



Developing an ENERGY STAR® Program for Set-top Boxes

Stakeholder Meeting

July 18, 2007

Washington, DC



Today's Agenda



Time	Topic
12:00 p.m.	Conference room opens; meeting begins
12:00 p.m.	Welcome and introductions
12:25 p.m.	Overview of Draft 1 specifications
12:45 p.m.	Summary of IEA STB meetings
1:15 p.m.	Discussion of service provider requirements in Draft 1
2:45 p.m.	Break
3:00 p.m.	Discussion of Draft 1 test procedures and duty cycle
4:30 p.m.	Discussion of setting levels
5:00 p.m.	Conclusion
5:30 p.m.	Meeting adjourn



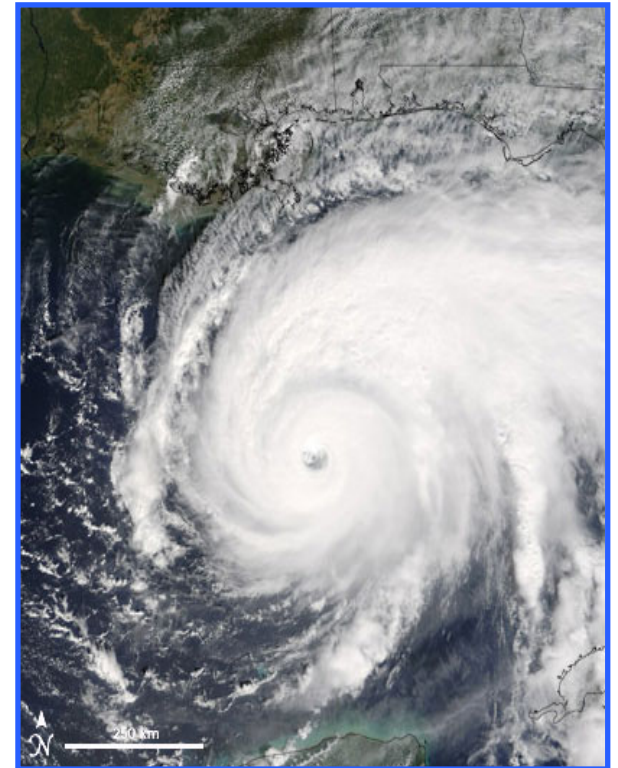
Why ENERGY STAR?

Katharine Kaplan, EPA

Trend: Growing Energy & Environmental Concerns



- Gallup polls show Americans' concerns about environmental issues have increased **more than 10 percentage points** between 2004 and 2006
- 88%** of US adults responded that “energy efficient” was very important in their electronics, appliance, lighting, and heating/cooling equipment purchases*
- Annual Pew Surveys report:
 - 58%** of Americans rank “dealing with the nation’s energy problem” as a top priority in 2006, up from 40% in 2003
 - 87%** of Americans cite home heating and energy prices as a “very big” or “big” problem for the nation’s economy
- ABC News/Washington Post Poll:
 - 79%** of Americans think global warming poses a serious threat to future generations



Source: NASA

* The Natural Marketing Institute, *Understanding the 2004 LOHAS Consumer Report™: A Focus on Durable Goods*, February 2004.

Trend: Rising Energy Costs

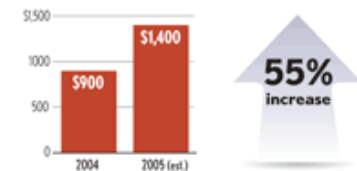


- Average annual household utility bills have increased **48%** since 1980
- Electricity costs continue to rise, with some utilities requesting rate increases of **35% or more**
- Spending on electricity is the **highest share of total consumer spending** since the Energy Crisis of 2000

ENERGY PRICES SOAR

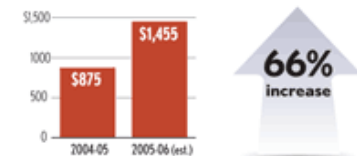
Sharply higher energy prices are expected to seriously squeeze family budgets in coming months, particularly seniors living on fixed incomes.

Annual Baltimore gasoline bill



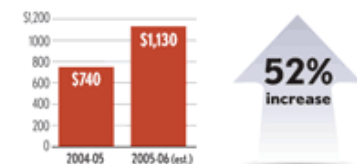
(Assumes 2005 average gasoline price of \$2.80 a gallon compared with \$1.80 in 2004. Assumes 10,000 miles driven in a vehicle that gets 20 miles to a gallon.)

Home heating oil bill



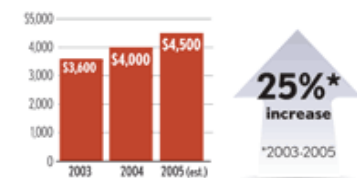
Source: Energy Department estimate of Northeast fuel costs.

Natural gas heating bill



Source: Energy Department National estimate.

Total household energy costs



Source: Global Insight

[SUN NEWS GRAPHIC]

Impacts on Consumer Spending/Purchasing Decisions



- 6% of consumer spending was projected to be accounted for by energy prices by the end of 2005, which is higher than any point in the last decade[#]
- 47% of consumers plan to spend less on discretionary items like HDTVs, PCs, and major appliances, due to higher energy and gas bills^{*}
- 88% of consumers agree “somewhat” to “completely” that it is important for household appliances, electronics, heating/cooling systems, and lighting products to have the ENERGY STAR label ^{**}
- 80% of consumers rate energy efficiency as important to their purchase decisions ^{**}

[#]Daniel Chung and Zachary Karabell; Alger Market Commentary, as it appeared in the online edition of *Forbes Magazine*. “Energy Costs Drain Joe Six-Pack” (September 30, 2005)

^{*}Mary Ellen Lloyd, Dow Jones Newspapers, as appeared in the online edition of the *Wall Street Journal*. “Best Buy, Circuit City Down: Angst Over Consumers Continues” (July 12, 2006)

^{**}*Understanding the LOHAS Consumer Report*, The Natural Marketing Institute, 2004

What Does This Mean?



Consumers care about energy efficiency

- **78%** of survey respondents state that ENERGY STAR certification is very or somewhat important for electronics*
- **95%** of recent purchasers of qualified product are likely to purchase an item with the ENERGY STAR mark in the future*

The bottom line is that concerns about energy costs are an issue that consumers increasingly care about when looking at electronics, especially TVs and the home theatre package.

* National Awareness of ENERGY STAR: Analysis of CEE Household Survey Data, 2004.

Additional ENERGY STAR Research



A product's energy efficiency has at least some impact on the purchasing decisions of **46%** of consumers as the energy efficiency of the product increases.

- 42% indicate they are "definitely more likely to purchase"
- 39% indicate they are "somewhat more likely to purchase"

When making their purchasing decisions, **50%** of consumers place **high importance** on the product's ability to protect the environment.

- The importance of protecting the environment **has increased** this year compared to last **among males**.

53% of consumers report being **willing to pay more** to ensure that the product they purchase has a positive impact on the environment.

- Those willing to pay more would be most comfortable **paying up to 10% more** for this type of product.

Approximately **72%** of consumers feel that the energy and cost savings over time surpass the cost difference of purchasing an ENERGY STAR qualified product, thus making the initial investment more acceptable.

- Compared to last year, males rate the cost of ENERGY STAR qualified products significantly higher (meaning they understand that these products cost more).

ENERGY STAR Responds to Trends



ENERGY STAR is currently writing and revising specifications in the following product

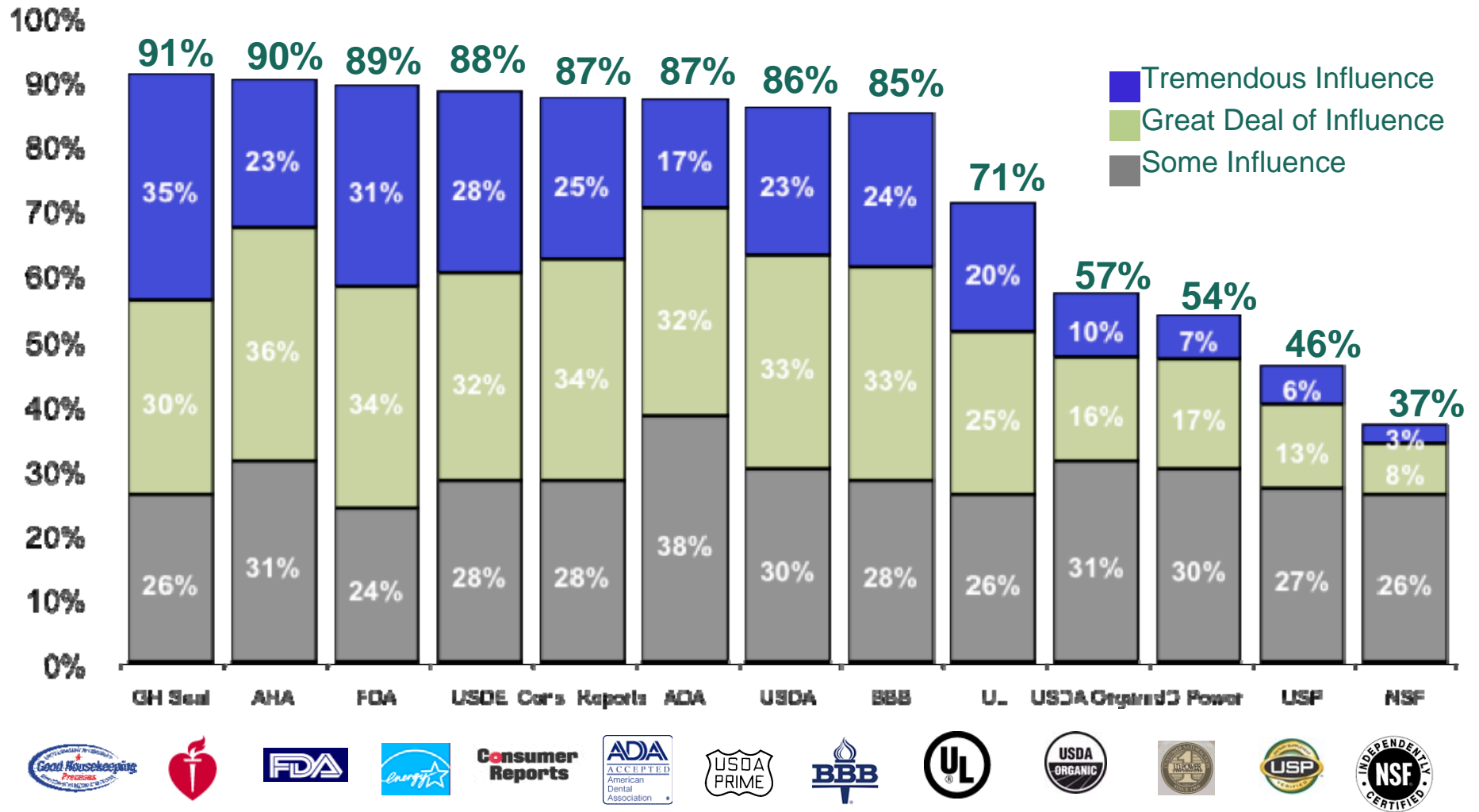
categories:

1. New specification for **DTAs**
 - New specification finalized and effective on January 31, 2007
 - Includes active mode criteria and an auto-off power down requirement
2. Revised **television** specification in development
 - Opportunity to participate in the development of the new 'active mode' specification
 - First-to-market opportunity to launch qualifying products in 2008
3. New specification for **battery chargers and power adapters**
 - ENERGY STAR models make a huge environmental difference with no associated costs – all you have to do is tell your vendors you want them.
 - Opportunity to pair end-use products with qualifying chargers and adapters
4. New specification for **set top boxes** (includes DVRs)
5. Revised specifications for **imaging equipment** (includes printers, scanners, MFDs, fax machines, and copiers)
 - New active mode specification took effect April 1, 2007
6. Revised specification for **computers** addressing active mode
 - New active mode specification takes effect July 20, 2007

ENERGY STAR Influences Purchasing Decisions



The ENERGY STAR label ranks among the highest level of influence on product purchase among all consumer emblems, similar in ranking to the Good Housekeeping Seal and Consumer Reports.



Source: Fairfield Research, May 2003



Overview of Draft 1 Specifications

Katharine Kaplan, EPA

Why STBs?



- Scale
 - CEA/TIAX data suggests 19.4 TWh of energy in 2006 in the US alone
- STBs are almost always ON
 - Regardless of user intent
- Growing Feature Richness
 - Adding to Consumption
- STBs are Ubiquitous
 - The industry is moving to multiple boxes per home

Goals for an STB Program



- Drive for the **greatest energy savings** practical
- Identify appropriate **roles and responsibilities** for all
- Develop energy efficiency specifications for STBs that are
 - **performance based**
 - **technology neutral**
- **Harmonize** existing test procedures
- Domestic and international partners
- Develop Program Requirements that offer
 - **longevity**
 - **simplicity**
 - **fair comparisons**



Summary of Internal Energy Agency STB Meetings

Darcy Martinez, ICF International

IEA STB Meetings



- IEA STB meeting in Paris July 4 – 6
 - Attendees included government officials, box manufacturers, service providers, component manufacturers, and non-profit representatives
 - Significant global interest in energy use of STBs (China, EU member states, Switzerland, Australia, US); expressed urgency for action
 - Great interest in international harmonization; agreement to propose IEC workgroup for STB test procedure
 - Examples of and support for service provider and manufacturer roles; current and very near-term savings opportunities as well as slightly longer term efficiency options
- Code of Conduct meetings July 2 and 3
 - Discussion of revised Code of Conduct and values
 - Clarification of operational modes
 - Presentations from industry



Service Provider Requirements in Draft 1

Katharine Kaplan, EPA

Darcy Martinez, ICF International

Why Service Providers?



- In the US, Service Providers purchase and deploy the vast majority of STBs in Americans homes
- Service providers spec boxes delivered to customers
- Service Providers control much of the behavior of devices on their network
- Service Providers have a unique opportunity to educate

The Role of Service Providers



- ENERGY STAR has proposed partnership requirements for:
 - Products from OEMs/Box Manufacturers
 - Service Providers
- ENERGY STAR:
 - Provide Incentives for OEMs:
 - To develop new energy saving technologies
 - To decrease the overall energy consumption in periods of use and non-use
 - Provide Incentives for Service Providers:
 - To buy and deploy efficient STBs
 - Ensure maintenance of efficiency measures once product is in the field (including educating user about impacts of their changes to product set up)
 - Educate consumers on the benefits of the energy saving features of their STB and on ENERGY STAR

Service Provider Discussion Questions



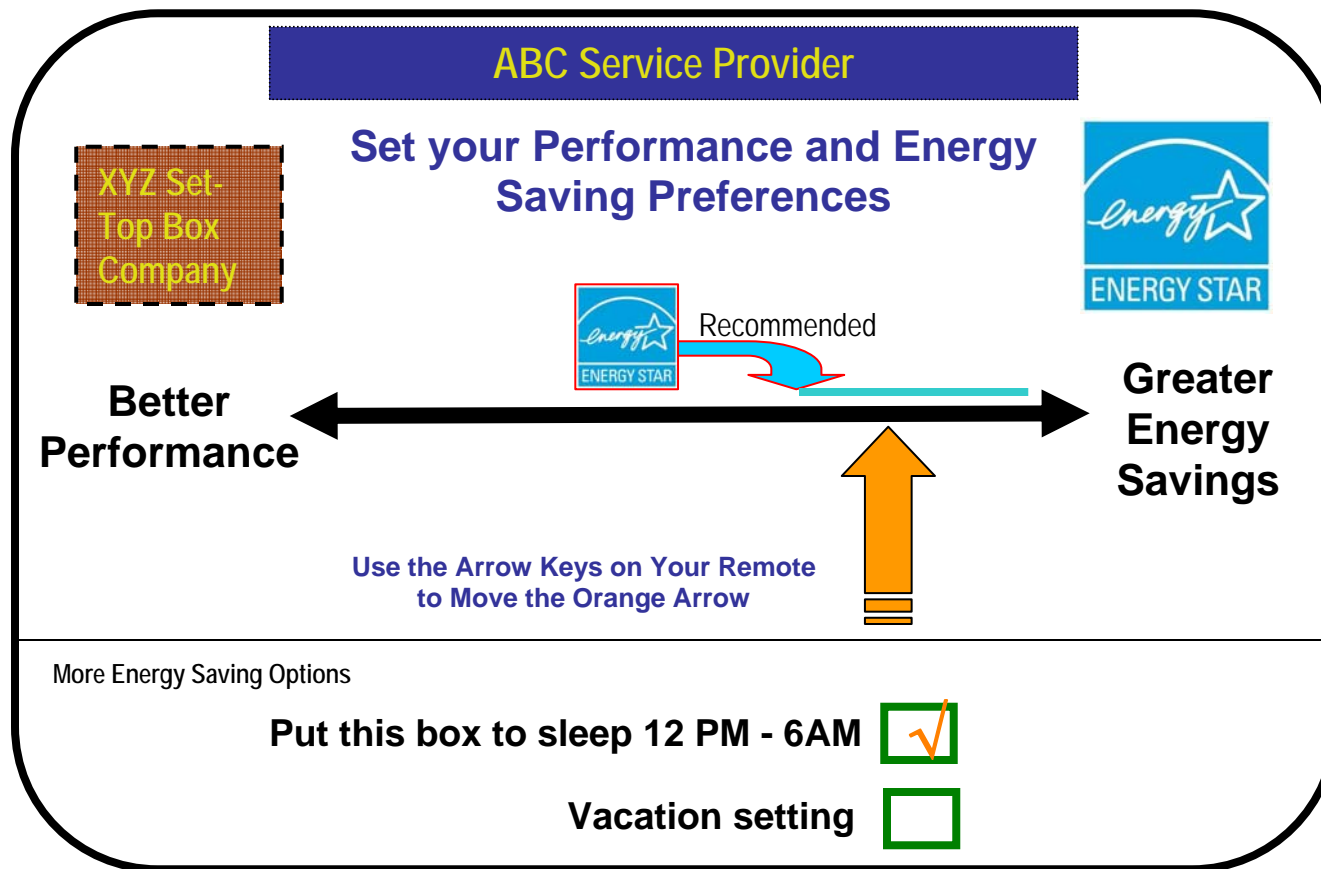
- What are realistic purchasing numbers for 2009?
- What options are available for legacy products?
 - Power down DVR/HD via middleware upgrades
 - Give customers choice re: speculative recording, video on demand
 - Consumer education/user interface
 - Disabling the screen saver

Service Provider Discussion Questions (continued)



- What can service provider partners do to ensure features are not defeated?
 - Ensure software they put in place maintains savings
 - Introduce automatic power down to low power mode
- What user interface options can be introduced?
 - Ability to set product to achieve greater energy savings
 - Incorporate the ability for the user to easily disable the speculative recording and automatic movie download features
 - Limit subscribers ability to change power management settings (reset PM after set amount of time if subscriber disables)

Example of User Information -- An "Energy Control Panel"



Service Provider Discussion Questions (continued)



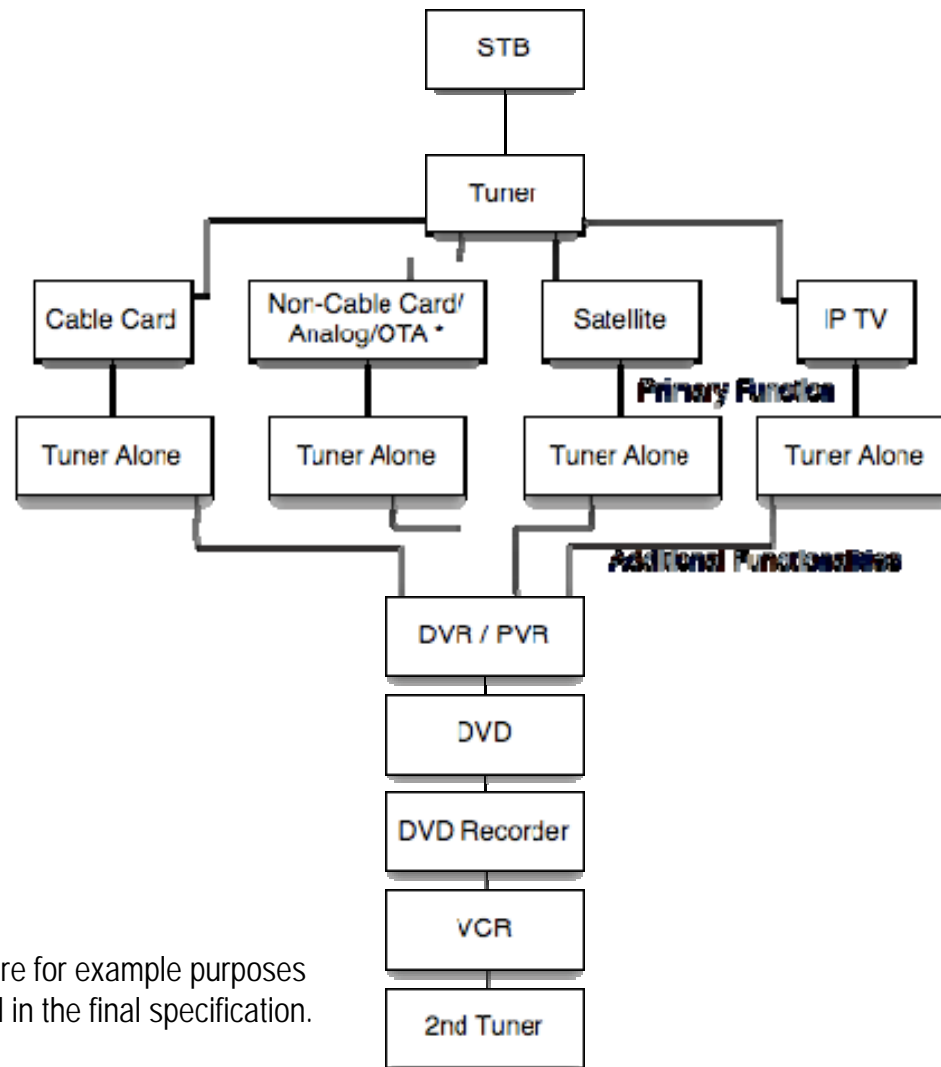
- What educational efforts can providers employ to inform customers?
 - Dedicated mailings or bill stuffers
 - Education about specific qualified products and energy saving opportunities via provider's Web site
 - Training of sales staff and customer service representatives



Draft 1 Test Procedures and TEC Approach in Draft 1

Dave Beavers, The Cadmus Group
Tom Bolioli, Terra Novum

Modular Classification System



The Additional Functionalities listed are for example purposes and not necessarily those to be found in the final specification.

***Cable Card with no card picks up the analog/broadcast and local.**

Typical Energy Consumption (TEC) Approach - Description



- Criteria specified in kWh/year rather than Watts
- Two approaches
 - *Calculated*: employs measurements of power in key states and the duty cycle for a typical user, e.g,

$$\text{TEC (kWh/yr)} = P_{\text{on}} * \text{Hours}_{\text{on}} + P_{\text{standby}} * \text{Hours}_{\text{standby}}$$

- *Measured*: products are metered for kWh over a simulated timeframe (yr) of typical operation

Typical Energy Consumption (TEC) Approach – Benefits For STBs



- Goal of STB specification is to save energy
 - savings target-criteria better matches desired outcome
- Provides manufacturers flexibility
- Allows for additional functionality allowances such as integrated DVRs, extra tuners, etc...
- No need to prescribe requirements to ensure energy savings
 - components (e.g. power supply)
 - energy savings features (e.g. auto power down)
- Less likely to result in perverse outcomes
 - guards against large number of products that meet the criteria but actually use more energy than those that don't meet the criteria

Typical Energy Consumption (TEC) Approach – Hypothetical Perverse Outcome



Sample Device

- Duty Cycle Agnostic Scenario
 - On and Standby criteria are required
 - Model A passes and Model B fails
- Duty Cycle/Use Scenario
 - On: 5 hours/day
 - Standby: 19 hours/day
- TEC End Result
 - Model A: 91 kWh/yr
 - Model B: 61 kWh/yr
- Model A uses more energy than Model B!!!

	Criteria (Watts)	Model A	Model B
On	14	12	18
Standby	10	10	4
Modal Criteria		PASS	FAIL
TEC Criteria		FAIL	PASS

Typical Energy Consumption (TEC) Approach – Measured vs. Calculated



- Measured
 - Ideal approach
 - More precise estimates of annual energy use
 - Requires new and novel test procedures
 - Not realistic at this time – needs more development
- Calculated
 - Can employ, with some modification, current test procedures such as CSA C380-06, CEA-2022, CEA-2013A, etc...
 - Duty cycle times for power states need to be established

Principles of Efficiency



- Use power more efficiently during periods of activity
- Use as little power as possible when not active
- Components/devices should drop into low power modes as often and as deep as possible
- TEC allows all of these to be rewarded

Typical Energy Consumption (TEC) Approach-Testing Products



- How many power states should be included?
- CSA-C380-06 defines three power states: On, Off, Standby/ Sleep
- Industry proposal has multiple active and standby states for four categories: STB, HD STB, STB-DVR, HD STB-DVR
- Example for HD-DVR STB
 - STB ON(1) - similar to ON under CSA-C380-06
 - STB ON (2) – similar to CSA ON with EPG preview window
 - STB ON (3) – recording to hard disk, no equivalent in CSA
 - STB ON (4) - recording to hard disk, no equivalent in CSA
 - STANDBY – equivalent to CSA?



Addendum to Test Procedure

Chris Stone, Motorola
See Separate Presentation

Discussion Questions



- What level of additional precision can be gained from the more detailed, industry proposed test procedure?
- What equipment, beyond power meters, is required to perform the test procedure?
- Does either test procedure require substantial exceptions to test requirements using CSA-C380-06?
- Will the test procedures need to be amended in the next few years as STB products evolve?



Setting Levels

Katharine Kaplan, EPA

Current and Future Energy Use



- Currently-installed US STBs consume 20 TWh per year.

–This is 13% of the total electricity consumed by CE devices (not including digital TVs), which collectively accounts for 11% of US residential electricity consumption

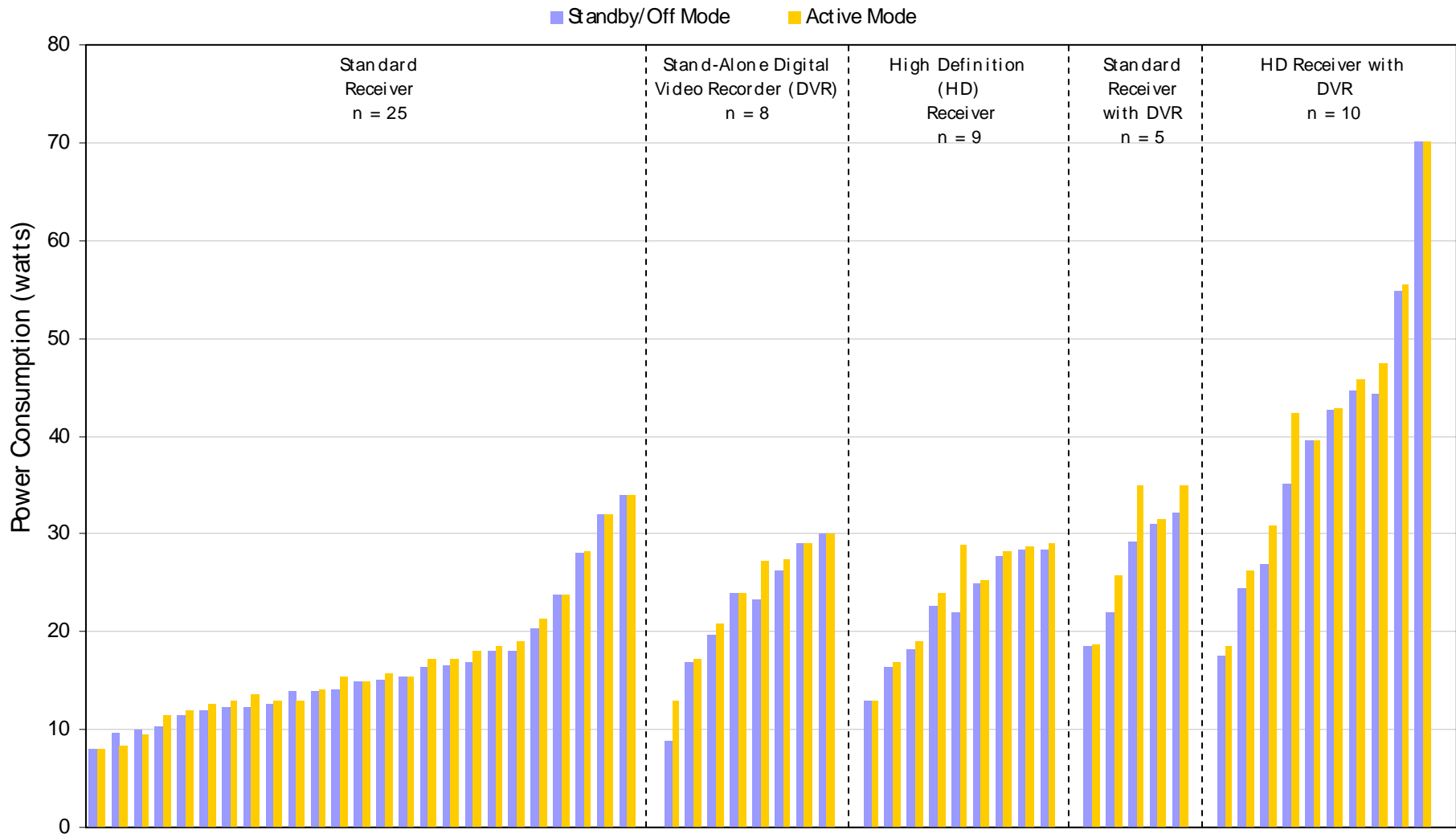
Roth, Kurt W., and Kurtis McKenney, TIAX, LLC., *Energy Consumption by Consumer Electronics in U.S. Residences*, TIAX. Here in after referred to as “TIAX Report.” See Table 5-46: Annual Energy Consumption of Set-Top Boxes (TWh/yr).

Current and Future Energy Use (continued)



Annual Energy Consumption of Set-Top Boxes (TWh/yr) [Table 5-46, TIAX Report]				
	Cable	Satellite	Stand Alone	Total
Analog STB	4	n/a	n/a	4
Digital STB	5	7	n/a	12
HD Digital STB	0	0	n/a	0.4
PVR Digital STB	1	1	0.4	3
HD DVR Digital STB	0	1	n/a	1
Total	10	9	0.4	20

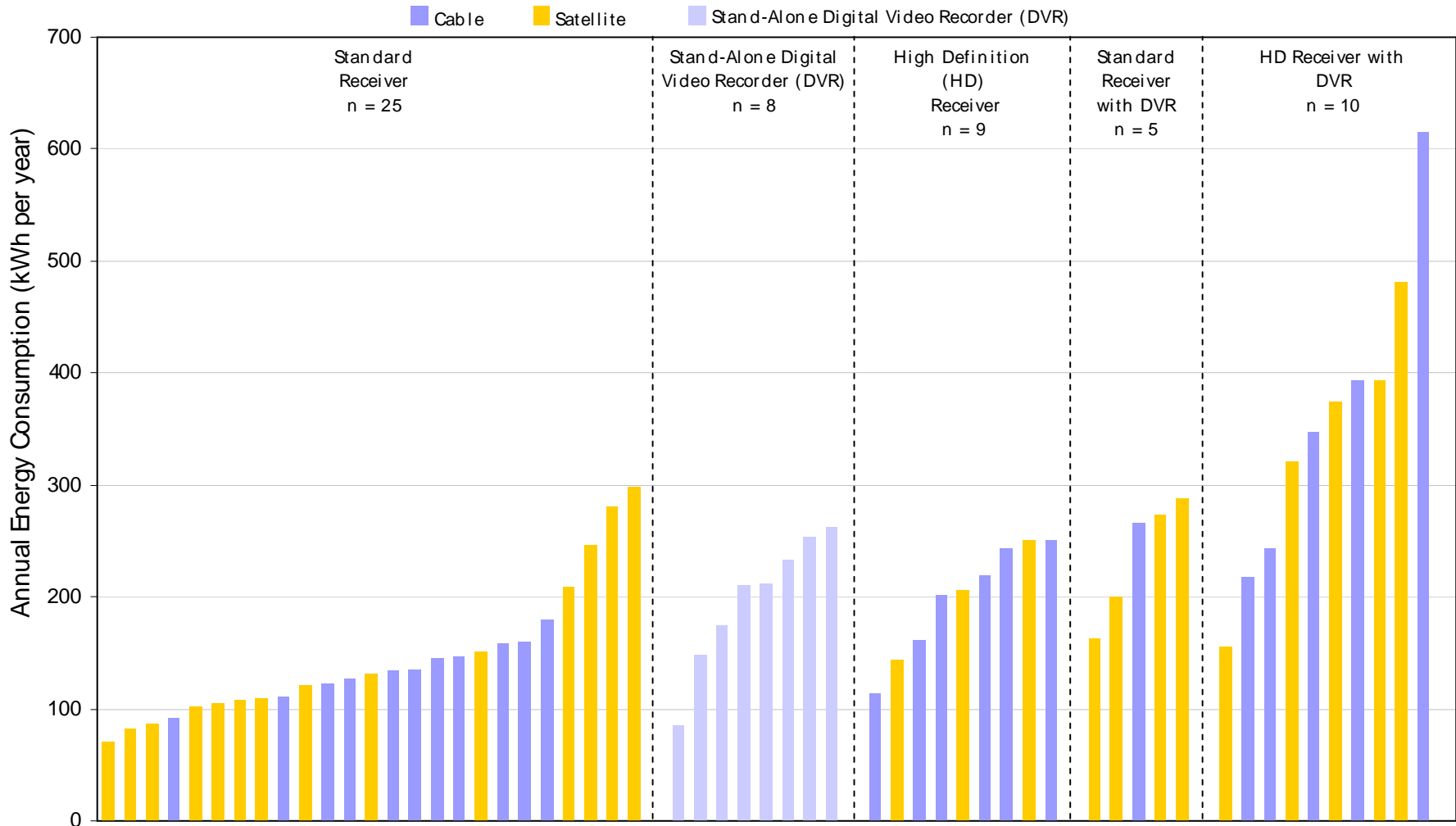
Power Consumption of Today's Set Top Boxes by Mode



NRDC Set-top Box Study

- Power consumption does not differ significantly by mode with the exception of a few models that we are investigating.
- No meaningful sleep or auto power down modes detected in any of the boxes surveyed.

Annual Energy Consumption of Today's Set Top Boxes



NRDC Set-top Box Study

- Cable/satellite boxes without DVRs use 100 to 200 kWh of electricity per year. High definition cable and satellite boxes use only slightly more energy on average.
- Cable and satellite set top boxes with DVRs use anywhere from 200 to 400 kWh per year, or 1.5 to 2 times as much as stand-alone DVRs like Tivo or cable/satellite boxes without DVR capabilities
- Media receiver boxes like the Sling box use significantly less energy (around 35 kWh per year) but must be used in conjunction with existing A/V equipment and computers, thus adding another 35 kWh to the annual energy use of existing home electronics. New media receiver boxes like the AppleTV can be expected to use more power due to built-in hard drives.

Typical Energy Consumption (TEC) Approach – Two Criteria Scenarios



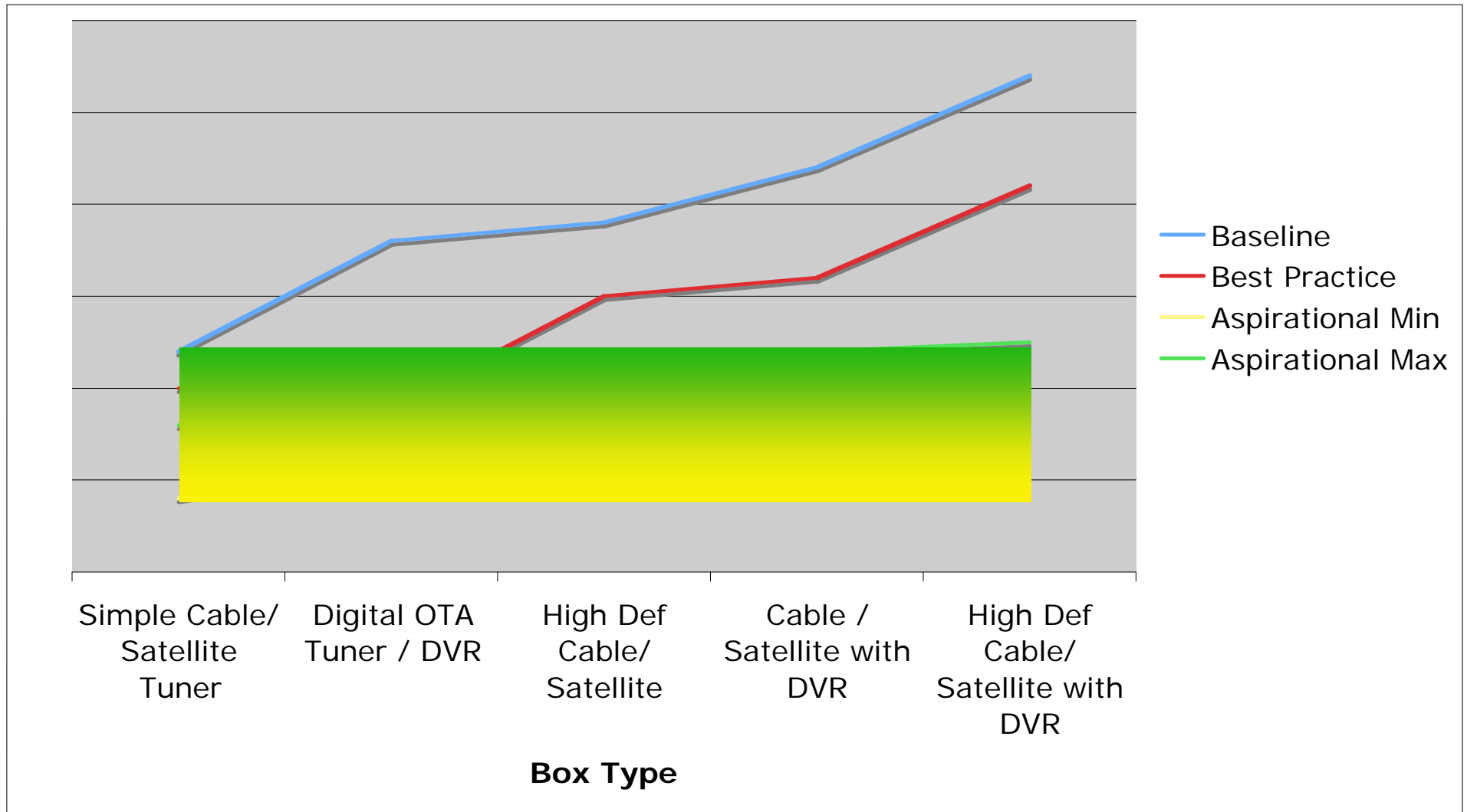
Current Best Practices

- Criteria set based on most efficient units currently available
- Data available: CEA/TIAX & NRDC Reports
- Savings from powering down DVRs

Next Generation Technology/Aspirational

- Savings from powering down cable and satellite tuners
- Savings from reduced on mode power use

Typical Energy Consumption (TEC) Approach – Compared to NRDC Data Set





Conclusion

Katharine Kaplan, EPA

Key Milestones



Key Milestone	Date
Publicly launch spec. development process by distributing announcement letter	March 15
Meetings in Denver with cable and satellite providers	April 25 - 27
Distribute an update document with a list of key questions for stakeholders Stakeholder meeting in Washington, DC	Early May May 15
Deadline for stakeholders to offer response to questions distributed in early May and share thoughts post May 15 stakeholder meeting	May 23
Release proposed specification approach and test procedure (First Draft)	June 29
Deadline for initial stakeholder comments on First Draft	July 12
International STB meeting at the IEA in Paris	July 4 - 6
Stakeholder meeting	July 18

Key Milestones (continued)



Key Milestone	Date
Deadline for final stakeholder comments on First Draft and Paris meeting	July 27
Release Second Draft Specification with proposed levels	Sept. 14 (may be sooner)
Stakeholder meeting	TBD
Deadline for stakeholder comments on Second Draft Specification	Oct. 15
Release Draft Final Specification	Late Oct.
Deadline for stakeholder comments on Final Draft Specification (expected to be minor)	Late Nov.
Publication of Final Specification	Mid Dec.
Specification effective date	Sept. 2008

Action Items



- EPA to consider requirements for legacy boxes. What credit is given? Expectations vs. benefits. Bill to suggest what might be possible. (pending Bill's approval)
- Industry conducts cost benefit analysis for legacy boxes.
- EPA explores if deactivation of energy saving features is an item of concern.
- Industry submits comments on Draft 1 specifications by July 27, giving focus to questions in text boxes.
- EPA considers issue of ENERGY STAR as a voluntary program, to possibly remain so for XX years.

Action Items (continued)



- EPA gets management support for aspirational goals vs. historical 25% levels.
- EPA consider ENERGY STAR capable boxes, in addition to ENERGY STAR qualified boxes.
- Stakeholders contact EPA to volunteer to run trials for TP.
- EPA send details on electronic labeling options.
- SPs talk to software/silicon providers to discuss options for increased energy efficiency.
- EPA to think through reporting requirements, particularly in terms of confidential information.
- SPs tell EPA what program benefits they need.

Contacts



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