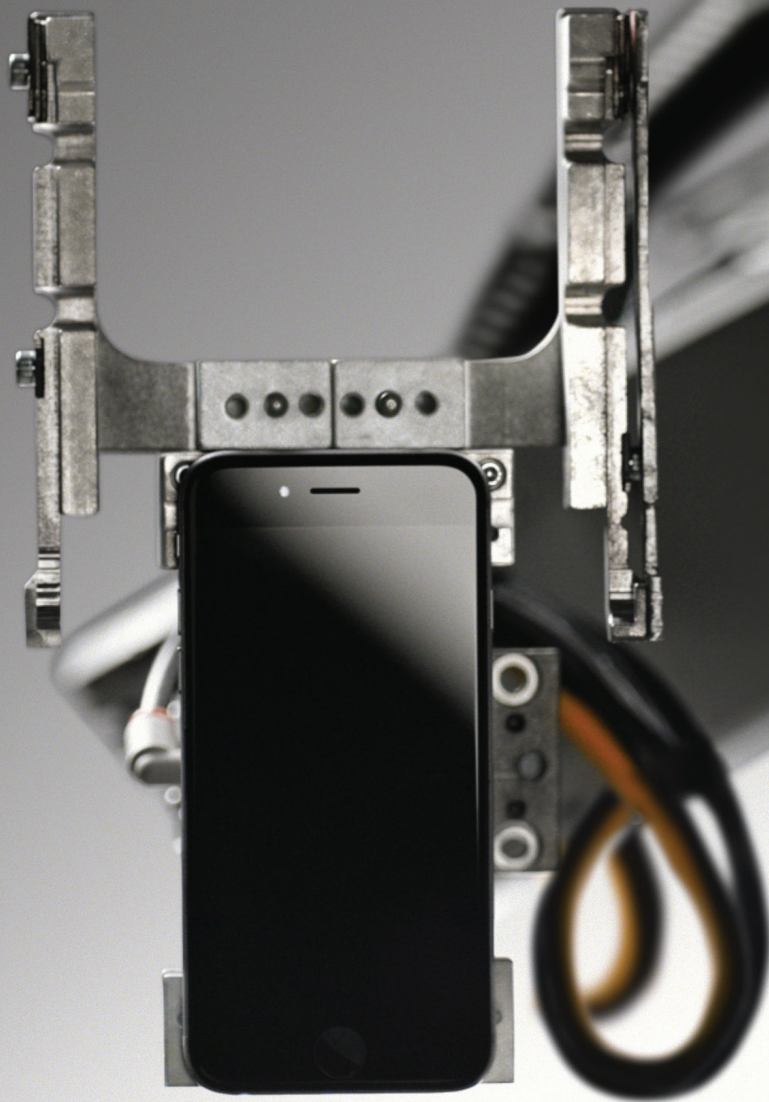




# Environmental Responsibility Report

2016 Progress Report, Covering Fiscal Year 2015



We designed a line of robots that can take apart up to 1.2 million phones a year. We call it Liam.



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# Environmental Responsibility at Apple

We're working to protect or create up to a million acres of responsibly managed forest.



Our work is led by Lisa Jackson, Apple's Vice President of Environment, Policy and Social Initiatives, reporting directly to CEO Tim Cook. The Office of Environment, Policy and Social Initiatives works with teams across Apple to set strategy, engage stakeholders, and communicate progress. Our integrated approach means that decisions about Apple values, including environment, are reviewed and supported at the highest levels of the company.

Innovation is at the heart of everything we do at Apple, and that extends to our commitment to protecting the natural environment for the future.

We believe our planet deserves our best thinking. So we're constantly striving to find or invent solutions to important environmental challenges—whether it's a line of robots that disassembles iPhone 6 for recycling, a vast network of solar panels on urban rooftops to power our facilities in Singapore, or new product designs that eliminate harmful substances like beryllium.

Apple's 2016 Environmental Responsibility Report, covering fiscal year 2015, is our ninth annual update, highlighting the progress we've made and the places we're working hard to improve.

Focus and simplify is one of our mantras. So, after deep reflection, data analysis, and conversations with stakeholders, we set three priorities where we believe Apple can make the most impact:

- Reduce our impact on climate change by using renewable energy sources and driving energy efficiency in our products and facilities.
- Conserve precious resources so we all can thrive.
- Pioneer the use of safer materials in our products and processes.
- This report details how we are approaching each of these priorities, and highlights some of our key accomplishments to date.

For starters, as of January 2016, we're sourcing or generating enough renewable energy to cover 93 percent of the electricity we use at our facilities worldwide. In fact, Apple is now 100 percent renewable in 23 countries, including China, Germany, Singapore, and the United States. We're also 100 percent renewable at every one of our data centers. So whenever you send an iMessage, download a song from iTunes, or ask Siri a question, the energy Apple uses doesn't contribute to climate change.

In the past five years, we have reduced the carbon footprint of Apple facilities by 64 percent thanks to our clean energy use, avoiding over 1 million metric tons of carbon emissions. We're working hard to reach 100 percent renewable energy for all of our facilities worldwide, and help our suppliers in China and everywhere around the world make the same transition to clean energy as we have.

# 1.5billion

In February 2016, we issued a US\$1.5 billion green bond, the first ever by a U.S. tech company. The green bond proceeds are dedicated to financing environmental projects—because environmental responsibility is core to our business.

We're as committed as ever to conserving precious resources. In 2015, we diverted more than 89 million pounds of e-waste from landfills. And more recently, we introduced Liam, a line of robots that can disassemble an iPhone every 11 seconds and sort its high-quality components so they can be recycled, reducing the need to mine those resources from the earth. It's an experiment in recycling technology, and we hope this kind of thinking will inspire others.

We're also making strides in our efforts to preserve working forests, which, when managed properly, can be important renewable resources. Last year, over 99 percent of our product packaging came from paper that was recycled or sourced from sustainably managed forests. We're also partnering with The Conservation Fund to protect sustainably managed working forests in the United States, and with World Wildlife Fund to transition forests into responsible management in China.

For years, we've led the electronics industry in removing toxins such as arsenic, PVC, brominated flame retardants, and phthalates from our products. Many toxins are restricted not only in the products themselves but also in the manufacturing process, because we are committed to the people who make, use, and recycle our products. This past year, we started a Full Material Disclosure program, which will show us the chemical composition of every material in every component of our products so we can understand their effect on our health and on the environment.

We are working every day to leave the world better than we found it. We know we have a long way to go, and a lot of work ahead of us. We are committed to increasing openness in our work and welcome you to join us on our journey.





# Climate Change

The Singapore solar project is the first distributed utility-scale installation in the country and is spread over hundreds of rooftops.

## 93%

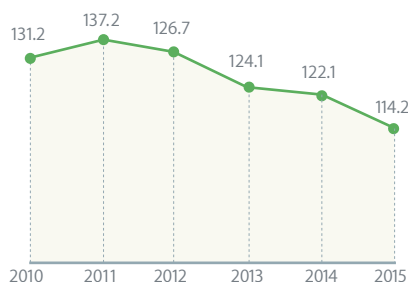
Currently, 93 percent of our facilities worldwide run on renewable energy.

Climate change is real. So is what we're doing about it.

In 2015, 93 percent of our energy came from renewable sources. And we're constantly looking for ways to get to 100 percent. In Singapore, we're powering our facilities with a 32-megawatt solar project spread over more than 800 rooftops. In China, we're adding 170 megawatts of solar to begin offsetting the energy used to make our products. And our data centers around the world run on 100 percent clean energy and power billions of iMessages, answers from Siri, and song downloads from iTunes.

## Carbon Footprint

A more complex carbon footprint requires more inventive solutions.



### CO<sub>2</sub>e Emissions per Product (kg)

We've decreased carbon emissions per product every year since 2011.

When we measure our carbon footprint, we include hundreds of suppliers, millions of customers, and hundreds of millions of devices. And we're always looking for ways to make the biggest difference in five major areas: manufacturing, product use, facilities, transportation, and recycling.

We design each generation of our products to be as energy efficient as possible. We're sourcing lower-carbon materials to make our devices, and we're partnering with suppliers to add clean energy to their facilities. We produce and procure clean, renewable energy to power 93 percent of our offices, retail stores, and data centers around the world, which has lowered emissions from our facilities to 1 percent of our comprehensive carbon footprint. We're also adjusting our recycling practices and rethinking our shipping strategies.

## Our 2015 carbon footprint

38,400,000

metric tons of greenhouse gas emissions



### Manufacturing

## Manufacturing a smaller footprint.

How we make our products is the largest piece of our carbon footprint. We've identified two areas where we can dramatically reduce our impact—raw materials production and electricity used in manufacturing.

## Partnering with suppliers to reduce emissions.

The electricity we use in our supply chain to process raw materials, make parts, and assemble our products is the single biggest source of our carbon footprint—over 60 percent of our manufacturing emissions. So in 2015, we created programs to help our partners around the world reduce their energy use, power their facilities with clean energy, and build high-quality renewable energy projects.

We started engaging directly with suppliers in 2015 to assess their energy use with detailed energy audits. We work together to find ways to reduce energy use—replacing outdated or inefficient heating, cooling, and lighting systems; repairing compressed air leaks; and recovering waste heat. Through the process, we aim to promote continual improvement; build technical capabilities; and increase awareness of the environmental and financial benefits of energy efficiency.

We conducted 13 energy audits at supplier facilities in China, Taiwan, and Japan last year, identifying more than US\$32 million in annual savings opportunities. This corresponds to reductions of approximately 224 million kilowatt-hours of electricity and 269,000 million British thermal units of fuel. From these identified improvements, suppliers have already reduced over 18 million kilowatt-hours of electricity, avoiding 13,800 metric tons of carbon dioxide equivalents (CO<sub>2</sub>e).<sup>1</sup> We are continuing to expand the program for even greater impact.

Our efforts go beyond energy efficiency to spur the development and procurement of renewable energy within our supply chain. We're building 200 megawatts of solar in China, starting with a 170-megawatt solar project in Inner Mongolia, to begin offsetting our manufacturing emissions. We're also working with suppliers to install more than 4 gigawatts of new clean energy worldwide, including 2 gigawatts in China by 2020. Our 4 gigawatts of clean energy projects will avoid over 30 million metric tons of carbon pollution, equivalent to taking over 6 million cars off the road for one year.<sup>2</sup>



The transition to renewable energy can be highly technical. It often requires complicated deal structures across many regions with their own regulatory requirements. Apple is experienced in sourcing and building renewable energy—quickly and at a high standard across the globe—so we are working with our suppliers to help them overcome challenges. We know that, with some hard work and collaboration, suppliers can reduce their own carbon footprint through the development of high-quality and cost-effective renewable energy projects. As part of Apple's industry-leading program, over the next two years, Foxconn will install 400 megawatts of solar to cover the energy use of its iPhone final production facility in Zhengzhou, China.

## Lowering our carbon emissions by focusing on aluminum.

We sell millions and millions of phones. So making even small adjustments to the production of iPhone can have a big impact. We discovered that changing how we make the aluminum enclosure could lower our carbon footprint. We prioritized aluminum that was smelted using hydroelectricity rather than fossil fuels. And we reengineered our manufacturing process to reincorporate the scrap aluminum. As a result, we cut the carbon footprint associated with the aluminum enclosure of iPhone 6s in half compared with the previous generation. And we're looking for new ways to use more carbon-efficient aluminum across all of our products.

iPhone 6

iPhone 6s

The carbon footprint of iPhone 6s aluminum enclosure is half that of the previous generation.



## Product Usage

### Your energy use is our energy use.

All of the energy it takes to run your device—from the time you open the box to the day it's recycled—is added to our carbon footprint. We even include the energy it takes to charge your device, which usually comes from carbon-intensive sources such as coal or gas. So we're always developing new ways to make our products as efficient as possible. For example, the Mac operating system puts the hard drive to sleep and runs processors in an ultralow power mode when you're not hard at work. It can even save energy when the screen is static and between keystrokes when you type.

MacBook Air consumes 52 percent less energy than the original model. Mac mini consumes 40 percent less power when idle than the previous generation. Apple TV consumes 90 percent less energy than the first generation. And you can charge your iPhone 6s once a day for a year for only 53 cents.<sup>3</sup> In fact, since 2008 we've reduced the average total power consumed by Apple products by 64 percent, bringing down our overall carbon footprint and your electricity bill at the same time.<sup>4</sup>



0.5w

Power consumed by the MacBook in sleep mode, the lowest of any Mac.



7x

Mac mini exceeds ENERGY STAR requirements by up to seven times.



97%

The power used by the iMac in sleep mode was reduced 97 percent compared with the first-generation iMac.



The cost to charge the battery of an iPhone 6s once a day in the United States is 53¢ per year.<sup>3</sup>



Our data centers run on 100 percent renewable energy. Which means every time you send an iMessage, download a song from iTunes, or ask Siri a question, the energy Apple uses doesn't contribute to climate change.



## Go ahead, ask Siri all the questions you want.

Every time you send an iMessage, make a FaceTime call, ask Siri a question, download a song, or share a photo, it takes energy. And we hold ourselves responsible for that energy, not you. We're proud to say that all those tasks are handled by Apple data servers running on 100 percent renewable energy. When we need a little extra juice, we work with third-party data centers. Even though we don't own them, and share them with other companies, we still include them in our renewable energy goals. So we're working with these providers to get them to 100 percent renewable energy, too. All told, in 2014 our data centers avoided 150,000 metric tons of CO<sub>2</sub>e emissions. And in 2015, that number grew to 187,000 metric tons.

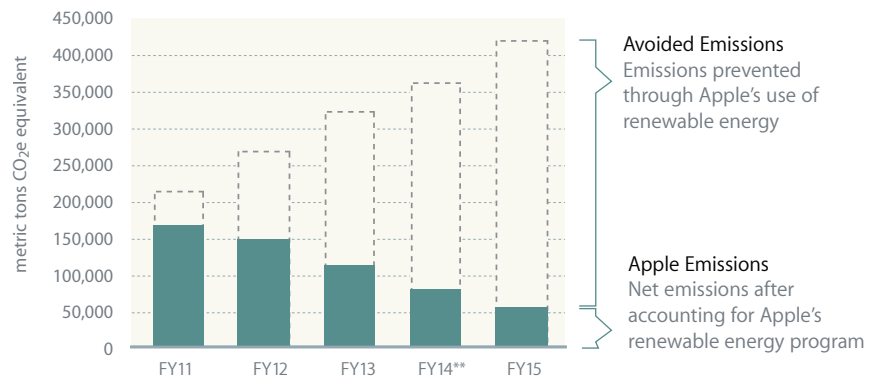
### Facilities

## We use the power of the sun, wind, and water to power our lights, servers, and coffeemakers.

We're constantly finding ways to be more energy efficient and working toward our goal of covering 100 percent of the electricity use of our global facilities—data centers, corporate offices, and more than 475 Apple Retail Stores—with 100 percent renewable energy. As of January 2016, we're at 93 percent worldwide. And in 23 countries, including the United States, the United Kingdom, China, and Australia, we're at 100 percent. For example, we connected 40 megawatts of new solar energy to China's national grid, producing more than enough electricity for all of Apple's offices and retail stores in China. Apple is one of the largest end-users of solar power in the world. As of March 2016, we have announced 521 megawatts of solar projects—the majority of these projects are Apple-owned, with 162 megawatts undertaken as part of Power Purchase Agreements.

In fiscal year 2015, by using renewable energy in Apple facilities, we avoided 335,000 metric tons of CO<sub>2</sub>e emissions from entering the atmosphere, the equivalent of 359,828,142 pounds of coal not burned.<sup>2</sup> Sourcing renewable landfill biogas to power our fuel cells avoided an additional 27,000 metrics tons of CO<sub>2</sub>e in fiscal year 2015. Altogether, since fiscal year 2011, we have reduced carbon emissions from Apple facilities by 64 percent—avoiding over 1 million metric tons of CO<sub>2</sub>e from entering the atmosphere.

## Apple Scopes 1 & 2 Building Emissions\*



\*Building emissions refers to emissions from natural gas and electricity at corporate offices, data centers, and retail stores.

\*\*In fiscal year 2014, Apple owned a facility in Mesa, AZ, that was operated by a supplier, which had default grid emissions of 151,279 tons CO<sub>2</sub>e and effective emissions of 0 tons CO<sub>2</sub>e due to the use of 100 percent renewable energy. It was removed from operation in fiscal year 2015 and is not shown on this chart.

## The cleanest energy is the energy you never use.

We've made energy efficiency a priority across all of our facilities, seeing energy savings of 25 percent or more in the buildings assessed. We have completed extensive energy efficiency projects at our corporate headquarters in Cupertino, California, and the surrounding Santa Clara Valley, where we operate more than 100 buildings, some of which we've called home for more than 20 years. As buildings age, and as our working needs have changed, we've undertaken aggressive programs to improve the comfort and function of our facilities, all the while ensuring they require less energy.

Improvements made during the past five years now save over 39 million kilowatt-hours a year—equivalent to the output of a typical 20-megawatt solar photovoltaic (PV) array. The efficiency improvements include upgrading to LED lighting, retro-commissioning building controls, and upgrading heating, ventilation, and air-conditioning systems. When designing new buildings, we optimize energy efficiency through use of high-efficiency lighting and heating, ventilation, and air-conditioning systems and through careful selection of windows, insulation, shading, and roofing materials to reduce heating and air-conditioning loads.





Our Maiden, North Carolina data center is powered by our biogas fuel cells and three solar arrays.

## 100 percent of our data centers run on 100 percent renewable energy.

Our data centers are built with the environment in mind, often including innovative energy efficiency measures. In fact, three of our data centers—in North Carolina, Oregon, and Nevada—earned Leadership in Energy and Environmental Design (LEED) Platinum certification from the U.S. Green Building Council, the highest level possible.

Our data centers have been 100 percent renewable since 2013. And we're continuing to find innovative ways to bring renewable energy projects to the places where we consume a lot of energy. For example, we recently partnered with the local utility, Duke Energy, to develop a green energy tariff—Duke Energy's Green Source Rider Program. This program allowed us to co-develop five solar PV projects in North Carolina, the first of which came online in October 2015. For more information about Apple's industry-leading efforts to supply our data centers with 100 percent renewable energy, see Appendix B.

## Innovating on rooftops in Singapore.

Singapore is so densely populated that there's no space on the ground for a large-scale solar project. So we designed an entirely new solution. We worked with local renewable energy provider Sunseap to source clean energy from roughly 32 megawatts of solar panels on more than 800 rooftops in the city. This first-of-its-kind project will produce enough energy to run all our Singapore offices and our part of the shared data center that we use for extra computing capacity.

To further advance the renewable energy market in Singapore and to ensure accountability and traceability of our generation, Apple worked closely with APX (a renewable energy tracking software developer) and other key partners to develop a regional renewable energy tracking system, similar to those in North America and Europe. Apple is using the tracking system now and soon it will be opened to renewable energy generators and purchasers in Singapore and elsewhere in Asia.

## We're powering 97 percent of our Apple Stores with renewable energy. That's almost good enough.

As of April 2016, we are powering 463 Apple Stores in 13 countries with 100 percent renewable energy. Our preferred method is to generate renewable energy from Apple-created projects to cover our stores' electricity use. For many of our other retail stores, we purchase renewable energy from third-party providers. And where local regulations don't allow these options, we participate in utility green tariff programs, collaborate with landlords to purchase renewable energy on our behalf, or procure renewable energy certificates that meet strict verification standards.

# Our renewable energy strategy

## 1. Energy Efficiency

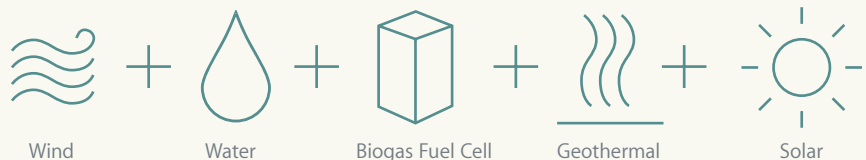
An important first step in managing energy use is to ensure our facilities use as little as possible. That's why we design them for maximum energy efficiency, and regularly audit their energy use to identify further opportunities for energy optimization.

## 2. Renewable Energy

**Renewable Energy Generation.** Where feasible, we produce our own renewable energy by building our own solar arrays, biogas fuel cells, and micro-hydro generation systems.

**Renewable Energy Investments.** Where it's not feasible to produce our own, we purchase renewable energy, investing in local and newer projects that follow our robust renewable energy sourcing principles.

**Grid-Purchased Renewable Energy.** In cases where we aren't able to purchase renewable energy in this way due to local regulations, Apple purchases renewable energy credits (RECs). We apply the same rigor here as for our other grid-purchased renewables, and we also register and retire these RECs in certified tracking systems. When Apple acquires RECs, we require that they are Green-e Energy certified and come from the same region—and preferably the same state—as the Apple facility they support.



### Our renewable energy sourcing principles.

We encounter many legal and regulatory frameworks around the world that constrain our renewable energy supply options. In each location, we endeavor to choose the strongest approach available to us as defined by three guiding principles:

**Displacement.** We seek to displace the more polluting forms of energy in the same electric grid region in which we operate—by putting into the grid an amount of renewable energy equal to the amount of energy taken from the grid by our facilities.

**Additionality.** We strive to create new clean energy that adds to the energy sources already delivering to the grid. This generally means participating in renewable energy projects that would not have been built without Apple's involvement. We make sure that the energy we count toward our goals is not counted toward regulatory obligations that utilities must meet, such as the Renewable Portfolio Standards in many states.

**Accountability.** We apply rigor in measuring and tracking our energy supply resources, and use third-party registries such as WREGIS and NC-RETS, certification programs such as Green-e Energy, and contractual provisions to ensure that all renewable energy supplied to Apple is supplied only to Apple. When needed, we work with industry partners and governmental entities to create such systems.

### Your grid is our grid.

When it is not feasible to power our facilities with onsite renewable energy, we match our load with renewable energy generated by either Apple-owned projects or third-party projects. We put the clean energy we generate onto the local grid, displacing the more polluting forms of energy.

The best way to think about it is like a bank: You can deposit \$20 in one bank branch, then go to another branch and withdraw \$20. Renewable energy works in a similar way. And Apple's renewable energy approach goes a step further to make sure we "deposit" on the same grid as the energy we are "withdrawing."



We are also changing how we design our stores to be better for the planet. For example, our latest store design is 40 percent more energy efficient and uses 30 percent less water than our previous design. We're also bringing the outside in, through mixed-mode natural ventilation and biophilic design, where available and appropriate. In late 2015, our Mall of the Emirates store in Dubai received LEED Platinum certification.



Our Mall of the Emirates store in Dubai was designed with environmental features that earned the building LEED Platinum certification from the U.S. Green Building Council.

## Home green home.

The new Apple campus in Cupertino will be the most energy-efficient building of its kind. We're recycling or reusing over 95 percent of the material from the demolished buildings at the site, by finding ways to repurpose virtually every piece of concrete, glass, and steel.

The building will be powered by 100 percent renewable energy, generated by 4 megawatts of baseload biogas fuel cells and 16 megawatts of rooftop solar—one of the largest onsite corporate solar energy installations in the world. When additional energy is needed, it will come from a 130-megawatt solar project in Monterey County thanks to Apple's power purchase agreement with First Solar. The site is designed as a micro-grid—which allows Apple to disconnect from the local grid and power the campus autonomously when grid power goes down, providing energy resiliency. To support the micro-grid design, the onsite solar energy production will be augmented with biogas fuel cells and battery storage. And air will flow freely between the inside and outside of the building, providing natural ventilation for 75 percent of the year, with highly efficient radiant heating and cooling the remainder of the year.

The building itself is only part of the story. About 80 percent of the site will be open space, populated by more than 8000 trees, which includes over 7000 newly planted shade and fruit trees. Virtually all plants used throughout the landscape are drought-tolerant to minimize freshwater use. We're also reclaiming as much rainwater as we can, and 157,000 gallons of recycled water from the city of Sunnyvale's recycling facility will be used for the majority of our landscaping water needs at the new campus. By investing in recycled water, we are helping to ease the demand for freshwater in Cupertino.

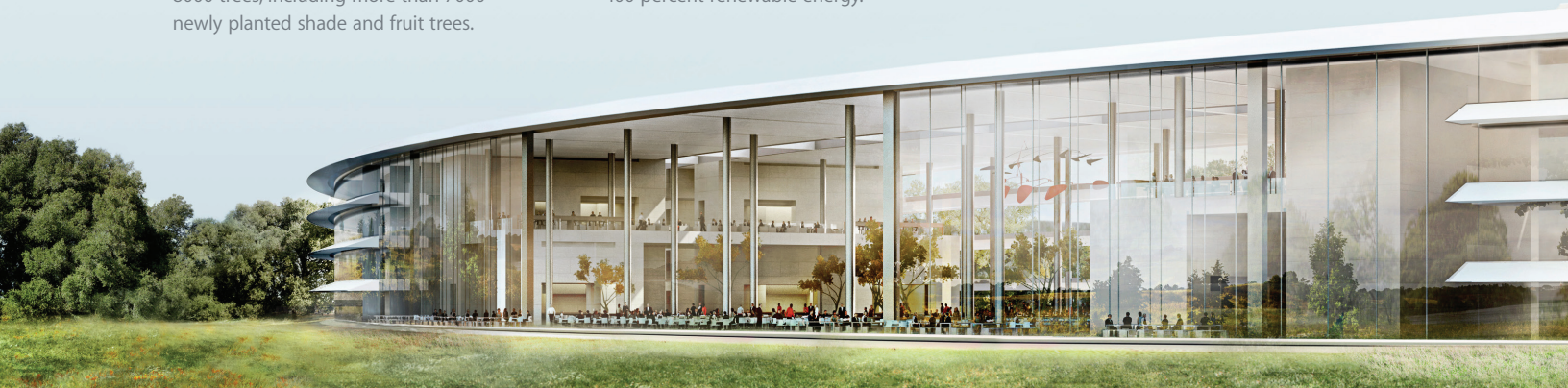
Getting to and from the new campus will be greener, too. We're expanding our commute alternatives program by 20 percent. This means that over a third of our employees in the area can commute to our existing and new campuses using our biofuel buses, public transit, bicycles, carpools, and their own two feet. And for drivers, we'll have over 1000 electric vehicle charging stations. When completed, Apple Campus 2 will be an ever-present reminder of our commitment to sustainability and an example of what every corporate campus can be.

8000

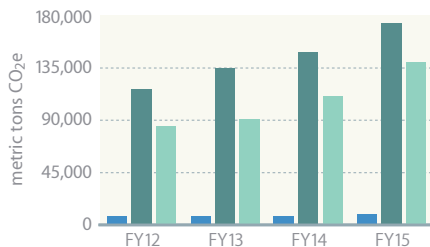
The site will be populated by over 8000 trees, including more than 7000 newly planted shade and fruit trees.

100%

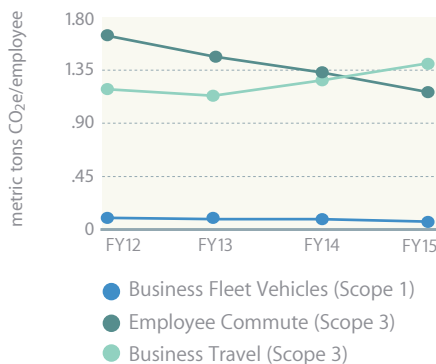
Apple Campus 2 will be powered by 100 percent renewable energy.



## Travel Emissions



## Travel Emissions per Employee



We're lessening our impact when we commute or hit the road.

As we shrink the carbon footprint of Apple's facilities, we're also continuing to look for ways to reduce carbon emissions from business fleet vehicles, employee commute, and business travel. Those emissions grew in fiscal year 2015 primarily because our employee count increased by 14 percent in the same period, and because long-distance business travel increased. We offer our United States employees a transit subsidy of up to US\$100 per month, and at our Cupertino and surrounding Santa Clara Valley campus, we offer free coach buses to commute to and from our corporate offices. In fiscal year 2015, use of these coach buses increased by close to 19 percent. And we're seeing the difference this is making: In fiscal year 2015, our emissions per employee dropped for the fourth year in a row; they have decreased by close to 30 percent since fiscal year 2012. And to encourage electric vehicle use, we also offer our employees over 550 electric vehicle charging ports, at no cost—an increase of 67 percent compared to last year—and we continue to add more to meet increased demand.

## Transportation

### Reducing our carbon emissions by air and sea.



We're participating in the U.S. Environmental Protection Agency's SmartWay Program to find more ways to improve fuel efficiency and reduce greenhouse gases and air pollution from the transportation supply chain.

Transporting hundreds of millions of products uses a lot of energy. Our logistics team is focused on reducing our carbon footprint in this area. That includes looking for opportunities to make air and ocean shipping more efficient so they use less fuel. And because we're working to make our devices lighter and the packaging smaller, we're cutting down on emissions no matter how our products are delivered.

We are also looking at ways beyond just shipping to reduce our product transportation impacts—like our boxes. We're reviewing our box sizing, material selection, recycled content, and even our packing slips, to see where we can be more material efficient. We use distribution centers across the world to act as transportation hubs for our products. While we don't own these facilities, we believe they should have as small a footprint as possible. So we're collecting data on their energy use, carbon emissions, waste generation, and waste diversion from landfill, to identify where there may be opportunities for improvement.

## Recycling

### Recycling counts toward our footprint, too.

Unlike many of our competitors, we include all the energy used to recycle our products in our carbon footprint. So whenever possible, we recycle our products in the region where they're collected, reducing the carbon emissions associated with shipping. When we have to ship, we do it responsibly. Because we work closely with all our recyclers and with vetted facilities, nothing is dumped unsafely in developing countries, which is a common problem in our industry.

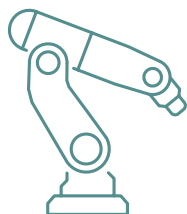
Recycling is also good for reducing global carbon emissions. Fewer carbon emissions are created by recycling materials such as aluminum than by mining and smelting new materials. Whoever uses the recycled material can count the carbon savings against their footprint, so we don't double-count it against ours.





# Resources

Liam is a line of robots that disassembles iPhone 6 into individual components, making it easier to recover finite resources such as aluminum, gold, and cobalt.



We designed a line of robots that can take apart up to 1.2 million phones a year. [Meet Liam.](#)

## Resources

We can't manufacture natural resources. So we invent ways to make the most of them.

We want to make sure we're protecting and creating more sustainable forest than we're using. It's part of our larger goal to minimize the materials we take from the earth. We're measuring our water footprint and finding ways to reduce or reuse water wherever we can. And none of the waste from any of our iPhone and Apple Watch final assembly sites ends up in a landfill.<sup>5</sup> We also created Apple Renew—a program that lets you recycle any Apple device at an Apple Store.

## Reuse & Recycling

One of the best ways to use a resource is to reuse it.



### Apple Renew

Recycle your Apple device at any Apple Store or request a prepaid shipping label online and send it to us.

[Learn more >](#)

We work hard to keep electronic devices out of landfills so that the precious resources they contain can be reused. And we want to ensure that these devices are recycled properly so they don't pose a threat to human health or the environment. That's why we've developed recycling collection events, take-back initiatives, and efforts like Apple Renew, a global program that lets you bring used Apple devices to any Apple Store for reuse or responsible recycling. We're also working with over 160 recyclers around the world, whose facilities we hold to rigorous standards of environmental compliance, health and safety, and social responsibility. Through our efforts, we've kept more than 597 million pounds of equipment out of landfills since 1994. In 2015, we collected nearly 90 million pounds of e-waste through our recycling programs. That's 71 percent of the total weight of the products we sold seven years earlier.

## Amount of material recovered for reuse through take-back initiatives in 2015

61,357,800 lbs

Steel 23,101,000	Plastics 13,422,360	Glass 11,945,680	Aluminum 4,518,200	Copper 2,953,360	Cobalt 189,544
Nickel 39,672	Lead 44,080	Zinc 130,036	Tin 4408	Silver 6612	Gold 2204

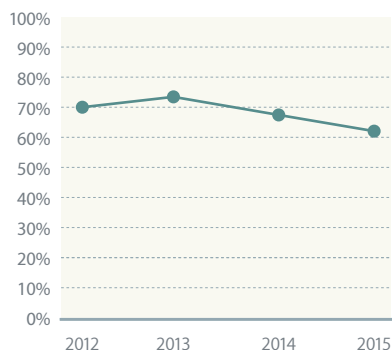
We also see a huge opportunity to improve the way we reclaim finite resources from our products. Existing recycling techniques, like shredding, only recover a few kinds of materials and often diminish their quality. So we invented Liam, a line of robots designed to disassemble 1.2 million phones a year, sorting all their high-quality components and reducing the need to mine more resources from the earth. Liam prototypes are operating in California and the Netherlands. It's an experiment in recycling technology, and we hope this kind of thinking will inspire others in our industry.

Additionally, we're committed to making sure all the waste created by our final assembly facilities and by us is reused, recycled, composted, or, when necessary, converted into energy. It's an ambitious goal that requires collaboration among multiple Apple teams, local governments, and specialty recyclers, but we've already seen great success. In 2015, our facility in Cork, Ireland, was the first outside North America to receive UL's Zero Waste to Landfill validation. In 2016, our final assembly sites, Foxconn Guanlan and Foxconn Taiyuan, were the first to receive this validation in China, and all our remaining iPhone and Apple Watch final assembly sites are on track to do the same before 2017.<sup>5</sup> And most recently, all our stores worldwide have initiated zero waste programs.

We found that our final assembly supplier facilities were already diverting on average 70 percent of the waste generated from manufacturing, cafeterias, and employee support facilities. The challenge was to address the remaining 30 percent—the small, low- or no-value, mixed waste materials that most recyclers will not accept. We worked closely with our suppliers to find innovative ways to reduce, recycle, eliminate, or incinerate this waste for energy recovery. For example, at many of our iPhone and Apple Watch final assembly facilities, we implemented waste sorting on the line to separate previously landfilled recyclable waste. We also implemented a component tray reuse program for iPhone, allowing single-use trays to flow through the supply chain multiple times. At other sites, suppliers established waste reduction campaigns and worked with local recyclers to process materials not previously accepted. In response to this program, all iPhone and Apple Watch final assembly suppliers now have "zero waste" or "green" teams to support this program and other environmental improvements.

At our corporate offices and retail stores, wherever possible we've created robust recycling and composting programs to minimize the environmental impact of the waste we produce. In fiscal year 2015, we generated approximately 13.1 million pounds of waste, and diverted over 22.5 million pounds of materials from landfill through recycling and composting. Our rate of landfill diversion was 63 percent, compared with 68 percent in fiscal year 2014. We are working to improve our landfill diversion rate through a variety of actions, including expanding composting at our corporate campuses, and initiating zero waste at our more than 470 retail stores.

## Landfill Diversion Rate for Office Waste



Waste, recycling, and compost data is collected or estimated for all Apple facilities, including Apple Retail Stores.



Apple disposes of hazardous waste responsibly. We complete regular audits of the Transportation, Disposal, and Storage Facilities (TSDf), where the hazardous waste is ultimately sent to be treated, incinerated, or recycled. Only facilities we audit and approve are allowed to accept and treat the hazardous waste we generate, which was 1 million pounds in fiscal year 2015 (mostly from research and development), or less than 8 percent of our total waste. We take this commitment seriously: If the TSDf's do not meet our strict standards for environment, health, safety, and waste management protocols, we switch facilities.



## Water Conservation

### Every molecule of water we use matters.

We're constantly working to minimize our water use, so we monitor it within our cooling, landscaping, and sanitation processes and at our manufacturing sites. Then we develop targeted ways to reduce it. That includes creating cooling systems in our data centers that can reuse water up to 35 times. Or, for facilities in drier climates, installing intelligent irrigation systems that monitor weather and deploy water only when needed.

In 2015, we started collecting even more sophisticated data to help strengthen our conservation strategy. We've begun to measure the water it takes to manufacture each of our products, starting with iPhone. And now we're identifying the high-, medium-, and low-scarcity areas where we use water, so we can focus our efforts where they matter most.

When we began to measure the water consumption footprint of iPhone, we learned that the story was similar to our product carbon footprint: the vast majority is during the manufacturing phase. This is primarily due to water consumed in energy production, such as for oil extraction, distillation, and processing, as well as non-energy sources, such as process water consumed during metals processing. That's why we are focusing on reducing water consumption in our supply chain, primarily through our supplier clean water and clean energy programs.



## Supplier Clean Water Program

The water we use to manufacture our products has a direct effect on the communities in which we operate. We launched the Clean Water Program in 2013 to reduce the use of freshwater in our suppliers' processes. Through 2015, 73 supplier facilities have joined our Clean Water Program—so we can help them improve their water and wastewater management systems, and reduce freshwater use. Through baseline assessments, performance evaluations, technical support, and training, we helped these facilities save more than 3.8 billion gallons of freshwater. We're also focused on reuse of treated wastewater and have achieved an average wastewater reuse rate of 36 percent across these facilities. To ensure our efforts impact areas of greatest need, we prioritize facilities by evaluating water use data, reviewing product life cycle water consumption data to identify water-intensive component suppliers, and mapping that data to water-stressed geographies.

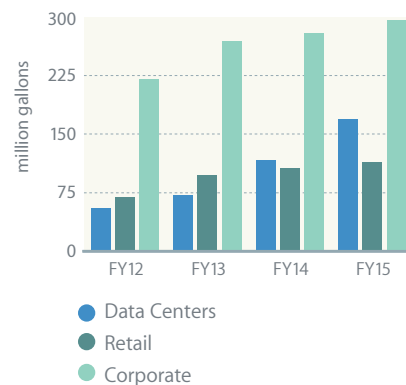
## Supplier Clean Energy Program

Of the production water consumption, over 70 percent is associated with electricity generation needed to power our suppliers' facilities. We know that water consumption varies by energy technology, and that renewable energy sources such as solar PV and wind energy are less water-intensive than conventional forms of energy such as natural gas, coal, or nuclear. Understanding this will help us make decisions, wherever possible, that result in both low-carbon and low-water sources of energy.

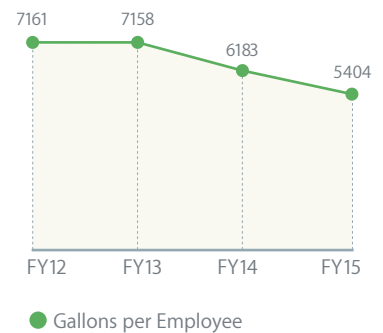
## Conserving water where it matters most.

To meet the water needs of our offices, data centers, and retail stores across the world, Apple used 573 million gallons of water in fiscal year 2015, which represented a 16 percent increase from fiscal year 2014. This increase is driven primarily by growth, as well as increasing cooling needs at our data centers, and we are focusing our water usage reduction efforts on these facilities.

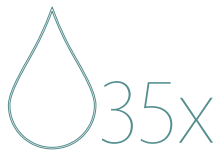
### Facilities Water Use



### Corporate Water Use per Employee



We calculate our corporate water use for our data centers, retail stores, and corporate offices.



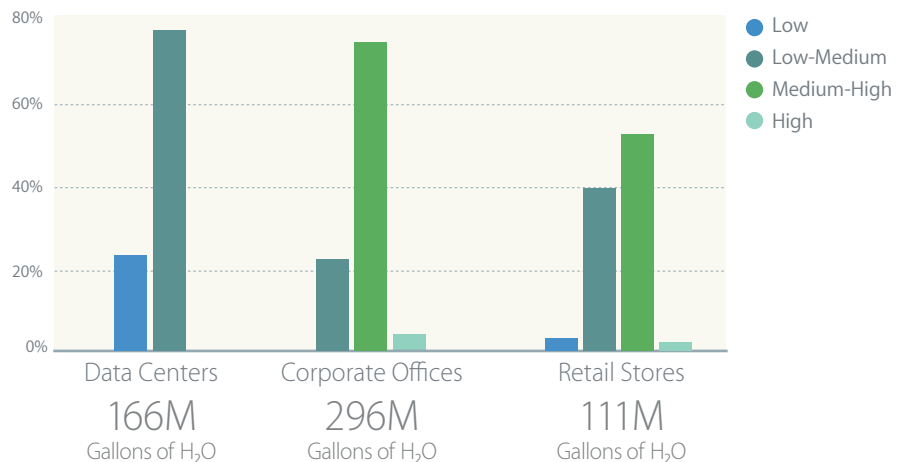
We've created cooling systems for our data centers that can reuse water up to 35 times.

We have targeted water-conservation efforts at our corporate facilities, especially in Cupertino and surrounding Santa Clara Valley, California, where our headquarters are located—an area experiencing significant drought. We are installing high-definition flow sensors and sub-meters in our landscaping to better understand and reduce our irrigation needs. In 2015, we converted approximately 120,000 square feet of previously grass lawns to drought-tolerant landscape, translating to estimated water savings of up to 6 million gallons per year—enough water to fill nine Olympic-size swimming pools. We also planted throughout Apple's headquarters over 167,000 California native plants, which are adapted to the local climate and require less water. To tackle water use in research and development facilities, we are beginning to retrofit laboratory equipment to recycle process water, already saving approximately 2.25 million gallons annually from two sites alone. As a result of these conservation efforts, our corporate water use per employee declined by 25 percent since fiscal year 2013.

At our existing and planned data centers, we will be expanding our efforts to use non-water-intensive cooling technology, recycle water where we can, and reduce withdrawals from the local watersheds. Our Maiden, North Carolina, data center employs an innovative cooling system that reuses water 35 times, resulting in a 20 percent reduction in overall water consumption at the data center. We are also building our newer data centers in locations that can rely heavily on outdoor air for cooling.

The impact of water usage varies greatly depending on the watershed conditions where the resource is being used. So we've continued to look at more sophisticated ways to measure and analyze our water use. The profile of water use at our data centers, corporate offices, manufacturing sites, and retail stores differs significantly depending on the climate and nature of activities. We have begun to map those operations against indicators of water risk, which include water scarcity, business risk, and habitat and livelihood impact to the basins in which we operate. This analysis will help prioritize our conservation efforts across our operations.

### FY2015 Water Use by Risk Level



We mapped our water use to different levels of water risk (as defined by WRI's Aqueduct tool) across the world to understand where we should be focusing our conservation efforts. Water risk takes into consideration water availability, water quality, and regulatory risks at a localized level.

Source: World Resources Institute (WRI) Aqueduct, [www.wri.org/our-work/project/aqueduct](http://www.wri.org/our-work/project/aqueduct)

## Reducing carbon emissions helps the planet in more ways than one.

Our move to 100 percent renewable energy has conserved a lot of water. That's because traditional fossil-fuel sources of energy consume a substantial amount of water. Water is consumed during fuel extraction, refining and processing, and often during power generation. For example, cooling fossil fuel-based power plants requires large quantities of water. By contrast, many renewable energy generation technologies don't rely on combustion processes, so they use much less or no water to generate electricity.

In California alone, where the electricity our operations use is sourced from 100 percent renewable energy—primarily wind—we avoided over 135 million gallons of water consumption in fiscal year 2015. And globally, our use of 93 percent renewable energy avoided over 566 million gallons of water consumption in fiscal year 2015.<sup>6</sup>



### Forestry

We're not just protecting forests.  
We're protecting generations of them.



All our suppliers must adhere to our Apple Sustainable Fiber Specification.

[Learn more >](#)

Forests provide wood fiber for the paper we use in our packaging. They also clean our air, purify our water, and shelter our wildlife. So we work hard to minimize our impact by sourcing paper responsibly and using it as efficiently as possible. But that's not enough. The world's forests still face widespread destruction due to illegal logging, poor management, and aggressive land development. That's why we're determined to protect and create enough responsibly managed forests around the world to cover all our packaging needs and produce fiber for generations.<sup>7</sup>



## FY2015 Fiber Footprint

133,000

metric tons

61%

Recycled  
Fiber

39%

Sustainably Sourced  
Virgin Fiber

<1%

Other

Our 2015 footprint captures all paper used to package and ship products, as well as all in-box papers and paper retail bags that we used for Apple Watch. It also accounts for fiber losses during the paper production process.

Note: Due to rounding, total of percentages doesn't add up to 100.



U.S. retail packaging of iPhone 6s is 20 percent lighter and consumes 34 percent less volume than the first-generation iPhone packaging.



Retail packaging for iPad Pro uses a minimum of 38 percent post-consumer recycled content.



The 21.5-inch iMac retail packaging consumes 53 percent less volume and weighs 35 percent less than the original 15-inch iMac packaging.

## How we're reducing our impact.

### Using paper more efficiently.

We look for ways to make our packaging smaller, we're creating technologies that use paper more efficiently, and we use recycled paper whenever we can. In fact, in fiscal year 2015, more than 60 percent of the paper used in our packaging was made of recycled wood fiber.

### Sourcing virgin paper responsibly.

When we use virgin paper in our packaging, our suppliers must source it from sustainably managed forests or controlled wood sources. And we conduct regular audits to ensure that they adhere to our specifications. In fiscal year 2015, over 99 percent of the virgin paper used in our packaging met these requirements.

### Protecting sustainable forests.

We continue to protect and create sustainable working forests because, when properly managed, they can provide abundant resources for a long time.

In partnership with The Conservation Fund, we've protected 36,000 acres of sustainable forest in North Carolina and Maine and responsibly harvested more than 13,000 metric tons of wood. The 3600-acre forest we're protecting in North Carolina will connect to the 17,000-acre Green Swamp Preserve, improving biodiversity and connectivity for wildlife in the area. A natural resource assessment commissioned by The Conservation Fund found six rare species,<sup>8</sup> including the Venus flytrap (carnivorous plant), present in the Brunswick Forest. As of February 2016, The Conservation Fund had planted 185,000 trees across 300 acres, including 40 acres of native longleaf pine and Atlantic white cedar, which provide a home for the rare Hessel's hairstreak butterfly. The property is currently being managed as a working forest under the standards of the Sustainable Forestry Initiative (SFI).

In Maine, we're protecting more than 32,400 acres of forest, which includes wetlands and upland forest that are important for numerous wildlife species in Maine's iconic North Woods. This project adds to more than a million acres of conserved lands and interconnected forest habitat that stretch into Canada. The Conservation Fund is working with the Forest Society of Maine to better understand the presence and ecological significance of rare and threatened plants and animals. So far, investigations have identified two species of mussel, wood turtle, and the elusive Canada lynx on the property.

The collective annual production from the Reed and Brunswick forests is equivalent to about 30 percent of the virgin fiber used in our product packaging, compared with nearly 50 percent in 2014.<sup>9</sup> Our project with The Conservation Fund is just as productive as we originally estimated, but Apple's fiber footprint has grown. That's attributable to increased product sales, resulting in more packaging used, and an improved methodology that now accounts for all Apple products, not just a subset.

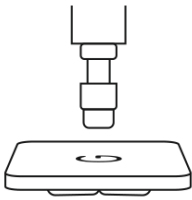
We remain committed to protecting—and creating—as much sustainable working forest as is needed to produce the paper in our product packaging.<sup>7</sup> And we expect that our latest effort in China with World Wildlife Fund, our most ambitious yet, will get us significantly closer.



The five-year WWF pilot project aims to transition up to 1 million acres of forest, across five southern provinces, into responsible management by 2020.<sup>10</sup> WWF's work has three primary components:

1. Increase responsible management of working forests in China—by creating up to 300,000 acres of Forest Stewardship Council (FSC)–certified forests, and up to 700,000 acres of forests under improved management.
2. Improve China's policy framework to encourage responsible forest management.
3. Establish long-term market incentives in China for responsibly sourced paper.

Since launching the project in 2015, WWF has signed up forestry companies that are committed to certifying nearly 150,000 acres to the FSC standard and an additional 190,000 acres under improved management. Once certified, these forests will make a major contribution toward Apple's goal of protecting and creating enough responsibly managed forests around the world to cover all our packaging needs. If successful, this project can shift the dynamics of the world's paper market in both the short and long term, and in the process protect some of the world's most important forests.



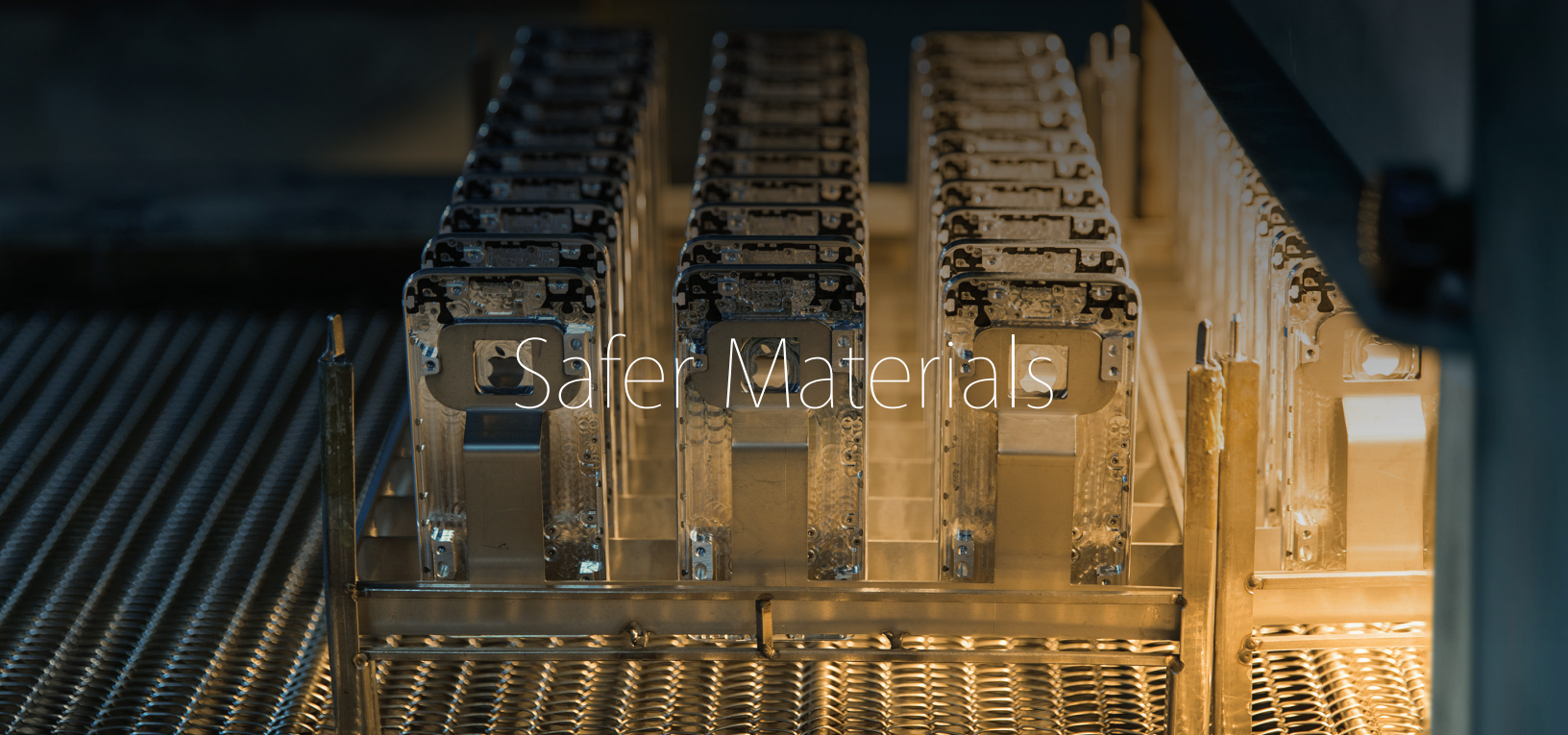
To ensure that it can stand up to repeated use, the MacBook keyboard is tested with millions of clicks.

## Product Design

### A durable device is a greener device.

When products can be used longer, fewer resources need to be extracted from the earth to make new ones. So we assess all our products in our Reliability Testing Lab, using custom, comprehensive measures. And we release regular software updates that keep our products current and reduce how often they need to be replaced.





# Safer Materials

## Safer Materials

We have three really good reasons to remove toxins from our products. You, our workers, and the planet.

For years, we've led the electronics industry in removing toxins from devices. This past year, we started a Full Material Disclosure program, which will show us the chemical composition of every material in every component of our products. It also makes us even better at reducing or removing toxins. And once we figure out how to remove a toxin from a device or a manufacturing process, we use extensive testing to make sure it stays out.

We've analyzed over 10,000 parts. And that's just the beginning.

Our Full Material Disclosure program seeks to identify all the substances we use in all the parts we use. We've already looked at more than 10,000 individual components, and we get data on more parts every day. We assess the different chemicals in those components using 18 different criteria. This helps us understand their effect on our health and on the environment. If we do find an unacceptable risk, we then seek alternatives or ban the substance altogether.

We start this process early in the design and manufacturing phases so we can take appropriate actions to remove or replace hazardous chemicals. In some cases, few replacements are readily available so we work with our suppliers to find substitutions—or switch to another supplier that uses safer materials. If there is no replacement for the substance, we work with our design teams to explore how to eliminate the need for that substance.



It took us four years to remove polyvinyl chloride, or PVC, from our power cords and headphone cables. We tested dozens of formulations until we finally found the right blend of durability, safety, and environmental performance in our PVC replacement materials: nonchlorinated and nonbrominated thermoplastic elastomers.

## The worst toxins and what we've done about them.

After we identify toxins in our products, we reduce them, remove them, or develop new materials that are safer. These efforts also remove toxins from our manufacturing and recycling processes, which protects workers and keeps pollutants out of the land, air, and water.



### **Beryllium**

Found in copper alloys used to make connectors and springs. All new products are designed without the use of beryllium.



### **Mercury**

Eliminated in 2009. We use energy-efficient, mercury-free LEDs instead of mercury-based fluorescent lamps in all our displays.



### **Lead**

We completely phased lead out of our display glass and solder in 2006.



### **Arsenic**

Traditionally used in glass. Our display glass has been arsenic-free since 2008.



### **PVC and Phthalates**

Both are still used by other companies in power cords and headphone cables. We have replaced PVC and phthalates with thermoplastic elastomers.<sup>11</sup>



### **Brominated Flame Retardants (BFRs)**

Eliminated from thousands of parts such as enclosures, circuit boards, and connectors in 2008. We use safer metal hydroxides and phosphorus compounds in their place.

## We double-check our work.



All our suppliers must adhere to our Apple Regulated Substances Specification.

[Learn more >](#)

The standards we set for our suppliers go far beyond what's required by law. Our toxicologists rigorously analyze the safety of materials our suppliers use by looking at data from our own Environmental Testing Lab. The lab runs tests such as inductively coupled plasma mass spectrometry, X-ray fluorescence spectroscopy, laser-induced breakdown spectroscopy, and ion or gas chromatography. If we find an issue, we work with the supplier to correct it. Since creating our Cupertino Environmental Testing Lab in 2006, we've grown it to 20 times its original size, and have regularly updated it with state-of-the-art equipment. We've also been building out testing labs at our manufacturing facilities in China to test and validate products throughout the manufacturing process.



Our Environmental Testing Lab in Cupertino, California, enables us to test products for compliance with our Regulated Substances Specification.

## We can do a lot. But we can't do it alone.

We want insights and ideas from those who share our commitment to removing toxins. So, we formed our own Green Chemistry Advisory Board made up of some of the world's leading toxicologists, researchers, and academics. They help us identify innovative ways to minimize or eliminate toxins from our supply chain. And we're allowing the advisory board members to use our data to develop and publish research, which we hope will advance the use of safer chemistry, materials, and processes in all industries.

We also invite experts from around the world to meet with leaders at Apple and we seek out the best ideas and insights from top NGOs. In 2015, we worked with Ceres to convene a roundtable meeting with United States-based and international NGOs to gather feedback on our toxins work. By working with organizations that share Apple's focus and commitment to the elimination of toxins, we believe that we will achieve better, faster results that will have greater impact across the world.

# We're better together.

At Apple, we believe that innovation can happen anywhere and great ideas can come from anyone. That's why we engage with diverse stakeholders. Regular dialogue with NGOs, university researchers, industry experts, investors, policy makers, and our customers provides us with a different lens through which to view our work.

We engage to develop a better understanding of emerging issues, to gain additional expertise in key areas, and to identify potential partnerships for future projects. Through these formal and informal conversations, we can gather feedback that shapes our thinking and planning.

We approach stakeholder engagements strategically, working with organizations and associations to generate meaningful information exchanges. Some updates from fiscal year 2015 include:

- Memberships, such as:
  - Ellen MacArthur Foundation CE100, a global platform of companies and innovators focused on accelerating the transition to a circular economy.
  - Corporate Eco Forum, an organization that facilitates the exchange of best practices and the sharing of insights from business leaders across various sectors, with the goal of accelerating sustainable innovation.
  - World Business Council for Sustainable Development (WBCSD), which provides a forum to engage with like-minded organizations to identify pathways to a sustainable future for business, society, and the environment.
  - Advanced Energy Economy (AEE), an association working to support the long-term success of the advanced energy industry nationwide, to ensure that the energy we all use is secure, clean, and affordable.
- Our CEO, Tim Cook, sits on the [Paulson Institute's CEO Council for Sustainable Urbanization](#), working with other CEOs of top Chinese and Western companies to advance sustainability in China.
- We formed our own Green Chemistry Advisory Board, made up of some of the world's leading toxicologists, researchers, and academics, to help us identify innovative ways to minimize or eliminate toxins from our supply chain.
- We're part of the [Ceres Company Network](#), a coalition of companies and investors working together to integrate sustainability into their core strategies. In partnership with Ceres, we hosted a roundtable meeting with United States-based and international NGOs with a focus on our safer-materials strategy.
- Through our work with [The Conservation Fund](#), we're permanently protecting more than 36,000 acres of working forest in the eastern United States.
- Our project with [World Wildlife Fund](#) will significantly increase the amount of responsibly managed forest by protecting as many as 1 million acres across China.



# Appendix A

## Apple's Operations: Environmental Data

**Facilities Environmental Key Performance Indicators (Page 29)**

**Scopes 1 & 2 Building Carbon Emissions (Pages 30–31)**

**Fiscal Year 2015 Natural Gas and Electricity Use (Page 32)**

# Facilities Environmental Key Performance Indicators

The following table provides an overview of environmental key performance indicators relating to Apple's facilities—our data centers, corporate offices that house nearly 55,000 employees, and more than 475 Apple Retail Stores around the world.

	KPI	Unit	Fiscal Year			
			2015	2014	2013	2012
Greenhouse Gas Emissions	Scope 1 (effective)	metric tons CO <sub>2</sub> e	28,100	28,490	29,300	21,220
	Natural gas		19,360 <sup>1</sup>	20,710	22,090	14,300
	Fleet vehicles		8740	7780	7210	6920
	Scope 2 (effective)		42,460	63,210	91,510	139,160
	Scope 3		312,910	259,130	225,630	202,060
	Business travel		139,940 <sup>2</sup>	110,940	90,948	85,090
	Employee commute		172,970	148,190	134,685	116,970
Energy Use	Electricity	million kWh	996	839	708	608 <sup>3</sup>
	U.S.		831	702 <sup>4</sup>	590	—
	International		166	137	118	—
	Natural gas	million btu	851,660	922,860	764,550	304,000
	U.S.		794,830	840,490	676,630	240,230
	International		56,830	82,370	87,920	63,770
Energy Efficiency	Additional annual savings due to implemented energy efficiency measures since 2011	kWh/year	6,711,510	4,470,180	14,405,580	7,653,190
		million btu/year	72,410	34,420	193,480	379,350
Renewable Energy	Renewable energy sourcing <sup>5</sup>	%	93	87	73	60
	Renewable energy sourced	million kWh	916	703	522	294
	Emissions avoided as a result of renewable energy sourcing	metric tons CO <sub>2</sub> e	362,410	282,990	213,770	118,090
Water Use	Total	million gallons	573	494	430	345
	Data centers		166	113	69	57
	Retail		111	103	94	71
	Corporate		296	278	267	217
Waste Generation	Landfilled	pounds	13,110,880	6,833,000	5,923,810	4,850,160
	Recycled		19,599,570	14,621,940	15,866,650	11,464,020
	Composted		3,006,170 <sup>6</sup>	— <sup>6</sup>	—	—
	Hazardous waste		1,002,300	508,040	70,550	123,460
	Landfill diversion rate	%	63	68	73	70

**Notes:** Apple's fiscal year begins approximately October 1 each year.

Numbers are rounded.

<sup>1</sup>In fiscal year 2015, we adjusted our methodology to better reflect locations where natural gas is used. We estimate natural gas usage in offices and retail stores where we are not billed based on usage (e.g., leased office space or retail stores within malls). This more accurate methodology resulted in a decrease in emissions in fiscal year 2015.

<sup>2</sup>In fiscal year 2015, we adjusted our methodology to reflect actual travel instead of booked travel. Using this more accurate methodology revealed overestimates for previous years.

<sup>3</sup>Only total electricity usage data was available for fiscal year 2012.

<sup>4</sup>Not included in this figure is a facility in Mesa, Arizona, which Apple owned in fiscal year 2014, but was operated by a supplier. It generated 282 million kilowatt-hours of electricity—100 percent of which was covered by our renewable energy program. The facility was removed from operation in fiscal year 2015.

<sup>5</sup>We calculate our progress toward 100 percent renewable energy on a calendar year basis. In calendar year 2015, we used 1048 million kilowatt-hours electricity and 977 million kilowatt-hours in renewable electricity.

<sup>6</sup>Prior to fiscal year 2015, composted quantities were reported as part of the "recycled" figure.

## Scopes 1 & 2 Building Carbon Emissions (metric tons CO<sub>2</sub>e)

Fiscal Year 2011				
Location	Scope 1		Scope 2	
	Default Utility Emissions*	Apple Emissions (incl. Renewable Energy)	Default Utility Emissions*	Apple Emissions (incl. Renewable Energy)
<b>Corporate</b>	<b>14,425</b>	<b>12,656</b>	<b>82,183</b>	<b>59,516</b>
Cupertino, CA	11,007	9238	39,428	39,428
Elk Grove, CA	556	556	7930	0
Austin, TX	45	45	10,139	0
Other U.S.	564	564	2141	2141
Cork, Ireland	804	804	4598	0
Singapore	—	—	3243	3243
China	—	—	280	280
Other International	1449	1449	14,424	14,424
<b>Data centers</b>	<b>0</b>	<b>0</b>	<b>51,651</b>	<b>28,988</b>
Maiden, NC	0	0	22,663	0
Newark, CA	0	0	28,988	28,988
<b>Retail stores</b>	<b>2600</b>	<b>2600</b>	<b>65,769</b>	<b>65,769</b>
Domestic (U.S.)	746	746	—	—
International	1854	1854	—	—
<b>Totals</b>	<b>17,025</b>	<b>15,256</b>	<b>199,603</b>	<b>154,273</b>
Fiscal Year 2012				
<b>Corporate</b>	<b>13,160</b>	<b>11,343</b>	<b>84,611</b>	<b>48,215</b>
Cupertino, CA	10,949	9132	39,457	25,450
Elk Grove, CA	560	560	6952	0
Austin, TX	59	59	10,635	0
Other U.S.	237	237	4265	4265
Cork, Ireland	715	715	4801	0
Singapore	32	32	4946	4946
China	—	—	1049	1049
Other International	609	609	12,505	12,505
<b>Data centers</b>	<b>146</b>	<b>146</b>	<b>87,732</b>	<b>7664</b>
Maiden, NC	146	146	52,977	0
Newark, CA	0	0	33,492	7664
Prineville, OR	0	0	1263	0
<b>Retail stores</b>	<b>2812</b>	<b>2812</b>	<b>83,285</b>	<b>83,285</b>
Domestic (U.S.)	787	787	—	—
International	2025	2025	—	—
<b>Totals</b>	<b>16,118</b>	<b>14,301</b>	<b>255,628</b>	<b>139,164</b>
Fiscal Year 2013				
<b>Corporate</b>	<b>15,211</b>	<b>13,727</b>	<b>85,354</b>	<b>17,503</b>
Cupertino, CA	12,231	10,747	43,116	0
Elk Grove, CA	509	509	4400	0
Austin, TX	83	83	12,162	0
Other U.S.	337	337	2463	0
Cork, Ireland	743	743	5320	0
Singapore	50	50	5826	5826
China	390	390	7490	7490
Other International	868	868	4578	4187
<b>Data centers</b>	<b>19,360</b>	<b>2201</b>	<b>123,855</b>	<b>0</b>
Maiden, NC	19,360	2201	75,836	0
Newark, CA	0	0	36,959	0
Prineville, OR	0	0	9965	0
Reno, NV	0	0	1095	0
<b>Retail stores</b>	<b>6158</b>	<b>6158</b>	<b>77,425</b>	<b>74,002</b>
Domestic (U.S.)	3548	3548	44,606	44,606
International	2610	2610	32,819	29,397
<b>Totals</b>	<b>40,729</b>	<b>22,086</b>	<b>286,634</b>	<b>91,505</b>



Fiscal Year 2014				
Location	Scope 1		Scope 2	
	Default Utility Emissions*	Apple Emissions (incl. Renewable Energy)	Default Utility Emissions*	Apple Emissions (incl. Renewable Energy)
<b>Corporate</b>	<b>16,716</b>	<b>15,335</b>	<b>86,842</b>	<b>21,555</b>
Cupertino, CA	14,310	12,929	36,496	0
Elk Grove, CA	411	411	2516	0
Austin, TX	148	148	15,149	0
Other U.S.	115	115	2270	0
Cork, Ireland	1000	1000	7678	0
Singapore	51	51	6852	6852
China	385	385	8577	8577
Other International	296	296	7304	6126
<b>Data centers</b>	<b>26,854</b>	<b>18</b>	<b>148,320</b>	<b>0</b>
Maiden, NC	26,835	0	92,306	0
Newark, CA	0	0	38,278	0
Prineville, OR	18	18	10,392	0
Reno, NV	0	0	7344	0
<b>Retail stores</b>	<b>5355</b>	<b>5355</b>	<b>82,770</b>	<b>41,658</b>
Domestic (U.S.)	2812	2812	45,041	11,036
International	2543	2543	37,729	30,662
<b>Totals</b>	<b>48,924</b>	<b>20,708</b>	<b>317,932</b>	<b>63,213</b>

Fiscal Year 2015				
<b>Corporate</b>	<b>16,960</b>	<b>15,423</b>	<b>106,134</b>	<b>19,564</b>
Cupertino, CA	14,792	13,256	42,074	0
Elk Grove, CA	369	369	3279	0
Austin, TX	233	233	20,874	0
Other U.S.	121	121	2715	0
Cork, Ireland	892	892	6227	0
Singapore	0	0	5310	3767
China	117	117	9050	2201
Other International	435	435	16,605	13,596
<b>Data centers</b>	<b>24,543</b>	<b>136</b>	<b>186,586</b>	<b>0</b>
Maiden, NC	24,530	123	99,907	0
Newark, CA	0	0	26,519	0
Prineville, OR	13	13	39,507	0
Reno, NV	0	0	20,653	0
<b>Retail stores</b>	<b>3800</b>	<b>3800</b>	<b>86,070</b>	<b>22,893</b>
Domestic (U.S.)	2269	2269	42,543	0
International	1531	1531	43,527	22,893
<b>Totals</b>	<b>45,303</b>	<b>19,359</b>	<b>378,790</b>	<b>42,457</b>

**Notes:** Apple's fiscal year begins approximately October 1 each year.

Scope 1 emissions result from natural gas use for facilities, and gasoline use for fleet vehicles. As is typical, these emissions are tracked separately from our 100 percent renewable energy claim.

Scope 2 emissions result from electricity use for facilities. In addition, in fiscal year 2014, Apple owned a facility in Mesa, Arizona, that was operated by a supplier, which had default grid emissions of 151,279 tons CO<sub>2</sub>e and effective emissions of 0 tons CO<sub>2</sub>e in fiscal year 2014. It was removed from operation in fiscal year 2015.

— = Energy source not yet online.

\*Default Utility Emissions are based on utility-scale and regional default grid emission factors (using the most granular data set available).

## Fiscal Year 2015 Natural Gas and Electricity Use

The chart below provides a detailed breakdown of fiscal year 2015 energy use, which is used to calculate our carbon emissions.

Fiscal Year 2015				
Location	Natural Gas		Electricity	
	Total Gas (mmBTU)	Renewable Biogas (mmBTU)	Total Electricity (million kWh)	Renewable Electricity (million kWh)
<b>Corporate</b>	<b>318,842</b>	<b>29,027</b>	<b>348</b>	<b>315</b>
Cupertino, CA	278,092	29,027	217	217
Elk Grove, CA	6928	0	13	13
Austin, TX	4385	0	40	40
Other U.S.	2290	0	7	7
Cork, Ireland	16,771	0	14	14
Singapore	0	0	12	5
China	2197	0	11	8
Other International	8179	0	34	11
<b>Data centers</b>	<b>461,388</b>	<b>461,145</b>	<b>455</b>	<b>455</b>
Maiden, NC	461,145	461,145	218	218
Newark, CA	0	0	137	137
Prineville, OR	243	0	54	54
Reno, NV	0	0	46	46
<b>Retail stores</b>	<b>71,437</b>	<b>0</b>	<b>194</b>	<b>146</b>
Domestic (U.S.)	41,750	0	99	99
International	29,687	0	95	47
<b>Totals</b>	<b>851,667</b>	<b>490,171</b>	<b>997</b>	<b>916</b>
<b>Percent Renewable</b>		<b>58%</b>		<b>92%</b>

**Note:** Apple uses third-party colocation facilities for additional data center capacity. In fiscal year 2015, these facilities used 143 million kilowatt-hours of electricity, of which 85 percent was covered by renewable energy (see Appendix B for additional energy and emissions information).

# Appendix B

## Data Center Energy Supplement

### Maiden, North Carolina

On any given day, between 60 and 100 percent of our Maiden data center's energy use is generated through 68 megawatts of Apple projects: two 20-megawatt solar arrays, an 18-megawatt solar array that came online in October 2015, and 10 megawatts of biogas fuel cells. In 2015, we took a new approach to support further growth at our Maiden data center: We partnered with the local utility, Duke Energy, to build five solar PV projects through Duke Energy's Green Source Rider program. These solar PV projects, which began coming online in October 2015 to support our Maiden data center, were Duke's first Green Source Rider projects to become operational. We worked with Duke Energy for several years to develop this green energy tariff option, which allowed Apple and Duke Energy to work together to develop new renewable energy projects. Apple's Maiden data center was the first facility to begin benefiting from renewable energy through this program. The five projects have a combined peak capacity of 20 megawatts. All told, Apple's data center will be supported by projects that generate 244 million kilowatt-hours of renewable energy a year, which is equivalent to the energy used by over 17,900 North Carolina homes.\*

Among Maiden's energy efficiency features is the use of outside air cooling through a waterside economizer during night and cool-weather hours, which, along with water storage, allows the chillers to be turned off more than 75 percent of the time.

### Maiden, North Carolina—100% renewable since opening June 2010



Solar + Biogas Fuel Cells

Duke Energy Default Grid Mix		Apple Actual Renewable Energy Use	
Nuclear	51%	Solar PV Projects	36%
Coal	33%	Biogas Fuel Cells	28%
Other	16%	NC GreenPower (80% solar)	36%
Renewable	<1%		
2015 Default Emissions (mtons CO <sub>2</sub> e/year)	99,907	2015 Effective Emissions (mtons CO <sub>2</sub> e/year)	0
From Duke Energy Carolinas 2015 Statistical Supplement generation data		Actual fiscal year 2015 energy data	

Resource Advisor generated utility emissions values (utility-specific data).

\*Carbon emissions equivalences calculated using U.S. Energy Information Administration, 2013 data: [www.eia.gov/electricity/sales\\_revenue\\_price/pdf/table5\\_a.pdf](http://www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf).



## Newark, California

Our data center in Newark, California, is powered by 100 percent renewable energy. We hit this milestone in January 2013, when we began serving the data center with energy sourced primarily from California wind power. We're acquiring this energy directly from the wholesale market through California's Direct Access program. Late this year, when our 130-megawatt solar project in Monterey County, California, comes online, we'll use Direct Access to supply power from that project directly to our data center as well as other Apple facilities in California.

### Newark, California—100% renewable since January 2013



Pacific Gas & Electric Default Grid Mix		Apple Actual Renewable Energy Use	
Natural Gas	24%	Bundled Grid (mostly wind)	63%
Nuclear	21%	Grid (mostly wind)	37%
Other/Unspecified	21%		
Renewable	34%		
2015 Default Emissions (mtons CO <sub>2</sub> e/year)	26,519	2015 Effective Emissions (mtons CO <sub>2</sub> e/year)	0
<a href="http://www.energy.ca.gov/sb1305/labels/2014_labels/all_labels/Pacific_Gas_and_Electric_(PGandE).pdf">www.energy.ca.gov/sb1305/labels/2014_labels/all_labels/Pacific_Gas_and_Electric_(PGandE).pdf</a>		Actual fiscal year 2015 energy data	

Resource Advisor generated utility emissions values (utility-specific data).

## Prineville, Oregon

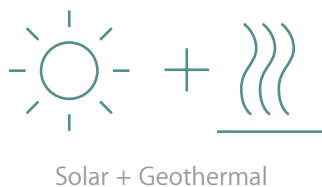
To support our Prineville data center, we built our first two micro-hydro systems that harness the power of water flowing through local irrigation canals that have been operating for over 60 years. These micro-hydro projects will generate 12 million kilowatt-hours of clean, renewable energy a year. To supplement this micro-hydro generation, we're able to directly access enough local wind energy to power the entire data center.

### Prineville, Oregon—100% renewable since opening May 2012



Pacific Power Default Grid Mix		Apple Actual Renewable Energy Use	
Coal	61%	Oregon Wind	89%
Natural Gas	13%	Utility Green	1%
Other	11%	Apple's Micro-Hydro Projects	10%
Renewable	15%		
2015 Default Emissions (mtons CO <sub>2</sub> e/year)	39,507	2015 Effective Emissions (mtons CO <sub>2</sub> e/year)	0
<a href="http://www.pacificpower.net/about/rr/ori.html">www.pacificpower.net/about/rr/ori.html</a> from PowerContent—Large Non Residential		Actual fiscal year 2015 energy data	

Resource Advisor generated utility emissions values (utility-specific data).



## Reno, Nevada

Unlike competitive energy markets where we've located some of our data centers, the regulated electricity supply in Nevada did not offer a simple solution for us to create new renewable energy projects dedicated to our data center. So we created a partnership with the local utility, NV Energy, to develop our first renewable project: Fort Churchill Solar PV project. Apple designed, financed, and constructed the project, and NV Energy operates it and directs all the renewable energy it produces to our data center. The Fort Churchill Solar PV project uses a new kind of photovoltaic panel with curved mirrors that concentrate sunlight. The 20-megawatt array has an annual production capacity of over 43 million kilowatt-hours of clean, renewable energy.

To facilitate further renewable development in Nevada, Apple worked with NV Energy and the Nevada utility commission to create a green energy option open to all commercial customers that does not require the customer to fund project development upfront. Thanks to this new option, in late 2015 we announced our second Nevada solar array, a 50-megawatt project called Boulder City II that should come online by end of 2016. We're proud that another Nevada data center operator has also used the new green energy option, twice.

### Reno, Nevada—100% renewable since opening December 2012

NV Energy - North Default Grid Mix		Apple Actual Renewable Energy Use	
Natural Gas	53%	Apple's Solar PV Projects	29%
Coal	27%	Other Solar PV	51%
Other	<1%	Local Geothermal	20%
Renewable	20%		
2015 Default Emissions (mtons CO <sub>2</sub> e/year)		20,653	2015 Effective Emissions (mtons CO <sub>2</sub> e/year)
			0
<a href="http://www.nvenergy.com/bill_inserts/2016/Power_Content_Insert_NVE-North_2016-01.pdf">www.nvenergy.com/bill_inserts/2016/Power_Content_Insert_NVE-North_2016-01.pdf</a>		Actual fiscal year 2015 energy data	

Resource Advisor generated utility emissions values (utility-specific data).

## Athenry, Ireland

Our data center in County Galway, Ireland, will be built on recovered land that was previously used for commercial lumber. It will provide a forested outdoor education space for local schools and a walking trail for the community. When it opens in 2017, the data center will run on 100 percent clean, renewable energy, and will be cooled by natural ventilation, rather than mechanical air-conditioning, by taking advantage of the mild Irish climate.

Ireland has one of the strongest coastal wave energy resources of anywhere in the world. Apple has partnered with the Sustainable Energy Authority of Ireland to support innovative new ways of capturing wave energy and converting it to renewable electricity, with Apple agreeing to use electricity generated from new wave energy technologies to support the Athenry data center.

## Viborg, Denmark

In 2017, we'll open a new data center running on 100 percent renewable energy in Denmark's central Jutland region. Due to its proximity to one of Denmark's largest electrical substations, the data center won't require any back-up generators, which typically run on diesel and require periodic testing and burning of fuel. The facility is designed to capture excess heat from its equipment and conduct it into the local district heating system to help warm homes in the community. Denmark has a long tradition of biomass energy generation from agricultural waste products.

## Our colocated facilities

The vast majority of our online services are provided by our own data centers; however, we also use third-party colocation facilities for additional data center capacity. While we don't own these shared facilities and use only a portion of their total capacity, we include our portion of their energy use in our renewable energy goals. Over 85 percent of our power for colocated facilities is matched with renewable energy generated within the same state for facilities in the United States, or within the same country for those around the world. And we will keep working with collocated suppliers to get to 100 percent around the world, including in regions where renewable energy markets are underdeveloped.

Furthermore, we worked with one of our main suppliers of colocated services to help it develop the capability to provide renewable energy solutions to its customers. This partnership serves to advance the renewable energy program of both Apple and those of other companies that use this colocation provider.

Beyond the use of our own data centers and colocated facilities, we also use third-party computing services to support some of our on-demand cloud storage-based services. We encourage and work with these suppliers to adopt a 100 percent renewable energy strategy for their energy use.

## Energy Use and Emissions at Apple's Colocated Facilities

	Energy Use (kWh)	Renewable Energy (kWh)	Default Utility Emissions (metric tons CO <sub>2</sub> e)	Apple's Emissions - including renewable energy (metric tons CO <sub>2</sub> e)	% Renewable Energy
FY2011	42,524	0	12	12	0%
FY2012	38,552,271	1,471,680	17,220	16,543	4%
FY2013	79,462,860	46,966,891	31,757	14,493	59%
FY2014	108,659,693	88,553,380	44,338	10,976	81%
FY2015	142,615,026	121,086,061	60,495	12,740	85%

## Regional Energy Use at Apple's Colocated Facilities (Fiscal Year 2015)

	Energy Use (kWh)	Renewable Energy (kWh)	% Renewable Energy
U.S.	75,671,765	75,671,765	100%
Europe	36,595,776	36,595,776	100%
APAC	29,911,090	8,818,520	29%
Other	436,395	0	0%
FY2015 TOTAL	142,615,026	121,086,061	85%



# Appendix C

## Assurance and Review Statements

**Facilities energy, carbon, waste, and water data (Pages 38–40)**  
(Bureau Veritas)

**Product life cycle carbon footprint (Pages 41–44)**  
(Fraunhofer Institute)

**Paper footprint (Pages 45–46)**  
(Fraunhofer Institute)

# BUREAU VERITAS NORTH AMERICA

## INDEPENDENT ASSURANCE STATEMENT



### Introduction and objectives of work

Bureau Veritas North America, Inc. (BVNA) was engaged by Apple, Inc. (Apple) to conduct an independent assurance of select environmental data reported in its 2015 environmental report (the Report). This Assurance Statement applies to the related information included within the scope of work described below. The intended users of the assurance statement are the stakeholders of Apple. The overall aim of this process is to provide assurance to Apple's stakeholders on the accuracy, reliability and objectivity of select information included in the Report.

This information and its presentation in the Report are the sole responsibility of the management of Apple. BVNA was not involved in the collection of the information or the drafting of the Report.

### Scope of Work

Apple requested BVNA to include in its independent review the following:

- Assurance of select environmental data and information included in the Report for the fiscal year 2015 reporting period (September 28, 2014 through September 26, 2015), specifically, in accordance with Apple's definitions and World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol:
  - Energy: Direct (Million Therms) and Indirect (Million kilowatt hours (mkWh))
  - Renewable Energy (mkWh)
  - Water (Total withdrawal)
  - Greenhouse Gas (GHG) Emissions: Direct Scope 1 emissions by weight, Indirect Scope 2 emissions by weight, Indirect Scope 3 emissions by weight (Employee Commute and Business Travel)
  - Waste Quantities and Disposition
  - Appropriateness and robustness of underlying reporting systems and processes, used to collect, analyze, and review the environmental information reported;

Excluded from the scope of our work is any assurance of information relating to:

- Text or other written statements associated with the Report
- Activities outside the defined assurance period

### Methodology

BVNA undertook the following activities:

1. Site visits to Apple facilities in Cork, Ireland; London, United Kingdom; Seoul, South Korea; and Singapore;
2. Visit to Apple corporate offices in Cupertino, California;
3. Interviews with relevant personnel of Apple (10 individuals including employees and external contractors at the corporate level);
4. Review of internal and external documentary evidence produced by Apple;
5. Audit of environmental performance data presented in the Report, including a detailed review of a sample of data against source data; and
6. Review of Apple information systems for collection, aggregation, analysis and internal verification and review of environmental data.

Our work was conducted against Bureau Veritas' standard procedures and guidelines for external Verification of Sustainability Reports, based on current best practice in independent assurance.



Bureau Veritas procedures are based on principles and methods described in the International Standard on Assurance Engagements (ISAE) 3000.

The work was planned and carried out to provide reasonable assurance for all indicators and we believe it provides an appropriate basis for our conclusions.

## Our Findings

BVNA verified the following indicators for Apple's Fiscal Year 2015 reporting period (September 28, 2014 through September 26, 2015):

Parameter	Quantity	Units	Boundary/ Protocol
Natural Gas Consumption:	8.5	Million Therms	Worldwide occupied properties / Apple Internal Protocol
Electricity Consumption:	990	Million kilowatt hours (mkWh)	Worldwide occupied properties / Apple Internal Protocol
Renewable Energy	914	Million kilowatt hours (mkWh)	Worldwide / Invoiced quantities & self-generated
Scope 1 GHG Emissions	28,103	metric tons of carbon dioxide equivalent (tCO <sub>2</sub> e)	Worldwide occupied properties / WRI/WBCSD GHG Protocol
Scope 2 GHG Emissions (Location-Based)	376,365	tCO <sub>2</sub> e	Worldwide occupied properties / WRI/WBCSD GHG Protocol
Scope 2 GHG Emissions (Market-Based)	43,608	tCO <sub>2</sub> e	Worldwide occupied properties / WRI/WBCSD GHG Protocol
Scope 3 GHG Emissions – Business Travel	139,936	tCO <sub>2</sub> e	Worldwide occupied properties / WRI/WBCSD GHG Protocol Value Chain (Scope 3)
Scope 3 GHG Emissions – Employee Commute	172,968	tCO <sub>2</sub> e	Worldwide occupied properties / WRI/WBCSD GHG Protocol Value Chain (Scope 3)
Water Withdrawal	2,000,000	cubic meters (m <sup>3</sup> )	Worldwide occupied properties / Apple Internal Protocol
Trash disposed in Landfill	5947	Metric tonnes	Worldwide occupied properties / Apple Internal Protocol
Hazardous Waste (Regulated waste)	455	Metric tonnes	Worldwide occupied properties / Apple Internal Protocol
Recycled Material (Removal by recycling contractor)	10,221	Metric tonnes	Worldwide occupied properties / Apple Internal Protocol



## Our Conclusion

Based on the assurance process and procedures conducted, we conclude that:

- The Energy, Water, Waste, and Scope 1, 2 & 3 GHG Emissions assertions shown above are materially correct and are a fair representation of the data and information; and
- Apple has established appropriate systems for the collection, aggregation and analysis of relevant environmental information, and has implemented underlying internal assurance practices that provide a reasonable degree of confidence that such information is complete and accurate.

## Statement of independence, impartiality and competence

BVNA is an independent professional services company that specializes in Quality, Health, Safety, Social and Environmental management with over 180 years history in providing independent assurance services, and an annual 2015 revenue of \$4.6 billion Euros.

No member of the assurance team has a business relationship with Apple, its Directors or Managers beyond that of verification and assurance of sustainability data and reporting. We have conducted this verification independently and we believe there to have been no conflict of interest.

BVNA has implemented a Code of Ethics across the business to maintain high ethical standards among staff in their day-to-day business activities.

The assurance team has extensive experience in conducting assurance over environmental, social, ethical and health and safety information, systems and processes, has over 20 years combined experience in this field and an excellent understanding of BVNA standard methodology for the Assurance of Sustainability Reports.

### Attestation:

A handwritten signature in blue ink, appearing to read 'Trevor A. Donaghu'.

Trevor A. Donaghu, Lead Verifier  
Technical Director, Climate Change Services  
Sustainability and Climate Change Services  
Bureau Veritas North America, Inc.

A handwritten signature in blue ink, appearing to read 'John A. Rohde'.

John A. Rohde, Technical Reviewer  
Senior Project Manager  
Sustainability and Climate Change Services  
Bureau Veritas North America, Inc.

April 11, 2016



## Review and Verification Statement

### Company Carbon Footprint – Scope 3: Product related Carbon Footprint for Fiscal Year 2015

Fraunhofer IZM reviewed Apple's scope 3 company carbon footprint (CCF) data related to the products manufactured and sold by Apple Inc. in fiscal year 2015.

#### 1 Summary

This review checks transparency of data and calculations, appropriateness of supporting product related data and assumptions, and overall plausibility of the calculated corporate annual carbon footprint comprised of emissions derived from the life cycle assessment (LCA) of Apple products shipped in fiscal year 2015. This review and verification focuses on Scope 3 emissions for products sold by Apple Inc. (as defined by WRI/WBCSD/Greenhouse Gas Protocol – Scope 3 Accounting and Reporting Standard). It is noted that emissions relating to the facilities that are owned or leased by Apple (scope 1 and 2 emissions) as well as business travel and employee commute were subject to a separate third party verification and are therefore excluded from the scope of this statement. Confidential data relating to product sales and shipments were also excluded from the scope of this verification.

This review and verification covers Apple's corporate annual greenhouse gas emissions and does not replace reviews conducted for individual product LCAs for greenhouse gas emissions (GHGs). The life cycle emissions data produced by Apple for individual products has been calculated in accordance to the standard ISO 14040/14044: Environmental management – Life cycle assessment – Principles and framework / Requirements and guidelines. This review and verification furthermore complies with ISO 14064-3: Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions.

The review of the corporate annual carbon footprint has considered the following criteria:

- The system, boundaries and functional unit are clearly defined
- Assumptions and estimations made are appropriate

- Selection of primary and secondary data is appropriate and methodologies used are adequately disclosed

These criteria are also fundamental to the review of LCAs conducted for individual product emissions. The reviewers note that the largest share (98%) of Apple Inc. annual corporate carbon footprint is comprised of scope 3 emissions from individual products. The aforementioned criteria have been regularly reviewed by Fraunhofer IZM since 2007 with a view to providing independent feedback that can facilitate continuous improvement and refinement in the LCA methodology applied by Apple Inc.

Data reported by Apple is as follows:

	Manufacturing	Transportation	Product Use	Recycling
2015	29,599,494	1,322,121	6,566,851	502,547
	[metric tons CO <sub>2</sub> e]	[metric tons CO <sub>2</sub> e]	[metric tons CO <sub>2</sub> e]	[metric tons CO <sub>2</sub> e]

Based on the process and procedures conducted, there is no evidence that the Greenhouse Gas (GHG) assertion with regards to scope 3 corporate carbon footprint

- is not materially correct and is not a fair representation of GHG data and information, and
- has not been prepared in accordance with the related International Standard on GHG quantification, monitoring and reporting.

## 2 Reviewed Data and Plausibility Check

A verification and sampling plan as required by ISO 14046-3 has been established in the course of this CCF review and verification, defining the level of assurance, objectives, criteria, scope and materiality of the verification.

As part of this review and verification Apple disclosed following data to Fraunhofer IZM:

- Sales data for FY2015, including accessories
- Regional distribution of sold units and country specific allocation per product to major sell-in countries
- Product specific data on transportation including breakdown of air and sea shipment

- Life cycle GHG emissions for all products, differentiating the actual product configurations (i.e. memory capacity)
- Calculation methodology for the company carbon footprint and methodological changes implemented in 2015
- The total company carbon footprint – scope 3 for the fiscal year 2015
- Detailed analysis of the CCF including:
  - The breakdown of the CCF into life cycle phases manufacturing, transportation, product use and recycling
  - Detailed product specific split into life cycle phases
  - The contribution of individual products and product families to the overall CCF

The data and information supporting the GHG assertion were projected (use phase and recycling) and historical (i.e. fiscal year 2015 data regarding sales figures, manufacturing, transportation).

This review comprises a check of selected data, which are most influential to the overall company carbon footprint. The overall plausibility check addressed the following questions:

- Are product LCAs referenced correctly?
- Are results for products, for which no full LCA review was undertaken, plausible?
- Are carbon emission data for individual products plausible in the light of methodological changes as indicated by Apple?

This review was done remotely.

### 3 Findings

Prior to this CCF review and verification 14 recent product LCA studies, including for the first time separately sold accessories, have been reviewed successfully against ISO 14040/44. These recent LCAs cover most important product segments (Apple Watch, iPad, iPhone, iPod, MacBook, MacBook Pro, and Beats products). These latest LCA studies cover products which represent in total 47,2% of the total scope 3 company carbon footprint. Representatives of other product segments (iMac, Mac Pro, Mac Mini, Airport Express /

Airport Extreme, Apple TV and Cinema Display) underwent no or only minor design changes compared to those which went through a full LCA review in former years.

The methodological changes implemented with the 2015 CCF data are confirmed to lead to an improvement in terms of accuracy and real use patterns representation of the results. Inevitably this hampers the comparability of 2015 results with earlier CCF data.

All questions raised in the course of the review were answered by Apple and related evidence was provided where needed.

## 4 Conclusions

We observe from year to year an improvement of the assessment approach in terms of granularity of the used calculation data. This year the use phase models have been enhanced, taking into account real use pattern data. Several additional components are now modelled with primary data from Apple's suppliers.

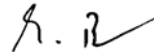
For all product LCA calculations, where exact data was missing, the principle of a worst-case approach has been followed and results have been calculated with rather conservative estimates regarding e.g. production yield losses and recycling.

The review has not found assumptions or calculation errors on the CCF data level that indicate the scope 3 corporate carbon footprint has been materially misstated. The excellent analysis meets the principles of good scientific practice.

Berlin, March 24, 2016



- Karsten Schischke -  
Fraunhofer IZM  
Dept. Environmental and  
Reliability Engineering



- Marina Proske -  
Fraunhofer IZM  
Dept. Environmental and  
Reliability Engineering



## Review Statement

### Company Fiber Footprint

Fraunhofer IZM reviewed Apple's company fiber footprint data related to the products manufactured and sold by Apple Inc. in fiscal year 2015.

## 1 Summary

This review checks transparency of data and calculations, appropriateness of supporting product and packaging related data and assumptions, and overall plausibility of the calculated corporate annual fiber footprint of Apple products shipped in fiscal year 2015.

As there is no standardised method available for calculating a product or company fiber footprint Apple defined a methodology for internal use. The scope of the Fiber Footprint includes Apple's corporate fiber usage from products. Facility fiber usage is explicitly excluded. The fiber footprint tracks the total amount of wood fiber, both virgin and recycled, that Apple uses in packaging, and other paper products. Apple obtains and analyses supplier-specific data for each product line and sums up these figures for the entire company using sell-in numbers. The output is a total fiber footprint.

The review of the corporate annual fiber footprint has considered the following criteria:

- The system boundaries are clearly defined
- Assumptions and estimations made are appropriate
- Use of supplier data is appropriate and methodologies used are adequately disclosed

Data reported by Apple is as follows:

	Total Fiber	Virgin Fiber	Recycled Fiber
2015	132,741	51,669	81,072
	[metric tons fiber]	[metric tons fiber]	[metric tons fiber]

All results and figures reviewed for fiscal year 2015 are plausible.

## 2 Reviewed Data and Findings

As part of this review Apple disclosed following data to Fraunhofer IZM:

- Calculation methodology for the company fiber footprint
- Sales data for FY2015, including accessories
- Product and supplier specific data on packaging design (including CAD design drawings), materials (distinction of paper qualities, fiber content, including recycled fiber content), weights and production yields (process yields and cut-off losses)
- Aggregated fiber data for all products and the total company fiber footprint for the fiscal year 2015

The revised methodology paper provided by Apple (Fiber Footprint at Apple - Methodology Description - V1.0) on March 15, 2016, is considered a sound and appropriate guidance for determining the company fiber footprint. Where appropriate, this approach follows methodological principles applied for state-of-the-art Life Cycle Assessments.

This review comprises a check of fiber data for selected products, which are most influential to the overall company fiber footprint and which represent the full spectrum of Apple products. The selection of products for individual reviews has been agreed between Apple and Fraunhofer IZM.

Plausibility of some supplier data has been questioned and discussed in detail with Apple. Based on direct supplier feedback related fiber data has been corrected.

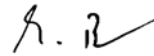
This review was done remotely. All questions raised in the course of the review were answered by Apple and related evidence was provided where needed.

Based on the process and procedures conducted, there is no evidence that the corporate fiber footprint is not materially correct and is not a fair representation of fiber data and information. The excellent analysis meets the principles of good scientific practice.

Berlin, March 29, 2016



- Karsten Schischke -  
Fraunhofer IZM  
Dept. Environmental and  
Reliability Engineering



- Marina Proske -  
Fraunhofer IZM  
Dept. Environmental and  
Reliability Engineering

# Appendix D

## Environmental Health and Safety Policy Statement

### **Mission Statement**

Apple Inc. is committed to protecting the environment, health, and safety of our employees, customers and the global communities where we operate.

We recognize that by integrating sound environmental, health, and safety management practices into all aspects of our business, we can offer technologically innovative products and services while conserving and enhancing resources for future generations.

Apple strives for continuous improvement in our environmental, health and safety management systems and in the environmental quality of our products, processes, and services.

### **Guiding Principles**

Meet or exceed all applicable environmental, health and safety requirements.

We will evaluate our EHS performance by monitoring ongoing performance results and through periodic management reviews.

Where laws and regulations do not provide adequate controls, we will adopt our own standards to protect human health and the environment.

Support and promote sound scientific principles and fiscally responsible public policy that enhance environmental quality, health and safety.

Advocate the adoption of prudent environmental, health and safety principles and practices by our contractors, vendors, and suppliers.

Communicate environmental, health, and safety policies and programs to Apple employees and stakeholders.

Design, manage and operate our facilities to maximize safety, promote energy efficiency, and protect the environment.

Strive to create products that are safe in their intended use, conserve energy and materials, and prevent pollution throughout the product life cycle including design, manufacture, use, and end-of-life management.

Ensure that all employees are aware of their role and responsibility to fulfill and sustain Apple's environmental, health and safety management systems and policy.

**Luca Maestri**

Senior Vice President and CFO

January 2016

# Appendix E

## EMS Certification





# CERTIFICATE OF REGISTRATION

This is to certify that

**Apple Inc.**

operates an

**Environmental Management System**

which complies with the requirements of

**ISO 14001:2004**

for the following scope of registration

**The management of the environmental risks associated specifically with aspects/impacts associated with functions limited to the " Design & Engineering " Department & Corporate Recycling of Apple Inc., 1 Infinite Loop, Cupertino, Ca.**

Registered Sites:	Apple Inc.	Apple Inc.
	1326 Kifer Road Sunnyvale, California 94086 USA	1 Infinite Loop Cupertino, California USA
Certificate Number:	CERT-0095035	CERT-0095035
File Number:	1677254	1677253
Issue Date:	March 11, 2016	March 11, 2016
Original Certification Date:	March 11, 2016	March 11, 2016
Current Certification Date:	March 11, 2016	March 11, 2016
Certificate Expiry Date:	September 28, 2017	September 28, 2017

Heather Mahon  
Acting Head of  
Policy, Risk and Certification



ISO 14001



#### Report Notes:

- This report is published annually and covers fiscal year 2015 activities, unless otherwise noted.
- This report addresses environmental impacts and activities at Apple-owned facilities (corporate offices, data centers, and retail stores), as well as the life-cycle impacts of our products, including in the manufacturing, transportation, use, and end-of-life phases.
- To provide feedback on this report, please contact [environment-report@apple.com](mailto:environment-report@apple.com).

<sup>1</sup>CO<sub>2</sub>e, or carbon dioxide equivalent, is a standard unit for measuring carbon footprints. It translates into one number the impact of different greenhouse gases based on their potential to contribute to climate change.

<sup>2</sup>Greenhouse gas equivalencies calculated using the U.S. EPA Greenhouse Gas Equivalencies Calculator: [www.epa.gov/energy/greenhouse-gas-equivalencies-calculator](http://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator).

<sup>3</sup>Based on the average residential cost of electricity in the U.S. in 2015; includes customer use scenarios and power consumed by the power adapter when disconnected from the iPhone.

<sup>4</sup>Calculations based on sales-weighted averages for all energy-using Apple-branded products in the given years.

<sup>5</sup>In Brazil, sanitary waste is legally mandated to be landfilled as biohazard waste. Because of this regulatory requirement, UL is exempting sanitary waste from the zero waste to landfill validation currently underway at the Foxconn final assembly facility in São Paulo, Brazil. As of March 2016, sanitary waste represented 4 percent of total waste at this facility.

<sup>6</sup>Water consumption is calculated using NREL source data, Operational Water Consumption and Withdrawal Factors for Electricity Generating Technologies, 2012. Savings estimated from use of renewable energy is not reflected in our facilities' water-use calculations.

<sup>7</sup>Based on equivalent virgin fiber production from protected forests and virgin fiber used for product packaging.

<sup>8</sup>In terms of global and statewide occurrence.

<sup>9</sup>Based on estimates of the volume of virgin fiber required to produce our packaging and the volume of virgin fiber produced by those forests protected through our partnership with The Conservation Fund.

<sup>10</sup>Hunan, Guangxi, Guangdong, Fujian, and Yunnan.

<sup>11</sup>Every Apple product is free of PVC and phthalates with the exception of power cables in India and South Korea, where we continue to seek government approval for our PVC and phthalates replacement.

Updated September 2016.

Added energy and emissions tables for colocated facilities to Appendix B.