



# Product Environmental Report

## iPhone 11

September 10, 2019

### Made with better materials

**100%**

recycled tin in the solder of the main logic board

**100%**

recycled rare earth elements in the Taptic Engine

### Energy efficient

**40%**

less energy consumed than the U.S. Department of Energy requirements for battery charger systems

### Responsible packaging

**100%**

of the wood fiber comes from recycled and responsible sources

**<7%**

plastic in packaging



### Tackling climate change

**100%**

All iPhone 11 final assembly suppliers have committed to 100% renewable energy for Apple production.

### Smarter chemistry<sup>1</sup>

- Arsenic-free display glass
- Mercury-free
- Brominated flame retardant-free
- PVC-free
- Beryllium-free

### Apple Trade In

Return your device through Apple Trade In and we'll give it a new life or recycle it for free.

**First-ever smartphone made with 100% recycled rare earth elements in the Taptic Engine\***

\*The Taptic Engine represents about 25 percent of the total rare earth elements used in the product.

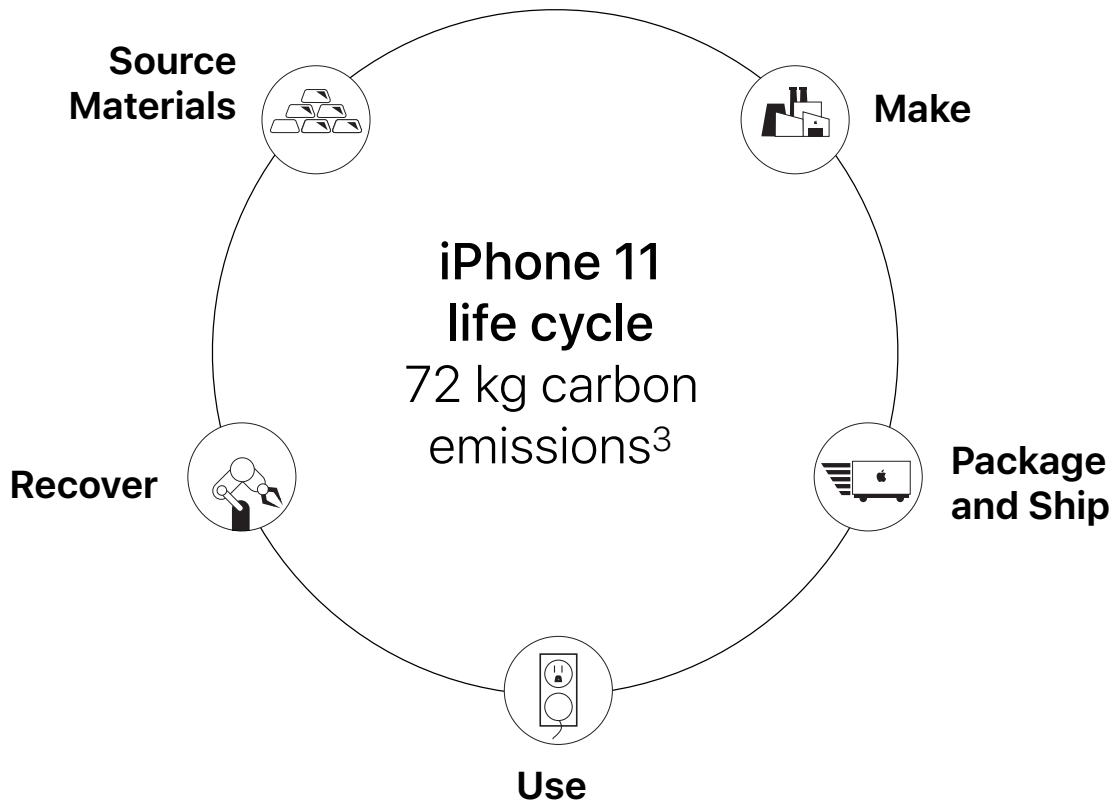
This report includes data current as of product launch. Product evaluations are based on U.S. configuration of iPhone 11.



# Taking responsibility for our products at every stage

We take responsibility for our products throughout their life cycles—including the materials they are made of, the people who assemble them, and how they are recycled at end of life. And we focus on the areas where we can make the biggest difference for our planet: reducing our impact on climate change, conserving important resources, and using safer materials.

**We sell millions of products. So making even small adjustments can have a meaningful impact.**



## Carbon footprint

We continue to make progress in reducing Apple's contribution to climate change—by focusing on making energy-efficient products with renewable or recycled materials and with renewable energy. iPhone 11 uses low carbon aluminum smelted using hydroelectricity rather than fossil fuels, which reduces the associated greenhouse gas emissions by 68 percent.<sup>4</sup> Total product emissions increased slightly—about 6 percent—compared to iPhone XR.<sup>5</sup> Apple is committed to using carbon life cycle assessments to identify opportunities to drive down product greenhouse gas emissions.

## iPhone 11 life cycle carbon emissions

79%	Production
3%	Transport
17%	Use
<1%	End-of-life processing



# Source Materials

First smartphone made with 100 percent recycled rare earth elements in the Taptic Engine.\*

To conserve precious resources, we work to reduce the material we use and aim to one day source only recycled or renewable materials in our products. And as we make this transition, we remain committed to the responsible sourcing of primary materials. We identify and map materials in our products to the farthest reaches of our supply chain, and proudly lead our industry in establishing the strictest standards for smelters and refiners. Our product designs also consider the safety of those who make, use, and recycle our products, restricting the use of hundreds of harmful substances. Our standards go far beyond what's required by law to protect people and the environment.



## Rare earth elements

Most magnets in consumer electronics are made with virgin rare earth elements, and rarely do those used get recycled. So we worked with our suppliers to make a new magnet with 100 percent recycled rare earth elements for the Taptic Engine. This means more materials in the device come from recycled sources—not mines.



## Plastic

We're transitioning to renewable and recycled alternatives from fossil fuel-based plastics. For iPhone 11, we use 35 percent or more recycled plastic in multiple components.



## Tin

We use 100 percent recycled tin<sup>6</sup> in the solder of the main logic board, where the majority of the tin is located. Apple also requires 100 percent of identified tin, tantalum, tungsten, gold, and cobalt smelters and refiners to participate in third-party audits.<sup>7</sup>



## Made without

Free of harmful substances like mercury, brominated flame retardants, PVC, phthalates, arsenic in the display glass, and beryllium.<sup>1</sup> And 100 percent of the materials in iPhone 11 are protected by our [Regulated Substances Specification](#). We go even further by aiming to understand the nonregulated substances in every part of every product—so far we've identified the makeup of 75 percent by mass of iPhone 11.

\*The Taptic Engine represents about 25 percent of the total rare earth elements used in the product.



# Make

Every year, we assess our suppliers against our Supplier Code of Conduct, which requires suppliers to make workplaces better for employees and the environment.

We work closely with the suppliers that make our products to reduce their environmental impact, and to treat people making Apple products with dignity and respect, provide opportunities to advance, and maintain a safe work environment. Our Supplier Code of Conduct sets high expectations for our suppliers. With strong foundational standards, we can make further progress, from helping suppliers transition to renewable energy to providing educational opportunities for their employees. And in 2018, we achieved UL Zero Waste certification for all iPhone final assembly test and packaging facilities.<sup>8</sup>

### Greener chemicals

All iPhone 11 final assembly supplier sites use safer cleaners and degreasers in their manufacturing processes.<sup>9</sup>

### Zero Waste to Landfill

iPhone 11 final assembly supplier sites do not generate any waste sent to landfill.<sup>8</sup>

### Supplier energy use

All iPhone 11 final assembly suppliers have begun transitioning to 100 percent renewable energy for Apple production.





# Package and Ship

iPhone 11 packaging is made with recyclable, fiber-based materials.

To improve our packaging, we are working to eliminate plastics, increase recycled content, and use less packaging overall. All of the wood fiber in our packaging is either recycled or comes from responsibly managed forests.<sup>10</sup> And we have protected or created enough responsibly managed forests to cover all the wood fiber we use in our packaging.<sup>11</sup> This ensures working forests are able to regrow and continue to clean our air and purify our water.

**100%**

of the primary wood fiber in the packaging comes from responsibly managed forests<sup>10</sup>

**93%**

of the packaging<sup>12</sup> is fiber based

**62%**

of the fiber content in packaging is recycled





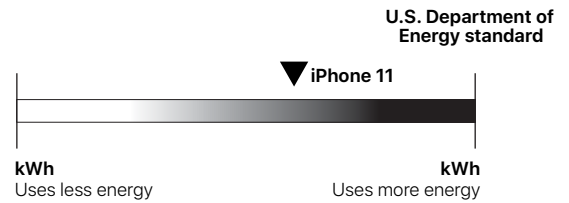
# Use

iPhone 11 uses 40 percent less energy than the energy conservation standard.

We design our products to be energy efficient, long lasting, and safe. iPhone 11 uses software and power-efficient components that intelligently manage power consumption. We also run our own Reliability and Environmental Testing Labs so our products go through rigorous testing before they leave our doors. Our support continues throughout each product’s life cycle, with regular software updates to keep devices current and a network of authorized repair professionals to service them, if necessary.

## Energy efficiency

Apple devices consistently exceed the U.S. Department of Energy Federal Energy Conservation Standards for Battery Chargers.<sup>13</sup> iPhone 11 consumes 40 percent less energy than required by this standard.



## Designed to last

iPhone 11 will launch with iOS 13, which offers features to optimize battery charging and reduce the effects of battery aging.

## Made with smarter chemistry

We apply rigorous controls for materials users touch most—all based on recommendations from toxicologists and dermatologists.

# Recover

Return your product with Apple Trade In and we'll ensure it has a long life, or we'll recycle it for free.

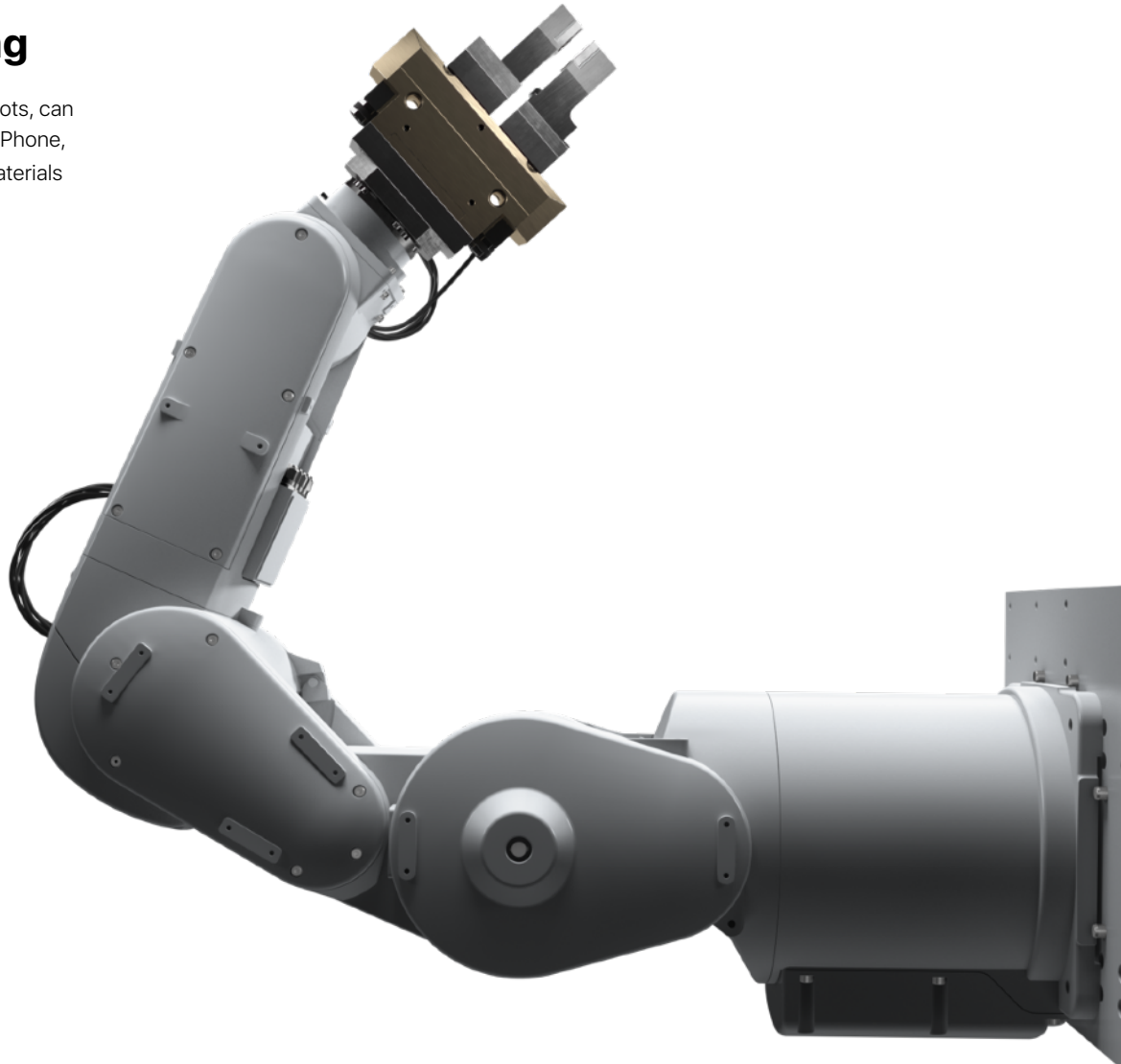
When products are used longer, fewer resources are extracted from the earth. That's why we launched Apple Trade In—it offers customers a seamless way to return their old devices to Apple. Customers can trade in eligible devices for an Apple Store Gift Card.<sup>14</sup> If a device is not eligible for credit, we'll recycle it for free. For more information on how to recycle your products at end of life, visit [apple.com/shop/trade-in](https://apple.com/shop/trade-in). We also offer and participate in [product take-back and recycling programs](#) for 99 percent of the countries where we sell products—and we hold our recyclers to high standards. Our efforts to keep harmful substances out of our products also mean our materials are safer to recover and reuse.



## iPhone recycling

Daisy, Apple's line of disassembly robots, can disassemble 15 different models of iPhone, recovering more of the important materials stored inside.

[See Daisy in action](#)



# Definitions

**Recycled materials:** Recycling makes better use of finite resources by sourcing from recovered rather than mined materials. Recycled content claims for materials used in our products have been verified by an independent third party to a recycled content standard that conforms to ISO 14021.

**Bio-based plastics:** Bio-based plastics are made from biological sources rather than from fossil-fuel sources. Bio-based plastics allow us to reduce reliance on fossil fuels.

**Renewable materials:** We define bio-materials as those that can be regenerated in a human lifespan, like paper fibers or sugarcane. Bio-materials can help us use fewer finite resources. But even though bio-materials have the ability to regrow, they are not always managed responsibly. Renewable materials are a type of bio-material managed in a way that enables continuous production without depleting earth's resources. That's why we focus on sources that are certified for their management practices.

**Supplier Clean Energy Program:** Since the electricity used to make our products is the largest contributor to our overall carbon footprint, we're helping our suppliers become more energy efficient and transition to new renewable energy sources. As part of this program, Apple and our suppliers are working to generate and procure more than 4 gigawatts of new renewable energy worldwide by 2020. This goal represents approximately one-third of our current manufacturing carbon footprint.

**Carbon footprint:** Estimated emissions are calculated in accordance with guidelines and requirements as specified by ISO 14040 and ISO 14044. There is inherent uncertainty in modeling carbon emissions due primarily to data limitations. For the top component contributors to Apple's carbon emissions, Apple addresses this uncertainty by developing detailed process-based environmental models with Apple-specific parameters. For the remaining elements of Apple's carbon footprint, we rely on industry average data and assumptions. Calculation includes emissions for 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 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 manufacturing site to regional distribution hubs. Transport of products from distribution hubs to end customers is modeled using average distances based on regional geography.
- **Use:** Apple conservatively assumes a three-year period for power use by first owners. Product use scenarios are based on historical customer use data for similar products. Geographic differences in the power grid mix have been accounted for at a regional level.
- **End-of-life processing:** Includes transportation from collection hubs to recycling centers and the energy used in mechanical separation and shredding of parts. For more information on the carbon footprint, visit [apple.com/environment/answers](https://apple.com/environment/answers).

# Endnotes

<sup>1</sup> Apple defines its restrictions on harmful substances, including definitions for what Apple considers to be "free of," in the [Apple Regulated Substances Specification](#). Every Apple product is free of PVC and phthalates with the exception of AC power cords in India, Thailand, and South Korea, where we continue to seek government approval for our PVC and phthalates replacement. Apple products comply with the European Union Directive 2011/65/EU and its amendments, including exemptions for the use of lead such as high-temperature solder. Apple is working to phase out the use of these exempted substances where technically possible.

<sup>2</sup> iPhone 11 achieved a Gold rating for EPEAT in the United States and Canada. Electronic Product Environmental Assessment Tool (EPEAT) is a program that ranks computers and displays based on environmental attributes in accordance with the requirements in UL 110 Standard for Sustainability for Mobile Phones. For more information, visit [www.epeat.net](http://www.epeat.net).

<sup>3</sup> Greenhouse gas emissions were calculated using a life cycle assessment methodology in accordance with ISO 14040 and 14044 standards and based on the iPhone 11 64GB memory configuration.

Configuration	Carbon footprint	
	iPhone 11	iPhone Xr
64GB	72 kg CO <sub>2</sub> e	68 kg CO <sub>2</sub> e
128GB	77 kg CO <sub>2</sub> e	73 kg CO <sub>2</sub> e
256GB	89 kg CO <sub>2</sub> e	82 kg CO <sub>2</sub> e



# Endnotes

- <sup>4</sup> Enclosure greenhouse gas emission reduction is based on a comparison to average primary aluminum ingot.
- <sup>5</sup> iPhone XR was used for comparison as the most recent and similar device with the same screen size.
- <sup>6</sup> The recycled content claim applies to the tin in the solder.
- <sup>7</sup> Third-party assessments seek to confirm sourcing practices and are part of our responsible sourcing program. In addition, our efforts consider conflict, human rights, and other risks.
- <sup>8</sup> Final assembly supplier sites for iPhone 11 are third-party certified as Zero Waste by UL LLC (UL 2799 Standard). This means these final assembly supplier sites do not generate any waste sent to landfill.
- <sup>9</sup> Only chemicals that meet GreenScreen® benchmark 3 or 4 are considered safer and preferred for use. In 2017, 18 final assembly supplier facilities adopted these safer cleaners. And in 2018, 100 percent of process chemicals used at final assembly supplier facilities were verified to comply with the [Apple Regulated Substances Specification](#) for the third year in a row. GreenScreen is a comprehensive hazard assessment tool that evaluates substances against 18 different criteria. For more information, visit [www.greenscreenchemicals.org](http://www.greenscreenchemicals.org).
- <sup>10</sup> Responsible sourcing of wood fiber is defined in Apple's [Sustainable Fiber Specification](#). We consider wood fibers to include bamboo.
- <sup>11</sup> For more information about our work to protect and create responsibly managed forests, please read our [Environmental Responsibility Report](#).
- <sup>12</sup> Breakdown of U.S. retail packaging by weight.
- <sup>13</sup> Efficiency performance is based on the U.S. Department of Energy: [Federal Energy Conservation Standards for Battery Chargers](#). Please note that ENERGY STAR does not certify smartphone devices.

Energy efficiency terms: The energy efficiency values are based on the following conditions.

- Power adapter, no-load: Condition in which the Apple USB Power Adapter with the Lightning to USB Cable (1m) is connected to AC power, but not connected to iPhone.
- Power adapter efficiency: Average of the Apple 5W USB Power Adapter with the Lightning to USB Cable (1m) measured efficiency when tested at 100 percent, 75 percent, 50 percent, and 25 percent of the power adapter's rated output current.

Mode	Power consumption for iPhone 11		
	100V	115V	230V
Power adapter, no-load	0.014W	0.014W	0.012W
Power adapter efficiency	74.3%	74.3%	73.1%

- <sup>14</sup> Trade-in values vary based on the condition, year, and configuration of your trade-in device, and may also vary between online and in-store trade-in. You must be at least 18 years old. In-store trade-in requires presentation of a valid, government-issued photo ID (local law may require saving this information). Additional terms from Apple or Apple's trade-in partners may apply.

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