



2019 Industry Report on GHG Emissions

**Consumer Technology
Association™**

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Methodology

- For each annual report, CTA will only focus on data from CTA member companies whose primary business involves one or more phases of consumer electronics technology – from manufacturing to retailing electronics products, or providing technology services.
- In presenting CPD data,
 - CDP 2018 Reporting: Reflects company emissions from calendar year 2017
 - CDP 2017 Reporting: Reflects company emissions from calendar year 2016
- For Year-Over-Year Numbers, companies included have provided reporting figures for both the current and prior year. By comparing only continuing participants, each year will provide meaningful comparison against previous year's result.
- CTA has not included any individual company CDP reported data. All reported data is aggregated data for electronics companies.
 - Individual companies are only highlighted in recognition for CDP A/A-ranking and SBTi targets.

Introduction



The climate change challenge is enormous. The technology industry continues to address that challenge by creating more energy-efficient devices that do more while using less – less energy, less material. Our industry also provides solutions for other sectors to reduce their climate change impacts. Beyond product improvements and cross-sector solutions, most major consumer technology companies have set – and are on the path to achieve – stretch Greenhouse Gas (GHG) emission reduction goals for their operations and value chains. This report includes data provided by companies whose core business is electronics. During the year this report examines (data from 2016-2017 as reported in 2017-2018), the consumer tech industry experienced a growth of 11.7% while reducing its U.S. GHG emissions by 8.9%.

The consumer technology industry is growing rapidly, yet more and more companies are challenging themselves to achieve overall emission reductions. After the U.S. administration announced plans to withdraw the U.S. from the Paris Agreement to address climate change, CTA's Board of Industry Leaders unanimously agreed in June 2017 to a resolution "...on behalf of the consumer technology

industry...to reduce emissions in the spirit of the Paris Agreement." As part the Initiative, CTA agreed to:

- Measure GHG emissions produced by the consumer technology industry on an annual basis as reported through and vetted by a third-party organization (e.g., CDP);
- Develop an annual report that shows the combined progress made by CTA's members in reducing GHG emissions on a year-over-year basis as well as highlighting individual company initiatives;
- Encourage members who have not yet either assessed their emissions or developed mid-term or long-term goals for GHG emission reductions to do so; and
- Recognize the climate program achievements of individual CTA members – from those just starting on the journey to those already demonstrating extraordinary performance.

In our commitment to this initiative, CTA presents the first annual report to highlight and examine the combined progress made by the 45 companies in our industry publicly reporting data on GHG emissions on a year-over-year basis – both globally and in the U.S.

¹ The Paris Agreement is an implementation plan ratified by 148 of the 197 countries that are parties to the United Nations Framework Convention on Climate Change. The Paris Agreement builds upon the Convention and – for the first time – brings all participating nations into a common cause to strengthen the global response to the threat of climate change to keep global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

Reduction in US Emissions

US Emissions: Scopes 1 & 2 Emission Reductions for 2016-2017

In the table below are Scope 1 & 2 emissions* for the United States for those companies reporting for that geographical area (approximately half of companies included in YoY

comparison). While global Scope 1 & 2 emissions increased across the 45 companies, emissions from their US operations went down by 8.9%.

CO2E EMISSIONS	METRIC TONS 2016	METRIC TONS 2017	% CHANGE
Scope 1	5,015,719	4,930,717	-1.7%
Scope 2	15,859,225	14,079,466	-11.2%
Total Scope 1&2	20,874,974	19,010,183	-8.9%

*Scope 1 emissions are direct emissions by sources owned or controlled by a company – such as process emissions, fuel combustion for energy or heating or emissions from company owned transport vehicles. Scope 2 emissions are upstream sources of energy consumed by the company – most commonly from electricity. Scope 3 emissions are those resulting from the company's operations or products, although not owned or controlled by the company – e.g., materials purchased by a company for manufacturing its products, or the use of products by downstream companies or consumers.

The GHG Protocol Scope 2 Guidance requires most companies to report their Scope 2 emissions to CDP in two different ways as 'location-based' emissions and as 'market-based' emissions.

- **Location-based:** Quantify scope 2 GHG emissions based on average electricity generation emission factors for defined geographic locations, including local, subnational, or national boundaries.

- **Market-based:** Quantify scope 2 GHG emissions based on GHG emissions emitted by generators from which reporter contractually purchases electricity bundled with contractual instruments or separate contractual instruments – e.g., renewable energy certificates (RECs), Preferred Power Agreements (PPAs).

TOTAL SCOPE 2 - BASIS FOR COMPANY SCOPE 1&2 TOTALS	METRIC TONS 2016	METRIC TONS 2017	% CHANGE
Total Scope 2	15,858,255	14,079,466	-11.2%
Location	13,795,325	12,287,510	-10.9%
Market	2,099,930	1,791,956	-14.7%

Company Recognition (CDP Rank and SBTi Targets)

This section highlights CTA members going above and beyond in their commitment to reducing GHG emissions. These companies have either demonstrated or planned for operations that result in significant carbon emission reductions. Companies are recognized based on the following criteria:

1. Companies that have achieved CDP ranking of A or A- (Leadership Level)
 - o Ranking based on assessment of level of details provided to CDP responses; comprehensiveness of content/data provide; company awareness of climate change issues, management methods and progress on climate change initiatives.
2. Companies with approved targets from the Science Based Target initiative (SBTi)
 - o SBTi is a joint program of CDP, World Resources Institute and World Wildlife Fund with the goal of promoting emission reductions sufficient for each participant to meet its quota for reaching Paris Agreement reductions necessary to meet 2 degrees C limit. Once SBTi approves company plans, it sets company emission targets.
3. Companies that have taken the step of submitting plans for SBTi approval but have not yet received SBTi-approved targets.

CTA Members with SBTi-approved Targets*

Accenture PLC	Legrand
Adobe Systems Inc.	L'Oréal
Advanced Micro Devices Inc.	Mercedes-Benz AG
Autodesk Inc.	Microsoft Corp.
Best Buy Co. Inc.	Nikon Corp.
Cisco Systems Inc.	Panasonic Corp.
Colgate Palmolive Co.	Royal Philips
CVS Health	Schneider Electric
Dell Technologies	Seagate Technology
Ericsson Group	Sony Corp.
ERM	T-Mobile US Inc.
HP Inc	Wal-Mart Stores, Inc.
International Flavors & Fragrances Inc.	Yamaha Corp.

*Listing based on company designation at the time of this report's publication.

CTA Members with a CDP Score of A or A-*

Accenture
Adobe Systems Inc.
Akamai Technologies Inc.
Alphabet, Inc.
Apple Inc.
AT&T Inc.
Best Buy Co. Inc.
Canon Inc.
Cisco Systems Inc.
Coway Co Ltd
Hitachi, Ltd.
HP Inc
Legrand
LG Display
Microsoft Corp.
Nikon Corp.
NVIDIA Corp.
Panasonic Corp.
QUALCOMM Inc.
Samsung Electro-Mechanics Co. Ltd.
Samsung Electronics
Schneider Electric
Seagate Technology LLC
Sony Corp.
Verizon

*Consistent with the data in this report, CDP Score is based on 2017 data submitted in 2018.

CTA members have submitted letters of commitment to SBTi, but do not yet have SBTi-approved Targets*

AT&T Inc.
AU Optronics Corp.
Coway Co Ltd
Delphi Technologies
HITACHI
Lenovo
Logitech International
Nissan Motor Co. Ltd.
OMRON Corp.
Robert Bosch GmbH
Toyota Motor Corp.
Verizon

*Listing based on company designation at the time of this report's publication.

Company Initiatives and Recent Progress

Over the past couple of decades, CTA members have made our industry one of the fastest growing while also leading the way for greater energy efficiency. More and more, tech companies are delivering the life-changing innovations consumers demand while reducing the overall emissions from those products. A 2017 CTA study found that tech devices in U.S. homes accounted for 25% less residential energy than they did in 2010, even as the number of these devices in U.S. homes has increased 21 percent.

The above product achievements, when combined

with company operational, manufacturing and supply chain commitments to reducing greenhouse gas (GHG) emissions will make a truly significant impact. While complete transformation can't be done overnight, these companies are leading us down the path to sustainability that will benefit consumers and the planet for generations to come.

These highlights have been collected from company corporate responsibility reports and other sustainability-focused public materials.



Adobe Systems Inc.

Adobe aims to source only renewable energy by 2035, a goal certified by the voluntary Science-Based Targets Initiative for being in line with the global push to cap temperature rise at 1.5 degrees.

Due to Adobe's relatively small size compared to other Silicon Valley tech leaders, the San Jose-based company relies heavily on partnerships to meet its goals. Two joint power purchase agreements (PPAs), including a Nebraska wind project with Facebook and a solar deal in Bangalore, India, for example, have already increased its renewables footprint.



Akamai Technologies Inc.

In 2016, Akamai committed to powering 50% of its global network operations with renewable energy, and decreasing absolute GHG emissions below 2015 levels by 2020. Akamai believes our procurement strategy which, involves executing virtual power purchase agreements with developers for new renewable energy projects in power markets where Akamai has significant network operations, will exceed customer expectations. Akamai believes that this rigorous method will result in strong and favorable press coverage and exposure for Akamai and differentiation of its services across markets and geographies.

In May 2017, Akamai completed its first investment in an 80 MW wind farm project near Dallas, targeted to go online in November 2018. Renewable energy procured through a 20-year virtual power purchase agreement is expected to cover 100% of Akamai's Texas data center load, and approximately 6% of its global network load.

Adobe Systems Inc., Akamai Technologies Inc., Analog Devices Inc., Apple Inc., AU Optronics, Autodesk Inc., Cisco Systems Inc., Ericsson, FUJIFILM Holdings Corp., Hitachi Ltd., HP Inc., Lenovo Group, LG Electronics USA, Microsoft Corp., Panasonic Corp. and Sony Corp. logos are trademarks, or registered trademarks, of their respective companies in the United States and/or other countries and are used here for nominative and identification purposes only.



Analog Devices Inc.

A key operational goal for ADI is to achieve a 50% greenhouse gas emission reduction target by 2025 over our 2015 baseline, a significant step up from our previous emission reduction goals. ADI is making a significant investment in the use of renewable energy at ADI manufacturing sites and establishing targets for its overall carbon footprint in terms of how it delivers ADI products to the marketplace.

In 2015, ADI initiated a major efficiency effort across its organization aimed at eliminating wasteful activities and updating older equipment to improve efficiency. On one of its campuses, this effort has yielded more than \$1 million of annual savings in electricity costs and resulted in a 19 percent spending reduction on chemicals supporting manufacturing operations by the end of 2017.



Apple Inc.

Apple prioritizes the use of renewable energy, starting with its own facilities. Apple has transitioned to 100 percent renewable energy for the electricity used at its offices, retail stores, and data centers around the world, which has reduced facilities emissions to only 2 percent of its comprehensive carbon footprint. Apple has extended its efforts into its supply chain, where product manufacturing represents 74 percent of overall emissions. Whether designing a product, an operating system, or a manufacturing process, Apple considers the environmental impact—alongside cost, durability, form, and functionality. And because the cleanest energy is the energy you never use, Apple is reducing energy use at facilities it operates as well as those where its suppliers make its products.

In fiscal year 2018, Apple reduced its comprehensive carbon footprint for the third year in a row—down 35 percent compared to 2015. A major contributor to the decrease was Apple’s Supplier Clean Energy Program, which lowered its carbon footprint by nearly 3.6 million metric tons compared to last year. Apple also made several product design changes that reduced its carbon footprint, like sourcing aluminum made with hydroelectricity and recycled content, improving product energy efficiency, and redesigning integrated circuits to use less silicon. Together, these product design changes resulted in 4.8 million fewer metric tons of carbon emissions compared to last year.



AU Optronics


In 2015, AUO announced its Carbon 2020 target, which is based on the life-cycle management concept with the plan to reduce 1 million metric tons of carbon emissions by 2020. The measures to implement and fulfill the objective include all aspects from low-carbon product design, material selection, localized purchasing, 4R strategy, green production, green transportation and development of energy-efficient panels. As of 2017, the progress made thus far was 45.6% completion with the reduction breakdown as follows: 2% from green procurement and logistics measures, 25% from green production practices and 73% from product innovation. In addition, AUO has committed to setting a Science Based Target as a way to respond and meet the 2°C target.

 **Autodesk Inc.**

During fiscal year 2018, Autodesk's absolute GHG emissions across its value chain decreased by 1 percent compared with the prior year.

Business travel: Autodesk seeks to reduce the GHG emissions of meeting travel through virtual meetings, partner education, a green rating system for hotels, and by incorporating sustainability expectations into its standard meeting contracts.

Data centers: In addition to using 100 percent renewable energy for its cloud services, Autodesk strive to minimize data center energy use through server virtualization, selection of efficient equipment that meets respected industry standards, and by streamlining its code. These efforts help Autodesk provide customers a faster, more reliable experience, with reduced environmental impacts.

 **Cisco Systems Inc.**

Including renewable energy purchases, Cisco's global average contractual emissions factor is 73 percent below the world average. Cisco achieved this by locating facilities where low-carbon grid electricity is available and buying renewable energy from utilities and green power providers. Cisco's challenge will be to prevent its global average emissions factor from increasing as it grows in emerging markets such as India, where low- and no-carbon electricity is less readily available.



Dell Technologies

Dell Technologies believes it has a responsibility to protect and enrich our planet together with its customers, suppliers and communities. When it comes to climate change, Dell understands the important role that technology will play in both mitigating and adapting to climate change, and its customers look to Dell for those technology solutions to solve such big challenges. That's why science-based climate goals have been a key part of the company's 2020 plan and continue to be a focus for its new Progress Made Real 2030 goals. Dell is committed to a comprehensive science-based climate program, setting emissions goals across facilities, supply chain and operations and extending to its customer's use of Dell products.

Specific goals include: Reducing Scopes 1 and 2 greenhouse gas emissions by 50% by 2030, sourcing 75% of electricity from renewable sources across all Dell facilities by 2030 — and 100% by 2040, reducing the energy intensity of its entire product portfolio by 80% (2011–2020), and partnering with its direct material suppliers to meet a science-based greenhouse gas emissions reduction target of 60% per unit revenue by 2030.

Dell's work is comprehensive, and addresses the material parts of its business that can impact climate through their measurable carbon emissions.



Ericsson

Facility energy: The overall reduction in CO2e emissions for facility energy (offices, production sites, data centers and test labs) within the Real Estate portfolio in 2018 was 15%. Ericsson buys renewable energy in countries where it is available. The ratio of renewable energy of the Real Estate portfolio has increased to 54%. Smart Office concept has been expanded to 11 locations representing 2% of Ericsson's facilities. This concept, which is based on the Internet of Things, aims to improve employee experience in the workplace, for example, by optimizing air quality and temperature.

Fleet vehicles: In 2018 the CO2e emissions related to fleet vehicles decreased by approximately 16 Ktonnes. Ericsson's goal is to continue to reduce CO2e emissions per kilometer by using vehicles more efficiently, for example, by implementing telematics and trialing alternative fuels.

FUJIFILM FUJIFILM Holdings Corp.

In FY2017, CO2 emissions from the entire product lifecycle in the Fujifilm Group achieved a large reduction of 7% over the previous year. In FY2017, the factory cut its CO2 emissions by 14,000 ton by using the small energy supply system and being flexible in using the large system to match the production quantity, improving the overall energy efficiency. FUJIFILM Hunt Chemicals USA reduced its energy consumption per product by 18% by introducing LED lighting, contributing to a reduction in CO2 emissions. More than ten facilities in Japan, the United States and South East Asia introduced LED lighting in FY2017.



Hitachi Ltd.

Hitachi seeks to reduce its CO2 emissions by 80% by fiscal 2050 compared to fiscal 2010 levels as its contribution to realizing a drop in global anthropogenic GHG emissions. Hitachi will attain this target throughout its value chain, starting with the usage stage of its products and solutions, which accounts for a substantial share of value chain emissions.

Hitachi will contribute to the well-being its our customers and to society by developing innovative technologies and solutions as well as enhancing the efficiency of its products and supplying low-carbon energy. At the same time, Hitachi will also work to cut emissions at the production stage of its business activities.

Hitachi is already promoting ways to reduce the amount of CO2 emissions from its factories and offices by improving production efficiency, installing high-efficiency equipment and devices, and using renewable energy.



HP Inc.

HP strives to reduce the climate impact of its supply chain, operations, and products and solutions. HP's carbon footprint in 2017 equaled 37,130,100 tonnes of CO₂e, 2% more than in 2016. HP anticipates this amount could increase in 2018, due to the acquisition of Samsung Electronics Co., Ltd.'s printer business.

Supply Chain: Business growth and demand shifts elevated production and shipping. This increased GHG emissions from purchased goods and services by 12% and from transportation by 15% compared to 2016, raising absolute supply chain emissions by 12%.

Operations: Increased energy efficiency as well as purchase of renewable energy and renewable energy certificates in the United States helped decrease this category by 18% year-over-year.

Products & Solutions: GHG emissions from product use decreased 6% compared to 2016 despite business growth, due to energy efficiency gains, improved LaserJet power usage data, increased LaserJet printing duplexing rates, and product mix shifts toward less GHG-emissions intensive products.



Lenovo Group

Lenovo has been working on several initiatives – including making one an open-source standard so all manufacturers can use the process, as described below:

Low-temperature Solder Update: A breakthrough for sustainability in electronics manufacturing was described in Lenovo's 2016/17 Sustainability Report: the invention of low-temperature solder (LTS). To recap, when lead-based solder was phased out in the early 2000s, the electronics industry had to switch to a tin-based solder that required high heat during manufacturing. In February 2017, Lenovo announced it had invented a solder that could be used at 180 degrees Celsius, much lower than the conventional solder temperature of 250 degrees Celsius. Lenovo spent much of FY 2017/18 testing LTS in different facilities and process lines, and modifying quality management to fit LTS requirements. Total CO₂ emissions saved by LTS at the end of FY 2017/18 was approximately 59 metric tons. As LTS is more widely rolled out in Lenovo during 2018, the CO₂ emissions reduction potential rises as well.



LG Electronics USA

LG Electronics USA has committed to reducing its emissions by 50% by 2020, compared to a 2008 baseline. The company is on track to meeting its goal using a variety of carbon reduction mechanisms including energy efficiency upgrades with HVAC and lighting technologies, implementing energy management systems, use of renewable energy, and engaging employees to drive behavioral changes to conserve energy.

 **Microsoft Corp.**

Microsoft set a commitment to be carbon neutral in 2012, which it has met every year since and funds through an internal carbon fee. Microsoft also has a commitment to reduce its Scope 1 and Scope 2 greenhouse gas emissions 75% by 2030 relative to a 2013 base year, and a commitment to reduce its scope and emissions 30% by 2030 relative to a 2017 base year.

The Microsoft Cloud is between 22 and 93 percent more energy efficient than traditional enterprise datacenters, and between 72 and 98 percent more carbon efficient. These savings are attributable to IT operational efficiency, IT equipment efficiency, datacenter infrastructure efficiency, and renewable electricity procurement.

In 2017, Microsoft increased year-over-year green power consumption by 36% - from over 3 billion kWh to 4.5 billion kWh – and moved into the top spot on EPA’s Green Power Partnership National Top 100.

Panasonic Corp.

Panasonic has introduced a unique indicator “size of contribution in reducing CO2 emissions” to accelerate emissions reduction, targeting its products (for energy saving and energy creation). The size of contribution in reducing CO2 emissions is defined as the amount achieved by deducting the actual emissions from the amount that would have been emitted without the improvements by the energy-saving performance of its products from fiscal 2006, and this amount is combined with the emission reduction resulting from power generation by energy-creating products. In other words, it reflects the continuous efforts being made to reduce CO2 emissions.

Panasonic will continue to maximize the size of contribution in reducing CO2 emissions.

By using electricity generated by solar power generation and such, Panasonic can reduce CO2 emissions from thermal power plants. Panasonic will further foster its energy creation business to increase the size of contribution in reducing CO2 emissions.

SONY Sony Corp.

Sony joined RE100 in 2018, targeting to use 100% renewable energy globally by 2040. Sony also pledged to use 100% renewable energy in the U.S. with an accelerated date of 2030.

Sony’s goals also include reducing GHG emissions in sites by 5% (vs. FY 2015), engaging suppliers to monitor GHG emissions and establish own reduction targets, reducing CO2 emissions during product transportation by 10% (vs. FY 2013), reducing product energy consumption by 30% (vs. FY 2013), and an overall goal of a zero environmental footprint by FY 2050.

Global Year-to-Year Emissions Summary

Over the short term, the vast growth of businesses -- especially in new markets with huge expansions and emerging technologies -- presents challenges to reductions in GHG emissions. Still, in spite of rapid product and services growth, companies are increasingly putting in place more future-facing initiatives and operations to growing success.

Forty-five CTA members with electronics as their core business reported to CDP in both 2017 and 2018 (with data for 2016 and 2017). The table below summarizes total worldwide GHG emissions of those companies. While global emissions increased by 2.7% from 2016 to 2017, the growth of the consumer tech industry during that same time was 11.7% - more than four times as much.

CO2E EMISSIONS	2016 METRIC TONS	2017 METRIC TONS	% CHANGE
Scopes 1&2*	67,299,200	68,686,973	+2.1%
Scope 3**	704,282,321	723,859,825	+2.8%
Total Scope 1&2	771,581,521	792,546,798	+2.7%

*Scope 1 emissions: Direct emissions from an organization's owned or controlled sources.

Scope 2 emissions: Indirect emissions from generation of purchased energy (usually electricity).

**Scope 3 emissions: All indirect emissions (not included in scope 2) that occur in the value chain of the reporting organization.

CONCLUSION

The consumer technology industry is committed to identifying and creating solutions to environmental challenges. With growing industries and increasing populations, the need to monitor our changing climate has never been more important. By tracking the progress tech companies have made toward reducing carbon emissions, we have a better understanding of how our industry can make a positive impact on our planet, now and for future generations.

While challenges and improvements remain, there is reason to be optimistic about our industry's sustainable future. As this report shows, the tech industry has made progress in several key areas including more efficient manufacturing and distribution methods, growing its commitment to renewable energy and reducing emissions in the United States. And already, through industry initiatives and innovation, today's tech devices are faster, smarter and more efficient than ever.

The evolution of technology enabled a more sustainable way of life for people across the globe. With telecommuting and e-commerce activities, consumers are living a more digital life – and the need for fuel, paper and

other resources is declining. Emerging technologies, such as home automation products, are also helping consumers actively reduce their energy consumption. One CTA study found that smart home products such as smart lights and thermostats collectively can help reduce total residential primary energy consumption by as much as 10%.

As part of its commitment to the environment, the tech industry also educates consumers on the importance of sustainability with efforts including GreenerGadgets.org, a public resource helping consumers measure their energy impacts and directing them to responsible recycling locations. CTA also produces Public Service Announcements (PSAs) on TV and radio stations across the country encouraging consumers to responsibly recycle their old electronics to lessen our environmental impact.

To learn more about the industry's efforts and overall sustainability, visit [CTA.tech](https://cta.tech).

About

Consumer Technology Association™

Consumer Technology Association

As North America's largest technology trade association, CTA® is the tech sector. Our members are the world's leading innovators – from startups to global brands – helping support more than 18 million American jobs. CTA owns and produces CES® – the largest, most influential tech event on the planet. Find us at [CTA.tech](https://cta.tech). Follow us @CTAtech.