Title 20 Opportunities in Consumer Electronics

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Today's Presentation

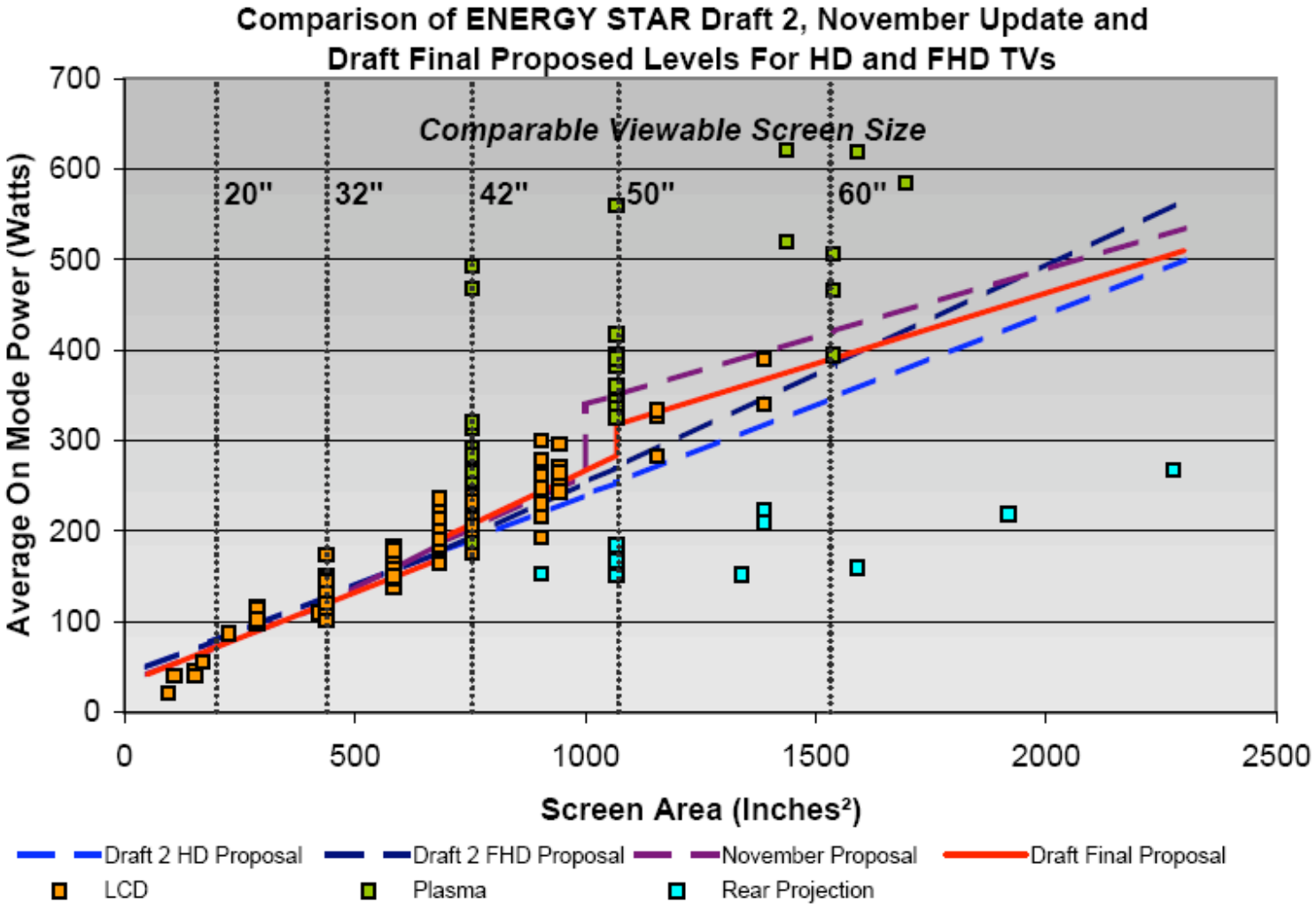
- Provide high level background on energy use of key consumer electronics products.
- Suggest potential Title 20 standards opportunities. Lay ground work for follow on conversations, hearings, etc.
- Standards "readiness" varies by product category

TV Energy Use

- National TV electricity use approaching 5% of residential use and >1% overall national electricity use.
- Home TV energy use growing due to:
  - Bigger screen size
  - On more hours per day (pay TV, DVDs, game consoles, etc.)
  - HDTV – can require more power

What do we know?

- Big screen TVs often use 150 – >500 W.
- If on 5 hours/day : 365 – > 900kWh/yr.
- Put into context – new fridge uses 500 kWh/yr.
- Big spread between best and worst models of similar size.
- Plasmas often use 50 – 100% more power than similar sized LCD. Landscape is however very fluid.


Comparison of ENERGY STAR Draft 2, November Update and Draft Final Proposed Levels For HD and FHD TVs
Comparable Viewable Screen Size
20"
32"
42"
50"
60"
Average On Mode Power (Watts)
0
100
200
300
400
500
600
700
0
500
1000
1500
2000
2500
Screen Area (Inches²)
Draft 2 HD Proposal
Draft 2 FHD Proposal
November Proposal
Draft Final Proposal
LCD
Plasma
Rear Projection

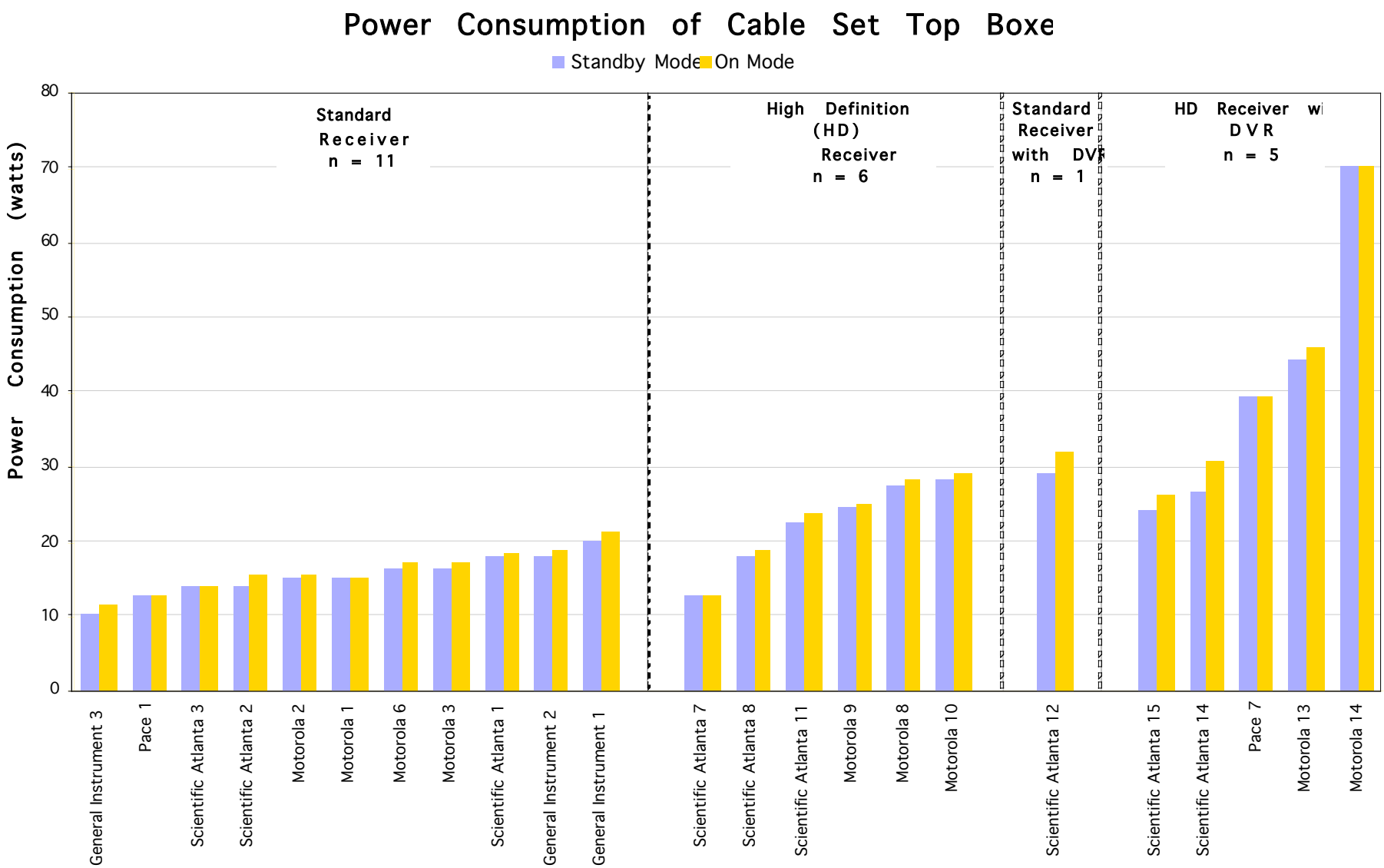
Policy Stuff

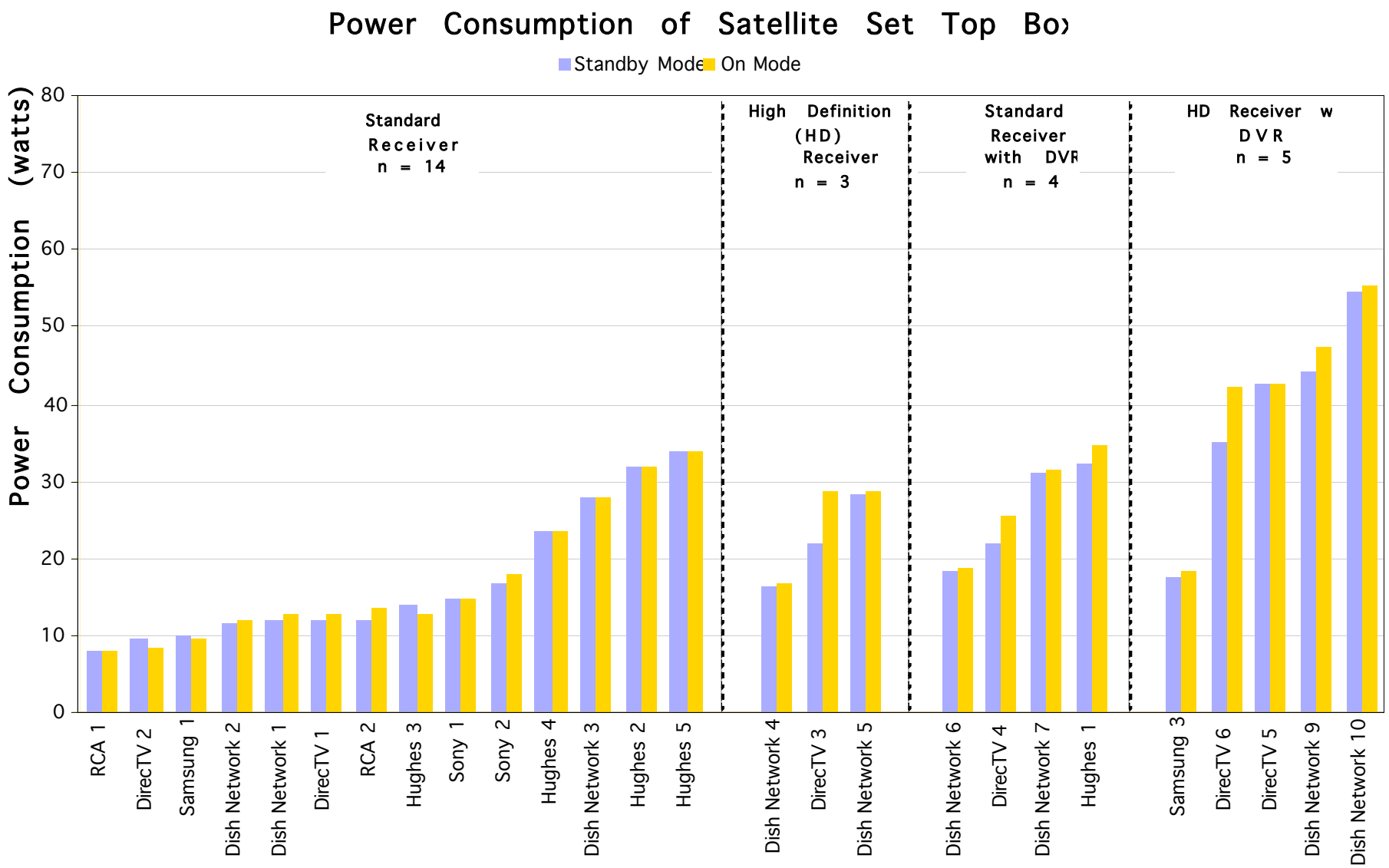
- Now have an up to date test method for on mode (may need to tweak how to deal with initial setup settings)
- On mode soon to be added to ESTAR spec
- TVs to be added to federal ENERGY GUIDE labeling program in late 2009.
- Title 20 currently only deals with standby power (note on mode represents >85% of annual TV energy use)

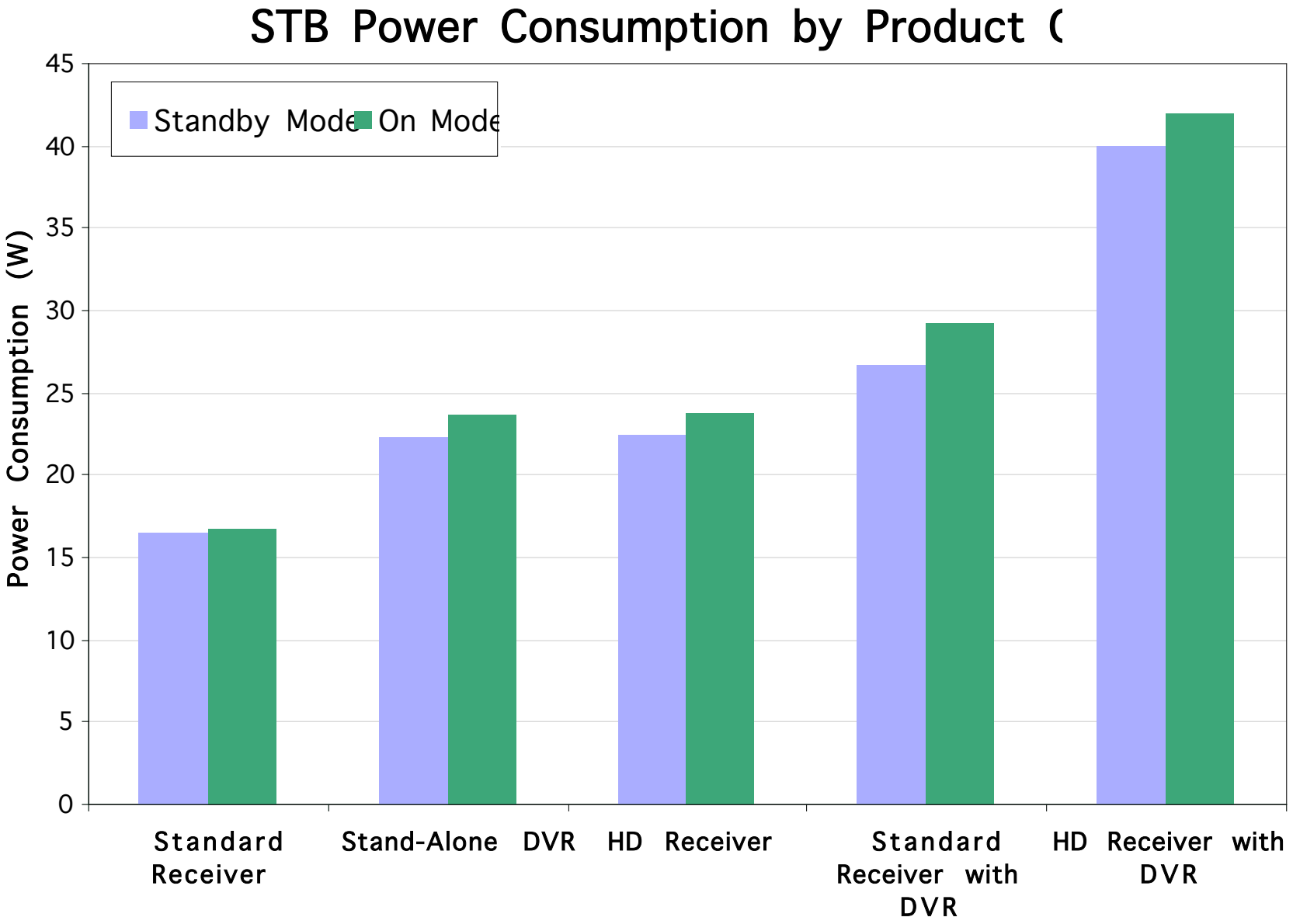
Options to Consider

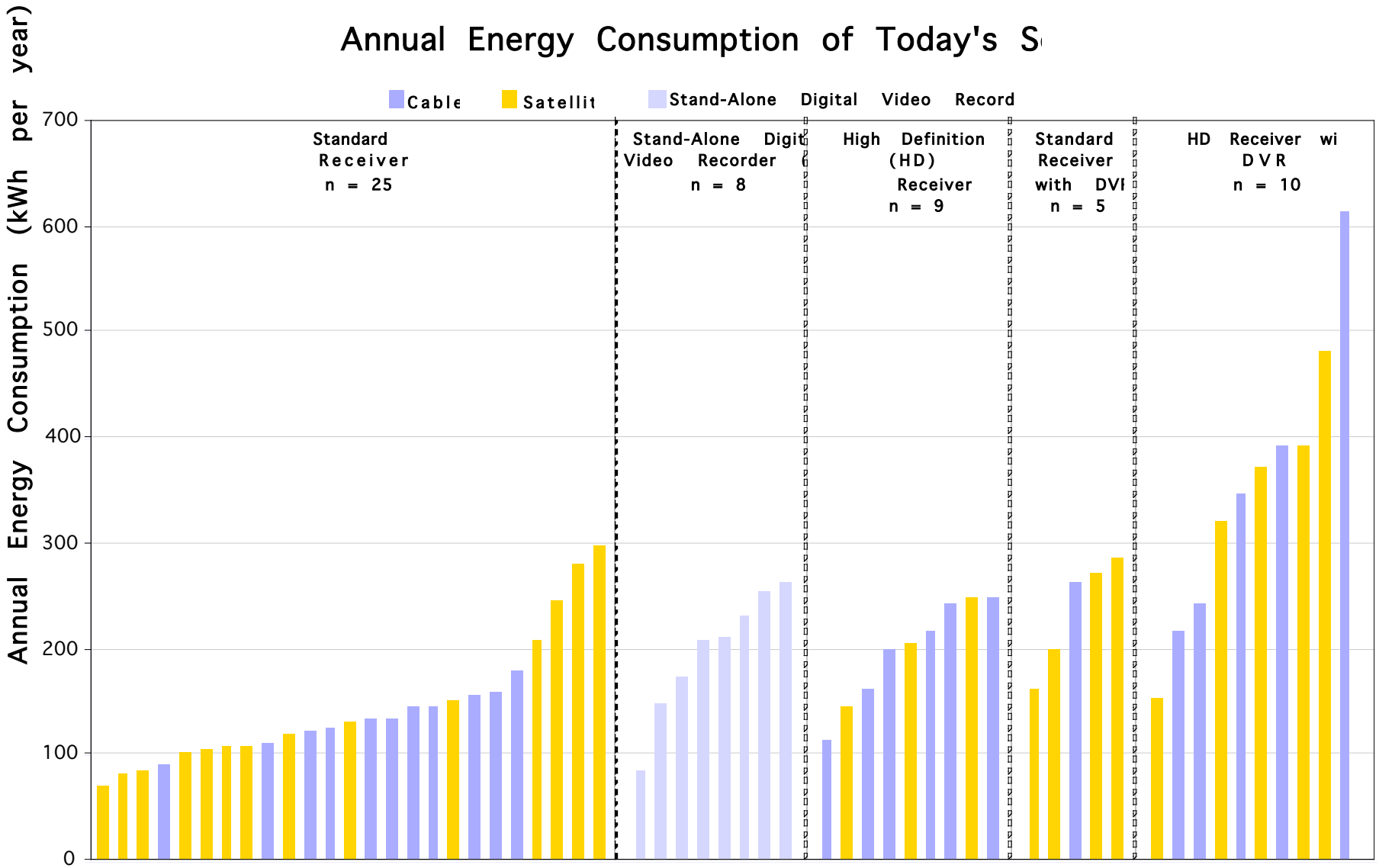
- Require manufs to “test and list” if data not available elsewhere
- Strongly consider adding a maximum allowable “on mode” standard (watts/in2).
- At a minimum, remove worst performing models from the market.
- Need to carefully decide if one size fits all or separate specs for each technology (e.g. remove worst x % plasma, worst x% LCD, etc.)

Cable and Satellite Set Top Boxes


Power Consumption of Cable Set Top Boxe
Standby Mode
On Mode
Power Consumption (watts)
0
10
20
30
40
50
60
70
80
Standard Receiver n = 11
High Definition (HD) Receiver n = 6
Standard Receiver with DVR n = 1
HD Receiver wi DVR n = 5
General Instrument 3
Pace 1
Scientific Atlanta 3
Scientific Atlanta 2
Motorola 2
Motorola 1
Motorola 6
Motorola 3
Scientific Atlanta 1
General Instrument 2
General Instrument 1
Scientific Atlanta 7
Scientific Atlanta 8
Scientific Atlanta 11
Motorola 9
Motorola 8
Motorola 10
Scientific Atlanta 12
Scientific Atlanta 15
Scientific Atlanta 14
Pace 7
Motorola 13
Motorola 14


Power Consumption of Satellite Set Top Box
Standby Mode
On Mode
Power Consumption (watts)
0
10
20
30
40
50
60
70
80
Standard Receiver n = 14
High Definition (HD) Receiver n = 3
Standard Receiver with DVR n = 4
HD Receiver w DVR n = 5
RCA 1
DirecTV 2
Samsung 1
Dish Network 2
Dish Network 1
DirecTV 1
RCA 2
Hughes 3
Sony 1
Sony 2
Hughes 4
Dish Network 3
Hughes 2
Hughes 5
Dish Network 4
DirecTV 3
Dish Network 5
Dish Network 6
DirecTV 4
Dish Network 7
Hughes 1
Samsung 3
DirecTV 6
DirecTV 5
Dish Network 9
Dish Network 10


STB Power Consumption by Product (
Standby Mode
On Mode
Power Consumption (W)
45
40
35
30
25
20
15
10
5
0
Standard Receiver
Stand-Alone DVR
HD Receiver
Standard Receiver with DVR
HD Receiver with DVR


Annual Energy Consumption of Today's S
Cable
Satellit
Stand-Alone Digital Video Record
Annual Energy Consumption (kWh per year)
700
600
500
400
300
200
100
0
Standard Receiver n = 25
Stand-Alone Digit Video Recorder n = 8
High Definition (HD) Receiver n = 9
Standard Receiver with DVI n = 5
HD Receiver wi DVR n = 10

The Lowdown

- These boxes stay at or near full power 24/7 even when the user is neither watching, recording or playing back a show.
- New full featured boxes called DVRs are growing in popularity (HD, multi-tuners, with built in TiVo like features)
- Boxes need to stay connected to the system ready for an up date, download, verify user, etc……. BUT SHOULD NOT REQUIRE ANYWHERE NEAR 30 – 40 Watts all night long

Limited Progress

- NRDC and others have been working this issue for more than 3 years now.
- If boxes designed with efficiency in mind, lots of progress could be made:
  - Spin down hard drive in middle of night
  - Turn off second and third tuners when not in use
  - Consider moving to flash memory
  - Ability to shut off speculative recording and opt out of automatic pay per view movie downloads

Title 20 Option

- Probably time to establish a mandatory standard
- Strawman :

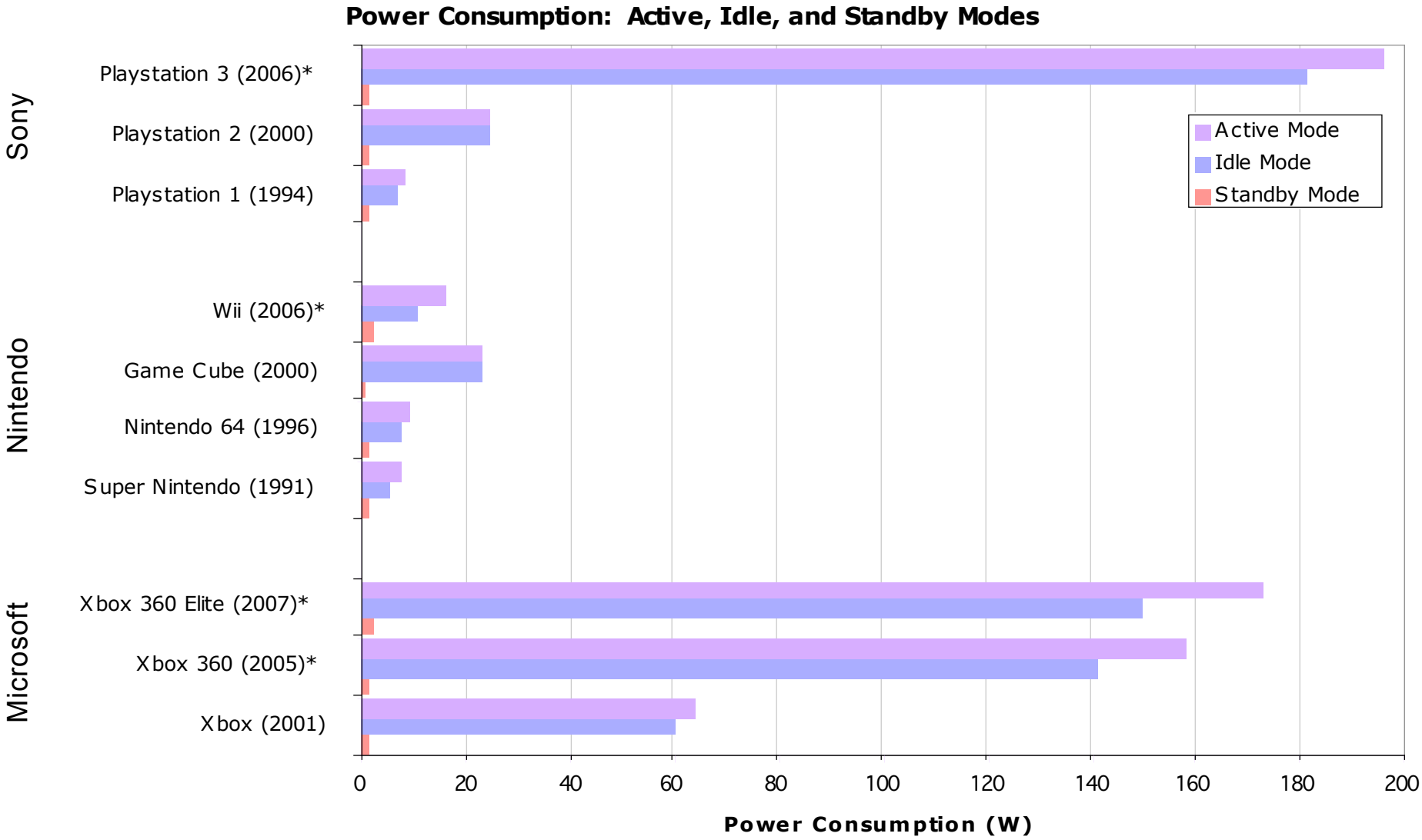
  a)Set maximum allowable “standby” power level of X watts. Is it 5W? 10W? TBD

  b)Require auto power down feature after extended period of non use (make sure box really does go into low power mode)

  c)Require testing to be done on a live system (eg hooked up to the cable or satellite operator)

Preliminary NRDC Game Console Research

PRELIMINARY DATA - Power Consumption of Today's Game Consoles



What if box is never turned off?

- Anecdotal evidence – many users don't turn off their box at night (forget/lazy or don't want to lose their place in the game)
- Boxes don't have ability to save the game
- Why care? – run the math. If on 24/7 uses an extra 1000 kWh/yr ➔
  - Same annual energy as two new refrigerators,
  - Extra >$100 in electricity costs.

Xbox 360 Duty Cycle and Energy Use

User Type	Standby/Off Hours per Day	Idle Hours per Day	Active Hours per Day	Annual Energy Use (kWh)
Best Case User turns off box after use.	23	0	1	70
Enthusiast User leaves it on all the time - no auto off	0	22	2	1,247
With 6-Hour Auto-Off	16	6	2	433
With 1-Hour Auto-Off	21	1	2	178

Recommendations

- Require manufs to ship boxes enabled with "auto power down" feature after x hours of inactivity.
- Establish standby mode limit of Y Watts (beware some manufs want these boxes to serve as network devices and may require more than 1W)

Two Stages?

- Start with Tier 1 – auto power down only if game is over.
- Move to Tier 2 –auto power down, even if game unfinished. Requires the industry to work together to figure out how to auto save the game so you don't lose your place.
- Provide longer time for Tier 2. Telegraphs need to build this capability into their future hardware and games.
- To leave designers with maximum design flexibility, avoid setting on mode power limit for now.

NEXT STEPS

- CEC host dedicated workshop on these consumer electronics products in the spring to pursue potential standards in greater detail.
- Track developments at ENERGY STAR, European Union, Australia, etc.