NRDC TV Energy Efficiency Research

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

<table>
<thead>
<tr>
<th>Method</th>
<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>
</tr>
</thead>
<tbody>
<tr>
<td>DOE method</td>
<td>✔</td>
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<tr>
<td>JEITA method</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>IEC 62087</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
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)

Screen Area (square inches)
Power Consumption in Direct View and Projection TVs (NRDC/Ecos and AGO)

- Active Mode Power (watts)
- Screen Area (square inches)

Legend:
- Plasma
- Projection
- LCD
- CRT
How do we fairly gauge efficiency in TVs?

Lumens/watt

\[ \frac{\text{watts}}{\text{in}^2} \]
Different Trends for Different Technologies

Power Consumption Trends in Direct View and Projection TVs

- Active Mode Power (watts) vs. Screen Area (square inches)
- Direct View: 0.35 watts per square inch
- Projection: 0.15 watts per square inch
Room for efficiency improvements in all technologies

Efficiency (watts/square inch)

- CRT
- LCD
- PDP
- Projection

NRDC/Ecos results (n=25) vs. Australia results (n=104)
Future technologies provide hope of increased efficiency

Energy Use of TVs and Home Appliances

**TVs**
- Active Mode
- Standby Mode

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Annual Energy Use (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30&quot; Direct View TV</td>
<td>100</td>
</tr>
<tr>
<td>30 - 40&quot; Direct View TV</td>
<td>300</td>
</tr>
<tr>
<td>&gt; 40&quot; Direct View TV</td>
<td>600</td>
</tr>
<tr>
<td>Projection TV</td>
<td>300</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>Screen Type</th>
<th>Factory Default</th>
<th>DVE Calibrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>32&quot; CRT</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>50&quot; PDP</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>27&quot; CRT</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>32&quot; CRT</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>32&quot; LCD</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

*Average Power Consumption (watts)*
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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