# NRDC TV Energy Efficiency Research

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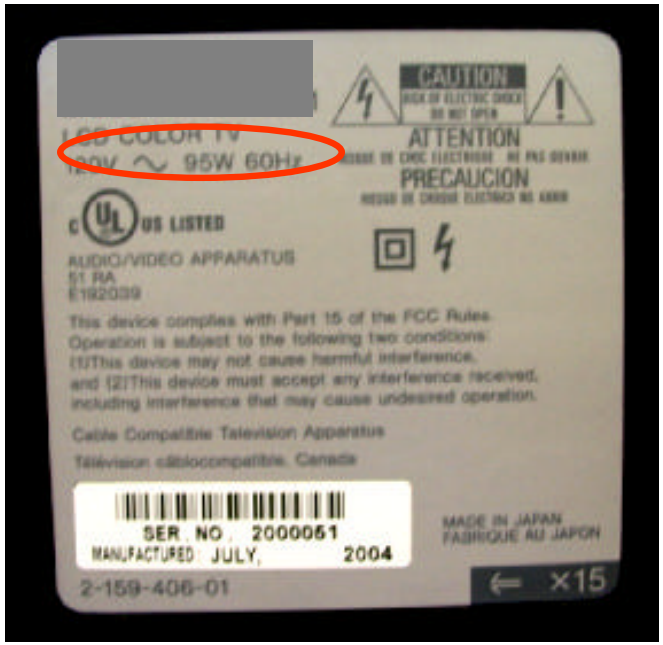
# Little information on TV power use

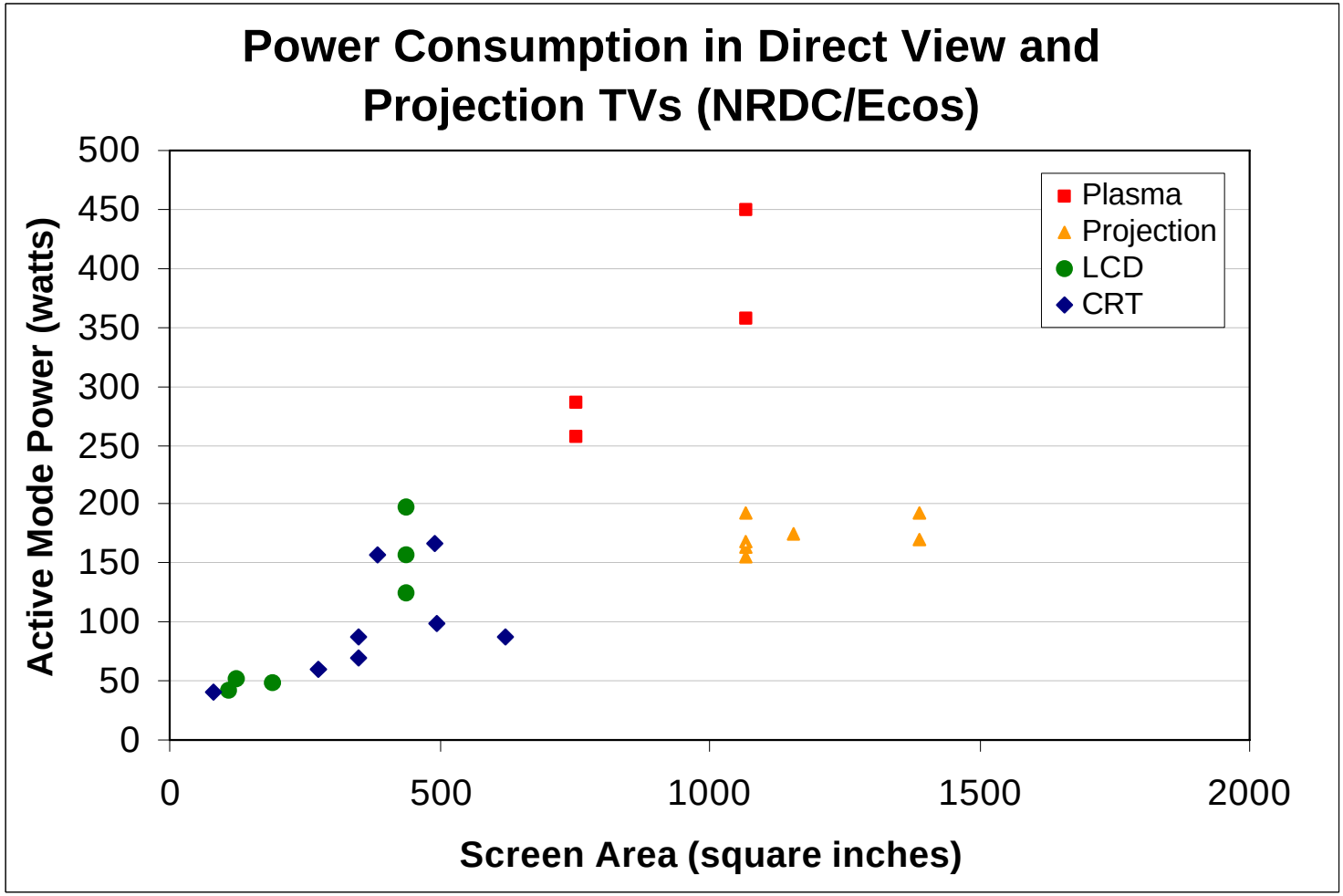


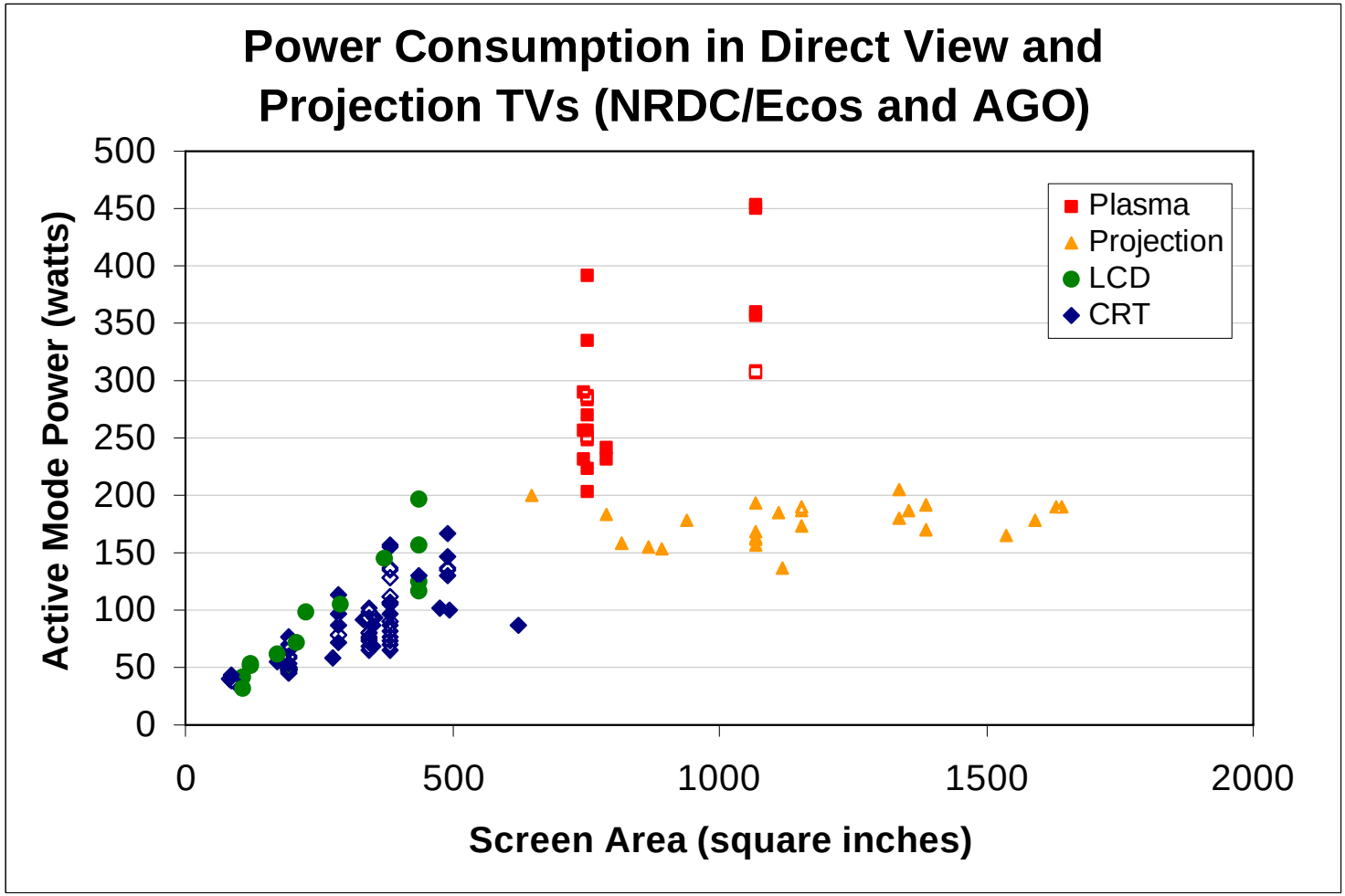

# What test methods are available?

| | Measures black and white CRTs | Measures color CRTs | Measures new display types | Reflects real world power consumption |
|---|---|---|---|---|
| DOE method | ✓ | | | |
| JEITA method | ✓ | | ✓ | |
| IEC 62087 | ✓ | ✓ | ✓ | |

# Our Field Test Method

- Measured TV power use in retail setting with WattsUp? Pro power meter
- Used showroom screen settings
- Measured average power over 2 minutes using standard test clip
- Digital Video Essentials video clip used as reference material



Power Consumption in Direct View and Projection TVs (NRDC/Ecos)
Active Mode Power (watts)
500
450
400
350
300
250
200
150
100
50
0
0
500
1000
1500
2000
Screen Area (square inches)
Plasma
Projection
LCD
CRT

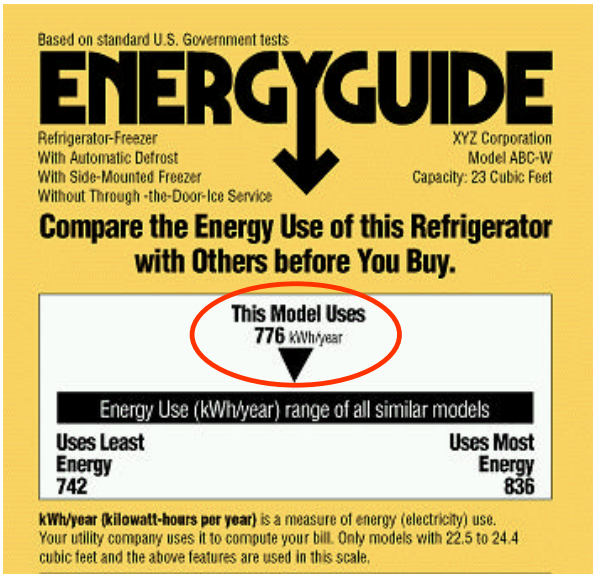

Power Consumption in Direct View and Projection TVs (NRDC/Ecos and AGO)
Active Mode Power (watts)
500
450
400
350
300
250
200
150
100
50
0
0
500
1000
1500
2000
Screen Area (square inches)
Plasma
Projection
LCD
CRT

# How do we fairly gauge efficiency in TVs?

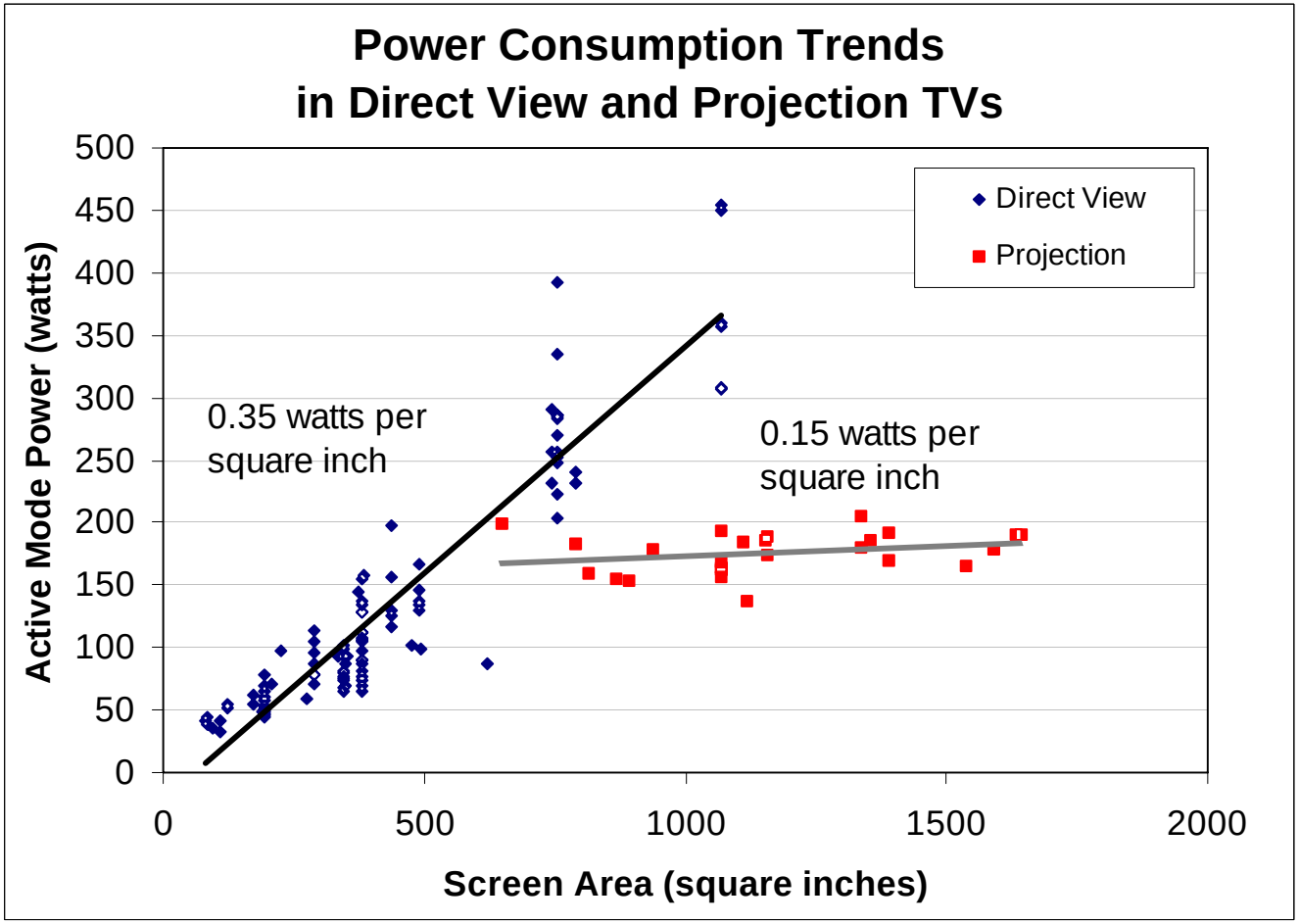
Lumens/watt


$$\frac{watts}{in^2}$$ ?

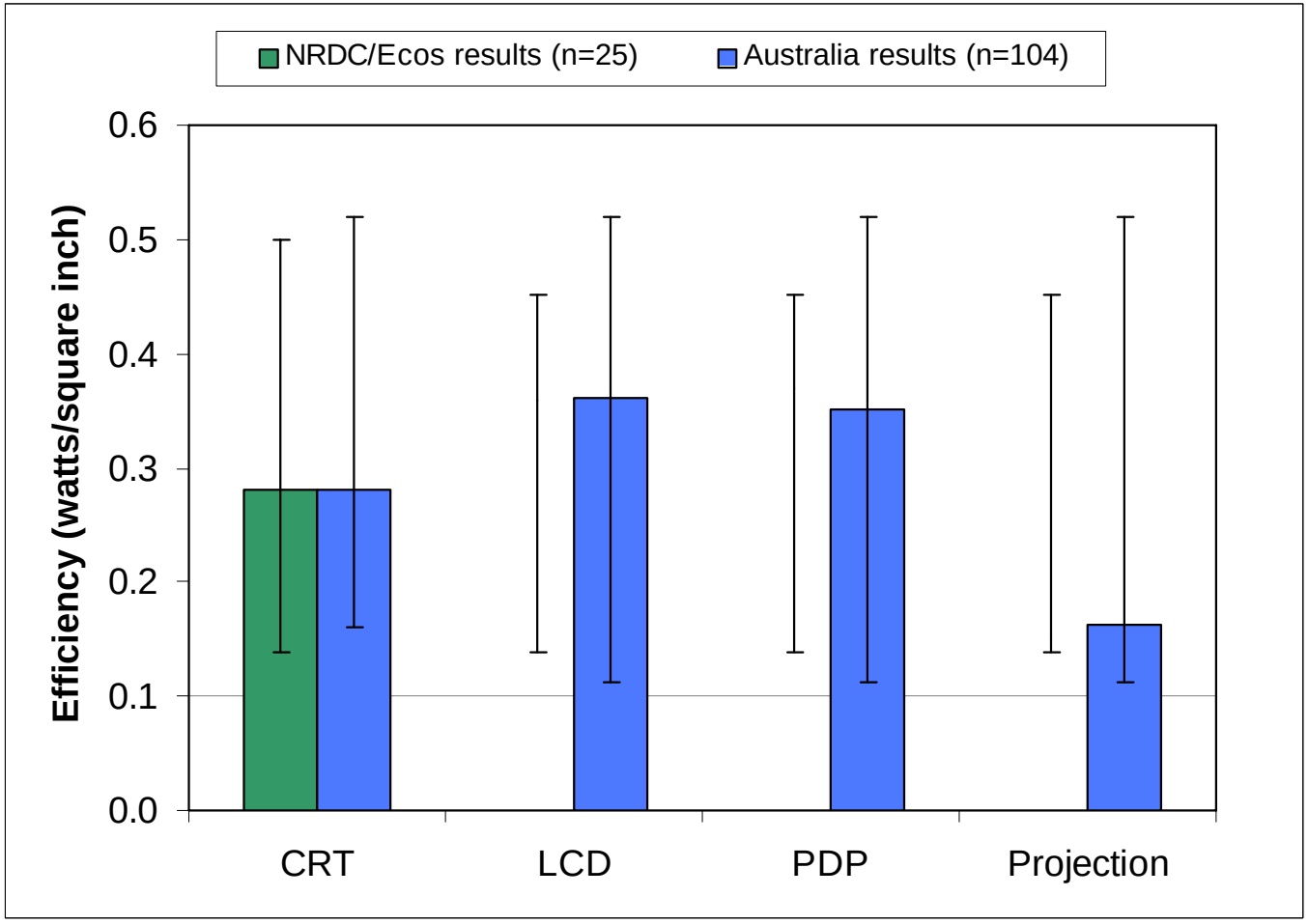
kWh/year



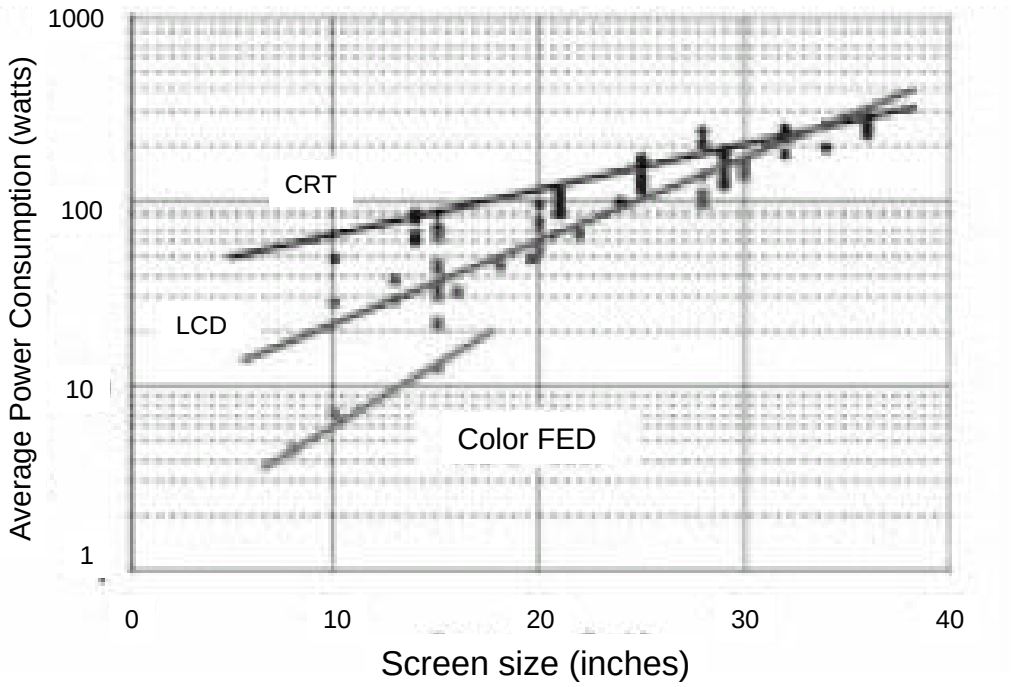
# Different Trends for Different Technologies



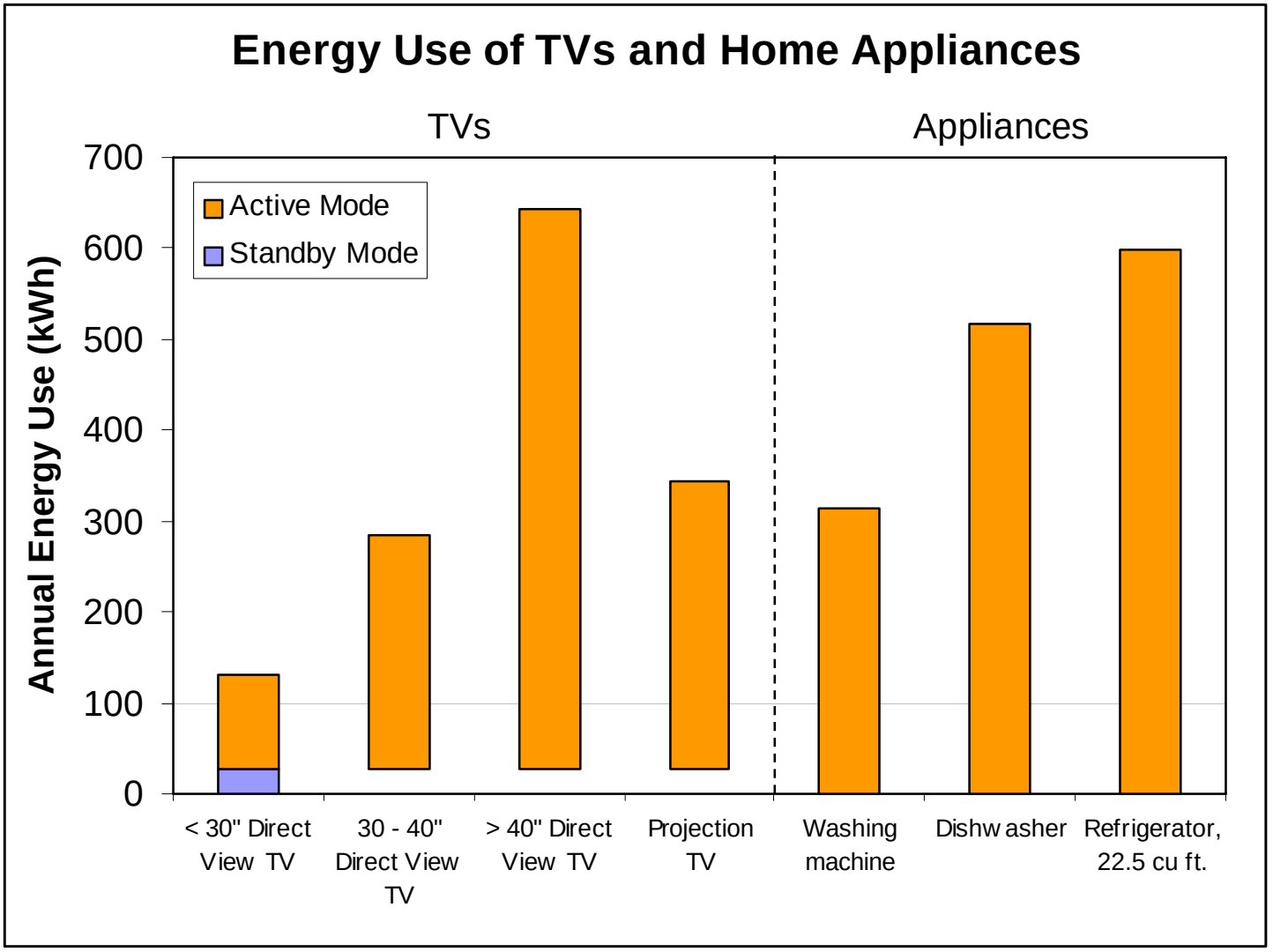
# Room for efficiency improvements in all technologies



# Future technologies provide hope of increased efficiency



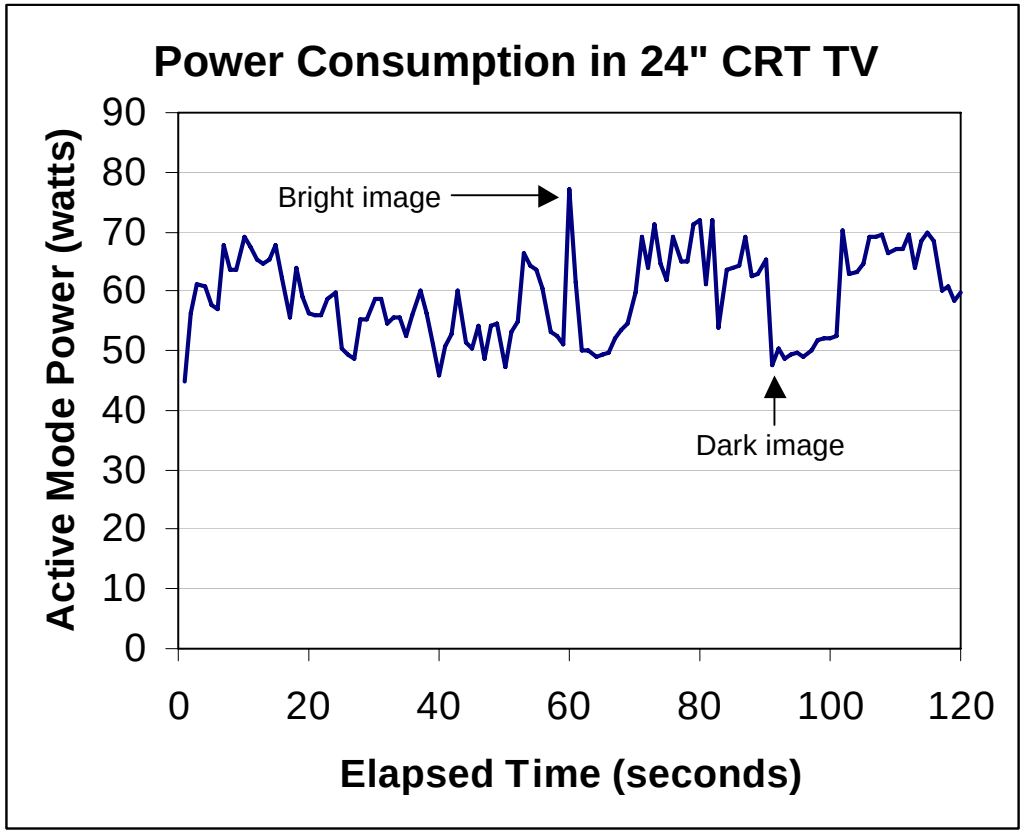

Itoh S and Tanaka M. "Current Status of Field Emission Displays." *Proceedings of the IEEE.* Vol. 90, No. 4. April 2002.

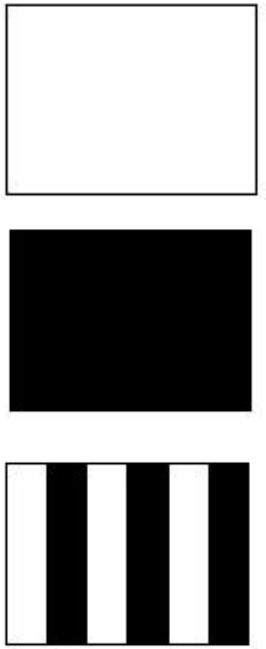

Energy Use of TVs and Home Appliances
TVs
Appliances
Annual Energy Use (kWh)
700
600
500
400
300
200
100
0
Active Mode
Standby Mode
< 30" Direct View TV
30 - 40" Direct View TV
> 40" Direct View TV
Projection TV
Washing machine
Dishwasher
Refrigerator, 22.5 cu ft.

# What have we learned?

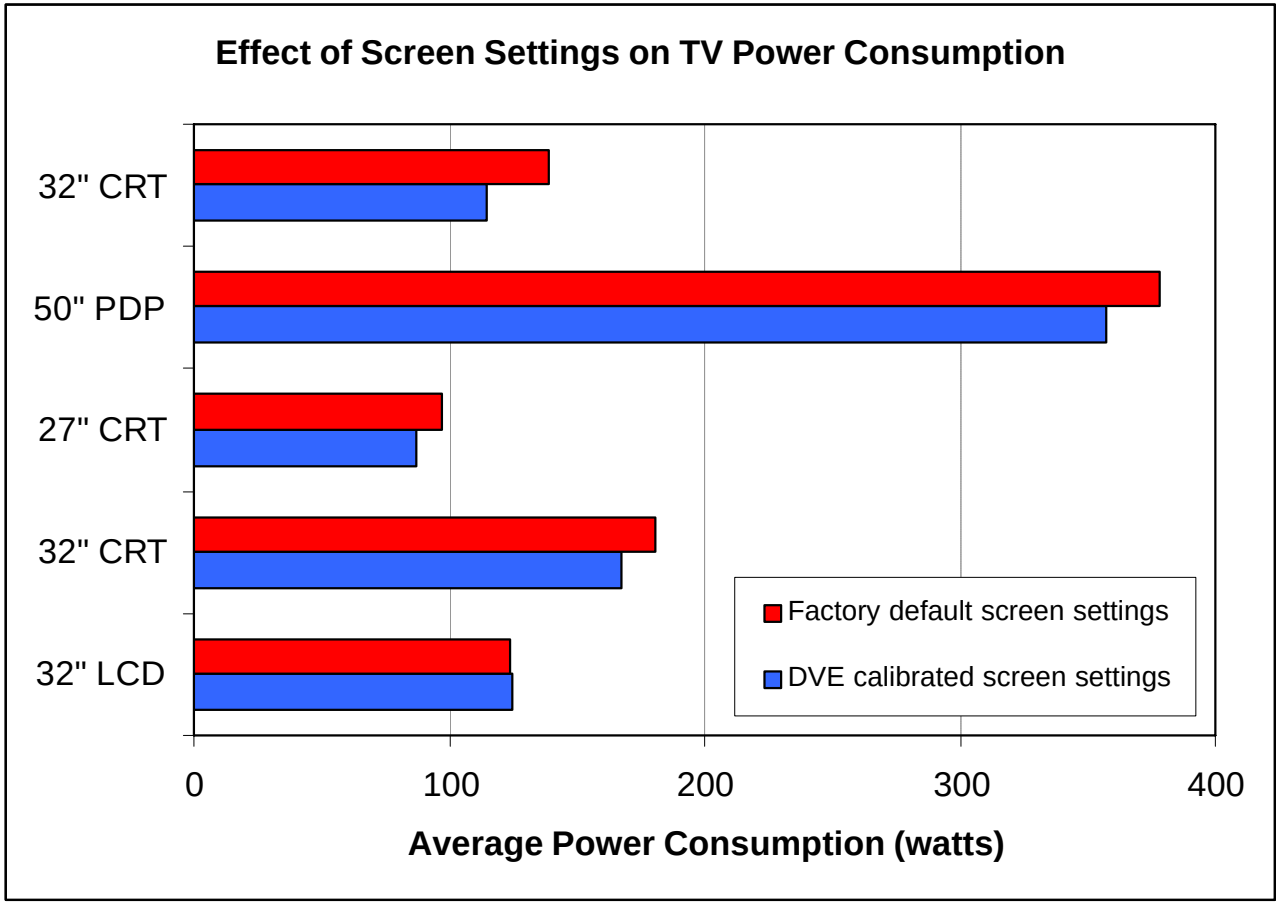
- TV models of given size can vary widely in power consumption while providing similar resolution picture even for models of the same screen technology
- Direct view display technologies follow a similar efficiency trend; no one technology *today* stands out as efficient or inefficient
- Projection display technologies follow a separate efficiency trend due to fixed power consumption of projection bulbs
- Wide spread in efficiency means opportunity to encourage most efficient models
- Demand for an active mode test method

# Power use can vary significantly based on image displayed

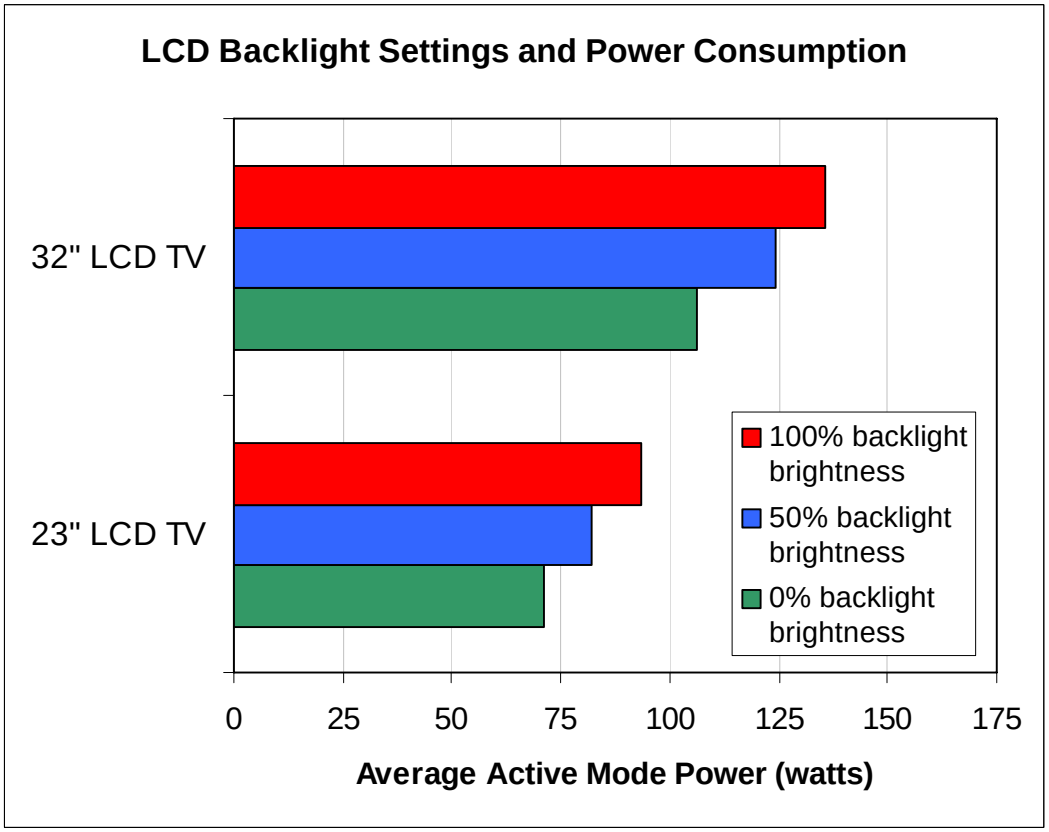


# Bright showroom settings affect power consumption in many TVs

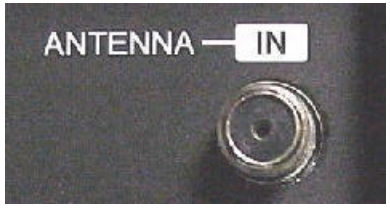


# Screen settings can even affect new LCD TVs with backlight controls

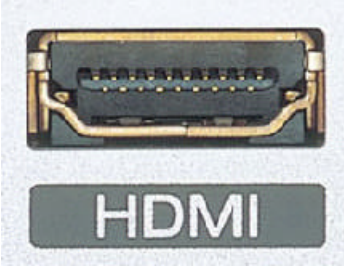


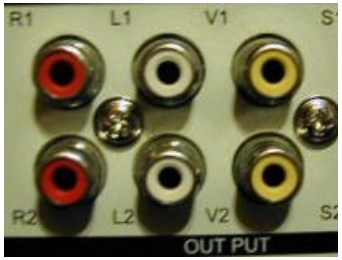

~ 14% range in power use observed

# How to feed the signal?

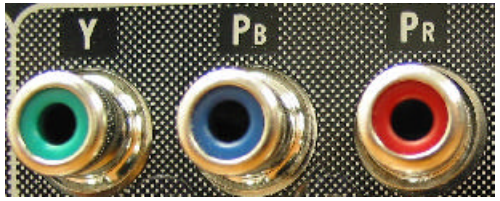




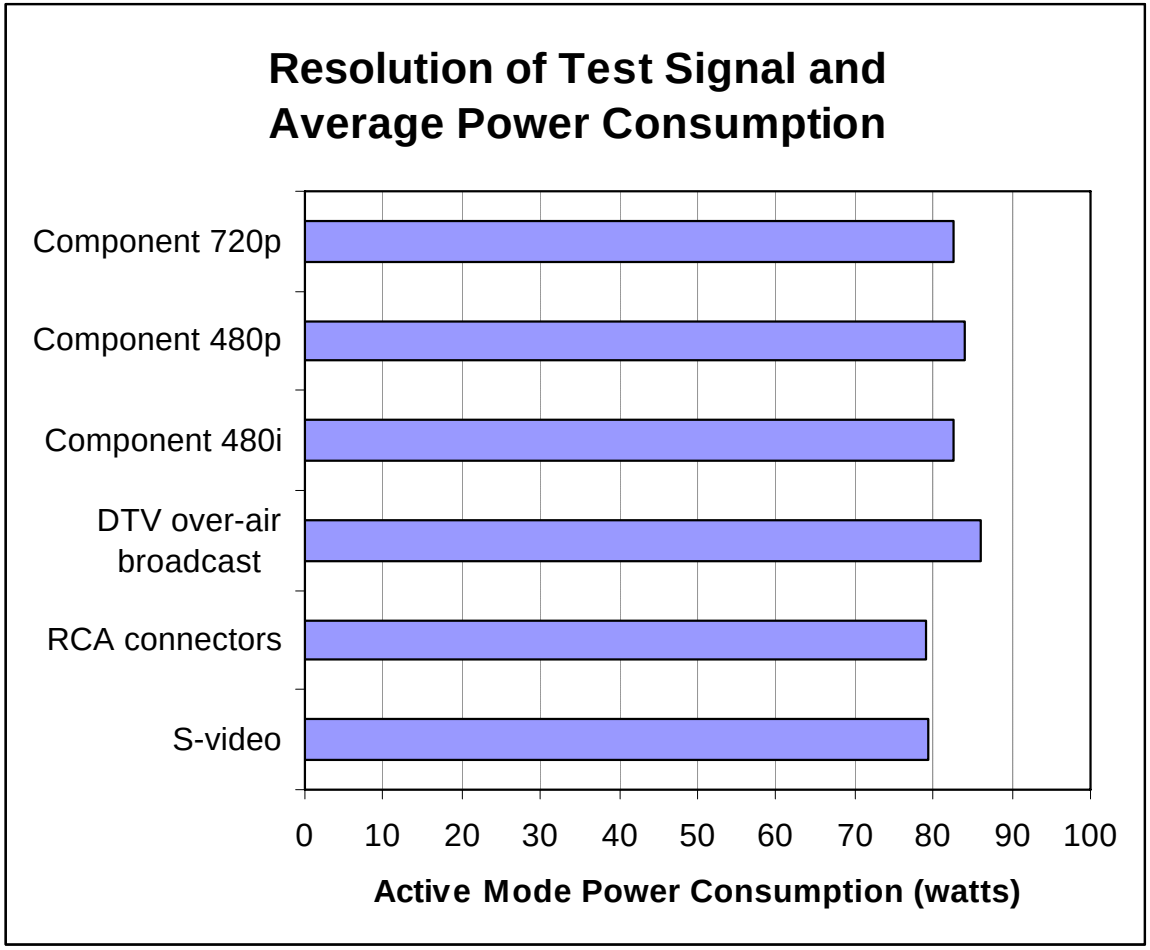







# Resolution of test signal can matter




5% - 10% increase in power consumption using digital signals

# What *is* a good TV test method?

- Easy to Conduct
  - A trained technician should be able to quickly and easily perform the test
- Reproducible
  - Test setup should be clear enough that results do not vary with lab or technician
- Robust
  - Can measure all types of TVs, regardless of display technology (CRT, LCD, PDP, etc.)
  - No significant changes in test procedure would be required for future technologies
- Representative
  - Should indicate real world power consumption of TV

# Questions?

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