Corporate Profile

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: Home Electronics Business, Car Electronics Business, Others
Capital: 87,257 million yen (as of March 31, 2013)
Net sales: 451,841 million yen (as of March 31, 2013)
Number of employees: 23,926 (as of March 31, 2013)

Editorial Policy

- This report has been created for general readers to promote Pioneer’s environmental conservation activities in the global community. We aim to fulfill our role as a responsible corporation based on opinions and criticism from the public.
- 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.
- The GRI Guidelines require disclosure of corporate information from three aspects: economic, environmental and social. This report covers the environmental aspect.

* GRI (Global Reporting Initiative) is an international organization established to improve the quality of corporate communications so as to realize sustainable development.

Period covered

- The period covered by the data is FY2013 (April 2012 - March 2013), 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.
Striving to Achieve “Zero Environmental Impact”
To “Move the Heart and Touch the Soul”

Promoting the development of products to customer’s preference with excellent environmental performance

Pioneer has identified three key environmental issues: (1) prevention of global warming; (2) resource saving and resource recycling; and (3) management of chemical substances to achieve zero environmental impact, and engages in its unique environmental initiatives. To create products of customer’s preference with excellent environmental performance, we shall promote the development of environment-friendly products through reduction of environmental impact, implementation of product environmental assessment, and introduction of our unique product evaluation system for environment-friendliness through the entire product lifecycle from planning/design/manufacturing to delivery to the customer’s doorstep, and disposal and recycling after use.

Development of environment-friendly products aimed at preventing global warming

All products are developed to be environment-friendly from the beginning of product planning. The environment-friendliness are checked based on our unique environment-friendliness evaluation system. Products evaluated to have extremely high environmental performance are certified as super advanced eco-models. The following 3 models (series) were certified in last Fiscal Year.

1. Carrozzeria Car Power Amplifier PRS-D700 – Significantly reduced the size, weight, and power consumption to reduce fuel consumption of equipped cars.

2. Cyber Navi AVIC-VH99HUD Series – Reliably supports eco-driving by the eco-route search function, which has received several environmental awards, display of carefully selected information in the line of sight that provides the ultimate intuitive guidance to lessen mistaken roads and reduce wasteful fuel consumption.

3. AVIC-MRZ007-EV* and AVIC-EVZ05 EV Navigation Systems – Navigation systems equipped with the EV-dedicated Eco-route Search function that has a eco-friendly route that is most efficient in terms of power consumption. Also, they are equipped with the "estimated cruising range display*" function that eliminates the worry of battery run-out and contributes to the overall reduction of power consumption with EVs (electric vehicles) and PHVs (plug-in hybrid vehicles) of high environmental performance.

Also, with regard to energy saving of our enterprise activities, we set an energy reduction target up to March 2013 with 1990 as the basis year as part of the Voluntary Environmental Action Plan of the electrical and electronic equipment industry to a target of 35% reduction. We achieved a reduction of 56%. We will continue to participate in the low carbon society execution plan of the electrical and electronic equipment industry and work toward achieving our targets for FY2021.

Adoption of recycled materials for resource saving and resource recycling

The core concepts for recycling use of resources are to reduce the generation of waste, reuse, and recycle. The Pure Malt series, which we have marketed since 1998, boasts a high recognition around the world as a product that represents our recycling efforts. Casks (solid white oak material), which were formerly used as fuel, etc., after fulfilling the mission of aging whiskey, are recycled by Pioneer’s speaker making techniques to cabinets of Pure Malt Speakers that provide warm, mellow reverberations. This endeavor has been awarded the Clean Japan Center Chairman's Award in 2005 as part of the Resource Recycling Technology & System Awards presented by the Clean Japan Center, the METI Industrial Technology & Environment Bureau Director General Award in 2009, and the Reduce/Reuse/Recycle Promotion Association Chairman’s Award in 2009 as commendation for meritorious action in the Reduce, Reuse, Recycle Promotions program.
Promotion of Green Procurement for the Management of Chemical Substances

With regard to the management of chemical substances, green procurement standards were established to promote reduction and total abolition of environmental hazardous substances contained in parts and materials. The environmental management system certification acquisition status, status of adherence to laws and ordinances, etc. are evaluated as green scores. Parts and materials are only procured from suppliers with sufficient scoring.

Also, in the production process, we engage in the reduction of release of environmental impact substances used in production processes and are continuing activities towards reducing volatile organic compounds (VOCs). We are engaged in the management of chemical substances to provide products that can be used with a strong sense of safety and reliability by customers and prevent pollution of the environment by chemical substances in used products.

Our corporate philosophy is to "Move the Heart and Touch the Soul." By proactively striving to integrate corporate and environmental activities toward achieving zero environmental impact, we believe that we can help to recover the irreplaceable natural beauty of the Earth, and in turn, truly "Move the Heart and Touch the Soul" of people everywhere.

June, 2013

Susumu Kotani
President and CEO
Eco-driving is firmly taking hold and people who practice it are increasing as well. Eco-driving not only leads to reduction of fuel consumption and reduction of CO2 emissions but is also easy on the household budget and leads to safe driving.

Pioneer's car navigation systems powerfully support eco-driving. Development anecdotes and experiences of the development staff are introduced below in interview style.

[Interviewee] Car Electronics Engineering Division: Yasushi, Ohsawa, Fukuda, Hirose

[Host] Quality Assurance Division: Kobayashi

Eco-route Search* appraised for reducing gasoline consumption and awarded with environmental prizes

(Host) Today, we would like you to share development anecdotes, mainly in relation to the Eco-route Search function, which has become the basis of eco-drive supporting functions. It continues to be equipped in the newest cyber navigation systems, and the "fuel consumption estimation technology" by which the fuel cost to a destination can be made known in advance.

Pioneer equipped the Cyber Navigation AVIC-VH9990 Series of 2010 with the highly precise Eco-route Search function that takes into consideration road congestion information. This was an industry first wasn't it? Appraisal of the fuel consumption improvement effects of the Eco-route Search function, etc. has also lead to the double awarding of the Green IT Award 2010 and the 12th Green Purchasing Award.

* 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 amount and CO2 emission amount.

(Yasushi) That's right. Eco-route Search is influenced not only by road congestion conditions but also by acceleration, engine displacement, vehicle weight, etc. of the car. 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 (this was an extremely difficult task that shall be explained later), we were able to become the first 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.

The fuel consumption estimation technology !

(Host) The establishment of the fuel estimation technology seems to have been a key development – please tell me about some impressive, memorable events and struggles.

(Yasushi) The fuel consumption estimation technology initially started as an informal project and was not appraised much inside the company. Oppositely, a carmaker outside the company appraised it as being wonderful, and this lead to appraisal and then to adoption within the company.
The fuel consumption estimation technology became the basis for the later Eco-route Search function. However, fuel consumption estimation differs according to the 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 much time. This was the most difficult stage of the project.

* The “information” is required for a computer, equipped in the navigation system to perform the calculation for the fuel consumption estimation. These parameters differ for each car because each car differs in engine displacement and weight. The precision of fuel consumption estimation is dependent on setting the optimal fuel consumption parameters for each car.

**Verification tests** repeated over an actual driving distance of 10,000 km!

The fuel consumption parameters for each vehicle are an important key for implementing the fuel consumption estimation technology and the Eco-route Search.

Thoroughgoing verification tests (repetition of driving and measuring and driving and measuring) performed to increase the precision of the fuel consumption parameters

**Host** What did you do, specifically, to calculate the fuel consumption parameters?

**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 were actually acquired for a gross distance of no less than 10,000 km in the verification tests.

Verification tests were performed with various types of cars

In order to perform sudden acceleration, sudden deceleration, high-speed driving in assumption of overseas highways, etc. driving experiments were also performed by renting the high speed oval track of the Japan Automobile Research Institute (JARI).

![Test course at the JARI Shirosato Test Center, where high-speed driving is possible](image)

**Ohsawa** Also in order to check the influences of air conditioning, hot conditions, and cold conditions, we performed driving in the midsummer with the air conditioning turned off, the heater on, and all windows closed completely as well as driving in midwinter with the heater off (this was quite harsh). Further, we prepared three vehicles of the same type and drove them simultaneously in 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 of different conditions.

Through such various verification experiments, we calculated the optimal fuel consumption parameters and were able to equip the Eco-route Search and the fuel consumption estimation function with high accuracy. When we were finished, we felt like: “We did it!”
Sensing reduced fuel consumption and ease on your pocketbook drains by its use.

(Host) Eco-route Search (fuel consumption estimation technology) lets you know the fuel cost to a destination in advance, and can be used in various situations.

(Hirose) Just the other day, I found out that a slightly faraway 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 go there and that the cost of fuel used is less if I shopped at a closer location. I was happy to find waste in money that I would not have noticed before.

(Hirose) 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.

(Host) Although the above may be just one example, it clearly shows that Eco-route Search is eco-friendly and helps economically at the same time. Eco-driving support functions of car navigation systems are evolving year by year – telling me something about your future activities.

(All development staff) Eco-friendly functions are the needs of the times, and we consider them to be the basic functions of a navigation system that we would like to continue to develop steadily.

(Host) I was able to clearly understand the circumstances for the development of Eco-route Search (fuel consumption estimation technology), which is the basis of eco-driving support. I hear that this has evolved further and is now equipped in the newest cyber navigation system. Thank you for your discussion today.
The EV Navigation System Development Story

The future has already begun.
The story of the Pioneer staff who stood up to develop the EV navigation system, AVIC-MRZ007-EV, to support the expanding EV* society.

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 vehicle

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
Quality Assurance Division: Fukushima

Seeking Out Why People Hesitate to Buy an EV

(Host: Fukushima) 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?

* Pioneer’s evaluation system for environment-friendly products

(Planning) Everyone knows that EVs are eco-friendly. EVs don’t use gasoline and do not emit exhaust fumes and CO2. 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.

(Planning) We ourselves drove EVs several times. We drove to various places on various roads and with various situations in mind. But it was not like we began to understand the answers - it was more like we began to "see" them.

We became more aware that what is moving is not just a "vehicle" but is also a "person", and 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. We repeated driving tests assuming driving scenarios in which the central character is a "special person" - a family member, a loved one, or a friend who is riding together, or a customer or client who is waiting, etc. 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.
If the battery runs out in the middle, the drive is interrupted and the EV will have to be pushed by the family members who were riding together. When the battery runs low, one may have to shelve the amusement park for next time or give up on the meal at the restaurant. If more time than expected is taken for charging, one may not be able to go where one wanted to or may not be on time for an important business meeting with a client.

Now that would certainly disappoint the most loved family member, 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. The project proposal was compiled based on such views. We wanted the product designers to develop a system with top priority placed on "people."

Making Full Use of New Developments and Accumulated Technologies

(Software Design A) Upon hearing of 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 studying the running power consumption characteristics of EVs. Moreover, routes that are low not in fuel consumption but in power consumption must be searched. However, we do have the Eco-route Search technology, which was doubly awarded with the environmental awards of the Green Purchasing Award and the Green IT Award. Although this technology is for gasoline vehicles, we may be able to make use of this technology unique to Pioneer. After thinking so, I immediately sought and discussed with co-workers who would be able to cooperate.

(Software Design B) If it's just a problem of 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 specialty technologies for 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!

(Host) So that's how the "EV navigation project" got started. And what was achieved?

(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 hard late into the night! But then, we are all so young! (laughter)

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

(The features of the EV navigation system as explained by the respective development team staff.)

1. The "Estimated Cruising Range Display" displays the cruisable range along roads – Up to where one can drive is displayed in an easily comprehensible manner –

(Software Design) The drivable range in the fully charged state can be displayed along actual roads. Also, an EV is not always in the fully charged state. In addition to the "fully charged state," the cruisable range in the "50% charged state" can also be displayed in an amoeba-like, color-coded manner.
2. Development of "Dedicated Eco-Route Search for EV" – Realizing eco-driving with suppressed power consumption

(Software Design) Unlike gasoline vehicles, an EV stores electric power by using regenerative braking during deceleration, etc. The battery can thus be made to last longer on a route in which acceleration and deceleration are repeated suitably than on a highway, etc., in which driving is continued without braking. The "Exclusive Eco-Route Search for EV" function, which we have developed, enables one to select a route with top priority placed on "eco-friendliness" and not just on "time" or "distance" to enable efficient driving but with conserved power consumption. In addition to contributing to power saving for society, the driving power reduction of EVs also enables reduction of electricity bills for charging by reducing the charging frequency by users.

Functions for supporting enjoyable eco-driving are also fully equipped.

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 50 W x 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.

Unlike a gasoline powered vehicle, an EV does not emit engine noise or exhaust gas. So it is also possible to enjoy TV or a movie on the large 7-inch screen while parking and charging at home.

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

(Laughter)

Realization of "Environment-Friendliness / Economy / Enjoyment"

(Planning) Thank you, thank you! For all of your efforts! Not only is the electricity bill for driving an EV made lower than the fuel cost of a gasoline powered vehicle but numerous functions are provided for further reduction of power. On top of that, the air gesture and the substantial AV functions are also provided. Truly, AVIC-MRZ007-EV marks the birth of a work–of–pride by Pioneer Carrozzeria and will surely contribute to the spread of Electric Vehicles! (Applause)

(Host) I now understand the "eco-friendliness / economy / enjoyment" concept that will be realized by AVIC-MRZ007-EV. Thank you for your time, regardless of your busy schedule to gather together today.
The "Environmental Treasure-box" explains environmental issues for children. The main characters are a cat called Spimaru, a clever feline who knows everything about environmental issues, and the elementary school student, Pio who is ever so curious.

The contents of this site are for elementary and junior high school students. Adult readers have also found the contents to be enjoyable and informative. Please visit the company's website.

Environmental Treasure-box

(These stories are only available in the Japanese-language version.)
http://pioneer.jp/environment/tamate/