


**Pioneer**



**Pioneer Group  
Environmental Activities Report  
2015**

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## Corporate Profile

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Company	PIONEER CORPORATION
Headquarters	1-1 Shin-Ogura, Saiwai-Ku, Kawasaki-shi, Kanagawa 212-0031, Japan
Phone	+81-44-580-3211
President	Susumu Kotani
Founded	January 1, 1938
Established	May 8, 1947
Main Businesses	Car Electronics Business Home Electronics Business Others
Capital	91,731 million yen (as of June 30, 2013)
Net sales (consolidated)	501,676 million yen (as of March 31, 2015)
Number of employees (consolidated)	19,404 (as of March 31, 2015)

## Editorial Policy

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- This report has been created for all stakeholders for the purpose of conveying information related to environment conservation activities to as many people as possible. We aim to fulfill our role as a responsible corporation.
  - During the production of the environmental report, we referred to the GRI\* Guidelines and the Environmental Reporting Guidelines 2012 from the Ministry of the Environment. With the guidelines as our guiding principle, we will continue to strive for ever greater accuracy.
- \* GRI (Global Reporting Initiative) is an international organization established to improve the quality of corporate communications so as to realize sustainable development.

## Period Covered by This Report

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- The period covered by the data is FY2015 (April 2014 - March 2015), but whenever possible, the latest events have been included even if outside this period.
- Expansion of the range of the data and scrutiny of the figures has caused some changes from the figures released last year.
- There may be some discrepancies between subtotals and totals due to rounding off.

## Basic Concept of Environmental Activities

The Pioneer Group aims to uphold and share its philosophy: "Move the Heart and Touch the Soul" through its business activities. We consider one of the major factors in achieving this goal is the preservation of the global environment, with our "Philosophy of Environmental Protection" established in 1992.

In recent years, an increase in the world's population and expansion in economic activities have accelerated environmental problems such as global warming, pollution, loss of resources, and biodiversity which previously had been advocated has now become apparent. The range of social responsibility in continuing business exceeds our fields, where we are expected to achieve activities related to environmental preservation through entire lifecycles, contributing to the environment through our products and services. In order to achieve a sustainable society with stakeholders, the Pioneer Group promotes cross cutting strategies for environmental protection in view of laws and regulations and social contributions in response to each issue. We initiate our activities via environmental education and proactively disclosing information of the results.

## Philosophy of Environmental Preservation

The Pioneer Group will make efforts to always contribute to maintaining and realizing the rich and safe global environment through our corporate activities, based on the general understanding that it is one of our corporate missions to maintain, improve, and hand over the global environment to the next generation.

## Environmental Policies

The Pioneer Group shall promote environmental preservation activities through four basic actions to address four key environmental issues.

In order to realize environmental contributions from the perspective of stakeholders, we promote a shared vision of our environmental policy globally.

### Basic Policies of Environmental Preservation

#### Key environmental issues

##### 1. Prevention of Global Warming

Efforts shall be implemented to reduce energy use and greenhouse gas emissions attributable from our business activities and the product's life cycle.

##### 2. Conservation of Resources, and Recycling

Strive to reduce use of materials and water resources in the business process, and to promote recycling of resources as much as possible.

##### 3. Management of Chemical Substances

Manage a secure control for the use of chemical substances, and to continuously reduce or strive for alternatives regarding potentially hazardous chemicals that may be harmful. Moreover, in using chemical substances, efforts shall be made to prevent pollution.

##### 4. Preservation of Biodiversity

To preserve the wildlife ecosystem on earth, forests, oceans, and in sustaining biodiversity as important issues to consider, constructive action in protecting the natural environment shall be implemented.

#### Basic actions

##### 5. Compliance to Laws and Regulations

While complying with applicable environmental laws and regulations, establish voluntary management standards necessary to perform the business activities.

##### 6. Disclosure of Information, and Communication

Provide environment related information to the stakeholders, and respect the opinions widely from both inside and outside the company advantageously for environmental activities.

##### 7. Environmental Education

While having awareness for environmental preservation, promote environmental education and training with the aim of developing human resources to enable taking action to environmental activities.

##### 8. Social Contribution

As a good corporate citizen, we will dedicate ourselves in realizing a better environment both globally and locally, and contribute to the development of society.

Initiatives for the Future

## Environmental Vision 2020

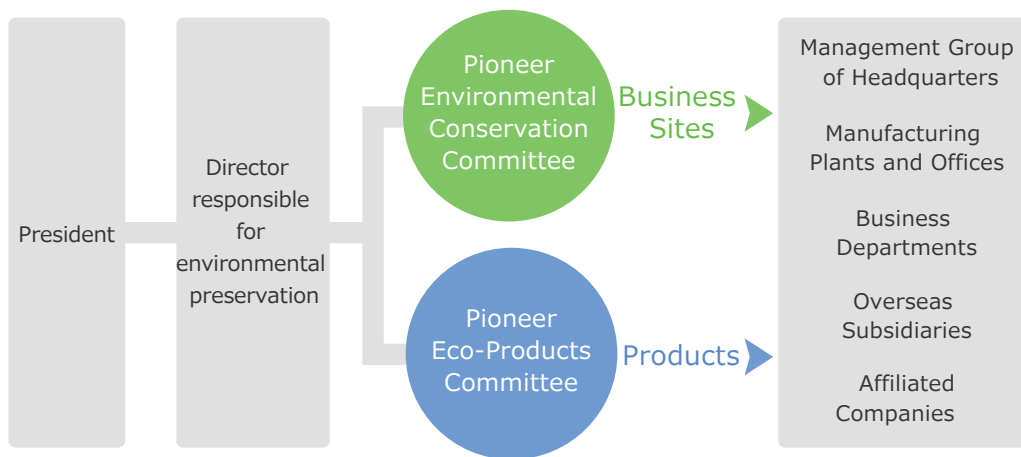
To create an eco-friendly, enriched life, and contribute to society with high quality "technology" and "activities" for the realization of a sustainable society.

As corporate citizens, our mission is not only to accelerate proactive environmental preservation and fulfillment of our responsibility with mitigation measures, but also to propose eco-friendly measures, enrich life, and deliver sensations. As a company that has offered the world's first products to customers, we established "Environmental Vision 2020" based on our consideration toward environmental contributions.

### Organization of Pioneer Environmental Preservation Activities

Pioneer launched the "Pioneer Environmental Conservation Committee" to control environmental preservation activities in 1991. In 2004, the "Pioneer Eco-Products Committee" which cross divisionally controls environmental preservation activities related to products was inaugurated. These current two committees structure serves to promote overall activities of Pioneer's environmental preservation system to cover both facilities and products.

In the future, transparency of CO<sub>2</sub> impact across all business activities will be promoted in addition to activities for manufacturing plants, offices, and products. A system for environmental contribution by planning, development, production, and use of products will be organized to reduce greenhouse gases for each stage of the lifecycle.



## Solutions to Environmental Issues by Technological Products

Pioneer considers its environmental contribution to be the delivery of products that offer an "ecological and enriched life." We are engaged in product development to address and solve the issues related to "prevention of global warming", "resource recycling", and "management of chemical substances contained in products" with our environmental technologies.

### Issues and Initiatives

#### Prevention of Global Warming

- Reduction of power consumption
- Improvement of fuel consumption of automobiles
- Energy saving during transport

#### Recycling of resources

- Reduction of material quantities and number of parts
- Reduction of packaging
- Easily degrading properties

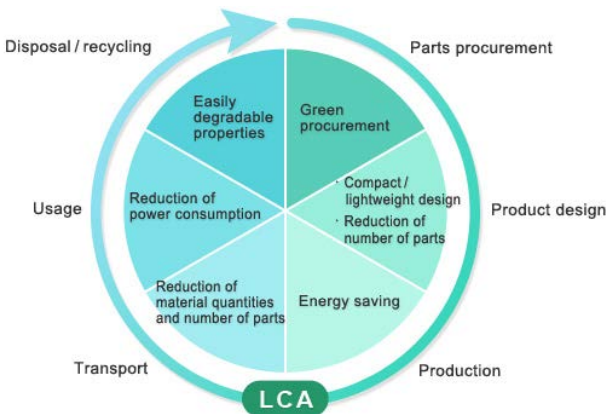
#### Management of Chemical Substances Contained in Products

- Minimization of environmental impacts
- Promotion of green procurement
- Management of chemical substance information

## Product Lifecycle Point of View

We perform Life Cycle Assessments (LCA) in order to reduce the environmental impact on the lifecycles of products from mining of raw materials to production/distribution of products, and use/disposal by customers. Influence on product lifecycles at each stage is visualized to promote improvements in the environmental performance of products, and the analyzed data that is disclosed on our website.

### Flow of Product Assessment from the Lifecycle Viewpoint



## Improve Environmental Performance

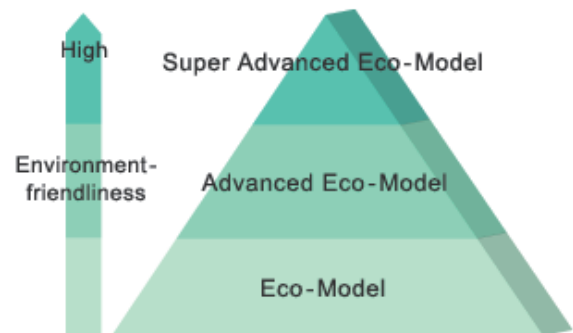
Materials composing of parts, amounts used, and electronic parts are selected at the product design stage. In addition, electrical performance such as power consumption is determined at this stage. We conduct product assessments at this important stage to determine the environment performance to realize effective environmental consideration and ensure compliance with environmental laws around the world.

## Evaluation for environmental consideration Products

Achievement status is confirmed based on the evaluation system for environmental consideration products at the completion of design. Products are certified as Super Advanced Eco-Model, Advanced Eco-Model or Eco-Model at the time of release.

An award is given to the Development Department of the certified model and this system is also fully used for the purpose of promoting communication such as publication within the company and application for environmental awards.

### Evaluation system for environmental consideration products



#### • Super Advanced Eco-Model

Products with outstanding environmental

Products with industry-leading environmental performance or products incorporating Pioneer's original environmental technologies

#### • Advanced Eco-Model

Products with superior environmental performance

Products with environmental performance of a certain level, such as products exceeding in environmental performance over previous products, or products surpassing the environmental performance of competitor products.

#### • Eco-Model

Products that exhibit basic environmental performance

## Concept of Environmental Activities in Business Activities

Reduction of environmental impact in offices and plants to develop, produce and sell products is our corporate social responsibility. A consistent concept of developing environmentally friendly products in energy saving offices and manufacturing products in eco-factories is shared not only in Japan, but also globally. We also promote improvement activities utilizing the ISO14001 Environmental Management System, collect contents of worldwide activities, and provide feedback of activities in the following year. Our "Environmental Activities Report" summarizing results is proactively disclosed on the company's website.

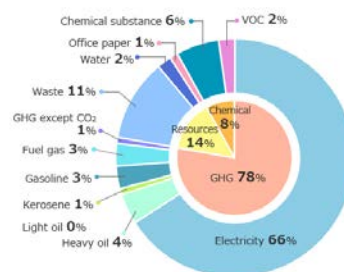
## Setting of management items(Environmental Impact Assessments)

Pioneer conducts global environmental impact assessments to determine environmental management items for offices and plants. In our business structure, the impact on global warming through use of energy (greenhouse gas emissions) is large and occupies 78% of the total. Secondly, impact from wastes generated through development and production activities at business sites is 11%. In order to reliably achieve targets for these two upper level items, target results to target values in each office and plant are collected and assessed on a quarterly basis. Other items extracted in the Environmental Impact Assessment are managed annually as monitoring items.

## Environmental Audits

We conduct internal environmental audits regularly at each facility to check the effectiveness of the environmental management system and promote continuous improvement and we acquired the ISO 14001 certification. The Pioneer Group has 299 active internal environmental auditors. Along with implementing these improvements, efforts are being made to share information between all facilities in order to ramp up environmental activities.

## Environmental Impact Assessments



\* Environmental impact assessment method: Environmental aspects = Obtained by multiplying coefficient calculated by Environmental elements (for example, annual electric usage) and LIME (Lifecycle Impact Assessment Method based on Endpoint Modeling, developed)

## Targets, Plans and Performance in FY2015

The Pioneer Group is working to prevent global warming, to recycle resources and to reduce environmentally hazardous substances. In FY2015 we succeeded in achieving 10 out of our 11 targets. Based on this result, we will set targets for our activities in FY2016 and FY2018.

Category	Issue	Target and Results in FY2015			Target in FY2016	Target in FY2018
		Target	Results	Self assessment		
Targets	Prevention of Global Warming	CO2 equivalent greenhouse gas emissions Japan: 12% reduction from FY2010 to FY2021 (Gross emission)	Achieved 17% reduction	◎	Same as the targets as of FY2015	
		CO2 equivalent greenhouse gas emissions: Japan and Overseas : 10% reduction from FY2010 to FY2020 (Emissions per unit of sales amount)	Achieved 22% reduction	◎	Same as the targets as of FY2015	
	Conservation of Resources, and Recycling	Reducing valuable resources/waste materials Japan & Overseas: 3% reduction from FY2011 level on a per unit of sales amount	Achieved 31% reduction	◎	Same as the targets as of FY2015	
Controls	Prevention of Global Warming	Exhaust of five GHG (Five gases except CO2) Worldwide : maintaining FY2014 level	Achieved: 77.6% reduction	◎	Same as the targets as of FY2015	
		Management of the energy accompanying transportation of products in Japan : Check of less than 30 mega-tonne-kilometers	Achieved: 12.2 mega-tonne-kilometers	◎	Same as the targets as of FY2015	
	Conservation of Resources, and Recycling	Recycling rate for valuable resources/waste material Japan : Maintaining 99.5% rate or higher Overseas : Maintaining 99% rate or higher	Achieved : Japan : 100% Overseas : 99.5%	○	Same as the targets as of FY2015	
		Green purchasing promotion Japan : Maintaining 95% rate or higher	Achieved : 98.6%	◎	Same as the targets as of FY2015	
		Management of the amount of the water resources used Worldwide : maintaining FY2014 level	Achieved: 0.6 decrease	◎	Same as the targets as of FY2015	
	Management of chemical substances	Management of the amount of office paper purchase Worldwide : maintaining FY2014 level	We reduced paper use to 23.5 million sheets from the last fiscal year of 26.2 million sheets.	◎	Same as the targets as of FY2015	
		Management of emissions of PRTR chemical substances and VOCs Worldwide : maintaining FY2014 level	VOC discharge amount was 99 tonnes last year ,but increased to 105 tonnes. Discharge amount of PRTR applicable substances increased from 9.02 tonnes to 14 tonnes.	△	Same as the targets as of FY2015	
	Management of emissions of SOx, NOx and dust Worldwide : maintaining FY2014 level	-Japan: 7.2 tonnes, reduced from the last fiscal Year. -Overseas 5.1 tonnes, same amount as the last fiscal year.	◎	Same as the targets as of FY2015		

(Note) Self-evaluation standards (broad estimates)  
Significantly exceeds the target: 110% or more/ Achieved the target: 100% to less than 110%/ Fell slightly short of the target: 95% to less than 100%/ Failed to meet the target: less than 95%

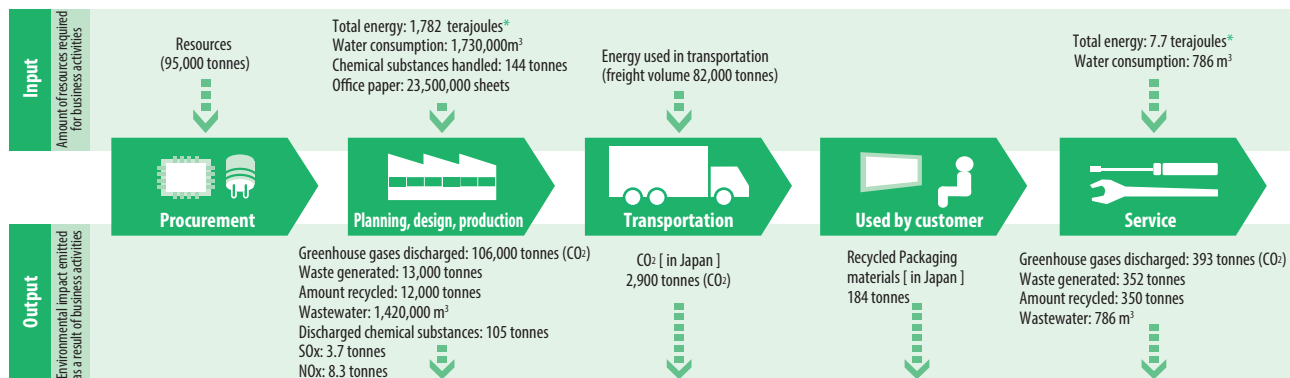
\*1: By regulation of Zero emission of waste (Pioneer's definition), it judges for every plant.

\*2: The target material is 20 kinds for JEITA's independence reduction activity.



## Input and output (FY2015)

Pioneer grasps environmental data of the operation from a viewpoint of the LCA continuously to promote environmental impact reduction activity effectively, and exploited in environmental assessments.



Figures in parentheses are approximate, based upon estimates \*Tera is defined as 10<sup>12</sup>

## Trends in Past 3 Years

### Input

		Unit	FY2013	FY2014	FY2015
Procurement	Resources	10,000 tonnes	9.3	9.7	9.5
	Total energy	TJ	1,872	1,786	1,782
Planning, design, production	Water consumption	10,000 m <sup>3</sup>	184	174	173
	Chemical substances handled	tonnes	145	123	144
	Office paper	10,000 sheets	2,860	2,620	2,350
	Goods transported	10,000 tonnes	7.9	8.3	8.2
Service	Total energy	TJ	7.3	7.0	7.7
	Water consumption	m <sup>3</sup>	1,026	711	786

### Output

		Unit	FY2013	FY2014	FY2015	
Planning, design, production	Greenhouse gases discharged	10,000 tonnes CO <sub>2</sub>	11.4	10.3	10.6	
	Waste generated	10,000 tonnes	1.4	1.4	1.3	
	Amount recycled	10,000 tonnes	1.3	1.3	1.2	
	Waste water	10,000 tonnes m <sup>3</sup>	153	141	142	
	Waste chemical substances	tonnes	127	99	105	
	SO <sub>x</sub>	tonnes	10.7	4.2	3.7	
	NO <sub>x</sub>	tonnes	14.8	12.8	8.3	
Transportation	CO <sub>2</sub> (in Japan)	1,000 tonnes	3.4	3.0	2.9	
Used by customer	Recycled packaging materials (in Japan)	paper	tonnes	256	188	184
Service	Greenhouse gases discharged	tonnes CO <sub>2</sub>	380	266	393	
	Waste generated	tonnes	54	168	352	
	Amount recycled	tonnes	54	167	350	
	Waste water	m <sup>3</sup>	1,026	711	786	



## Environmental Accounting

Pioneer has introduced environmental accounting as one means to conduct quantitative evaluations related to environmental activities. As a compilation of rules, "Pioneer Environmental Accounting Guidelines" has been established based on "Environmental Accounting Guidelines 2005 edition" published by the Ministry of the Environment. One hundred percent of wage costs are accounted for in the division that deals with the environment full-time, and other notable environmental activities are accounted for based on a prorate or time-multiplied wage rate. Economic benefits such as profits

from recycling and cost savings (savings on electricity and waste disposal expenses, etc.) are accounted for, but so-called "surmised benefits" (from risk avoidance) are not calculated. Environmental investment depreciates in fixed amounts over a five-year period and the economic benefit extends to five years. Depreciation of capital investment is 5 years, and improvement effect by investment is also 5 years. The scope of the environmental accounting application includes all offices and plants and subsidiaries that have received ISO14001 management system certification.

## Environmental Costs

(Millions of JPY)

Category	Description	Details	FY2013		FY2014		FY2015	
			Investment	Expense	Investment	Expense	Investment	Expense
Plants	Anti-pollution costs	Wastewater treatment and management, water quality analysis, smoke treatment, etc.	5	104	3	98	0	103
	Global environmental preservation costs	Energy saving-related costs (depreciation of solar power generation, demand control, inverter control, power measuring systems introduction, etc.)	2	65	9	12	0	65
	Resource recycling costs	Waste disposal and recycling costs	19	61	0	62	0	94
Upstream and downstream costs	Cost of reducing environmental impacts generated upstream or downstream in production and servicing activities	Difference from environment-friendly products (elimination of styrene foam, energy saving components, etc.) green procurement by introduction of EDX equipment, green purchasing	17	23	4	17	0	17
Management activities	Cost of acquiring and maintaining ISO 14001 certification, education and training costs, PR costs	Cost of acquiring and maintaining ISO certification, environmental organization personnel expenses, Education and training costs, PR activities, cleanup activities	0	215	0	173	0	218
R&D	Environmental preservation costs in R&D activities	Cost of developing technologies including environmental factors	60	597	54	540	31	573
Social activities	Environmental preservation costs in social activities	Voluntary environmental preservation activities (Cleanup activities, etc.) and donations to environmental groups	0	13	0	8	0	11
Environmental remediation	Environmental remediation cost	Cost to restore, cover degradation suits or insurance fees.	0	0	0	0	0	0
Total			104	1,078	70	909	31	1,081

## Economic Benefits

(Millions of JPY)

Category	Details	FY2013	FY2014	FY2015
1. Savings due to environmental preservation (energy saving, pollution prevention, etc.)	Power reduction by purchase of energy saving equipment, upgrading, etc.	18	16	10
2. Savings due to resources recycling (resource saving, recycling, waste disposal, etc.)	Reduction of waste disposal costs. Profits from sales of valuable resources.	84	37	21
3. Upstream and downstream savings (in procurement, production, distribution, green purchasing)	Reduction in component unit price, reduction in distribution costs, green purchasing effect.	2	0	0
Total		104	54	31

## Environmental Conservation Benefit

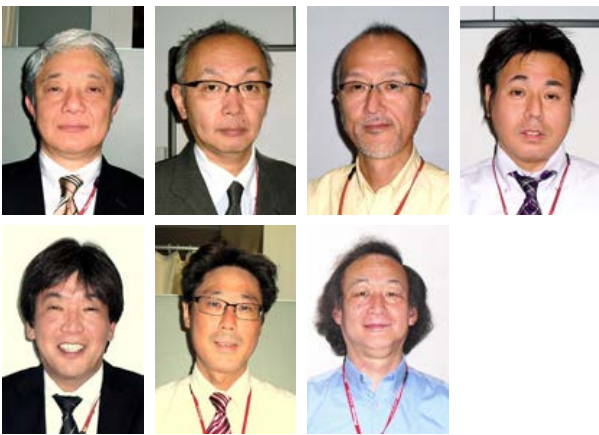
Category	Details	FY2014	FY2015	The difference between the previous year
1. Global warming	Reduction in greenhouse gases	103 (x10 <sup>3</sup> tonnes-CO <sub>2</sub> )	106 (x10 <sup>3</sup> tonnes-CO <sub>2</sub> )	3 (x10 <sup>3</sup> tonnes-CO <sub>2</sub> )
2. Resources recycling	Reduction in waste discharge amount	14 (x10 <sup>3</sup> tonnes)	13 (x10 <sup>3</sup> tonnes)	-1 (x10 <sup>3</sup> tonnes)
	Reduction in usage of water	1,730 (x10 <sup>3</sup> m <sup>3</sup> )	1,730 (x10 <sup>3</sup> m <sup>3</sup> )	0 (x10 <sup>3</sup> m <sup>3</sup> )

## Supporting Eco-Driving!

### Persons Gathered in the Background with a Desire to Reduce Electric Power

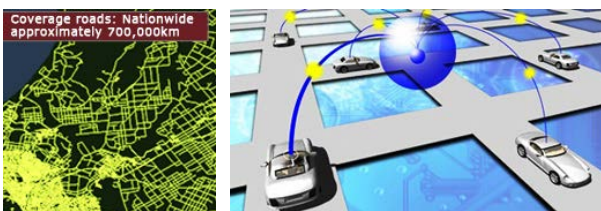
(Host) carrozzeria car navigation is very convenient. However, management of the enormous amount of information required large electric power. Today, I would like "behind-the-scenes" individuals who significantly reduced electric power to candidly reveal the challenges.

Car Electronics Strategic Business Planning Division: Kuwahara, Shirasaka, Kurata, Shiina  
 IT Division: Hayasaka, Arima  
 (Host) Quality Assurance Division: Fukushima



### carrozzeria is not "Just Guidance"

(Car) The Smart Loop of the carrozzeria allows us to drive eco-friendly while avoiding traffic congestion using information in real time between many vehicles and information accumulated by us, and to know the latest map information and parking lot vacancies. It is an awesome amount of "collective knowledge."

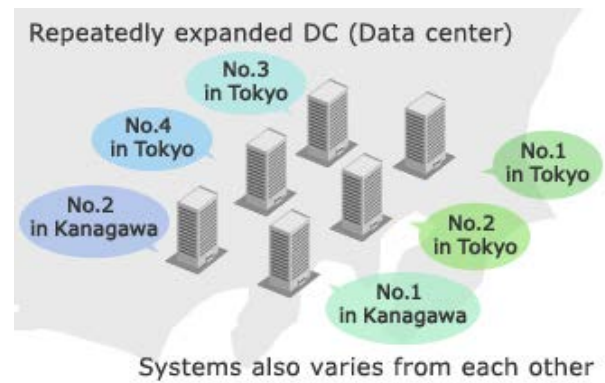
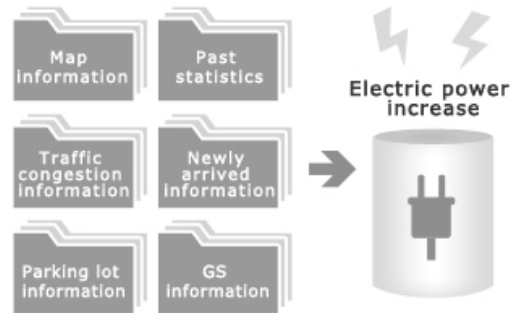


### "Scream of Joy" Also Increases Electric Power

(Car) The Smart Loop which started operations in 2007 received an Eco-Products Award and has earned a widespread recognition. Also, information has been released that the number of accumulated shipments of just RAKU NAVI exceeded 3 million in 2012. An increase in the number of customers has also lead to an increase in the amount of data, and servers necessary for data management of car navigation have increased more and more. During each expansion, the optimum system at the time was built, the methods were not unified.



(Car) Enormous data required a significant amount of electric power and many data centers. "This was not efficient. Electric power and cost increased, which is not good for the environment! We need to do something." As a result, we started to consider plans and countermeasures seriously.



### It was not an Emergency Response for an Earthquake

(Host) There was a shortage of electric power due to the planned outage after the Great East Japan Earthquake. Was this a response to that?

(Car) No, the plan was started in 2010, and energy savings were considered systematically before the earthquake. We engaged in frequent turning off of lighting and equipment at the workplace etc. However, this was not enough so we considered that fundamental reform was required.

### Focused on Advanced IT Technology and the Project was Launched

(Host) What was the fundamental reform?

(Car) You said that we were "individuals in the background", however, we continuously had a strong sense of mission and responsibility. "Showing the Pioneer spirit, challenge for innovating new technologies, and setting our sights on a significant double eco-effect!" This is it.

(Host) What is the significant double eco-effect?

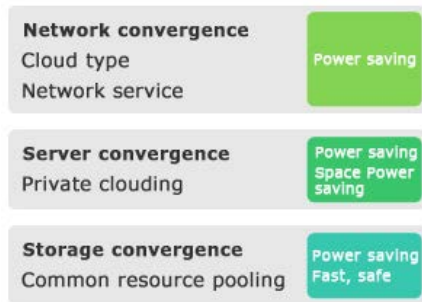
(Car) "We put the first priority on never degrading quality with respect to the provision of information and collection for customers." We planned the introduction of advanced IT technologies, contribute to environment by reducing power consumption and reducing costs through lower maintenance costs and labor cost in addition to electric charges. We started a project team with our Information System Department which is familiar with information infrastructure.

## Overcoming Setbacks with the Pioneer Spirit!

### There is Also an Uneasy Feeling of "Can We do It?"

**(Host)** What are the advanced IT technologies?

**(IT)** The advanced IT technologies mean virtual technologies, specifically, cloud and storage convergence. We considered saving electric power and improving operation efficiency using IT resources with these technologies.



We did not have much experience with virtualization so we felt "very uneasy" at that time. The following are the reasons.

1. There is no other example of introduction for such a large scale project.
2. While other companies felt uneasy and introduced limited information processing such as in-house data, we introduced an important system which was directly connected to customers 24 hours and 365 days. No accidents can occur because it handles information such as traffic congestion information.

### Unexpected Situation

**(Host)** Were they successfully introduced?

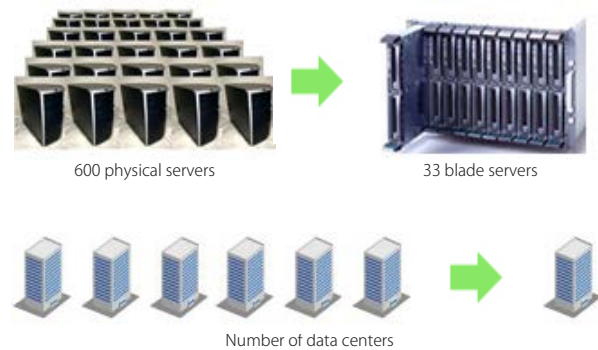
**(IT)** This was an unprecedented large scale introduction, and there were some difficulties as we expected. However, something more than we expected occurred. We started to relocate data centers in 2010, and the Great East Japan Earthquake occurred in March of the following year when the relocation started successfully. Our members instinctively held the rack storing the server. Fortunately, there was no damage to the relocating servers, however, the power of other systems and the network were disconnected, and system fault occurred.

### Experiencing "Disheartening" Setback

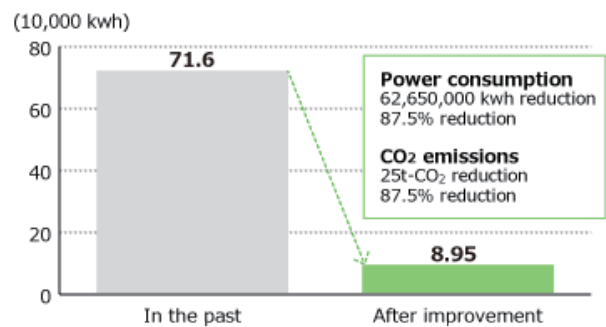
**(IT)** Although it was already turning out to be a complicated relocation, we suffered the earthquake. However, information services for customers must not be stopped. Therefore, "Introduction" and "recovery" were simultaneously started with no waiting time despite our situation. Overnight works continued and our hearts were almost broken from impatience and uneasiness. No one knew who said "now let's give up..." "No, we will not. People in the disaster areas are having a harder time than we care." "We must embody the Pioneer spirits." So, "we will realize an eco-friendly society with customers!" All of us fought back tears and clenched our fists at that moment.

## Feeling of Achievement of Reduction in Power and CO<sub>2</sub>

**(IT)** Convergence and relocation of the last of the six data centers were completed in March 2012. Our initiative significantly reduced conventional physical servers, consolidated the data centers into one location and reduced power consumption and CO<sub>2</sub> emissions greatly.



### Annual power consumption



### Media-Focused Attention

**(IT)** This information which our data centers manage is important car navigation data which forms the backbone of the Global Positioning System. The media also paid attention and TV stations interviewed us, so we provided an explanation on our data management.



Building of data center

### High Evaluation within and Outside of the Company

**(Car and IT)** Received "Kawasaki Environmental Show-Window Award"\* and "Pioneer Environmental Contribution Award."

**(Host)** Thank you for joining us today.



Harumitsu Saito  
Executive Officers and Prize winners



## Carefully Protecting "People"! Members with Warm Hearts

### Enthusiastic Members Gathered

**(Host)** The engineers who developed the EV navigation system under the theme of "Eco-Friendliness, Economy, and Enjoyment" were interviewed on their passion for development.



\* EV: Electric Vehicles

AVIC-MRZ007-EV

Car Electronics Strategic Business Planning Division: Furusho  
 Car Electronics Engineering Division: Ohgami (project leader)  
 Car Electronics Engineering Division: Akagi, Nagafuji, Okamoto, Yasushi, Matsunaga, Hirose  
 Car Electronics Engineering Division: Ohgami  
 (Host) Quality Assurance Division: Fukushima



### Seeking Out Why People Hesitate to Buy an EV

**(Host)** With the heightening concerns for the environment and awareness of energy problems, Electric Vehicles

**(EV)** have come to attract much attention. In our present interview, we shall have the staff members who developed the EV navigation system, AVIC-MRZ007-EV, which has been appraised for its excellent environment-friendly functions and certified as a "super advanced eco-model," introduce some behind-the-scenes development anecdotes. First of all, what were the intentions behind developing this product?

**(Planning)** Everyone knows that EVs are eco-friendly. EVs don't use gasoline and do not emit exhaust fumes and CO<sub>2</sub>. By spreading the use of EVs, we can contribute more to the environment. We thus planned to make an EV-dedicated navigation system that would powerfully support EV driving and spread the use of EVs!

**(Host)**What do you mean by "EV-dedicated" and "powerful support"?

**(Planning)** Many customers are interested in EVs. However, we also hear that many customers are hesitant about buying an EV. We therefore began by finding out the reasons for this hesitation. We thought that by finding that out, we will be able to visualize what an ideal EV-dedicated navigation system would look like.

**(Host)** How did you go about seeking out the answers? And what did you find out? Although I myself tried driving an EV once, I was also uncertain.

## Who Drives and Waits are "Important Persons"

**(Planning)** We repeated driving with various situations in mind – going shopping, dropping off or picking up someone at a station or school, etc., driving to dine, driving alone free of care, making rounds to clients, enjoying drives with family, etc. If the battery runs out on the way to somewhere, the EV will have to be pushed by the family members who are riding together. If the battery runs out or takes time for charging, you will not be able to arrive at your destination or will be late for a business meeting. That would certainly disappoint your beloved family members or loved one or friend or inconvenience a customer. We did not want to cause such worries or sad feelings. And most of all, it became clear that a fun, pleasant drive is important above all else.



The EV that underwent repeated test runs during development

What we began to see were that:

1. What is important is not just how many more kilometers one can drive but also up to where one can drive.
2. Even if the shortest/fastest route is driven with the desire to reduce power consumption as much as possible, the power consumption may still end up being high.
3. There were times where, upon arriving at a charging spot, the charging spot was occupied and we had to wait.
4. We also wished to listen to nice music and enjoy a pleasant drive with the family because there is no engine noise, and it is quiet.

We wanted the product designers to develop a system with top priority placed on "people."

### Although it Became a Difficult Challenge...

**(Software design A)** Upon hearing about the project, I would have loved to say "All right! Leave it up to us!" But my first impression was: "Hmm, this is going to be quite difficult..." For one thing, in order to meet the demands of the Planning Division, we would have to start from reviewing the running power consumption characteristics of EVs. Moreover, routes that are low not in fuel consumption but in power consumption must be searched.

**(Software design B)** If it's just a problem of for how many more kilometers the car can be driven, the drivable range can simply be expressed by drawing a circle on a map with a compass. However, in that case, even places that actually don't have roads, such as the sea, will be displayed. Moreover, what is required to be displayed is not "how many more kilometers" but "how far the vehicle can be driven," that is, "how far the battery will last." So what must be displayed is not the range but the road.

**(Project leader)** Pioneer has its specialized technologies of traffic jam prediction, fuel consumption estimation, and image processing. The instant I realized that, I (coolly) expressed the commitment to cooperate together and take on the challenge! The EV dedicated navigation project has started!

## Repetition of Steady Verification Until Midnight!

### Overcoming Issues with Teamwork

**(Host)** What are the achievements of the "EV dedicated navigation project"?

**(Project leader)** Now it's easy to ask: "What was achieved?" – but the road up to now was long and hard. All of us repeated research, experiments, actual driving, simulations, and verifications over and over. Everybody worked so late into the night! But then, we are all so young! (laughter)



Route algorithm verification



Discussions were continued until we were all satisfied, even late into the night.

And the teamwork was the best! We shall now explain our achievements with a little bit of pride.

## Boasting a High Level of Perfection – Not Just Eco-Friendliness

### 1. "Estimated Cruising Area Display"

~A reference of how far the vehicle can drive is understandably displayed in an easy-to-understand way~

**(Software design)** Drivable range is colored in amoeboid form and displayed along real roads. "50% charged" is also displayed in addition to "Fully charged."



Fully charged state



50% charged state

### 2. Developed "EV dedicated Eco-Route Search"

~Realized eco-driving with limited power consumption~

**(Software design)** Different from gasoline vehicles, an EV stores electric power by using regenerative braking when decelerating allowing longer use of batteries on routes having appropriate decelerating zones. Not only time and distance but also the most "eco-friendly" prioritized route can be selected, and electric costs paid for charges can be reduced in addition to power savings in society.



### 3. The "Charging Spot Search & Charging Spot Availability Information" function

**(Software design)** Nearby charging spots can be searched easily during driving. Also, not only the difference between "rapid charging" and "regular charging" but whether or not a charging spot is in-use can be made known.



### 4. Fully loaded with substantial AV functions together with an air gesture function

**(Electric Design)** A 12-segment terrestrial digital TV, DVD-V, CD, USB, SD, and FM/AM tuners are equipped, and moreover, music can be enjoyed at a high-power capability of 50W × 4 channels. Further, an air gesture function that displays often-used keys and switches to desired screens when a hand is simply brought close by or waved briskly – as if the driver's feelings are read in advance – is equipped to make driving more comfortable and pleasant. The estimated cruising range display, which one may want to view on the spur of the moment, can also be displayed smoothly.



### 5. We were very meticulous about being eco-friendly in other aspects as well

**(Mechanical Design)** Even while being equipped with substantial functions, the product has a 2-DIN size that snugly fits in the dashboard of a car. The weight and consumption power are also not increased in comparison to navigation systems for gasoline vehicles. All of these contribute to suppressing the consumption power of an EV. An LED, which is low in consumption power and free of toxic mercury, is adopted for the backlight of the screen. As another of our meticulous features - even though it may not be visible to a customer - the packaging box used for product shipment was changed to an eco-friendly material.

**(All Designers)** So, what do you make of that, Planning Division?" Really, we would like to shout, "How's that for you!"" (Laughter)

## Thanks to the Birth of Work Pride!

**(Planning)** Thank you, thank you! For all of your efforts! The electricity bill for driving an EV has been made lower than the fuel cost of a gasoline vehicle. Moreover, eco-friendly and full-scale AV functions are also provided. Truly, it marks the birth of work pride by Pioneer carrozzeria and will surely contribute to the spread of electric vehicles! (Applause)

**(Host)** I now understand the "eco-friendliness/ economy/ enjoyment". Thank you for coming today.



## Reduce Gasoline Consumption for Eco-Driving!

### Persons in Charge Candidly Reveal the Behind-the-Scenes Developments

Eco-driving not only leads to a reduction in fuel consumption and a reduction in CO<sub>2</sub> emissions but is also easy on household budgets and leads to safe driving.

This is the development story of Pioneer's car navigation systems powerfully supporting eco-driving.

Car Electronics Engineering Division: Yasushi, Ohsawa, Fukuda, Hirose



Carefully examining the new eco-drive support functions

### "Eco-Route Search" Received the Environmental Award

Pioneer received a double awarding of the "Green IT AWARD 2010" and "Green Purchasing Award 2010" with the Cyber Navi AVIC-VH9990 series (2010) as fuel consumption improvement effect by "Eco-Route Search" \* which the first one in the industry was evaluated, wasn't it? And this technology also mounted on existing products has earned a favorable reputation.



\* Capable of estimating the fuel consumption of all candidate routes according to each vehicle prior to driving to enable setting of a route of low fuel consumption and CO<sub>2</sub> emissions.



(Yasushi) Fuel consumption is influenced not only by road congestion conditions but also by types or operations of cars. Although prior research was performed at the time of development, unfortunately, there was no theory compatible to the various types of vehicles and road conditions and there where only demonstration reports concerning specific vehicles.

(Fukuda) We therefore prepared a theoretical model and by verifying it, we were able to become the first ones in Japan to equip the search function in a commercial navigation unit. The minimum fuel consumption route is searched. The basis for this Eco-Route Search was the fuel consumption estimation technology.

## Highly Evaluated by Vehicle Manufacturers

(Yasushi) The fuel consumption estimation technology initially started as an informal project and was not highly valued much inside the company. On the other hand, a carmaker outside the company appraised it as being exceptional and this lead to valued and then to adoption within the company.

(Fukuda) This fuel consumption estimation technology became the basis for the later Eco-Route Search function. However, fuel consumption estimation differs according to size and engine displacement of a vehicle and various vehicles must be used to set the respective fuel consumption parameters\*. The precision of the fuel consumption estimation changes in accordance with the fuel consumption parameters and an enormous amount of work was required to collect and analyze the data. The verification work also took a great deal of time. This was the most difficult stage of the project.

\* The "information" required for a computer, equipped in a navigation system, to perform calculations for fuel consumption estimation.



A driving experiment

## 10,000 km in Various Vehicles

(Fukuda) Experiments were performed on 20 or more vehicle types, from light vehicles to large engine displacement vehicles, from sport cars to minivans. Fuel consumption data was actually acquired for a gross distance of no less than 10,000km in the verification tests. In order to increase the accuracy of the fuel consumption parameters, verification tests, in other words, repetition of "driving and measurement, driving and measurement" were required.



Measurements were repeated over and over



## Physical Strength and Guts, Indifferent to Hot or Cold!

### Assuming Various Driving Conditions

(Fukuda) As there are various vehicles, the way of driving also varies depending on the driver. However, any experience to reproduce such various driving conditions on public roads results in not only violation of the Road Traffic Law, but also creates dangerous situations and inconveniences neighbors in terms of safety and noise. In order to perform sudden acceleration, sudden deceleration, high-speed driving based on assumptions about overseas highways, etc., driving experiments were also performed by using high speed oval track Japan Automobile Research Institute.



Test course at the JARI Shiroato Test Center, where high-speed driving is possible

(Ohsawa) In order to obtain correct data with no influence such as differences in season and time zone, and the vehicle model using actual public roads other than a test course, we prepared three vehicles of the same type and drove them simultaneously on different routes from the same starting point to the same destination to check the prediction accuracy of gasoline consumption estimation, the correctness of order of eco-friendliness, and the order of the required time. These tests were performed on several courses over different conditions.



## Assuming Various Seasons and Weather

(Ohsawa) In order to confirm the heat of midsummer, the cold of midwinter, and, influence by operation of the car's air-conditioner, we performed driving in midsummer with the air conditioning turned off, the heater on, and all windows completely closed as well as driving in midwinter with the heater off. This was quite harsh. (Laugh)

However, we still are quite young, and have physical strength, spirit and confidence. As all focused on the missions that we wish to reduce the consumption of fossil fuels to contribute to preservation of the environment, and satisfy customers, we felt that the "heat and cold" and that "less then comfortable experience" blew off somewhere. These are now good memories.

Through such verification experiments, we calculated the optimal fuel consumption parameters and were able to equip the Eco-route Search and fuel consumption estimation function of high accuracy. When we were finished, we felt like: "We did it!"



Detailed meetings on test driving

## Realizing Ecology, Economy and Enjoy

(Hirose) I found out that a slightly far away supermarket was doing sales for 50 yen less and so I thought of riding out there. However, I found out in advance that it takes 200 yen of fuel to get there and that the cost of the fuel used is less if I shopped at a closer location. There are two gas stations run by the same chain in the same direction from my home. One of them is 1 yen cheaper per liter. So when I wondered which gas station to go to and checked the fuel cost to the destination, I found out that the gas station that is 1 yen cheaper takes up a higher fuel cost. This is when I realized the true convenience of this function.

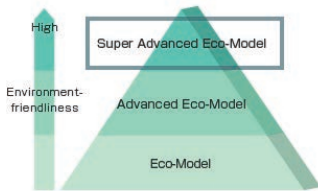
It is exciting that waste which was overlooked in the past cannot be found. It seems as though we will continue to enjoy driving. It is indeed ecology, economy and enjoy!

Route No.	Distance (km)	Estimated Time	Toll (¥)	Estimated Fuel Cost (¥)	Estimated CO2 Reduction Rate (%)
1	492	7時間 41分	10,650	5,490	0.2%
2	422	7時間 58分	8,550	4,920	10.5%
3	482	12時間 37分	0	6,450	-17.2%
4	413	11時間 34分	不明	5,730	-4.1%
5	408	7時間 55分	7,200	4,880	11.6%
6	491	7時間 41分	10,650	5,480	0.4%

Example of 6 route list display



## Example of Environment-Friendly Product Certification



\* See page 5 for details.

## carrozzeria "Car navigation for EV " AVIC-MRZ007-EV

The future has already begun. The story of the Pioneer staff who stood up to develop the EV navigation system to support the expanding EV society



Car navigation for EVs with satisfying navigation features and innovative operation feeling

Electric vehicles (EV) which do not use fossil fuels or emit exhaust gas can be expected to be the eco-car of the next generation. Pioneer has developed a car navigation system for EVs in order to support an expanding EV society.

## Guide "How far you can drive" rather than "How many km?"

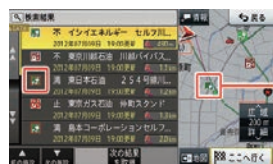
Equipped with an "Estimated Cruising Range Display" function that eliminates worries about battery depletion. A range to be driven displayed on the map of the navigation screen visually (amoeboid) at the time of full battery charge and 50% charge by our unique "Power Consumption Estimating Technology" etc., fully using fuel consumption estimation technology which we developed and mastered in our navigation system for gasoline vehicles.

### Estimated cruising range display image



## Charging location

In addition to charging location guidance, type of charging as rapid or regular, or information regarding charging location as "occupied" or "vacant" is possible.



## Realizing eco-driving while reducing power consumption

Unlike gasoline vehicles, an EV stores electric power by using regenerative braking during deceleration, allowing a battery to last longer. Eco-Route Search which has earned an excellent reputation for the carrozzeria car navigation system is equipped with newly developed travel route algorithms. An eco-route to reduce power consumption is recommended before driving by accumulated enriched map information.

### Example of Eco-Route Search exclusively for EVs



### Example of general recommended route



## Enjoyable drive in comparison with eco-friendliness level

Important information for EVs such as "e-brake rate", "average power consumption rate" is displayed in comparison with the previous information. Equipped with an "Eco-status function" allowing you to enjoy eco-driving.



## Product (AVIC-MRZ007-EV) certified for the Low CO2 Kawasaki Brand '13 hosted by Kawasaki City, Kanagawa Prefecture

CO<sub>2</sub> is reduced by approximately 10%. Advanced environmental technology is recognized.



## Developers talk with passion

Previously unknown development stories that can now be revealed.

\* See page 11 for "Eliminate Worries about Electric Vehicles!"



## Advanced Eco-Model Certified Products

### AV-Receivers

SC-LX87, SC-LX77, SC-LX57, SC-2023, VSA-1123, VSA-823

- Pursuit of eco-friendliness while being a full-fledged AV amplifier



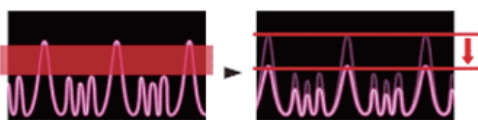
AV amplifier with full-scale component product also thoroughly focuses on eco-friendliness, "high power, high sound quality, and advanced function electricity consumption". Such common sense is non-sense to Pioneer. "Fully enjoy movies and music with overwhelming realism while still environment-friendly". This is Pioneer's concept toward the environment.

- Equipped with a "New ECO-MODE" which does not sacrifice sound quality

The general energy saving function to cut only a part which exceeds the limit by the limiter may cause unbalance in sound configuration of various sounds such as lines in a script and sound effects, and impair realism and the image of the content. The "ECO MODE" which Pioneer newly developed analyzes peak volume in playback during real time. Power saving is possible without impairing the image of the content by limiting the power consumption in consideration of the entire balance. There is MODE1 appropriate for music playback and MODE2 appropriate for movie watching. These can be selected depending on the content.

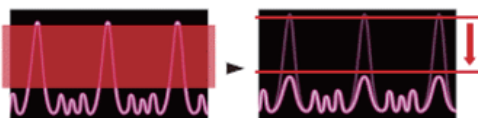
#### ECO MODE1

Mode suitable for content of high average sound volume level such as music and Internet radio.



#### ECO MODE2

Mode suitable for contents with high dynamic range as movies and live images.



- Easily realizes eco-friendliness with one shot!

Equipped with a "dedicated eco-function". We equip this function not because we prepared such a function but because we would like you to use the eco function. There is no need to repeat complicated operations many times while watching the screen. Anyone can realize eco-friendliness with these easy operations.

#### Eco-function dedicated button (remote control)



#### ECO mode Mounted on all models



#### Eco-function dedicated button (main body front panel) Mounted on SC-2023, VSA-1123, VSA-823



- Environment-friendly even when not in use

Realizes low standby power consumption of 0.1W\*, the highest industry standard. Also, equipped with standby power saving functions such as auto power OFF, HDMI® standby through, and network standby.

\* When HDMI® control is OFF

- Collective control of eco-functions with smartphone

iControlAV2013\* is equipped with ECO MANAGER which can collectively control eco-functions. (Excluding VSA-823)

\* This application operates the latest Pioneer AV amplifiers and BD players using iPad/iPhone/iPod touch as a controller.



- Product (SC-LX85) certified for the Low CO<sub>2</sub> Kawasaki Brand '12 hosted by Kawasaki City, Kanagawa Prefecture

SC-LX85 reduced CO<sub>2</sub> by approximately 47%. Advanced environmental technology is recognized. SC-LX87, SC-LX77, SC-LX57 and SC-2023 etc., are also equipped with these technologies.



- Super advanced eco-model certification ceremony

The department which was engaged in commercialization was awarded a certificate and activation for further environment-friendliness was promoted.

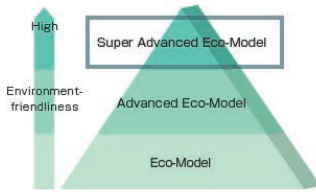


From Harumitsu Saito, Executive Officer, in charge of environment (from center) Staff in charge of technology received a certificate



Staff in charge of planning also received a certificate

## Advanced Eco-Model Certified Products



\* See page 5 for details.

## Cyber Navigation AVIC-VH99/ZH99 series

Future beyond imagination will come



Ultimate in Intuitive Guidance Navigation that projects Augmented Reality (AR) information in front of the front window. High-end car navigation includes further evolved various eco-driving support functions. Cyber navigation AVIC-VH99/ZH99 series

Realizes eco-driving that helps to eliminate taking the wrong way

Eco-Route Search\* projects ongoing direction forward of the driver's sight and guides along the lowest fuel consumption route. This avoids useless driving such as turning back and going in a roundabout manner because of taking a wrong turn.

\* Reduce fuel by approximately 20%



Proper inter-vehicular distance eliminates traffic congestion and also improves safety

The AR Scouter Mode function displays the recommended inter-vehicular distance and supports easing of traffic congestion, and also contributes to improvements in fuel consumption.



## Car Power Amplifier PRS-D700

Realizes high power, high sound quality and CO<sub>2</sub> reductions



Highly efficient Class D amplifier (max. output 250W×2) has realized significant downsizing and reduced power consumption. This has achieved significant effects related to the environment such as CO<sub>2</sub> reductions when an equipped vehicle is driven and products are transported in addition to increased mounting capability.

Previous product PRS-D8200



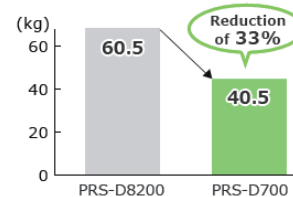
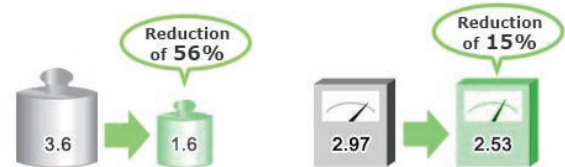
Main unit volume Reduction of 63%

Current product PRS-D700



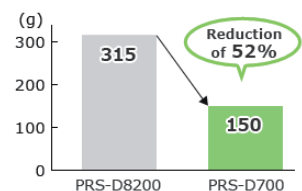
Main unit mass (kg)

Average consumption current (A)



CO<sub>2</sub> emissions reduction by equipped car (Per 1 product, used 6 Years)

CO<sub>2</sub> emissions reduction during product transportation (Per product)





## Advanced Eco-Model Certified Products

### "Pure Malt Speaker" series

#### Long-selling products playing mellow and rich sound



S-A4SPT-PM



S-A4SPT-VP



S-PM300

#### Recycling Whiskey Casks

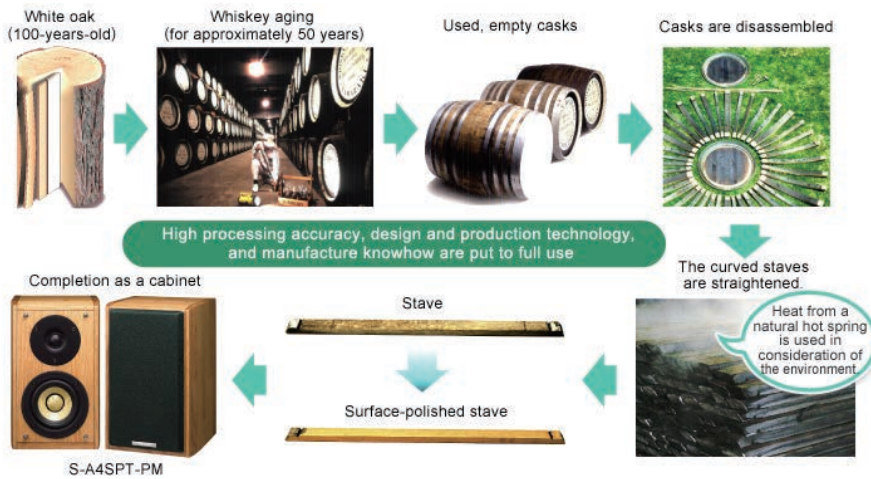
Wood from 100-year-old white oak is used to make casks that are used to age whiskey for 50 years or more. Although casks that have ended their service of aging have previously been used for fuel, etc., Pioneer has put its acoustic and woodworking technologies, cultivated over the years, to full use to recycle the cask material (solid wood) to a speaker cabinet. Pure Malt Speaker was thus born. Pure Malt Speaker always produces a warm, mellow resonance. Pure Malt Speaker, which we began to market from 1998, has become a long-selling commodity that continues to captivate many fans even today. In addition to providing high sound quality, Pure Malt Speaker, which is a recycle product that contributes to the reduction of cutting new timber, has been appraised for the long years of production and marketing and has received several prestigious environmental awards.

#### Main Examples of Awards FY2009/2005

- "METI Industrial Technology & Environment Bureau Director General's Award"  
Resource Recycling Technology & System Award
- "Chairman's Award of the Reduce, Reuse, Recycle Promotions Council"  
Commendation of meritorious action in the "Reduce, Reuse, Recycle Promotions" program



#### How Pure Malt Speaker is made



#### Environmental Accommodations of the Pure Malt series



## Pioneer Products Receive Environmental Award

The Environmental Award is an evaluation certification system in which environmental experts and knowledgeable persons conduct examinations and reviews and intended to promote corporate environmental initiatives and develop eco-friendly products.

Our unique environmental technology has been recognized as achieving industry top-class environmental performance and environmental functions, and has received well-known and authoritative environmental awards through strict examinations. Pioneer will create excellent environment-friendly products together with all of its employees.

## Awarded Products, Evaluation Content

### Low CO<sub>2</sub> Kawasaki Brand '13

#### carrozzeria "Car navigation for EV "AVIC-MRZ007-EV"

Power saving LCA



#### Low-CO<sub>2</sub> Kawasaki Brands

We access products, technologies, and services generated in Kawasaki that contribute to reducing CO<sub>2</sub> in overall life cycles. We thus contribute to the reduction of greenhouse gasses globally by widely spreading the certified products, technologies, and services.



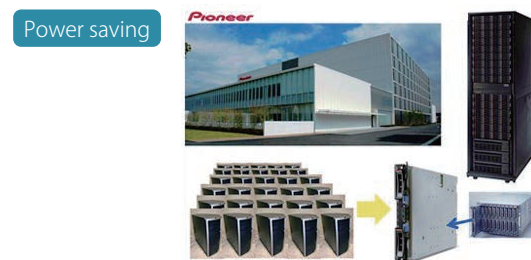
Kimura, Car Electronics Strategic Business Planning Division, receiving an award from Fukuda, Mayor of Kawasaki City

#### Main evaluation points

- A power saving route is recommended before driving by our unique EV-dedicated Eco-Route Search in consideration of EV driving properties that stores electric power by using regenerative braking. CO<sub>2</sub> was reduced by approximately 10% in comparison with the route guidance of the car navigation for gasoline vehicles.
- Eliminates worries of users with regard to battery depletion and contributes to the spread and support for EVs with the Estimated Cruising Area Display, charging spot location and full/empty information guidance.
- Analyzes environmental loads by Life Cycle Assessment (LCA) and calculates evaluation of CO<sub>2</sub> reduction effects.
- Many domestic main EVs are equipped, etc.

### Kawasaki Environmental Show Window Award 2012

#### Power saving of navigation data management



Shirosaka received commendation from a judge.

#### Main evaluation points

Operation and management of enormous data necessary for a comfortable car life required multiple data centers and a large amount of electrical power in addition to Smart Loop Information essential to eco-driving.

For this requirement, the latest IT technology has been introduced and servers have been integrated. 6 data centers have been consolidated into one location. As a result, power consumption and CO<sub>2</sub> emissions have been reduced by 87.5%.

### Low CO<sub>2</sub> Kawasaki Brand '12

#### AV-Receiver SC-LX85

Power saving Resource saving Energy saving LCA



Inoshita, Managing Executive Officer receiving an award from Abe, Mayor of Kawasaki City

#### Main evaluation points

While 9ch810W simultaneous output is realized, CO<sub>2</sub> has been reduced by approximately 47% in comparison with conventional analog amplifiers by adoption of highly efficient direct energy HD, and low power consumption and downsizing. Managing Executive Officer, Gen Inoshita receives an award from Takao Abe, Mayor of Kawasaki City.



Awarded Products, Evaluation Content

Green IT AWARD 2010/Green Purchasing Award 2010

CYBER Navigation AVIC-VH9990 series

Fuel saving



Main evaluation points

- Equipped with "Eco-Route Search" for the industry's first showing fuel economy before driving. \*At the time of launch, highly accurate fuel consumption estimates by Pioneer's unique "Fuel Consumption Estimation Technology".
- Response to "Smart Loop Traffic Congestion Information".
- Mountable to not only recent eco-cars, but also used cars and older model cars.
- Makes it possible to check eco-friendliness while driving with vibrant graphic indications and sound messages and support eco-driving.

Green Purchasing Award 2009

Demand Bus Navi System

Fuel saving



Main evaluation points

- Driving to one's home with reliable navigation
- Use of private cars and taxis eliminated and fuel consumption is reduced by realization of public transportation system that is convenient and understandable to everyone.

\* Jointly awarded together with Iizuna Town of Nagano Prefecture which introduced the system.

Resource Recycling Technology & System Awards 2009, 2005/ 3R Promotion Contributors Awards 2009

Pure Malt Speakers series

Resource saving Energy saving



Main evaluation points

- Technology to reuse used casks for aging whisky conventionally used for fuel, as a cabinet.
- The recycled materials also show excellent properties of sound quality.
- Continuous manufacturing and sales with the same concept for more than ten years

Eco-Products Awards 2008

CYBER NAVI AVIC-VH9000

Fuel saving



Main evaluation points

- Share information between drivers and reduce fuel consumption by Pioneer's original "Smart Loop" that provides congestion information in real time.

Energy Conservation Grand Prize 2005

Plasma TV PDP-435SX

Power saving



Resource Recycling Technology & System Awards 2002

DVD Player DVD MINI RAKU (RAKURA) DV-U7

Resource saving



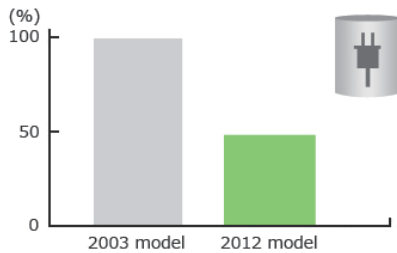
## Initiatives for Prevention of Global Warming

In order to reduce CO<sub>2</sub> emissions throughout the lifecycle of products, Pioneer conducts a Life Cycle Assessment (LCA), analyses CO<sub>2</sub> emissions and visualizes reduced amounts in emissions in comparison with conventional products and initiates global warming prevention activities.

## Reduction of Power Consumption by Digital Technology

With amplifiers, which are the core components of audio systems, we realized a halving of power consumption by our original digital technology. This digital amplifier technology is incorporated into high-end products to mainstream products for household use as well as in audio products for automobiles.

### Example of reduction of power consumption by digital amplifier technologies

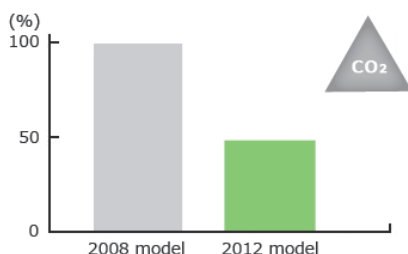


## CO<sub>2</sub> Reductions in Transportation by Energy Savings in Distribution

We are engaged in reducing fuel consumption as a way of saving energy in the transportation of raw materials and products. We are also engaged in reducing fuel consumption as a way of saving energy in the transportation of our products. We started by streamlining our physical distribution bases and simplifying the distribution steps, and have also introduced a milk-run\* system for shortening transportation distances from several parts makers. In regard to transportation means, we are carrying out a modal shift of switching from truck transportation to railway and maritime transportation. Also, we address reductions in product size and weight (downsizing) and promote transportation efficiency and reductions in fuel consumption.

\* A system in which a single transportation service makes a round among several suppliers to perform efficient pickup of production parts from suppliers.

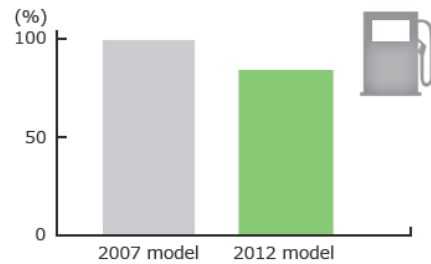
### Example of CO<sub>2</sub> reduction in transport by energy saving in distribution



## Searching for Routes Enabling Good Fuel Consumption with Car Navigation Products

Our car navigation may realize an energy-saving drive by searching for a route with lesser gasoline consumption.

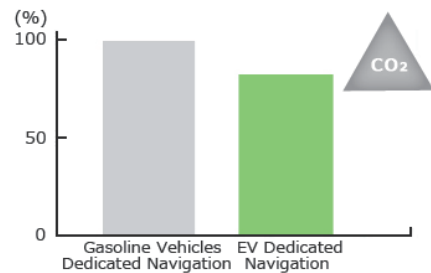
### Example of reductions in gasoline consumption by evolutionary advancements in route searches



## Realization of Eco-Drive with Reductions in Power Consumption

Different from gasoline vehicles, an EV stores electric power by using regenerative braking when decelerating allowing longer use of batteries on routes having appropriate decelerating zones. The EV dedicated navigation searches more ecological routes before departure with "EV-dedicated Eco-Route Search", eliminating worries about battery depletion and realizes efficient drive.

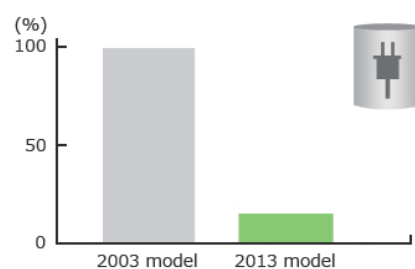
### Example of CO<sub>2</sub> reduction by using the EV dedicated navigation



## Reduces Power Not in Use

Also, most electronic products consume power, even slightly, just with the plug being inserted in the outlet. We even turned our attention to this power and were able to reduce standby power consumption to no more than 0.5 W.

### Example of reduction of standby power consumption





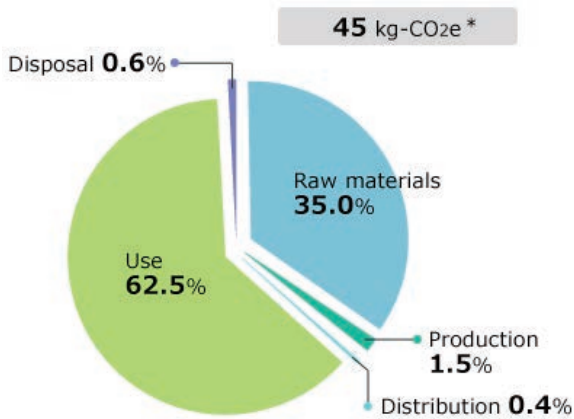
## Visualization of CO2 Emissions

### Analyzing CO2 emissions in lifecycle



### Products for Vehicles

#### ■ AV Main Unit MVH-790



\* Represent emissions throughout the lifecycle. CO<sub>2</sub>e is a carbon dioxide conversion value of greenhouse gas. The same applies below

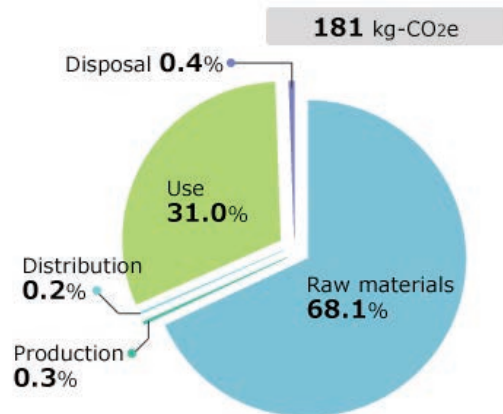
These products are for enjoying enhanced music experience in vehicles. AV main units are small products which are fitted into dash board of vehicle, and the CO<sub>2</sub> emissions are not large. However, MVH-790 aimed for further reductions, decreased the main body volume by 41% and the main body mass by 28%\*. By achieving downsizing, CO<sub>2</sub> emissions in "raw materials" and "transportation" have been significantly reduced. In addition, MVH-790 reduces power consumption in use, also minimizes backup current not in use to reduce vehicle battery loads and reduce CO<sub>2</sub> emissions in "use".

\* Details are introduced in the section "Eco-Friendliness in Cars".

#### LCA calculation conditions

Fuel consumption: Weighted average for actual fuel consumption of top ten best selling cars in 2008, according to the Japan Automobile Dealers Association  
 Driving condition: 800 km per month  
 This model is operating while driving and duration of usage are six years.

#### ■ Raku-Navi AVIC-MRZ099



This product also allows you to enjoy music and video content as well as car navigation.

Raku-Navi is a compact product which is fitted into the dashboard of vehicles, however, the AV function as well as car navigation function have been enhanced. Therefore, the "raw material" ratio in CO<sub>2</sub> emissions is large. For this reason, we have pursued a reduction in the number of parts and CO<sub>2</sub> reduction activities among suppliers. The ratio of "use" is large, but this is a calculation in a state that the following fuel consumption improvement function is not used.

In fact, use of the following functions results in improvement in fuel consumption. Raku-Navi proposes a route with the lowest gasoline consumption by the "Smart Loop Congestion Information" and "Eco-Route Search" with our "Fuel Consumption Estimation Technology" and contributes to reductions in CO<sub>2</sub> emissions. Moreover, the Eco-Status function assists driving with low fuel consumption.

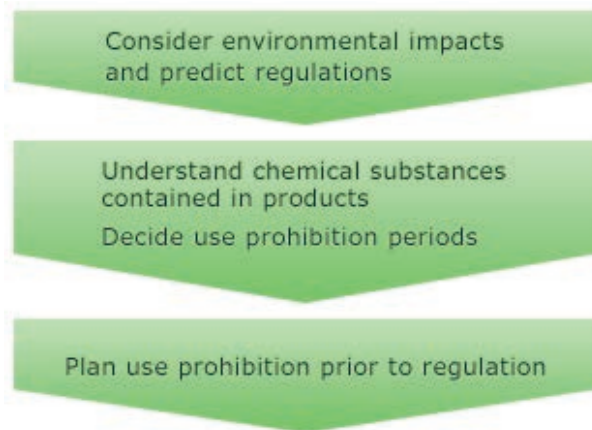
#### LCA calculation conditions

Fuel consumption: Weighted average for actual fuel consumption of top ten best selling cars in 2008, according to the Japan Automobile Dealers Association  
 Driving condition: 800 km per month  
 This model is operating while driving and duration of usage are six years.

## Minimizing Environmental Impacts

Pioneer manufactures and sells electrical and electronic equipment such as car navigation and audio products. We continuously pursue efforts to minimize environmental impacts from chemical substances used in these products. Conventionally, information on chemical substances contained in products has been collected, and controls were carried out so that the regulated substances were not used. Subsequently, environmental impact from the various chemical substances were assessed in each country and designated as regulated substances. For this reason, Pioneer established a system to accurately judge the environmental impact of these substances from varied information and secure reliable implementation of planned use prohibition measures prior to regulation.

### Response to Chemical Substance Regulations Worldwide



## Response to Chemical Substance Regulations Worldwide

As regulations to control chemical substances used in electrical and electronic equipment, there include "RoHS Directive" \*1 and "REACH Regulation"\*2 in Europe, "Proposition 65"\*3 in the United States, and the "JCSCA" \*4 in Japan. These regulations were originally enacted in developed countries. However, in recent years, regulations similar to the "RoHS Directive" have been introduced or planned in Asian, Middle Eastern and Latin In order to respond to changing regulations, we also proactively participate in domestic industry organizations\*5, and make efforts to collect information, and further, expand similar activities in our Asian, European and US offices and plants to acquire more accurate information more quickly.

\*1 RoHS Directive: Abbreviation for Restriction of Hazardous Substances EU Directive concerning chemical substances contained in electrical and electronic equipment.

\*2 REACH regulation: Abbreviation for Registration, Evaluation, Authorization and Restriction of Chemicals. An EU regulation to control chemical substances and their uses for protection of human health and environmental protection in the European Union.

\*3 Proposition 65: A law which was established in California, the U.S.A. for the purpose of protecting the human body and drinking water from hazardous chemical substances.

\*4 JCSCA.: Japanese Chemical Substances Control Act Conducts necessary regulation on manufacture, import and use etc., of chemical substances.

\*5 Examples of industry organizations Japan Electronics and Information Technology Industries Association: Industry organization related to electronics technology, electronic equipment and information technology (IT).

Japan Machinery Center for Trade and Investment: Export and import trade association related to machines

Japan Environmental Management Association for Industry: Organization to conduct investigations and research related to environmental management and national examinations for managers in charge of pollution controls.

### Chemical Substance Regulations Worldwide

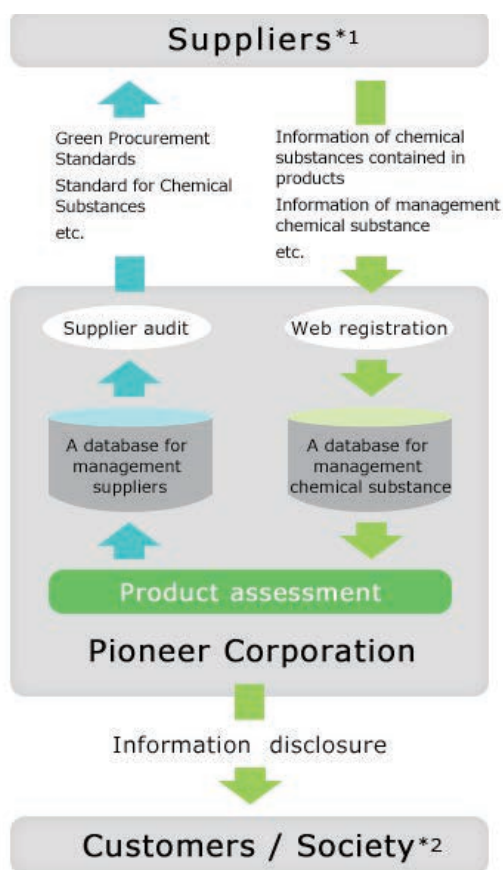


## Management Chemical Substance Information

To understand operations of chemical substances contained in products and achieve smooth operations of the system for disclosure and transmission of chemical substance information, Pioneer has adopted an industry standard format and is engaged in improving the efficiency of information collection throughout the supply chain as a whole. The collected chemical substance information is managed in an integrated environment database and an information transmission system is constructed to enable efficient reception and delivery of information from suppliers\*1 to customers\*2.

In addition, Pioneer has established Green Procurement Standards to purchase parts and products of low environmental impact from suppliers proactively involved in the global environment protection.

A system for conveying information regarding chemical substances Suppliers Environmental information



\*1 Materials supplier

\*2 Customers, delivery destinations

## Management Activities for Chemical Substances

Pioneer prepared management standards\*1 concerning chemical substances in 2003 and has been engaged in constructing a worldwide management system. 7 total abolishment priority substances (lead, mercury, cadmium, hexavalent chromium, PBBs; polybrominated biphenyls, PBDEs; polybrominated diphenyl ethers, and short-chain chlorinated paraffin) were determined to promote replacement of parts and total abolishment\*2 was achieved in 2006. As a recent worldwide trend, risk evaluations of respective chemical substances are being promoted together with strengthening of regulations concerning chemical substance management. Pioneer amended the standard\*1 in 2013 to respond to these regulations according to the plan.

### History of main activities



\*1 "Standard for Chemical Substances Contained in Products (GGP-001)"

\*2 Excludes regulation-exempted usage where contained hazard substance is acknowledged under a law or ordinance and replacement is not possible.

## Initiatives on Design and Parts Purchasing Stage

We promote initiatives in view of lifecycle in consideration of resource recycling.

### Select Easily Recyclable Materials

At the parts purchasing stage, we select materials that enable reducing the number of types of plastic materials used, not adhering to different types of plastic materials, not attaching resin film to packaging boxes, and promoting use of recycled materials. Materials that are easily collected, classified and disassembled are selected.



### Conduct Product Assessment

Product assessment is conducted for the following items at the design stage and the target values are set for each item. Product development is promoted with focus on resource recycling.

1. Less weight, less volume
2. Recycling of resources, use of recycled parts
3. Increase in resource recyclability
4. Ease in manual disassembly and classification
5. Packaging
6. Environmental preservation properties

### Response to Recycling Scheme at Consumption Point

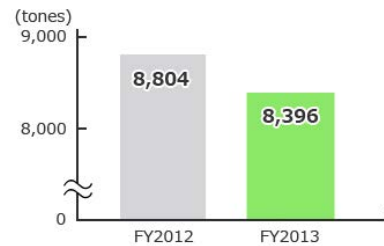
At the disposal stage of products, we have prepared a law and ordinance monitoring system globally to enable appropriate treatment in accordance with recycling laws at the respective points of consumption. We adhere to the recycling laws and ordinances of respective countries and promote recycling-awareness designs to contribute to effective utilization of resources, prevention of environmental pollution, etc.



## Initiative for Reduction of Emissions from Packaging Materials

### Transition of Usage of Packaging Materials

Packaging materials of approximately 8,400 tones were used (in FY 2013). In order to reduce emissions from packaging materials, we proactively employ resource saving, downsizing and low environmental load materials.



### Example of Reduction in Packaging Volume

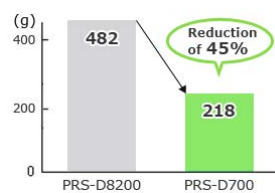
Significant downsizing of products is realized by high density mounting of circuit designs and improvement in digital amplifiers. Accordingly, the sizes of packaging boxes have also been reduced.

Conventional Model: PRS-D8200

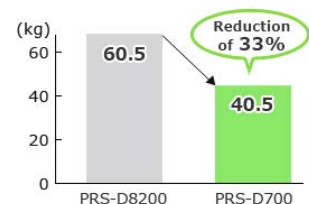
Current Model: PRS-D700



Reduction of Packaging Materials



CO<sub>2</sub> Reduction in Transport





## The Excellent Eco-Friendly Features of carrozzeria

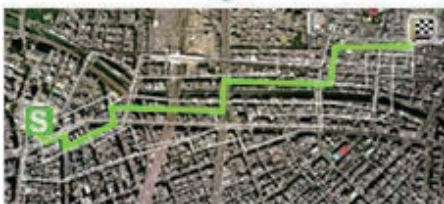
Pioneer creates products that realize "Eco-Friendliness, Economy, and Enjoyment" and enhance your car-driving experience. In car navigation systems, carrozzeria's original Smart Loop function searches for an eco-friendly route that avoids traffic congestion to reduce fuel consumption and shorten the driving time to your destination. With car AV products, we have downsized each product and reduced power consumption to reduce the load on a car in which the product is installed and contribute to fuel consumption improvements. Products of smaller size and lighter weight also contribute to a reduction in transportation fuel for delivery of products to customers.

Further, all carrozzeria products are provided with substantial AV functions thoroughly focused on realizing high sound quality, high image quality, and advanced functions to make driving even more pleasant. "Environment-friendliness, Economy, and Enjoyment" are thus pursued in carrozzeria. Furthermore, by taking full advantage of Green IT Technology as well, the consolidation of data centers for management and operation of the car navigation data system has been achieved, realizing significant reductions in electrical power consumption.



### Search of the route which is good for environment

Route for reducing gasoline consumption reduces CO<sub>2</sub> emissions



### Downsizing and Power Saving Contribute to Reducing the Load on the Car

Small size, light weight, and power saving contribute to lessen the load on the car and improve fuel consumption



### Electric Power Necessary for Management and Operation of Car Navigation Data Reduced

Power consumption of car navigation data centers reduced to 1/6 through integration.

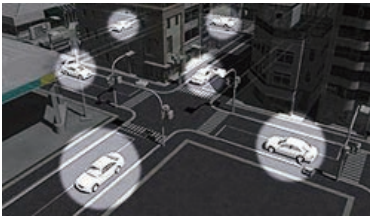


## Eco-Driving to Avoid Traffic Congestion and Useless Driving

### What is a Smart Loop?

General car navigation used only fixed information of car navigation main unit. Pioneer's car navigation system can collect and transmit a large amount of data related to driving. carrozzeria is a large and unique "information network" consisting of "collective knowledge" by networks such as driving experiences of individual persons, various information accumulated by manufacturers and information by third parties.

### General car navigation: Fixed information only



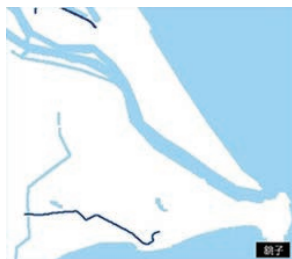
carrozzeria: Collective knowledge of smart loop



### Broad Range of Road Information!

Smart Loop Traffic Congestion Information pursues multidirectional information collection and optimum data processing. Real time information and additional data collected from CYBER NAVI and RAKU NAVI are also effectively used in addition to VICS information.

### VICS generally used as traffic congestion information (Example of Choshi City)



### Smart Loop Traffic Congestion Information covering roads, approximately 700,000 km (Example of Choshi City)



## Have You Experienced Useless Driving While "Searching for"?

You might have had such an experience that when arriving at a parking lot, it was full. Or, you may have driven back and forth because gasoline is sold at a particularly high price at a gas station and you used gasoline wastefully searching for a cheaper price. Smart Loop allows you to know not only the location but also the full/empty information and gasoline price in real time.

### Parking lot full/empty information



### Information on price at gas station



\* This information can be obtained from the contents of a communication service.

## Reducing Load on Cars Equipped with the Product

### Downsizing and power saving

Downsizing and power saving of car AV products reduces the load on cars equipped with it, decreases consumption of gasoline and depletion of battery and contributes to ecology and economy. Furthermore, downsizing reduces product transportation fuel from our plant to customers by ship and truck in addition to reduction of raw part materials.

### Enjoy the Latest Eco-Friendly Broad Media

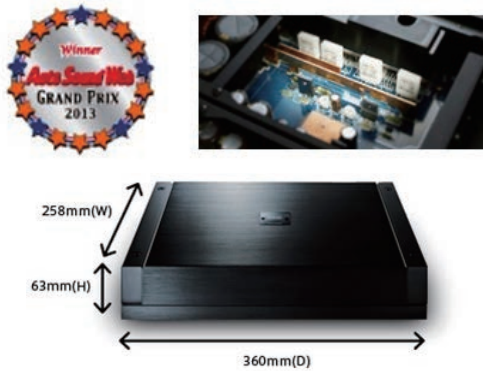
MVH-790 is an AV main unit which allows you to enjoy music from your smartphone and iphone even wirelessly. Mountability onto cars has been improved, and size and weight have been reduced.



	MVH-580	MVH-790	
Main unit depth (mm)	165	97	
Main unit volume (cm <sup>3</sup> )	1,469	863	Reduction of 41%
Main unit mass (g)	700	500	Reduction of 28%

## Full-Scale Audio Products Also Challenges Environment-Friendliness!

arrozzeriaX high-end power amplifier RS-A09X offers the ultimate high sound quality and its state-of-the-art technology is also eco-friendly.



### (Main environmental-friendly factors)

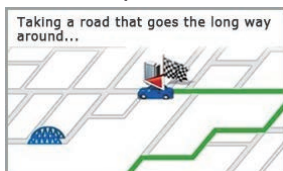
- Realizes small size by high density implementation technology
- Low backup current design
- Notes are included in the instruction manual, etc., and resources are reduced.

## Comfortable and Enjoyable Driving

### Eliminates Useless Driving with the Most Current Map

Updating map data using map charge allows you to drive using short-cuts to your destination and drive comfortably at any time with guidance using new roads which were not included at the time of purchase of purchasing the car navigation. It is unnecessary to renew car navigation and contributes to resource reduction.

#### With old map data...



#### Update map with carrozzeria map charge



### Example of map charge update

Type	Route name	Improvement content
Expressway	Central Circular Route (Yamate Tunnel) Middle loop Oi-minami Ramp ~ Ohashi JCT	Open
	Metropolitan Inter-City Expressway Ebina JCT ~ Samukawakita IC	Open
	Metropolitan Inter-City Expressway Sagami IC	Open-up

## More Enjoyable Drive

"Air gesture" allows you to operate only by bringing your hand close or swinging without touching the car navigation system. The satisfying AV functions offer comfort and enjoyment with music and video, making your driving time more "fun".

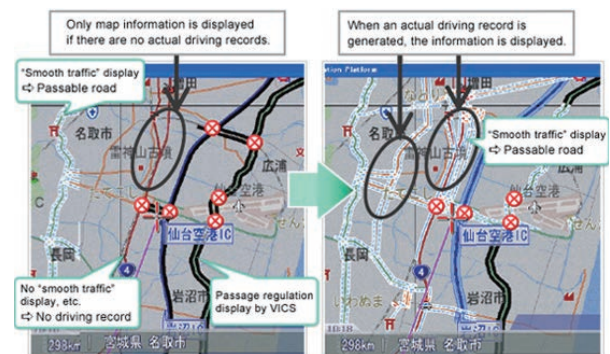


## Contributes to Restoration of Disaster-Struck Area

### "Passable Roads" are Displayed

The passable roads can be checked by display of VICS information ("passage prohibited (black solid lines)", "smooth traffic (blue solid lines)" along highways, etc.) and smart loop congestion information ("smooth traffic (blue dotted lines)," "congested (orange dotted lines)," etc.).

Only map (road) information is displayed if there are no actual driving records after the occurrence of a disaster.



When an actual driving record is generated, the information is displayed in real time and a passable road can be checked.



Certificate of Appreciation for "passable roads" near disaster areas



Car navigation system donated to Yamagata Prefecture for restoration support



## Eco-Friendliness of BD Drive for Personal Computers

We are also engaged in downsizing and power saving for the BD/DVD/CD writer for personal computers.

### BDR-XD05J2



- Lightest weight in the world at 230 g \*1
- Compact size \*2
- Disk can be removed even when the power is OFF

\*1 As portable BD writer  
\*2 W133× H14.8×D 133 mm

### BDR-S09J-BK



- Power saving mode is equipped. Power consumption at the time of operation peak is suppressed. Stable operation is maintained even when power supply is decreased.

## Eco-Friendliness of Daily Life

### Smoothly, Beautifully and Eco-Friendly

Organic EL illumination promoted by Pioneer as new business is expected to be the next-generation illumination. Our organic EL illumination panels have been adopted at many commercial facilities and medical sites.

"Organic EL illumination for makeup" "OLE-B01" exclusive for SHISEIDO



Lights suitable for makeup in various scenes are reproduced under the supervision of Noriko Okubo, SHISEIDO top hair & makeup artist.

## Features of OLE-B01

- Close to natural light and excellent in chromogenic performance and visibility. A natural color look.
- The entire surface emits light and illumination friendly to the eyes.
- Makeup modes of three patterns ("natural light", "office", and "lounge") are equipped according to use scene.
- Equipped with relaxation modes of 12 patterns which can be changed according to the user's mood.
- Includes remote control that easily operates modulated light and modulated colors.
- Slim and simple design
- Eco-friendly illumination which does not contain environmentally harmful chemicals such as mercury.
- Energy saving design of low power consumption of 10 W.



## Excellent Eco-Friendliness of Leisure Products

Enjoy bicycling with Potter Navi



## Ride with Navigation Units for Bicycles

Driving is enjoyable, but riding a bicycle eco-friendly and healthily without using fuel is also fun. You can go cycling to some destination with your friends or potter freely by yourself (outing by bicycle). In addition, the past running record can be checked.

## Cycling Life is More Enjoyable and Free

### Ride with Navigation Units for Bicycles SGX-CN710-W



Time circle indication indicating a range to be returned

### Meter mode



### Diet mode



As the power supply, the Potter-Navi main unit uses a lithium ion battery that can be charged and used repeatedly at a maximum of 10 hours. The usage time can be extended by turning on the "energy-saving mode". Also, when using just the metering function, the usage time can be extended further by turning off the GPS. Such functions and measures for reducing power consumption also saves electric power by reducing the frequency and number of times of charging. The lithium ion battery is a precious, recyclable resource and reception and recovery for battery exchange and product disposal are performed at our repair outlets.

### Save mode







Pioneer's Thailand plant is in "Ayutthaya," which is located approximately 80 km north of Bangkok, the capital of Thailand, and is famous as a World Heritage site. The cleanup activities performed for more than 10 years by employees in this ancient city dotted with the Ayutthaya ruins and numerous temples are introduced below.

How it began ---

It was 2003 – the company president at that time proposed regional cleanup activities, which had been started in Japan, in introducing ISO14001. Although direct effects, such as regional contribution and beautification of streets, were expected, there was some anxiety as to whether or not such indirect effects as raising the environmental awareness of the employees and providing them with the opportunity to physically sense the importance of global environment friendliness would be understood in a foreign land.

As the first round of activities, the employees performed cleanup at Wat Mongkhon Bophit, located in the Ayutthaya historical park, which they take extreme pride in. Approximately 200 persons, mainly company staff, gathered together to pick up litter within the temple grounds.



Wat Mongkhon Bophit



Approximately 200 participated

At this moment ---

The initial anxiety was unnecessary. The activities have become an annual event that everyone looks forward to. The activities have evolved to a point where everyone shares an awareness to voluntarily engage in social service and understands the importance of accumulating small activities in environmental conservation. The locations of the activities have also changed to temples where tourists hardly visit. Famous tourist sites are well cleaned. The cleanup activities are performed with the resolve to make temples of regions that are not tourist sites cleaner than those of tourist sites.

## Recent Activities are Introduced (Wat Rachbuakaw)

The company's commuting pickup bus is used for transport from the plant to the temple. To avoid heat, the activity is performed for 2 hours from 8 in the morning. After arriving, the arrangements are checked during the opening formalities. It is now time to start the cleanup activity.



Wat Rachbuakaw



"It's time to start"

When the participants started activities, they were tense but enthusiastic. The spacious temple grounds are cleaned up efficiently through the teamwork cultivated in daily work activities.

Together with the cleanup activities, we have been donating trash cans to temples for installation on the grounds with the wish to "keep the temples always clean." In return for our cleanup activities, the monks offer us "prayers and blessings." All participants listen closely with their hands held together. The heat and fatigue go away and we all feel spiritually enriched. Even our hearts are cleansed through the activity – a scene that may be unique to Thailand.



"Excellent teamwork"



Donating trash



Prayers and blessings

## Comments from Participants and the Host



Participant

I am especially thankful because I was able to feel very happy about myself. I am very glad to have participated. I will continue to participate.

The temples of the Ayutthaya ruins are our treasures. We consider these activities to be opportunities for enlightenment for all participants. We are also proud to have received appreciation from these temples and the local community.



Host



President

Everybody performs the activities very eagerly. Participating in the activities together with everyone gives me a very satisfying feeling. I am sure the employees feel the same. We would like to continue our cleanup activities at the temples.



### Introduction to Pioneer in Thailand Pioneer Manufacturing (Thailand) Co., Ltd

Design and production of car electronics are performed. The plant is located in the Rojana Industrial Park of Ayutthaya and more than 3000 persons work there.



## Concept Related to Global Warming Measures

Pioneer is engaged in global warming issues based on a basic concept that companies live up to their social responsibilities with respect to sustainable development. Energy consumption used for corporate activities, we recognize that it's one of the causes of global warming. Pioneer will continue to be engaged in reduction of energy which is consumed by our business activities in a rational planned manner.

In addition, Pioneer considers risks and opportunities in response to climate change as management issues, recognizes its own standing position, and engages in issues from the two perspectives of highly efficient production (energy saving) and supply chains (indirect fields).

## Targets Setting for Activities of Global Warming

The target values for global warming countermeasures in offices and plants promoted by the Pioneer Group have been set in consideration of commitments to stakeholders. In large-scale offices and plants, activities are promoted according to the framework of the Energy Saving Act, however, some offices or plants mainly focus on global warming countermeasures promoted by local government.

The Kawagoe Plant participates in the Target Setting Type Emission Trading System of Saitama Prefecture. It has conducted reduction activities in line with reduction targets determined by the manufacturing industry and achieved its targets without depending on emissions trading.

The Headquarters in Kawasaki City achieved reduction targets for the first three years (FY2011 to 2013), and continues activities for FY2016.

Furthermore, the electrical and electronic industries set common voluntary targets and started global warming countermeasures across entire industries based on Keidanren's Commitment to a Low Carbon Society. Pioneer also registered for participation. With 2012 as the basis year by original unit evaluation index, we are promoting activities to achieve our targets in 2020.

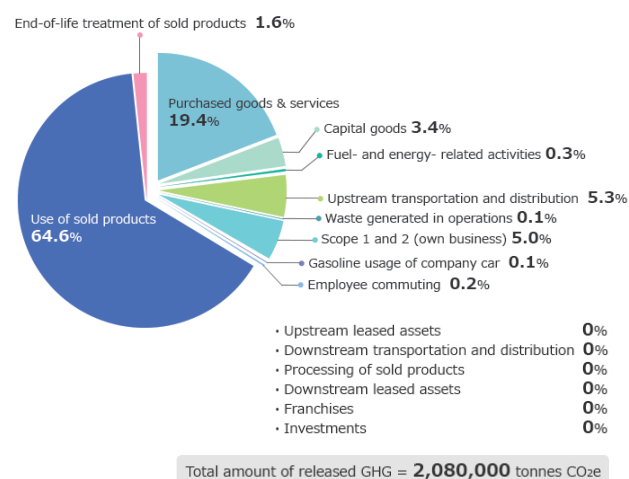
### Third-Party Verification

Upon reporting on the Target Setting Type Trading Scheme of Saitama Prefecture, the Kawagoe Plant received a third-party verification regarding greenhouse gas emissions in the basis FY and FY2013 by a verification registration agency. Boundary check, measurement point check, check of evidence of energy usage amount, etc., were performed in accordance with the emission verification guidelines of Saitama Prefecture, and the transparency and reliability of the data were confirmed.

## Greenhouse Gas Emissions throughout the Supply Chain

Pioneer engages in understanding and calculation of greenhouse gas emissions throughout its entire supply chain involved in corporate activities. Total emissions by the FY ending March 2014 were approximately 2,080,000 tonnes, and our area (total of scopes 1 and 2) was 5.0%. As an environmental impact assessment method, the Life Cycle Assessment (LCA) was researched and environmental impacts from raw materials to disposal and recycling for each product has been calculated. However, the method has recently advanced from product unit to entire corporate activity. The calculating algorithms of the product LCA were uniquely established, and the entire concept refers to the GHG Protocol and greenhouse gas emissions original unit list refers to the emissions original unit database (Ver.2.0) of March 2013 version of the Ministry of the Environment.

### Greenhouse gas emissions in the supply chain

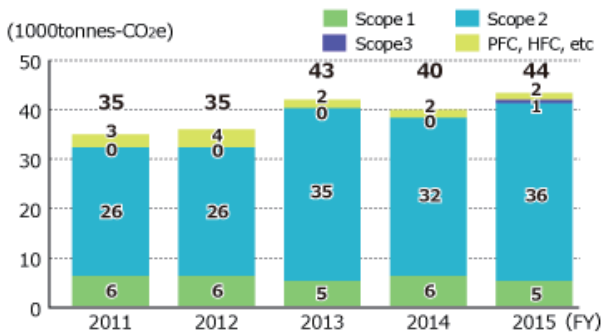


- Purchased goods & services, Fuel- and energy- related activities, Capital goods and Waste generated in operations are calculated from the Emission Intensity Data for Japan Using Input-Output Tables.
- Upstream transportation and distribution, Gasoline usage of company car and Employee commuting (of gasoline usage) are calculated from actual survey results of the first hierarchy.
- Use of sold products and End-of-life treatment of sold products are calculated from the results of the product LCA.
- CO<sub>2</sub>e is a carbon dioxide conversion value of greenhouse gas.

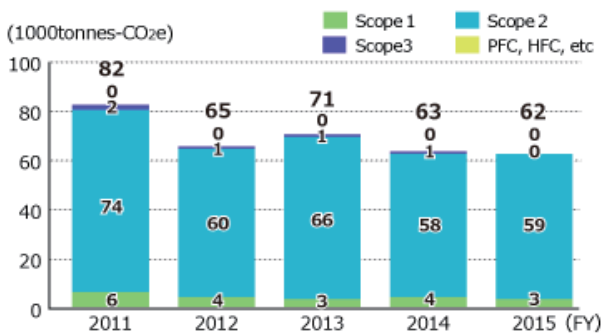
## Reduction of Greenhouse Gases

In comparison to the previous FY, the greenhouse gas emissions in the FY ending March 2015 increased by approximately 3% in pioneer groups. The amount of greenhouse gases in both Japan and overseas, there is the impact of the emission factor of electricity.

### Greenhouse gases emissions (in Japan)



### Greenhouse gases emissions (Overseas)



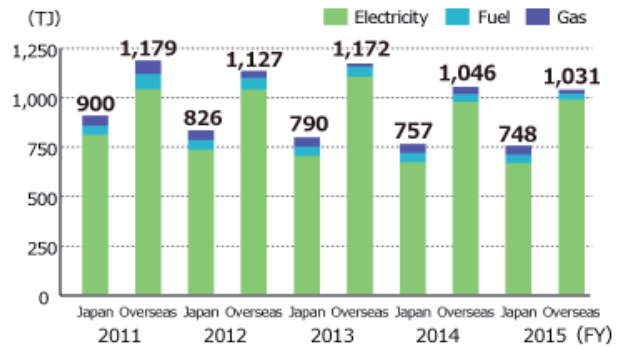
- Scope 1 : CO<sub>2</sub> emissions were calculated based on the amount of fuel used to equipment stationary combustion diesel generator, gas turbine generators, boilers, etc.

Scope 2 : Electricity (Japan) : CO<sub>2</sub> emissions were calculated based on emission factor after adjustment for each electric power company. (Overseas) : We used the data (Emission Factors from Cross-Sector Tools) in 2009 that have been published from GHG Protocol. For locations in Belgium the CO<sub>2</sub> emissions was set to zero because it contracts with power companies to supply green energy.

Scope 3 : Gasoline and diesel fuel were aggregated for the company-owned cars.

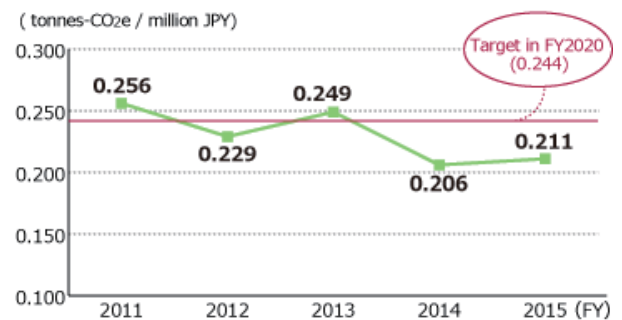
PFC or HFC : For greenhouse gases other than CO<sub>2</sub> (SF<sub>6</sub>, CH<sub>3</sub>, PFCs, HFCs, N<sub>2</sub>O) is converted to an aggregate amount of CO<sub>2</sub> emissions in the production process. (Emissions in the semiconductor production process mainly)

### Energy consumption



Pioneer set a target to reduce greenhouse gas emitted from offices and plants by 10% by 2020 in CO<sub>2</sub> tonnes per sales amount as of the FY ending March 2010 as the basis year. We analyze the results to utilize further activities.

### GHG intensity from sales amount (Pioneer group)



- Greenhouse gas emissions include gasoline for company-owned cars and greenhouse gases other than CO<sub>2</sub>. Sales amounts are consolidated net sales.

## Introduction of Renewable Energy

Electric power makes up 92% of the energy use of the Pioneer Group (actual value of the FY ending March 2015). Most of the power is purchased from power companies. If greenhouse gas emitted at the time of power generation is considered, electric power quality should also be taken into account. In regard to the introduction of renewable energy in Japan, solar power generating equipment for 150 kW has been installed at Pioneer Microtechnology Corp. (Yamanashi Prefecture) and that for 30 kW has been installed at the Kawagoe Plant and these are being used on a trial basis. In regard to overseas, power for PEE (a corporation for Europe corporate supervision and sales in Belgium)\* is purchased from a power company that generates 100% of the power from renewable energies (wind, solar, and biomass).



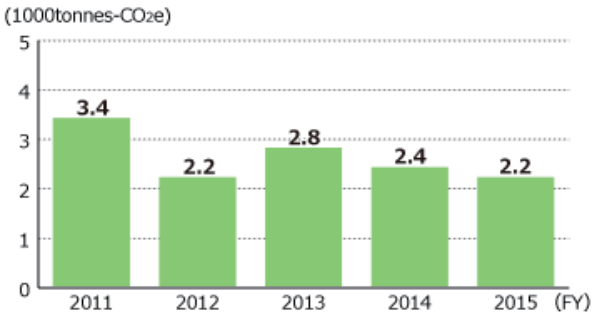
Solar generation equipment in Kawagoe plant

\* Pioneer Europe NV

### Reduction of Non-Energy-Derived Greenhouse Gases

In regard to emission circumstances of non-energy-derived greenhouse gases in Pioneer, there are no plants or offices of a level requiring reporting by the Energy Saving Act on Promotion of Global Warming Countermeasures (cases where the release of one type of substance as converted to CO<sub>2</sub> exceeds 3000 tonnes as Japanese law). The main emission sources are process gases used in the semiconductor production process and lubricants used in mechanism parts of car products. In regard to use in semiconductor production processes, we are engaged in reduction of release amounts by such measures as restricting usage amounts to the minimum necessary in the production processes, etc. Solvents used for coating fluorine-based lubricants are being replaced as much as possible to those with an ozone-depleting potential of zero and a low global warming potential.

#### Emissions of non-energy-derived greenhouse gases (in Japan)

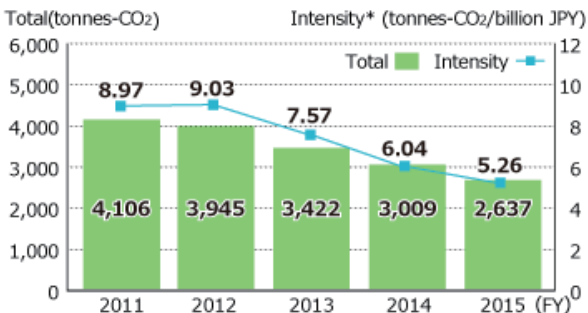


• This data includes CO<sub>2</sub>, CHCO<sub>4</sub>, HFC, PFC, N<sub>2</sub>O, SF<sub>6</sub>, HFE, NF<sub>3</sub>

#### Energy Saving in Distribution (Modal shift)

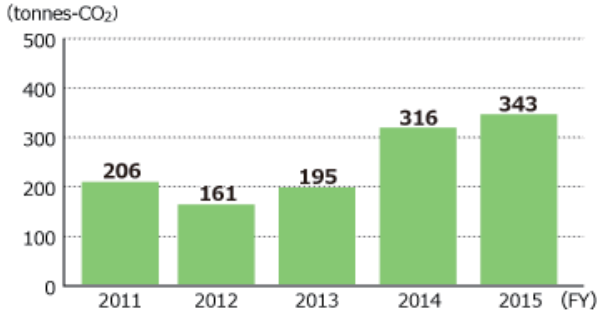
The Pioneer Group is engaged in energy saving in distribution of product lifecycles from transportation of production materials to transportation related to marketing. CO<sub>2</sub> emissions in transportation in Japan have been reduced by approximately 12% at the FY ending March 2015 in comparison with the previous year. In particular, we have been promoting a modal shift of transportation means from trucks to railway and maritime transportation, and CO<sub>2</sub> reduction in this activity was 343 tonnes.

#### Transition of CO<sub>2</sub> emissions by domestic product



\* Intensity = CO<sub>2</sub> emissions (Total)/Sales amounts

#### CO<sub>2</sub> reduction by modal shift



#### Example of Energy Saving Activities

##### Energy Saving by Re-examination of Flow Rates of Cooling Water Pumps

The Pioneer Headquarters uses many temperature and humidity test units in order to guarantee the quality of products. When the energy saving committee within the company diagnosed the cooling water facilities to control the temperature of these units, it was found that there were some allowances for the capacity of the cooling water pump. For this reason, an inverter circuit was installed on the cooling water pump and flow rate control of cooling water was made possible according to the load. As a result, used power was significantly reduced. We will also continue energy saving activities.



Cooling Water Pump equipment

##### Example of Activity for Global Warming Prevention

PSG (production corporation in China)\* replaced lighting to LED lamps. Since China has a high ratio of coal thermal power generation, reduction of greenhouse gas by energy savings brings about a significant effect. Electricity savings of 98,000 kWh annually were realized by changing lighting during the production process from conventional fluorescent lamps to LEDs.



Replacement to straight LED lamps

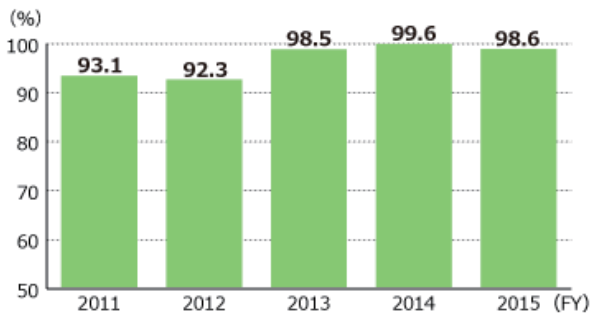
\* Pioneer Technology (Shanghai) Co., Ltd.



## Green Purchasing Activities

The Pioneer Group is proactively engaged in green purchasing. The basic ideas of green purchasing are: "not buying any useless things;" "buying only what is necessary;" and "when buying, buying only environmentally-friendly goods." Achieved green purchasing rate of 98.6% as of the FY ending March 2015 compared with the target of 95%.

### Green purchasing rate



### Items targeted for 100% green purchasing\*

Based on the basic ideas of green purchasing, 13 items were set as items targeted for 100% green purchasing. 100% green purchasing was achieved for 12 items in the FY ending March 2013. Uniformity could not accomplish 100% purchasing since there were no green-compatible products that provided for the function and performance required.

- Office paper
- Copiers
- Printers
- FAX machines
- Multifunction Printers
- Toilet Paper
- Personal computer
- Office furniture
- Uniforms
- TVs
- Refrigerators
- Electronic chalkboards
- Company Vehicles

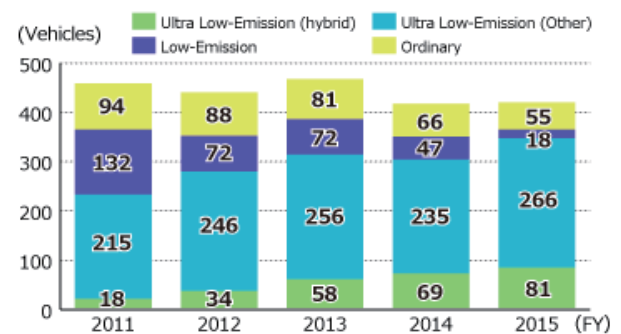
\* Items targeted for 100% green purchasing (Achieved 100% green purchasing was achieved)

### Switching to eco-friendly vehicles

Company-owned cars have now been replaced with low emission cars. 365 company-owned cars (87%) out of 420 cars have been replaced with low emission cars\*1 as of the FY ending March 2015. Moreover, 347 cars (95%) out of the low emission cars are ultra-low emission cars\*2. Also, hybrid vehicles were introduced systematically, and we presently own 81 hybrid vehicles.

\*1,2 Low-Emission Vehicle (LEV) Environmental Performance Certification : System of indicating how much hazardous substances have been reduced from exhaust gas emissions from the reference value.  
 Ultra Low-Emission Vehicles (4-star ranking) : Reduced by 75% or more  
 Low-Emission Vehicles (3-star ranking) : Reduced by 50% or more

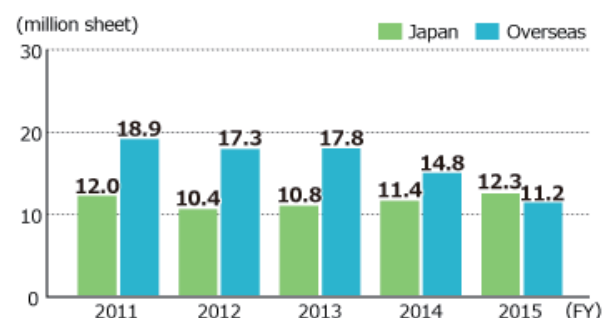
### Amount of office paper purchases



### Amount of office paper purchases

According to the basic ideas of "not buying any useless things" and "buying only what is necessary" for green purchasing, we promote activities to reduce purchase amounts of OA paper. The purchase amount of OA paper as of the FY ending March 2015 increased by approximately 8% by expanding coverage to include all of Japan, compared with the FY ending March 2014. Overseas, significant reductions were achieved by educating employees and promoting computerization. As a result, the reductions of approximately 8% throughout the entire group were achieved.

### Transition of office paper purchases





## Initiatives Related to Waste and Valuables

For sustainable resource recycling activities, we promote efforts in recycling activities and reduction of generated amounts of waste and valuables.

## Concepts Related to Effective Use of Resource

Pioneer aims not to input useless materials and to use input resources without waste to deliver products. Under this concept, Pioneer carries out activities by incorporating waste (unwanted objects) and valuables (object having market value as a resource) generated at the time of business activities into evaluation indices.

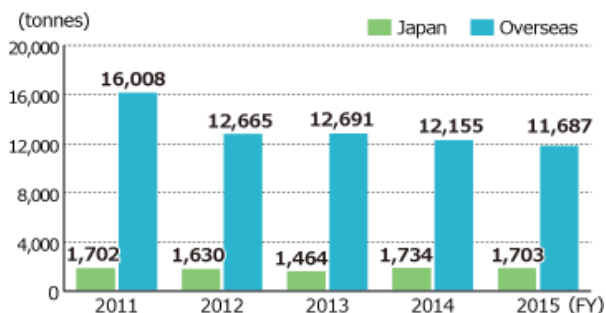


## Reduction in Waste and Valuables

Due to differences in characteristics of each plant or office. Action plans for waste reduction and effective resource utilization activities are formulated at respective sites in accordance with differences in production processes for plants and work flows for offices. Various approaches are taken toward reducing waste and valuables in the production process. For example, in the design and production sector, circuit board scraps are eliminated, and in the semiconductor production process, the coating amount of a photoresist is optimized, etc.

Approximately 90% of the waste and valuables tend to be emitted from bases other than Japan. We will promote activities to reduce waste and valuables in Japan and overseas.

## Transition of generation amounts of waste and valuables



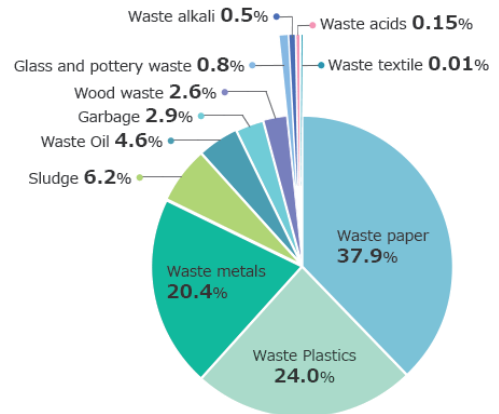
## Breakdown of Waste and Valuables

Most waste and valuables generated from offices and plants in Japan are packaging materials (cardboards). The equipment business also emits effluents containing chemicals.

• The total of the component percentages does not add up to 100%

## Breakdown of waste and valuables (in Japan)

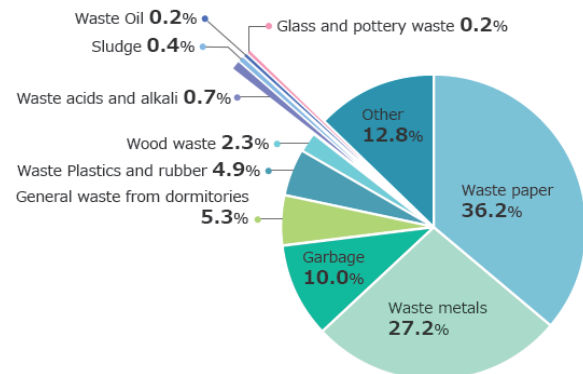
(actual figure for the FY ending March 2015)



Waste derived from overseas is mainly packaging materials (cardboard, plastic film) generated when components are delivered and extracted residue generated at the time of metallic pressing.

## Breakdown of waste and valuables (in Overseas)

(actual figure for the FY ending March 2015)



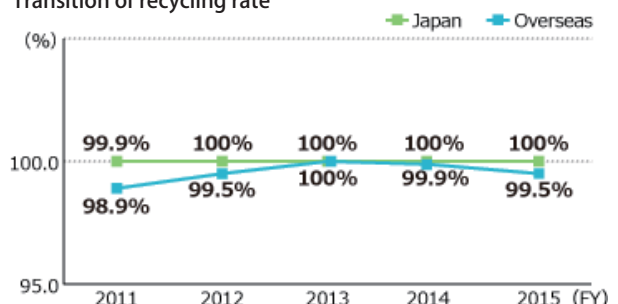
• Some production plants have dormitories for employees in sites and there is waste from daily life.

## Transition of Recycling rate

A high recycling rate of 99.5% (actual figure for the FY ending March 2015) is being maintained both in Japan and overseas.

• Zero emissions of waste (definition by Pioneer) means to recycle waste from offices and plants to reduce landfill disposal close to zero.  
 Japan: To recycle more than 99.5% of waste from offices and plants.  
 Overseas: To recycle more than 99% of waste from offices and plants.  
 (The recycling rate is calculated according to the waste disposal methods specified by laws and ordinances in each country.)

## Transition of recycling rate



## Recycle Promotion Activities (Kawagoe Plant)

Although trial products for which performance evaluations have been completed are disassembled for disposal for security reasons, classified recovery is performed while exchanging information with recycling companies in order to recover useful metals. At the recovery locations, recovery unit prices are indicated according to the type of IC, circuit, material, etc. Classification is performed with a greater level of intention now that disposed objects are indicated as being marketable goods of value.



Recycling center

### Example of increase in classification awareness by numbering garbage bags (Kawagoe Plant)

Numbers are assigned to respective floors and the numbers are indicated in all garbage bags to enable feedback to the division concerned when there is a classification error. In regard to items with which an error occurred, the 10 worst classification errors are notified in the plant in the environmental education by e-learning.

## Increase in Recycling Quality (Kawagoe Plant)

Stretch wrap (polyethylene) is used to prevent collapse in carrying products on pallets (bases used for placing cargo during distribution). It was conventionally disposed of as waste plastic, however, compressors have been introduced because they were found to be valuables if they are compressed. By this method, the value as a resource from thermal recycling to material recycling also increased. Also, due to transportation upon compressing, the transportation efficiency has been improved, sales as valuables have increased, and in comparison to before the introduction of the compressor, total processing costs for plastics have been cut to 60%.



Packed wrap

## Example of Generated Amount Including "Waste Circuit Board are Eliminated" Valuables (Kawagoe Plant)

We eliminated circuit board (marginal material) which are necessary only at the time of production and are disposed of in process by fabricating parts for circuit board and layout patterns. Cost reductions with reduction in material costs by a decrease in circuit board area and elimination of marginal material cutting processes as well as a reduction in generation of waste and valuables have been achieved. Applicable models will be expanded in the future and reductions in waste will be promoted around the world.



Waste circuit board (red shaded areas) were eliminated.

## Battery Recycling at Distributions

In order to comply with battery recycling directives of various parts of the world, Pioneer practices marking and removal-facilitating design and promotes battery collection at vendors. PBL (production corporation in Brazil)\*1, collection boxes were uniquely created for collecting used (recyclable) batteries, installed at the service agent's reception counters (approximately 200) variously located in Brazil. The collected batteries are processed in accordance to the applicable battery regulation in the country. Also in Japan, compact rechargeable batteries are used in our products such as cordless phones, portable navigation units, etc. Therefore, based on the Law for Promotion of Effective Utilization of Resources, we have joined the general incorporated association, JBRC\*2, as a recycling cooperation enterprise and are engaged in the collection and recycling of used compact rechargeable batteries.



The battery collection box which the overseas subsidiary of Brazil designed uniquely.

\*1 Pioneer do Brasil Ltda. (PBL)

\*2 Japan Portable Rechargeable Battery Recycling Center

## Concepts Related to Management of Chemical Substances

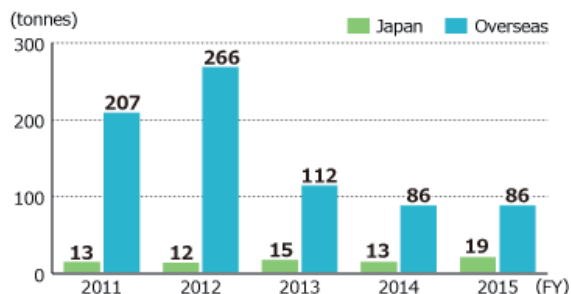
We at Pioneer regard management of chemical substances as an important theme from the standpoint of pollution risk, and have conventionally implemented improvements and reduced emissions such as appropriate management of chemical substances and replacement of used substances according to the process. As business structures change, use of chemical substances have also been eliminated and risks have decreased. However, we will comply with changes in laws from respective countries, strengthen regulations and promote initiatives to maintain a high level of management.

### Reduction of VOC\* Emissions

In performing risk management of chemical substances, Pioneer is engaged in reduction of VOCs released in production processes. VOCs are mainly contained in organic solvents, adhesive agents and cleaning agents used in production lines. Change of adhesive agents, improvement of soldering processes, etc., are carried out to reduce residual VOCs in products.

\* VOC : Volatile Organic Compounds.  
Scope of these data is PRTR substances that included in VOC and 20 substances of VOC electrical and electronic industry-defined.

### Trends in VOC emissions

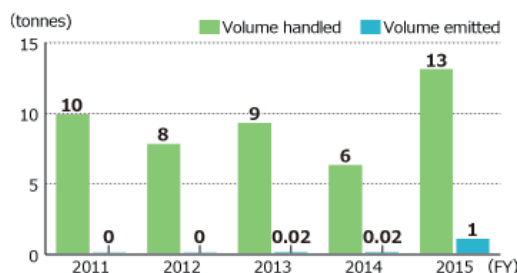


### Chemical Substances Management by PRTR System

For chemical substances which are used in the production process, an environmental impact assessment is conducted. In order to reduce emissions of chemicals into the air and water, efforts for improvements in the production process, and shifting to alternative materials where technically possible are implemented. Where chemical substances are necessary for use in the process, defined procedures for appropriate management etc. are actively promoted. In accordance to the PRTR system in Japan, the total volume in the handling of chemical substances for the year ending March, 2013 year end data, the specified chemical substances contained in heavy oil for power generation is summarized.

\* PRTR system: Pollutant Release and Transfer Register system under Japanese law

### Trends in PRTR chemical substances handling and emissions



### Handling, transfer and emissions of PRTR chemical substances

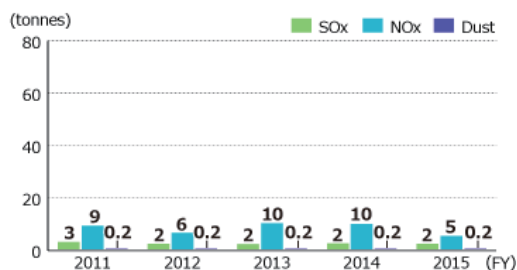
Substance	Volume handled	Emissions			Transferred		Transferred in the products	Volume removed or disposed of	Volume recycled
		Volume emitted into atmosphere	Volume emitted into water	Volume emitted to soil	Volume transferred as waste	Volume transferred to sewers			
Methylnaphthalene*	7.5	0.04	0	0	0	0	7.5	0	0
Hydrogen Fluoride and its salt	3.4	0	0	0	0	0	0	3.4	0
N,N-dimethylformamide	1.3	0	0	0	1.3	0	0	0	0
Toluene	1.0	1.0	0	0	0	0	0	0	0
Total	13.2	1.0	0	0	1.3	0	7.5	3.4	0

\* Methylnaphthalen is included in the distilled fuel for power generation.  
• This table is the result of the aggregate quantity that one substance handled by one plant exceeds one tonne in Japan.

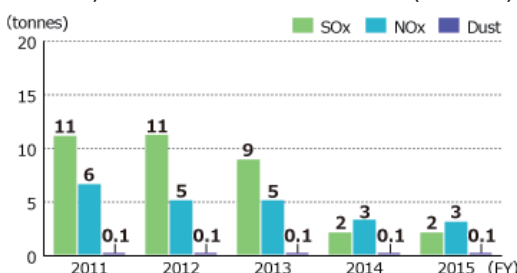
### Reduction of SOx, NOx, and Smoke Dust Emissions

Due to renewal of air conditioning equipment (as an environmental measure), the emissions of SOx, NOx, and smoke dust from production sites of the Pioneer Group are restricted to emissions at a limited number of sites. The major facilities that are applicable are cogeneration facilities and boilers that use heavy oil as the energy source. The cogeneration facilities have been decreased in operation rate due to a steep rise in fuel cost and electric power is being purchased from power companies. In regard to boilers and absorption chiller-heaters, the energy source has mostly been switched to natural gas and the SOx emission has thus decreased. The total emission amounts of SOx, NOx, and smoke dust are calculated as (concentration) x (operation time) at the time of measurement.

### Trends in SOx, NOx and Smoke Dust emissions (In Japan)



### Trends in SOx, NOx and Smoke Dust emissions (Overseas)



## Initiatives in Biodiversity Conservation

Pioneer is engaged in biodiversity conservation in order to realize a sustainable society.

### Concepts of Biodiversity Conservation

Although an enterprise performs its business activities by receiving food, water, and other benefits of ecosystem services supported by diverse organisms, it also has impacts on the ecosystem, such as decrease of biological species.

Environmental impact assessment results show that the Pioneer Group is high in environmental impact in terms of greenhouse gases, pollution etc. The Pioneer Group thus engages continuously in global warming prevention, resource savings, resource recycling, and management of chemical substances as necessary efforts towards comprehensively reducing environmental impacts and contributing to biodiversity conservation.

In addition, we continuously make efforts to improve regional contribution activities and biodiversity conservation such as the Pioneer Forest activity and improvements in activity areas for animals and plants.



Scenery around Kamakita Lake where Pioneer Forest is located



Eggs found in a forest

### Examples of Activities at each site

#### Conservation of Pink Dolphins in China

PHK (sales and production corporation in Hong kong)\*1 is performing cleanup activities on "Lung Kwu Chau" which is one of the uninhabited islands located in area where wild pink dolphins (formal name: *Sousa chinensis*\*) live. In these waters, the level of pollution has increasingly become serious, threatening the life of the dolphins due to construction of a bridge to Macau and waste flowing from inland rivers in China.

Since 2011, PHK has observed wild dolphins to understand the ecology and has cleaned the island in this marine area for the purpose of improvement of the environment under the guidance of the environment preservation ecology association "Eco Association Limited."

In October 2014, a total of 25 persons including employees, their families and friends visited the island by boat and participated in cleanup activities.



Pink dolphins



Cleanup activities



Participants

#### Planting of Mangrove in Thailand

PTM (production corporation in Thailand)\* is performing planting activities by Samut Songkhram. There are mangrove forests along the coastline of Thailand, populated by marine and forest animals and plants. The forests serve important roles as two ecological systems and are called a "paradise for living creatures" and "cradle for marine lives." However, mangrove forests have been dying out recently. As a result, PTM started planting activities in 1996 in order to improve the environment. In 2014, activities were conducted in October.



Activities



Visit by boat



Participants

\*1 Pioneer (HK) Ltd.

\*2 *Sousa chinensis* has been designated as a near-threatened species on the red list of threat to endangered species in the International Union for Conservation of Nature and Natural Resources (IUCN).

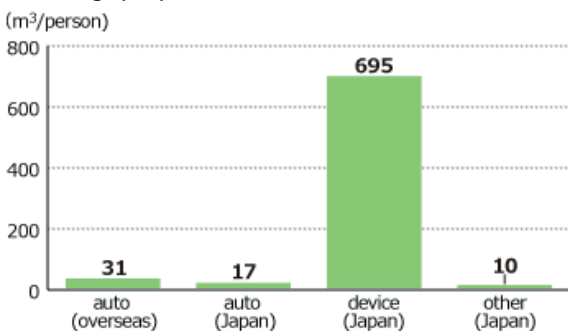
\* Pioneer Manufacturing (Thailand) Co., Ltd.



## Concepts Related to Effective Use of Water Resources

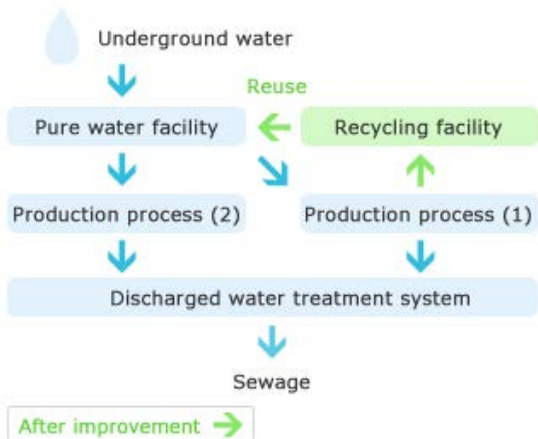
Water usage per person was surveyed for each business, and a water resource impact assessment was conducted. For businesses using a large quantity of water, the proactive recycling of water, including the introduction of facilities, as well as measures related to future water risks are under consideration. Plants or offices which rely on water resources in small proportions will also thoroughly control usage and discharge amounts.

### Water usage per person



### Discharged Water Recycling Facility in Semiconductor Plant

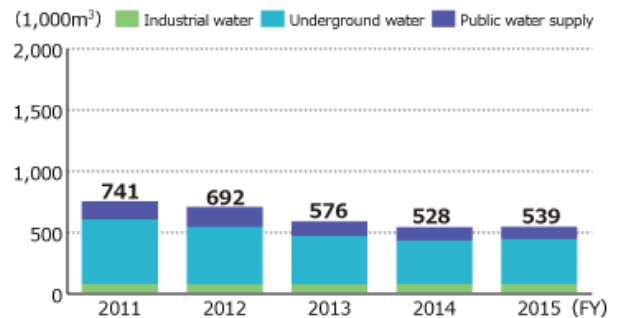
Although Pioneer Micro Technology (Yamanashi Prefecture) was using groundwater for production of semiconductor devices, it has begun to use discharged water from the production process for conservation of water resources. Piping connections were upgraded so that the optimum discharged water flows to the recycling facilities. Thus, half of the water which previously flowed to sewage from the discharge water processing facility was returned to the reuse system from the recycling facility.



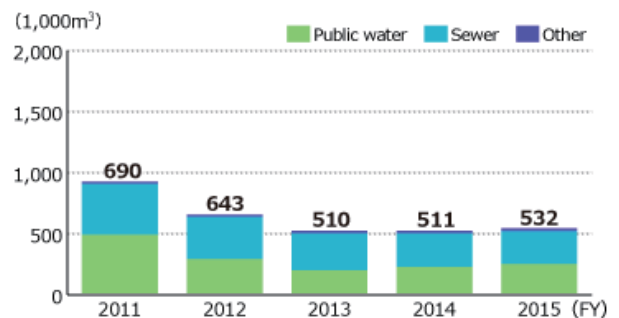
## Reduction of Water Usage and Discharged Water Amounts

Both in Japan and overseas, the water usage amount in the FY ending March 2014 decreased with respect to that of the previous year. In Japan, reduction effects are being achieved by promotion of reuse of water in semiconductor plants. Most sites are constructed in areas where sewage systems are completed, and it can be said that the risk that the water discharge system will impact the water quality of public water areas (general rivers) is low.

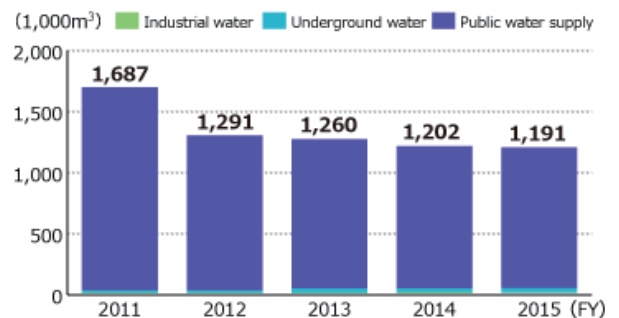
### Water usage (In Japan)



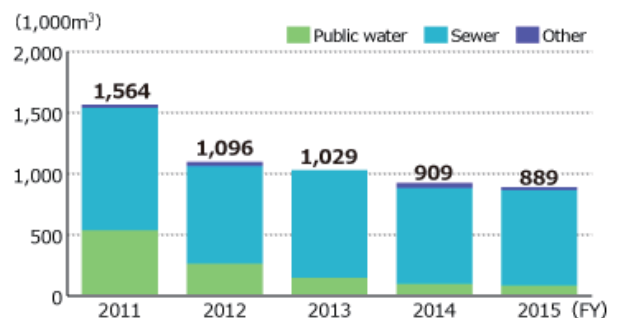
### Discharged water (In Japan)



### Water usage (Overseas)



### Discharged water (Overseas)



## Environmental Impact in FY2015

Environmental impact of main sites of Pioneer group

Site name	District	Energy consumption (GJ)	Waste (tonnes)	Chemical substances* emissions (tonnes)	Water use (x10 <sup>3</sup> m <sup>3</sup> )
Pioneer Corporation Headquarters	Kanagawa pref.	57,168	209	0.0	26.3
Pioneer Corporation Kawagoe plant	Saitama pref.	105,435	517	11.0	40.7
Pioneer FA Corporation	Saitama pref.	4,633	8	0.0	1.2
Pioneer Finetech Corporation	Saitama pref.	12,012	56	6.2	1.6
Tohoku Pioneer Corporation	Yamagata pref.	214,345	200	0.7	93.2
Mogami Denki Corporation	Yamagata pref.	2,483	1	0.1	5.4
Tohoku Pioneer EG Corporation	Yamagata pref.	21,701	163	0.0	4.6
Towada Pioneer Corporation	Aomori pref.	24,876	75	0.5	6.8
Pioneer Micro Technology Corporation	Yamanashi pref.	283,100	119	0.3	358.0
Pioneer Automotive Technologies, Inc. (PAT)	USA	32,545	2,033	0.0	3.3
Pioneer do Brasil Ltda.(PBL)	Brazil	32,820	797	0.0	34.3
Pioneer Yorkey do Brasil Ltda. (PYB)	Brazil	24,121	165	0.0	6.0
Pioneer Technology (Malaysia) Sdn. Bhd.(MPT)	Malaysia	74,572	44	0.0	41.0
Pioneer Manufacturing (Thailand) Co., Ltd. (PTM)	Thailand	181,053	756	0.0	153.4
Tohoku Pioneer (Thailand) Co., Ltd. (TPT)	Thailand	60,041	2,710	0.0	53.8
Tohoku Pioneer (Vietnam) Co., Ltd.(TPV)	Vietnam	53,174	940	0.0	30.8
Shanghai Pioneer Speakers Co., Ltd. (SPS)	China	113,340	1,292	0.0	75.8
Pioneer Technology (Shanghai) Co., Ltd. (PSG)	China	151,729	266	39	67.5
Pioneer Electronics (Shanghai Export Zone) Co. Ltd. (PGE)	China	107,539	299	46.6	28.6
Pioneer Technology (Dongguan) Co., Ltd. (PTD)	China	111,302	898	0.0	334.1
Dongguan Monetech Electronic Co., Ltd. (MND)	China	21,999	262	0.0	49.6
Mogami Dongguan Electronics Co.,Ltd. (MDE)	China	19,552	469	0.6	303.6
Pioneer Sintai (Donguan) Optical Co.,Ltd.(PSD)	China	574	0	0.0	2.5

\* PRTR substances and VOC (20 substances of VOC electrical and electronic industry-defined)

The Pioneer Group educates all its executives and employees in environmental conservation. Pioneer's educational activities are not restricted to within the company, but extend to families too, and enable the company, employees and their families to act together. The company also presents awards for outstanding contributions to conservation activities.

## Internal Environmental Education

The domestic group prepared a textbook for the collective education of employees in order to increase the level of environmental activities throughout the company. Themes in the textbook are changed on a yearly basis to incorporate the latest topics so as to learn while raising the level of interest. Since lecture are now conducted adopting. In addition, newly-hired employees are educated by incorporating environmental themes in the group training curriculum.



A part of the textbook in 2014  
Theme "CO<sub>2</sub> reduction"

## Awards Program in Company

The Pioneer Group has internally been awarding offices, plants, groups, or individuals that have contributed to environmental protection activities with the Pioneer Environmental Contribution Award and has been awarding patents judged to be contributions to environmental protection with the Environmental Patent Award.

The Pioneer Environmental Contribution Award as of the FY ending March 2015 was given

- "Initiatives in CO<sub>2</sub> reductions (prevention of global warming) through the promotion of energy saving at home"
- "Contribution to the creation of valuable resources through the separation of stretch film"
- "Full use of recycled material for molding material"
- "Reduction of CO<sub>2</sub> by utilizing an EV (Electric Vehicle) navigation system"
- "Size reduction of commercial/OEM Low END FM/AM tuner and reduction in number of parts"

The above five items were selected for the Awards for Excellence, and the Kawagoe Plant (Saitama Prefecture) was commended as the plant which conducted the most impressive activities.



Award winners using Web conference system for oversea ,PTM (Thailand) , PTD (China)



## Power Saving Activities at Home in the Summer and Winter

Towada Pioneer Corporation sets up targets for CO<sub>2</sub> reductions and global warming prevention by power saving at home to monitor electric power usage at home. Activities in winter (December to March) were added in 2013 in addition to the activities in summer (July to September) since power demand increases due to the use of heating in winter.

Bulletin board for environmental activities in offices and plants are used to raise awareness and approximately one third of employee homes participated in the activities.



Bulletin board

## Environmental Garden Project in Brazil

PBL (production corporation in Brazil)\* grows vegetables such as eggplant and tomatoes by organic farming methods in the plant using the name "environmental garden project." Through the activity, employees learned about the impact due to agricultural chemicals on the environment and health and developed a sense of appreciation for nature by consuming the fruits of the nature at the company cafeteria.

\* Pioneer do Brasil Ltda.



Scene of growing vegetables



Grown vegetables



Harvested vegetables

## Together with Children in Charge of the Future

PBL \*1 and PYB \*2 (both are production corporations in Brazil) accept social study plant tours from neighboring elementary schools.

Elementary school students of 7 to 10 years old have been invited to the plant to observe production products, learn about the company's policies related to the environment and safety, and think about "eco-activities which we can do" together.

Such activities are performed across the world and in various ways. Also, Pioneer wishes to contribute to the environment together with children in charge of the future through acceptance of plant tours.

\*1 Pioneer do Brasil Ltda.

\*2 Pioneer Yorkey do Brasil Ltda.

### Scene of plant tour in production corporation in Brazil (FY2014)



## Number of Environment-related Qualification

The Pioneer Group has secured staff numbers exceeding the legally required number of qualified persons in Japan.

FY2015

		Qualification	Legally required number	Number of Holders
National qualification	Pollution-related	Pollution Control Manager	4	13
		Energy	Qualified Person for Energy Management	3
		Energy Managers and Energy Management Planning Promoters	4	8
	Waste	Managers of the Specially Controlled Industrial Wastes	11	36
	Handling of hazardous materials	Hazardous Materials Officer	12	151
		Specified High Pressure Gas Handling Supervisor	2	40
		High Pressure Gas Handling Supervisor	0	2
		Work Supervisor (Organic Solvents, Lead, Specified Chemical Substances)	23	301
	Toxic Substances Handling Officer	0	9	
Company qualification	Environmental management	Internal Environmental Auditor (in Japan)	-	60
		Internal Environmental Auditor (Overseas)	-	239



## Value Environmental Communication

Pioneer has established reliable relationships by transmitting business activities and information about its products related to the environment in a timely manner and holds dialogues with stakeholders. Furthermore, Pioneer has developed environmental activities based on regions around the world so as to contribute to a better global environment. Pioneer values environmental communication with stakeholders.

### Environmental communication with stakeholders



## Report Environmental Activities

"Environmental Activity Report" and website "Environmental Activity"



"Environmental Report" \* is summarized in electronic data (pdf) files and published with a desire to transmit environmental activities of the Pioneer Group.

In addition to the activity reports, many articles are included on Pioneer's official website "Environmental Reports" site for a closer look at activities and enjoyment related to the environment.

\* Reports are prepared with reference to the guidelines on the Global Reporting Initiative (GRI) and "Environmental Reporting Guidelines 2012" of the Ministry of the Environment.

## Employees Speak with Enthusiasm

Pioneer conducts environmental activities together with all company members for development of products and operation of offices and plants. For excellent activities, there are particular projects that persons in charge of activities conduct for study and review. The special content details from "what they really felt" and "story of hard times" which they candidly discuss, and "untold stories" which could not be disclosed as well as time, and further "enthusiasm" which they can talk about now.

### Eliminate worries about Electric Vehicles!



### Want to Know about Your Fuel Consumption before Driving!



### Reduce Electric Power at the Data Center!



## Answers to Your Inquiries

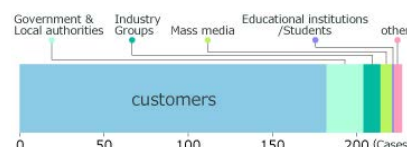
We receive many inquiries about our environmental activities. Pioneer takes each inquiry seriously and answers sincerely and promptly and consults on customer opinions.

### Main inquiries

We have received inquiries from customers about inclusion and use of environmental load substances in products, from government and local authorities related to global warming prevention, and from industry groups related to overseas laws and regulations related to energy savings and chemical substances.

### Number of inquiries

We received 227 inquiries in 2015.



## Transmission of Environmental Information to Many People

Pioneer makes efforts to transmit environmental activities and environmental information to stakeholders related to their respective objectives through various types of media and activities.

### Inform the Entire Image to Advance Dialogue

#### ■ Pioneer Group CSR Report

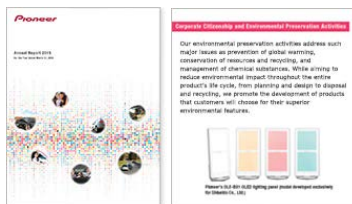
Pioneer publishes the "Group CSR Report" in order to transmit the concepts and activities of Pioneer in an easy-to-understand way. Among them, Pioneer places importance on environmental preservation as a social responsibility and reports the activities.



## Transmission of Environmental Information to Investors

#### ■ Annual Reports

We include environmental activity topics in our annual reports that inform about our businesses and achievements to investors and shareholders, and present excellent examples of our initiatives.



## Establishment of Cooperative System with Suppliers

#### ■ Publication related to green procurement documents



Products compose many raw materials and components, and cooperation with suppliers is essential to create environment-friendly products. Pioneer determined "environmental preservation" as the first request to the suppliers. In particular, for chemical substance management, we disclose our management standards to secure compliance with official regulations together with suppliers in order to respond to the ever-changing regulatory trends around the world.

## Instruction by Experts

#### ■ Challenge for awards (environmental award)

Pioneer participates in many authoritative environmental award competitions so that third parties can evaluate our environment-friendly products and activities in our offices and plants. The major purpose is to listen to comments and opinions of knowledgeable persons who specialize in the environment such as government and academia, not only to apply to competitions and receive awards. Some comments and advices are strict, however, we fully use them to improve our daily environmental activities. Furthermore, participation in environmental award competitions increases environmental awareness and vitality to take on new challenges, not only in each individual's related department which submitted an application but also in the entire company, which invigorates the Pioneer spirit.



## Participation in Standardization Activities

The Pioneer Group cooperates with industry groups and government in order to contribute to the creation of a framework to realize a sustainable society. For management of chemical substances, in order to transmit technological knowledge from the electrical industry to the government, the Pioneer Group participates in JEITA (Japan Electronics and Information Technology Industries Association), Japan Machinery Center for Trade and Investment, DIGITALEUROPE, and the ECFI (Executive Committee of Foreign Investment Companies). Pioneer also participates in JAMP (Joint Article Management Consortium) and IEC/TC111\_VT62474 study team for the purpose of building a transmission scheme for chemical substances information throughout its supply chain. For preventing global warming, the Pioneer Group participates in the Low CO<sub>2</sub> Kawasaki Brand to reduce CO<sub>2</sub> emissions from products and improve CO<sub>2</sub> emission calculation technology by the Life Cycle Assessment (LCA).



## See, Touch and Feel Eco-Products

Pioneer introduces excellent environment-friendly products via events based on the theme "Eco-friendly, enjoyable and comfortable in towns, at homes, and in cars", and values direct communication with many customers by seeing, touching and feeling.

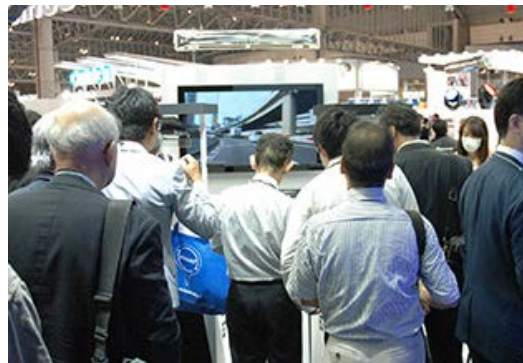
## Introduction to Pioneer's Advanced Technologies

Talk shows about the exhibited products were held on the main stage, and proved a great success. Communication was made with visitors.

### CEATEC



The view from near the entrance of the PIONEER booth



HUD experience corner proved so popular that queues formed

## Enjoyable, Comfortable and Eco-Friendly Car Life

We enjoyed not only the environmentally advanced technologies but also the live Disk Jockey (DJ) and stage shows with customers.

### Tokyo-motorshow



Telematics





## Think Eco-Friendliness Together with Everyone

Many customers have the image of Pioneer products being high in sound quality, high in image quality, and advanced in function and we are transmitting the information that our products are also excellent in environmental performance both in Japan and overseas. We actively engage in environment-related exchange with local people and promote learning, discussion, and utilization in regard to the environment through cooperation in environmental learning of citizens, research seminar results of universities for information exchange, etc. We also actively participate in the Nikkei Environmental Management Ranking with the purpose of improving our environmental activities and engage in self-assessment as an enterprise. Our interactions are thus aimed toward thinking together, learning together, and progressing together in regard to the environment.

## Transmitting Environmental Information Via Environmental Events of Local Government

### Kawasaki International Eco-Tech Fair



Explaining CO<sub>2</sub> reduction functions related to car navigation systems for Electric Vehicles (EVs)  
Car Electronics Strategic Business Planning Division: Kimura, Furusho



Transmission of information of initiative for power saving on navigation data inside and outside the company  
IT Division: Shirasaka, Arima  
Quality Assurance Division: Fukushima



Exchanging opinions for use and expandability of POTTER NAVI (Navigation for bicycle) Saito,  
Executive Director in charge of environment (left)



Organic EL lighting for makeup "OLE-B01" which was certified as "Low CO<sub>2</sub> Kawasaki Brand" was exhibited at the award ceremony.

## Research Future of the Environment with Universities



Environmental research results presentation by Yokohama City University and opinion exchange  
Ao professor of Yokohama City University, seminar members and Pioneer Eco Products Committee

## Introduction to Initiatives Related to the Environment by Radio



Kawasaki FM on air



Mr. Fukushima of the Quality Assurance Division with the radio personality, Ms. Shoji

With the desire to have more citizens become interested in the environment, an appearance was made on the radio program, "Happiness with Eco" at Kawasaki FM hosted by the radio personality, Keiko Shoji.

\* Vice President of Act Kawasaki, an NPO engaged in environmental problems



## A Desire to Expand One Small Step Toward the World

Waste pickup around the company which started 15 years ago has now expanded not only in Japan but also overseas with participation and support from many employees. Communication with people in the region through cleanup activities also results in an increased awareness of individual employees toward environment.



Headquarters / Kawagoe Plant / Pioneer Home Electronics Sayamagaoka / Pioneer FA / Pioneer Finetech / Tohoku Pioneer Headquarters & Yonezawa Plant / Pioneer Service Network Sizuoka / Towada Pioneer / Pioneer Automotive Technologies, Inc.(PAT) / Pioneer do Brasil Ltda.(PBL) / Pioneer Yorkey do Brasil Ltda.(PYB) / Pioneer Technology (Shanghai)Co.,Ltd.(PSG) / Pioneer Electronics (Shanghai Export Zone) Co. Ltd. (PGE) / Shanghai Pioneer Speakers Co., Ltd.(SPS) / Pioneer Manufacturing (Thailand) Co., Ltd.(PTM) / Tohoku Pioneer (Thailand) Co., Ltd. (TPT) / Pioneer Technology (Malaysia) Sdn. Bhd. / Pioneer Technology (Dongguan) Co., Ltd. (PTD)

## Pioneer Carried Out Simultaneous “GomiZero” Activities Around the World

Pioneer regards the period from April to June when many events related to the environment such as Earth Day, Zero Garbage Day, Environment Month and World Environment Day as the best chance to initiate cleanup activities, and therefore, established “Pioneer GomiZero 1st Quarter.” The number of participating plants in this activity has increased, and cleanup activities are proactively carried out overseas.

## Cleaning Up Region to Be Proud of

At Towada Pioneer, cleanup activities have been carried out along a footpath along the Oirase Stream of Aomori Prefecture since 2003 under the designation of “Oirase Stream Cleanup Operation” with the hope of “clean the nature specified as a special place of scenic beauty and natural treasure by our hands.”

### Newly-hired employees experience first GomiZero

Newly-hired employees who joined in April experienced GomiZero activity around the Headquarters (Kawasaki City in Kanagawa Prefecture) for the first time. Some comments are introduced here.

“I felt very good. I found that a simple social contribution like waste pickup is a matter-of-course duty as a member of society.”

- “It felt like I was commuting before. But after picking up waste and participating in the region, I really feel like I live in the Kawasaki area. I will think about the activities from the perspective of coexistence of people in the region even though I do not live here.”



participants (10th)



Working while listening to sounds of the stream

## Cleanup Activities in Tanjung Emas Park

MPT (production corporation in Malaysia)\* carried out cleanup activities with the desire to clean Tanjung Emas Park at the mouth of the Moor River flowing near the plant. On October 5, 2013, a total of 78 persons participated and collected waste of 165.5kg. Participants commented that we collected much more waste more than expected, and want to continue the activity in the future.

\* Pioneer Technology (Malaysia) Sdn. Bhd.

## Let's Cleanup the Temples of Thailand!



“Enthusiastic and hot” initiative by employees in the Thailand plant is introduced.

\* See page 31 for details.



A total of 78 participants



Activities

## Forest Conservation Activities

The Pioneer Group, which has continued to make speakers using wood is performing forest conservation activities as a way to express our gratitude to the trees. These forest preservation activities are said to be useful for capturing of CO<sub>2</sub> and preserving water resources and our ecological system. Therefore, these activities also provide a chance for employee education.

### Activities in "Pioneer Forest"



In 2005, we named a cypress forest near Kamakita Lake in Saitama Prefecture the "Pioneer Forest" and since then, we have been carrying out forest conservation activities there periodically. The "Pioneer Forest" was certified to be equivalent to a CO<sub>2</sub> absorption amount of 69.9 tonnes-CO<sub>2</sub> / year in 2013 from Saitama Prefecture.

### Activities in "Yamagata Kizuna Forest"

Tohoku Pioneer participates in the activity "Yamagata Kizuna Forest Project" to protect the limited forests. The activity was later carried out in June and October of 2014, and tree thinning and pruning were carried out and a "Planter case" was made with the thinned wood.



Planter case

### Overseas Forestation Activities

PHK (Pioneer Hong Kong)\*1 planted trees in the Hong Kong Lantau Ngong Ping region on January 31, 2015 for environmental improvement in the region. 22 people from our staff and their families took part in this activity and planted about 30 seedlings for about 2 hours while working with hard soil and covered in sweat.

PTM (production corporation in Thailand)\*2 also plants mangroves.

\*1 Pioneer (HK) Ltd.

\*2 Pioneer Manufacturing (Thailand) Co., Ltd.

\* See page 39 for details.



Planting of Hong Kong Lantau Ngong Ping region (PHK)

## Activities to Conserve Resources

### Reusing Files

Tohoku Pioneer (Yamagata Prefecture) donated unnecessary files to schools in the region for the purpose of reuse. A total of 330 files were donated to 11 organizations as of the FY ending March 2015, and were effectively used.



Unnecessary files collected

## Supporting Children Around the World with Caps

Pet bottle caps are classified and collected with the cooperation of employees. The caps are sold as recyclable resources and the profits are donated to JCV\*. In 2014, polio vaccines for approximately 1,390 children were provided through this donation.



Classification and collection BOX in company

\* The certified non-profit organization, Vaccine to children in the world, Japan Committee Vaccine for the World's Children (JCV) is an international support organization which carries out activities to deliver vaccines to "children whose lives can be improved by preventing infectious diseases" and generate futures for the children.

## Electric Power Reductions Through "Light Down" Participation

The Pioneer Group participated in "Light Down 2014" under the slogan of "nighttime when electricity goes off. Thinking of the earth at night hopes become a little brighter." The Pioneer Plaza Ginza (Showroom) turned off lights completely on the two days of the "Summer Solstice Light Down" of June 21 (Saturday) and the "Tanabata Light Down" of July 7 (Monday). A total of 13 sites and facilities carried out light down activities and reduced 947.5 kWh of power consumption.

### Light Down at Pioneer Plaza Ginza



Before



After

## "Organic EL Illumination" Producing Towns

A Christmas tree using 216 organic EL illumination "VELVE" jointly developed with Mitsubishi Chemical Corporation was displayed at Roppongi Hills at the end of the year. Light which is environment-friendly, does not use hazardous substances such as mercury in the production process or emit ultraviolet rays, and is friendly to the eyes and skin gently bathed people at the site. Yonezawa Plant (Yamagata Prefecture) of Tohoku Pioneer made snow lanterns using organic EL illuminations for the "Uesugi Lantern Festival." Low-heat-generating and "candle" like warm light filled the site.



Christmas tree at Roppongi Hills in 2013



Snow lanterns at 37th Uesugi Lantern Festival in 2014

# Progress of Activities

## Pioneer's History of Environmental Preservation

- Management Details related to environmental management
- Site Details related to environmental initiatives of offices and plants
- Products Details related to creation of environment-friendly products

Year	Month	Matter
2012	April	<span style="background-color: #cccccc; padding: 2px;">Management</span> Pioneer GomiZero 1st Quarter activities were spread from within Japan to the world
2010	November	<span style="background-color: #0070c0; color: white; padding: 2px;">Site</span> Towada Pioneer won Excellent Award in Ecological-drive contest
	October	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Cyber Navi won Green IT AWARD and Green Purchasing Award
	November	
	April	<span style="background-color: #cccccc; padding: 2px;">Management</span> Pioneer GomiZero 1st Quarter activities is put into effect.
2009	September	<span style="background-color: #cccccc; padding: 2px;">Management</span> Integrated ISO14001 certification at Pioneer Group companies nationwide
2008	December	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Cyber Navi AVIC-VH9000 won Eco-Products Award
	August	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Established Advanced Eco-Model certification system
2007	August	<span style="background-color: #cccccc; padding: 2px;">Management</span> ISO 14001 certification of the environmental management systems in all Pioneer Group was integrated.
	February	<span style="background-color: #0070c0; color: white; padding: 2px;">Site</span> The installation of a 150kW photovoltaic power system at Pioneer Micro Technology Corporation.
2006	February	<span style="background-color: #cccccc; padding: 2px;">Management</span> Awarded Economy, Trade and Industry Minister's Award in the Green Purchasing Awards.
2005	February	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Plasma TV (PDP-435SX) awarded Energy Conservation Grand Prix.
	February	<span style="background-color: #cccccc; padding: 2px;">Management</span> ISO 14001 certification is completed at all sites worldwide.
2004	May	<span style="background-color: #cccccc; padding: 2px;">Management</span> Environment Managers' Conference head in the World Environment Conference.
2003	November	<span style="background-color: #cccccc; padding: 2px;">Management</span> Established the Environmental Preservation Group and inaugurated the Eco Products Division
	November	<span style="background-color: #cccccc; padding: 2px;">Management</span> Conducted an Opinion Exchange Forum for third parties about the Environmental Report.
2002	June	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Mini Rakura DVD player launched as the first product of the internal Eco Champion Support System.
	June	<span style="background-color: #cccccc; padding: 2px;">Management</span> First World Environment Conference held.
	March	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> In-company Life Cycle Assessment (LCA) system is established.
	March	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Full-scale introduction of lead-free solder to products manufactured in Japan begins.
2001	October	<span style="background-color: #0070c0; color: white; padding: 2px;">Site</span> Publication of site reports begins.
	March	<span style="background-color: #cccccc; padding: 2px;">Management</span> ISO 14001 certification is completed at all of Pioneer's main manufacturing facilities worldwide.
2000	December	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Pioneer participates in Eco Products Expo Japan.
	October	<span style="background-color: #cccccc; padding: 2px;">Management</span> Awards ceremony for the First Pioneer Environment Contribution Awards is held.
	July	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Green Procurement Standards are published.
	June	<span style="background-color: #cccccc; padding: 2px;">Management</span> Public announcements of environmental accounting begin.
1999	June	<span style="background-color: #cccccc; padding: 2px;">Management</span> First issue of the Pioneer Environmental Report is published.
	March	<span style="background-color: #cccccc; padding: 2px;">Management</span> ISO 14001 certification is completed at all Pioneer design and manufacturing facilities in Japan.
1998	November	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Products with lead-free solder go on sale.
	October	<span style="background-color: #cccccc; padding: 2px;">Management</span> Pioneer Environmental Label is established.
	June	<span style="background-color: #cccccc; padding: 2px;">Management</span> Division of Environmental Preservation is established with a full-time director in charge.
1996	June	<span style="background-color: #cccccc; padding: 2px;">Management</span> Tokorozawa Plant obtains ISO 14001 certification (the first in the Pioneer Group).
	March	<span style="background-color: #cccccc; padding: 2px;">Management</span> HCFCs (substitute for CFCs) are eliminated from all Pioneer Group manufacturing processes
1995	June	<span style="background-color: #cccccc; padding: 2px;">Management</span> A Pioneer director is named to take charge of environmental affairs.
1993	February	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Use of collapsible cardboard packaging for A/V products is adopted.
	February	<span style="background-color: #0070c0; color: white; padding: 2px;">Site</span> Collection and recycling activity of the Ni-Cd battery begin in Japan.
1992	November	<span style="background-color: #cccccc; padding: 2px;">Management</span> Environmental Preservation Policies are established as an Environmental Charter.
	September	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Product assessments are begun for all electrical appliances.
	March	<span style="background-color: #0070c0; color: white; padding: 2px;">Site</span> CFCs are completely eliminated from Pioneer Group manufacturing processes.
1991	July	<span style="background-color: #cccccc; padding: 2px;">Management</span> Company-wide Pioneer Environmental Conservation Committee is established.
1990	December	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Use of molded pulp (shock absorbing material made from recycled paper) for packing car stereo components begins.
1989	Spring	<span style="background-color: #c00000; color: white; padding: 2px;">Products</span> Examination into substitutes for styrene foam packaging begins.

## List of Awards Outside the Company

About "Pioneer products receive environmental award", see page 20 for details.

The names at the time of the awards are used by the Awarding Body.

Year	Month	Awarding Body	Description	Recipient
2014	October	CEATEC JAPAN	Organic EL lighting for makeup "OLE-B01" "CEATEC AWARD 2014 Green Innovation Category" Semi-Grand Prix	Pioneer Headquarters
	May	Hong Kong Special Administrative Region	Certificate of Merit from the 2013 Hong Kong Awards for Environmental Excellence	PIONEER (HK) LTD.[PHK]
	February	Kawasaki city	Organic EL lighting for makeup "OLE-B01" was certified as "Low CO <sub>2</sub> Kawasaki Brand '14"	Pioneer Headquarters
2013	November	MOI (Thai Ministry of Industry)	Prime Minister Industry Award 2013 (Energy management category)(Thailand)	PIONEER MANUFACTURING (THAILAND) CO.,LTD. [PTM]
	May	Hong Kong Special Administrative Region	Certificate of Merit from the 2012 Hong Kong Awards for Environmental Excellence	PIONEER (HK) LTD.[PHK]

In this report, we have posted awards for the past two years.  
Award history for more than five years ago, please see our website.

# Scope of Data

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The scope of this data is as follows. (Site name is as of March in 2014.)  
Activities other than the following are also reported.

## Japan

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- Pioneer Corporation
  - Headquarters
  - Kawagoe Plant
  - East Japan Logistics Center
- Tohoku Pioneer Corporation
  - Headquarters
  - Yonezawa Plant
- Mogami Denki Corporation
- Tohoku Pioneer EG Corporation
- Pioneer Micro Technology Corporation
- Towada Pioneer Corporation
- Pioneer FA Corporation
- Pioneer Service Network Corporation
  - World Parts Center / Repair Technical Center
- Piotec, Inc.
- Pioneer System Technologies Corporation
- Pioneer Finetech Corporation
- Increment P Corporation
  - Headquarters
  - Tohoku Design Center

## THE AMERICAS

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### U.S.A.

- Pioneer North America, Inc. (PNA)
- Pioneer Automotive Technologies, Inc. (PAT)

### CANADA

- Pioneer Electronics of Canada, Inc. (POC)

### BRAZIL

- Pioneer do Brasil Ltda. (PBL)
- Pioneer Yorkey do Brasil Ltda. (PYB)

## EUROPE

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### BELGIUM

- Pioneer Europe NV (PEE)

## ASIA & OCEANIA

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### SINGAPORE

- Pioneer Electronics Asiacentre Pte. Ltd. (PAC)

### MALAYSIA

- Pioneer Technology (Malaysia) Sdn. Bhd. (MPT)

### THAILAND

- Pioneer Manufacturing (Thailand) Co., Ltd. (PTM)
- Tohoku Pioneer (Thailand) Co., Ltd. (TPT)

### VIETNAM

- Tohoku Pioneer (Vietnam) Co., Ltd. (TPV)

### AUSTRALIA

- Pioneer Electronics Australia Pty. Ltd. (PTY)

### CHINA

- Pioneer China Holding Co., Ltd. (PCH)
- Pioneer Technology (Dongguan) Co., Ltd. (PTD)
- Pioneer Technology (Shanghai) Co., Ltd. (PSG)
- Pioneer Electronics (Shanghai Export Zone) Co. Ltd. (PGE)
- Pioneer (HK) Ltd. (PHK)
- Dongguan Monetech Electronic Co., Ltd. (MND)
- Shanghai Pioneer Speakers Co., Ltd. (SPS)
- Mogami Dongguan Electronics Co., Ltd. (MDE)
- Pioneer Sintai (Dongguan) Optical Co., Ltd. (PSD)





The Pioneer Environmental Mark, a motif of the Earth and a sprout, represents the Earth, the environment and living in harmony. Displayed on reports related to the environment, environmental posters, activity tools, etc., the symbol is used to raise awareness within the Group and appeal Pioneer's environmental protection activities externally.

Address for opinions and inquiries about this report:

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## **PIONEER CORPORATION**

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