



# Thunderbolt Display

## Environmental Report



Model MC914

### Date introduced

July 20, 2011

## Environmental Status Report



Thunderbolt Display is designed with the following features to reduce environmental impact:

- Arsenic-free display glass
- Brominated flame retardant-free
- Energy Efficient Ethernet enabled<sup>1</sup>
- Mercury-free LED display
- PVC-free<sup>2</sup>

Meets ENERGY STAR® Version 5.1 requirements for displays



Achieves a Gold rating from EPEAT<sup>3</sup>



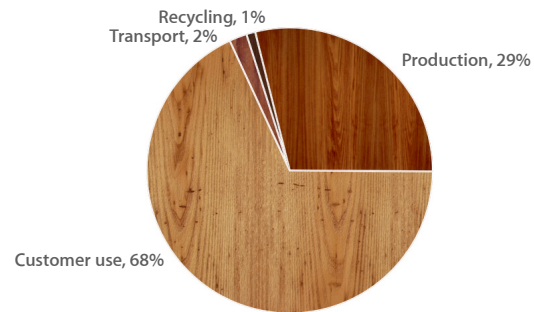
## Apple and the Environment

Apple believes that improving the environmental performance of our business starts with our products. The careful environmental management of our products throughout their life cycles includes controlling the quantity and type of materials used in their manufacture, improving their energy efficiency, and designing them for better recyclability. The information below details the environmental performance of Thunderbolt Display as it relates to climate change, energy efficiency, restricted substances, and material efficiency.

## Climate Change

Greenhouse gas emissions have an impact on the planet's balance of land, ocean, and air temperature. Most of Apple's corporate greenhouse gas emissions come from the production, transport, use, and recycling of its products. Apple seeks to minimize greenhouse gas emissions by setting stringent design-related goals for material and energy efficiency. The chart below provides the estimated greenhouse gas emissions for Thunderbolt Display over its life cycle.

### Greenhouse Gas Emissions for Thunderbolt Display



Total greenhouse gas emissions: 1040 kg CO<sub>2</sub>e

## Energy Efficiency

Because the largest portion of product-related greenhouse gas emissions results from its use, energy efficiency is a key part of each product's design. Apple products use power-efficient components and software that can intelligently power them down during periods of inactivity. The result is that Thunderbolt Display is energy efficient right out of the box.

Thunderbolt Display outperforms the stringent requirements of the ENERGY STAR Program Requirements for Displays Version 5.1. The following table details power consumption in different use modes.

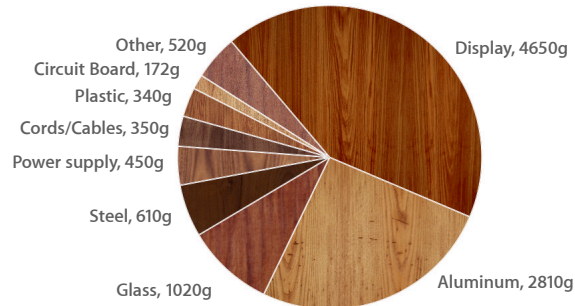
### Power Consumption for Thunderbolt Display

Mode	100V	115V	230V
Off	0.75 W	0.75 W	0.75 W
Sleep	1.90 W	1.90 W	1.90 W
On	110 W	110 W	108 W
Power Supply Efficiency	89%	89%	89%

## Material Efficiency

Apple's ultracompact product and packaging designs lead the industry in material efficiency. Reducing the material footprint of a product helps reduce energy consumed during production and material waste generated at the end of the product's life. It also helps maximize shipping efficiency. The chart below details the materials used in Thunderbolt Display.

### Material Use for Thunderbolt Display



## Packaging

The packaging design for Thunderbolt Display uses corrugated cardboard made from a minimum of 35 percent post-consumer recycled content. The following table details the materials used in its packaging.

### Packaging Breakdown for Thunderbolt Display

Material	Retail box	Retail and shipping box
Paper (corrugate, paperboard)	2360 g	3890 g
Expanded polystyrene	660 g	660 g
Polypropylene (film, fabric)	65 g	65 g
Other plastics	16 g	16 g

## Restricted Substances

Apple has long taken the lead in restricting harmful substances from its products and packaging. As part of this strategy, all Apple products comply with the strict European Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, also known as the RoHS Directive. Examples of materials restricted by RoHS include lead, mercury, cadmium, hexavalent chromium, and the brominated flame retardants (BFRs) PBB and PBDE. Thunderbolt Display goes even further than the requirements of the RoHS Directive by incorporating the following more aggressive restrictions:

- Mercury-free LED-backlit display
- Arsenic-free display glass
- BFR-free
- Polyvinyl chloride (PVC)-free internal cables
- PVC-free AC power cord for United States, Canada, Mexico, Colombia, El Salvador, Guatemala, Panama, Peru, Puerto Rico, U.S. Virgin Islands, and Venezuela



## Recycling

Through ultra-efficient design and the use of highly recyclable materials, Apple has minimized material waste at the product's end of life. In addition, Apple offers and participates in various product take-back and recycling programs in 95 percent of the regions where Apple products are sold. All products are processed in the country or region in which they are collected. For more information on how to take advantage of these programs, visit [www.apple.com/recycling/](http://www.apple.com/recycling/).

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## Definitions

**Electronic Product Environmental Assessment Tool (EPEAT):** A program that ranks computers and displays based on environmental attributes in accordance with IEEE 1680.1-2009. For more information, visit [www.epeat.net](http://www.epeat.net).

**Greenhouse gas emissions:** Estimated emissions are calculated in accordance with guidelines and requirements as specified by ISO 14040 and ISO 14044. Calculation includes emissions from the following life-cycle phases contributing to Global Warming Potential (GWP 100 years) in CO<sub>2</sub> equivalency factors (CO<sub>2</sub>e):

- **Production:** Includes the extraction, production, and transport of raw materials, as well as the manufacture of the product and product packaging.
- **Transport:** Includes air and sea transportation of the finished product and its associated packaging from the manufacturing site to continental distribution hubs. Transport of products from distribution hubs to the end customer is not included.
- **Use:** User power consumption assumes a three-year use period. Consumption patterns are modeled on data that reflects intensive daily use of the product. Geographic differences in the power grid mix have been accounted for at a continental level.
- **Recycling:** Includes transportation from collection hubs to recycling centers and the energy used in mechanical separation and shredding of parts.

**Energy efficiency terms:** The energy values in this report are based in part on the ENERGY STAR Program Requirements for Displays Version 5.1. For more information, visit [www.energystar.gov](http://www.energystar.gov).

- **Off:** Lowest power mode of the display when it is shut down. Also referred to as Standby.
- **Sleep:** Low power state that is entered after the display receives instructions from a computer or via functions. This mode is characterized by a blank screen.
- **On at full brightness:** The display is connected to a power source and a host computer and produces an image at its maximum brightness.
- **Power supply efficiency:** Average of the power supply's measured efficiency when tested at 100 percent, 50 percent, and 20 percent of the power supply's rated output current.

**Restricted substances:** Apple defines a material as BFR-free and PVC-free if it contains less than 900 parts per million (ppm) of bromine and of chlorine.

1. Energy Efficient Ethernet requires a compliant switch to enter low-power mode.
2. PVC-free AC power cord available in the United States, Canada, Mexico, Colombia, El Salvador, Guatemala, Panama, Peru, Puerto Rico, U.S. Virgin Islands, and Venezuela.
3. Thunderbolt Display achieved a Gold rating from EPEAT in the United States and Canada.

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