

Contributing to society has been the management philosophy for Panasonic ever since its founding, and we have been taking measures against pollution since the 1970s. We announced the Environmental Statement in June 5, 1991, clarifying our approaches to address global environmental issues as a public entity of society. Since then we have been carrying out initiatives including matters on global warming prevention and resources recycling corporate-wide, aiming to attain a sustainable, safe, and secure society.

After the completion of the Green Plan 2010 which was established in 2001, the Green Plan 2018 was established in 2010 to clarify our targets for fiscal 2019 (from April 1, 2018 to March 31, 2019) as well as an action plan for all employees in order to achieve the targets. The Green Plan 2018 will continue our initiatives in five areas: CO₂ reduction, resources recycling, water, chemical substances, and biodiversity.

In 2013, the Panasonic Group introduced a new brand slogan, “A Better Life, A Better World,” aiming to realize a better life for all its customers, and is promoting environmental initiatives as an important element in achieving that goal. Based on this, the Green Plan 2018 was revised in 2013, followed by the newly-established Environmental Action Guideline. Furthermore, in response to rising demand by the society for CO₂ reductions following the 21st session of the Conference of the Parties (COP21) of the United Nations Conference on Climate Change, and to the need to make changes to our business structure, including growth in the automotive and B2B businesses, the Plan was revised again in 2016.

Additionally, we formulated the Environment Vision 2050 in 2017 to achieve “a better life” and “a sustainable global environment,” aiming for a society with clean energy and a more comfortable lifestyle. Under the Vision, through the development of products, technologies, and solutions relating to energy creation, storage, saving, and management, Panasonic will work towards creation and more efficient utilization of energy which exceeds the amount of energy used.

Environmental Policy

Environmental Statement

Fully aware that humankind has a special responsibility to respect and preserve the delicate balance of nature, we at Panasonic acknowledge our obligation to maintain and nurture the ecology of this planet. Accordingly, we pledge ourselves to the prudent, sustainable use of the earth's resources and the protection of the natural environment while we strive to fulfill our corporate mission of contributing to enhanced prosperity for all.

Environmental Action Guideline

Toward achieving a sustainable society, we will strive to develop our business through the creation of environmental value. For this purpose, we will address environmental challenges through our business activities and will expand our environmental initiatives based on collaboration with stakeholders.

(1) Initiatives to address environmental challenges

- We will reduce CO₂ emissions through production activities and products/services.
- We will work to efficiently use resources by pursuing Recycling-oriented Manufacturing.
- We will conserve water resources through efficient use of water and prevention of contamination.
- We will reduce the impact of chemical substances on human health and the environment.
- We will consider and conserve biodiversity.

(2) Initiatives based on collaboration with stakeholders

- We will provide products and services that create environmental value for customers with our technical strengths.
- We will expand our environmental contributions with our partner companies.
- We will deepen communications with local communities and work as a team to address environmental challenges.

Environmental Action Plan

We strive to grow and develop our business through the creation of environmental value for customers with our technical strengths while each and every employee follows the Environmental Policy to address environmental challenges. Therefore, collaboration with stakeholders including our partners is essential. We will continue to sincerely work on environmental sustainability management through further collaboration with stakeholders.

Environmental Action Plan “Green Plan 2018”

The Green Plan 2018 is focused on maximizing the size of our contribution in reducing CO₂ emissions through products and services (see pages 40-41), which is an indicator that represents our efforts for CO₂ reduction, as well as on steady and continual reduction in CO₂ emissions from our factories to contribute to making net CO₂ emissions from the entire community peak and decline thereafter at an earlier timing.

Panasonic has introduced its own indicator called “the size of contribution in reducing CO₂ emissions” to strengthen CO₂ reduction efforts through products and services. The size of contribution in reducing CO₂ emissions had been disclosed from the fiscal 2011 results to represent the volume of our direct contribution to CO₂ emissions reduction by cutting down power consumption during product use through energy-saving designs for our key consumer products. Now, we are also engaged in business development in the areas of housing, automotive, and B2B. Accordingly, more of our products are being integrated into finished goods and services of other companies, contributing to their energy-saving performances. For this reason, we have defined the CO₂ emissions reduction effect in these business areas as “the size of indirect contribution to reduction,” and disclosed the figures from the fiscal 2015 results. In addition, the revised Green Plan 2018 clearly stated the target amount of CO₂ reduction to clarify our contribution in these areas.

Furthermore, we define our products and services that accelerate the transition to a sustainable society, such as energy-saving performances, as Strategic Green Products (GPs). Of these, we call the products that deliver the industry's top class

environmental performance “Super GPs,” and are actively working for business expansion and wider use.

In production activities, exhaustive energy-saving measures have been implemented in all factories worldwide, pushing for further CO₂ emissions reduction in our production activities. As for resources recycling, we promote higher recycled resource utilization ratio and factory waste recycling rate, as well as create more resources recycling-oriented products to materialize recycling-oriented manufacturing.

In addition, the revised Green Plan 2018 has set new targets such as 100% completion of water risk assessments for our factories. It also clearly states zero violation of laws and regulations related to environmental pollution by factories, and products.

Further, we have expanded the coverage of our eco-conscious products and business to B2B products, services, and solutions, while inheriting our conventional business strengths in the area of home appliances. We have been working to create environmental value for customers, towards concrete targets set in accordance with our updated Green Plan 2018. We also have been expanding our environmental initiative beyond Panasonic to cover the entire supply chain by deepening alliances with various partners to engender a positive effect across society.

By continuing such efforts over the past nine years since 2010, we have achieved almost all the targets we set out in Green Plan 2018.

Environmental Action Plan “Green Plan 2018” and Results

Priority issues	Targets for 2018	Results in FY2019 (Numerical)	Pages
(1) Initiatives to address environmental challenges			
CO ₂ Reduction	<ul style="list-style-type: none"> Maximize the size of contribution in reducing CO₂ emissions through products and services¹ (Size of contribution in reducing CO₂ emissions through products and services: 55million tons) 	69.13 million tons	P41
	<ul style="list-style-type: none"> Reduce CO₂ emissions per basic unit in factories (Basic unit: -5% or more compared with 2013) 	14%	P46
	<ul style="list-style-type: none"> Expand the use of renewable energy (In-house renewable energy adoption: 10,000 MWh or more) 	25,000 MWh	P48
	<ul style="list-style-type: none"> Reduce CO₂ emissions per basic unit in logistics (Basic unit of weight²: -5% or more compared to 2013 [in Japan]) 	2.6%	P50
	<ul style="list-style-type: none"> Increase the Business of Energy Conservation Support Service for the Entire Factory 	P47	
Resources Recycling	<ul style="list-style-type: none"> Reduce total resources used and increase recycled resources used (Recycled resin consumption: 45,000 tons or more (2014-2018 total)) 	79,000 tons	P54
	<ul style="list-style-type: none"> Achieve “zero waste emission” from production activities at sites both in and outside Japan (Factory waste recycling rate³: 99% or more) 	99.1%	P59
	<ul style="list-style-type: none"> Expand the creation of Resources Recycling-oriented Products 	P56-57	
Water	<ul style="list-style-type: none"> Increase products to save water and contribute to water recycling 	P65	
	<ul style="list-style-type: none"> Reduce water consumption in production activities and increase the use of recycled water 	P66	
	<ul style="list-style-type: none"> Water risk assessment of factories: Complete 100% 	100%	P65
Chemical Substances	<ul style="list-style-type: none"> Develop alternative technologies for environmentally hazardous substances 	P70-72	
	<ul style="list-style-type: none"> Discontinue the use of substitutable environmentally hazardous substances in products 	P71-72	
	<ul style="list-style-type: none"> Minimize the release of environmentally hazardous substances from factories 	P72-73	
Biodiversity	<ul style="list-style-type: none"> Increase products contributing to biodiversity conservation 	P77	
	<ul style="list-style-type: none"> Use green areas in business divisions to contribute to biodiversity conservation 	P75-76	
	<ul style="list-style-type: none"> Promote green procurement for wood toward sustainable utilization of forest resources 	P76	
Compliance	<ul style="list-style-type: none"> Compliance with laws and regulations (Factories and products); Zero violations 	2 violations	P25

(2) Initiatives based on collaboration with stakeholders				
Customers	<ul style="list-style-type: none"> Offering products, services, and solutions that improve people's lifestyles, reduce burden on the environment, and help to make our society more sustainable 			
	Improvement of energy-saving performance of major consumer electronics products ^{*4}	Energy-saving performance improvement: 35% (compared to 2005)	45%	P42
	Dissemination of household fuel cells	Total power generation: 440,000 MWh (2010-2018)	460,000 MWh	P43
	Dissemination of LED lighting (Residential and non-residential buildings)	LED lighting sales ratio: 75%	77%	P42
	Dissemination of photovoltaic power generation systems	Total power generation: 5.0 million MWh (2012-2018)	5.40 million MWh	P43
	Air quality improvement in living environment (air purification)	Amount of air with improved quality: equivalent to 14 million rooms (2015-2018)	14.06 million rooms	P37
	Dissemination of Net Zero Energy Houses (ZEH)	ZEH ^{*5} ratio to all detached houses: 22%	36%	P44
	Development of smart cities	Start construction/sales: 3 sites (870 lots) (2015-2018) ^{*7}	3 sites (607 lots)	P44
	Increasing automotive battery supply	Battery supply meeting the demand: 200% (compared to 2014)	268%	P43
	Dissemination of eco-conscious B2B equipment ^{*6}	Expansion of sales in Strategic GPs: 120% (compared to 2015)	141%	P36
	<ul style="list-style-type: none"> Promote 'eco' marketing firmly rooted in each region and country 		website ^{*8}	
Supply Chain	<ul style="list-style-type: none"> Increase environmental contributions through the promotion of Green Procurement with suppliers (Establish environmental management systems and address five major environmental challenges) 		P80	
	<ul style="list-style-type: none"> Promote the ECO-VC (Value Creation) Activity aimed at simultaneously achieving environmental contributions and cost reductions 		P81	
Local Communities	<ul style="list-style-type: none"> Participate in presenting proposals for environmental policies by the government, aimed at the creation of a sustainable society 		P84	
	<ul style="list-style-type: none"> Implement initiatives contributing to local communities and educate children who will be the major players in the next generation (Promote Panasonic Eco Relay for Sustainable Earth) (Provide environmental education to 3 million children or more around the world by 2018) 		2.934 million children ^{*9}	website ^{*10}

*1 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 our products and productivity from fiscal 2006, and this amount is combined with the emission reduction resulting from power generation by energy-creating products. This total of size of direct contribution through our key consumer products, and indirect contribution through our main housing, automotive, and B2B businesses. (see pages 36-37)

*2 CO₂ emissions per basic unit in logistics = CO₂ emissions in logistics/Transportation weight

*3 Factory waste recycling rate = Amount of resources recycled/ (Amount of resources recycled + Amount of landfill)

*4 Air conditioners, refrigerators, TVs, washing machines, etc.

*5 A ZEH is a house designed to produce net-zero or nearly zero consumption of primary energy per year by improving the energy-saving performance of the housing structure and equipment and utilizing energy efficient means such as renewable energy. The Japanese government aims to make ZEH as the standard for new houses by 2020. Including Nearly ZEH (A house that reduces its primary energy consumption per year by 75% to less than 100% by utilizing energy efficient means such as renewable energy).

*6 Audio-visual solutions and mobility solutions equipment (such as laptop PCs) etc.

*7 Smart cities constructed and sold by Panasonic Homes Co., Ltd.

*8 Environmental sustainability management across the world
<https://www.panasonic.com/global/corporate/sustainability/eco/globalprojects.html>

*9 Cumulative total from 2009 to 2018. Results for 2018 alone is 49,000.

*10 Contribution to Local Communities and Education for the Next Generation
<https://www.panasonic.com/global/corporate/sustainability/eco/community.html>

Environment: Panasonic Environment Vision 2050

Panasonic Environment Vision 2050

While the global attention being paid to the social issues surrounding the environment and energy is intensifying, the focus on the Sustainable Development Goals (SDGs) set by the United Nations and the Paris Agreement—through which a number of countries allied together to work towards global warming prevention—indicates the seriousness of these issues worldwide.

Also, in the World Economic Forum held in January 2018, where political and economic leaders from across the world gathered, the issues concerning the environment and energy, such as climate change and natural disasters, occupied the major part of the list of the most significant risks. Based upon the results of these discussions, the world leaders initiated actions that could lead to fundamental solutions.

Aware that society's expectations of the role of corporations in resolving these global social issues is rising, Panasonic formulated the Panasonic Environment Vision 2050 in 2017 to determine our own initiatives in responding to the expectations and requests from our stakeholders.

The Environment Vision 2050 means to work towards creation and more efficient utilization of energy which exceeds the amount of energy used, aiming for a society with clean energy and a more comfortable lifestyle.

Currently, relative to the amount of energy used (energy used in our operation, and energy used by products in consumer use), the amount of energy created (clean energy that is created and/or made available by products and services by Panasonic, such as photovoltaic power generation systems, storage batteries, and energy solutions) is merely one-tenth. From now on, for the energy used, we will develop technologies for improving energy-saving performances of products and innovate manufacturing processes to reduce the amount of energy consumption. For the energy created, we will expand energy-creation and storage businesses as well as contribute to new social systems such as a hydrogen society to increase the use of clean energy.

Through these efforts, Panasonic will endeavor to make the "energy created" exceed the "energy used" toward the year 2050.

Panasonic Environment Vision 2050

To achieve "a better life" and "a sustainable global environment,"
Panasonic will work towards
creation and more efficient utilization of energy
which exceeds the amount of energy used,
aiming for a society with clean energy and a more comfortable lifestyle.

Energy used < Energy created

Panasonic

Activities for Achieving the Environment Vision 2050

In order to realize the Environment Vision 2050, we promote two major activities.

One of the initiatives to realize the Environment Vision 2050 is “creating a safe and secure society with clean energy.” To be specific, we will work to provide eco-conscious and smart living spaces as well as contribute to eco-conscious and smart travel and transport.

Another initiative is “promoting businesses aiming for a sustainable society.” We will work to promote effective utilization of resources as well as promote the creation of factories with zero CO₂ emissions.

1. Panasonic will Create a Safe and Secure Society with Clean Energy

The eco-conscious and smart living spaces that Panasonic strives to provide means living spaces that create electricity and/or hydrogen using clean energy and then storing/transporting the created energy. Such living spaces offer a safe and secure life with clean energy enabled through appropriate energy management for energy-saving equipment and buildings with high insulation performances. Here, living spaces refer to not only homes of individuals but also working or learning spaces, and spaces for living or leisure. It refers to all spaces relating to people’s lives.

In order to realize this, Panasonic will work on development of environmental technologies from the four viewpoints of energy creation, energy saving, energy storage, and energy management.

As for energy creation, in particular, we will develop a next-generation solar cell technology and fuel cell technologies that use hydrogen derived from clean energy as energy source. At the same time, for energy storage, we will work on technologies relating to storing and/or supplying hydrogen, and storage batteries. These will expand the possibilities of utilizing clean energy anywhere in the society.

We will also work on developing environmental technologies to realize eco-conscious and smart travel and transport. With further development in technology of storage battery systems for eco-cars such as electric vehicles, we will contribute to promoting the shift from fossil fuels to clean energy. Additionally, for a safe mobility society, we will work on further development of support systems for autonomous driving and utilize our IoT technology etc. to realize next-generation logistics/transport solutions that help arteries in the society flow more smoothly.

As an example of the utilization of clean energy in all aspects of society, a study on projects involving experiments on demonstrations of the use of hydrogen commenced in 2018 to build a future carbon-free society. Specifically, the H₂ Kusatsu Farm (hydrogen station) set up at the Kusatsu Factory will be used to create CO₂-free hydrogen with photovoltaic power generation, used as a source of renewable energy, via a water electrolysis hydrogen production device, and high-pressure compression of the hydrogen for supply to fuel-cell-powered forklifts. The hydrogen supply is to be used for logistics within the Factory starting in FY2019.



H₂ Kusatsu Farm

2. Panasonic will Promote Businesses Aiming for a Sustainable Society

As efforts to promote effective utilization of resources, Panasonic will aim for sustainable use of resources through the reuse of parts and materials and product recycling.

To create factories with zero CO₂ emissions, we have switched lighting to LEDs, completing the transition by the end of fiscal 2019¹. Furthermore, FEMS² and other innovative energy-saving technologies will be introduced to promote smart manufacturing. In activities to expand energy creation, photovoltaic power generation systems will be installed by fiscal 2021 at sites where system implementation is viable.

As prior examples of our efforts for creating zero-CO₂ factories, two factories in Japan and Europe at Panasonic Eco Technology Center Co., Ltd. (PETEC), a home appliance recycling company, and Panasonic Energy Belgium N.V. (PECBE), which produces dry batteries, have become the first zero-CO₂ factories for Panasonic.



PETEC

This was achieved by the two factories by installing renewable energy power generation systems such as photovoltaic power generation system and wind power generation system, procuring 100% renewable electricity, and utilizing carbon credits to offset CO₂ emissions from fossil fuels^{*3}.

Additionally, all three factories under Panasonic do Brazil (PANABRAS) in Extrema, Sao Jose and Manaus, that became the first factories in Panasonic to achieve manufacturing with 100% renewable electricity in 2016, have also become the first zero-CO₂ factories on the American continent for Panasonic by reducing the use of fossil fuels and utilizing of carbon credits, in addition to procurement of 100% renewable electricity.

By making these factories the leading model of the company's zero-CO₂ factories, and by gradually expanding the activities to global plants, Panasonic will steadily promote production that does not emit CO₂, aiming for a sustainable society as envisioned by the "Environment Vision 2050."

*1 Installable sites

*2 Factory Energy Management System

*3 Press release dated February 28, 2019

Panasonic Realizes Its First Zero-CO₂ Factories at Two Sites in Japan and Europe under 'Panasonic Environment Vision 2050'

<https://news.panasonic.com/global/press/data/2019/02/en190228-2/en190228-2.html>



Wind power generation system in PECBE



Extrema factory in PANABRAS

Environmental Action Plan “Green Plan 2021”

Upon completing the targets we set out in Green Plan 2018, we have newly created Green Plan 2021 towards realizing Panasonic Environment Vision 2050, which aims at building a society based on clean energy and a more comfortable lifestyle in order to achieve both a better life and a sustainable global environment.

Green Plan 2021 sets targets that focus on “energy” and “resources,” which are the materiality to address to realize Environment Vision 2050. We also set out integrated and simplified targets as our continuing efforts for issues other than the above material issues, based on the Environmental Action Guidelines while taking account of environmental challenges and understanding society. We plan to direct our efforts to make “energy created” exceed “energy used” towards the year 2050, or even earlier.

To this end, in terms of “energy”, we will “increase amount of energy created” and “increase the size of contribution toward energy savings” in the area of products and services.

The size of contribution toward energy savings through our products and services is an index to indicate the amount of our efforts toward energy savings when our products and services are used by customers. We aim to increase the value of this index. The initiative to increase this index is similar to our aims concerning the size of contribution in reducing CO₂ emissions through our products and services (see pages 40-43), which indicates the amount of our efforts to reduce CO₂ emissions in order to bring forward the peak of total CO₂ emissions in whole society. When the size of contribution in reducing energy consumption is converted to CO₂ emissions, it can be transferred to the size of contribution in reducing such emissions.

As a means of “energy,” Panasonic factories will undertake “promoting zero-CO₂ model factories,” “increasing the use of renewable energy,” and “promoting energy efficiency in production.”

In our production activities, we are currently working to further reduce energy consumption and CO₂ emissions by employing thorough energy-saving measures in all factories across the globe.

In terms of “resource,” we will “create circular economy business models,” “reduce resources consumption and increase the use of sustainable materials,” and “achieve Zero Waste Emissions from factories globally.”

As other environmental sustainability goals, We will strive to take initiatives in solving issues concerning water, chemical substances, and biodiversity, as well as in promotion of community contributions and education for the next-generation, and to prevent pollution in factories and thoroughly comply with product-related laws and regulations.

To spread a positive influence across society, we are accelerating our environmental efforts by rolling them out beyond Panasonic across the entire supply chain through close collaboration with a variety of partners.

We will steadily put this environmental action plan into practice to achieve the set targets by fiscal 2022.

Environmental Action Plan “Green Plan 2021”

Category		2021 targets		
Material Issues	Energy	Increase the ratio of total energy created to total energy used		Total energy created ^{*1} : total energy used ^{*2} = 1 : 8.5
		Products & Services	Increase amount of energy created	Amount of energy created ^{*1} : 30,000 GWh or more
			Increase the size of contribution toward energy savings through products and services	Size of contribution toward energy savings through products and services ^{*3} : Direct ^{*4} : 25,000 GWh or more Indirect ^{*5} : 2,000 GWh or more
			Expand energy creation businesses	
			Expand energy efficient products and services business, focusing on products and services utilizing IoT/AI	
		Factories	Promote zero-CO ₂ model factories - Establish model factory using advanced hydrogen technology - Establish at least one zero-CO ₂ model factory in each region ^{*6}	
			Increase the use of renewable energy through the generation of renewable energy on-site and procurement of renewable energy	Renewable energy generated on our sites ^{*7} : 40,000 MWh or more
	Promote energy efficiency in production - Reduce energy loss through IoT - Improve productivity through manufacturing innovation			
	Resources	Create circular economy business models		Analysis of the development of circular economy options for existing businesses: 100%
		Reduce resource consumption and increase the use of sustainable materials		Recycled resin usage ^{*8} : 42,000 tons or more (2019 to 2021 total)
Achieve Zero Waste Emissions from factories globally		Factory waste recycling rate ^{*9} : 99 % or more		
Other environmental sustainability goals	Water	Reduce water consumption in production activities		
	Chemical substances	Minimize the environmental impact of chemical substances usage in production activities and products		
	Biodiversity	Promote procurement of sustainable materials		
	Local communities	Promote environmental initiatives to contribute to local communities and educate the next generation		
	Compliance	Ensure compliance with environmental laws and regulations		

*1 Clean energy that is created/efficiently utilized in business activities as well as for products/services made through such activities.

*2 Energy that is used in business activities as well as for products/services made through such activities.

*3 The amount of energy achieved by deducting the actual emissions from the amount that would have been emitted without the improvements by the energy-saving performance of our products.

*4 Size of contribution by our major products.

*5 Size of contribution by our solutions, or materials and components built into products of other companies.

*6 Five areas, covering: Japan; China & Northeast Asia; Southeast Asia & Oceania, India & South Asia, and Middle East & Africa; North America and Latin America; and Europe & CIS.

*7 Usage in Panasonic’s sites of renewable energy (solar, wind, biomass, etc.) generated by renewable power generating facilities in Panasonic’s sites.

*8 Mass of recycled materials contained in the recycled resin used in our products.

*9 Amount of resources recycled/(Amount of resources recycled + Amount of landfill).

Promoting Corporate-wide Environmental Sustainability Management Centering on PDCA

Striving for the creation of a sustainable society, we are following our initiative under the Chief Quality Officer (CQO) (Hiroto Uehara Executive Officer, as of April 2019) and working to fulfill our corporate social responsibility through eco-conscious business activities as well as resolve environmental issues such as climate change, resources, water, etc. through our products and services. The Panasonic Group formulates its annual environmental management policy in accordance with the Group management policy, Environment Vision 2050, Environmental Action Guidelines, and the environmental action plan (Green Plan). The annual environmental policy is shared across the entire organization through the Operation Policy Meeting led by the CQO, whose authority is delegated by the president. Companies and business divisions establish their own environmental policies and targets based on this Group policy, and plan and promote their activities accordingly.

The progress and results of activities for the key environmental targets we pledged to society to achieve under the Green Plan 2018 and the Green Plan 2021, as well as Environment Vision 2050, are examined in the Group Strategy Meeting. This meeting is attended by the presidents of the Panasonic Corporation and the Companies along with other members of senior management, for reviews of policy directions, issues, and, particularly important measures to be adopted.

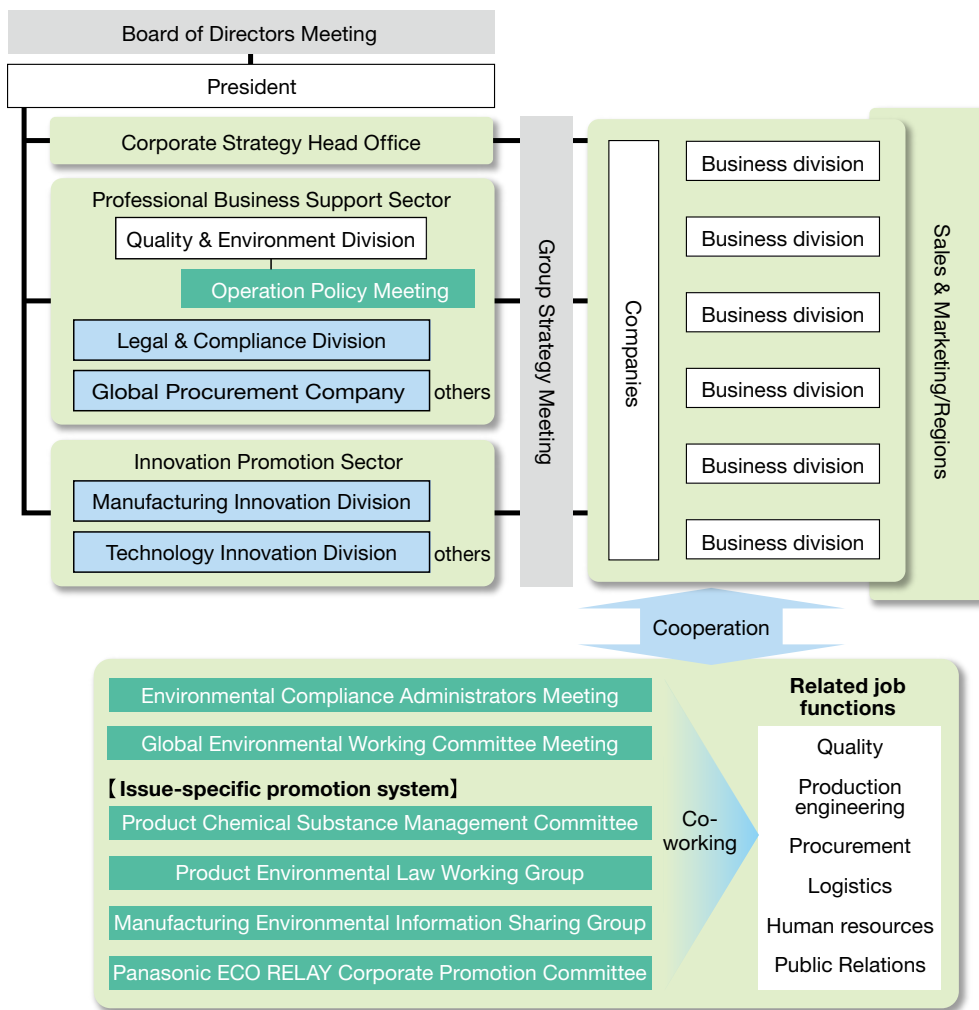
In fiscal 2017, the Environmental Compliance Administrators Meeting (held twice a year) attended by the executive officer in charge of environmental affairs and environmental compliance administrators at the Companies was newly established to accelerate decision-making for corporate-wide action in the area of the environment. In addition, as has been the way until now, successful practices, challenges in implementation, and approaches to mid-term to long-term targets at Companies and various regions are shared and discussed at the Global Environmental Working Committee Meeting, held twice a year, which consists of environmental compliance administrators and environmental operation administrators at Companies and Regional Headquarters, seeking to enhance the level of corporate-wide environmental sustainability management through the PDCA management cycle.

In principle, results of activities relevant to environmental targets are gathered and assessed on a monthly basis as environmental performance data, to identify the achievements, and additional measures are taken as needed. Feedback of annual performance data is given internally and disclosed externally after review, onsite audits, and independent assurance by a third-party. Moreover, reviews and feedback from stakeholders are utilized in subsequent measures to ensure further continuous improvement.

Promotion System for Environmental Sustainability Management

To implement key measures across the entire company, theme-specific committees and working groups are formed to set a promotional structure that enables coordinated action across Companies, related job functions, and Regional Headquarters outside Japan. Specific examples include the Product Chemical Substance Management Committee which deliberates and ensures the implementation of chemical substance management guidelines, and the Product Environmental Law Working Group which engages in information sharing regarding product-related laws and regulations and reviews the actions to be taken.

Promotion System of Environmental Sustainability Management in Fiscal 2020



Environmental Sustainability Management Founded on Environmental Management Systems (EMS)

As the foundation of environmental sustainability management, Panasonic established EMS in all of our manufacturing sites across the world in fiscal 1999, and has continued to have the sites ISO14001 certified since then.

In order to further reinforce environmental sustainability management globally, we have established EMS in all our sites including non-manufacturing sites across the world, and these sites have certified ISO14001 in principle. In October 2011, we published the Environmental Management System Establishment Guidelines that summarize EMS concepts for different business forms such as manufacturing, sales and services, and head office administration, aiming to build EMS in accordance with the Basic Rules for Environmental Affairs on a global scale. Based on the Guidelines, we have practiced Environmental Sustainability Management to achieve the targets set in the Green Plan 2018.

With the ISO14001 updated in 2015, integration of environmental and business activities, and broader view activities have been required. We implemented activities to improve members' understanding level, through study meetings for transforming to the updated situation, trainings for internal audit, information sharing relevant information with advanced Business Division(BD)s, and provision of dedicated self-learning documents for upper management, per respective Company or BD. Thereby, we completed the transformation by Sept. 2018, due date.



Training session for internal auditors

Acquired status of the ISO 14001 Certification (as of end of March 2019)

Region	Number of certifications obtained*1		Total
	Manufacturing	Non-manufacturing	
Japan	14	12	26
North America & Latin America	16	0	16
Europe & CIS	11	2	13
Southeast Asia, & Oceania	41	9	50
China & Northeast Asia	53	0	53
India, South Asia, Middle East & Africa	8	2	10
Total	143	25	168

*1 The above number includes the one for integrated certification. The number of acquired status varies every year depending on the situation such as reorganization or closure of BDs, or promotion to acquire integrated certification.

► Obtaining of ISO 14001 Certification

https://www.panasonic.com/jp/corporate/sustainability/pdf/eco_isolist2018.pdf

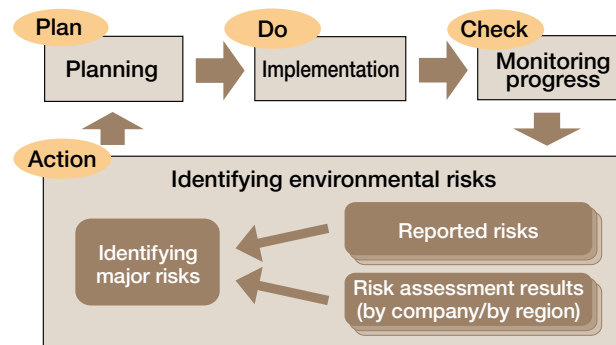
Group-wide Systems to Manage Environmental Risks

As a tool to continuously reduce environmental risks, Panasonic has established an Environmental Risk Management System specific to each Company. In accordance with the basic risk management policy for all Companies (see page 8), we promote (1) identification of environmental risks and group-wide risk management each year, and (2) ensuring quick responses to reported environmental risks.

To identify environmental risks and implement the management system, environmental risks are identified for each Company and for each region in the world each year. From these risks, environmental risks on a group-wide level are selected. The risks that show a high level of frequency or seriously impact business management are designated as major risks and prioritized in planning and executing risk-reducing measures. These measures are implemented for each major risk, and progress is monitored and followed up on a quarterly basis in the PDCA cycle.

When an environmental risk is found, the relevant Company, related job functions, and Regional Headquarters collaborate to promptly implement emergency measures and recurrence prevention measures adapted to the risk level. Also, the management flow in case of risk discovery is standardized to prevent the occurrence of secondary risks as a result of confusion.

Classification of Environmental Risks and Countermeasure Implementation



Environmental Compliance Management at Factories

Panasonic manages its environmental systems in full compliance with laws and regulations. We regularly measure emissions of gas, wastewater, noise, odor, etc., and introduce preventative measures for cases that may lead to serious violations.

Furthermore, key human resources are developed for information sharing among the Companies/Business Divisions, environment-related job functions, and Regional Headquarters, to ensure exhaustive compliance with legislation related to factory environment management in respective countries where Panasonic manufacturing sites are located. Specifically, activities to share information as well as specialized training are conducted for factory management officers in charge of the management of chemical substances, waste, wastewater, and exhaust gas, either by country or by region in Japan, Europe, China, and Southeast Asia. Field surveys on laws and regulations using checklists were conducted on a global scale to confirm comprehensive implementation of environmental compliance, and we also conducted verification of the effectiveness of various measures.

However, in fiscal 2018, we discovered five violations of environment-related legislation across the world. These cases were promptly reported to the respective authorities along with implementation of countermeasures against the causes of such violations and we have already corrected the issues in order to meet the standard requirements. We continue our efforts for thorough legal compliance and the prevention of any recurrence.

Case of Violations of Laws and Ordinances (e.g. excess of the standard legal level) in Fiscal 2019

Region	Environmental pollution					Other	Total
	Air	Water quality	Noise	Odor	Waste	Permission / Approval	
Global (including Japan)	1	1	0	0	0	0	2
(Japan)	(0)	(0)	(0)	(0)	(0)	(0)	(0)

Compliance with Environmental Regulations Relating to Products

Panasonic manages compliance with regulations relating to its products through a quality management system. Compliance with regulations is ensured with our Products Assessment System, a mechanism which incorporates environmental performance targets such as customer demands for environmental performance, the energy efficiency labeling program, and third-party certification systems, as well as evaluation of compliance with regulations on chemical substance management, energy efficiency, 3R, and recycling, to (1) set up overview for achieving targets at the product planning stage, (2) define concrete targets at the design planning stage and confirm compliance at the design stage, (3) conduct interim assessment at the design completion stage, and (4) conduct final assessment at the mass production decision-making stage. Additionally, incoming inspections are being conducted on a regular basis for purchased components to ensure compliance with the RoHS Regulations which regulates the content of six hazardous substances (see page 67 “Chemical Substances Management”).

However, in fiscal 2019, two regulatory violation related to chemical substance management occurred, one in Japan and the other overseas. We will tighten the criteria to judge potential inclusion of regulated substances to ensure thorough compliance with the laws and regulations.

Measures Against Soil and Groundwater Contamination and Air Pollution

In the latter half of the 1980s, soil and groundwater contamination due to chlorinated organic solvents was detected at some Panasonic sites. In response, we have conducted anti-contamination activities across the company. Specifically in 1991 we created the Manual for Preventing Contamination of Soil and Groundwater and began conducting necessary surveys and measures. In 1995 we discontinued the use of chlorinated organic solvents, and in 1999 created Guidelines on the Prevention of Environmental Pollution to ensure there would be no recurrence of similar problems at our sites. In fiscal 2003 we began enhancing our surveys and measures to comply with relevant laws and regulations, including the Soil Contamination Countermeasures Act, which was enforced in Japan in 2003, and in fiscal 2004 started implementing measures to place all our bases across the globe under management supervision with regard to soil and groundwater.

Specifically, we conduct onsite inspections and interviews at the bases, in addition to surveying their use of VOCs and heavy metals. Furthermore, we implement surface soil surveys within the premises. For the sites where contamination was detected beyond the regulatory pollution standards, we conduct detailed borehole surveys to identify the boundaries of the contaminated areas and take remedial measures.

As a result of these efforts, we were able to place all our bases under management supervision in 2008. Furthermore, in fiscal 2011, the management supervision scheme was purpose-specifically reorganized and reinforced to establish a new management supervision scheme. With the highest priority given to preventing dispersion of pollution beyond our premises, this new scheme is implemented across all operating sites to further improve the level of measures against contamination. In fiscal 2017, we reviewed the new management supervision guidelines in response to the amended Soil Contamination Countermeasures Act in Japan.

Soil and Groundwater Risk Management Policy

Conditions subject to management supervision	Procedure
Pollution dispersion prevention beyond Panasonic premises	<ol style="list-style-type: none"> 1. Conduct historical surveys 2. Determine and install monitoring wells at the premises' borders 3. Analyze groundwater at the borders 4. Check possibility of pollution from external sources 5. Report to management department 6. Determine the external pollution dispersion prevention methods 7. Install the external pollution dispersion prevention methods 8. Install assessment wells 9. Begin assessments (monitoring)
Thorough pollution source elimination	<ol style="list-style-type: none"> 10. Conduct brief status check 11-1. Horizontal direction detailed analysis 11-2. Vertical direction detailed analysis 12. Determine the magnitude of pollution 13. Discuss the areas and methods of purification 14. Conduct purification and install pollution dispersion prevention measures 15. Monitor pollution source (groundwater) after purification 16. Report purification completion to management department

Soil and Groundwater Pollution Surveys and Remedial Measures for Fiscal 2019

Region	Number of sites that completed remedial measures	Number of sites currently taking remedial measures
Global (including Japan)	0	40
Japan	(0)	(34)

In addition to the above, we implement measures for air pollution. The efforts made in factories are as matters of course, we are working as a company to comply with the Act Concerning Special Measures for Total Emission Reduction of Nitrogen Oxides and Particulate Matter from Automobiles in Specified Areas (Act No. 70 of 1992), which regulates nitrogen oxides and particulate matter emitted from company cars owned and/or managed by Panasonic.

The company cars owned and/or managed by Panasonic Japanese business sites are centrally managed on the corporate-wide vehicle management system. Annually required reports are submitted through the vehicle management system. Also each business site undertakes thorough regular vehicle checkup and fuel economy management on these cars, as well as taking the initiative in reducing air pollution, such as by advising employees on eco-driving techniques and hosting related workshops, and promoting introducing hybrid cars.

Initiatives for PCB Pollution

Our initiatives for PCB pollution are introduced on the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/governance/risk.html>

Environment: Climate Change Risks and Opportunities, and Resilience of Strategy through Scenario Analysis



We recognize risks and opportunities concerning climate change as a critical business challenge and we are making action as follows based on the Recommendation by TCFD.^{*1} We have identified risks and opportunities in the business areas of home appliances, housing, and automotive that are judged to be susceptible to climate change. The identified risks are categorized into those related to transition to a low-carbon economy and others related to physical changes caused by climate change, and further studies are then undertaken. Opportunities are also being investigated to create new businesses mainly in the areas of energy resources, products, and services.

*1 TCFD: The task force was set up by the Financial Stability Board (FSB) in response to a request by the G20 Finance Ministers and Central Bank Governors. TCFD published its recommendations in 2017.

Identifying Risks

Risks concerning Transition to a Low-Carbon Economy

The energy efficiency standards for products are becoming increasingly demanding and products that do not meet such standards may be banned from sale. In concrete terms, meeting with a minimum energy performance standard (MEPS) is legally stipulated under the laws and regulations such as US federal law, the California State law, and the EU ErP Directive. Not only in advanced countries, the standard is also legally binding as mandatory in many developing countries and sales of non-standard products are prohibited. Many countries also adopt energy efficiency labeling programs, under which the products display their energy efficiency level so that customers are able to choose eco-conscious products more easily. Minimum energy performance standards and energy efficiency labeling programs for electric and electronic products significantly contribute to CO₂ reduction during product usage, which occupies the largest percentage in the product lifecycle. These standards and programs are constantly reviewed and discussed for amendments and their scope of the covered products in each country or region continue to expand. At the same time, their requirements are becoming stricter. Because these standards and programs in different countries rely on various criteria and measurements, if we fail to keep up to date with the latest requirements in the product design stage, the products that we developed with massive investment may not even be released into the market. This is a potential risk that may cause a significant business loss.

Physical Risks

As the Panasonic Group operates its business globally, its production sites face physical risks in their operations that may be hindered by abnormal weather conditions associated with global warming, such as flooding. Other than direct damage to factory buildings and facilities, losses from the cessation or suspension of operations must also be taken into account. If such a situation should occur, the costs required to restore the business becomes excessive.

Identifying Opportunities

Energy Sources

In order to optimize energy consumption in our production factories, we install the Factory Energy Management System (FEMS) in each site. See page 47 for more details. We also proactively utilize renewable energy, such as solar power, in our sites across the world according to the suitability of regional feature. Panasonic promotes the utilization of renewable energy among customers by expanding the energy solution business in addition to the manufacturing business of solar cell modules. See page 48 for more details.

Products and Services

In 2018, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) introduced a financial support system to promote energy-efficient housing. The system provide incentives in proportion to the expenses paid for installation and construction when building a new house with high energy efficiency, when building a new house with high energy efficiency, renovating a house with installation of thermal insulation, and/or installing energy-saving equipment. Not only do we own Panasonic Homes Co., Ltd, a housing company; furthermore, we deal with wide range of products for energy creation and energy storage. Therefore, introduction of this incentive system by government could become huge business opportunity to Panasonic. Panasonic Homes has been working, focusing development, sales, and spread of high energy efficient houses, with target of building Net-Zero energy houses (ZEH) up to 50% of the total number of built detached houses by 2020.

Because more countries are employing environmental policies concerning reduction of greenhouse gas emissions, the

regulations for engine mounted vehicles are tightening. As a result, vehicles are becoming more electrified and HVs and EVs are expected to become ever more common. Panasonic produces and sells high performance automotive batteries. As HVs and EVs spread in society, demand for such secondary batteries, the core component of such vehicles, is expected to increase. With this in view, we aim to sell 2.5 times the number of automotive secondary batteries in fiscal 2022 than we did in fiscal 2018. As a means to grasp this opportunity, we have started full operation of automotive battery factories in the US and China and will commence mass production of the batteries in Himeji Factory in 2019.

Scenario Analysis

World Energy Outlook 2017 (WEO2017) issued by the International Energy Agency (IEA) presents the New Policies Scenario (NPS=4 degree scenario), a set of policies to realize the targets set by various countries in the Paris Agreement, and the Sustainable Development Scenario (SDS=2 degree scenario) that could “hold the increase in the global average temperature to well below 2°C above pre-industrial levels” if executed.

Towards realization of Environment Vision 2050, we analyzed the impact of climate change on our business based on the said scenarios, discussed the countermeasures, and verified the resilience of our strategy.

Respective SDS and NPS were created on the assumption that the average temperature would rise 2°C or 4°C by 2100. Assuming that we continue the current business activities, we analyzed the impact of climate change on our business as of 2030.

SDS, the 2°C rise scenario, forecasts rapid changes in society to restrain greenhouse gas emissions by 2030. For example, the scenario estimates that an emission restriction measure possibly charging more than 100 dollars per one ton of CO₂ emissions, may be adopted. Using this 2°C rise scenario as a reference, we analyzed the impact from regulation changes on our business by 2030, assuming that there will be no major impact to the business from physical risks from climate change, such as water shortages and more frequent abnormal weather conditions.

At the same time, using NPS, the 4°C rise scenario, we analyzed the impact from physical changes due to climate change to our business by 2030, assuming that such impact from physical changes would be greater than that from regulation changes.

Analysis results based on the 2°C rise scenario suggested that the burden from CO₂ emissions would increase as carbon pricing is adopted in major countries. However, we should be able to avoid this burden by minimizing the impact from carbon pricing through striving to reduce carbon emissions in products (by adopting energy efficiency and creating energy) as well as during their manufacturing process to realize Panasonic Environment Vision 2050.

We also understand that changes or amendments in environmental laws will greatly affect our home appliance business that covers a wide range of energy-saving products. To prepare for such changes, we understand information as on updated environmental laws and regulations environmental laws and regulations across the world through close coordination among management departments and environmental departments in different regions as early as possible. We obtain the latest environmental legal information through the environmental regulation databases, and share the information among the relevant departments. When we identify some issue to address, we notify this to Companies and relevant departments, as well as acquiring the information on current situations to formulate countermeasures.

When referring to the 4°C rise scenario, we need to take account of the impact from the predicted increase in abnormal weather conditions, such as flooding and tropical storms, on the supply chain, and reduced economic activity in society. For example, we experienced large scale flooding in Thailand in 2011 and we suffered massive losses. Although we established a range of countermeasures in case of a recurrence, if some disaster hinders our business operations—or those of any party in the supply chain—sales will be affected and we would still need to direct significant funds to recover damaged facilities. To prepare for such situations, we create Business Continuity Plans (BCP) based on past experience of damage from abnormal weather conditions. At the beginning of 2012, we established the Business Continuity Management (BCM) Guidelines that focus on minimizing various risks related to factories and operations in accordance with the BCM System. As a means to reinforce disaster and accident countermeasures, we have established the Disaster/Accident Countermeasure Committee under the Global and Group Risk Management Committee, which is chaired by the Chief Risk Management Officer (CRMO), comprising directors of the Professional Business Support Sector (PBSS) under the head office. The Disaster/Accident Countermeasure Committee is now establishing a readiness against a range of serious risks from natural disasters, such as earthquake and flooding, to large scale accidents, including fire and explosion. We have also established working groups dedicated to different types of risk under the Disaster/Accident Countermeasure

Committee to create concrete measures against risks through liaison between related departments.

We plan to undertake further analyses on impacts from climate change on the supply chain and on markets and production areas that may be sensitive to climate conditions. Changes in social movements and the underlying scenarios will be monitored by environment departments, and promotion of investment and collaboration will be monitored by respective Companies.

* Note that these scenarios presented by the IEA are merely potential prospects with a high degree of uncertainty. The analysis results obtained based on these scenarios are our forecasts developed from those scenarios and our own medium- to long-term future prospects may be different in actuality.

Integrated Management of Corporate Environmental Information

In order to implement the PDCA cycle for environmental sustainability management, it is essential to collect a significant amount of data, such as amounts of used energy, waste, valuables, discharged and transferred chemical substances, and used water, etc. at each business site in a prompt and accurate manner.

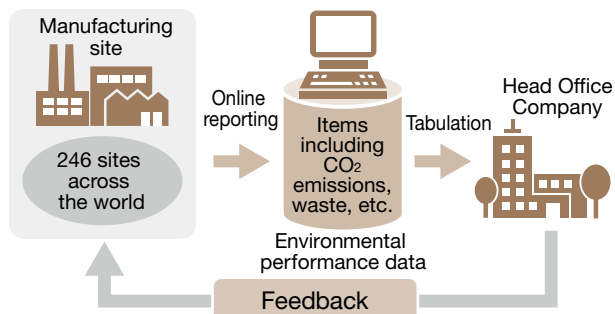
Panasonic has built and introduced an environmental performance system, the Eco System (Factory), to globally collect and manage environmental data from all of own business sites. With this system, monthly CO₂ emissions are managed in particular, allowing checking the progress of initiatives and identifying issues. The system plays an important role in achieving the reduction of CO₂ emissions by sharing the information and taking measures.

The Eco System (Factory) is also functioning as a scheme for sharing information on the status of compliance among sites across the world. In the event of complaints from local community residents or when a specific value exceeds ordinance-regulated levels, as soon as the person in charge at the business site inputs the data on the system, information of the data is instantaneously e-mailed to relevant persons at the Company and the Head Quarters. Thereby, the system enables rapid information-sharing and appropriate actions.

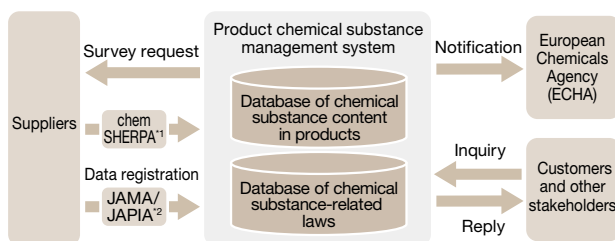
As for products, legislation relating to chemical substances in products is becoming more stringent, and communication and disclosure of chemical information in the EU supply chain are mandatory under the REACH Regulations. Panasonic developed own management system for chemical substances in products based on industry-standard information handling methods in order to respond to a wide range of regulations and requirements. In January 2017, Panasonic renewed the system to adopt chemSHERPA,^{*1} the new format for information handling of chemical substances in products led by the Ministry of Economy, Trade and Industry (METI). With the expansion of Panasonic automotive business, we also adopted the JAMA/JAPIA sheet,^{*2} the standard material data format for the Japanese automotive industry, in order to respond to increasingly complex and diverse regulations covering chemical substances used in products.

Also, Panasonic aim to cut down CO₂ emissions during product use by improving the energy-saving performance of own products. For this reason, the Eco System (Product) is used to globally assess the size of contribution in reducing CO₂ emissions by linking product performance data such as annual power consumption for each product category with other data such as sales volume and CO₂ emission factors in each region.

Mechanism of the Eco System (Factory)



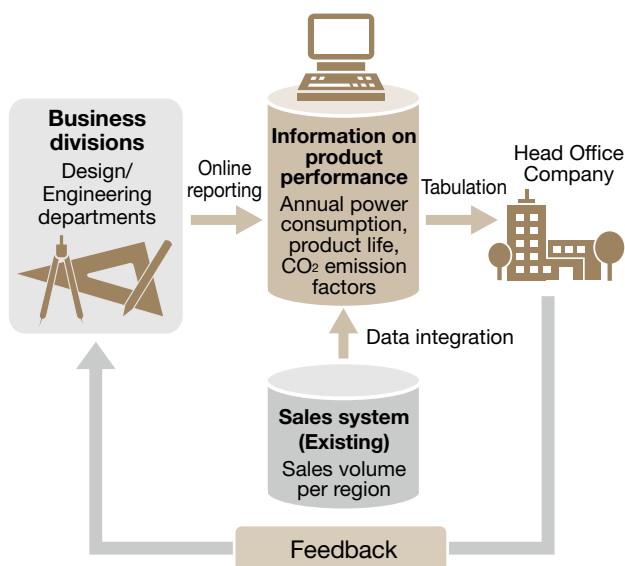
Mechanism of the Product chemical substance management system



*1 New chemical information format led by METI and recommended by the Joint Article Management Promotion-Consortium (JAMP).

*2 A standardized datasheet for chemical compounds contained in automotive components in automotive industry.

Mechanism of the Eco System (Product)



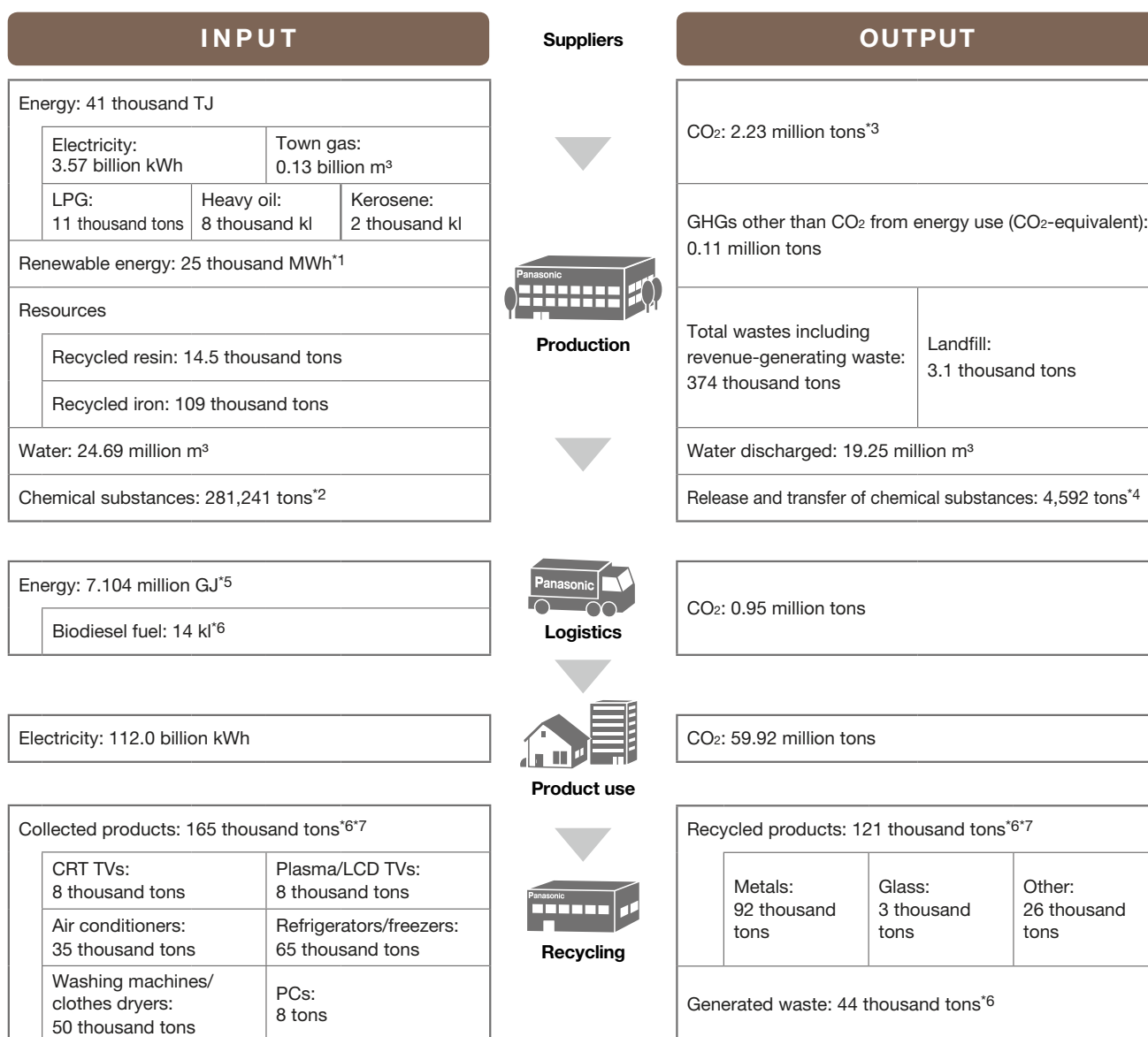
Environment: Overview of Environmental Impact and Environmental Accounting



Overview of Environmental Impact from Business Operation

In order to mainly manufacture and market electrical and electronic products, Panasonic consumes petroleum and electricity as energy sources and resources as raw materials of parts and components. As a result, we emit CO₂ and wastes into the environment. This diagram maps the environmental impact from our business operation from a procurement stage to recycling activities. Also, GHG throughout the entire supply chain is classified into Scope 1, Scope 2, and Scope 3 and assessed according to the GHG Protocol, the international calculation standard.

Overview of Environmental Impact from Business Operation



Production: 246 manufacturing sites

Logistics: Logistics stage of procurement, production, marketing and waste by partner companies and Panasonic.

Product use: Lifetime power consumption (a) of major products^{*8} with large amounts of energy use and CO₂ emissions (b) associated therewith.

a = Annual power consumption of a model sold^{*9} x Sales quantity x product life^{*10}

b = Annual power consumption of a model sold^{*9} x Sales quantity x product life^{*10} x CO₂ emission factor^{*11}

Recycling: Recycling of products means to use by oneself or to make into a state available for sale or free of charge the components and materials of a separated product.

*1 Figures from photovoltaic, wind, and biomass sources. Heat pumps not included.

*2 Target substances include all substances in the Panasonic Group Chemical Substances Management Rank Guidelines (For Factories).

*3 The factors related to fuels are based on the Guidelines for Calculation of Greenhouse Gas Emissions (version 4.3.1) published by the Japanese Ministry of the Environment. The CO₂ emission factor for electricity purchased in Japan (kg-CO₂/kWh) is fixed at 0.410. The factors above are also used for electricity purchased from power producers and suppliers (PPS). The GHG Protocol factors for each country are used for electricity purchased outside Japan.

*4 Release amount: Includes emissions to air, public water areas, and soil.

Transfer amount: Includes transfer as waste and discharge into the sewage system. Recycling that is free of charge or recycling where Panasonic pays a fee for treatment under the Waste Management and Public Cleaning Law is included in "Transfer." (Different from the transferred amount reported under the PRTR Law.)

*5 Intra-region outside Japan not included.

*6 Figures for Japan.

*7 Air conditioners, TVs, refrigerators/freezers, washing machines/clothes dryers, and PCs.

*8 Household air conditioners, commercial air conditioners, fluorescent lamps, LED lamps, household refrigerators, commercial refrigerators, LCD TVs, washing/drying machines, fully-automatic washing machines, clothes dryers, dish washer and dryers, IH cooking heaters, EcoCute, bathroom ventilator-dryers, humidifiers, dehumidifiers, air purifiers, extractor fans, vending machines, electronic rice cookers, microwave ovens, warm-water washing toilets, clothing irons, hair dryers, under-rug heaters, vacuum cleaners, electric thermal pots, extractor hoods, telephones, security cameras, projectors, production modulars etc.

*9 For each product category, the model that was sold in the largest quantity in the region was selected.

*10 Number of years during which spare parts for the product are available (defined by Panasonic).

*11 Regional CO₂ emission factors (kg-CO₂/kWh) used: 0.410 (Japan); 0.487 (Europe); 0.579 (NorthAmerica); 0.740 (China & Northeast Asia); 0.927 (India & South Asia); 0.527 (Southeast Asia & Oceania); 0.332 (Latin America); and 0.599 (Middle East & Africa).

GHGs from the Whole Supply Chain (by Scope)

Category		Emissions(10,000 tons)	
		FY2018	FY2019
Scope 1 ^{*12}		46	41
Scope 2 ^{*13}		195	192
Scope 3 ^{*14}	1. Purchased goods and services	1,294	1,395
	2. Capital goods	112	86
	3. Fuel- and energy-related activities	13	13
	4. Upstream transportation and distribution	94.4	95.0
	5. Waste generated in operations	1.8	1.8
	6. Business travel	2.6 ^{*15}	2.8 ^{*15}
	7. Employee commuting	3.6 ^{*15}	3.1 ^{*15}
	8. Upstream leased assets	0.8 ^{*15}	2.0 ^{*15}
	9. Downstream transportation and distribution	2.1 ^{*15}	2.0 ^{*15}
	10. Processing of sold products	–	–
	11. Use of sold products	6,449	5,992
	12. End-of-life treatment of sold products	127	125
	13. Downstream leased assets	–	–
	14. Franchises	–	–
	15. Investments	–	–

*12 Direct emissions from facilities owned and controlled by Panasonic (e.g. emissions from use of town gas or heavy fuel oil).

*13 Emissions from production of energy consumed at facilities owned and controlled by Panasonic.

*14 Other indirect emissions, excluding Scope 1 and Scope 2.

*15 Figures for Japan.

Environmental Accounting

Panasonic globally collects data on its environmental conservation costs and economic benefits obtained through its environmental activities in relation to generated/controlled environmental impact. This data is internally utilized as basic information for our continuing environmental sustainability management.

Environmental Accounting for Fiscal 2019

Environmental conservation in factories	
Investments*16	3,098 million yen
Expenses*16,*17	75 million yen
Economic benefit	1,444 million yen

*16 Includes all investments relating to environmental conservation. The difference or appropriate portions (divided proportionally) are not calculated.

*17 Expenses include a cost of capital investment depreciation. For example, if latest energy-saving facilities were installed, the value includes depreciation for the first year but not for the second year and later.

Environmental Conservation Benefits for Fiscal 2019 (in physical terms)

Categories	Emission reduction	Reference indicator: environmental impact	
		Fiscal 2018	Fiscal 2019
CO ₂ emissions from production activities	0.02 million tons	2.28 million tons	2.23 million tons
Human Environmental Impact	4 thousand counts	522 thousand counts	538 thousand counts
Landfill of waste	0.0 thousand tons	3.1 thousand tons	3.1 thousand tons
Water consumption	1.48 million m ³	25.84 million m ³	24.69 million m ³

Fiscal 2019 data on the reduced amount of electricity and effect of reduced electricity costs through our energy-saving products are as shown in the chart below.

Economic Effects for Customers for Fiscal 2019

Electricity cost reduction from product usage (global)	
Reduced amount of electricity*18	77.6 billion kWh
Reduced electricity costs*19	1,622 billion yen

*18 Calculated under the same conditions as when determining the size of contribution in reducing CO₂ emissions through energy-saving products (see page 40).

*19 Electricity costs were set for each region based on IEA Statistics.

Panasonic is also engaged in research and development that will lead to new creation of environmental value. The R&D expenses related to environmental management were approx. 8.8 billion yen in fiscal 2019.

Initiatives for Eco-conscious Products (Green Products)

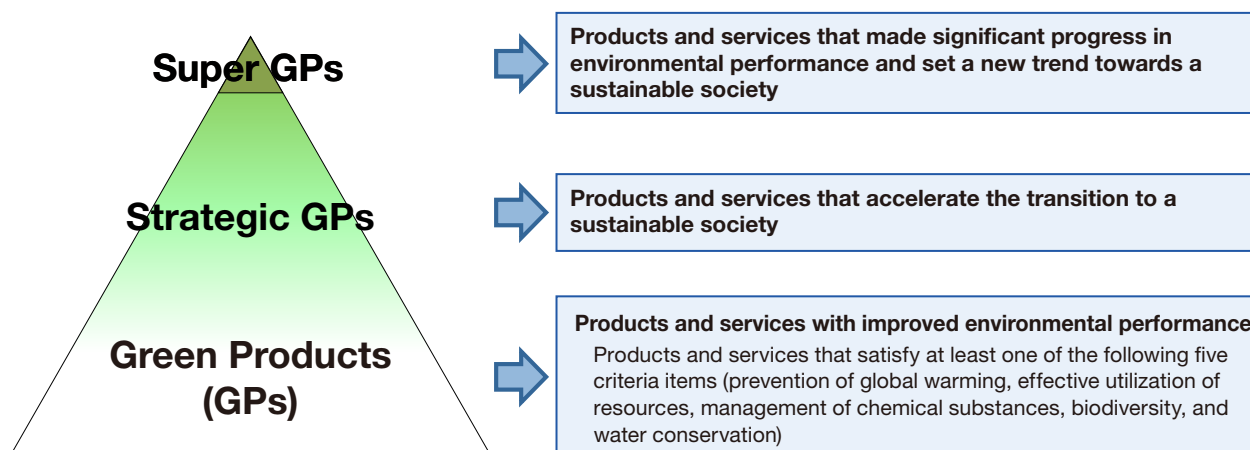
Based on the product assessment system where the environmental impacts of products and services area assessed from the planning and the design stages, Panasonic accredits own products and services that achieved high environmental performance as Green Products (GPs).

In the GP accreditation criteria, we assess the performance of our products in terms of prevention of global warming, effective utilization of resources, and management of chemical substances by comparing them not only with our own products but also with competitors' products. Since fiscal 2012, we have conduct various activities to further enhance our accreditation criteria by adding biodiversity and water conservation to existing items. This has in turn enabled the creation of a wider range of GPs. The products and services which have been developed from the conventional superb Green Products^{*1} starting from fiscal 2014, and which can accelerate the transition to a sustainable society, are newly defined as Strategic GPs.

Among these products, those that particularly create new trends are certified as Super GPs.

^{*1} Products and services that showed superb environmental performance to products in the same category in the industry.

Green Product Structure

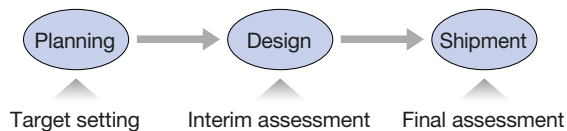


Definition of Strategic GPs

Products and services that accelerate the transition to a sustainable society:

- (1) Products and services that reduce environmental impact with top-level environmental performance in the industry**
(Energy-/Resources-/Water-saving products, etc.)
- (2) Products and services whose promotion and dissemination lead to reducing environmental impact**
(Recyclable or energy-creating products, energy-storing products, energy management systems, Smart Houses and Smart Cities, smart meters, products/services that support next-generation vehicles and environmental performances of stores, LED lighting, etc.)
- (3) Products and services that reduce environmental impact on a specific region, or support measures to address environmental impact**
(Air filtration devices, water filters, environmental engineering service, etc.)

Products Assessment System



Product Environmental Assessment		
Items for assessment		Assessment criteria
(1) Products	Prevention of global warming	CO ₂ emissions and energy saving
	Effective utilization of resources	Resource saving, light weight/downsizing, number of reused parts, durability, amount of recycled resources used, structure to recovery/recycling, etc.
	Water and biodiversity conservation	Water saving, consideration for biodiversity
	Comparison with competitors' products	
(2) Production process (of relevant products)	Prevention of global warming	CO ₂ emissions and energy saving
	Effective utilization of resources	Resource saving, mass of packaging materials to be wasted, amount of resources used, amount of waste from factories, etc.
(3) Packaging	Effective utilization of resources	Resource saving, light weight/downsizing, amount of foamed plastic used, amount of recycled resources used, etc.
(4) Instruction manual	Effective utilization of resources	Resource saving, light weight/downsizing, amount of recycled resources used
(1) (2) (3) (4)	Management of chemical substances	Panasonic's Chemical Substances Management Rank Guidelines (for products and factories)
LCA*2		Global warming
Information management		Green procurement, information provision across the supply chain, etc.

Laws/regulations and criteria, guidelines, and environmental action plan of Panasonic

*2 Life Cycle Assessment: Method of quantitatively assessing the environmental impact of products at each life cycle stage.

Increase in sales volume of Strategic GPs

In fiscal 2014, Panasonic newly defined 'Strategic GP' in order not only to pursue the environmental performance of consumer products, but also to commit ourselves to further increase sales volume of various products and services which lead to mitigation of environmental impact in the course of structural reform of business such as expansion of B2B business. Based on the definition, we have worked to create such products and services. In addition to reducing environmental load on a global scale with top-level environmental performance, we aim to accelerate a shift to a sustainable society through various business operations, including products or services whose contribution to reduce environmental load can be expected by promoting diffusion of them, as well as whose contribution to reduce environmental load directly in specific regions can be expected.

The sales ratio of Strategic GPs in fiscal 2018 accounted for approx. 24% of the total sales. Additionally, in our Green Plan 2018, we have set the fiscal 2019 target as 120% of expansion of sales in eco-conscious B2B Strategic GPs (compared with fiscal 2016). The result of fiscal 2018 was 141% compared to fiscal 2016. Panasonic will work to further push up the sales ratio of Strategic GPs in the future.

Improving Air Quality in Living Environments

Air pollution caused by PM2.5 etc. is now a major social issue not only in developed countries such as Japan but also in emerging countries including China and India. With this background, Panasonic has set offering products, services, and solutions that improve people's lifestyles, reduce burden on the environment, and help make our society more sustainable as the fiscal 2019 target in its Green Plan 2018. One specific element of the Plan is to improve the air quality of living environments (air purification), with a target figure equivalent to 14 million rooms with improved air quality over fiscal 2016 to 2019. The cumulative total for over fiscal 2016 to 2019 is equivalent to 14.06 million rooms.

Examples of air purifiers are introduced in the following website.

https://www.panasonic.com/global/corporate/sustainability/eco/gp_gf.html

Initiatives for Eco-conscious Factories (Green Factories)

Panasonic is leading Green Factories (GF) activities in its efforts to cut down the environmental load caused by manufacturing. On the assumption of compliance of laws and regulations in each factory, concretely we formulate a plan to reduce environmental loads in manufacturing activities, such as amounts of CO₂ emission, generated wastes and valuables, water consumption, and discharged and transferred chemical substances, conduct Progress management for total reduction amount with basic unit of discharged amount and the like, and improve the activities. Thereby, we intend to achieve reduction of environmental loads and increase of our business at the same time. In fiscal 2011, we started the GF assessment system^{*1} aiming to further improve GF activities by visualizing the progress status in each factory.

In addition, we share information on global activities for reducing environmental loads, relevant laws and regulations, and social trends through the Manufacturing Environmental Information Sharing Group.

In Europe, Southeast Asia, China, and Latin America, we hold information exchanges and competitions on best practices by region to reduce environmental impact (presentation of awards for best practices and roll-out of good examples to other regions). By doing so, we promote GF activities suited to the issues in each region to expand and accelerate the activities.

As measures to strengthen the company-wide foundation aiming at improving the structures with energy efficiency, we have developed a BA (Before/After) chart search system to share and spread knowhow across the world on the Internet. With the system, each factory can register and share their best practices concerning managing CO₂, waste, chemical substances, water, etc. Further, we prepared "Energy-Saving Potential Diagnosis Sheet" which is a tool with which users can evaluate visualized energy-efficient structure and extract of effective measures, based on the existing support tools and manuals for energy-efficiency which we reviewed and updated. And then, we rolled out the sheet to all sites. In fiscal 2019, we confirmed validity of the Diagnosis Sheet.

Besides, in China and Southeast Asia, we started a cross-company compliance assessment (CCCA) as a new activities to comply with environmental laws and regulations more definitely. In the CCCA, one factory A conducts an environmental assessment for other factory B in the same region, while the factory B conducts an assessment for the factory A, beyond own Company border. In China, we have newly trained 20 internal assessors in fiscal 2019 and

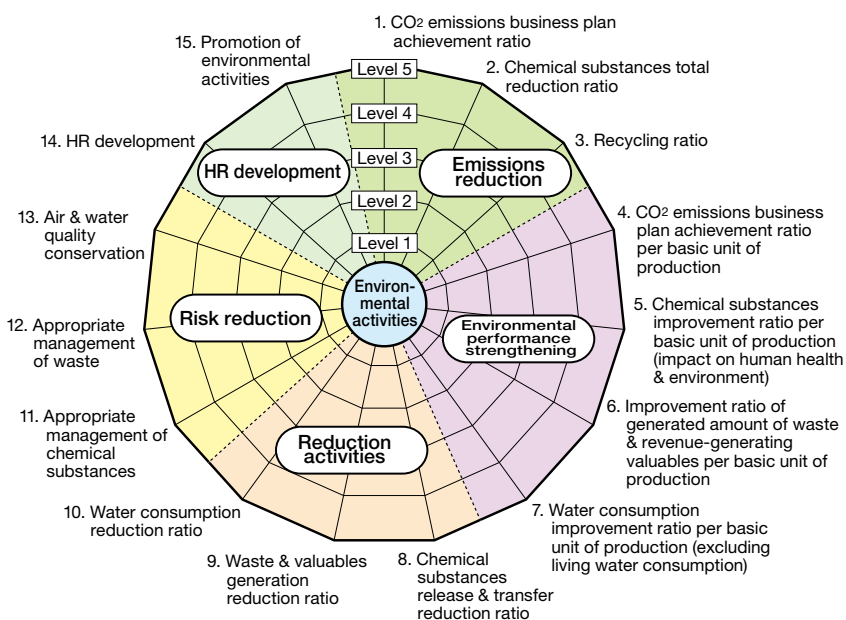
conducted assessments in 11 factories; as a result, some points need to be improved were extracted. In Southeast Asia, we conducted CCCA in groups formed by country. In fiscal year 2019, we conducted the CCCA at 22 factories in 6 countries, i.e. 24 sites. We will further upgrade the level of activities, by accelerating the CCCA, learning each other through checking compliance with relevant laws and regulations, and utilizing accumulated corporate-wide knowhow.

*1 The GF assessment system enables factories to evaluate themselves on a five-point scale across 19 environmental activity items, classified into six basic groups: emissions reduction; environmental performance enhancement; reduction activities; risk reduction; human resource development; and management. Factories then compare their self-assessment results with the results from other factories to obtain a relative assessment to identify issues to be addressed and determine corrective measures. The system was improved in fiscal 2014, in the way that items to assess could be added to the standard 19 items as required by each Company. For example, a Company may implement tasks concerning compliance with environmental laws and compliance management to strengthen risk management in its factories. Then, in the assessment questionnaire, they can set questions with their own standard values stricter than the legal requirements, for example, for their ventilation systems or other facilities that control air and water quality.



cross-company compliance assessment (CCCA)

Indicators for GF Assessment System



Management

- 16. CO₂ emissions management/activity level
- 17. Chemical substances management level
- 18. Waste management level
- 19. Water management level

Essential items

Continuous acquisition of ISO14001
Compliance with environmental legislation
Promotion of measures against soil and groundwater contamination
Monthly data registration

Furthermore, by setting up our own regulatory limits, we are working on optimal management of sulfur oxides (SO_x) and nitrogen oxides (NO_x), the principal causes of air pollution, as well as indicators of water contaminant concentration biochemical oxygen demand (BOD) and chemical oxygen demand (COD).

SOx/NOx management example: Tajima Factory, Device Solutions Business Division, Industrial Solutions Company

	FY	Facility name	Average measured	Maximum measured
SOx(Nm ³ /h)	2017	Absorption Water Heater No. 1	0.004	0.005
		Absorption Water Heater No. 2	0.004	0.005
		Absorption Water Heater No. 3	0.004	0.005
	2018	Absorption Water Heater No. 1	0.003	0.004
		Absorption Water Heater No. 2	0.001	0.002
		Absorption Water Heater No. 3	0.003	0.004
	2019	Absorption Water Heater No. 1	<0.004	<0.004
		Absorption Water Heater No. 2	<0.003	<0.004
		Absorption Water Heater No. 3	<0.002	<0.003

Absorption Water Heater No. 1: Legal limit: 6.5, Voluntary limit: 5.0, Measuring frequency: Twice a year

Absorption Water Heater No. 2: Legal limit: 6.5, Voluntary limit: 5.0, Measuring frequency: Twice a year

Absorption Water Heater No. 3: Legal limit: 6.5, Voluntary limit: 5.0, Measuring frequency: Twice a year

	FY	Facility name	Average measured	Maximum measured
NOx(ppm)	2017	Absorption Water Heater No. 1	52	53
		Absorption Water Heater No. 2	40	43
		Absorption Water Heater No. 3	43	47
	2018	Absorption Water Heater No. 1	52	55
		Absorption Water Heater No. 2	51	58
		Absorption Water Heater No. 3	47	48
	2019	Absorption Water Heater No. 1	65	77
		Absorption Water Heater No. 2	61	65
		Absorption Water Heater No. 3	66	75

Absorption Water Heater No. 1: Legal limit: 180, Voluntary limit: 150, Measuring frequency: Twice a year

Absorption Water Heater No. 2: Legal limit: 180, Voluntary limit: 150, Measuring frequency: Twice a year

Absorption Water Heater No. 3: Legal limit: 180, Voluntary limit: 150, Measuring frequency: Twice a year

BOD/COD management example: Hikone Factory, Beauty And Personal Care Business Division, Appliances Company

	FY	Facility name	Average measured	Maximum measured
BOD(mg/l)	2017	Factory wastewater outlet	1.2	5.1
	2018	Factory wastewater outlet	1.4	2.9
	2019	Factory wastewater outlet	1.3	3.7

Legal limit: 20.0, Voluntary limit: 18.0, Measuring frequency: four times a month

	FY	Facility name	Average measured	Maximum measured
COD(mg/l)	2017	Factory wastewater outlet	1.1	2.3
	2018	Factory wastewater outlet	1.0	3.4
	2019	Factory wastewater outlet	0.9	2.4

Legal limit: 20.0, Voluntary limit: 18.0, Measuring frequency: four times a month

Approaches to CO₂ Reduction

The Paris Agreement that went into effect in November 2016 sets out a target to limit global temperature increases to less than 2°C above pre-industrial levels and a more ambitious target to keep global temperature increases to less than 1.5°C above pre-industrial levels, as well as sets the goal for CO₂ and other greenhouse gas emission levels for the second half of this century to be virtually zero.

In addition to the announcement of the Environment Vision 2050 (see page 17) focusing on energy, in consistent with the goal set by the Paris Agreement, Panasonic has set the targets for emission of greenhouse gas (GHG) in our business activities to reduce 30% by 2030 (vs. 2013), and Zero by 2050, and in usage of our products to reduce 30% by 2030 (vs. 2013).”, and obtained accreditation for the targets as Science Based Targets (SBT*1) in October 2017. Our activities to reduce CO₂ emissions have been progressed to achieve the SBT targets.

In order to achieve the goals set by the Paris Agreement, we must reduce CO₂ emissions as much as possible. Therefore, all corporations are expected to further contribute to reduction in CO₂ emissions.

*1 SBT: an abbreviation of Science Based Target. It is a target to reduce GHG emissions consistent with scientific knowledge toward the goals to limit global temperature increases to less than 2°C above pre-industrial levels.

Size of Contribution in Reducing CO₂ Emissions through products and services

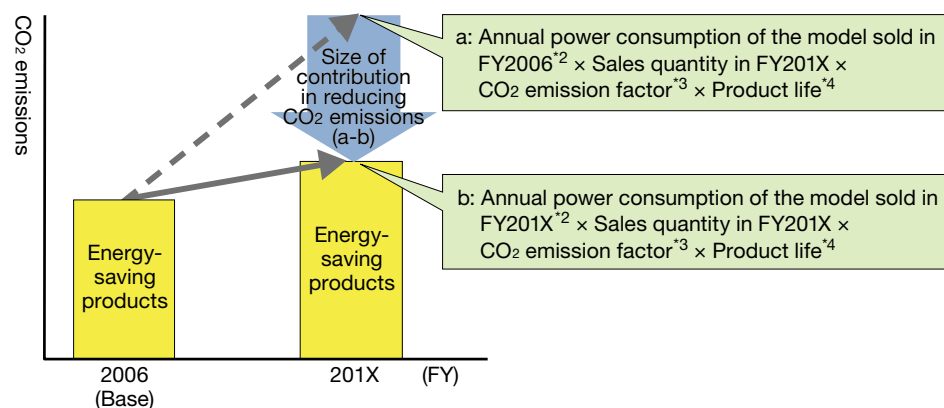
Panasonic has introduced a unique indicator “size of contribution in reducing CO₂ emissions” to accelerate emissions reduction, targeting our products (for energy saving and energy creation). The size of contribution in reducing CO₂ emissions is defined as the amount achieved by deducting the actual emissions from the amount that would have been emitted without the improvements by the energy-saving performance of our 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.

Size of Direct Contribution in Reducing CO₂ Emissions through Energy-saving Products

We will improve the energy-saving performance of our products to reduce the energy consumed in using the products. The more energy-saving products are introduced and promoted, the size of contribution in reducing CO₂ emissions will further increase.

Size of Direct Contribution in Reducing CO₂ Emissions through Energy-saving Products



*2 For each product category, the model that was sold in the largest quantity in the region was selected.

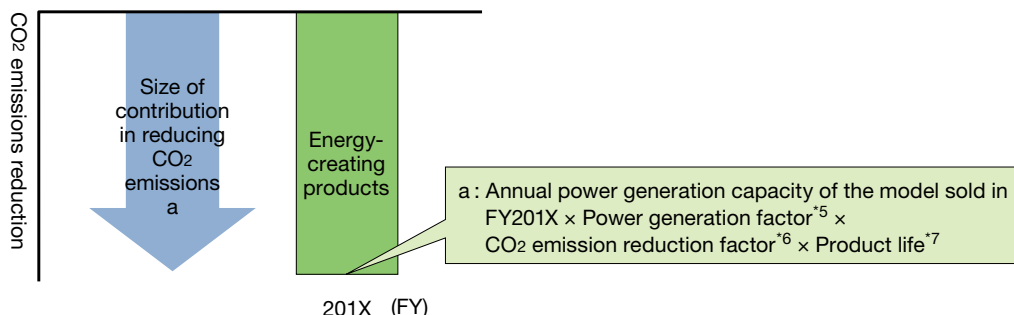
*3 Regional CO₂ emission factors (kg-CO₂/kWh) used: 0.410 (Japan); 0.487 (Europe); 0.579 (North America); 0.740 (China & Northeast Asia); 0.927 (India & South Asia); 0.527 (Southeast Asia & Oceania); 0.332 (Latin America); and 0.599 (Middle East & Africa).

*4 Number of years during which spare parts for the product are available (defined by Panasonic).

Size of Direct Contribution in Reducing CO₂ Emissions through Energy-creating Products

By using electricity generated by solar power generation and such, we 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.

Size of Contribution in Reducing CO₂ Emissions through Energy-creating Products



*5 For photovoltaic power generation: 1,204 kWh/kW (after fiscal 2015), 1,193 kWh/kW (fiscal 2014 and prior). Considering sunshine conditions, system loss, and other variables.

*6 For photovoltaic power generation: 0.360kg-CO₂/kWh (Source: Voluntary Rules on Indication (2010) by the Japan Photovoltaic Energy Association).

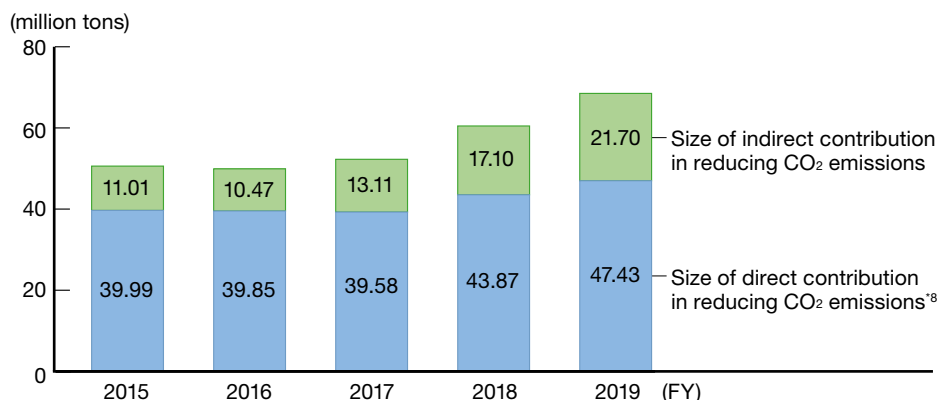
*7 For photovoltaic power generation: 25 years (fiscal 2019), 20 years (fiscal 2018 and prior).

Size of Indirect Contribution in Reducing CO₂ Emissions

Effects of reducing CO₂ emissions in domains of housing, automotive, and B2B businesses which we are focusing on are shown as the size of indirect contribution to reducing CO₂ emissions to distinguish it from the size of direct contribution in reducing CO₂ emissions from Panasonic-brand products. The size of indirect contribution in reducing CO₂ emissions represents the CO₂ emissions reduction effects from other companies' products, in which our components contribute to reducing CO₂ emissions. Specifically, the data represents "air conditioning load reduction effects from improved insulation performance in Panasonic housing," "energy-saving effects from products by other companies equipped with Panasonic energy-saving compressors, motors, and vacuum insulation materials" and "improved fuel economy effects from electric vehicles equipped with Panasonic automotive batteries." From the results for fiscal 2017, CO₂ reduction effects as a result of energy saving such as less travelling made possible through the use of our HD Visual Communication Systems, and from the results for fiscal 2018, the energy-saving effects from using our HEMS and BEMS are also calculated and disclosed.

Our size contribution in reducing CO₂ emissions through products and services amounted to 69.13 million tons in fiscal 2019. Of this, direct contributions amounted to 47.43 million tons, and indirect contributions to 21.70 million tons.

Size of Contribution in Reducing CO₂ Emissions through Products and Services



*8 Total amount of contribution in reducing CO₂ through energy-saving products and energy-creating products.

Environment: CO₂ Reduction through Energy-saving/creating/storing Products



Energy-saving Products

The size of direct contribution in reducing CO₂ emissions through our energy-saving products in fiscal 2019 was 39.80 million tons which is more than the previous fiscal year mainly because of the shift in lighting to LED, etc. In the breakdown of the size of contribution in reducing CO₂ emissions by global product category, 82% was from air conditioners, lighting equipment, LCD TVs, and refrigerators. By region, Japan, Southeast Asia & Oceania, China & Northeast Asia made up approx. 79%. CO₂ emissions from the use of our major products^{*1} in fiscal 2019 is estimated to be approx. 59.92 million tons. We will continue to further reduce the CO₂ emissions from the use of major products by making energy-saving products even more widely available.

Also, improvement in energy efficiency of major consumer electronics by 35% compared to the fiscal 2006 level is our numerical target for fiscal 2019 under our Green Plan 2018. The results for fiscal 2019 marked 45% because of an increase in sales of high energy-saving performance models. The Green Plan 2018 also includes a numerical target for fiscal 2019 to achieve a 75% sales ratio for LED lighting (residential and non-residential buildings), and the fiscal 2019 results marked 77%.

*1 Lifetime CO₂ emissions from major products^{*2} with large amounts of energy use.

$$\text{Lifetime CO}_2 \text{ emissions} = \text{Annual power consumption of a model sold}^{\text{*3}} \times \text{Sales quantity} \times \text{Product life}^{\text{*4}} \times \text{CO}_2 \text{ emission factor}^{\text{*5}}$$

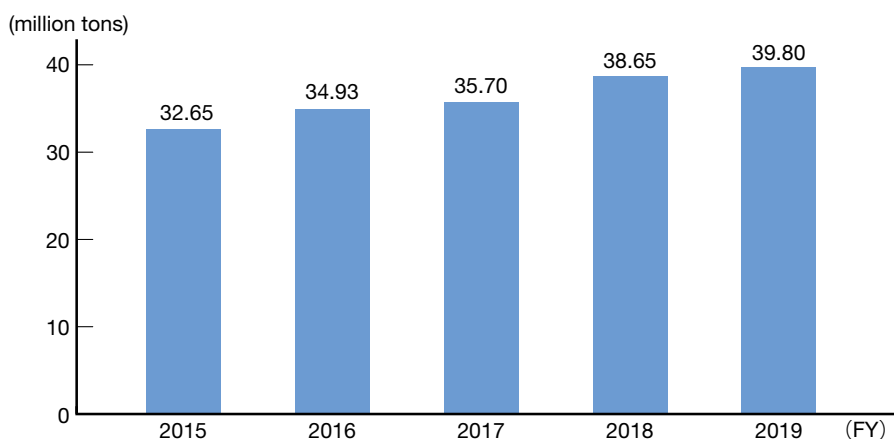
*2 Household air conditioners, commercial air conditioners, fluorescent lamps, LED lamps, household refrigerators, commercial refrigerators, LCD TVs, washing/drying machines, fully-automatic washing machines, clothes dryers, dish washer and dryers, IH cooking heaters, EcoCute, bathroom ventilator-driers, humidifiers, dehumidifiers, air purifiers, extractor fans, vending machines, electric rice cookers, microwave ovens, electric bidet toilets, irons, hair dryers, electric carpets, vacuum cleaners, electric thermo pots, extractor hoods, telephones, security cameras, projectors, production modulars etc.

*3 For each product category, the model that was sold in the largest quantity in the region was selected.

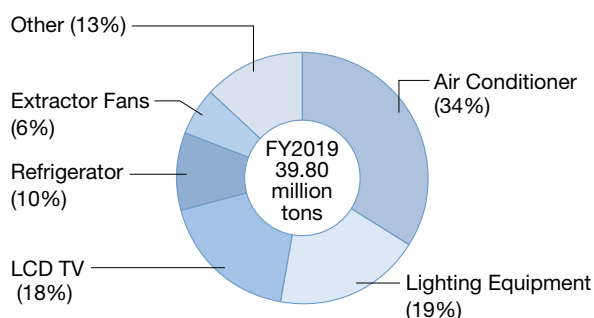
*4 Number of years during which spare parts for the product are available (defined by Panasonic).

*5 Regional CO₂ emission factors (kg-CO₂/kWh) used: 0.410 (Japan); 0.487 (Europe); 0.579 (North America); 0.740 (China & Northeast Asia); 0.927 (India & South Asia); 0.527 (Southeast Asia & Oceania); 0.332 (Latin America); and 0.599 (Middle East & Africa).

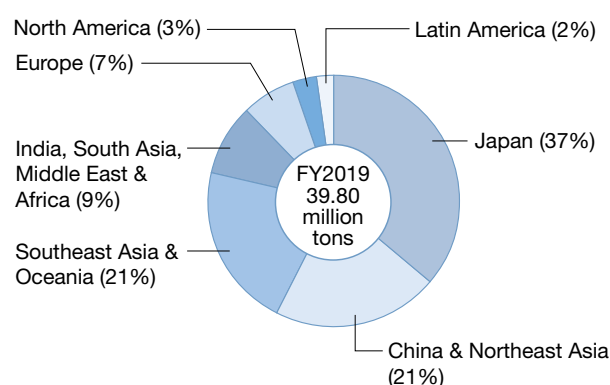
Size of Contribution in Reducing CO₂ Emissions through Energy-saving Products



Size of Contribution in Reducing CO₂ Emissions through Energy-saving Products (by product)



Size of Contribution in Reducing CO₂ Emissions through Energy-saving Products (by region)



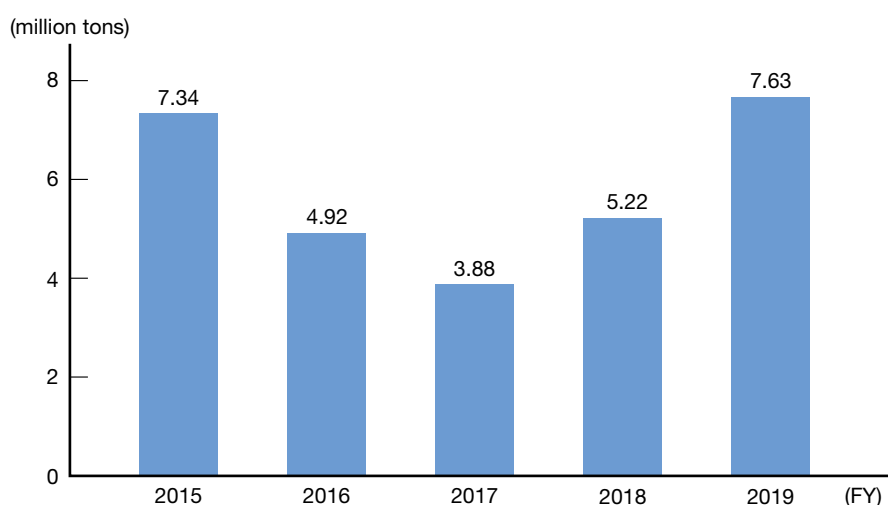
Energy-creating Products

We actively develop our energy creation business to maximize the size of contribution in reducing CO₂ emissions. By delivering photovoltaic power generation systems and household fuel cell cogeneration systems as means to create necessary electricity with few CO₂ emissions, we reduce CO₂ emissions in society.

The size of direct contribution in reducing CO₂ emissions through energy-creating products in fiscal 2019 was 7.63 million tons due to the expansion of global demand for photovoltaic power generation solar panels. By region, North America accounts for approx. 55%.

Other fiscal 2019 targets under the Green Plan 2018 include achieving 440,000 MWh of total power generation from dissemination of household fuel cells (fiscal 2011 to fiscal 2019), and 5 million MWh of total power generation from dissemination of photovoltaic power generation systems (fiscal 2013 to fiscal 2019). The results of total power generation up to fiscal 2019 were 460,000 MWh from household fuel cells and 5.40 million MWh from photovoltaic power generation systems.

Size of Contribution in Reducing CO₂ Emissions through Energy-creating Products



Initiatives for Energy-storing Products

Energy-storing products such as lithium-ion batteries can be used in various situations for electric power storage and contribute to reducing CO₂ emissions through installation in homes, cars, and offices. In particular, automotive lithium ion batteries support spreading environmentally friendly car as key device. Panasonic is actively engaged in the development of energy-storing products that contribute to reducing CO₂ emissions.

Under our Green Plan 2018, we have set the target as 200% for battery supply demand for increase in automotive battery supply (compared to the fiscal 2015 level). The results up to fiscal 2019 were 268%.

Examples of Energy-saving/creating/storing products are also introduced on the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/co2/product.html>

Global Warming Mitigation

While people seek for affluent lifestyles, the acceleration of global warming caused by the increase in CO₂ emissions from people's daily lives and corporate activities is becoming a concern. Panasonic promotes measures to mitigate the progress of climate change and to minimize the impact by reducing the greenhouse gases emitted from its products and services as well as production activities.

As measures to mitigate the impact of our products and services, we offer energy-management products and solutions that link and control a range of energy-saving/creating/storing products.

In promoting our Net-Zero Energy House (ZEH), we set a numerical target in Green Plan 2018, which is "achieving the ZEH ratio of 22% in all detached house". The achievement in fiscal 2019 was 36%.

In addition to these energy management solutions in the housing area, the Panasonic Group is also promoting Smart Town projects in Fujisawa City and Yokohama City in Kanagawa Prefecture. Under Green Plan 2018, we are aiming to start construction/sales at three locations (870 lots) from fiscal 2016 through fiscal 2019. The results up to fiscal 2019 were three locations (607 lots).

More details on reducing CO₂ emissions at our factories can be found on pages 46-49. For details on reducing CO₂ emissions in logistics, see pages 50-52.

Examples of solutions for global warming mitigation are also introduced on the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/co2/solution.html>

Global Warming Adaptation

Panasonic is also making efforts for adaptation to address unavoidable impacts on the global environment that cannot be addressed by mitigation measures. Such adaptation is based on the matters indicated by the Intergovernmental Panel on Climate Change (IPCC) etc., focusing on the impact of climate change on the ecosystem, society, and the economy. Further, we understand that it is important for the measures to take account of regional feature, as impacts of climate change vary according to the region.

Our measures are currently implemented from the viewpoints of the following two aspects:

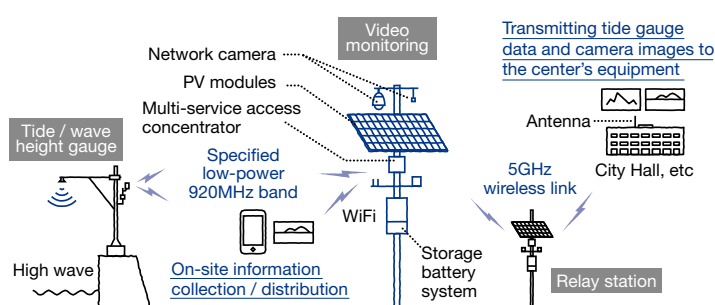
- (1) Activities to reduce the impact of climate change through our products, services, and solutions; and
- (2) Activities to reduce the impact on our corporate activities

Specific examples of (1) include the coastal monitoring system and the Green Air-Conditioner. Panasonic has developed the coastal monitoring system that sources power independently. This system always operates wireless network cameras and wireless transmission devices by photovoltaic power generation modules and storage batteries. It would contribute to preparing for high tides that are expected to increase due to climate change.

As for Green Air-Conditioner, we are working on to develop new products in joint project with other company to commercialize them towards the Olympic and Paralympic Games Tokyo 2020 (for commercialization in April 2019). Dry-type mist made by mixing fine particles of water and air to minimize the sense of wetness as well as air curtains that will create dome-shaped cooling spaces under shades are designed to provide relief from the summer heat in open spaces. These systems are expected to reduce heat stroke and other adverse effects on everyday life caused by global warming.



Coastal tsunami monitoring system in Higashi Matsushima City in Miyagi Prefecture



Coastal Tsunami Monitoring System Configuration

▶ Coastal tsunami monitoring system in Higashi Matsushima City in Miyagi Prefecture (An example of a coastal monitoring system) (Japanese)

<https://www2.panasonic.biz/es/solution/works/higashimatsushima.html>

▶ [Press release] Introduction of the “Green Air-Conditioner,” outdoor mist cooling system equipped with micro mist

<https://news.panasonic.com/jp/press/data/2019/04/jn190419-1/jn190419-1.html>

As for (2), the first priority is to identify the issues to be addressed by assessing the impact of climate change on Panasonic. One such issue is the effect of water shortages on our production activities. Panasonic completed all water risk assessments for its production sites in fiscal 2018. As of now, we have not identify any visible water risk that may affect its business activities. For further details, please see Water Resource Conservation (Pages 65-66).



Micro mist



Air curtain creating dome-shaped cooling space

Reducing CO₂ Emissions through Production Activities

Panasonic engages in energy-saving measures to reduce CO₂ emissions in factories, aiming at reinforcing our environmental management structure for contribution to climate change mitigation, increase of productivity and reduction of energy costs in factories. In the revision of Green Plan 2018, our Environmental Action Plan for 2016, the “CO₂ basic unit” has been used as an indicator for CO₂ reductions in our production activities. Members at our respective factories are proactively working to achieve the fiscal 2019 target of reducing “CO₂ basic unit” by 5% or more compared to fiscal 2014 (more than a 1% annual reduction on average).

In energy-saving and CO₂ emission reduction measures, we roll out good examples, nurture environmental specialists, and conduct CO₂ ITAKONA activities^{*1} corporate-wide, in addition to individual activities conducted at each factory. At the same time, we are also promoting the introduction and utilization of photovoltaic power generation to achieve our fiscal 2019 target of adopting “at least 10,000 MWh of in-house renewable energy.” Adopted amount of in-house renewable energy reached 25,000 MWh^{*2} companywide^{*3} in fiscal 2019, exceeding the target. At the same time, we introduced a scheme to switch to LED lighting at our factories, offices, and showrooms that will reach completion at all business divisions^{*4} by fiscal 2019.

Our investment in CO₂ emissions reductions in fiscal 2019 was 2.9 billion yen.^{*5}

As a result, the CO₂ emission per basic unit in fiscal 2019 was reduced by 14% compared to fiscal 2014 (annual average of 2.8%), which exceeded the target level. Not only the emission per basic unit, but also that of the total energy is steadily reducing.

Additionally, Panasonic has participated in Keidanren’s “Action Plan for Low Carbon Society”, a voluntary action program to prevent global warming across the whole of the electrical and electronic engineering industry, with targets set for 2030. Specifically, we are steadily implementing energy-saving measures in our factories and offices to achieve the goals set by the industry in Japan, aiming to improve the energy consumption per basic unit in our factories and large offices at an annual rate of 1% on average towards 2030.

*1 ITAKONA is a coined word created by Panasonic, which is a concept for a method to find unnecessary activities, MUDA in Japanese, by analyzing costs of materials and components of a product in details in order to find unnecessary activities in product design at the stage of product development. CO₂ ITAKONA activities are the ones where ITAKONA activities are applied to find unnecessary activities related to reduction of CO₂ emission. Through CO₂ ITAKONA activities, energy consumption per production amount (energy consumption per basic unit) are continuously visualized, and factors of variations of the energy consumption per basic unit, measures to manufacture products with minimum energy consumption per basic unit are analyzed and discussed. Thereby, new viewpoints for energy efficiency, as well as effective measures are found.

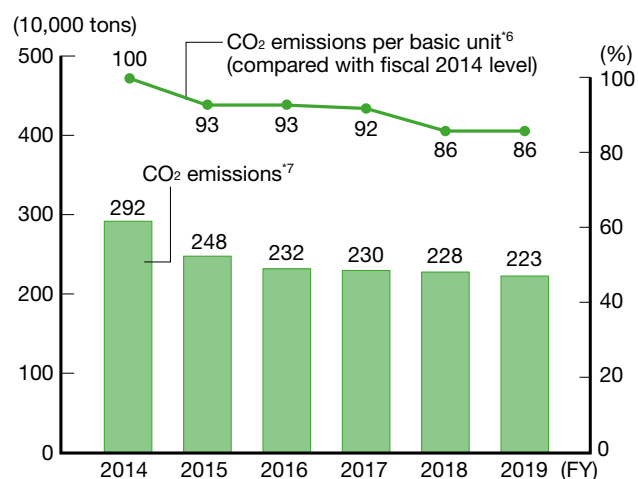
*2 Covers solar energy, wind power and biomass energy. Excludes heat pumps.

*3 Includes renewable energy use at the company’s non-manufacturing sites.

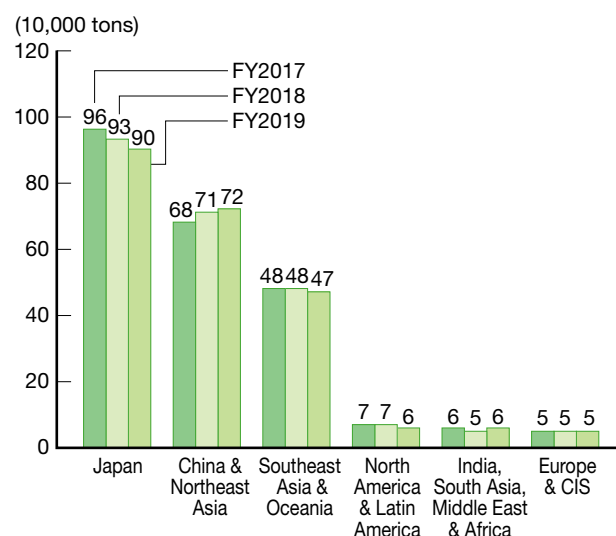
*4 The targets were installable sites

*5 Includes all investments concerning CO₂ emissions reduction. Differences or proportion are not calculated.

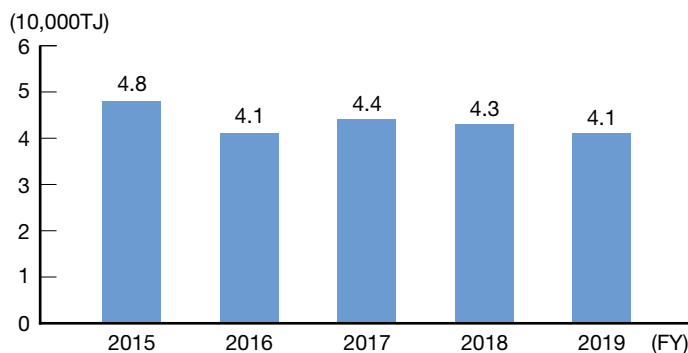
CO₂ Emission in Production Activities and CO₂ Emission Per Basic Unit



CO₂ Emission in Production Activities (by region)



Energy Consumption in Production Activities



*6 Calculated using the weighted average value of improvement rates compared to the fiscal 2014 in CO₂ emissions per basic unit, which is calculated by dividing CO₂ emissions by the volume of activity closely related to CO₂ emissions, including production amounts and volumes, etc. of each factory. As for the weighted factor, the CO₂ emission amount of each factory on the assumption of no improvement is used.

*7 The factors related to fuels are based on the Guidelines for Calculation of Greenhouse Gas Emissions (version 4.3.2). The CO₂ emission factor (kg-CO₂/kWh) for electricity purchased in Japan in each fiscal year is fixed at 0.410 to accurately reflect efforts for CO₂ emissions reduction. If the factors set for each fiscal year are used instead (0.570 for fiscal 2014, 0.554 for fiscal 2015, 0.587 for fiscal 2016, 0.512 for fiscal 2017, 2018 and 2019), total CO₂ emissions will be 3.34 million tons for fiscal 2014, 2.77 million tons for fiscal 2015, 2.68 million tons for fiscal 2016, 2.50 million tons for fiscal 2017, 2.47 million tons for fiscal 2018, and 2.41 million tons for fiscal 2019. The factors above are also used for electricity purchased from power producers and suppliers (PPS). The GHG Protocol factors for each country are used for electricity purchased outside Japan.

Promoting CO₂ Reduction Activities in our Factories

To ensure steady progress with reducing CO₂ emissions, it is important to visualize trend of the energy consumption of each facility in factory and the effects of specific emissions reduction measures. To date, we have worked on CO₂ reduction by introducing more than 40,000 measurement equipment systems and Factory Energy Management System (FEMS) at all of our global manufacturing sites, promoting METAGEJI (Meter and Gauge)⁸, which visualizes and analyzes energy consumption.

Based on this scheme, the CO₂ ITAKONA activities have been implemented since fiscal 2011. Through CO₂ ITAKONA activities, energy consumption per production amount (energy consumption per basic unit) are continuously visualized, and factors of variations of the energy consumption per basic unit, measures to manufacture products with minimum energy consumption per basic unit are analyzed and discussed. Thereby, new viewpoints for energy saving as well as effective measures are found.

An example of factory energy conservation support service is introduced on the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/co2/service.html>

*8 METAGEJI is a coined word created by Panasonic which refers to visualizing energy consumption and implementing measurable reduction initiatives by introducing measurement instruments, such as meters and gauges.

Activities at factories

Members in our respective factory are actively and continually working on to reduce CO₂ emissions. In fiscal 2019, we received four awards including the Grand Prize of the Minister of Economy, Trade and Industry for Energy Conservation Best Practices in the Energy Conservation Grand Prize 2018. In the area of Best Practices, our two factories received awards stated below; both of the activities conducted with production reform on-site in the factory, and the advanced activities for innovation in production were highly evaluated.

●Prize of the Director General of the Agency for Natural Resources and Energy (Industrial category)

Niigata Factory, Lighting Business Division, Panasonic Corporation, Life Solutions Company*

“Energy saving activities in the factory whose backbone is to manufacture energy-saving LED lighting fixtures”

The activities conducted in Niigata factory, which supplies energy-saving products by energy-saving manufacturing



Niigata Factory, Lighting Business Division, Panasonic Corporation, Life Solutions Company

were highly evaluated on the activities to improve its production processes involving a degreasing agent manufacturer, in addition to the activities which all employees participate in.

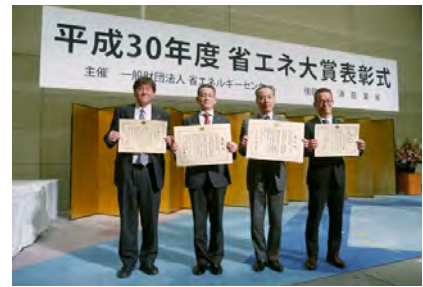
● **Grand Prize of the Minister of Economy, Trade and Industry (Energy-saving Category)**

Manufacturing Innovation Division, Innovation Promotion Sector, Panasonic Corporation

“Development of Smart EMS and energy saving activities by fully utilizing the Smart EMS.”

The activities to build a unique system through collaboration of all members from production sites and engineers by utilizing IoT/AI were highly evaluated.

*Name of the company: Eco Solution Company when it received award.



Received the Energy Conservation Grand Prize

In addition, the Manufacturing Innovation Division, who leads innovation in manufacturing at Panasonic, are working on to reduce energy consumption to use in our factories, through multiplying our strength in manufacturing, with “Manufacturing Vision” which aims at trying to solve customer issues and social issues. We will continuously strive for making Zero CO₂ factories, activities to realize the “Environmental Vision 2050”, through closely collaborated with relevant divisions.



Manufacturing Vision

Utilization of Renewable Energy

To reduce CO₂ emissions, Panasonic actively and globally promotes the adoption of renewable energy suited the characteristics of the region, such as photovoltaic power generation systems. The principal applications of renewable energy in fiscal 2019 are the installation of photovoltaic power generation systems in China, Southeast Asia and Japan.

In China, Panasonic Industrial Devices Materials (Guangzhou) Co., Ltd. (PIDMGZ) installed a large-scale photovoltaic power generation system with a generation capacity of approx. 1.4 MW.



Photovoltaic power generation system at PIDMGZ

In Southeast Asia, a 500-kW photovoltaic power generation system has been introduced in Panasonic Asia Pacific Pte. Ltd. (PA) in Singapore.



Photovoltaic power generation system at PA

Additionally, a 100-kW photovoltaic power generation system was started up at the Kadoma site of the Industrial Solutions Company (IS). In addition to reducing CO₂ emissions at the site, it is being used to gather verification test data for starting up photovoltaic power generation systems at other sites.

As a result of these activities and full operation of photovoltaic power generation system at respective existing sites, our in-house renewable energy adoption across the entire company⁹ reached 25,000 MWh¹⁰ in fiscal 2019, exceeding the fiscal 2019 target.



Photovoltaic power generation system at IS, Kadoma

Photovoltaic power generation system is being promoted at other global sites in addition to those mentioned above, and will be installed by fiscal 2021 at sites where system implementation is viable.

We will continue our efforts to achieve further reductions in CO₂ emissions.

Examples of the use of renewable energy are introduced on the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/co2/site.html>

⁹ Includes renewable energy utilization at non-production sites.

¹⁰ Includes photovoltaic, wind, and biomass power but not power from heat pumps.

Approach towards the CO₂ Emissions Trading Scheme in China

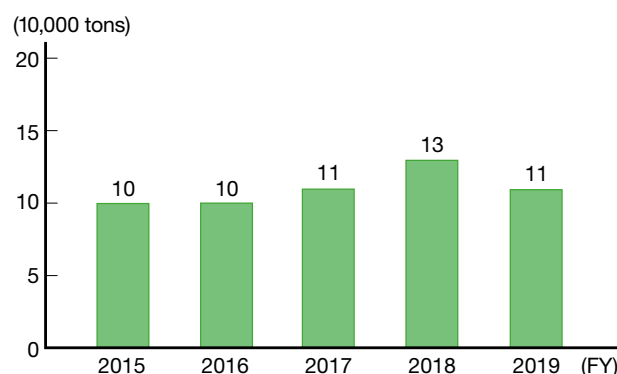
In China, an Emissions Trading Scheme (ETS) targeted for more than 1,700 companies in the power industry has been implemented from December 2017. China's Ministry of Ecology and Environment publicized Tentative Regulations for the Administration of Carbon Emissions Trading at the end of March, 2019. It is expected that the regulations become stricter. As we have many business divisions located in China, we continue to take measures for the possibilities that Panasonic may be a target in the light of risks and opportunities, by making use of our strength in terms of reducing CO₂ emissions in production activities we have conducted.

Reducing the Emissions of GHGs Other than CO₂ from Energy Use

GHGs other than CO₂ from energy use emitted by Panasonic include nitrogen fluoride (NF₃) and sulfur hexafluoride (SF₆) used as cleaning gases in LED and semiconductor factories, hydrofluorocarbons (HFCs) used in air conditioner factories as refrigerants for products. To reduce these gases, we implement a variety of measures, such as installing removal devices, preventing leakage of refrigerants, collecting and destroying refrigerants, and replacing the gas with substitute non-GHG.

GHG emissions other than CO₂ from energy use (CO₂-equivalent; hereinafter the same) in fiscal 2019 amounted to 110,000 tons, which was 20,000 tons less than the previous fiscal year.

Emissions (CO₂-equivalent) of GHGs Other than CO₂ from Energy Use in Production Activities

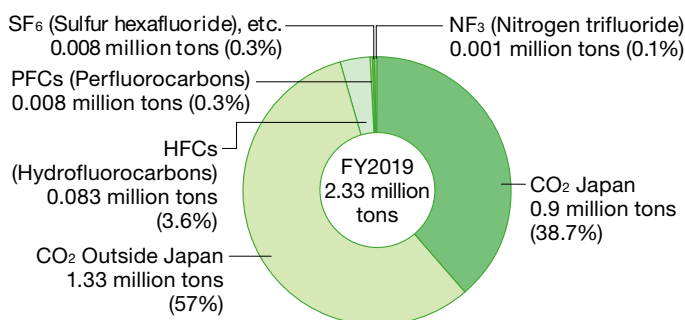


Breakdown of Total GHG Emissions (by gas and by scope)

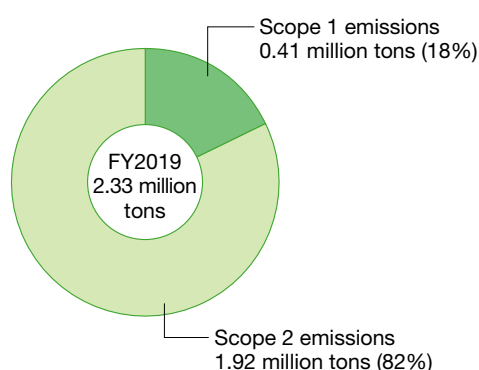
Our GHG emissions, including emissions from energy sources and other sources, reached 2.33 million tons in fiscal 2019, the breakdown being 18% for Scope 1 emissions^{*11} and 82% for Scope 2 emissions^{*11} (see page 33 for Scope 3 emissions).

*11 GHG emissions defined by the GHG Protocol, an international calculation standard for GHG emissions. Scope 1 emissions refer to all direct GHG emissions from facilities that are owned or controlled by the reporting entity (e.g. emissions from usage of town gas or heavy oil). Scope 2 emissions refer to GHG emissions from manufacturing of the energy that is consumed in facilities owned or controlled by the reporting entity (e.g. emissions from generation of electricity that the reporting entity purchased).

Breakdown of Total GHG Emissions (CO₂-equivalent) in Production Activities (by category)



Breakdown of Total GHG Emissions (CO₂-equivalent) in Production Activities (by scope)



Reducing CO₂ Emissions in Logistics

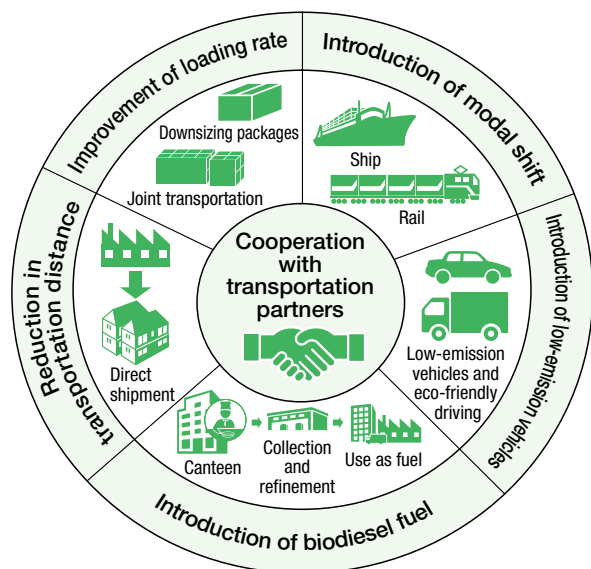
To contribute to the prevention of global warming as well as to improve transportation efficiency while reducing costs, Panasonic is working to reduce CO₂ emissions in logistics.

In the revision to our Environmental Action Plan “Green Plan 2018” in fiscal 2017, numerical targets for reducing CO₂ emissions per basic unit of transportation within Japan by 1% or more year-on-year and reducing them by 5% or more in fiscal 2019 over the fiscal 2014 level were announced. To achieve these targets, we have taken actions, focusing introduction of modal shift, low-emission vehicles, and biodiesel fuels, reductions in transportation distances, and improvement of the loading rate.

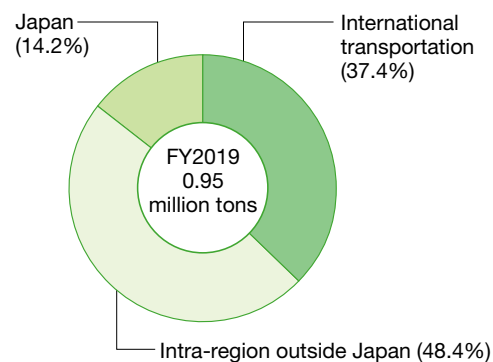
In fiscal 2019, our global CO₂ emissions from logistics activities came to 0.95 million tons across the world, of which international transportation was 0.355 million tons, and domestic transportation within Japan was 0.135 million tons. CO₂ emissions per basic unit of transportation within Japan reduced by 2.6% from the fiscal 2014 level.

*1 CO₂ emissions per transportation weight.

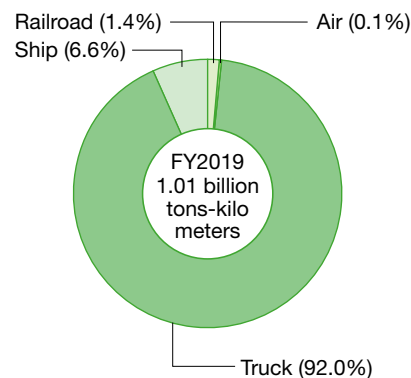
Focused Activities for Green Logistics



CO₂ Emissions from Logistics



Transportation Amount by Transportation Method (Japan)



Consolidated Shipment (ship/load of different products at the same time) in Collaboration with Sales Division

Making best use of that products are shipped from the same warehouse, Panasonic has shipped products in consolidated cargo (ship/load of different products at the same time) in collaborating with its sales division. Under the system of order finalization two days before the shipment, which was introduced in 2017, the followings have been realized: 1) allocation of a tack for the shipment one day before the shipment instead of on the shipment day, and 2) consolidated shipment of water heaters and air conditioners. As a result, the number of ordering trucks for shipment has been reduced, which has contributed to CO₂ reduction, and at the same time, actions for shipment risk have been realized. In fiscal 2019, the number of actually ordered trucks for consolidated shipment was 2,512 trucks, whose consolidated rate was 27%, and CO₂ reduction effect was equivalent to 61 ton per year; for the subject shipment, 4.7% of CO₂ was reduced.

Modal Shift*² Initiative in Collaboration with Logistics Partners

Panasonic promotes a modal shift in transportation from trucks to railroad and ships in order to reduce CO₂ emissions.

As a part of this initiative, we have been working together with Suzuyo & Co., Ltd., Suzuyo Cargo Net Co., Ltd. and Nittsu Panasonic Logistics Co., Ltd. towards a new manner of transportation since 2017. Panasonic has conventionally used cargo trucks to transport its washing machines from Fukuroi City in Shizuoka Prefecture to Tosu City in Saga Prefecture. We have managed to switch this means of transportation to domestic shipments twice per week by reducing the shipping volume variation to average out the transportation load. This initiative generates a CO₂ emissions reduction effect equivalent to 98 tons.



Domestic vessel transportation

*² Switch from truck and air transport to railroad and sea vessel transport that has less environmental impact.

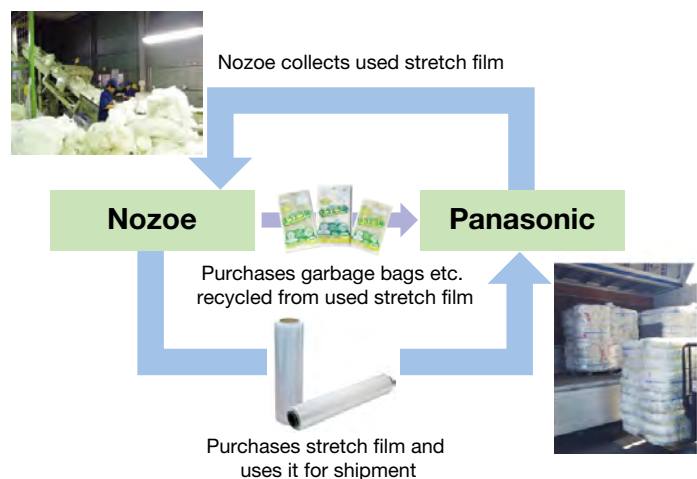
Use of Biodiesel Fuel (Japan)

Panasonic promotes transforming waste cooking oil collected from its business sites into biodiesel fuel and utilizing it for vehicles used in production, procurement, and marketing activities. Since fiscal 2010, we have been using 100% biodiesel fuel for the joint transportation with the Asahi Shimbun Company in the Tokai and Tokyo Metropolitan areas to enhance further usage of biodiesel fuel. Biodiesel fuel usage in fiscal 2019 was 13,777 liters. We will increase opportunity to use the biodiesel fuel in non-road vehicles such as forklifts.

Recycling of Stretching Film Used in Shipment

As an activity to reduce logistics waste, in fiscal 2015, we started recycling and reusing used stretch films with Nozoe Industry Inc. (Nozoe), and in fiscal 2019, we have continued the activity. It used to that all the stretch films used for shipment were discarded after use, however, the used films are now recycled and used as raw materials for polyethylene bags by Nozoe, while Panasonic has purchased the bags made of recycled materials. As Chinese government started banning imports of waste plastics in the end of 2017, Panasonic's other sites who did not have business contact with Nozoe in Japan started similar activities with Nozoe. In addition, with the launch of full operation of Nozoe's recycling factory in Saitama Prefecture led to expand our recycling scheme for used stretch film in Kanto region. As a result, the total 358 tons of stretch film was recycled. In FY2019, we have started to purchase recycled products from Nozoe in Panasonic, to further increase purchase volume of Nozoe's recycled products. We continue to make effective use of used stretch films, while reducing logistics wastes.

Stretch Film Recycling Scheme with Nozoe



Landing Shipments at a Port Close to the Target Sales Area

Aiming for higher efficiency in transporting products, Panasonic is expanding its our efforts to land imported products at a port close to the target sales area in Japan. Conventionally, landing of products was centralized to a port near the West Japan Global Logistics Center (GLC) in Amagasaki City in Hyogo Prefecture, stored at the West Japan GLC, and then transported to respective locations as required. Landing the products at ports closer to the target sales areas can reduce the distance required for land transport within Japan, thereby contributing to reducing not only CO₂ emissions but also inbound and outbound deliveries between sites as well as distribution costs. This effort has reduced CO₂ emissions by 1,014 tons per year in fiscal 2019.

We will further refine projection of sales demand in various regions and optimize stock amounts held in those areas, and expand landing products at ports near target sales areas.

Recycling-oriented Manufacturing

As economic grow rapidly on a global scale, more and more people has become concerned and pay more attention to issues of resources. Particularly, mining new resources is a big issue, as it not only greatly has burdened on environment, but also has heightened people’s concerns on depletion of mineral resources and rise of resource price.

In such a situation, to address the concerns, and as our responsibility as a manufacturer that uses a large volume of resources, Panasonic has worked for Recycling-oriented Manufacturing under the theme of circulating resources since 2010, positioning it as an important issue along with CO₂ emissions reduction. Under the Green Plan 2018 revised in 2016, we have further worked for realizing recycling-oriented manufacturing, by continuously increasing the used amount of recycled resin, the recycling ratio in factories, and recycling-oriented manufacturing has been further implemented through efforts such as expanding the creation of resources recycling-oriented products. Particularly for recycled resin, in to definitely increase its usage amount, we have promoted to use recycled one by setting the target.

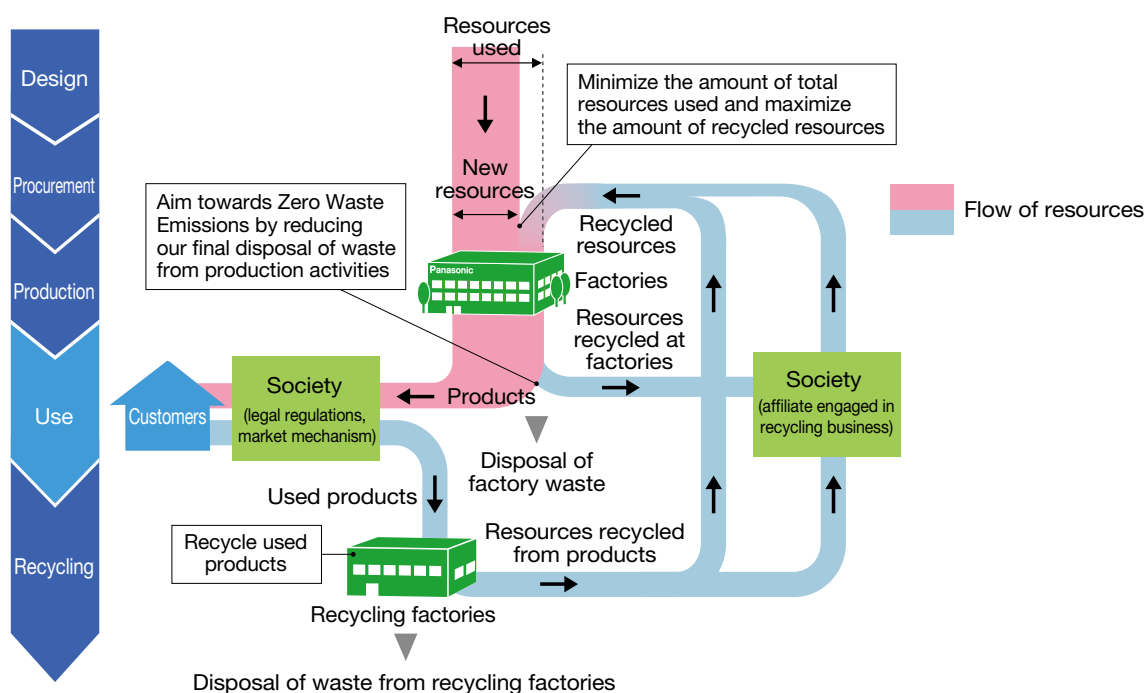
Recycling-oriented Manufacturing has three aspects in the activities: 1) minimizing the amount of total resources used and maximizing the amount of recycled resources, 2) aiming towards Zero Waste Emissions by reducing our final disposal of waste from production activities, and 3) recycling used products.

As for 1), in addition to activities to make a product lighter and smaller, we are working on to introduce new recycle technologies and a system for increase collected amount of resources, in order to increase the amount of recycled resources.

Furthermore, by reducing the amount of factory waste and thoroughly recycling resources from waste, we are working to reduce the amount of landfill disposal to as close as Zero.

We have proceeded activities towards sustainable business for product lifecycle by establishing a whole system where not only the resources ,which were wasted from the upper streams to the lower streams in the production process, are utilized, but also products which are manufactured using resources collected from used products; thereby, customers purchase and use the eco-friendly products.

Ideal Image of Recycling-oriented Manufacturing



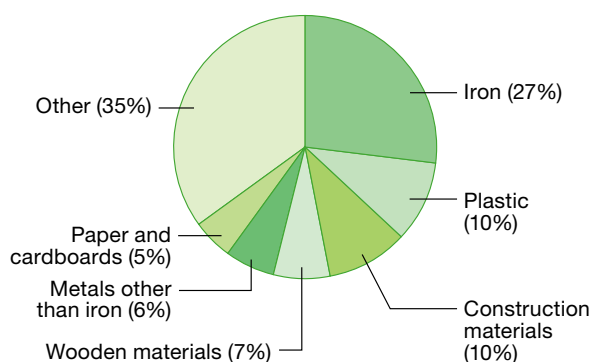
We use many kinds of resources, including iron (27% of total resources used) and plastic (10% of total resources used), because of our wide range of products and businesses, from home appliances, components such as semiconductors and batteries, to housing. In Recycling-oriented Manufacturing, we are further working on reducing input of virgin resources, at the same time for increasing the usage amount of recycled resources, we are working on to establish a circular system according to feature of the resource per resource type.

Furthermore, we clarify recycled resource utilization issues by identifying the volume of each type of resource used across the Panasonic Group. For example, in the case of recycled resin, we used approx. 14,500 tons of recycled resin in our products in fiscal 2019 by evolving the actions to take for the features required for components to use, securing stable amounts of supplied components, improving for using the components at manufacturing side, and developing new recycling technologies. Total usage of recycled resin since fiscal 2015 has reached approx. 79,400 tons. As stated above, Panasonic has achieved the targets of the Green Plan 2018, by minimizing input of virgin resources, while maximizing use of recycled resource.

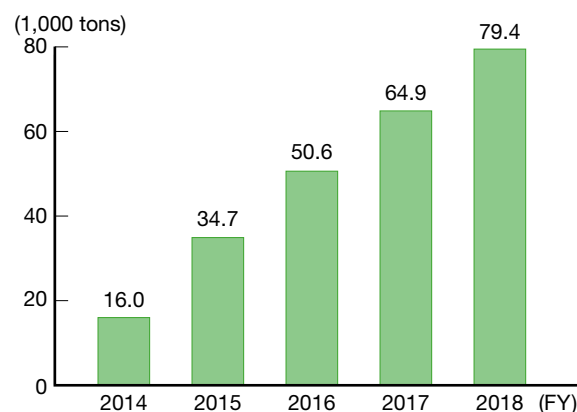
In addition, as for the factory waste recycling rate, we had traditionally set different targets for Japan and countries outside Japan according to the relevant local infrastructures. However, with the awareness of the importance of zero waste emission activities, we have set a globally standardized target since fiscal 2011 and are taking steps to improve the standard level of waste recycling across the entire Group. The factory waste recycling rate^{*1} has reached its target, achieving 99.1 % for fiscal 2019 against the target of 99% or more in fiscal 2019 (see Page 59).

*1 Factory waste recycling rate = Amount of resources recycled/(Amount of resources recycled + Amount of landfill)

Breakdown of Input Virgin Resources Used in Fiscal 2019 (by category)



Results of Recycled Resin Usage (Cumulative total from fiscal 2015)



Promotion of Circular Economy

Alongside changes in customer lifestyles, there is now a growing global trend for customers to use only specific functions of a product, rather than using or owning the whole product. In Europe, building a circular economy for sustainable economic growth has become a major economic strategy, in a move away from continuous resource consumption. This trend is spreading around the world along with the change in customers' sense of values. Amid this development, Panasonic is introducing the idea of the circular economy and moving forward in efforts to promote effective utilization of resources and maximization of customer value. The circular economy activities we promote have two aspects: 1) creation of circular economy businesses, and 2) evolution of recycling-oriented manufacturing.

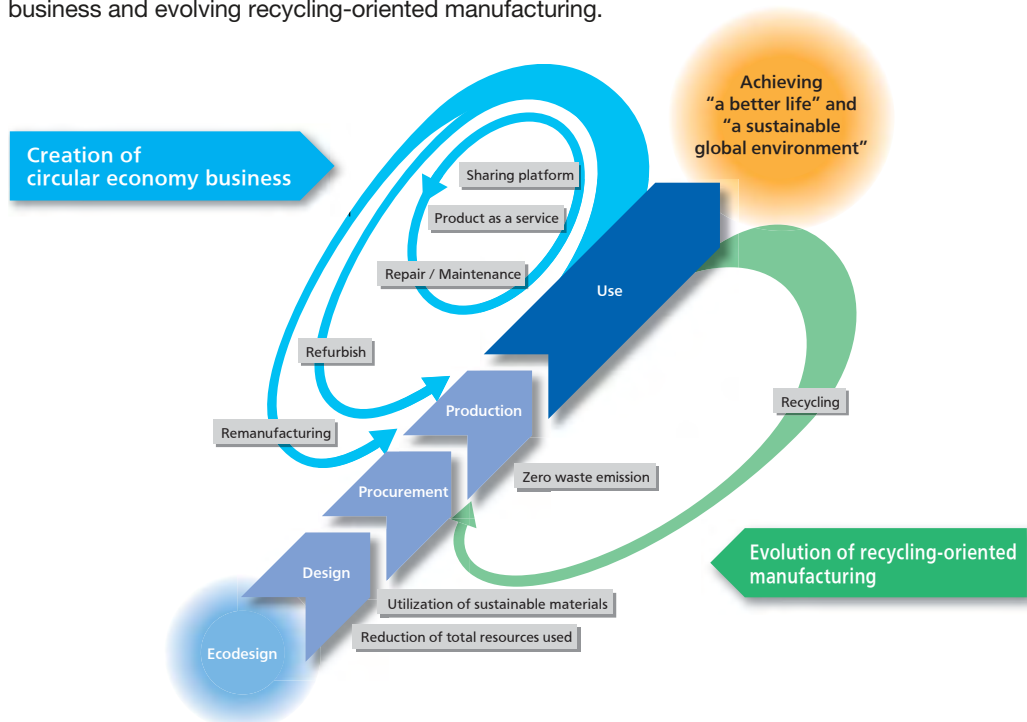
In order to realize the new value of using only product functionalities, instead of using or owning the whole product, we will strive to create circular economy businesses. These include a "Sharing service", where multiple users use the same individual product, a "Product as a service" where services are fulfilled based on functions, and "Repair and Maintenance, Refurbish and Remanufacturing", where functions, values, and the life cycle of a product are utilized in the most efficient manner by recycling or reusing the product itself or the components used in the products.

Alongside this, we continue to implement recycling-oriented manufacturing by reduction of the total resources used, utilization of circulative resources, zero waste emission, and recycling. Furthermore, we will develop recycling-oriented manufacturing to a higher level by using new materials and the latest digital technologies.

With all these activities, we aim to realize both "A better life" and a "Sustainable global environment" towards our Environmental Vision 2050, based on an eco-design concept which maximizes customer value in use by increasing resource efficiency at each process in design, procurement, and production.

Concept for the Actions toward Circular Economy

We will promote effective utilization of resources and maximization of customer value by creating circular economy business and evolving recycling-oriented manufacturing.



As specific activities, we will take actions to meet our targets regarding resources in Green Plan 2021. First, in order to create circular economy businesses, we will complete mapping of the relationships between our existing business and the circular economy, and then, to shift the existing business to circular economy businesses based on the mapping.

Next, we aim to use 42,000 tons or more of recycled resin (cumulative from FY2020-2022), by further developing the actions needed to achieve necessary component features, securing stable amounts of supplied components, improving the use of components in manufacturing, and developing recycling technologies.

Furthermore, as Zero waste emission activities are important in utilizing resources, we will continue to work toward achieving 99% or more for factory waste recycling rate at each factory as stated in the Green Plan 2018.

Reduction in Resources Used

To minimize the use of resources for production, we continuously look to reduce the weight of our products. Through the Product Environmental Assessment (see page 36), Panasonic has been promoting resource saving from the product planning and design stage, such as using less resources, making our products lighter and smaller, and using less components. We also implement various measures from the standpoint of resource recycling throughout the product life cycle, such as component reuse, longer durability, use of recycled resources, easier battery removal, and labels necessary for collection/recycling.

Examples of weight reduction and recyclable product design are also introduced in the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/resource/reduce.html>

Products Using Recycled Resources

Under the concept of “product-to-product”, we are enhancing our initiatives of utilizing resources recovered from used products. As for resin, we promote the reuse of resin recovered from our used home appliances (refrigerators, air conditioners, washing machines, and TVs) for our products. We also started recycling scrap iron recovered from used home appliances in our products in 2013.

► Our approaches to Resources Recycling

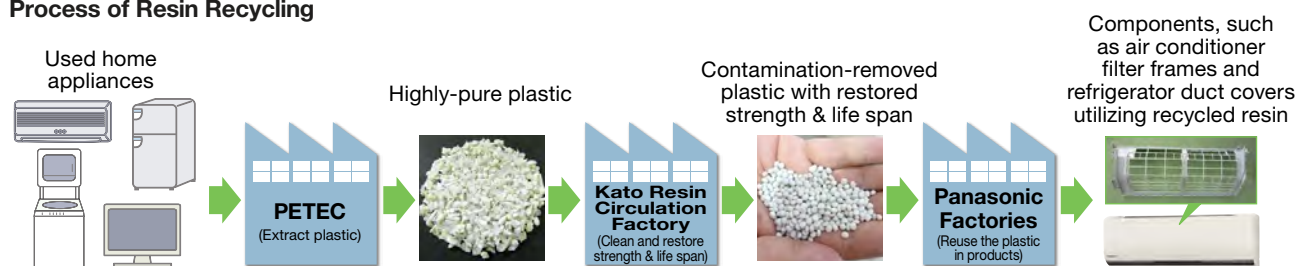
https://www.panasonic.com/global/corporate/sustainability/eco/resource_sp.html



Enhanced Use of Recycled Resin in Home Appliances

To efficiently utilize resin recovered from collected waste home appliances in addition to metals such as iron, copper, and aluminum, our recycling factory, Panasonic Eco Technology Center Co., Ltd. (PETEC), and Kato Plastic Recycling Factory of the Appliances Company work together for resin recycling.

Process of Resin Recycling



Using technologies such as our original near-infrared identification technology, PETEC is capable of sorting shredder residue of waste home appliances into three major types of resins with different purposes and properties—polypropylene (PP), acrylonitrile butadiene styrene (ABS), and polystyrene (PS)—at a material purity of over 99%.

The recycled single resins sorted and recovered at PETEC are then transferred to the adjacent Kato Plastic Recycling Factory to be further purified and processed to recover their chemical properties. Kato Plastic Recycling Factory is a manufacturing and development site that demonstrates promotion of use of recycled resin at our Appliances Company, a home appliance manufacturer and seller. The factory plays an important role in enhancing recycled resin utilization by developing recycling technologies, such as a more efficient method for improving the purity of recycled resins. Recycled resin is generally weaker in strength and has a shorter life than new resin. This is why its chemical properties have to be recovered to the level of new resin to make them usable as materials and components in new products. The properties required by our customers vary depending on the resin. We have established techniques that make full use of the properties optimal to each resin such as PP, ABS, and PS, which include adding antioxidants or mixing recycled and new resins.



Near-infrared sorting machine that can sort three types of resin simultaneously

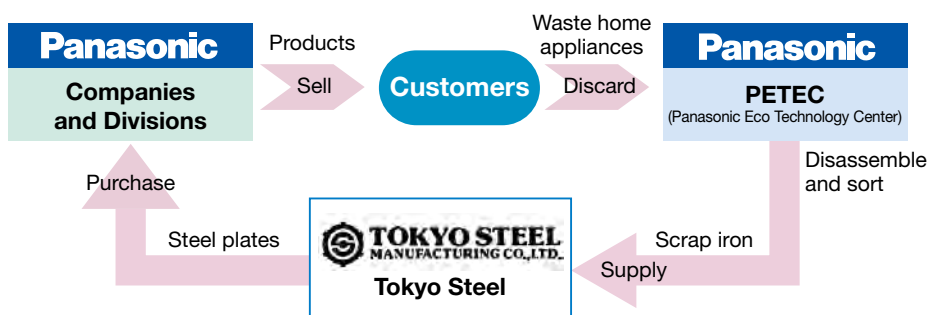
A new development in our activities in fiscal 2019 is the development of a polypropylene (PP) resin containing plant-derived cellulose fiber. The new, eco-conscious PP resin with cellulose fiber is currently used in structural components for cordless, stick-type vacuum cleaners, contributing to its main feature of lighter weight.

Kato Plastic Recycling Factory is developing and materializing eco-conscious new materials, such as plant-derived materials, for practical use, in addition to reusing resins from waste home appliances, to expand our use of resources.

Building a Recycling Scheme for Scrap Iron

Jointly with Tokyo Steel Co., Ltd., we started a recycling scheme for scrap iron in July 2013. In this scheme, we recover the scrap iron from used home appliances and Tokyo Steel makes it into steel sheets. We then purchase the sheets back as a material for our products. Supplying scrap iron for recycling and repurchasing the recycled iron is the first scheme of its kind in the Japanese electrical manufacturing industry.

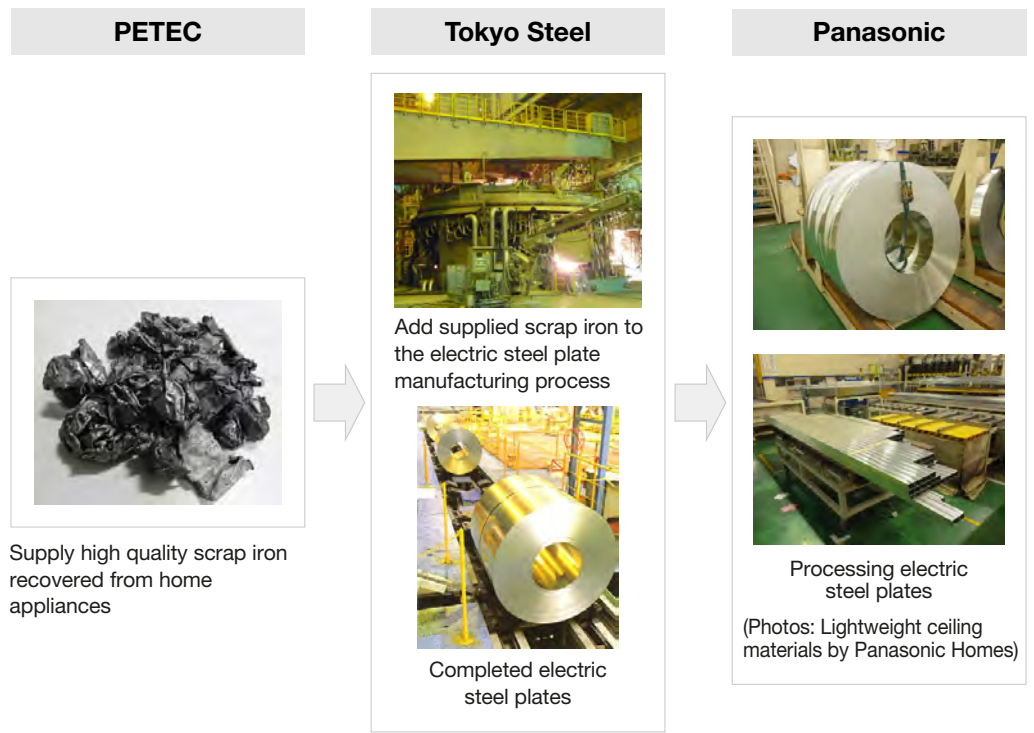
Self-recycling Scheme for Electric Steel Plates



Specifically, scrap iron from home appliances collected and treated at PETEC is supplied to Tokyo Steel’s Okayama Plant, where the scrap iron is processed into electric steel plates.^{*1} Panasonic procures the recycled steel plates and utilizes them in products. Discussions with Tokyo Steel commenced in 2010, and we have worked together since then to improve the quality of recycled iron to a level sufficient for production use, as well as developing the technology to improve the applicability of the recycled iron. From this we identified the optimum application of the electric steel plates, and refined its specific features (e.g. shape, strength, and weldability) to meet application-specific requirements. Use of thin electric steel plates in our products was first made possible in 2011. Through this close collaboration, we materialized this recycling scheme in 2013, a scheme where a home appliance recycling company that we own supplies scrap iron to be used to make electric steel plates.

The amount of scrap iron we initially supplied to Tokyo Steel was about 50 tons per month. In fiscal 2019, it reached over 2,600 tons, and the recycled steel is being used in our products, including washing machines and ceiling materials for housing.

Self-recycling Scheme Process



The increase in electric steel plate usage leads to an increase in the usage of scrap iron, which is one of the most important resources in Japan. In addition, producing steel plates from scrap iron emits much less CO₂ compared with producing steel plates from scratch. This scheme also stabilizes the procurement price, because the price of scrap iron supplied from PETEC and the price of electric steel plates procured from Tokyo Steel are determined by the scrap iron fluctuation rate agreed between the two companies. We will further expand this recycling scheme for more efficient resource utilization, CO₂ emissions reduction, and stabilization of procurement prices.

*1 Steel produced from scrap iron melted and refined in an electric arc furnace.



Improving Factory Waste Recycling Rate

From the viewpoint of effective usage of resources, we believe that generation of waste and revenue-generating waste at factories must be minimized, even if such waste could be sold as valuable commodities. Based on this belief, we identify the amount of generated waste (including both revenue-generating waste and factory generated waste) and classify it into: (1) recyclable waste (including those that can be sold and those which can be transferred free of charge or by paying a fee), (2) waste that can be reduced by incineration or dehydration, and (3) landfill (waste with no option other than being sent to landfills).

We reduce the emission of waste by boosting yield in our production process and increasing the recycling rate of our waste materials. Accordingly, we strive globally toward achieving our Zero Waste Emissions from Factories^{*1} goal by reducing the amount of landfill to nearly zero. We have reinforced such efforts particularly in China and other Asian countries, where many of our factories are located.

The factory waste recycling rate reached 99.1% in fiscal 2019, exceeding the target of 99% in Green Plan 2018. We will continue to promote these activities to maintain and improve our factory waste recycling rate.

As a means to reduce the generation of waste, we are fostering resource-saving product design. In our production activities, we are engaging in resource loss reduction, employing our own unique material flow analysis methods. We consider materials that do not become products and excessive use of consumables as resource losses, and make the material flow and lost values for each process visible in order to resolve the issues with close collaboration with the design, manufacturing, and other relevant business divisions. In the future, we will promote further reductions in resource losses through the Resource Loss Navigation, our original system developed to automatically display information to help reduce resource losses.

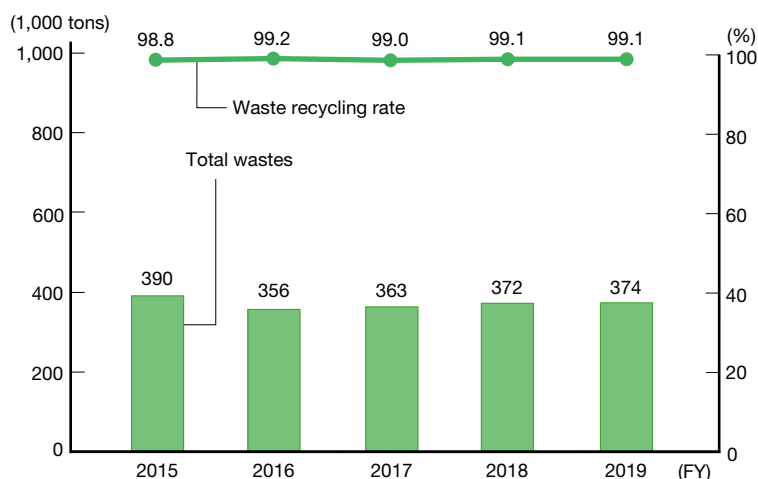
As measures to reduce the amount of landfill of waste and revenue-generating waste, we constrain the amount of waste materials that are particularly difficult to recycle, such as thermosetting resin. We are also strictly adhering to waste sorting practices in production processes to further expand the reuse of resources.

Because waste recycling rates in our overseas factories lag behind those in Japan, we have worked to improve the average level of recycling activities by sharing information within and between regions outside Japan. Specifically, in addition to accelerating the information sharing on waste recycling issues between our local factories and group companies in Japan, we also promote the sharing of excellent examples and know-how among our factories across regions by utilizing BA Charts^{*2} prepared by each region, following our long-standing approach toward CO₂ reduction activities.

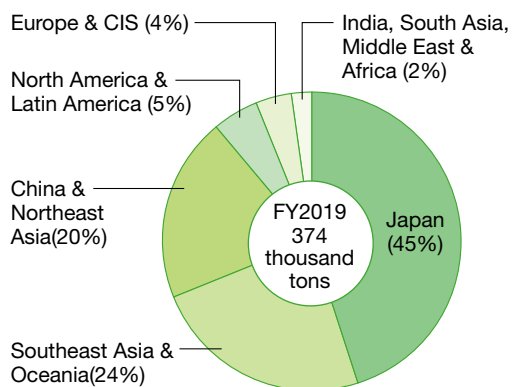
*1 Definition by Panasonic: Recycling rate of 99% or higher. Recycling rate = Amount of resources recycled/(amount of resources recycled + amount of landfill).

*2 A chart-format summary of comparisons between “before and after” implementation of waste reduction and recycling measures.

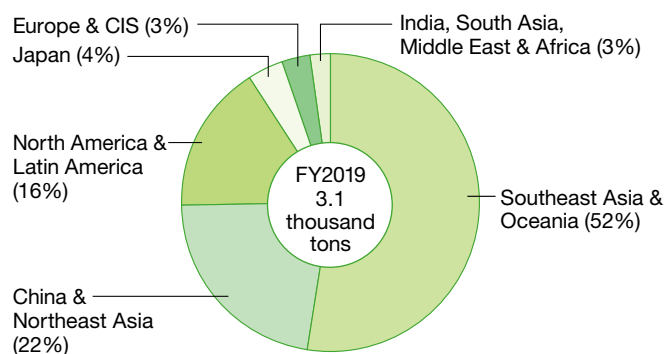
Amount and Recycling Rate of Total Wastes Including Revenue-generating Waste



Breakdown of Total Wastes Including Revenue-generating Waste (by region)



Breakdown of Landfill (by region)



Breakdown of Total Wastes Including Revenue-generating Waste for Fiscal 2019 (by category)

(1,000 tons)

Items	Total wastes	Recycled	Landfill
Metal scrap	144	143	0.6
Paper scrap	41	40	0.05
Plastics	44	40	0.6
Acids	32	22	0.1
Sludge	15	11	0.7
Wood	30	29	0.002
Glass/ceramics	6	6	0.05
Oil	26	24	0.08
Alkalis	21	19	0.03
Other *3	16	14	0.9
Total	374	348	3.1

*3 Combustion residue, fiber scraps, animal residue, rubber scraps, debris, ash particles, items treated for disposal, slag, infectious waste, polychlorinated biphenyls (PCBs), waste asbestos.

An example of factory waste reduction is also introduced in the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/resource/zero.html>

Global Initiatives for Used Product Recycling

For the purpose of efficient use of natural resources and prevention of environmental pollution, many countries around the world have been enacting recycling laws and developing their recycling systems. Examples include: the Law for Recycling of Specified Kinds of Home Appliances (Home Appliance Recycling Law) and the Act on the Promotion of Effective Utilization of Resources in Japan, the WEEE Directive in the European Union, and recycling laws in many states in the United States. In China as well, a similar recycling law has taken effect. In addition to complying with the Basel Convention which controls the transfer of hazardous waste to non-OECD countries as well as with related laws in respective countries, we strive to establish the most efficient recycling system in each country that is in line with its local recycling infrastructure, including the utilization of third parties.

Product recycling results in fiscal 2019 are as shown below. Because the collected products are becoming more compact and lighter due to the less volume of collection and recycling of CRT TVs and more flat screen TVs, and because the volume of collection and recycling has decreased due to reforms of business areas in various countries, the weight of collected products is on a flat or downward trend.

FY2019 Results

Japan	Processed approx. 165,160 tons of four kinds of used home appliances
Europe	Collected approx. 24,761 tons of used electronic products
USA	Collected approx. 275 tons of used electronic products

Product Recycling Initiatives in Japan

In response to the Home Appliance Recycling Law of 2001, which covers four specified kinds of home appliances, we established Ecology Net Co., Ltd. jointly with Toshiba Corporation to operate and manage a geographically dispersed recycling network through the effective use of existing recycling facilities nationwide. This recycling management company operates comprehensive recycling-related services on behalf of the “Group A” manufacturers (17 companies including Panasonic), and supervises 333 designated collection sites (shared by “Group A” and “Group B”) and 28 recycling facilities. Our recycling factories, Panasonic Eco Technology Center Co., Ltd. (PETEC), Panasonic Eco Technology Kanto Co., Ltd. (PETECK), and Chubu Eco Technology Co., Ltd. (CETEC)^{*1} conduct unique research to improve our processes for further efficient recycling of the four kinds of used home appliances^{*2} and for the recovery and supply of many resources. In fiscal 2019, we processed approx. 165,160 tons of the four specified used home appliances.

Amendment of the Home Appliance Recycling Law was considered in 2014 in order to make recycling fees clearer and lower, as well as to increase recycling rates.^{*3} This resulted in the revision of the statutory recycling rate^{*4} in April 2015.

Panasonic recycling factories are working to further enhance resource recycling by improving the productivity and recycling rates through efforts of applying different recycling methods appropriate to the characteristics and materials of respective products.

PETECK has developed and put into practical use a space-saving, low-cost compact crushing and sorting system, aiming to efficiently sort air conditioner heat exchangers into single materials. The system can crush heat exchangers in indoor and outdoor air conditioner units simultaneously as they are, and removes grease with centrifugal force generated by high-speed rotating blades on the crushing machine. Aluminum, copper, and iron are sorted by gravity and blower. Copper can be recovered at a high purity of 99%.



Compact crushing and sorting system for heat exchanger of air conditioner in PETECK

*1 PETECK and CETEC are joint ventures between Mitsubishi Materials Corporation and Panasonic.

*2 Air conditioners, TVs, refrigerators/freezers, and washing machines/clothes dryers.

*3 Recycling rate = Valuable resource weight/Total weight of used home appliances.

*4 The amended statutory recycling rates are at least: 80% for air conditioners, 55% for CRT TVs, 74% for LCD and plasma TVs, 70% for refrigerators and freezers, and 82% for washing machines and clothes dryers.

► Overview of Recycling of Specified Home Appliances (Japan)

<https://www.panasonic.com/global/corporate/sustainability/eco/resource/recovery/recycling.html>

► Panasonic Eco Technology Center Co., Ltd. (PETEC)

<https://panasonic.net/eco/petec/>

► PC Recycling

<https://www.panasonic.com/global/corporate/sustainability/eco/resource/recovery/pc.html>

Recycling Efforts in the Europe / CIS Region

In 2018, we collected approx. 24,761 tons^{*5} of used products covered by the WEEE Directive across Europe.

Circular Economy Package (Legislative review of Directives on Waste)

The EU Circular Economy Waste Package has entered into force on July 4, 2018 with new requirements on EPR (Extended Producer Responsibilities) for WEEE, Packaging and Batteries.

This Waste Package is the EU's approach towards "closing the loop" of product lifecycles through greater recycling and re-use measures. The provisions include setting ambitious recycling targets for waste recycling and measures on extended producer responsibility.

Panasonic is working through the industry association DIGITALEUROPE on proper implementation of the new requirements.

WEEE Open Scope

From August 15, 2018 onwards, the scope of the WEEE Directive was extended to include basically all kinds of electrical and electronic equipment (EEE).

In 2018, all EEE had to be re-classified within 6 WEEE categories from the initially established 10 WEEE categories.

Most national WEEE collection schemes provided new price lists as well as new declaration categories and subcategories for producers.

In response to this, Panasonic Europe thoroughly updated, with tremendous efforts, their European recycling information database with the newly applicable national categories in order to be able to generate declarations of EEE put on the market according to the new requirements.

The Russian Waste Law has been amended several times. The most recent amendments came into force in July, August, and October 2018. They define new declaration forms and declaration procedures. Producers and importers must manage waste from their product and packaging waste either through self-compliance or a collective organization, or pay an environmental fee. 14 members (including Panasonic) are registered as members of the collective organization EPR E-WASTE RECYCLING.

Panasonic is working on further developing appropriate regulations and on improving the recycling infrastructure in Russia through the industry association RATEK.

*5 Calculated by multiplying the weight of collected products per collection system by Panasonic market share in terms of weight per collection system.

Promoting Recycling Activities in North America

Panasonic continues its leadership role in establishing and operating a recycling system for waste batteries and consumer electronic products in North America. Following the startup of a state recycling law in Minnesota in July 2007, we established the Electronic Manufacturers Recycling Management Company, LLC (MRM), jointly with Toshiba Corporation and Sharp Corporation in September of the same year, and began recycling TVs, PCs, and other electronic equipment.

With collaborative ties to several recycling companies, MRM operates collection programs on behalf of 43 companies across 20 states and the District of Columbia. The cumulative total of collection by MRM has reached 1 billion lbs. (approximately 460 thousand tons) since its inception in 2007. With the changes in Panasonic's business strategies in the US in 2016, our remaining collection obligations are de-minimis, MRM will continue operating its collection programs on behalf of the manufacturers it serves.

As for waste batteries, we established Call2Recycle in 1994 jointly with other battery manufacturers, and now provide recycling programs for rechargeable batteries throughout the US and Canada. Call2Recycle provides collection programs and a robust retail collection network for over 300 companies, and collected approx. 52,278 tons of primary and

rechargeable batteries in the U.S. and Canada since the organization's inception. In terms of accessibility, 86% of US residents live within 10 miles of a Call2Recycle collection site.

Recycling end-of-life products in Canada started in 2004 with the Alberta Government Extended Producer Responsibility (EPR) Regulation. Since then a total of ten provinces and two territories have legislated WEEE, each with their own unique parameters and requirements. In an effort to harmonize these programs, Panasonic Canada takes an active role in the governance of the Electronic Product Recycling Association, a not-for-profit management organization which was established with the mandate to standardize operations and bring about economies of scale on a national basis through 3,400 collection sites. They are now responsible for managing all the provincial programs with the exception of Alberta and the two territories, as these three programs are under the direct jurisdictions of their governments and not industry. The currently active provincial EPR programs have proven to be very effective in diverting e-waste as reflected in last year's totals, where 115,890 tons in Canada were collected.

As the number of heavy CRT televisions entering the e-waste stream is on the decrease and the trend of light weighting of our products continues, it is therefore apparent that a new measurement/target must be agreed upon as weight collection alone is no longer a valid indicator of program performance.

In 2017, New Brunswick was the last province and the Yukon the last territory to launch their end-of-life recycling programs resulting in all of Canada regulating WEEE programs.

Initiatives in China

In China, through the Executive Committee of Foreign Investment Companies (ECFIC) and other organizations, we are engaged in activities to clarify the products covered by the Second Catalog (published in February 2015) of the Regulation for the Administration of the Recycling and Treatment of Waste Electrical and Electronic Products, which was published in May 2012 and enforced in July of the same year. In addition, we actively gather information and submit comments on setting unit-based rates for the covered products, toward early disclosure of information by Chinese governmental organizations such as the Ministry of Environmental Protection and the Ministry of Finance.

We are also carrying out an assessment of the development of the Plan on Promoting Extended Producer Responsibility promulgated by the government in January 2017 and reviewing our response.

International Collaboration in Southeast Asia and Oceania

Vietnam

Since the introduction of recycling law in Vietnam in July 2016, producers and importers are required to establish a take back scheme for their products sold in Vietnam. Panasonic Sales Vietnam has since set up 7 collection points in Hanoi, Ho Chi Minh, Haiphong, Thanhhoa, Nghean, Danang, and Cantho. In 2018, 32 tons of e-waste were collected and sent to licensed recyclers for proper treatment.

Australia

The National Television and Computer Recycling Scheme was established in Australia in 2011.

Panasonic Australia is a member of the MRI PSO, a co-regulatory arrangement approved by the Australian government to fulfill its obligation under the national scheme. Between July 2018 and June 2019, 1,161 tons of e-waste were recycled.

Other Southeast Asia countries

Regulators in Malaysia, Thailand, and Singapore are also gearing towards the global trend of mandating responsible end-of-life product recycling. Discussions with regulators and industry bodies are in progress. Such examples include Malaysia Department of Environment-Japan International Cooperation Agency (JICA) e-waste management mechanism development project and Thailand local industry association.

Through such engagements between the government and industry bodies, Panasonic hopes to contribute to the formulation of sustainable e-waste management policy in each country.

Recycling Efforts in India

In India, the new e-waste recycling law has been implemented by the Ministry of Environment, Forests and Climate Change (MoEFCC) from the 1st of October 2017, with Extended Producer Responsibility (EPR) targets based on end-of-

life (EoL) defined in the e-waste (Management) rules 2016. To fulfill the compliance, we will collect and recycle waste home appliances through the “I Recycle” program already established by Panasonic India (PI).

Panasonic has also been taking part in the Consumer Electronics and Appliances Manufacturers Association (CEAMA), which promotes an analysis of current recycling activities in India as well as a long-term plan for waste problem solutions.

We are having various dialogues with the Indian government, jointly with CEAMA, about the EPR target and EoL definition for recycling management.

We are also actively engaged in different active associations including the Federation of Indian Chambers of Commerce and Industry (FICCI) and Confederation of Indian Industry (CII) to establish an even more efficient and robust recycling system and to submit industry comments to the Indian government for a better governance system.

Recycling Initiatives in Latin America

In response to a growing trend in stricter environmental laws in Latin American countries, discussions on the establishment of recycling laws and actual enforcement are being conducted.

In Brazil, through industry groups, we are discussing the establishment of local recycling systems with the government, as well as actively participating in collection campaigns in major cities.

In Peru, under the recycling law that came into force in 2016, we joined a nonprofit organization Asociacion Peruana de Actores para la Gestion de Residuos (ASPAGER) as a leading member, and started a used-product recovery program.

In Mexico, a collection program is implemented under the government-approved recycling and management plan.

In Chile, the legislation process has also been accelerated and preparations for setting up a collection program are underway through continuous discussions with the government.

In Argentina, we are participating in the Latin American Battery Association (ALPIBA) and engaging in continuous discussions with the government for effective legislation on the regulation of dry cell batteries.

Approaches to Water Resource Conservation

It is said that available fresh water is only about 0.01% of the Earth's total water resources. In addition, the World Economic Forum, host of the Davos meetings, has stated in its annual report on global risks that the water crisis continues to be one of the top risks with global impact, in view of the increase in water consumption to be caused by future economic growth and population increases.

With water shortages becoming an increasingly grave social problem, Panasonic is working to conserve water resources both in its products and production activities, in order to fulfill its social responsibility and to reduce management risks. Our Environmental Policy (page 14) stipulates that we make efforts to conserve water resources by using water efficiently and preventing pollution. Under Green Plan 2018, our Environmental Action Plan for fiscal 2019, we are working to expand our range of products that contribute to saving and recycling water. At the same time, we have worked on reducing the volume of water we consume, while using more recycled water in our production processes to conserve water resources throughout our business activities. In risk management, we worked for our water risk assessment at all our production sites to be completed by fiscal 2019, and have completed 100% of the assessments.

Specifically, we evaluated the scale of water risk at all regions where our production sites are located, in order to identify and mitigate effects of water on our business activities. In the evaluation, we utilized evaluation tools such as Aqueduct supplied by the World Resources Institute (WRI) and the Water Risk Filter supplied by the World Wide Fund for Nature (WWF), which can evaluate risks in various aspects; not only from physical risks such as water shortages, but also from the risks in water-related regulations as well as reputation risks in each region. We also made use of public databases available from respective national governments. In areas with higher water risks, we collected information through public local information as well as through hearings with relevant organizations, etc. By conducting detailed analyses and close examination of the local information and the site data including water use volumes, we, more specifically, identified the effects on our business activities. We steadily proceeded processes of the water risk assessments, and in fiscal 2018, completed water risk assessments at all of our production sites. At present, no water risks that could affect our business activities have been reported. Yet, we will continue to make efforts to reduce water consumption in our production activities in the future under the water risk assessment that had been implemented.

In promoting these activities, we have built a structure to promote environmental management, including water management, (see pages 22-23) under the responsibility of the CQO (Uehara Hiroshi, as of August 2019), to proceed activities using PDCA cycle and upgrade the environmental management level.

In addition, we have established an Environmental Risk Management Structure to continuously reduce environmental risks, and (1) identify environmental risks and promote company-wide risk management every fiscal year and (2) promptly respond to occurrence of environmental risks (see page 25). Through these activities, we will continue to manage our environmental risks.

Moreover, we have participated in the Water Project, a public-private partnership project aimed at boosting awareness of water conservation, which was launched under the initiative of Japan's Ministry of the Environment in 2014. Objectives of the project are to maintain a sound water cycle and promote its recovery. The project distributes water-related activities conducted by corporations, and water-related information including importance of water. We will work in cooperation with the Japanese government and other companies to conserve water resources.

Water Resource Conservation through Products

By thoroughly analyzing the use of water through our products, we have developed functionalities that allow a considerable amount of water conservation by utilizing water at a maximum level through improvement of water flow control and cyclic use. In fiscal 2012, we enhanced one of the criteria, water conservation, in our Green Product accreditation criteria (see page 35), and has accelerated the development of industry-leading products that contribute to water saving.

▶ Example of water-saving products are introduced in the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/water.html>

Initiatives for Water Resource Conservation through Production Activities

By collecting and reusing wastewater from our manufacturing processes and air conditioning systems, we reduce the amount of water use and wastewater effluent. This reduces the impact of the intake and effluent of water in production activities on water resources. With many regions around the world threatened by water shortages, we focus on certain regions to address our use of water in our activities.

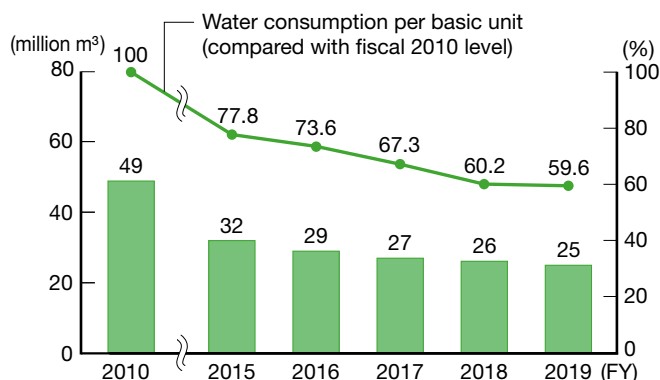
Water used at factories in fiscal 2019 resulted in 24.69 million m³, reduced by 4.4% compared to fiscal 2018. The water used at our factories per basic unit of production^{*1} improved year-on-year through impacts of structural reform, promotion of reuse, etc.

Our use of recycled water^{*2} in fiscal 2019 amounted to 5.17 million m³, accounting for 20.9% of our total water consumption. Discharged water in fiscal 2017, 2018, and 2019 resulted in 21.84 million m³, 20.47 million m³, and 19.25 million m³, respectively.

*1 Water used at factories per basic unit of production = Water used at factories / Production volume.

*2 The calculation excludes the water circulating for a single purpose (e.g. water in a cooling tower).

Water Consumption in Production Activities and Water Consumption Per Basic Unit



Note: Then-SANYO Electric and Panasonic Liquid Crystal Display not included in fiscal 2010.

FY2019 Breakdown of Water Consumption (by region)

(10,000 m³)

Region	Consumed	Consumed			Discharged	Discharged	
		Municipal water/ industrial water	Groundwater	Rivers/lakes		Sewer systems	Waterways
Japan	1,506	501	1,004	0	1,277	190	1,086
China & Northeast Asia	476	474	1	0	320	238	82
South East Asia, & Oceania	414	364	47	4	293	169	123
North America & Latin America	25	13	12	0	12	10	1
Europe & CIS	21	10	11	0	17	8	10
India, South Asia, Middle East & Africa	27	2	25	0	7	7	0
Total	2,469	1,365	1,100	4	1,925	623	1,303

In the Automotive & Industrial Solutions^{*3} Company under the Panasonic Group, water used at factories in fiscal 2019 resulted in 14.44 million m³, against a target of 16.01 million m³.

Panasonic Industrial Devices (Qingdao) Co., Ltd. is located in Qingdao, China, where water shortage is their concern. In the factory, water is used to treat hydrochloric gas produced during manufacturing processes of electrostatic capacitance-type touch panels. In order to take measures for increase in the amount of water to use because of product expansion, expansion, they introduced a system in which alkaline drainage water discharged in other processes. With the system, efficient neutralization of the treated alkaline water, i.e. acid water has become possible, which has contributed to reduction in the amount of used water. Panasonic continue our efforts to conserve water resources.



Panasonic Industrial Devices (Qingdao) Co., Ltd.

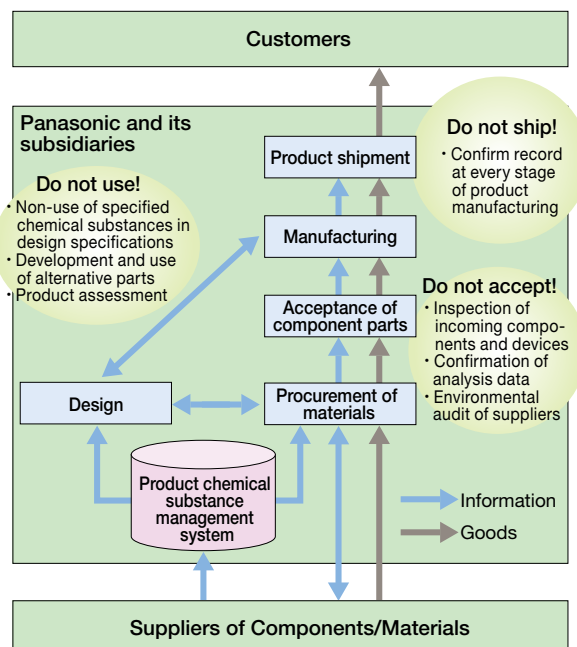
*3 Company name for fiscal 2019 is Automotive & Industrial Systems.

Approaches to Reduce the Environmental Impact of Chemical Substances

In order to prevent contents of hazardous substances prohibited under the EU RoHS Directive^{*1}, published in 2002 and revised in 2011, and the like to Panasonic products, it is important not only to pay attention to the contents at the stage of product design, but also to ensure that specified substances are not contained in products to purchase.

Therefore, Panasonic has rolled out the “Do not accept! Do not use! Do not ship!” campaign throughout the each production process from designing to shipment inspection in production activities at business sites across the world since October 2005. Specifically, as for the stage of inspection for incoming components, we have established a mechanism to check and analyze whether specified chemical substances are included by introducing an analyzer. In addition, we have supported to establish a Product Chemical Substances Management Structure, by periodically conducting environmental audits for suppliers of components/materials which may have high risks of containing specified chemical substances.

Specified chemical substance management system

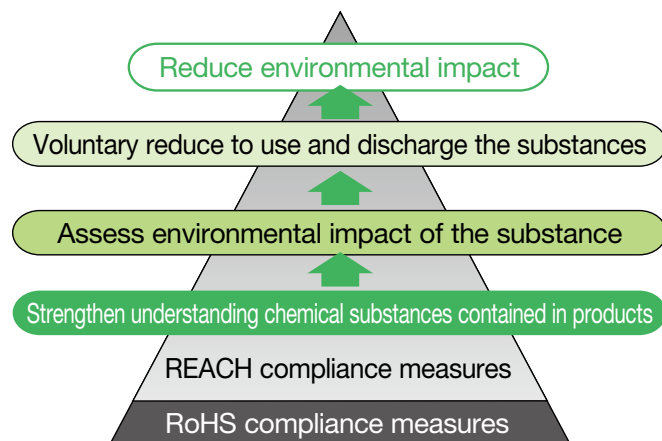


Meanwhile, as represented by the enforcement of the REACH regulation^{*2} in the European Union, the world is moving toward the goals agreed at the World Summit on Sustainable Development (WSSD) held in 2002, which is to produce and use all chemical substances in a manner that minimizes their impact on human health and the environment by 2020. In support of the precautionary approach proposed in the Rio Declaration made at the Earth Summit in 1992, Panasonic aims at manufacturing products in line with our basic policy of reducing the use of chemical substances that might adversely affect human health and the environment throughout their lifecycles. As for concrete activities, we have worked to comply with relevant regulations such as EU RoHS, as a matter of course. In addition, we have worked to reduce the environmental impact of our products by (1) identifying hazardous substances contained in our products, (2) evaluating these substances on their environmental impact, and (3) voluntarily reducing or discontinuing their use in case of any environmental risks.

*1 Directive on the Restriction of the use of certain Hazardous Substances in electrical and electric equipment

*2 Regulations on the registration, evaluation, authorization, and restriction of chemical substances.

Process to Reduce the Environmental Impact of Chemical Substances



To promote our initiatives clearly, we set forth our Chemical Substances Management Rank Guidelines, which prohibit or specify certain substances for management in terms of our products and factory activities. Companies in the Panasonic Group are requested to follow the Guidelines, and suppliers are also requested for support as necessary. In fiscal 2013, we added Level 3 to the Chemical Substances Management Rank Guidelines (For Products) to review the timing for the prohibition of further substances that may adversely affect humans and the environment, in addition to the current and forthcoming prohibitions.

Chemical Substances Management Rank Guidelines (For Products) and relevant documents, which prohibit or specify certain substances for management, can be downloaded from the website shown below (Green Procurement).

► Green Procurement (Download of Chemical Substances Management Rank Guidelines (For Products))

<https://www.panasonic.com/global/corporate/management/procurement/green.html>

Chemical Substances Management Rank Guidelines (For Products)

Rank		Definition
Prohibit	Level 1	(1) A substance contained in products that is prohibited by existing laws and regulations; or a substance where the upper limit of concentration is specified. (2) A substance that will be prohibited in products by laws and regulations or where the upper limit of concentration will be specified within one year of the revision of these Guidelines.
	Level 2	(1) Substances other than those specified as the Level 1 Prohibited Substances that will be prohibited in products after a certain period by a treaty, law, or regulation. (2) Substances that are prohibited in products by the Panasonic Group prior to the effective period specified by a treaty, law, or regulation. (3) Substances whose use is voluntarily restricted by the Panasonic Group.
	Level 3	Any substance other than those specified as a Level 1 or Level 2 Prohibited Substance that is reviewed for prohibition by legislation etc., and the clarification of substitution-related issues as well as the timing for prohibition is reviewed by the Panasonic Group in light of future legislation trends.
Manage		Substances whose consumption needs to be monitored and for which consideration needs to be given to human health, safety and hygiene, adequate treatment, etc. The intentional use of these substances is not restricted, but their use and contained concentration must be monitored.

Note: Covered legislation and chemical substances include: Class I Specified Chemical Substances under the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.; substances whose manufacture etc. is prohibited by Article 55 of the Industrial Safety and Health Act; EU RoHS Directive; and Annex XVII of the EU REACH Regulation. For more details, see the chapter on Specified Managed Substances in the Chemical Substances Management Rank Guidelines (For Products).

Chemical Substances Management Rank Guidelines (For Factories)

Rank	Definition
Prohibit	Use of the following substances should be immediately discontinued: Carcinogens for humans Ozone depleting substances Substances whose use is prohibited by Panasonic Chemical substances designated as Class I Specified Chemical Substances by the Japanese Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. Substances whose manufacture is prohibited by the Japanese Industrial Safety and Health Act Substances whose manufacture and use are prohibited by international treaties
Reduce	Substances whose use, release and transfer should be identified and reduced. Substances other than prohibited substances that might pose risks to human health and the environment.

Note: Covered legislation include: PRTR Act (chemical substances), environmental criteria under the Basic Environment Act; the Industrial Safety and Health Act; and the Stockholm Convention. For more details, see the contents on The Aim of Establishing the Chemical Substances Management Rank Guidelines (For Factories) in the Chemical Substances Management Rank Guidelines (For Factories).

History of Our Initiatives to Reduce the Environmental Impact of Chemical Substances

Social trends	1989: The Montreal Protocol entered into force	1992: Earth Summit in Rio de Janeiro— Agenda 21	1996: Discontinuance of the use of specified chlorofluorocarbons by industrialized countries	2002: WSSD in Johannesburg	2006: The RoHS Directive entered into force	2007: The REACH Regulation entered into force		
	1990	1995	2000	2005	2010	2015		
Panasonic								
All products		1992: Discontinued use of PVC resin in packaging materials		March 2003: Discontinued use of lead in solders globally* ³	October 2005: Discontinued use of six RoHS substances globally* ³	March 2009: Discontinued use of PVC in internal wiring of new products to be sold in Japan* ³	March 2011: Discontinued use of PVC in internal wiring of new products globally* ³	July 2018 Discontinue use of the four phthalates specified by the RoHS Directive in new products globally
Individual products	1991: Released mercury-free manganese dry cells	1992: Released mercury-free alkali dry cells	1995: Discontinued use of CFC refrigerant in refrigerators globally	2002: Discontinued use of HCFC refrigerant in air conditioners (Japan)	2004: Refrigerators in Japan market became fluorocarbon-free (Japan)	2006: Released lead-free plasma display panels	2010: Released fluorocarbon-free freezers using CO ₂ refrigerant and compatible display cases	2013: Released air conditioners using new refrigerant R32 with low Global Warmer Potential (GWP) (Japan)
Chemical substances used at factories			1996: Discontinued use of chlorinated organic solvents	1997: Began identification work for PRTR	1999: Launched the “33/50” reduction activity ⁴	2004 (Japan): Achieved Voluntary Action Plan Reduced use by 75% Reduced release and transfer amount by 62% compared to fiscal 1999 level	2010 (Global): Achieved Voluntary Action Plan Reduced release and transfer amount of key-reduction target substances by 46% compared to fiscal 2006 level	

*³ Excluding applications where the quality such as safety cannot be ensured, or applications where the material is designated by laws and regulations.

*⁴ A reduction activity that promotes cutbacks in the use, release, and transfer of chemical substances by 33% in three years and by 50% in six years, compared to the fiscal 1999 level.

Management of Chemical Substances in Products

To minimize the environmental impact of chemical substances contained in products, we endeavor to identify chemical substances used in the components and materials of our products. In addition, for substances that are prohibited in products in major developed countries because of laws and regulations such as the European RoHS Directive, we manage the substances not to be used and/or contained in our products by designating them as prohibited substances except the substance for specific usage which is unavoidable to use its substitution. We will also conduct environmental impact assessments for the managed substances contained in our products. As for a substance whose impact on human health and/or the environment cannot be ignored, we plan to reduce or prohibit use of the substance.

Keep understanding updated information concerning chemical substance contents

The electrical and electric products Panasonic manufactures and sells consist of various raw materials and components supplied through a long supply chain from material manufacturers to many component manufacturers. To contribute to the achievement of the global goals set at the WSSD, it is important for us to disclose and communicate information on the chemical substances used in our products across the supply chain, for which we must promote cross-industrial initiatives to establish and disseminate an effective system. Panasonic is a member of the Joint Article Management Promotion consortium (JAMP). Approx 440 major companies from various industries, such as chemical, component, and equipment manufacturers are also members of JAMP. We are proactively formulating, utilizing, and disseminating chemical substance management standards and systems through this organization.

We have started up a product chemical substance management system in fiscal 2005. From July, 2009, Panasonic’s 10,000 suppliers of materials and components provided us the data on chemical substances contained in their products, using JAMP’s data transmission formats (JAMP_AIS and JAP_MSDSplus).

Meanwhile, in Japan alone, the workload of upstream suppliers increased, as a number of hazardous substance inspections were carried out throughout the supply chain using own company format. Having recognized the issues obtained from the inspections, the Ministry of Economy Trade and Industry proposed a new scheme to introduce “chemSHERPA,” for sharing and exchanging information on chemicals contained in components and products. Because the format adopted for chemSHERPA complies with IEC62474, the international standard on material declaration for the electrical and electronic machinery industry and their products, we agreed to use chemSHERPA format, and in January 2018, started full-scale use of chemSHERPA as a data gathering format. With the supply chain expanding to a global scale, it is particularly important for overseas suppliers to deepen their understanding on the handling of hazardous chemical substances. Therefore, we carried out education programs for persons in charge of chemical substance management and suppliers at more than 100 of our business sites in ten countries including China and other Asian countries. At the same time, we completed conversion from JAMP format to chemSHERPA by June, 2018, when the JAMP format became unusable.

► chemSHERPA website: <https://chemsherpa.net/>

(The JAMP website was merged into chemSHERPA on March 15, 2019)

Companies that procure electronic components need to fully understand the information on the substances contained in the components at the point of selection or usage in order to comply with the EU RoHS Directives and REACH regulations. Particularly, as the REACH Substances of Very High Concern (SVHC) List is updated every six months, those companies expect their suppliers to speedily provide information on the latest substance to Panasonic. In order for the companies procure electric components to speedily and effectively understand information on chemical substance contents, we have published a table of RoHS and REACH compliance status on our website since November 2012. The table covers our RoHS Directive compliance information and the substances designated in the RoHS / REACH Confirmation Report for all our major generic electronic components.

▶ RoHS / REACH Confirmation Report for major generic electronic components

<https://industrial.panasonic.com/ww/downloads/rohs-reach>

For products covered by the Act on the Promotion of Effective Utilization of Resources of Japan, the Panasonic Group does not manufacture, import, or sell products that contain specified chemical substances which exceeds the limited value in non-exempt parts. For more details, see Information on the Content of specified chemical substances Chemical Substances in Covered Products below.

▶ Information on the Content of specified chemical substances Chemical Substances (Japanese)

<https://www.panasonic.com/jp/corporate/sustainability/eco/chemical/jmoss.html>

In June 2015, the Act on Preventing Environmental Pollution of Mercury was enacted to implement measures agreed in the Minamata Convention on Mercury. The act requires manufacturers of products containing mercury to provide information such as labelling so that such products are appropriately sorted and discharged when being disposed of. In order to communication information concerning the mercury used in our products to customers, we have established a new webpage, Information Based on the Act on the Preventing Environmental Pollution of Mercury, in May 2017.

▶ Act on Preventing Environmental Pollution of Mercury

https://members.wto.org/crattachments/2015/TBT/JPN/15_2560_00_e.pdf#search=%27Act+on+Preventing+Environmental+Pollution+of+Mercury%27

▶ Information Based on the Act on Preventing Environmental Pollution of Mercury (Japanese)

<https://www.panasonic.com/jp/corporate/sustainability/eco/chemical/jmoss/mercury.html>

Assessing the Impact of Chemical Substances

Scientifically identifying the impact on human health and the environment of products containing chemical substances is vital to the development of products with low environmental impact. We are engaging in activities designed to assess the levels to which customers are exposed to substances of very high concern (SVHC), as well as safety during product usage.

To date, we have assessed effects of ceramic fibers used in certain models of commercial microwave ovens. As part of our efforts to comply with the EU REACH regulation which requires preparing information for the safe use of products containing a certain amount of SVHC, we have created and publicized the safety assessment document. The exposure was considered to be nominal with little concern for any effects on human health. Furthermore, usage of ceramic fibers in our products was discontinued in December 2010.

▶ Management of Chemical Substances in Products

https://www.panasonic.com/global/corporate/sustainability/pdf/RCF_Professional_microwave_oven.pdf

Reduction in Used and Discharged Amount of Chemical Substances

Fluorocarbons used as a refrigerant for freezers and air conditioners, or heat insulator, have property which may damage ozone layer, and cause global warming. We developed the technology to utilize CO₂, which has much smaller impact than fluorocarbons, as a refrigerant and have been supplying a home boiler using CO₂ refrigerant since 2001. Although the CO₂ refrigerant is suitable for heating purposes, it was difficult to apply to refrigerators and freezers, especially in large professional equipment due to insufficient cooling efficiency and size. However, with support from the New Energy and Industrial



OCU-CR2001MV, a fluorocarbon-free freezer using CO₂ refrigerant



FPW-EV085, a display case compatible with a fluorocarbon-free freezer

Technology Development Organization (NEDO), we developed a refrigeration system using CO₂ refrigerant, and started supplying these fluorocarbon-free freezers and refrigerator display cases to supermarkets and convenience stores in Japan from 2010.

Making the best use of our expertise in the Japanese market, in August 2018 we also started sales of non-fluorocarbon freezers with a 10-horsepower capacity, in addition to our existing two-horsepower capacity products, and offered proposals designed for small stores and small warehouses in the European market, where stricter F-gas regulations and other environmental regulations are enacted. These products have appealed to small shops and warehouses. We have conducted installation trainings in countries such as France and Germany because that the freezers were sold mainly in North Europe in the first year. Thereby, we succeeded in spreading sales of the freezer to other countries. Sales doubled over the last fiscal year.

As for Asian and Oceanian markets, we are at the stage to determine whether we can place the freezer in full-scale to the markets in accordance with relevant environmental regulations and user's policy, continuing demonstration experience in Taiwan, Malaysia, and Indonesia to determine the possibility of full-scale implementation in compliance with environmental regulations and user policies.

In addition, as measures against ozone depletion caused by HCFCs, a refrigerant called R410 that does not deplete the ozone layer was used in room air conditioners; however, this substance has an issue of its very high very high Global Warming Potential (GWP). Therefore, Panasonic developed a model that uses a new refrigerant R32, which has a lower GWP and introduced it launched sales of the model in 2013. Furthermore, PT. Panasonic Manufacturing Indonesia, which owns the factory for manufacturing room air conditioners in Indonesia, redesigned its production facility that used an ozone-depleting HCFC refrigerant R22 to one using R32 in fiscal 2015, and started supplying new R32-based air conditioners. Thereby, Panasonic contributed to the Indonesian government's initiative to eliminate the use of HCFCs.

Mercury lamps are currently widely used as the light source for projectors, because they provide high luminosity easily. However, mercury can have a serious impact on human health and the environment if not treated properly, and the short life of the lamps causes high consumption of resources as well as high environmental impact. For these reasons, Panasonic is developing products that adopt laser light sources. The PT-RZ31K Series are projectors for professional use that provide high luminosity by employing a high-output semiconductor laser light source module and a heat-resistant phosphor wheel. In addition, the cabinet does not use halogenated flame retardant, making the projector an eco-friendly product that contributes to reducing the use of hazardous substances.



Example of two 10-horsepower freezer and one two-horsepower freezer at Carrefour Express (small stores)



PT-RZ31K Series, a laser projector for professional use

Restriction on Use of PVC Resin

Polyvinyl chloride (PVC) is a material of concerns to the generation of hazardous substances from inappropriate disposal, as well as the harmful effects of certain additive agents (phthalates) used to render PVC more pliable. In light of the significant potential for inappropriate disposal of the PVC resin used in the internal wiring of products, due mainly to difficulties associated with the sorting of this resin from used products, we have switched our new products launched from April 2011 to non-PVC.

▶ List of Our PVC-free Products https://www.panasonic.com/jp/corporate/sustainability/pdf/eco_pvclist2016.pdf

Restriction on Use of Phthalates

Phthalates are often used in PVC products, and the use of four phthalates⁵ will be restricted under the EU RoHS2 from July 22, 2019.

Panasonic classified these substances as Level 1 Prohibited Substances in our Chemical Substances Management Rank Guidelines Ver. 11 (for products) issued in July 2018, and delivery of materials and components contain the phthalates will be prohibited from July 22, 2019. We have classified other phthalates as Level 3 Prohibited Substances, and are promoting their substitution.

We are currently working on creating an analysis and management structure for the four phthalates to ensure their substitution. Since phthalates have a migration characteristic (where a substance from another article migrates through contact), materials may be contaminated by migration from production facilities as well as process equipment containing the four phthalates, which are specified as Level 1 Prohibited Substances. Accordingly, we are also discussing introducing preventive measures against contamination through contact.

To build a structure for incoming inspection for phthalate, we amended the standard for incoming inspection and determined to conduct incoming inspections on supplied components with a high chance of containing phthalates, such as PVCs, elastomers and glues. We have already selected and assessed an analyzer for phthalates to use for these inspections, and installed the analyzer at our business division. The phthalates contained in our products exported to Europe used to be as high as 10 tons. However, total elimination of the phthalates has been completed as of March 31, 2019.

*5 Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP).

Activities to Reduce Negative Environmental Impact at Factories

Panasonic is working to minimize environmental impact by identifying the hazardous substances used in our products, assessing the impact of such use, and voluntarily discontinuing the use or reducing the release of such substances. Since 1999, we have been conducting the 33/50 Reduction Activity to materialize reduction by 33% in three years and by 50% in six years. In Japan, we started promoting reduction of amounts to use, release, and transfer specified chemical substances at our factories in fiscal 2000. Against the target in our voluntary action plan, a reduction by 50% from the fiscal 1999 level, we achieved a 75% reduction in the chemical substance use and a 62% reduction in the release and transfer in fiscal 2005. Since then we have been continuing the activity, focusing on substances with particularly large amounts of release and transfer, setting a voluntary action target of reduction by 30% compared to the fiscal 2006 level. As a result, we achieved a 46% reduction in the amounts of release and transfer of specified key reduction-target substances across all factories worldwide in fiscal 2011.

Reflecting international trends in chemical substance management, our reduction measures have focused increasingly on particularly hazardous substances from fiscal 2011. Our Chemical Substances Management Rank Guidelines (for Factories) was established in 1999 as a guideline to help manage the above chemical substance reduction activities. In Version 1, the guidelines specified a list of chemical substances to be managed, mainly focusing on carcinogenic substances. The guidelines were later updated to Version 2 in 2000 to include rules concerning the Japan PRTR Law. Version 3, introduced in 2004, additionally covered a list of substances specified by chemical substances management legislation in Japan. The chemical substances covered by Version 4 and later from 2009 are those specified in legislation on human health and environmental impact in Japan, the U.S., and Europe, as well as those specified under international treaties.

Under our Chemical Substances Management Rank Guidelines (For Factories), we have focused our management on select chemical substances that are hazardous to human health and the environment. Further, we have created a unique indicator, the Human Environment Impact,^{*6} which is used globally in all our factories. Conventionally the chemical substances were managed by “quantity,” such as usage amount or emissions/release. However, such quantity-based management has a problem in that some highly hazardous substances do not become subject to reduction or management if the usage amount was small, and therefore would fall out of the scope of impact assessments. In addition, the toxicity criteria varied according to substance types and regional legislation, which made standardized management across the Group difficult. To address this issue, Panasonic worked together with experts from both within and outside the company, reclassified chemical substances based on an overall assessment of their hazardousness, and specified a hazardousness factor for each classification. Specifically, we set a hazard classification to each substance by utilizing carcinogen risk assessments issued by international organizations, together with publically available hazard information and lists of ozone depleting substances. For substances that have multiple hazard information items, the item ranked with the highest hazard risk is used for classification. We utilize this internal indicator as the Human Environmental Impact indicator to promote efforts to ensure reduction of highly hazardous substances with greater environmental impacts, such as carcinogens and ozone depleting substances, according to the risk level. The Panasonic Group Chemical Substances Management Rank Guidelines is also available on the website on our Green Procurement activities to promote collaboration with our suppliers, encouraging them to offer materials that do not contain hazardous substances.

▶ Green Procurement (PDF Download of Chemical Substances Management Rank Guidelines (For Factories))
<https://www.panasonic.com/global/corporate/management/procurement/green.html>

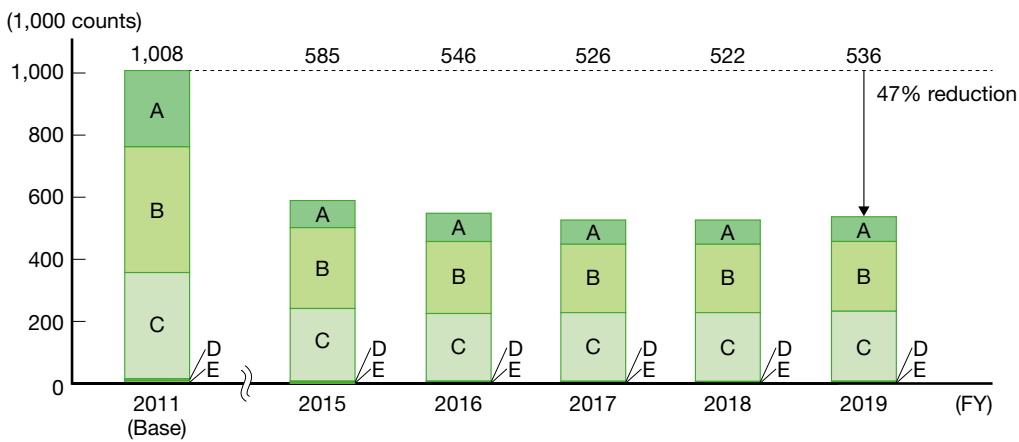
*6 Human Environmental Impact = Hazardousness factor x Release and transfer amount.

Classification of Hazards

Classification	Hazards*7	Hazardousness factor
A	Carcinogenicity/Ozone layer depletion	x 10,000
B	Serious or direct impact	x 1,000
C	Medium impact	x 100
D	Small or indirect impact	x 10
E	Minor impact or not assessed	x 1

*7 In addition to carcinogenicity, hazards to human health include genetic mutation, reproductive toxicity, and acute toxicity. In addition to ozone depleting substances, hazards to/substances with impact on the environment include ecological toxicity, substances that impact global warming, and substances that generate photochemical oxidants.

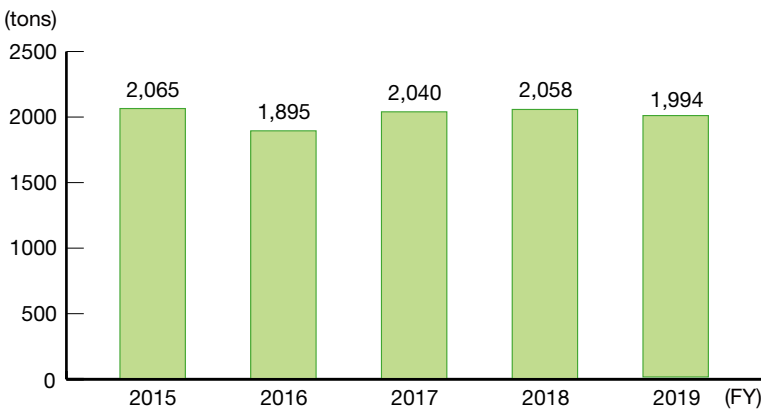
Human Environmental Impact



Note: Overseas sites of former SANYO Electric not included in fiscal 2011.

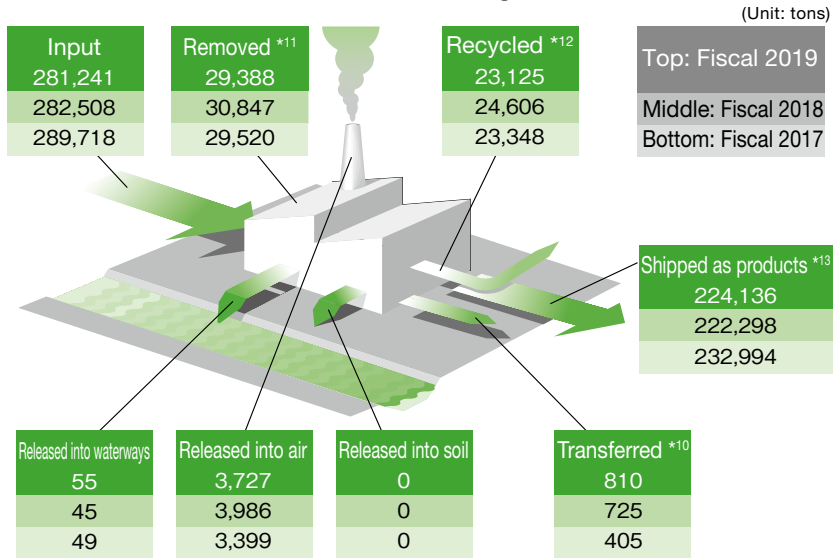
In fiscal 2019, we were able to reduce Human Environmental Impact by 48% compared to fiscal 2011 by substituting highly hazardous substances in paints, improving yields, promoting recycling, introducing substances with low-solvents and hazards, and improving processes, including reviewing the amount of paint or the number of washing cycles, as well as improving the efficiency of removal/deodorization equipment. We will continue our initiatives to minimize the amount of substances with environmental impact released through our production activities.

VOC*8 Emissions



*8 Emissions of Volatile Organic Compounds (VOC) into the air caused by use. The calculation covers 100 major VOC substances that Panasonic selected from those listed in the Air Pollution Control Act.

Material Balance of Substances in the Management Rank*9



*9 Based on the Chemical Substances Management Rank Guidelines (for factories). Includes all the substances specified in the Pollutant Release and Transfer Register Act.

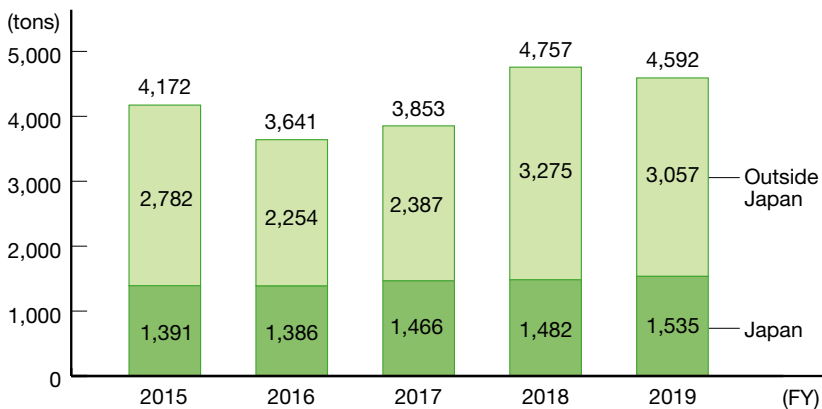
*10 Includes substances transferred as waste, as well as those discharged into the sewage system. Recycled amount which is free of charge or accompanies treatment cost under the Waste Management Law is included in "Recycled." (Different from the transferred amount reported under the PRTR Law.)

*11 The amount of substances converted into other substances through neutralization, decomposition, or other chemical treatment.

*12 The amount of substances recycled with revenue, as well as those recycled free of charge or with any payment.

*13 The amount of substances that have been changed to other substances as a result of chemical reactions, and/or those that are contained in or accompanied with products and shipped out of factories.

Release/Transfer of Substances Requiring Management



Approaches to Biodiversity

Business management and human life in our society is founded on the ecosystem services—a multitude of nature’s blessings provided by our natural capital, including soil, air, water, and animals and plants. It is important to preserve biodiversity to continuously receive blessings from this natural capital towards the future; however, this biodiversity has been declining at an unprecedented speed and scale.

Contributions by private companies to the Aichi Biodiversity Targets adopted by the 10th Conference of the Parties (COP 10) and to the United Nations Sustainable Development Goals (SDGs) have also been required. In the Sharm El-Sheikh Declaration of COP 14, held in November 2018, “Mainstreaming of biodiversity in the energy and mining, infrastructure, manufacturing and processing sectors industries” was adopted. Aiming to properly understand effects of our business activities on biodiversity, and to contribute to its conservation, we have promoted the activities, collaborating with local governments, environmental conservation NGOs, and relevant professional institutions. Concretely, we have focused on the three key areas of land use, procurement, and products, in order to promote biodiversity conservation activities incorporated into our businesses. In promoting the key areas, we formulate a biodiversity action plan (BAP), which is the basic concept of Article 6 of the Convention on Biological Diversity, and implement measures, check the achievement progress, and improve the initiatives accordingly.

Activities for Land Use

Green areas in our business divisions have a lot of potential to contribute to conserving biodiversity in that area. In particular, hardly any natural environments where wild animals can live and breed remain in urban areas. Therefore, even small areas of green in corporate premises can become a precious habitats of a variety of living things if they have indigenous vegetation and a watery environment.

Preservation of Biotopes in Collaboration with Governments and Experts

Once an ecological network that connects greenery in our business divisions, neighboring woodlands and parks is formed, living things such as birds, butterflies, and dragons in each area can move around wider areas for flowers and water through the ecological networks, and their habitats are expanded. In addition, the Ministry of the Environment and municipalities designate rare species of living things in local areas as endangers species for their preserving. Therefore, we have conducted preservation activities, in collaboration with environmental officers and experts. For example, 1) Biotope of Panasonic Life Solution Company in Kadoma City, through a Biodiversity Partnership (BP) Agreement concluded with Osaka prefectural government, Osaka Prefecture University, and Research Institute of Environment, Agriculture Fisheries (RIEGF) under Osaka prefectural government, and 2) “Tsunagari no Hiroba (i.e. Place for green networking)” of Panasonic Homes Co., Ltd, Headquarters, through a BP concluded with Osaka prefectural government, Toyonaka city government, Osaka Prefecture University, and RIEGF, Osaka prefecture by participating a project to build “Kazeno michi (Wind street with greens)”.

Examples of activities are introduced in the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/biodiversity.html>

Acquisition of External Certification Based on Quantitative Evaluation

The Kusatsu Factory of the Panasonic Appliances Company in Kusatsu City, Shiga Prefecture, obtained a certificate from the Association for Business Innovation in harmony with Nature and Community (ABINC) in March 2018 for its contribution to biodiversity. In the course of assessment, we received high ratings concerning how we are building greenery to suit diverse living creatures by appropriately preserving the natural environment, keeping invasive alien species under control and regularly monitor them to track their status, and the proactive use of greenery in liaison with external organizations and local people, such as the local public bodies and primary school students. In the monitoring survey we have conducted since 2011, 840 species of living things were recognized. At the same time, the survey result



Sustainable Forest
Biodiversity Report II of
Panasonic Appliances Company



Three-star rating in Shiga
Biodiversity Action
Certification Program

<https://panasonic.co.jp/ap/ecological/index.html>

indicated that our greenery is an important biotope in the urbanizing area, which contributes to the formation of local ecological networks. We won recognition for our activities, earning the top three-star rating in Shiga Prefecture’s fiscal 2018 Shiga Biodiversity Action Certification Program.^{*2}

*1 ABINC is a certification system by third-party evaluation on greenery improvement and management at business divisions based on the land use score (biodiversity quantitative assessment tool in environmental assessment) and Guidelines for Sustainable Business Sites developed by the Japan Business Initiative for Biodiversity (JBIB).

*2 Shiga Biodiversity Action Certification Program is the first system in Japan for rating wide range of activities conducted by business enterprises in the area of biodiversity conservation with 1 to 3 stars granted by governor.

The Matsumoto Factory of the Automotive & Industrial Systems Company^{*3} obtained rank A in the JHEP Certification^{*4} in September 2015. The certification is updated annually through assessment and our biodiversity preservation activities for greening are maintained continuously.

*3 The company name: Automotive & Industrial Systems when it received the certification

*4 A quantitative biodiversity assessment method developed by Ecosystem Conservation Society Japan based on the Japan Habitat Evaluation and Certification Program (HEP) used for environmental assessments.



Panasonic Appliances Company's Sustainable Forest

Efforts in Procurement

With the aim of biodiversity conservation and sustainable use of natural resources, we consulted extensively with World Wide Fund for Nature (WWF) Japan and formulated Panasonic Group Green Procurement Guidelines for Wood.

Exclusion of timbers and wood materials whose regulatory compliance in their logging has not been confirmed (Category 3)

In fiscal 2019, the total procurement of timber and wood materials was measured at approx. 350,000 m³. By category, this breaks down to 79.3% meeting Category 1 “Priority” procurement standards (a 2.0+point year-on-year decrease), 20.7% in Category 2 “Acceptable” (a 2.0-point year-on-year increase), and 0% in Category 3 “Avoiding” (same as previous year). Ever since the establishment of our Green Procurement Guideline, we have worked on to achieve zero procurement for Category 3, and have achieved zero procurement for the Category 3 continually since fiscal 2015. We will continue our efforts and maintain zero procurement for Category 3.

Green Procurement Guidelines for Wood Consulted and Formulated with WWF



At the end of every fiscal year, we confirm the progress status at the end of the fiscal year as well as review the measures for the subsequent fiscal year.

► Green Procurement Guidelines for Wood

https://www.panasonic.com/jp/corporate/management/procurement/green/pdf/green_wood_E.pdf

We are also engaged in the reduction of the use of natural raw materials, in terms of timber resource conservation. In Fit Floor Natural Wood Type (heat resistant and non-heat resistant) which is used as flooring materials (woody flooring materials), our unique newly developed materials where 100% recycled wood materials (excluding adhesives), called “Fit Board”, is used.

► Compliance with the Clean Wood Law (Japanese)

<https://www2.panasonic.biz/es/sumai/law/cleanwood/>



Fit Board
Cross section of a Fit Floor (heat resistant & non-heat resistant)

Activities in Products

In collaboration with Bird Life International, an international NGO, we have established a third-party assessment method in order to provide customer with information on product contributions to biodiversity. Using this method, we have assessed products which are closely linked to biodiversity. In addition, with our Green Product accreditation criteria (see page 35), we defined products that contribute to biodiversity conservation as those that use biodiversity-friendly materials in their major components and those that include functions to help biodiversity conservation.

In fiscal 2014, Panasonic Environmental Systems & Engineering Co., Ltd. developed ATPS-BLUEsys, a Ballast Water Management System (BWMS) to mitigate effects of transit of vessels in the surrounding sea area on marine ecosystem. Ballast water is sea water held in tanks in a vessel to increase its stability and maneuverability during transit when the vessel does not hold cargos. As the ballast water held in the ballast tank is different from the water of its discharging country's sea area because of transit of the vessel, effects of harmful foreign aquatic creatures such as plankton and bacteria, on the local ecosystem, environment, and resources has been big issues. ATPS-BLUEsys enables to treat microorganisms in the water with the first inline electrolysis method developed in Japan without using filters to a level lower than the standards by the International Maritime Organization (IMO). The company acquired the IMO G9 Basic Approval (G9BA) for the system. Marketing of this system has been fully launched in fiscal 2018, as the company acquired a certification equivalent to the IMO approval for the system from Japan's Ministry of Land, Infrastructure, Transport and Tourism in March 2017. Furthermore, the company has conducted tests to comply with the U.S. regulation.

▶ Ballast Water Management System ATPS-BLUEsys

<https://www2.panasonic.biz/ls/air/eng/water/atps-blue/>

▶ [Press Release] Ballast Water Management System was certified by MLITT as equivalent to the IMO approval.

<https://news.panasonic.com/global/press/data/2014/01/en140128-2/en140128-2.html>

In addition, Panasonic has developed Sustainable Smart Towns (SSTs) in Fujisawa City and Yokohama City in Kanagawa Prefecture. We are currently planning to develop another SST in Suita City in Osaka Prefecture. The SST urban design guidelines adopt the idea of biodiversity for greening towns as well as plans for reducing greenhouse gas emission, in order to establish sustainable towns by growing indigenous trees and plants and forming ecological networks that coexist in communities. Based on the SST guidelines, we have completely eradicated invasive foreign species in landscaping (planted zone) at the Fujisawa SST, and "Sora shima (literally Sky Island)", the largest SST in western Japan.

Biodiversity Conservation Through Collaboration with and Support to NGOs and NPOs

Panasonic participates in Keidanren Committee on Nature Conservation, aiming to promote activities for biodiversity collaborating with industrial sectors, as well as activities for biodiversity conservation on a global scale through NGOs and NPOs.

Through corporate and private donations to the Keidanren Nature Conservation Fund, including donations from Panasonic, Keidanren Committee on Nature Conservation provided support worth approx. ¥4.3 billion to 1,490 NGO projects in Japan and overseas in cumulative total till fiscal 2019.

In fiscal 2019, we visited the site where environmental education is provided to children in the Independent State of Samoa. The site is run by Conservation International collaborating with a local NGO and residents, under the fund. At the site, we confirmed that the learning of children on various environmental issues particularly linked to island countries, such as effects of climate change, conservation of coral reefs, and issues of oceanic plastics as well as wastes generated from household in the island is disseminated to members of their family and community.

Panasonic has also been involved in marine protection activities⁵ for some 20 years through collaboration with WWF Japan.

Main activity at the present is continual supply of MSC- and ASC-certified⁶ sustainable seafood⁷ to employee canteens that started for the first time in Japan from at Panasonic headquarters in March 2018. The six catering companies who



Samoa children learning about the environment

support our activity acquired CoC certification.^{*7} Three other companies who have collaborated for this activity with Panasonic also adopted sustainable seafood in their canteen. The number of sites where sustainable seafood is introduced in Panasonic canteen was increased to 12 sites. We aim to introduce sustainable seafood to canteens at new 30 sites in fiscal 2020, and to all Panasonic canteens in Japan in fiscal 2021. Through a supply of sustainable seafood at employee canteens, we promote to change consumption behaviors of our employees who are consumers, in order to mainstream biodiversity and contribute to SDG 14, “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”. Panasonic was highly evaluated with aforementioned activities, and won the excellent award in “Select” section in the Biodiversity Action Award held by Japan Committee for UNDB.



Sustainable seafood menu at the employee canteens



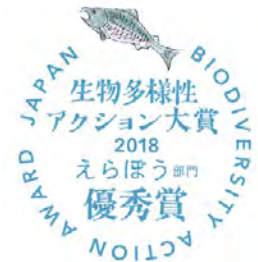
Fried oysters grew in Tokura, Sanriku region, granted the 1st ASC certification in Japan with Panasonic support

*5 Including supports for the conservation of the tidal flats in Ariake Sea (2001 to 2006) and the Yellow Sea Ecoregion (2007 to 2015).

*6 MSC certification is certified by Marine Stewardship Council for sustainably and properly managed fisheries. ASC certification is certified by Aquaculture Stewardship Council for responsible fish farming to minimize environmental load on the environment and society.

*7 Seafood that has been certified sustainable production with MSC and ASC certification and managed under CoC certification

*8 CoC is the acronym for Chain of Custody. Certification on securing management and traceability in processing, distribution, and marketing.



“Sustainable seafood” received an excellent award in “Select” section, of the Biodiversity Action Award

Participation in the Japan Business Initiative for Biodiversity

Panasonic has worked hard to try to understand global trends in biodiversity and potential risks, and has provided their feedbacks to own businesses, through participating Japan Business Initiative for Biodiversity (JBIB).

In fiscal 2019, we held a symposium on ocean plastic wastes was organized in EcoPro 2018. We also produced a 1st booklet by companies for member companies, titled “Let’s Try Biodiversity!”, through participating in the Biodiversity Working Group of four Electrical and Electronic Industry Association^{*9}. With the booklet, we conducted three study sessions. The working group of the four Electrical and Electronic Industry Association reported on the activities in the business forum at the COP 14 meeting and other venues, which appealed the biodiversity activities conducted by Japanese companies to overseas. These activities by the four Electrical and Electronic Industry Association were highly evaluated. As a result, the four Electrical and Electronic Industry Association won an excellent award in “Communicate” section, of the Biodiversity Action Award 2018 held by the Japan Committee for UNDB.



“Let’s Try Biodiversity!”



“Let’s try Biodiversity”, collaboration of the four EEIA won an excellent award in “Communicate” section, of the Biodiversity Action Award

*9 Four industry associations of: The Japan Electrical Manufacturers’ Association (JEMA), Japan Electronics and Information Technology Industries Association (JEITA), Communications and Information Network Association of Japan (CIAJ), and Japan Business Machine and Information System Industries Association (JBMIA).

Restoration of Satoyama*¹⁰ in Coordination with Citizens Groups

Panasonic have conducted various activities for environmental conservation through the Panasonic ECO RELAY JAPAN (PERJ) together with our domestic business sites, labor union, and retiree group.

Unitopia Sasayama Satoyama Restoration led by PERJ is an activity , aiming at circular use of Satoyama resources by reproducing the Satoyama conditions as they used to be, in the 26.4 ha of premises in the Unitopia Sasayama Resort owned by the Panasonic Group Workers Unions Association. In 2017, this activity was certified as a partner project of the Japan Committee for the United Nations Decade on Biodiversity in recognition of our unique activities such as utilizing a private company’s resort facility as a trial field for biodiversity conservation and environmental education, as well as organizing nature conservation activities and related educational programs in collaboration with various stakeholders including local authorities, corporations, universities, NPOs and local farmers. The ongoing project was also awarded the Biodiversity Action Award 2018.



“Unitopia Sasayama Satoyama Restoration” won the Biodiversity Action Award

*10 Satoyama is a Japanese traditional living area with rich nature that has been utilized by people, and where multiple organisms exist

▶ Panasonic ECO RELAY Japan (Japanese)

<https://www.panasonic.com/jp/corporate/sustainability/citizenship/environment/perj.html>

▶ Unitopia Sasayama Satoyama Revitalization Project (Japanese)

<https://unitopia-sasayama.pgu.or.jp/ecorelay/>

Collaboration with Suppliers and Transportation Partners

As a company backed by a number of suppliers, we must consider the environmental impacts of our entire supply chain, and not just of our own operations. Through our coordination efforts with suppliers and transportation partners, who form an integral part of our business operations, we strive to minimize our environmental impact across the entire supply chain, focusing on the reduction of CO₂ emissions, resource recycling, chemical substance management, and biodiversity conservation.

Activities for Green Procurement

Since the publication of the Green Procurement Standards in 1999, we have been promoting the manufacture of eco-conscious products in partnership with our suppliers. Furthermore, in the Green Procurement Standards, we set out the establishment of a group of suppliers who support our Environmental Policy in supplying products and goods in order to materialize the targets in supplier collaboration in our Green Plan 2018. In addition to cooperation in “reducing environmental impact in supplier business operations” and “sharing achievements through collaboration,” we are asking our suppliers to “seek the cooperation of upstream business partners” to expand the scope of activities of reducing environmental impact throughout the entire supply chain.

Also, based on the Green Procurement Standards, we have been conducting the Green Procurement Survey, where we monitor the implementation status of our suppliers regarding our requests, to promote environmental impact reduction activities more effectively with our suppliers. In fiscal 2013, we conducted a trial survey targeted at our major global suppliers. We received responses from 415 companies, and were able to confirm the level of activity in areas such as environmental management system development, thorough implementation of chemical substance management, reduction of greenhouse gas emissions, promotion of resource recycling, and biodiversity conservation. From fiscal 2014, we have replaced surveys conducted on a group-wide scale with surveys at a site level as a means of communication with our suppliers.

In China, seminars on our CSR Procurement Policy and Chinese environmental regulations were held in September 2016 for more than 400 suppliers in Guangzhou, Dalian, and Shanghai. By calling for exhaustive implementation of CSR through the supply chain by using the CSR self-assessment checklist as well as sharing China’s latest environmental regulations, we are making efforts to grasp the risks and reduce environmental impacts across the supply chain. In fiscal 2018, self inspection using the CSR self-assessment checklists was expanded to other Asian countries besides China to gain a wider understanding of environmental impact from our business activities.

In response to the enhancement of regulations such as EU RoHS Directive, we have been engaging in continual environmental quality assurance audits of our suppliers since 2005 to improve the management level throughout the entire supply chain. In fiscal 2019, we assessed the environmental quality assurance systems of some 1,200 suppliers and have supported their efforts to upgrade their management levels.

► Green Procurement Standards

<https://www.panasonic.com/global/corporate/management/procurement/green.html>

Estimation of Environmental Impacts in Business Activities by Suppliers

In order to assess greenhouse gas (GHG) emissions across the entire supply chain (scope 3^{*1}), we made our original calculations based on the Greenhouse Gas Protocol, the international accounting standard for GHG emissions. Since fiscal 2012 we have conducted assessment surveys on four occasions, with the cooperation of 185 suppliers in the areas of raw materials, electrical and electronic components, and processed parts.

From fiscal 2012, we started estimating our overall GHG emissions in the upstream range by multiplying the volume of materials purchased with the resource-specific GHG emissions per basic unit based on the Input-Output Table published by the Japanese government. The estimation results based on fiscal 2018 data is 13.95 million tons, roughly 6 times the GHG emissions of our own production activities.

*1 Other indirect emissions, excluding Scope 1 (direct emissions from facilities owned and controlled by Panasonic) and Scope 2 (emissions from production of energy consumed at facilities owned and controlled by Panasonic).

Sharing Achievements through Collaboration

Since fiscal 2010, we have been implementing the ECO-VC^{*2} Activity with our suppliers. This program is a collaboration between Panasonic and our suppliers, aimed to both reduce environmental impact as well as reinforce product capability and achieve further rationalization for our products and our suppliers. In fiscal 2010, the target for reducing environmental impact was limited to energy saving (CO₂ emission reduction). However, this was extended in fiscal 2011 to Recycling-oriented Manufacturing aiming at saving resources and using recycled materials. The geographical range of our activities has also extended. Initially centered in Japan, actions accelerated to China and other parts of Asia in fiscal 2013, and later extended to a global scale in fiscal 2015.

Case examples of ECO-VC activities are stored and accumulated in a database for effective use within the Panasonic Group. We have shared these progressive case examples of the activities with suppliers for their references, so that they can make the best use of them in their activities, through awarding outstanding case examples in the ECO VC Presentation of Award and Information Exchange Meeting, and have exhibited the examples at the meeting venue.

In Panasonic's centennial year, fiscal 2019, the number of entries for achieved activities drastically increased to 820 from 354 in fiscal 2018, with a large number of proposals submitted on the main theme of "Creating New Values."

*2 VC: Value Creation

Environmental Achievements Made through Proposals

Items	FY2016	FY2017	FY2018	FY2019
Number of proposals	933	622	354	820
CO ₂ reductions derived from proposals	484,532 tons	253,265 tons	58,448 tons	30,499 tons
Use of recycled resources derived from proposals	19,153 tons	18,421 tons	2,671 tons	80 tons
Reduction in resources used derived from proposals	21,243 tons	20,224 tons	1,090 tons	3,027 tons

Collaboration with Environmental NGOs

In fiscal 2016, Panasonic started asking our suppliers (approx. 7,000 in number) in China, where a large number of its production sites are located, to fill in and submit CSR self-check lists. At the end of fiscal 2019, we completed collecting the list from all existing suppliers. Additionally, we began an on-site CSR and environment check of key suppliers (approx. 20 companies), collecting their CSR self-check lists at the same time.

In face of rising social pressure in China for suppliers to take necessary actions for environmental issues, guidance for suppliers has become an important issue from points of CSR. For this reason, we have conducted CSR and environmental inspections in China in the form of audits not only for CSR compliance but with great attention to the environmental activities of the suppliers. Through the CSR and environmental inspections, we have asked them to improve the condition, if necessary, and also have conducted follow-up inspections.

At the same time, we are engaged in environmental improvement for suppliers through communication with the Chinese environmental NGO, Institute of Public and Environmental Affairs (IPE). In the Green Supply Chain ranking of suppliers to major business corporations (CITI Index) published since fiscal 2015 by the Institute of Public and Environmental Affairs (IPE), Panasonic has been rated in high ranks every year. In fiscal 2019, Panasonic was ranked as the fourth in the IT industry (one place higher than previous year) and the 1st in overall ranking in Japanese companies.

Encouraging All Employees to Become Practitioners of Environmental Activities

We believe that the development of human resources is important in laying the foundations and promoting environmental sustainability management. To put this into action, a training curriculum is in place for each specialty and position. General Programs are organized for all employees to acquire environmental knowledge as well as learn about our environmental policy and activities. Specialized Programs are designed to bring employees' environmental skills to an advanced level.

General Programs are held every year at each business site for employees to acquire a wide range of knowledge, such as energy problems, trends in global society, and environmental activities by Panasonic. Additionally, training catered to the distinctive features of each operation is organized to provide information directly linked to business and operational activities. Other creative initiatives that we continue include environmental sustainability education to new employees and engineering-related employees using exclusive textbooks specific to their respective job experiences and skills to enable them to practice environmental action in their job activities.

In fiscal 2018, ten courses were held in the Specialized Programs, such as ISO 14001 internal environmental auditor training, environmental legislation, chemical substance management, and factory energy conservation diagnosis, and a total of 77 people took the courses.

We hold continual group training on environment risk and other key points in management for members who are assigned to overseas production sites, as companies are expected to take more and more actions for better environment a global scale.

Fostering Environmental Awareness and Skills through Global Competitions and On-site Training

The Eco Mind Skills Competition and Energy Conservation Diagnosis Skills Competition are held; as environment-related events in the Panasonic Group Manufacturing Skills Competition held annually for Panasonic employees worldwide, aimed at training employees to acquire advanced skills and become top runners in Panasonic manufacturing. We hope that these events will bring greater environmental awareness and continuous environmental activities among our employees, and thus lead to more active proposals to address and resolve wide-ranging environmental issues and business risks.

The Eco Mind Skills Competition tests the participants' capabilities in overall environmental knowledge and expertise including global environmental issues and environmental sustainability management by Panasonic, as well as environmental improvement skills of proposing and implementing improvement measures that cut down environmental impact. Training materials for the Competition, preparatory study sessions, and mock tests are held at each business site, aiming for promising contenders to win high-ranking places. Additionally, voluntary activities are being organized actively to encourage competitors to acquire and improve their knowledge in the area. In fiscal 2018, 84 members, with increased number of participants from China and Thailand, participated in the completion.

In China, which is one of the major regions where we focus business strategies on, the Eco Mind Skills Competition China has been held since fiscal 2012 at the Manufacturing Technology Learning Center (our in-house center for manufacturing education) in Hangzhou. In fiscal 2016, it was also held in Beijing.

Matters unique to the region, including essential environmental impact reduction at the business site, energy-saving and improvement activities and environmental trends and laws in China, are being included to foster greater employee awareness of the environment.

In the energy conservation diagnostic skills competition, contests are held, including skills competitions in the various fields of air conditioning, furnace & heat. In fiscal 2019, the number of participants increased to 84, including participants from China and Thailand.



Eco Mind Skills Competition



Energy Conservation Diagnosis Skills Competition

The Competition requires competitors to identify energy-saving issues and improvement measures through analysis of the state of facility operations and energy use within a designated time period. It is an event that requires problem-solving capabilities based on advanced expertise and experience in environmental engineering. We award outstanding performers in the competition, and continue to promote further development of human resources capable of more advanced practices to raise the overall level of the company.

Raising the Level of Human Resources Development Through Environmental Education and Internal Certification System

In May 2017, Panasonic Homes^{*1} Co., Ltd. received recognition of its excellence in environmental human resources development at the Environmental Human Resources Development Business Awards 2016, sponsored by the Ministry of the Environment and another organization.

The company has been offering environmental education to all its employees via e-learning since fiscal 2008. In fiscal 2014, the company introduced an internal certification system in which employees who demonstrate continuing excellence in performance are recognized as Eco-Men or Eco-Jo (which mean eco-conscious men/women; the names have been registered as trademarks) to promote human resources development in the environment field. Under the HR system of the company, the Eco Kentei (certification test for environmental specialists) is a requirement in a program granting subsidies

for acquiring public certification (for labor union members), as well as a promotion requirement for all employees based on job performance standards. Accordingly, the e-learning training covers questions similar to the Eco Kentei.



Environmental training via e-learning

*1 Its name was PanaHome Corporation as of receiving the award.

Promoting Environmental Communication

Panasonic has been focusing on maintaining close communications with stakeholders. We are actively engaged in environmental communication with our customers, business partners, local communities, governments, investors, employees, NGOs, experts, etc., through a variety of perspectives, including products and services, factories, and cooperation in environmental activities, as well as advertising, exhibitions, and website communication. And at the same time, we utilize stakeholder's opinions to further improve our environmental management.

Proposals on Environmental Policy

In addition to publicity through Keidanren (Japanese Business Federation) and other industrial organizations, we submit environmental policy proposals not only to the Japanese government but also to governments of other countries through a wide range of opportunities. We joined in policy deliberations on environmental issues that the society is facing today: a future vision for national governments, industry, and people's lives aimed at the creation of a sustainable society, and information sharing and exchange related to international activities. Through this approach we established a deeper understanding of government policy. Based on this, we are engaging in a drive to promote environmental management with an awareness of preventing business risks as well as creating opportunities, through actively presenting proposals from the standpoint of manufacturing, marketing, and technology development.

Communication with Assessment Bodies and Investors

Panasonic has been engaged in constant communication with domestic and international assessment bodies and investors in order to inform them of our contribution to the environment and deepen their understanding of it. Among our contributions, great attentions have been paid especially to our initiatives to reduce the environmental impact of our products across their entire life cycle; to realize a smart society; and our medium and long term environmental vision.

We will continue to engage in such communication.

Engagement with Third Parties

Panasonic actively conducts a number of dialogues with experts from both within and outside Japan, and utilizes their comments in its environmental strategies.

With the Natural Step, in particular, we have built a partnership since 2001. We hold meetings with them to share the most advanced environmental information in Europe and seek their opinions on our environmental strategies and activities to assist us in further improvements.

Publishing Environmental Information

Panasonic has been publishing its environmental reports since 1997. In fiscal 2014, we integrated the webpage for our environmental activities with that of for our CSR activities in order to publish comprehensive information in relation to sustainability. From fiscal 2016, among information published on our website, topics of great interest to our stakeholders, such as our environmental policy, approach, and performance data, are also provided in a Sustainability Data Book.

To increase further awareness on our Environmental Vision and environmental activities for CO₂ reduction, resources recycling, water conservation, chemical substances, and biodiversity among customers worldwide, we are offering summary information on our activities on Panasonic websites in 59 countries (in 35 languages). In the area of chemical substances, for example, activities involving the entire supply chain to control certain chemical substances hazardous to the human health and the environment are presented in an easy-to-understand style.

▶ Example of the Panasonic website for general customers (Australia)

<https://www.panasonic.com/au/corporate/sustainability/eco.html>



Example of the management of chemical substances

For information on specified chemical substances in products regulated by the Act on the Promotion of the Effective Utilization of Resources, please refer to “Information on the Content of Certain Chemical Substances in Covered Products”

below. We do not manufacture, import, or sell products that contain certain chemical substances beyond specified standards, other than in exempted parts.

▶ Information on the Content of Certain Chemical Substances (Japanese)

<https://www.panasonic.com/jp/corporate/sustainability/eco/chemical/jmoss.html>

In addition, we have established a new webpage, Information Based on the Act on Preventing Environmental Pollution of Mercury, in May 2017 to communicate information concerning the mercury used in our products to customers.

▶ Information Based on the Act on Preventing Environmental Pollution of Mercury (Japanese)

<https://www.panasonic.com/jp/corporate/sustainability/eco/chemical/jmoss/mercury.html>

Other examples of environmental communication are introduced in the following website.

<https://www.panasonic.com/global/corporate/sustainability/eco/communication.html>

Environment: History of Environmental Activities



Era	Year	Panasonic Group	World	Japan
~1970s	1967			<ul style="list-style-type: none"> • Basic Law for Environmental Pollution Control enacted
	1968			<ul style="list-style-type: none"> • Air Pollution Control Law enacted
	1970	<ul style="list-style-type: none"> • Pollution Survey Committee established 		<ul style="list-style-type: none"> • Water Pollution Control Law enacted • Waste Disposal and Public Cleansing Law enacted
	1971			<ul style="list-style-type: none"> • Environment Agency established
	1972	<ul style="list-style-type: none"> • Environmental Management Office established 	<ul style="list-style-type: none"> • U.N. Conference on Human Environment held in Stockholm (Declaration of Human Environment adopted) 	
	1973		<ul style="list-style-type: none"> • First oil shock occurred 	
	1975	<ul style="list-style-type: none"> • Environmental Management Regulations enacted 		
	1979		<ul style="list-style-type: none"> • Second oil shock occurred 	<ul style="list-style-type: none"> • Energy Conservation Law enacted
1980s	1985		<ul style="list-style-type: none"> • Vienna Convention for the Protection of the Ozone Layer adopted 	
	1987		<ul style="list-style-type: none"> • Montreal Protocol on Substances that Deplete the Ozone Layer adopted • World Commission on Environment and Development (the Brundtland Commission) advocated the concept of sustainable development 	
	1988	<ul style="list-style-type: none"> • CFC-reduction Committee established 		<ul style="list-style-type: none"> • Ozone Layer Protection Law enacted
	1989	<ul style="list-style-type: none"> • Environmental Protection Promotion Office established 		
1990s	1991	<ul style="list-style-type: none"> • Matsushita Environmental Charter (Environmental Statement and Code of Conduct) enacted • Matsushita Product Assessment adopted and implemented 		<ul style="list-style-type: none"> • Keidanren Global Environment Charter enacted by Japan Federation of Economic Organizations • Law for Promotion of Effective Utilization of Resources enacted
	1992	<ul style="list-style-type: none"> • Environmental Policy Committee established 	<ul style="list-style-type: none"> • The Earth Summit held in Rio de Janeiro, Brazil; Agenda21 and Rio Declaration on Environment and Development adopted • United Nations Framework Convention on Climate Change adopted 	
	1993	<ul style="list-style-type: none"> • Matsushita Environmental Voluntary Plan (Year 2000 targets) adopted • Matsushita Group' global environmental internal audits launched 		<ul style="list-style-type: none"> • The Basic Environment Law enacted
	1995	<ul style="list-style-type: none"> • Acquired Environmental Management System Certification at AV Kadoma Site (first in the Matsushita Group) 	<ul style="list-style-type: none"> • First Conference of Parties to the U.N. Framework Convention on Climate Change (COP1) held in Berlin 	<ul style="list-style-type: none"> • Containers and Packaging Recycling Law enacted
	1996		<ul style="list-style-type: none"> • ISO 14001 International Standard on Environmental Management Systems launched 	
	1997	<ul style="list-style-type: none"> • Corporate Environmental Affairs Division (CEAD) established • Environmental Conference established (held semi-annually) 	<ul style="list-style-type: none"> • COP3 held in Kyoto and adopted the Kyoto Protocol 	<ul style="list-style-type: none"> • Keidanren Appeal on the Environment announced by Japan Federation of Economic Organization
	1998	<ul style="list-style-type: none"> • Love the Earth Citizens' Campaign commenced • Recycling Business Promotion Office established • First environmental report (1997) published 		<ul style="list-style-type: none"> • Home Appliance Recycling Law enacted (took effect in 2001) • Law Concerning the Promotion of the Measures to Cope with Global Warming enacted • Energy Conservation Law revised: Top Runner Approach introduced
	1999	<ul style="list-style-type: none"> • Green Procurement launched • Chemical Substances Management Rank Guidelines established • Acquired ISO14001 Certification in all manufacturing business units 		<ul style="list-style-type: none"> • PRTR (Pollutant Release and Transfer Register) Law enacted
	2000s	2000	<ul style="list-style-type: none"> • Lead-free Solder Project commenced • Held first environmental exhibition for general public in Osaka 	<ul style="list-style-type: none"> • Global Reporting Initiative (GRI) issued The Sustainability Reporting Guidelines
2001		<ul style="list-style-type: none"> • Environmental Vision and Green Plan 2010 adopted • Held first Environmental Forum in Tokyo and Freiburg, Germany • Panasonic Eco Technology Center launched 	<ul style="list-style-type: none"> • Reached final agreement on the actual rules of Kyoto Protocol in COP7 held in Marrakesh 	<ul style="list-style-type: none"> • Reorganized into the Ministry of the Environment • Law Concerning Special Measures against PCBs enacted
2002		<ul style="list-style-type: none"> • Panasonic Center Tokyo opened 	<ul style="list-style-type: none"> • Johannesburg Summit (Rio+10) held 	<ul style="list-style-type: none"> • Kyoto Protocol ratified • Vehicle Recycling Law enacted • Law for Countermeasures against Soil Pollution enacted

Era	Year	Panasonic Group	World	Japan
	2003	<ul style="list-style-type: none"> Declared 'Coexistence with the Global Environment' as one of the twin business visions Factor X advocated as an indicator for Creating Value for a New Lifestyle Completely introduced lead-free soldering globally Super GP Accreditation System launched Achieved zero waste emissions in Japanese manufacturing business sites (ongoing program) Held Environmental Forum in Tokyo 	<ul style="list-style-type: none"> EU's WEEE Directive was enacted 	
	2004	<ul style="list-style-type: none"> Environmental Vision and Green Plan 2010 revised PCB Management Office established Superior GP Accreditation System launched 		<ul style="list-style-type: none"> Prohibited manufacturing and use of products containing asbestos in principle
	2005	<ul style="list-style-type: none"> Participated in Expo 2005 Aichi, Japan as an official sponsor Green Plan 2010 revised Continued with the nationwide Lights-out Campaign 3R Eco Project launched Completed the elimination of specified substances (6 substances) in products Matsushita Group's Green Logistics Policy established CF Accreditation System introduced Panasonic Center Osaka opened Eco & Ud HOUSE opened Installed the first commercial household fuel cell cogeneration system in the new official residence of the Japanese Prime Minister Won the first place in Nikkei Environmental Management Survey 	<ul style="list-style-type: none"> Kyoto Protocol entered into force 	<ul style="list-style-type: none"> Expo 2005 Aichi, Japan held National campaign against global warming "Team -6%" launched Marking for the presence of the specified chemical substances for electrical and electronic equipment (J-Moss) established
	2006	<ul style="list-style-type: none"> Environmental specialist position established ET Manifest introduced into all manufacturing sites of Panasonic in Japan Realized lead-free plasma display panels and introduced them to the market Full-fledge introduction of biodiesel fuel in logistics 	<ul style="list-style-type: none"> Restriction of Hazardous Substances (RoHS) Directive took effect in EU 	<ul style="list-style-type: none"> Relief Law for Asbestos Victims enacted Energy Conservation Law revised: new cargo owner obligations, widened product scope of its application, and top runner standard revision
	2007	<ul style="list-style-type: none"> Energy conservation activities at our factories in Malaysia approved as CDM project by the U.N. A new environmental mark 'eco ideas' introduced Panasonic Center Beijing opened Environmental Forum in China held "Declaration of Becoming an Environmentally Contributing Company in China" announced Panasonic 'eco ideas' Strategy announced 	<ul style="list-style-type: none"> The Fourth Assessment Report of the Intergovernment Panel on Climate Change (IPCC) released Registration, Evaluation, Authorisation and Restriction of Chemicals entered into force in EU Framework for CO₂ reduction agreed at Heiligendamm Summit (G8) The Bali Road Map for the post Kyoto Protocol agreed at COP13 Administration on the Control of Pollution Caused by Electronic Information Products (China RoHS) came into effect 	<ul style="list-style-type: none"> 'Cool Earth 50' announced by Prime Minister Abe '21st Century Environment Nation Strategy' formulated 'The Third National Biodiversity Strategy of Japan' formulated 'Ministerial ordinance partially amending the Enforcement Regulation of the Waste Management and Public Cleansing Law' promulgated 'Domestic Emissions Trading Scheme Review Committee' established 'The Second Fundamental Plan for Establishing a Sound Material-Cycle Society' formulated
	2008	<ul style="list-style-type: none"> Established the Corporate CO₂ Reduction Promoting Committee Held environmental exhibitions, 'eco ideas' World Home Appliances Company announced environmental statement in which named its Kusatsu site as 'eco ideas' Factory Announced 'eco ideas' Declaration in Europe Established Environmental Strategy Research Center 	<ul style="list-style-type: none"> G20 (conference of key countries' environmental and energy ministers) held Hokkaido Toyako Summit held 	<ul style="list-style-type: none"> Cool Earth Promotion Program announced by Prime Minister Fukuda Mislabeled incident of waste paper pulp percentage Long-term Energy Demand and Supply Outlook announced Japan's Voluntary Emission Trading Scheme started
	2009	<ul style="list-style-type: none"> Opened the 'eco ideas' House to demonstrate a lifestyle with virtually zero CO₂ emissions throughout the entire house Announced the Asia Pacific 'eco ideas' Declaration Announced 'eco ideas' factories (in Czech, Malaysia, Thailand, and Singapore) Sanyo Electric joined the Panasonic Group 	<ul style="list-style-type: none"> China WEEE law promulgated New framework for countermeasures against global warming on and after 2013 (post-Kyoto Protocol), the Copenhagen Accord, was adopted at the COP15 (Copenhagen conference) Seeking to emerge from the Lehman collapse, countries throughout the world accelerated actions for the Green New Deal 	<ul style="list-style-type: none"> Energy Conservation Law amended: Covered area expanded from factories to commercial sector facilities Flat-panel TV and clothes dryer added as covered products under the Home Appliance Recycling Law 'Eco point' system started
2010s	2010	<ul style="list-style-type: none"> Announced "Vision looking to the 100th anniversary of our founding in 2018" Announced new midterm management plan, "Green Transformation 2012 (GT12)" Announced 'eco ideas' Declarations (Latin America, Asia Pacific, and Russia) Established 'eco ideas' Forum 2010 in Ariake, Tokyo Launched Panasonic ECO RELAY for Sustainable Earth Kasai Green Energy Park eco-friendly factory completed 	<ul style="list-style-type: none"> COP10 held in Nagoya—Nagoya agreement made APEC meeting held in Yokohama Ruling party lost in US midterm election—changes in anti global warming policy Cancun agreement made in COP16—Post-Kyoto framework still to be discussed 	<ul style="list-style-type: none"> Draft legislation of Basic Law of Global Warming Countermeasures submitted but remained in deliberation Obligatory greenhouse gas emissions reduction started as a part of Tokyo Emissions Trading Scheme Waste Management and Public Cleansing Law amended: self treatment regulations tightened Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. (CSCL) and Law concerning Pollutant Release and Transfer Register (PRTR) amended
	2011	<ul style="list-style-type: none"> Announced North America & Taiwan 'eco ideas' Declarations Announced establishment of Panasonic Dadi Dowa Summit Recycling Hangzhou Co., Ltd. Announced the Fujisawa Sustainable Smart Town Project Established Corporate Electricity Saving Division that bridges functions across the organization 	<ul style="list-style-type: none"> Rare earth prices soared Revised RoHS directives enforced in EU COP17 (Durban Climate Conference): Agreement made on long-term future of the scheme, and the second commitment period for the Kyoto Protocol (Japan announced non-commitment) 	<ul style="list-style-type: none"> Home appliance eco-point incentive program finished The Great East Japan Earthquake Revised Air Pollution Control Act and Water Pollution Control Act enforced Act on Special Measures Concerning Procurement of Renewable Electric Energy by Operators of Electric Utilities enacted (Feed-in tariff system to be enforced July 2012)

Era	Year	Panasonic Group	World	Japan
	2012	<ul style="list-style-type: none"> Business reorganization due to full acquisition of Panasonic Electric Works and SANYO Electric Commenced sales of Resources Recycling-oriented Product series Terminated production of household incandescent light bulbs Establishment of Environmental Management Group, Environment & Quality Center, Global Manufacturing Division Communication of 'eco ideas' Declaration (Vietnam) 	<ul style="list-style-type: none"> United Nations Conference on Sustainable Development (Rio +20) "Doha Climate Gateway" adopted at COP 18 Doha 2012, to lay down a future legal framework in which all nations can participate by 2020 and onwards Revised WEEE Directive implemented in Europe 	<ul style="list-style-type: none"> The Recycle Resource Project, national campaign by Ministry of the Environment, commenced 2012 Japan Tax Reform Bill enacted (Environment tax came into force in October 2012) Feed-in tariff for recyclable energy put into effect
	2013	<ul style="list-style-type: none"> Announced new midterm management plan Cross-Value Innovation 2015 Announced new brand slogan "A Better Life, A Better World" PETEC's home appliance recycling reached a cumulative total of 10 million units Announced 'eco ideas' factory (Philippines) 	<ul style="list-style-type: none"> Phase I of the Kyoto Protocol ends. Japan's target expected to be achieved in combination with forest CO₂ absorption and application of the Kyoto Protocol mechanisms. GRI announced G4, the next guidelines for CSR reports Minamata Convention on Mercury to internationally regulate import and export of mercury adopted at UN conference IPCC Fifth Assessment Report (Working Group 1) announced the possibility of human activity being the principal cause of global warming observed since the mid-20th century is "extremely high." Global average surface temperature is expected to rise as high as 4.8°C COP 19 Warsaw reaffirmed participation of all nations in the future framework of the Convention for 2020 and later. Nations were asked to submit emission pledges well in advance of 2015 	<ul style="list-style-type: none"> Home Appliance Recycling Law for small household appliances enforced Basic Plan for Establishing a Recycling-Based Society implemented Keidanren's "Action Plan Towards Low-Carbon Society" started (until FY 2021) Amended Law Concerning the Rational Use of Energy and Amended Law Concerning the Promotion of the Measures to Cope with Global Warming established. Amended Act on the Rational Use and Management of Fluorocarbons promulgated (June) Voluntary Action Plan by the electric and electronics industry terminated. Achieved improvement by 48% in CO₂ emissions per basic unit in average actual production output for fiscal 2009–2013 (compared with fiscal 1991 level) to the target of 35% Japan announced in November its fiscal 2021 reduction target of 3.8% over fiscal 2006 and registered this with UNFCCC Office (but with a possible review of the tentative target, which does not include possible resumption of nuclear power plant operations)
	2014	<ul style="list-style-type: none"> Panasonic DADI DOWA Summit Recycling Hangzhou Co., Ltd., started operation Opening of Fujisawa Sustainable Smart Town Announced Eco Declaration (Southeast Asia & Pacific) Communication of housing & town development at the International Greentech & Eco Products Exhibition & Conference (IGEM) (Malaysia) 	<ul style="list-style-type: none"> Targets for product environmental regulations in Europe begin to shift from energy saving to resource efficiency and environmental impact EU Parliament reelection results in the appointment of Mr. Jean-Claude Juncker as President of the European Commission. Review of the circular economy package was decided. IPCC 5th Assessment Report analyzed that the current multiple ways to achieve control of global temperature rise to less than 2°C cannot be materialized unless the target becomes nearly zero by the end of the century. Attention to "adaptation" is growing. COP12 Convention on Biodiversity, PyeongChang concluded the interim assessment of the Aichi Biodiversity Targets as "progress has been made but remains inadequate" COP 20 (Peru) reached agreement on the policy of developing reduction targets based on common rules for publication of "a new legal framework beyond 2020 applicable to all Parties" 	<ul style="list-style-type: none"> The amended Energy Conservation Act was enforced, incorporating action on power conservation during peak periods into existing qualitative reduction targets Phase II of the Commitment to a Low Carbon Society, a voluntary program promoted by Keidanren as measures against global warming, was newly established in response to government request, setting the target year to 2030 Toyota Motor launched fuel-cell vehicle MIRAI into the commercial market
	2015	<ul style="list-style-type: none"> Won Zayed Future Energy Prize 2015 Wonder Japan Solutions (Tokyo) held for the first time Announced the introduction of indirect contributions through housing, automotive, and B2B solutions in the size of contribution in reducing CO₂ emissions Announced the Tsunashima Sustainable Smart Town development project, together with Yokohama City and Nomura Real Estate Development Company 	<ul style="list-style-type: none"> Paris Agreement on the international legal framework for global warming control from 2020 and later was adopted at COP21 (Paris) 2030 Agenda for Sustainable Development was adopted at the UN Summit, focusing chiefly on sustainable development goals (SDGs) 	<ul style="list-style-type: none"> Draft proposal to cut greenhouse gases by 26% over 2013 levels as its 2030 greenhouse gas reduction target announced by the Japanese government COOL CHOICE, a new nationwide movement for greenhouse gas reduction, started
	2016	<ul style="list-style-type: none"> Establishment of Environmental Management Department, Quality & Environment Division Announced R&D 10-Year Vision Revised Green Plan 2018 Announced participation in Future Living Berlin, the first Smart City project in Germany Announced collaboration with Tesla Motors for solar batteries 	<ul style="list-style-type: none"> G7 Toyama Environment Ministers' Meeting held; ministers representing the G7 nations and the EU discussed policies on seven themes including resource efficiency and 3R, biodiversity, climate change, and related measures UK decided to leave the EU (Brexit) in a national referendum GRI announced "GRI Standard," the new guidelines for CSR reports COP 22 held in Marrakesh, Morocco. Agreement reached on establishing a rulebook to make the Paris Agreement effective by 2018 Donald Trump won the US presidential election COP 13, the 13th meeting of the Conference of the Parties on Biological Diversity, held in Cancun, Mexico 	<ul style="list-style-type: none"> The 2016 Kumamoto Earthquake The Plan for Global Warming Countermeasures was decided by the Cabinet. Direction of Japan's global warming countermeasures to achieve the Intended Nationally Determined Contributions under COP 21 was clarified. Long-term goal of reducing greenhouse gas emissions by 80% by 2050 was set Act on Promotion of Global Warming Countermeasures was amended; focuses on promoting the enhancement of Cool Choice, the reinforcement of international cooperation, and regional global warming countermeasures
	2017	<ul style="list-style-type: none"> Announcement of Panasonic Environment Vision 2050 Opening of Tsunashima Sustainable Smart Town 	<ul style="list-style-type: none"> France, UK, and China announced the prohibition of sales of gas and diesel cars and the conversion to EVs in the future 	<ul style="list-style-type: none"> Revision of the Charter of Corporate Behavior delivering on the SDGs through the realization of Keidanren Society 5.0
	2018	<ul style="list-style-type: none"> Announcement of Monozukuri (Manufacturing) Vision Achievement of zero-CO₂ factories at Panasonic Eco Technology Center Co., Ltd. (PETEC), Panasonic Energy Belgium N.V. (PECBE), and Panasonic do Brazil (PANABRAS) 	<ul style="list-style-type: none"> COP24 was held. The policy based on the Paris Agreements to be uniformly applied to all member countries was adopted 	<ul style="list-style-type: none"> The fifth Basic Environment Plan was decided by the Cabinet. Set up six cross-field strategies utilizing the concepts of SDGs