15-inch MacBook Pro
Environmental Report

Models MR932, MR942, MR962, MR972

Date introduced
July 12, 2018

Environmental Status Report

The 15-inch MacBook Pro is designed with the following features to reduce environmental impact:

- Arsenic-free display glass
- Mercury-free LED-backlit display
- Brominated flame retardant–free
- PVC-free
- Beryllium-free
- Recyclable aluminum enclosure
- Greenhouse gas emissions from aluminum enclosure reduced by 65 percent

Meets ENERGY STAR® requirements

Achieves a Gold rating from EPEAT[3]

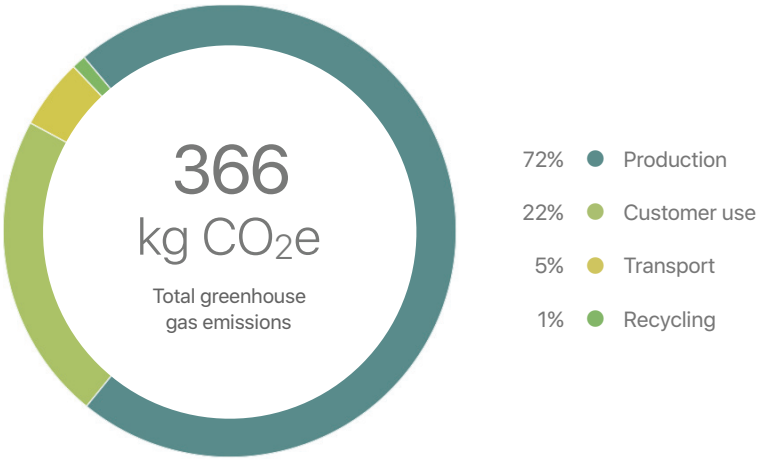
Apple and the Environment

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 types of materials used in their manufacture, improving their energy efficiency, and designing them for better recyclability. The information below details the environmental performance of the 15-inch MacBook Pro as it relates to climate change, energy efficiency, material efficiency, and restricted substances.[1]

Climate Change

Greenhouse gas emissions have an impact on the planet's balance of land, ocean, and air temperatures. Most of Apple's corporate greenhouse gas emissions come from the production, transport, use, and recycling of our products. Apple seeks to minimize greenhouse gas emissions by designing products to be as energy efficient as possible, sourcing materials with lower-carbon emissions, and partnering with suppliers to procure clean energy to power their facilities. For example, Apple sourced aluminum that was smelted using hydroelectricity rather than fossil fuels, and has reengineered the manufacturing process to reincorporate scrap aluminum. As a result, the greenhouse gas emissions of the enclosure are reduced by 65 percent. The chart below provides the estimated greenhouse gas emissions for the 15-inch MacBook Pro over its life cycle.[2]

Greenhouse Gas Emissions for 15-inch MacBook Pro
2.2GHz processor with 256GB storage



Battery design

The 15-inch MacBook Pro features a lithium-ion polymer battery chemistry that is free of lead, cadmium, and mercury. This allows for an extended lifespan and is designed to deliver up to 1000 full charge and discharge cycles before it reaches 80 percent of its original capacity.

Energy Efficiency

A significant portion of product-related greenhouse gas emissions occurs during the customer use phase. Energy efficiency is therefore prioritized throughout the 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 MacBook Pro is energy efficient right out of the box.

The 15-inch MacBook Pro outperforms the ENERGY STAR Program Requirements for Computers, by consuming less than one-half of the energy allowed. The following table details power consumed in different use modes.

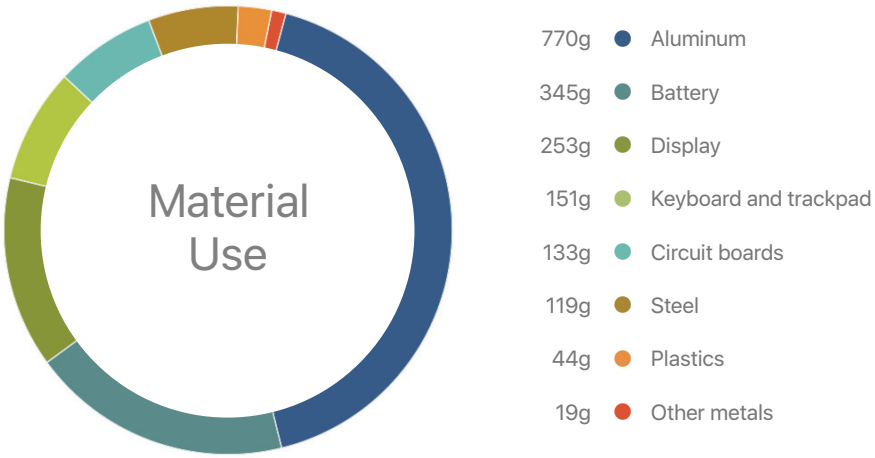
Power Consumption for 15-inch MacBook Pro

Mode	100V	115V	230V
Off	0.26W	0.26W	0.31W
Sleep	0.71W	0.73W	0.78W
Idle—Display on	4.19W	4.20W	4.21W
Power adapter, no-load	0.025W	0.028W	0.054W
Power adapter efficiency	90.5%	90.8%	90.5%

Material Efficiency

Apple's ultracompact product and packaging designs lead the industry in material efficiency. Reducing the material footprint of a product helps maximize shipping efficiency. It also helps reduce energy consumed during production and material waste generated at the end of the product's life. The 15-inch MacBook Pro enclosure is made of aluminum and other materials highly desired by recyclers. In addition, the feet, fan, rear vent, speaker, and keyboard hinge mechanism are made from plastics containing recycled or bio-based content, which reduces dependence on petroleum-based plastics. The chart details the materials used in this model.[4]

Material Use for 15-inch MacBook Pro



U.S. retail packaging of 15-inch MacBook Pro contains an average of 38 percent recycled content by weight.

Packaging

The packaging for the 15-inch MacBook Pro is recyclable, and 100 percent of the fiber is from either recycled content or responsibly managed forests. The following table details the materials used in its packaging.[1]

Packaging Breakdown for 15-inch MacBook Pro

Material	Retail box	Retail and shipping box
Fiber (corrugate, molded fiber)	412g	911g
High-impact polystyrene	208g	208g
Other plastics	16g	16g

Restricted Substances

Apple has long taken a leadership role in restricting harmful substances from our 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. The 15-inch MacBook Pro goes even further than the requirements of the RoHS Directive by incorporating the following more aggressive restrictions:

- Arsenic-free display glass
- Mercury-free LED-backlit display
- BFR-free
- PVC-free
- Beryllium-free

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 99 percent of the countries where Apple sells products, including at every Apple Store. For more information on how to recycle your products at end of life, visit www.apple.com/recycling.

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.

Greenhouse gas emissions: Estimated emissions are calculated in accordance with guidelines and requirements as specified by ISO 14040 and ISO 14044. Calculation includes emissions for the following life-cycle phases contributing to Global Warming Potential (GWP 100 years) in CO_2 equivalency factors (CO_2e):

- **Production:** Includes the extraction, production, and transportation of raw materials, as well as the manufacture, transport, and assembly of all parts and product packaging.
- **Transport:** Includes air and sea transportation of the finished product and its associated packaging from the manufacturing site to regional distribution hubs. Transport of products from distribution hubs to end customer is modeled using average distances based on regional geography.
- **Customer use:** Apple conservatively assumes a four-year period for power use by first owners. Product use scenarios are based on historical customer use data for similar products, collected anonymously. Geographic differences in the power grid mix have been accounted for at a regional 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 15-inch MacBook Pro is tested with a fully charged battery and powered by the 87W USB-C Power Adapter with the USB-C Charge Cable (2m). The energy efficiency values in this report are based on the ENERGY STAR Program Requirements for Computers. For more information, visit www.energystar.gov.

- **Off:** Lowest power mode of the system. System is shut down. Also referred to as Standby.
- **Sleep:** Low power state that is entered automatically after 10 minutes of inactivity (default), or by selecting Sleep from the Apple menu. Wake for network access enabled.
- **Idle—Display on:** System is on and has completed loading macOS. Display brightness was set as defined by ENERGY STAR Program Requirements for Computers and Auto-Brightness was turned off. Connected to Wi-Fi.
- **Power adapter, no-load:** Condition in which the 87W USB-C Power Adapter with the USB-C Charge Cable (2m) is connected to AC power, but not connected to the system.
- **Power adapter efficiency:** Average of the 87W USB-C Power Adapter with the USB-C Charge Cable (2m) measured efficiency when tested at 100 percent, 75 percent, 50 percent, and 25 percent of the power adapter'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. Apple defines a material as beryllium-free if it contains less than 1000 parts per million (ppm) of beryllium. A complete list of Apple's restrictions on hazardous substances is available at www.apple.com/environment/answers.

1. Product evaluations based on U.S. configurations of Models MR932 and MR962.
2. Enclosure greenhouse gas emission reduction compared to average primary aluminum ingot. Greenhouse gas emissions vary according to the configuration of 15-inch MacBook Pro. The following table details the estimated greenhouse gas emissions for U.S. configurations of 15-inch MacBook Pro over its life cycle.

Configuration	Greenhouse Gas Emissions
2.2GHz 6-Core Processor with 256GB Storage	366 kg CO_2e
2.6GHz 6-Core Processor with 512GB Storage	386 kg CO_2e

3. The 15-inch MacBook Pro achieved a Gold rating from EPEAT in the United States and Canada.
4. Excludes USB-C Charge Cable and 87W USB-C Power Adapter. Mass will vary by configuration.