

Panasonic Group Sustainability Data Book 2019
Standards for Calculating Main Environmental Performance Indicators

Reporting period

April 1, 2018 - March 31, 2019

Scope of this report

Product-related: All products developed in the reporting period.

Factory-related: Manufacturing sites in and outside Japan that have established Environmental Management Systems.

(Not included: Hussmann Parent Inc., Ficoso International S.A., consolidated subsidiaries since April 2016 and April 2017 respectively, and these consolidated subsidiaries.)

Others: Scope according to individual initiatives.

Standards

Item	Indicator	Calculation method
Reducing CO ₂ Emissions	Size of direct contribution in reducing CO ₂ emissions through energy-creating products	Solar panel, cell: Total power-generating capacity of panels shipped in the current fiscal year (kW) x 25* (years) x Power generation of model per unit (set by country/region) x CO ₂ emission factor (0.360 kg-CO ₂ /kWh) Fuel cell: Power generation of the current fiscal year model per unit (1,870 kWh/year) x 10 (years) x Total shipping quantity of the current fiscal year x CO ₂ emission factor (0.410 kg-CO ₂ /kWh) * : Until fiscal 2018: 20 (years) was used for this part of the calculation formula. From fiscal 2018: This part is 25 (years) because the warranty year for solar panel/cell was changed to 25 years.
	Size of direct contribution in reducing CO ₂ emissions through energy-saving products	(Annual power consumption of FY2006 base model - Annual power consumption of the current fiscal year model) x Product life x Shipping quantity of the current fiscal year x CO ₂ emission factor
	Size of indirect contribution in reducing CO ₂ emissions through products	Size of contribution in reducing CO ₂ emissions through "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 and motors*1," and "improved fuel efficiency effects from electric vehicles (EVs), plug-in hybrid vehicles (PHVs), and hybrid vehicles (HVs) equipped with Panasonic automotive batteries*2," "energy-saving effects by other companies' products using Panasonic vacuum insulation materials", "CO ₂ reduction effects attributed to less travelling with the use of HD Visual Communication Systems*3", "energy-saving effects from HEMS and BEMS*4", and "energy-saving effects by the installation of heat exchange ventilation system*5". *1 (Annual power consumption of FY2006 base model compressors and motors - Annual power consumption of the current fiscal year model compressors and motors) x Estimated life other companies' products x Shipping quantity of the current fiscal year x CO ₂ emission factor *2 Estimated quantity of EVs, PHVs, and HVs equipped with Panasonic automotive batteries x Product life x Estimated annual running distance x improved fuel efficiency effects. Improved fuel efficiency effects are estimated based on reports released by Japan Automobile Research Institute and car manufacturers. *3 Shown in a separate table. *4 Annual power consumption in a household (a) x Energy-saving effects from HEMS (%) (b) x Product life (10 years) x Shipping quantity of the current fiscal year x CO ₂ emission factor Power consumption in an office building (c) x Energy-saving effects from BEMS (%) (d) x Product life (10 years) x Shipping quantity of the current fiscal year x CO ₂ emission factor *5 Energy consumption of an air conditioner, using non-heat exchange ventilation system (simulated by Panasonic, (Tokyo, intermittent air conditioning)) x Energy-saving effects by the installation of heat exchange ventilation system (simulated by Panasonic, (Tokyo, intermittent air conditioning)) x Product life (10 years) x Shipping quantity of the current fiscal year x CO ₂ emission factor Conditions for the simulation are shown in a separate table. Reference (a) The Energy Conservation Center, Japan, "Report for Promoting Efficient Energy Use (Research for Standby Power Consumption)", 2013 (b) NEDO, "Research and Information Provision on Household Energy Consumption" of the Project for Promoting the Installation of Energy-saving Equipment, 2005 (c) The Building-Energy Manager's Association of Japan, "Report on Energy Consumption in Buildings, vol. 38" (d) NEDO, "NEDO's Efforts on the Installation and Promotion of BEMS", 2012
	CO ₂ emissions from the use of major products	Lifetime CO ₂ emissions from major products*1 with major products whose respective energy usage is high. Lifetime CO ₂ emissions = Annual power consumption of a model sold*2 x Sales quantity x Product life*3 x CO ₂ emission factor. *1 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, electronic rice cookers, microwave ovens, electric bidet toilets, clothing irons, hair dryers, under-rug heaters, vacuum cleaners, electric thermal pots, extractor hoods, telephones, security cameras, projectors, production modulars, etc. *2 For each product category, the model that was sold in the largest quantity in the region was selected. *3 Number of years during which spare parts for the product are available (defined by Panasonic).
	CO ₂ emissions in production activities	CO ₂ emissions from the use of fuel + CO ₂ emissions associated with purchased electricity and heat
	CO ₂ emissions per basic unit in production activities (compared to FY2014)	CO ₂ emissions per basic unit in production activities (improvement rate of basic unit compared to FY2014) was calculated as follows: Basic unit improvement rate (%) for FY2019 = A2015 x A2016 x A2017 x A2018 x A2019 An = $\frac{\sum\{FYn \text{ basic unit improvement rate in each factory (FYn-1 YOY comparison) (\%)} \times (FYn-1 \text{ basic unit improvement rate in each factory} \times FYn \text{ output etc.})}{\sum\{FYn-1 \text{ basic unit improvement rate in each factory} \times FYn \text{ output etc.}} \times 100$ n = 2015, 2016, 2017, 2018, 2019
	Energy consumption in production activities	The total energy usage (including electricity, town gas, and LPG) in each factory. For the calorific value, the conversion factor based on the Order for Enforcement of the Act on the Rational Use, etc. of Energy (Japan), was used globally. For town gas, however, the conversion factor published by the gas service provider was used.
	In-house renewable energy adoption	Total renewable energy generated and used in the sites, including photovoltaic, wind, and biomass power.
	Emissions of GHGs other than CO ₂ in production activities	GHGs specified in the Fourth Assessment Report (2007) of the Intergovernmental Panel on Climate Change (IPCC) were calculated and converted into CO ₂ emissions using the Global Warming Potentials stated in the Report.
	Scope 1 CO ₂ emissions	CO ₂ emissions from the use of fuel + Emissions of GHGs other than CO ₂
Scope 2 CO ₂ emissions	CO ₂ emissions associated with purchased electricity and heat	

	CO2 emissions from the use of fuel	Used CO2 emission factors provided in the Guideline for Calculation of Greenhouse Gas Emissions (version 4.3.1) published by the Japanese Ministry of the Environment.
	CO2 emission associated with purchased electricity and heat	<Japan> CO2 emission factor for electricity purchased every fiscal year in Japan is fixed at 0.410 (kg-CO2/kWh). <Outside Japan> Used numerical values for respective countries listed in the Calculation Tools in the GHG Protocol website by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI). The 2002 numerical values listed in the "Electricity-Heat SteamPurchase_tool1.0_final" are used as fixed values for all fiscal years.
	Energy consumption in transportation	Applied the concept specified in the Energy Conservation Law Guidebook for Consigners edited by the Agency for Natural Resources and Energy, Japan. (Applicable scope: transportation in which the Panasonic Group owns cargo) Energy consumption in international logistics is also tabulated by adopting the concept specified in the guidebook.
	CO2 emissions in transportation	Based on the energy consumption and other data calculated in the process specified above, the corresponding value was calculated in accordance with the Guideline for Calculation of Greenhouse Gas Emissions (version 4.3.2) published by the Japanese Ministry of the Environment.
	CO2 emissions per basic unit in logistics	CO2 emissions in logistics/Transportation weight
	CO2 emissions per basic unit in transportation in Japan (compared to FY2014)	CO2 emissions per basic unit in transportation in Japan (improvement rate of basic unit compared to FY2014) was calculated as follows: Basic unit Improvement rate (%) for FY2019 = 100% - B2015 x B2016 x B2017 x B2018 x B2019 Bn = CO2 basic unit in logistics in FYn / CO2 basic unit in logistics in FYn - 1* n = 2015, 2016, 2017, 2018, 2019 * If the calculation method of energy usage in transportation in FYn is changed, the newly adopted method is retroactively applied to the CO2 basic unit calculation in FYn - 1.
Resources Recycling	Total resources used	Amount of resources directly used in production activities of a product. Total resources used is calculated in the following two methods: (1) Method of calculating by identifying the amount of purchased materials (including sub-materials). (2) Method of calculating by identifying the amount of: shipped products + sub-materials + waste*. *The figure used for the amount of waste is that published in the Sustainability Data Book 2018 as waste or valuable items.
	Usage of recycled resin	Mass weight of recycled materials used in recycled resin, excluding new resin and newly mixed additives or fillers.
	Recycled weight of four kinds of home appliances in Japan	Applies to the recycling defined in the Home Appliance Recycling Law in Japan, and refers to the weight of components and materials of separated products which can be used by oneself, or made into a state available for sale or free of charge.
	Amount of used products covered by the WEEE Directive collected in Europe	Weight of collected products per collection system x Panasonic's weight-based share of products put on the market within the applicable collection system.
	Amount of used electronic products collected in the USA	Amount of equipment collected in accordance with state laws and through voluntary measures.
	Amount of total wastes including revenue-generating waste from factories	Total amount of generated industrial and general waste and revenue-generating waste.
	Revenue-generating waste	Waste that can be sold to recycling or disposal companies for profit.
Water	Amount of water consumption in production activities	Total water consumed for production (total amount of consumed municipal water, industrial water, river/lake water, and groundwater).
	Progress rate of water risk assessment	Progress of water risk assessments specified by Panasonic ((1) Water risk assessments in all regions where Panasonic manufacturing sites are located, conducted with assessment tools and the database of each country; and (2) Identification of impact on Panasonic business activities, collected through specific public local information and local information through interviews with relevant organizations, as well as through analyses of information on water usage conducted by local sites).
Chemical Substances	Substances requiring management	Based on the Chemical Substances Management Rank Guidelines (for factories). Including all the substances in the Japanese Law of the Pollutant Release and Transfer Registers (PRTR Law).
	Release of substances requiring management	Release amount includes emissions to air, public water areas, and soil.
	Transfer of substances requiring management	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 Law is included in recycled amount. (Different from the transferred amount reported under the PRTR Law.)
	Substances subject to calculation of Human Environmental Impact from factories	Chemical substances specified in the Chemical Substances Management Rank Guidelines (for factories).
	Human Environmental Impact	Human Environmental Impact = Hazard factor* x (Amount of covered substances released + Amount of covered substances transferred) *Hazard factors: Given by Panasonic, after classification according to the impact on human health and the environment. Factors are set as A: 10,000, B: 1,000, C: 100, D: 10, and E:1, according to the hazardous level. - Emission amount of covered substances: Includes emissions to the atmosphere, public waters, and soil. - Transfer amount of covered substances: Includes transfer as waste and discharge to the sewage system (not including those recycled free of charge or charged under the Waste Management and Public Cleansing Law).

Compliance	Number of violations	Number of violations of laws and regulations caused by our factories and products
	Eco-conscious Products	Definition of Strategic GPs
Percentage of sales for Strategic GPs		Sales of Strategic GPs / Panasonic consolidated sales
Improvement rate of energy-saving performance of major consumer electronics products		Improvement rate calculated by comparing the assumed total power consumption if no energy saving performance improvement has been made in representative products (product categories of air conditioners, refrigerators, TVs, washing machines, etc.) since the base year (FY2006) and the actual total of power consumption for the same products. The highest selling models in each region were chosen as the representative model for each target category.
Total power generation from household fuel cells		Total annual power generation from household fuel cells shipped between FY2011 and the specified year.
Sales ratio for LED lighting		Percentage of sales figures for LED lighting among the entire lighting business in the specified year.
Total power generation from solar cells		Total annual power generation from solar cells shipped between FY2013 and the specified year.
Amount of air with improved quality		Total number of rooms of whose air quality was improved by indoor air quality-related products, such as ventilators with air purifying function or filters exceeding a certain level of performance, shipped between FY2016 and the specified year. The number of rooms was calculated by the number of products x the coverage area. The coverage area was calculated using the number of tatami mats in a room based on the Japanese standard.
ZEH ratio to all detached houses		Percentage of ZEHs and Nearly ZEHs in detached houses ordered to PanaHome in the specified year.
Development of smart cities		Number of smart cities for which PanaHome was involved in the development and the number of lots sold.
Automotive battery supply meeting the demand		Comparison of supply of EV, PHV, and HV automotive batteries between FY2015 and the specified year.
Sales of eco-conscious B2B Strategic GPs		Comparison of the amount of shipment of target products, such as audio-visual solutions and mobility solutions equipment (such as laptop PCs etc.), between FY2016 and the specified year.
Collaboration with Stakeholders	Number of participants in environmental education programs	Total number of participants in education programs provided at schools, extracurricular activities, showroom/factory visits, eco picture diary programs, etc. (Cumulative figure from fiscal 2010)

■ Standard to calculate the size of contribution in reducing CO2 emissions through remote conference systems (HD Visual Communication Systems)

Calculation standard	
1. Hypothesis: Installing remote conference systems by Panasonic can reduce CO2 emissions by eliminating the necessity of business trips to attend meetings. 2. Calculation formula of the size of contribution in reducing CO2 emissions (size of CO2 emissions reduced by eliminating travel)	
$\sum_{i=1}^n (a_i \times b_i \times c_i \times d_i - e) \times f$	
n: The number of remote conference system sold (Sets)	Remote conference system sold within a fiscal year (The unit is a set of two devices - as a conference is held by having a minimum of two devices)
a: The number of business trips reduced in a year (Times/Year)	Inside Japan*1: 46 times /year Outside Japan*2: 24 times/year *1 Figure set by Panasonic based on Carbon Footprint Program - Program Category Reference (CFP-PCR) (Certified CFP-PCR No.: PA-BI-04) Remote Conference Systems, published by Japan Environmental Management Association for Industry on March 25, 2014. *2 Figure set based on case studies in specified departments in Panasonic.
b: Distance of a round trip (Km/Times)	Inside Japan: Distance between Tokyo station and Shin-Osaka station Outside Japan: Distance between Tokyo Haneda Airport and major world airports (Major airports in representative countries within target regions were chosen according to the sales results of the remote conference systems in the region.)
c: CO2 emissions factor per means of travel (t-CO2/Person x Km)	Shinkansen in Japan and airplanes for outside Japan. Source of CO2 emissions factor: Study Group Report for ICT Policy to Reduce Global Warming Problems, April 2008, Ministry of Internal Affairs and Communications.
d: Number of travelers (Persons/Times)	Inside Japan: Three people/time Outside Japan: Two people/time
e: CO2 emissions from the use of remote conference system (t-CO2)	Power consumption by remote conference system (kWh) x CO2 emissions factor (t-CO2/kWh)
f: Product life (Years)	Seven years

■ Conditions for the simulation to evaluate energy-saving effects by the installation of heat exchange ventilation system

<Conditions for the simulation: Tokyo, intermittent air conditioning>	
1. Heating period: Tokyo, November 6 to April 13	
2. Cooling period: Tokyo, May 30 to September 22	
3. Setting: Heating/Temperature: 20°C, Humidity: not lower than 50%, Cooling/Temperature: 27°C, Humidity: not exceeding 60% (Intermittent air conditioning) LD: 18-hour operation, single room: 3 to 5-hour operation	
4. Outdoor temperature and humidity: Based on the Expanded AMeDAS Weather Data	
5. Air conditioning system: Tokyo, heat pump air conditioner (cooling, dehumidifying, heating), humidifier Heat pump air conditioner APF 4.9, heating oil boiler COP 0.821, humidifier 60Wh/L	
6. Ventilation equipment: 24-hour continuous operation, (non heat exchange ventilation) FY-08PFE9D x 4, (heat exchange ventilation) FY-12VBD2SCL x 2	
7. New unit price of electricity (variable): JPY27/kWh (tax included)	
8. Unit price of heating oil: JPY75/L	