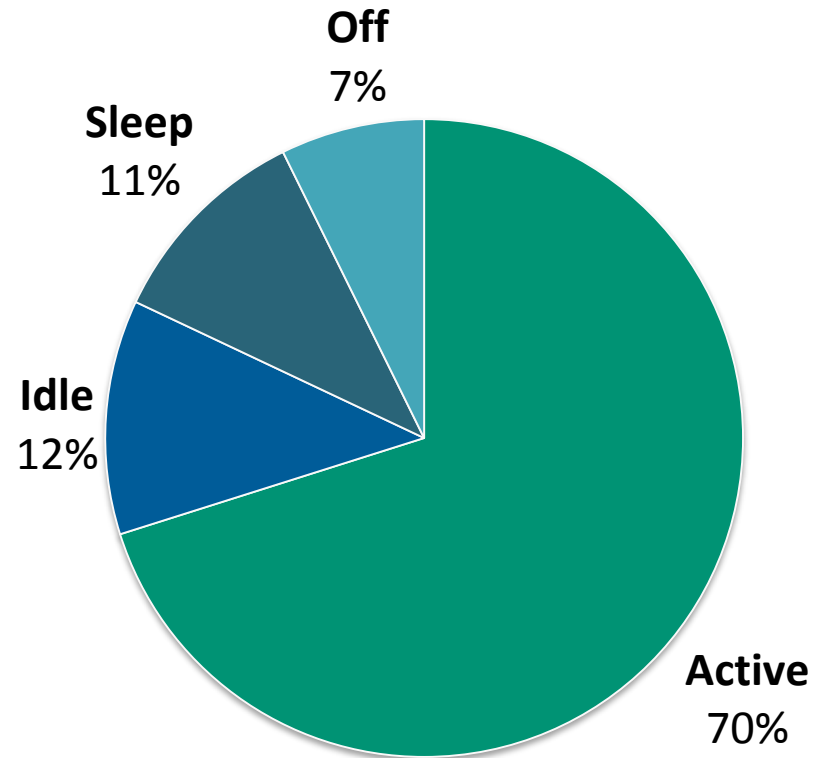


Plus 2.1 billion “other” devices.

The Unit Energy Consumption (UEC) of residential CE varied significantly among products.



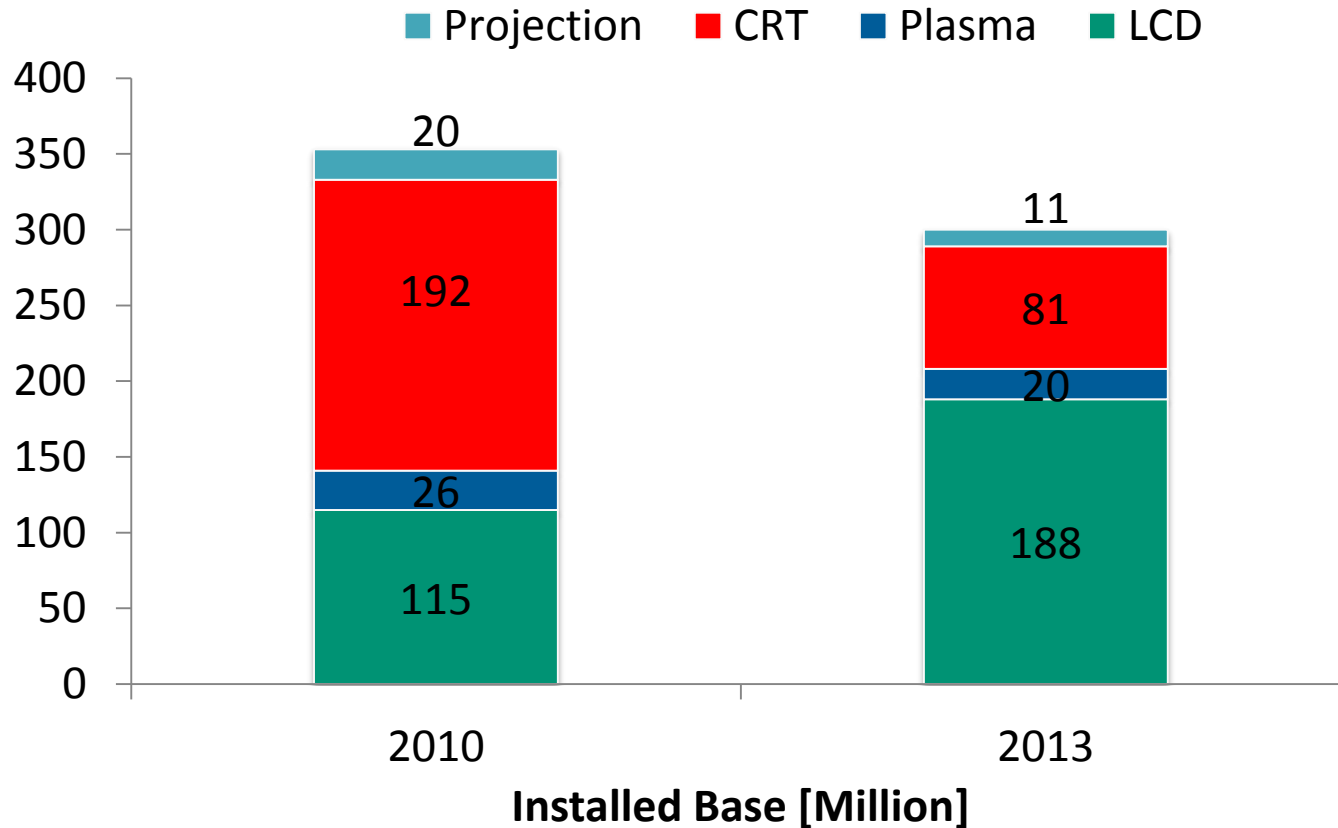
The active mode accounted for a large majority of total Residential CE AEC.



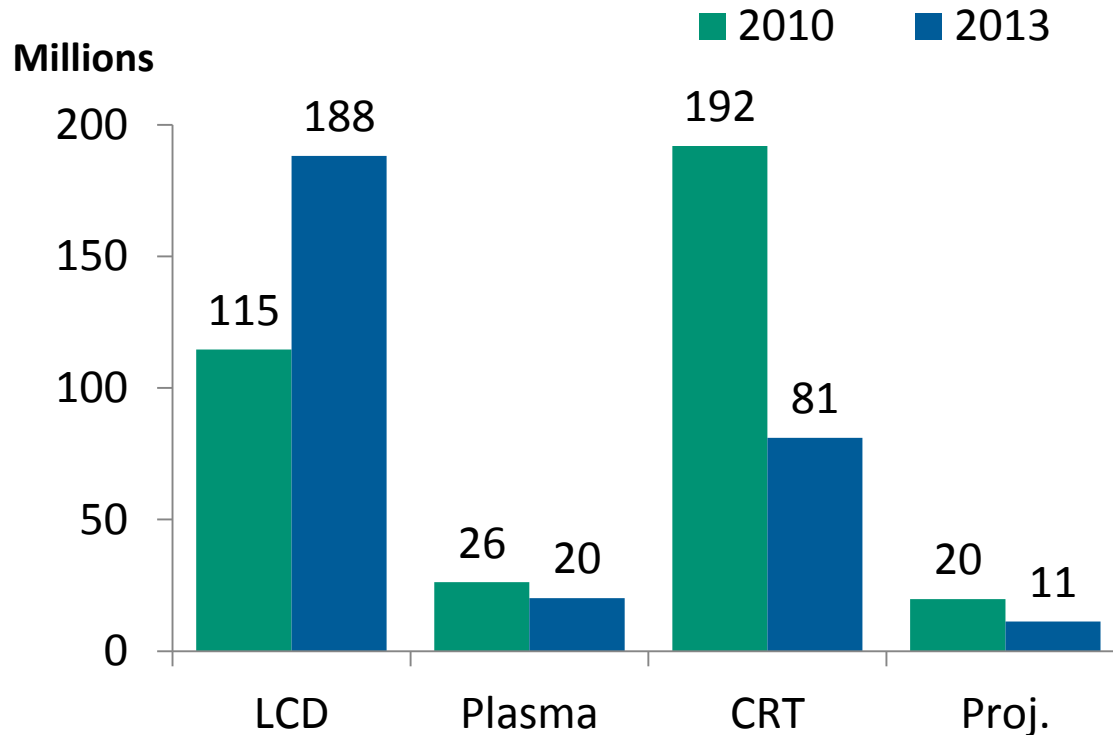
We estimate that residential CE energy consumption decreased by 12 percent from 2010 to 2013.

Why???

More than 100 million CRT TVs were removed from the plugged-in installed base between 2010 and 2013.

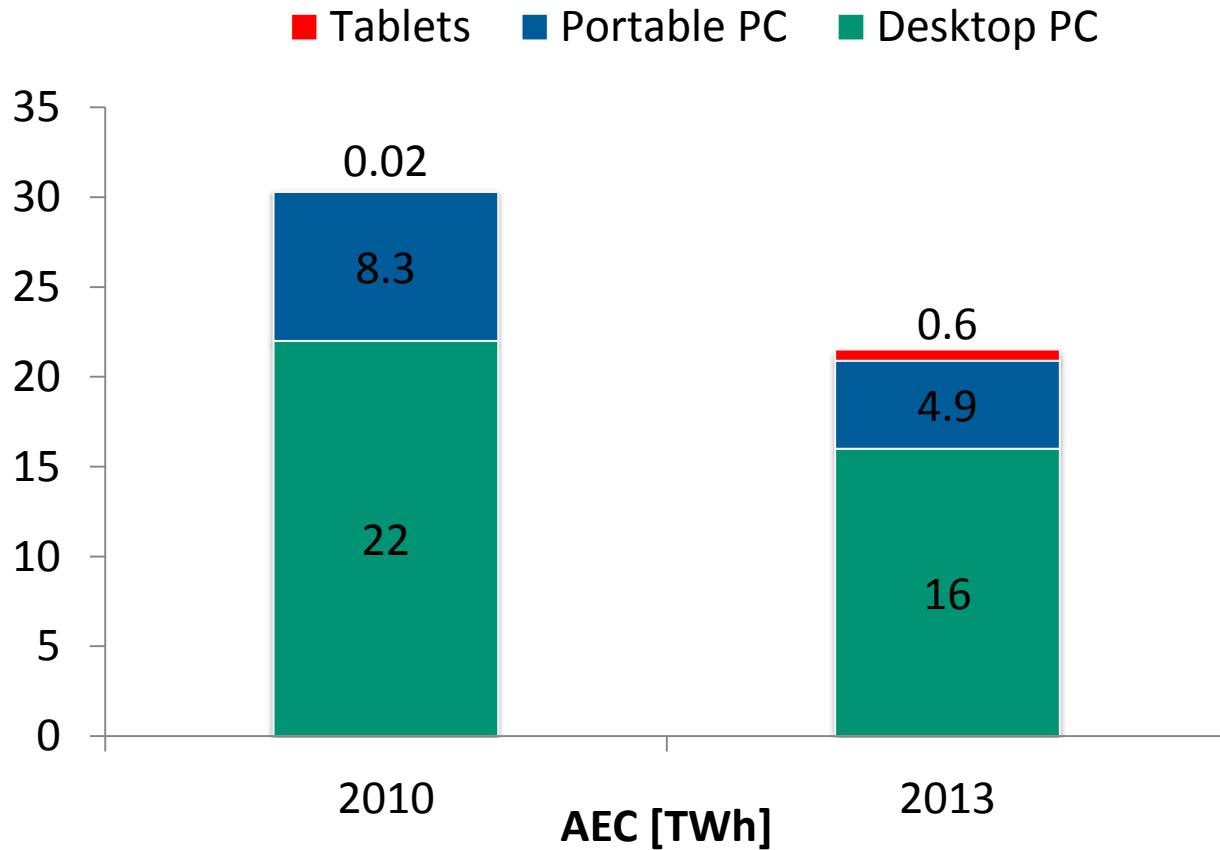


LCDs became the dominant TV display technology in the installed base between 2010 and 2013.

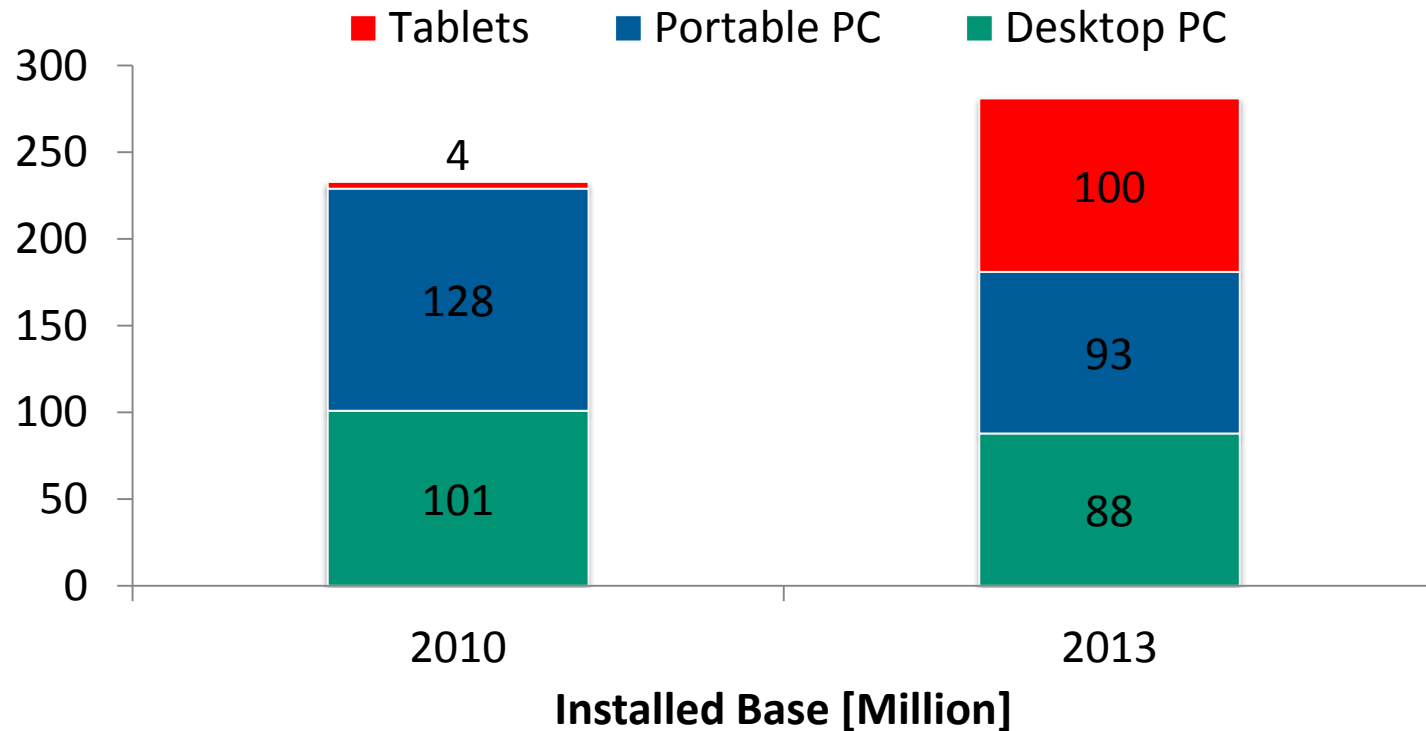


Average active-mode power draw decreased from 104 W to 90 W, while average screen size increased from 29 to 34 inches.

Total computer energy consumption decreased by 29 percent from 2010.



The computer installed base increased 19 percent while migrating to more portable formats.



Portable computers have a much lower UEC than desktops.



186 kWh

(monitor = +58kWh)



53 kWh



6 kWh

We also estimated lower annual hours in active mode for both desktop (18%) and portable (39%) computers in 2013.

Monitor AEC decreased by more than 50 percent from 2010.



Driven by decreases in:

- Installed base – 26 percent
- Average power draw – from 39 to 33 W
- Time in active mode – 39 percent

We evaluated four categories of set-top boxes (STBs).



Cable

113 million



Satellite

94 million



Telco/IPTV

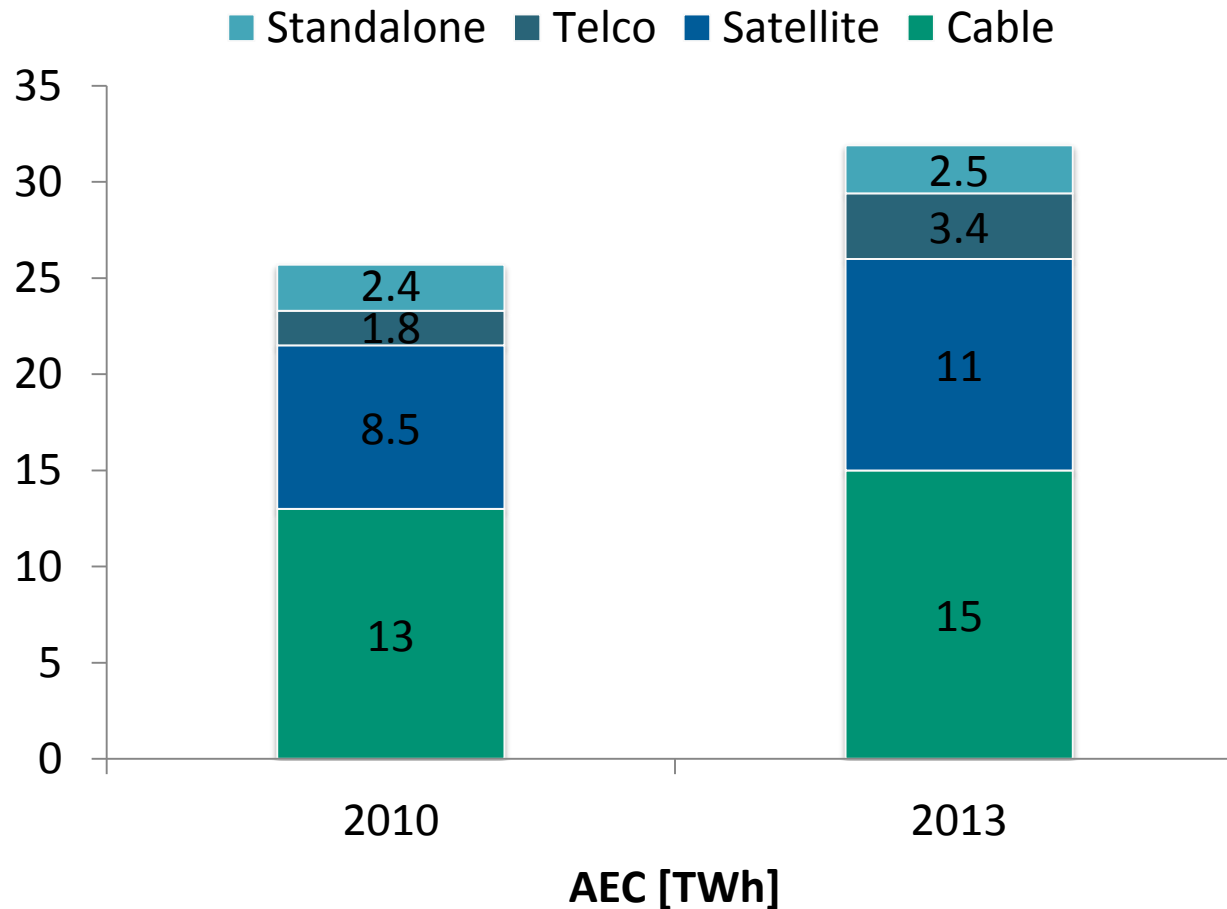
32 million



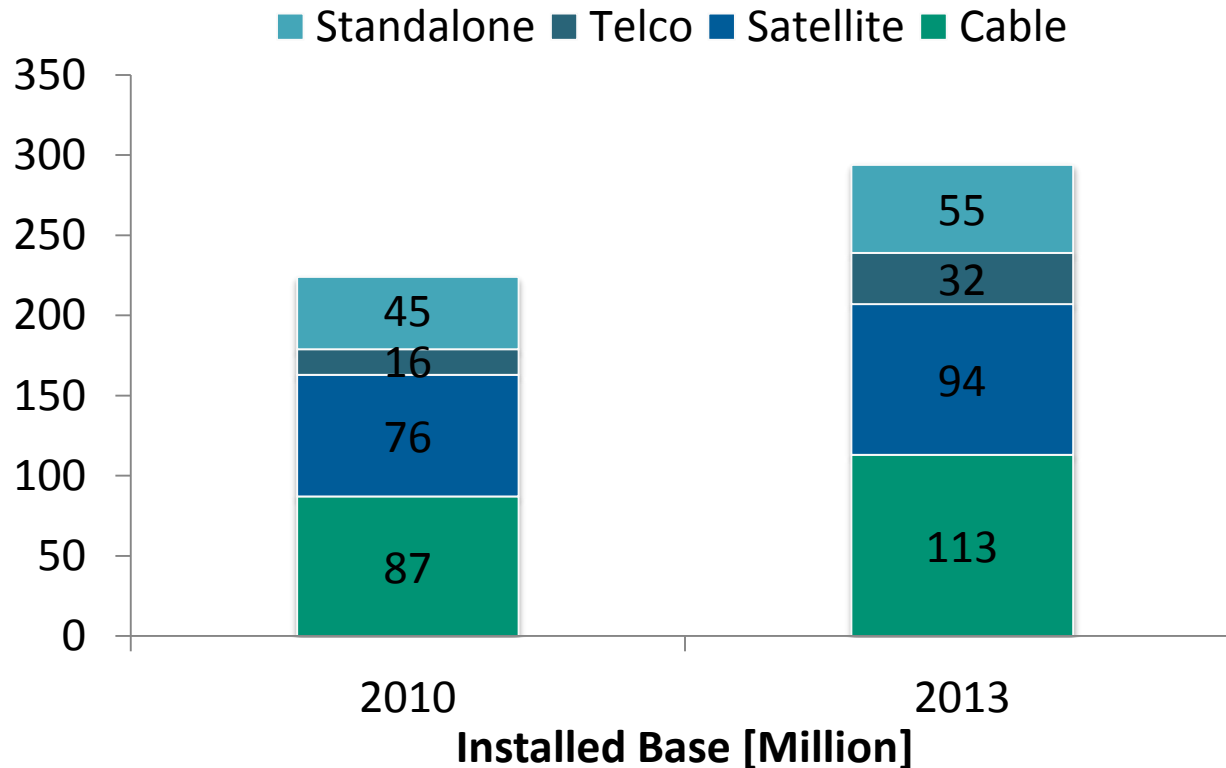
OTA-DTA, DVR,
Digital Media
Adaptor

57 million

We estimate that set-top box energy consumption increased by about 20 percent from 2010.



Although the total STB installed base increased by about 30 percent since 2010, the average power draw of pay TV STBs has been flat.



We estimate that video game console AEC decreased from 15 TWh in 2010 to 11 TWh in 2013.



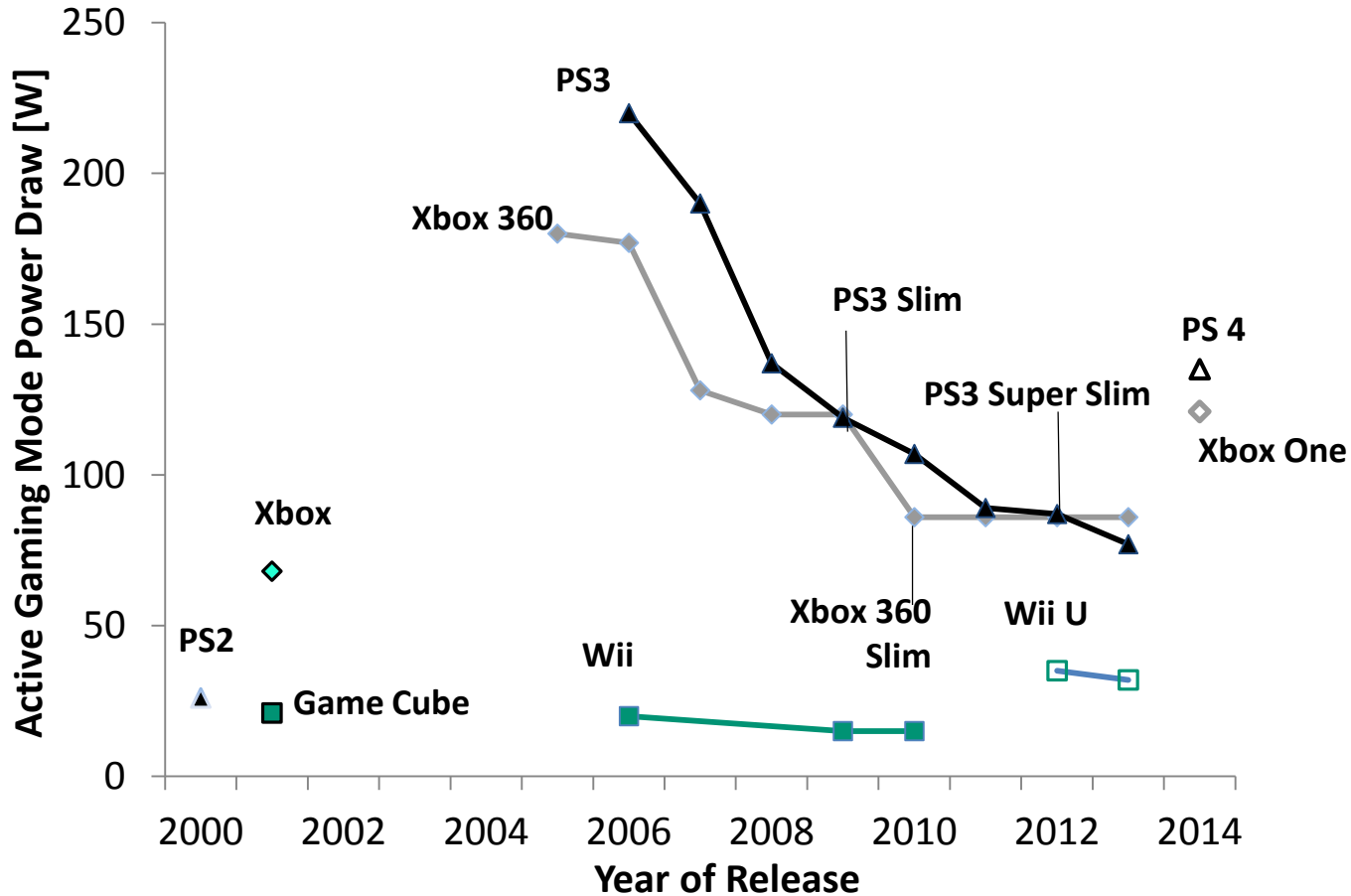
Increase in:

- Installed base – 128 million (109 in 2010)

Decrease in:

- Power Draw
 - Active mode – 58 vs. 85 W
 - Idle/Navigation Mode– 51 vs. 75W
- Time in Active + Idle Navigation – 18 percent

Video game console power draw has changed over time.



Together, Smart Phones and Tablets account for less than one percent of residential CE energy consumption



166 million units

UEC = 4.5 kWh

AEC = 0.8 TWh



100 million units

UEC = 6 kWh

AEC = 0.6 TWh

This does not account for induced “cloud” energy consumption.

Thank You to our Peer Reviewers!!

- Warren Boxleitner, Nintendo
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- Tim Calland, Microsoft
- Louis-Benoit Desroches, LBNL
- Paul Glist, National Cable and Telecommunications Association (NCTA)
- Jerry Jessop, Sony
- Gary Langille, EchoStar
- Lauren Liecau, Unaffiliated
- Adrian Liga, Apple
- David Maciel, Sony
- R.J. Meyers, EPA ENERGY STAR
- James Morgan, Sony
- Bruce Nordman, LBNL
- Scott O'Connell, Dell
- Verena Radulovic, EPA ENERGY STAR
- Vida Rozite, International Energy Agency
- Mark Sharp, Panasonic
- Hans-Paul Siderius, SenterNovem
- Michael Warnecke, Entertainment Software Association
- Andrew Ware, Logitech
- Liz Westbrook Trenholm, Natural Resources Canada
- Robert White, Dell

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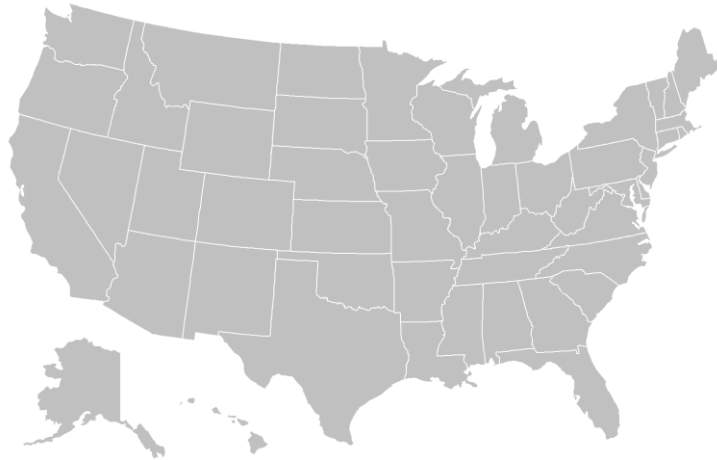
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Electricity Consumption in 2013



\$372 billion

3,692 TWh



\$169 billion

1,391 TWh



\$22 billion

169 TWh

1 TWh = 1 billion kWh