"Defining Display Greenness"

Why it Matters for Consumers, Manufacturers and Regulators

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Agenda

- Announcing a New Report from Insight Media
  - "*Green Display Report - The Business Threats and Opportunities of Green Displays*"
  - Authored by Phillip Wright and Ken Werner
  - Scope of the Report
- Why do we care about green displays?
- What makes a display green?
- Where are we today?
  - Green characteristics of benchmark display products
  - Green display specifications and trends
  - Regulatory framework and trends
- Where do we go from here?
- How will we know when we get there?

Report Coverage and Scope

- Display Coverage
  - Televisions (LCD, PDP)
  - Monitors (LCD)
  - Notebook PC displays (LCD)
- What Makes a Display Green?
- Why be Green?
- The Selling of Green Displays
- Qualitative Green Trend Impacts
- Regulatory Framework

- This presentation covers some aspects of the report
- Full Table of Contents available

Why do we care about green displays?

Why do we care about green displays? *Manufacturers*

- To be (or appear to be) good corporate citizens
- See areas of cost saving in green design, manufacturing, and recycling
- Wish to comply with (or get ahead of) government regulations
- See opportunities for marketing and sale of green products
- Take advantage of on-going energy saving and eco-friendly trends to promote as green products

Why do we care about green displays? *Consumers*

- Lower energy consumption will save money
- Want to contribute to environmental sustainability
- Need assistance in correctly disposing of display products at end of life
- Want high quality display products with green attributes without price increase
- Want to be seen as an eco-friendly consumer

Why do we care about green displays?

Regulators

- There are substantial energy savings and GHG reductions to be obtained
- Electronic waste is a growing global problem
- Hazardous materials pollute the environment
- Negative effects on the environment need to be reduced and controlled
- Regulations can change behavior (corporate and consumer) as well as drive technology innovation

Attributes of a Green Display

- **Examples of factors determining "Green-ness"**
  - Energy and raw materials consumed and GHG produced in manufacturing the display
  - Energy consumed and the carbon footprint involved in transporting the display to the point of sale
  - Energy consumption in operation
  - Hazardous materials content
  - Ease and cost of recycling

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- **A display is considered to have green attributes if in its design, manufacture, use or disposal, it:**
  - Conserves energy
  - Results in fewer greenhouse gas emissions
  - Reduces pollution
  - Yields a more environmentally sustainable outcome compared to prior products.

Evolution of Display Products

- LCD and PDP technology have evolved over time to deliver key display performance attributes
  - high luminance
  - high resolution
  - high contrast ratio
  - wide color gamut
  - fast response
  - large screen size with thin profile

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  - fast response
  - large screen size with thin profile
- "Green" properties of earlier displays have often been secondary or background considerations
  - Energy Star
  - RoHS
  - WEEE

Why Energy Savings from Televisions?

- Energy Star points out there are 275 million TVs in U.S. consuming >50 billion kWh of energy each year
  - 4 % of all household electricity use
  - Enough to power all the homes in New York state for a year
- Consumers have/are upgrading their sets to digital and the long term trend has been to more and larger screens

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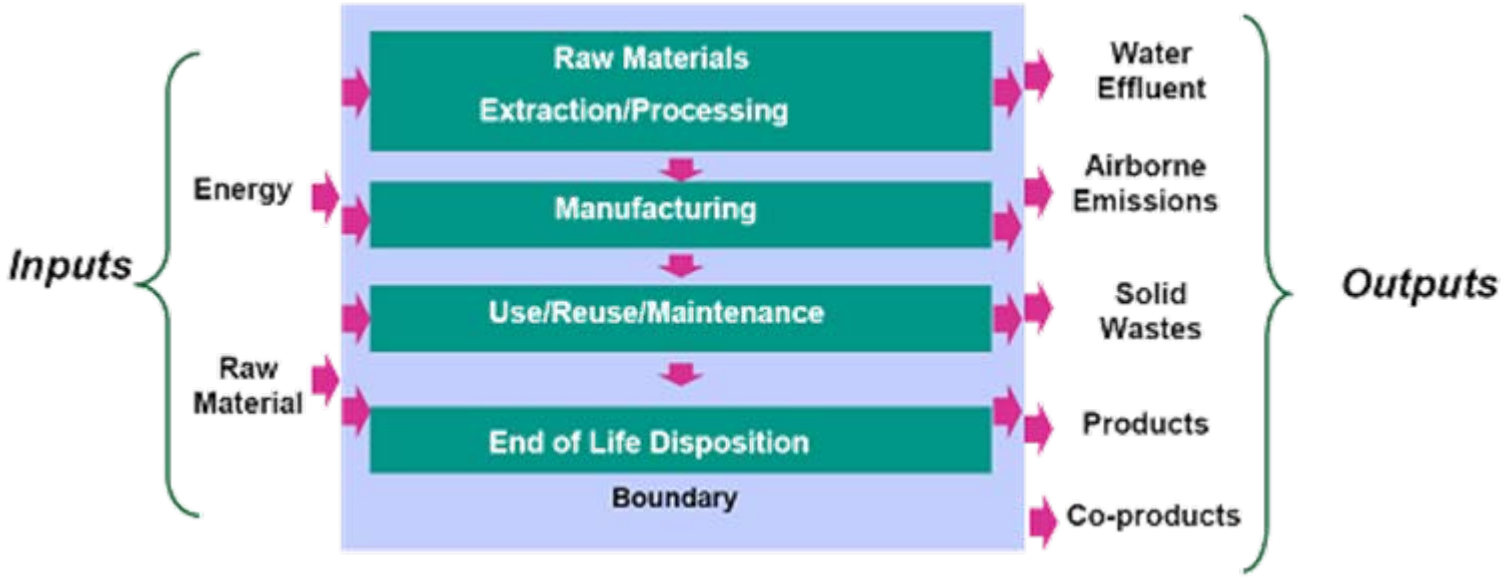
- Consumers have/are upgrading their sets to digital and the long term trend has been to more and larger screens
- *However, realizing substantial energy savings from televisions will require changes*

Green Product Lifecycle

- Energy used by the display
- Materials, Components and Supply Chain
- Energy and processes used for display manufacturing
- Transportation through the distribution supply chain and recycling process
- Recycling

Life Cycle Assessment

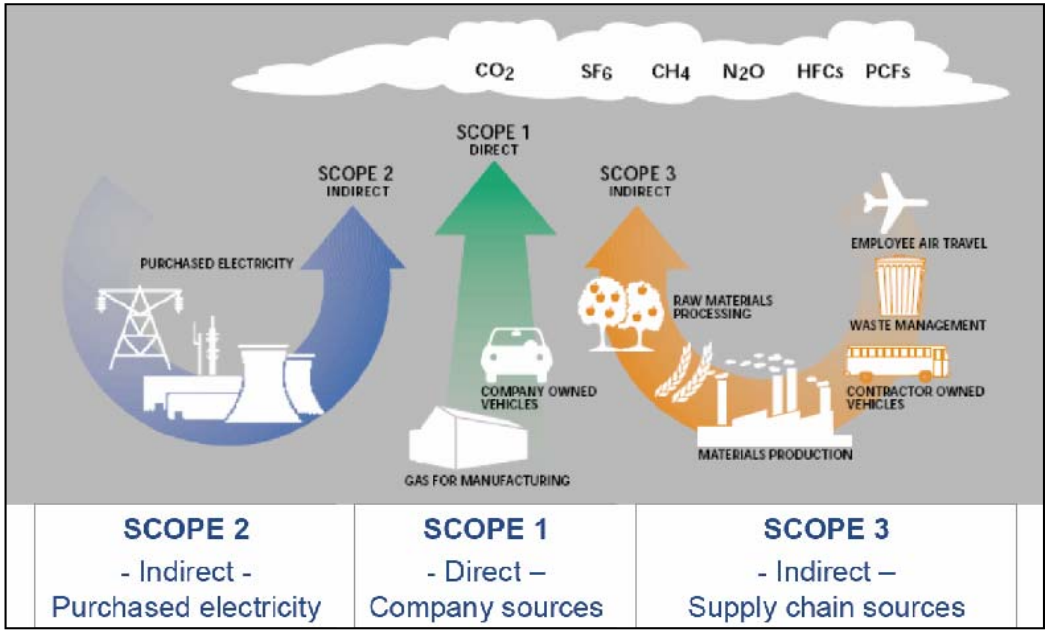
- **Intent of LCA**
  - **Capture all inputs and outputs involved in the manufacture, use and disposal or recycling of a product.**



Source: US EPA

Enterprise Carbon Accounting

- ECA should account for all direct and indirect sources of GHG emissions
- As the industry moves to adopt comprehensive LCA there have been some difficulties establishing common methods and definitions



Source: Climate Earth, Inc.

What Makes a Display Green?

- The green attributes of a display can be defined
- No accepted way to call a display product "green"
  - Just shades of green-ness today
- Should meeting Energy Star ratings make it a green display?
  - Suppose the manufacturing and disposal are not eco-friendly?
- Should guidelines in several categories be established to qualify a product as green?
  - Who sets the guidelines?
  - How will they change over time?
  - Who validates the results?

Where are we today?

- Green characteristics of benchmark 2009 display products
- Green display specifications and trends
- Regulatory framework and trends

Where are we today?

Power Consumption

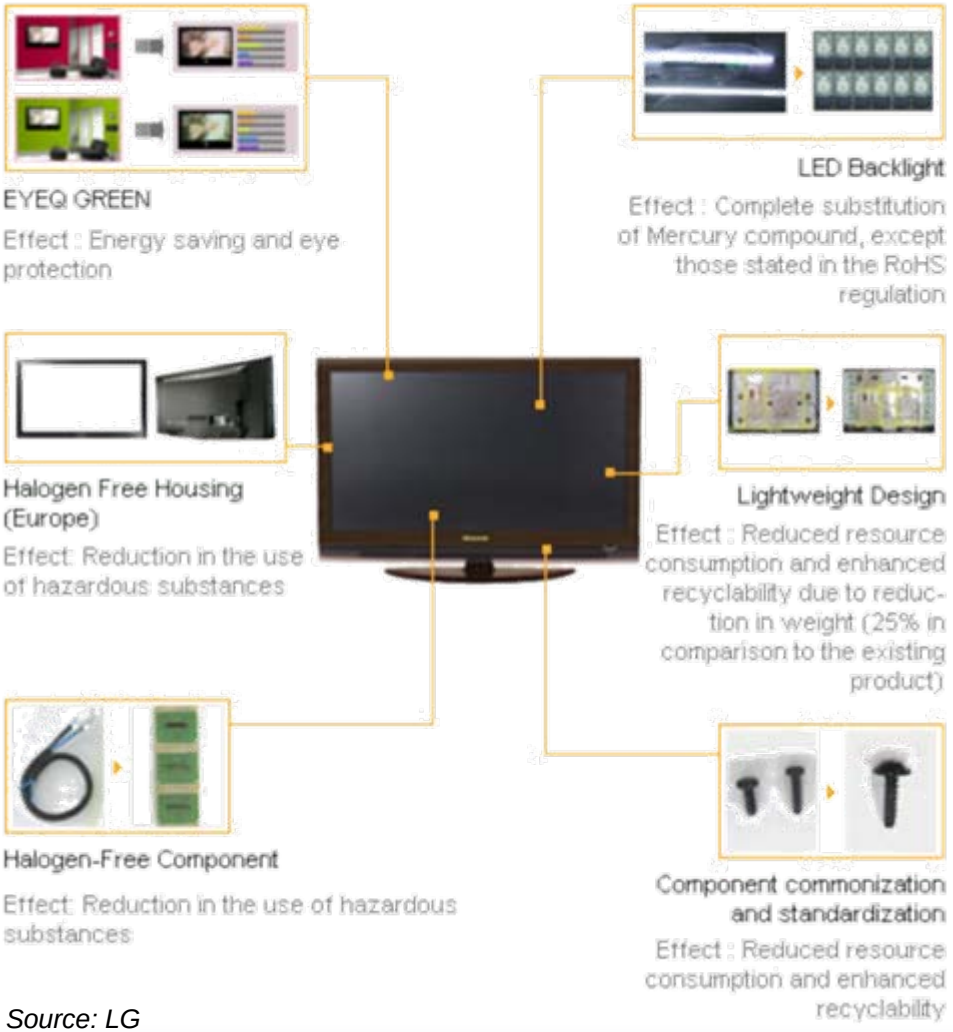
- **Needed to establish baselines for green-related specifications of commodity products available in 2009**
  - **Reasonable definition of "green-ness" would be if a product's ecologically relevant characteristics significantly exceeded this commodity baseline.**
- **Power consumption and energy efficiency features of 2009 televisions compared to 2008 models suggest some current sets are "greener"**
  - **Practical difficulties with this view**
  - **Before late 2008 there was no ratified standard method for measuring flat panel TV power consumption**
  - **Finalization of IEC 62087 Ed. 2 test procedure and its adoption by US EPA for Energy Star 3.0 - there is now a method for measuring energy consumption and comparing current and subsequent set models.**

Green Display Characteristics in 2009

- Specifications and features of green display products
  - Power consumption
  - Energy saving features
  - Reduced shipping and packaging materials
  - Reduced size and material content
  - Reduction or elimination of hazardous substances
  - Recyclability
  - Use of recycled material in the product or manufacture

Green Display Characteristics in 2009

- Display panel and set manufacturers are incorporating green features in the design of their products
- Ambient light sensors and new concepts to use eye tracking or proximity sensors to turn off the display if no one is watching



Source: LG

Green Display Characteristics in 2009 - *recyclability*

- **Material choices**
  - Aluminum rather than thermo set polymer
  - Recycled plastics
- **Free of pollutants**
  - Mercury, lead, arsenic (in glass), and halogens
  - Pollutants would have to be removed from the waste stream
- **Easy to disassemble and separate into their component parts at end of life**
- **Reducing the size and material content**
  - Material that is never included in a product to begin with does not have to be sourced, shipped, stocked, disassembled, recycled or disposed of at all.

Green Display Characteristics in 2009

- Comparison of TV sets as of mid-2009
  - Samsung set with LED backlight
    - 1.25 inches thick
    - weights 48.5 lbs (w/o stand)
    - Consumes 120 W.
  - Toshiba set with CCFL backlight
    - 4 inches thick
    - weighs 70.7 lbs. (w/o stand)
    - Consumes 201 W.
- LED backlight
  - thin, lighter weight, and lower power consumption (40% less)
- Price comparison
  - Samsung LED $2,560
  - Toshiba CCFL $2,000

Set pix		
Brand	Toshiba	Samsung
Description	55” 1080p LCD HDTV CCFL Backlight	55” 1080P LCD HDTV LED Backlight
Model No.	55ZV650U	UN55B6000
Price	$1999.99	$2,559.99
Recycling (old set)	Included (Best Buy)	Included (Best Buy)
Energy Star 3.0	Yes	Yes
Product Weight	80.5 lbs. 70.7 lbs. w/o stand	60.0 lbs. 48.5 lbs. w/o stand
Product depth	4.02” w/o stand	1.25” w/o stand
Standby Power Consumption	0.6 W	0.08 W
On Mode Power Consumption	201 W	120 W
Ambient Light Sensor	Yes	No
Proximity Sensor	No	No
Other		
Resolution	1920x1080	1920x1080
Carton Dim. (WxHxD) Weight	57.64" x 39.25" x 15.59" 102.5 lbs.	56.9” x 39.2” x 15.7” 77.6 lbs.
RoHS		

Regulatory Framework & Trends

- Regulation of displays is increasing
- Major outstanding questions
  - Mandatory vs. Voluntary?
  - Labeling vs. Laws?
  - How will the cost of recycling be recovered?
  - What are the business needs and opportunities for greener displays?
- Need and opportunity to rationalize global requirements, regulations, labeling initiatives, standards, and practices for display products
  - Currently at least 35 labeling programs for electronic equipment worldwide - 9 in Asia, 7 in North America, 7 in Europe, and 5 in Oceania
  - Globally, recycling regulation is being applied predominately at the national or federal level
  - In US, there are widespread moves by state and local governments to establish local recycling regulations

Where do we go from here?

- Serious need to simplify and clarify recycling regulations and practices.
- Widespread proliferation of requirements, regulations, labeling initiatives, standards, and practices for green displays is bewildering - likely to lead to increased industry costs, and consumer confusion.
- Harmonizing requirements, regulations, labeling initiatives, standards, and practices for green displays at all levels – city, state, federal, region, global – will absorb a great deal of effort and debate for at least the next several years.
- Harmonization is essential if expenses and benefits are to be optimized.

How will we know when we get there?

When we are …

- Realizing energy savings from displays
- Designing sets that are thinner and lighter
- Designing for the environment
- Designing for recycling
- Saving and making money through recycling
- Harmonizing global requirements and recycling practices

Green Display Index

- Recyclability
  - Recycled materials, smart design, smaller volume and weight
- Eco Impact of Manufacturing and Distribution
  - From manufacture to packaging and distribution
  - Mfg energy, GHG emission, water use, waste stream, recycled materials, hazardous materials
- Operational Efficiency
  - Scaled by screen size
  - Energy Star as first model
- Goal
  - Set up numeric index for these parameters by year and levels to be considered "green"
  - Easy to communicate to the consumer (EPEAT model?)

Call to Action

- A display industry lobbying effort is needed to:
  - Influence the harmonization of WW standards and regulations
  - Help create a green display index and roadmap

Thank You!

- **For further details about the new report:**
  - "*Green Display Report - The Business Threats and Opportunities of Green Displays*" by Phillip Wright and Ken Werner
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