Little information on TV power use
What test methods are available?

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<th>Measures black and white CRTs</th>
<th>Measures color CRTs</th>
<th>Measures new display types</th>
<th>Reflects real world power consumption</th>
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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 and AGO)

Active Mode Power (watts) vs. Screen Area (square inches)

Legend:
- Plasma
- Projection
- LCD
- CRT

[Graph showing power consumption data for different types of TVs]
How do we fairly gauge efficiency in TVs?

Lumens/watt

\[
\text{watts/m^2}\ ?
\]

kWh/year

Based on standard U.S. Government tests.

Compare the Energy Use of this Refrigerator with Others before You Buy.

This Model Uses 776 kWh/year.

Energy Use (kWh/year) range of all similar models:

- Uses Least Energy: 742 kWh/year
- Uses Most Energy: 835 kWh/year

kWh/year (kilowatt-hours per year) is a measure of energy (electricity) use.

Your utility company uses it to compute your bill. Only models with 22.5 to 24.4 cubic feet and the same features are used in this scale.
Different Trends for Different Technologies

Power Consumption Trends in Direct View and Projection TVs

- **Direct View**: 0.35 watts per square inch
- **Projection**: 0.15 watts per square inch
Room for efficiency improvements in all technologies

![Efficiency Chart](chart.png)

- **NRDC/Ecos results (n=25)**
- **Australia results (n=104)**

- **CRT**
- **LCD**
- **PDP**
- **Projection**

Efficiency (watts/square inch)
Future technologies provide hope of increased efficiency

Energy Use of TVs and Home Appliances

**TVs**
- < 30" Direct View TV
- 30 - 40" Direct View TV
- > 40" Direct View TV
- Projection TV

**Appliances**
- Washing machine
- Dishwasher 22.5 cu ft
- Refrigerator

- **Active Mode**
- **Standby Mode**
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.

Effect of Screen Settings on TV Power Consumption

- 32" CRT
- 50" PDP
- 27" CRT
- 32" CRT
- 32" LCD

Average Power Consumption (watts)

Factory default screen settings
DVE calibrated screen settings
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

Resolution of Test Signal and Average Power Consumption

- Component 720p
- Component 480p
- Component 480i
- DTV over-air broadcast
- RCA connectors
- S-video

Active Mode Power Consumption (watts)

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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