T.RAD Environmental Activities

Key Topics

One of our key topics (p.6) is "environmental consideration for businesses and products." In particular, we define our vision, environmental policy, and targets by identifying the mitigation of climate change, the conservation of biodiversity, the prevention of environmental pollution, and the saving of resources as material aspects. These are also related to issues facing the international society. The "sustainable development goals (SDGs)" that are closely connected to our environmental risks, impacts, and opportunities are energy (Goal 7), climate change (Goal 13), biodiversity (Goal 15), water (Goal 6), and sustainable consumption and production patterns (Goal 12).

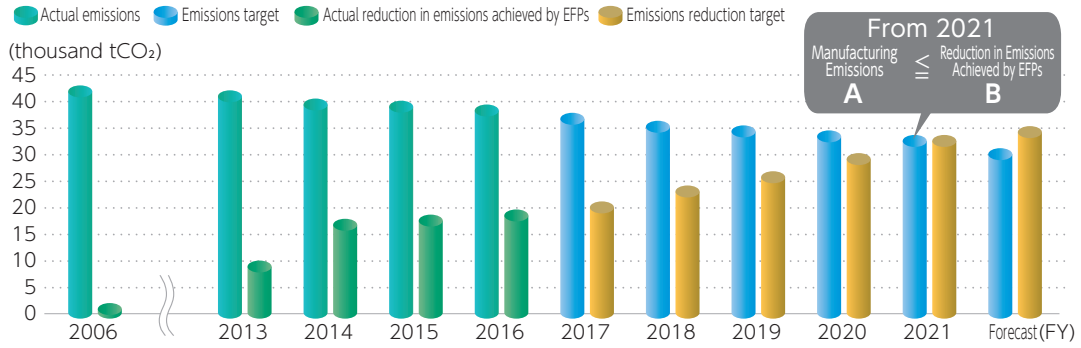
Environmental Principle

T.RAD Co., Ltd., and T.RAD group companies are aiming to be the world's top manufacturer of heat exchanger systems, and all their employees are committed to respecting our environment by taking environmental initiatives in biodiversity protection and nature conservation, leading to a happy and prosperous society.

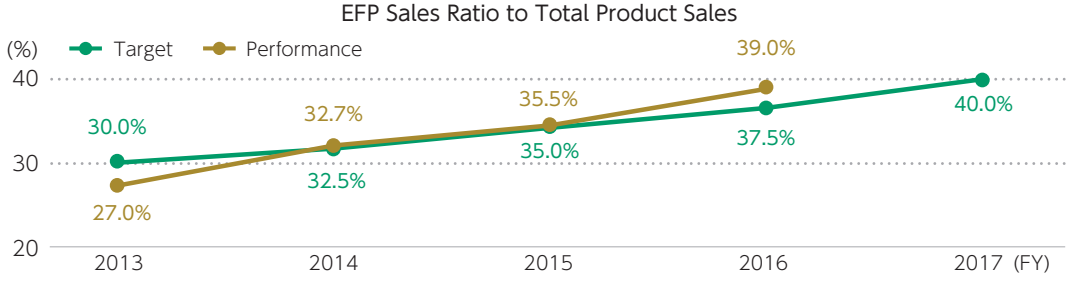
T.RAD Environmental Vision for 2021 (Japan)

1. Our aim is that from 2021, the volume of carbon dioxide (CO_2) reduced through the use of environmentally friendly products will exceed the volume of CO_2 emitted during production.

- We will reduce CO_2 emissions generated by the manufacturing process (Manufacturing Emissions). ····· A — DOWN!
- We will increase the amount of CO_2 reduced by developing, selling, and using our environmentally friendly products (EFPs) (Reduction in Emissions Achieved by EFPs). ····· B — UP!
- From FY 2021: A (Manufacturing Emissions) ≦ B (Reduction in Emissions Achieved by EFPs)



2. We will work to expand EFP sales to at least 40.0% of all product sales (in Japan) by 2017.



	Vision Targets (CSR Medium Term Plan)	Measures
Emissions	Reduction of CO_2 emissions	Introduction of energy-saving furnaces, making lines more compact, etc.
Avoided emissions	Increase in avoided emissions of CO_2 by EFPs	Commercialization and assessment of EFPs
Sales	Increase in EFPs sales ratio	Operation of registration system for product environmental efficiency indicators

See p. 30 and p. 39 for the targets and results for FY 2016. We are also considering setting a vision for our overseas subsidiaries for 2018 and beyond.

Environmental Policy (Action Plan)

T.RAD and T.RAD group companies employ a company-wide environmental management system to realize our corporate philosophy. We will ensure continual system improvement by predicting and assessing environmental impacts throughout the product life cycle, by setting objectives and targets for environmental and biodiversity conservation, and by implementing environmental activities.

Priority Measures	2016 targets of the CSR Medium Term Plan	2016	cf page
Establish and enhance the environmental management system to strengthen environmentally aware management.	90% achievement of the activities planned by the Environmental Promotion Committee	90% or more	11
	CO_2 and waste management, promotion of improvements: 8 overseas subsidiaries*	3 overseas subsidiaries achieved their target	39
	Acquisition of ISO 14001 certification by overseas subsidiaries*	90%	32
	Global unification of management of environmentally hazardous substances	No SOC content	11
Work in partnership with suppliers to promote environmental conservation.	On-site audits at 12 EMS-certified suppliers	12	21
	Research into legal compliance of the suppliers	36 companies	21
Organize and develop a system that promotes environmentally friendly design and development.	Verifications of reduction in CO_2 emissions achieved by products for EV, HV, and fuel cell	2020 89,000 tCO_2	11
	37.5% or greater sales ratio of EFPs	39.0%	33
Consider our environmental impact, comply with relevant environmental laws and any other requirements, set applicable and voluntary management standards, and further reduce our environmental burden.	Mutual assessment of compliance with environment-related laws and regulations	Once a year	32
	0 violations of (environmental) laws and regulations	2 violations	32
Enhance environmental training and awareness of all personnel.	Implementation of training about revised ISO standards	4 sites	11
Actively disclose environmental information, leading to a better understanding among stakeholders.	3 improvements that reflect GRI guidelines and external feedback	Made the 3 improvements.	11
	Creation of materials for external communication and PR	2	28
Get actively involved with local communities to work on environmental and biodiversity conservation.	Implement at least one biodiversity initiative from the medium-term plan in each site	3-9 (each site)	44
Mitigate climate change by reducing greenhouse gas emissions.	CO_2 emissions: 7.5% reduction compared to FY 2013	-5.5%	39
	7.5% reduction of consumption of energy converted into electricity per processing value compared to FY 2013	-5.4%	39
	Reduction of CO_2 emissions through EFPs (19,800 tCO_2)	19,900 tCO_2	33
	5.0% reduction of energy consumption per production compared to FY 2011	-14.6%	40
Prevent environmental pollution by preventing the release of pollutants.	0% of substances containing prohibited compounds	0.4%	33
	10% reduction in release and transfer of PRTR-specified chemicals per production compared to FY 2006	-81.2%	41
	30% reduction in release and transfer of VOCs per production compared to FY 2006	-75.3%	41
Encourage recycling and resource saving through resource-use efficiency and waste reduction.	Resource recovery rate of 98.0% or more	98.3%	40
	10% reduction of water consumption per production compared to FY 2006	-32.1%	41
	Verification of reduction in CO_2 emissions achieved by lighter or downsized products	2020 25 tCO_2	11

*Underlined targets are those that relate to the environmental vision (p.29). See the CSR Medium Term Plan for more details.
*Figures are for 9 consolidated subsidiaries (of which 2 were combined as 1 overseas subsidiary).
*For 10 companies that had business operations during January-December 2016. *VOC: Volatile Organic Compounds

Concrete Measures and Process

The measures for achieving the environmental vision 2021 (p.29) and the CSR Medium Term Plan (p.11) are decided on and their progress is monitored at the Environmental Promotion Committee Structure. Their implementation is led by the committee members, and supported by the organizations below it and stakeholders.

Environmental Promotion Committee Structure

Environmental Committee
Chairman: President
Hiromi Kano
Hosted by: TMS Dept.

- One meeting per year
  - Discussing and determining the Environmental Policy and CSR Medium Term Plan
  - Reviewing the fiscal year performance results and approving the targets and plans for the next fiscal year.

Management Subcommittee
Chairperson: Executive Officer responsible for the Environment
Kazuhiro Watanabe

- Four meetings per year
  - Defining strategies for employee education programs, community support projects, and environmental publications.
  - Discussing the biodiversity activities, including green procurement.
  - Evaluating and ensuring progress in the global implementation of EMS.

Product Subcommittee
Chairperson: Executive Officer in Charge of Engineering
Kimiaki Nakano

- Four meetings per year
  - Examining and reviewing progress of the development of environmentally friendly products.
  - Discussing environmental indices and environmental conservation related to product development.

Production Subcommittee
Chairperson: Director responsible for Production (Energy Management Control Officer)
Toru Yamazaki
Energy Management Planning Promoter: TMS Dept.

- Four meetings per year
  - Reviewing measures to reduce the environmental burden from production and coordinating with the department in charge.
  - Evaluating progress in environmental regulatory compliance, energy and resource saving practices, and improvement of logistics and procurement.

*The members of each subcommittee consist of representatives from the related departments.

Example 1: Company-wide deployment of biodiversity initiative (Japan) (cf p.44)

	2014	2015-2016	2017
Target	At least one high priority activity	At least one activity from the Plan in each site	Compliance of 6 items with the Act
Performance	Performed 1-4 activities in each site	3-4 activities in each site (2015), 3-9 activities	n/a

Management Subcommittee
- Decides policy — 4 times a year • Manages progress

Each site in Japan
- Changed copy paper in 3 sites and conservation
- Implemented the Medium Term Plan in 6 sites. Plan to increase purchases of items that comply with the Act on Promoting Green Procurement in 2017.

Example 2: Reduce CO_2 by EFPs (target related to Environmental Vision for 2021) (Japan) (cf p.33)

	2014	2015	2016	2017
Target	12,800 tCO_2	15,700 tCO_2	19,800 tCO_2	21,400 tCO_2
Performance	17,600 tCO_2	18,500 tCO_2	19,900 tCO_2	n/a

Product Subcommittee
- Commercializes and evaluates EFPs (Products for EVs, HVs*, and fuel cells) — 4 times a year • Manages progress • Sharing of external trends and information about customer needs

Design Department, etc.
- Decided detailed plans
- Trained on LCA* and "product environmental efficiency indicators"
- Verified CO_2 amounts for relevant products (Fuel gas preheaters, etc.)
- Continued assessment of design drawings (Certification of EFPs)
- Verified CO_2 amounts for relevant products
- Continued assessment of design drawings

Plan

*EV, HV: electric vehicle, hybrid vehicle *LCA: life cycle assessment

Example 3: Reduce CO_2 (target related to Environmental Vision for 2021) (Japan) (cf p.39)

	2013	2014	2015	2016	2017
Target	Base year data	-2.5%	-5%	-7.5%	-10%
Performance		-2.0%	-3.5%	-5.5%	n/a

Production Subcommittee
- Decides the measures (Introduction of energy-saving furnaces, making lines more compact) — 4 times a year • Manages progress • Shares new technology and information about laws and regulations

Each region (Energy-saving committees, Production Dept., etc.)
- Decided detailed plans
- Introduced energy-saving furnaces
- Integrated lines
- Measures to prevent air leakage
- Update energy-saving amp in testing machines
- Change to LED lighting, etc.
- Introduced energy-saving furnaces
- Removed old furnaces in production line maintenance
- Updated to high-efficiency transformers
- Plan to review cooling tower operation, etc.

Under the long term plan, we are changing the furnaces in the factories that use a lot of energy to energy-saving furnaces.

Environmental Regulatory Compliance

Environmental Regulatory Compliance and Accident/Complaint Results for FY 2016 (Unit: No. of Incidents)					
	Head Office	Hatano Works	Nagoya Works	Shiga Works	Kasadera Area
Violation of Laws and Regulations	0	1	1	0	0
Fines or Lawsuits	0	0	0	0	0
Accidents	0	0	0	0	0
Complaints	0	0	0	0	0
Spills	0	0	0	0	0

Hatano:Received an Instruction for Corrective Action from the Labor Standards Inspection Office about the failure to report local exhaust ventilation (Ordinance on Prevention of Lead Poisoning).
We submitted our Corrective Action Plan in March 2017.

Nagoya:Filed a Sequence of Events and Improvement Plan, which was accepted (April 2017), because we had not submitted a change report in relation to the Factory Location Act.

Environmental Management System

T.RAD strives to continuously improve its environmental management system in order to enhance its environmental performance. In Japan, we acquired ISO 14001 company-wide certification in 2011, and our domestic subsidiaries have also acquired Green Management and KES* certification. Overseas subsidiaries with production sites have also obtained ISO 14001 certification.

*KES: Kyoto Environmental Management System Standard

Status of acquisition of ISO 14001 certification by overseas sites	
T.RAD North America, Inc. (United States)	October 2001
T.RAD (Zhongshan) Co., Ltd. (China)	February 2005
T.RAD Czech s.r.o. (Czech Republic)	May 2007
T.RAD (THAILAND) Co., Ltd. (Thailand)	December 2007
PT. T.RAD INDONESIA (Indonesia)	August 2010
TRM LLC (Russia)	August 2014
T.RAD (Jining) Co., Ltd. (China)	January 2015
T.RAD (VIETNAM) CO., LTD. (Vietnam)	January 2015
T.RAD (Changshu) Co., Ltd. (China)	November 2015

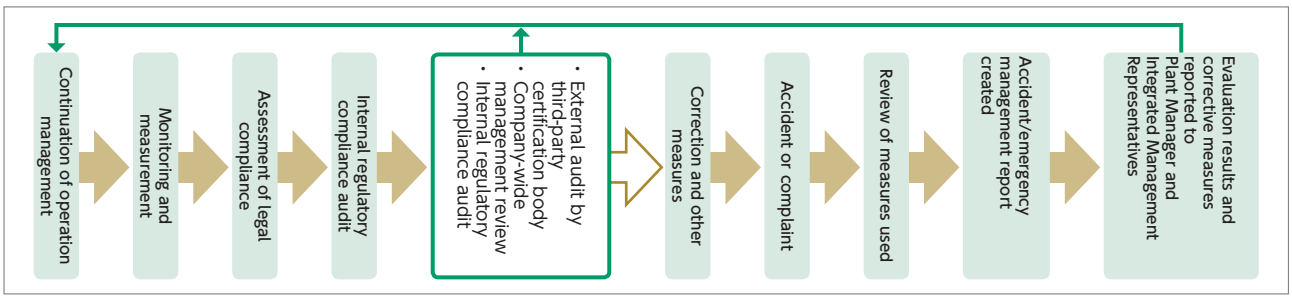
Environmental Risk Management

The internal and external audits inspect our environmental regulatory compliance performance and our operation of the Environmental Management System. T.RAD has strengthened its management of environmental and other types of risks, particularly by improving its internal audits through the use of our check sheets.

①Internal regulatory compliance audit…Regional management divisions mutually audit on regulatory compliance to objectively evaluate whether or not appropriate risk management is practiced.

②Company-wide integrated management review…The management team comprehensively evaluates company-wide management problems and execution appropriateness.

■ T.RAD Risk Management System Chart



Re-verification of compliance assessment

Checks by ISO secretariats

①Implemented self-inspection before mutual compliance audits

In FY 2015, we started to implement general inspections at each site, in addition to the normal controls, before conducting the mutual compliance audit. The number of issues picked up by the mutual compliance audit was 0 in FY 2016. We will continue to promote a speedy response by identifying issues using general inspections.

②Added labor-related elements to the mutual compliance audit

In FY 2016, we added label-related items to those covered by the mutual compliance audit.

While we have only covered a portion of the laws and regulations at this point, we plan to gradually add more while monitoring the result of the audits.

Development of Environmentally Friendly Product (EFP)

Background & Reasons

Design for resource efficiency and the development of products with a low environmental burden are indispensable activities for a sustainable society and important roles of a company. The appropriate control of the risks of environmentally hazardous substances contained in our products is also required by statutory provisions and stakeholders.

Relevant Sustainable Development Goals

Key Standards
- RoHS Directive, ELV Directive, REACH Regulation, etc.
- Customer standards
- Our in-house standards
- Our environmental vision and medium term plan
- Product environmental efficiency indicator

Engagement and Support
- Japan Auto Parts Industries Association
- Joint Article Management Promotion-consortium (JAMP), etc.

Impacts
- Product's impact on the environment during its life cycle (climate change, etc.)
- Impact on stakeholders (compliance with law, dealing with customers, etc.)

Opportunities
- Opportunities for technological improvement, risk management, and market expansion

Challenges
- Further strengthening of Design for the Environment (DfE) and the control system

Management Approach

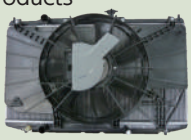
Product subcommittees set targets and manage progress. They cooperate with the design, sales, and purchasing departments; share research, training, and data; and calculate figures for the sale and CO_2 savings of environmentally friendly products.

Evaluation

We confirm product environmental efficiency indicators (PEEI) through evaluation of the design drawings. It is also evaluated by managers and external assessors through committees and IR reports. Once every six months we conduct a satisfaction survey with our major customers and adapt our policies accordingly.

Certification criteria for environmentally friendly products (EFPs)

① Products that achieve substantial CO_2 savings during their use compared to existing products



② Products whose PEEI, calculated based on life cycle assessments, is greater by 1.2 or more points than those of existing products

cf pp.11, 12

	Target	Performance
EFP sales ratio	37.5% or more	39.0%
Cumulative reduction in emissions through EFPs	19,800 tCO_2	Emissions reduced: Approx. 19,900 tCO_2
Reduction in substances containing prohibited compounds	to 0%	Proportion of substances containing prohibited compounds: 0.4%

How to Understand Product Environmental Efficiency Indicators (PEEI)

Environmentally Friendly Products should meet both of the following criteria.

1 Easy to use, high performance, low cost products (product value)

2 Products with a low environmental burden in terms of climate change, resource depletion, and environmentally hazardous substances.

Eco-efficiency is the quantification of how high the product value is and how low its environmental burden is. The product environmental efficiency indicator is obtained by dividing the eco-efficiency of the new products by that of existing products. The calculations are based on the guidelines of the Japan Auto Parts Industries Association.

1. Calculated based on LCA.

Eco-efficiency = Product Value ↑ Rises (Ease of use, high performance, low cost) / Environmental Burden ↓ Falls (Climate Change, Resource depletion, Environmentally hazardous substances)

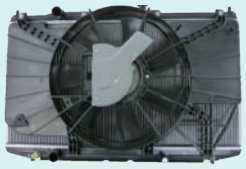
2. Eco-efficiency of new products compared with existing products

Eco-efficiency of new products / Eco-efficiency of existing products = Product Environmental Efficiency Indicator

The higher the value,
①the better the performance
②and the more considerate the EFP is of the environment.

Examples of Environmentally Friendly Products

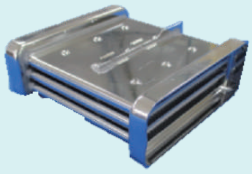
Automotive Parts



Radiator for hybrid vehicle (HV)

EGR cooler

Oil cooler for HV motor



Core of heat exchanger for waste heat recovery system

Reduction in emissions achieved by EFPs
approx. 10,100 tCO_2/yr

This corresponds to the amount of CO_2 absorbed by about 1,148,000 cedar trees

Construction Machinery Parts

Radiator for auxiliary equipment

Oil cooler for motor

EGR cooler

Charge air cooler

Reduction in emissions achieved by EFPs
approx. 1,100 tCO_2/yr

About 125,000 cedar trees

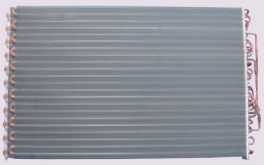
Motorcycle Parts

Radiator for motorcycle

Reduction in emissions achieved by EFPs
approx. 730 tCO_2/yr

About 83,000 cedar trees

Air Conditioner Parts



Heat exchanger for residential air conditioner

Reduction in emissions achieved by EFPs
approx. 2,930 tCO_2/yr

About 333,000 cedar trees

Stationary Device Parts

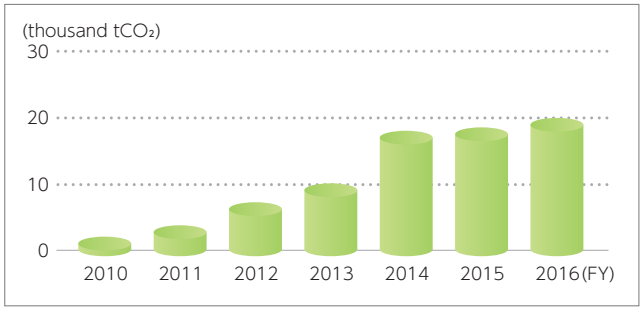
Heat exchanger for fuel cell

Reduction in emissions achieved by EFPs
approx. 3,980 tCO_2/yr

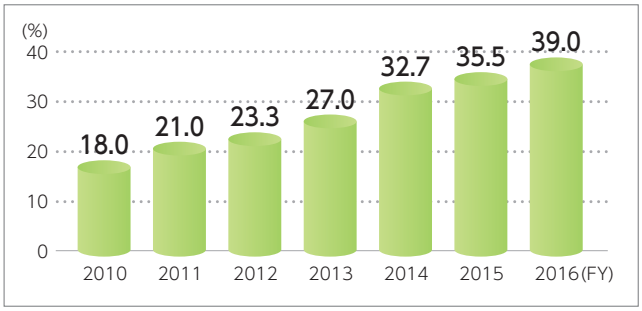
About 452,000 cedar trees

*Calculated based on the amount of carbon dioxide absorbed by a 40-year-old planted cedar tree during one year (8.8 kg of CO_2/year).
Source:"How much carbon dioxide does a forest absorb?" Forestry Agency.
http://www.rinya.maff.go.jp/j/sin_riyou/ondanka/20141113_topics2_2.html
One hectare of 40-year-old planted cedar trees absorbs about 8.8 tonnes of carbon dioxide per year. It is assumed that there are 1,000 trees in one hectare.

Cumulative reduction in CO_2 emissions through EFPs*1



EFP sales ratio*2



*1: The reduction of CO_2 emissions through use of EFPs is a cumulative 5-year value. (Taking into account the years of usage of the product in which the EFP is installed.)
A different calculation method is defined according to each product category.
Example 1: The difference in CO_2 between a base vehicle and a vehicle in which the EFP is installed × (weight of the EFP/vehicle weight) × annual distance driven × number of vehicles
Example 2: The difference in CO_2 between a base product and a product in which the EFP is installed × system contribution ratio × (utilization rate) × number of hours used per year × number of products
*2: This is the ratio of sales of EFPs compared to all our products.

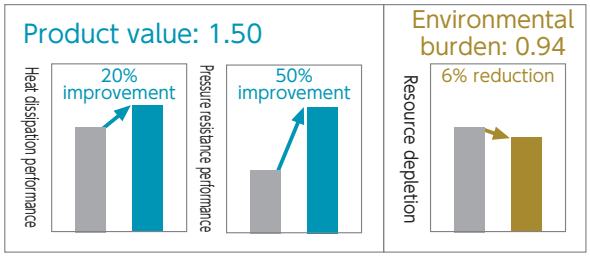
Examples of Environmentally Friendly Products

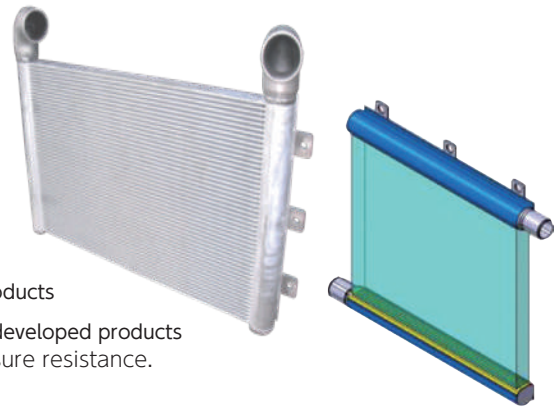
Charge air cooler for construction machinery

Mass-produced product　Ratio to total EFPs sales 7%

Environmental efficiency indicators of typical products **1.60**

■ Compared to existing products:





Contributing to exhaust gas purification through improvement of pressure resistance.
Reducing weight by optimization of the shape of parts.

■ Product characteristics

Contributing to exhaust gas purification by cooling heated air by supercharger and lowering engine combustion temperature. Downsizing system by improved pressure resistance and performance.

■ Installed in

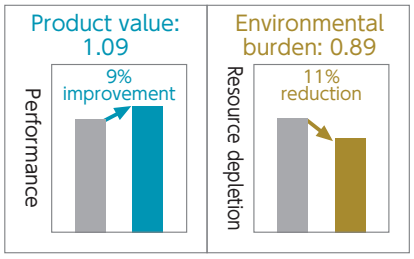
- Hydraulic excavators
- Wheel loaders
- Other construction machinery

Casing-less oil cooler

Mass-produced product　Ratio to total EFPs sales 13%

Environmental efficiency indicators of typical products **1.22**

■ Compared to existing products:



Mission oil (ATF) cooler/warmer

Reducing the amount of aluminum material use by doing away with fins on the water side and designing dimples.

■ Product characteristics

Improving fuel economy especially for a cold start by quickly heating ATF (Automatic Transmission Fluid) and reducing friction just after an engine start.

■ Installed in

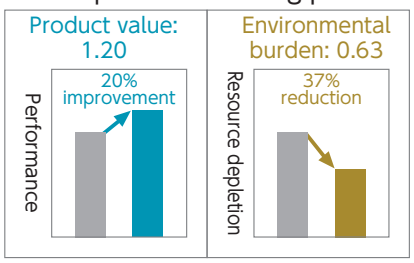
- AT vehicles (automatic transmission) and CVT vehicles (continuously variable transmission).

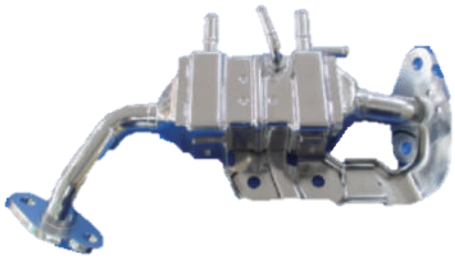
EGR cooler

Mass-produced product　Ratio to total EFPs sales 24%

Environmental efficiency indicators of typical products **1.90**

■ Compared to existing products:





Improving performance drastically and downsizing by improvement of fins on the gas side. Contributing to reduction in the amount of stainless steel use.

■ Product characteristics

Reducing NOx and improving fuel economy by recirculating some of high-temperature exhaust gas from an engine.

■ Installed in

- Gasoline engine
- Diesel engine

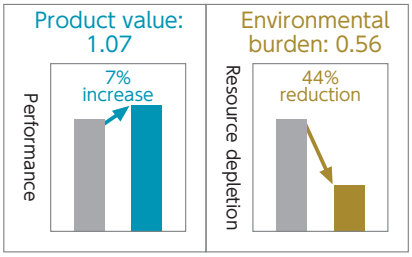
Core of heat exchanger for waste heat recovery system

Mass-produced product

Ratio to total EFPs sales 10%

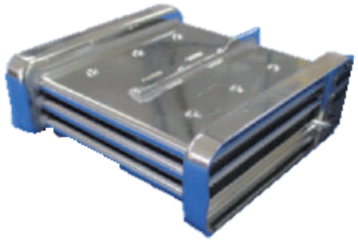
Environmental efficiency indicators of typical products **1.34**

Compared to existing products:



Existing products

Newly developed products

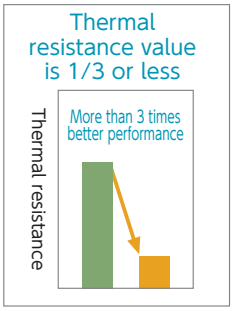


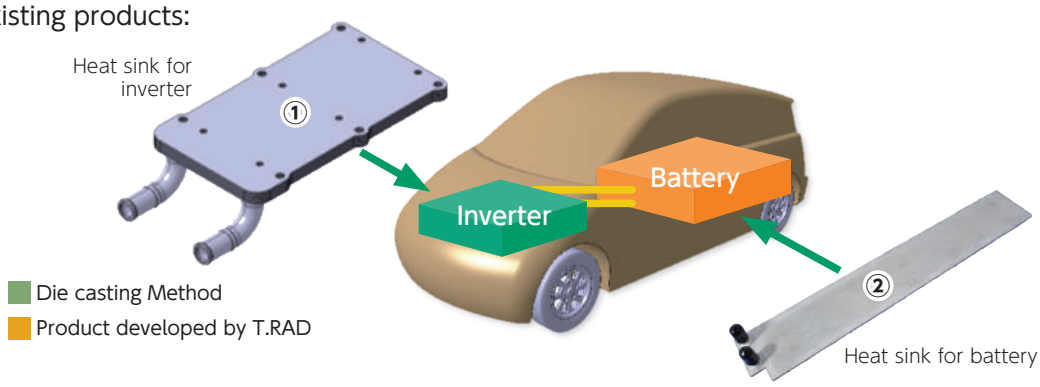
Product characteristics

Achieving higher performance than the current model and drastically thinner & lightweight shape by new high performance fins. Improving fuel economy and heating efficiency in the winter. Satisfying severe mounting requirements in a height direction by flat shape.

Heat sink for EV and HV

Compared to existing products:





Die casting Method

Product developed by T.RAD

Product characteristics ①

Enabling downsizing of semiconductors (power module) by high cooling performance. Contributing to reduction of the overall cost of inverter.

Product characteristics ②

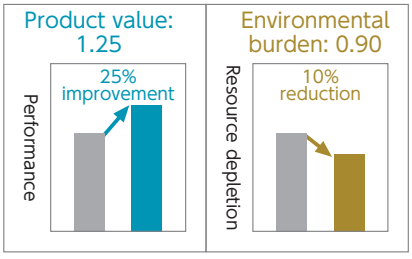
Contributing to higher efficiency and longer life by adjusting battery cells to appropriate temperature. Enabling downsizing of the battery module compared to the previous air cooling method that requires space between battery cells.

Heat exchanger for residential fuel cell

Mass-produced product

Environmental efficiency indicators of typical products **1.39**

Compared to existing products:



Existing products

Newly developed products

Heat exchanger "N-FFTex" for fuel cell

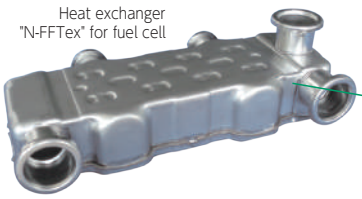
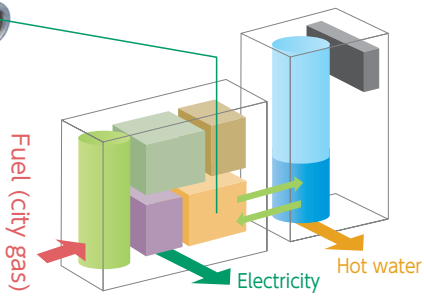


Diagram of inside the "ENE-FARM" system

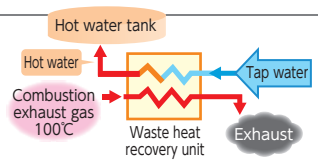
* New Energy Foundation
Based on the "The Happy Home Project: Home Fuel Cell Systems" ('09 version).



Reducing weight by optimization of the shape of parts.

Product characteristics

Heating tap water by recovering waste heat from a fuel cell. Contributing drastically to ENE-FARM's 50% heat recovery (Lower Heating Value).



Installed in

・2016 model of residential fuel cell "ENE-FARM"

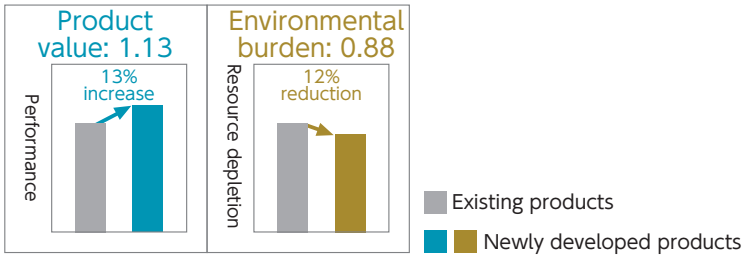
New type high performance charge air cooler (CAC)

Mass-produced product Ratio to total EFPs sales **9%**

Environmental efficiency indicators of typical products **1.31**

Water-cooled CAC

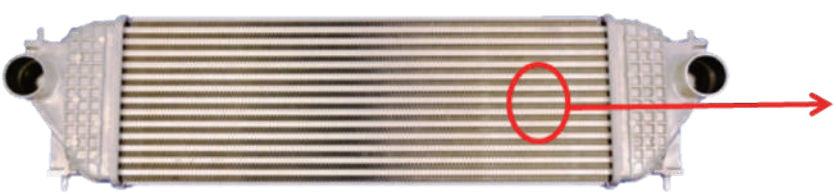
■ Compared to existing products:

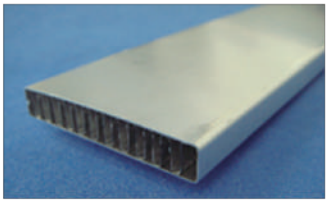


■ Product characteristics

Achieving low pressure loss, compactness, and lightweight by adopting high performance fins, dimples on the water side, and highly densified core.

Air-cooled CAC





■ Product characteristics

Adopting a rectangular tube that suits a front-mounted CAC with a wide core.
Expanding the pass of charge air by rectangular tube.
① Reduction of pressure loss of charge air.
② Improvement of performance by increasing the number of inner fin waves.
③ Reduction in the number of tubes and in weight by increasing the tube size.

Employee Comments

H. E. Development Dept.
Masashi Ogawa

Development of a charge air cooler in response to demand

One of the trends in engine development by domestic and overseas car manufacturers is a downsized turbo engine. This is a system that uses a turbo charger to compensate for the loss in power caused by reducing engine displacement. The smaller engine displacement improves fuel economy and environmental performance, but it also reduces engine power. This is a system that compensates for that with a turbo charger. If hot compressed air from a turbo charger is fed straight into the engine, its power will fall and fuel economy will deteriorate. It therefore needs to be cooled with a charge air cooler (CAC).

A CAC can cool by using water or air. There are also various types depending on where in the car it is mounted. There are various engines and cars being developed by car manufacturers, and we develop products in order to meet that wide-ranging demand.

Through our development of products that will support the development of these engines and cars, we will continue to work hard to become a manufacturer that makes even bigger contributions to the environment.

Chemicals Management

T.RAD ensures strict control of chemical substances at every step from design and parts procurement to manufacturing and shipping.
We also ensure appropriate control over our suppliers, based on our own Green Procurement Guidelines.

Pollution Prevention Management Regulations
- Listing of relevant laws and regulations
- Identification of persons in charge
- Identification of control methods (checks, measurements, records, responses to authorities, treatment, information management, etc.)

Control Procedures for Environmentally Hazardous Substances
- Identification of company-wide standardized control methods

Identification Procedures for Substances of Concern (SOC)
- Definition of SOC control standard values*
- Identification of verification method SOC control

Engineering Standards

Control Standard Values for Environmentally Hazardous Substances (Threshold)

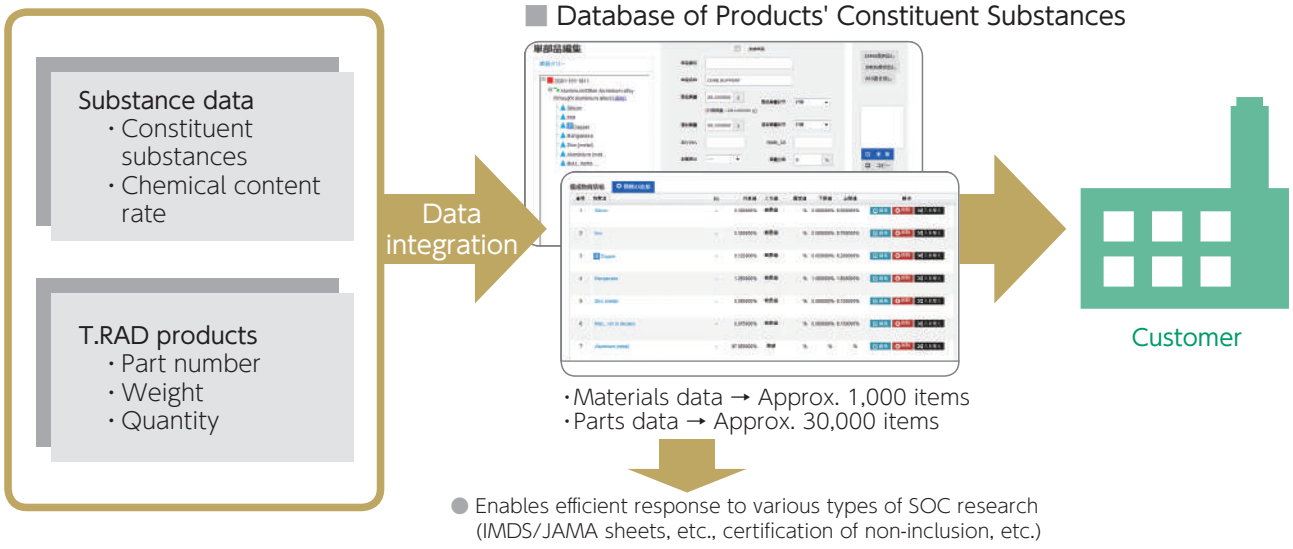
*Details of the controlled substances and standard values specified in the Procedures
- List of controlled substances, banned substances, and monitored substances
- Identification of the SOC control standard values (threshold)

T.RAD is promoting the improvement of control systems and the switch to safe materials in order to promptly meet the statutory provisions of all countries and the regulations of our trading partners. We are thereby working to reduce or eliminate environmentally hazardous substances used in products.

Statutory Provisions	Substances for Reduction or Elimination	Switchover Schedule		
		FY 2016	to FY 2017	FY 2017 and later
Substances banned by T.RAD	● RoHS Directive (including the revised RoHS), ELV directive ● REACH Regulation Any additional substances requiring permits ● Substances that are banned by subsequent revisions of laws or regulations	● For automobile/electronics industries: already done (save for certain exceptions) Reduction/elimination in the process of being complied with		● 0% in FY 2017 (Will also not use banned substances added after FY 2017)
Autonomous	● REACH Regulation Any further SVHCs (Substances of Very High Concern) ● Chemicals that need to be reported or monitored ● Other chemicals added in laws or regulations	Supported as needed		

● Details of banned and monitored substances controlled by T.RAD can be viewed at "Environmentally Hazardous Substance Control Standards" under Supplier Contacts on our website.
http://www.trad.co.jp/english/supplier/green.html

T.RAD has built, and now operates, a system that can be used more efficiently for each operation by storing information about SOCs (substances of concern) in a database.



Reduction of Environmental Burden of Business Activities

We are reducing the environmental burden of our business activities in order to tackle one of our key topics (p.6), an "environmental consideration for businesses and products."

Material Aspects and Environmental Performance

*Scope: The three works in Japan, Sales/Marketing & Technical Division, and the Production Engineering Center

Climate Change Mitigation (Energy)	Base year	Base year data	2014	2015	2016	Target	Performance	Achieved
Consumption of Energy Converted into Electricity (CECE) per processing value (MWh/ million JPY*1)	2013	3.31	3.19	3.33	3.13	-7.5%	-5.4%	×
CO_2 emissions (thousand tCO_2) (Total of scope 1 and scope 2)	2013	42	41	40	40	-7.5%	-5.5%	×
Energy consumption per production (Crude oil equivalent kL/million JPY) (Distribution)	2011	0.025	0.021	0.021	0.022	-5.0%	-14.6%	○
Resource-saving								
Waste per production (excluding steel scrap) (kg/million JPY)	2013	59.1	58.7	58.6	56.6	-3.0%	-4.3%	○
Waste recovery rate (%)		n/a	98.5	98.4	98.3	98.0 or more		○
Water consumption per production (m^3/million JPY)	2006	6.3	4.9	4.4	4.3	-10.0%	-32.1%	○
Environmental Pollution Prevention (Chemicals)								
Release and transfer of PRTR-specified chemicals*2 per production (kg/million JPY)	2006	3.1	1.0	0.8	0.6	-10.0%	-81.2%	○
Release and transfer of VOCs*3 per production (kg/million JPY)	2006	2.3	0.9	0.7	0.6	-30.0%	-75.3%	○
Biodiversity								
					Started in 2011. Activities performed at 3 sites 2013-2014. Performed at 6 sites from 2015.			
					2016 target: Implement plans at all sites. At least one plan in each site. Result: Implemented 3-9 plans, such as tree planting and green purchasing.			○

*1: In 2016, the denominator was changed from production to processing value.
*2: For chemicals with reduction targets. PRTR: Pollutant Release and Transfer Register
*3: VOCs (Volatile Organic Compounds) *See pp. 29 and 30 for product-related environmental values. See p.47 for other data.

Climate Change Mitigation (Reduction of Energy and CO_2)

Relevant Sustainable Development Goals (SDGs):

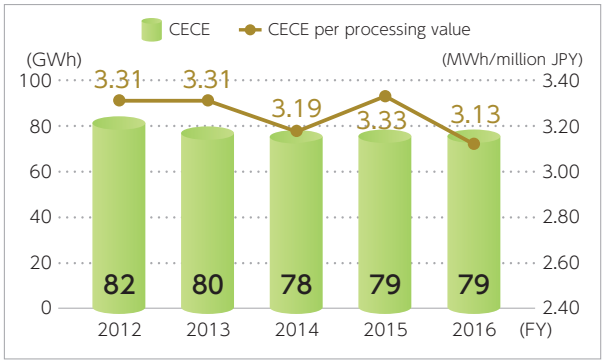
Energy and CO_2 from Business Activities

We have set numerical targets for consumption of energy converted into electricity (CECE) in Japan and for CO_2 indicators overseas, and assess the target achievements monthly. The FY 2016, CECE per processing value in Japan fell 5.4% compared to 2013, against a target of a 7.5% reduction.

6%

Reduction of CO_2 emissions compared to FY 2013 (Scope 1 + 2, Japan)

Changes in CECE and CECE per processing value (Japan)



CO_2 emissions per processing value (Overseas)

(tCO_2/million JPY)

	2016
United States	1.6
Czech Republic	4.5
China (Changshu)	2.2
Indonesia	4.5
Russia	3.0
Thailand	2.1
Vietnam	1.0
China (Zhongshan)	1.0

Energy consumption (GJ) was approx. 770,543 GJ, a 1.7% reduction compared to FY 2013 (p.47).

*In 2016, the denominator was changed from production to processing value (Japan and overseas). "Overseas" covers 9 overseas subsidiaries. Of which one company is included in figures for China (Changshu).
*High per processing value in the Czech Republic was caused by the installation and trials of a new line. In Indonesia, it was caused by a new furnace and taking production in-house.
*Electricity emission factor (Unit: tCO_2/MWh) United States 0.516, Czech Republic 0.490, China (Changshu) 0.686, Indonesia 0.755, Russia 0.437, Thailand 0.522, Vietnam 0.429, China (Zhongshan) 0.437. Other fuel emission factors: Gasoline 2.27 tCO_2/kL, kerosene 2.52 tCO_2/kL, light oil 2.68 tCO_2/kL, LPG 2.98 tCO_2/tonne, city gas 1.88 tCO_2/1,000㎥

Energy and CO_2 from Distribution Activities

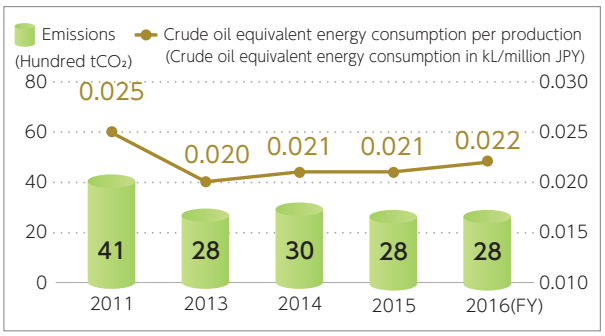
The FY 2016 target for energy consumption per production was a reduction of 5.0% from FY 2011. This was achieved with an actual reduction of 14.6%. We hold a Distribution Subcommittee meeting four times a year in which distributors and the departments involved in product shipping work together to reduce the energy used during distribution. In 2016, we improved the delivery routes. Our distributors also conducted eco-driving training and conducted improvement activities, such as fitting reformers to their trucks.

Distribution Improvement Case Study

Reduction of 19.6 tCO_2/year

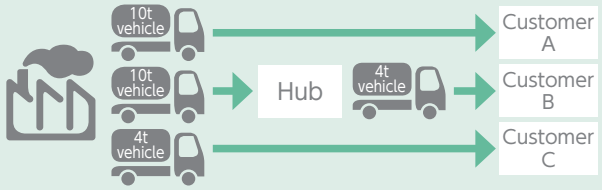
We reduced CO_2 emissions by changing the delivery route, changing the vehicles used, and adjusting the load.

■ CO_2 emissions and crude oil-based energy consumption per production cost



Before improvement (1 month)

4t vehicle: 94 (GJ) x 0.0187 (tC/GJ) x (44/12) = 6.4 (tCO_2)
10t vehicle: 66 (GJ) x 0.0187 (tC/GJ) x (44/12) = 4.5 (tCO_2)



After improvement (1 month)

4t vehicle: 15 (GJ) x 0.0187 (tC/GJ) x (44/12) = 1.0 (tCO_2)
10t vehicle: 73 (GJ) x 0.0187 (tC/GJ) x (44/12) = 5.0 (tCO_2)

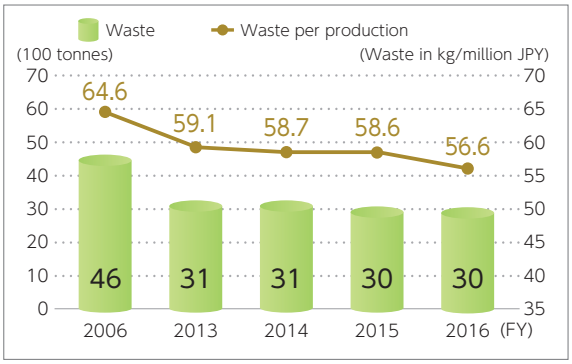
1 month's effect: 10.9 (tCO_2) - 6.0 (tCO_2) = 4.9 (tCO_2) FY 2017 effect (4 months): 4.9 (tCO_2) x 4 months) =19.6 (tCO_2)

Resource Saving (Reduction of Waste and Decrease of the Burden on Water Resources)

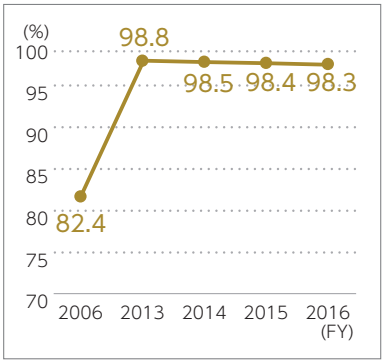
Relevant SDGs:

T.RAD is working on the reduction and recovery of waste. Our waste per production (excluding steel scrap) in FY 2016 posted a 4.3% reduction compared to FY 2013, against a target of a 3.0% reduction for the same period. Our resource recovery rate was 98.3% against a target of 98.0%. The waste generated (excluding steel scrap) was 5.2% less than in FY 2013.

■ Changes in waste and waste per production (excluding steel scrap) (Japan)



■ Resource Recovery Rate (Japan)



98%

Resource recovery rate (Japan)

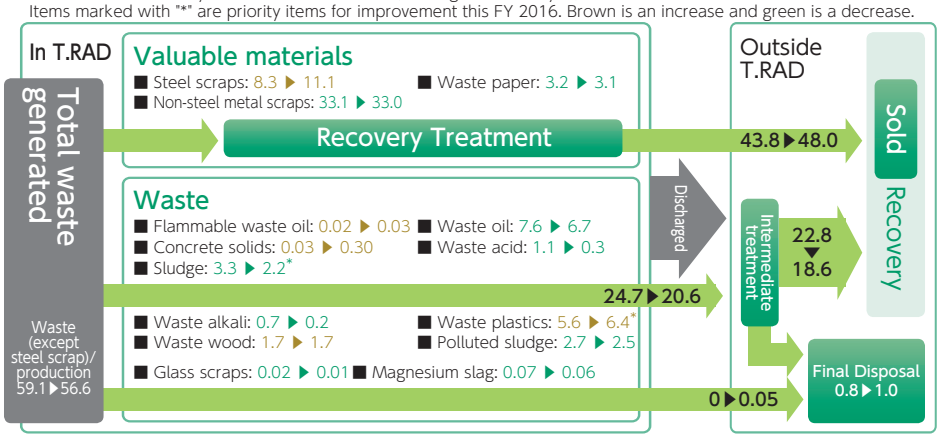
■ Waste per sales (Overseas)

(kg/million JPY)

	2016
United States	100
Czech Republic	111
China (Changshu)	45
Indonesia	122
Russia	102
Thailand	98
Vietnam	139
China (Zhongshan)	73

■ Waste flow (Japan)

Results from the base year FY 2013 to FY 2016 (Unit: kg/millions of yen)
Items marked with "*" are priority items for improvement this FY 2016. Brown is an increase and green is a decrease.

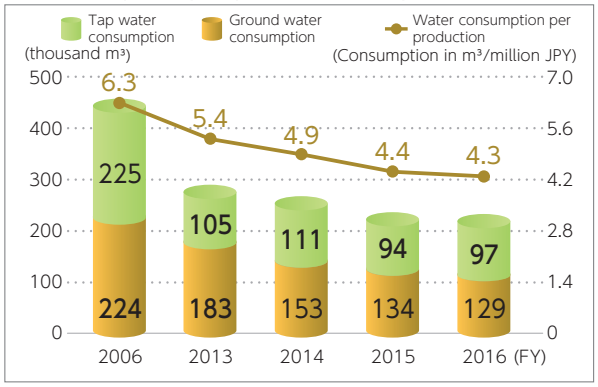


*"Overseas" covers 9 overseas subsidiaries. Of which one company is included in figures for China (Changshu).
*High per sales in Indonesia was caused by increase following taking production in-house. In Vietnam, it was caused by an increase in waste from more packaging and increased production. Per sales was low in China (Changshu) because of increased sales.

The FY 2016 target for water consumption per production of our Japanese works was a reduction of 10.0% compared to FY 2006. This target was easily met, as we achieved a reduction of 32.1%. Water consumption fell by 49.7% compared to FY 2006. In particular, the water used for industrial purposes in the Shiga Works was reused without being released.

Example: FY 2016 Shiga Works Breakdown of water consumption
- Total amount of water withdrawal: Approx. 62,000 m³ (For domestic use and additional industrial use)
- Total amount of water reused (for industrial use): Approx. 89,000 m³

■ Changes in water consumption and water consumption per production (Japan)



*Breakdown: Refer to GRI Standard 303-1 (G4-EN8)

50%
Reduction in water consumption compared to FY 2006 (Japan)

Environmental Pollution Prevention (Reduction of Chemicals in Production)

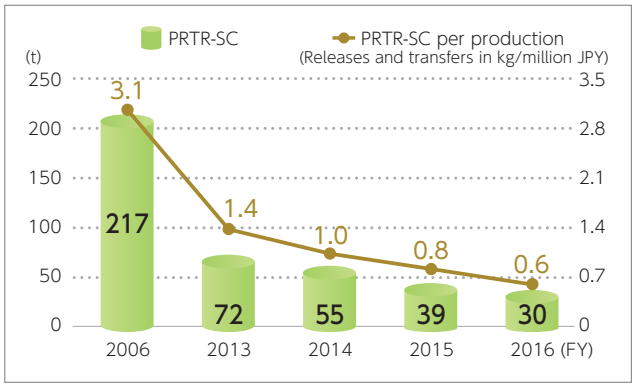
Relevant SDGs:

Reduction of PRTR-Specified Chemicals

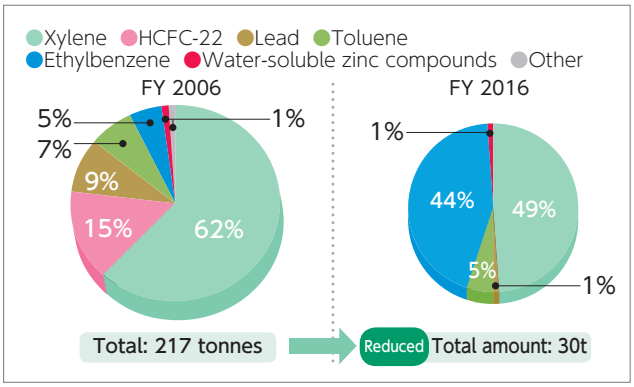
Of the chemicals specified in PRTR, the following seven required release and transfer volume notifications by T.RAD in 2016.
① Ethylbenzene ② Xylene ③ Chromium and trivalent chromium compounds
④ 1,2,4-trimethylbenzene ⑤ Toluene ⑥ Lead ⑦ Nickel
These are joined by water-soluble zinc compounds, dichloromethane, 1,1-dichloro-1-fluoroethane (HCFC-141b), benzene, and chlorodifluoromethane (HCFC-22) for a total of 12 substances for reduction, for which T.RAD has set targets and is strengthening control. Release and transfer of PRTR-specified chemicals per production has been greatly improved in FY 2016, with an 81.2% reduction compared to our target of a 10.0% reduction from FY 2006.
*We also monitor normal hexane, styrene, and others.

86%
Reduction of 12 controlled chemicals compared to FY 2006 (Japan)

■ Changes in release and transfer of PRTR-specified chemicals (PRTR-SC) and PRTR-SC per production (Japan)



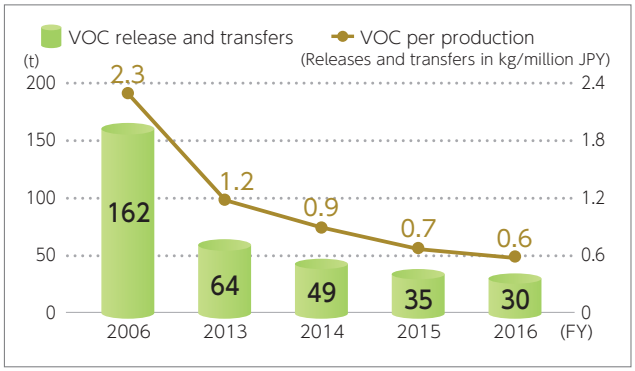
■ Release and transfer of PRTR-specified chemicals by chemical (Japan)



Reduction in Volatile Organic Compounds (VOC)

Ethylbenzene, xylene, toluene, 1,2,4-trimethylbenzene, and benzene are set as VOC reduction targets in particular. We gather data on them to understand how the improvements are working. The release and transfer of VOCs per production fell by 75.3% in FY 2016 compared to FY 2006, easily achieving the target of a 30.0% reduction.

■ Changes in release and transfer of VOCs and VOCs per production (Japan)



82%
Reduction in VOCs compared to FY 2006 (Japan)

*See p.38 for information about the management (prevention of environmental pollution) of chemicals in the products.

Improvement Case Studies

Improved air leakages

Reduction of approx. 70 tCO_2/yr (Japan)

We reduced the electricity consumption of our compressors by repairing air leaks in our factories.
Before improvement: 1,912 kWh/day, after improvement 1,527 kWh/day
Effect: Approx. 140 MWh/year x 0.500 tCO_2/MWh = approx. 70 tCO_2
(The photo below shows an example.)

Tear in hose | Hose replaced | Air leak from the joint | Part replaced

Withdrew old furnaces and introduced energy-saving furnaces

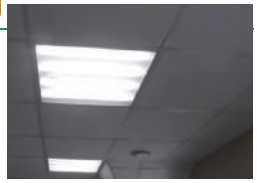
Reduction of approx. 49 tCO_2/yr (Japan)

We changed the furnaces used in production to compact energy-saving furnaces. This made the production process more compact and reduced CO_2.
Before improvement: 100,000 kWh/month, after improvement 92,000 kWh/month, effect: 8 MWh/month x 12 months x 0.509 tCO_2/MWh = approx. 49 tCO_2/year

Changed to LED lighting and energy-saving lighting

Reduction of approx. 81 tCO_2/yr (consolidated)

- **Changed to LED lighting:**
  Before improvement: 36.173 MWh x 0.500 tCO_2/MWh + 89.041 MWh x 0.486 tCO_2/MWh +133.517 x 0.509 tCO_2/MWh +1.143 x 0.437 tCO_2/MWh
  After improvement: 9.477 MWh x 0.500 tCO_2/MWh + 38.764 MWh x 0.486 tCO_2/MWh + 54.964 MWh x 0.509 tCO_2/MWh + 0.572 MWh x 0.437 tCO_2/MWh
  Effect: 78 tCO_2
- **Changed 11 lights to energy-saving lighting:**
  Effect: 0.00025 MW x 11 lights x 9h/day x 252 days x 0.437 tCO_2/MWh = approx. 3 tCO_2

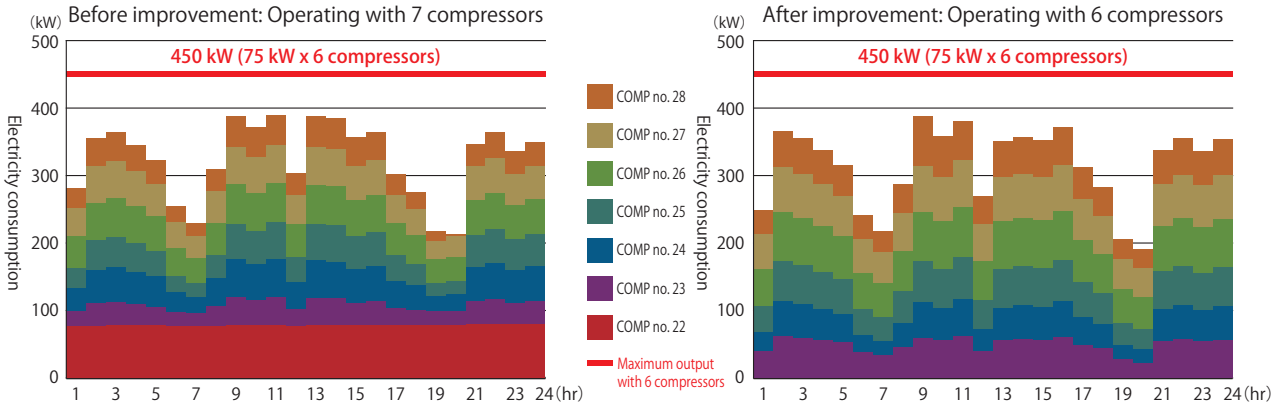


LED lighting in the Russian office

Appropriate operation and stopping

Reduction of approx. 85 tCO_2/yr (Japan)

- **Reorganization of transformers:**
  We stopped operation of two small load transformers and consolidated them into one large capacity transformer.
  Before improvement: 14,784 kWh/year, after improvement: 7,911 kWh/year, effect: 6.873 MWh/year x 0.500 tCO_2/MWh = approx. 3 tCO_2
- **Optimal operation of compressors:**
  ①We reduced the supply pressure of the low-pressure compressor. We also reviewed the operation settings of the inverters and dampers, and stopped the operation of two compressors. Before improvement: 5,287 kWh/week, after improvement: 4,477 kWh/week, effect: 0.81 MWh/week x 48.8 weeks x 0.500 tCO_2/MWh = approx. 20 tCO_2
  ②During the seven non-summer months, we stopped the operation of one compressor because of the lower load. We decided to use a 6-compressor operation because the electricity consumption from using a 7-compressor operation would never exceed the maximum output of 6 compressors of 450 kW (75 kW x 6) (left graph below).
  Before improvement: 43,621 kWh/week, after improvement: 41,230 kWh/week,
  effect: 2.391 MWh/week x 4 weeks/month x 7 months x 0.486 tCO_2/MWh = approx. 33 tCO_2/year



③On holidays, the six inverter compressors were operating at a low load, so we stopped the operation of three of them. We automatically stopped the operation during holidays for 34 hours using a calendar timer.
Effect: 0.018 MWh x 34h x 4 weeks/month x 12 months x 0.486 tCO_2/MWh = approx. 14 tCO_2/year

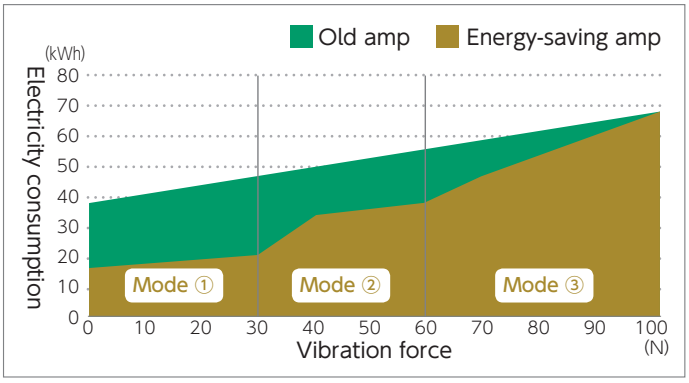
- **Stopping operation of blade servers and relocating them:**
  We reduced electricity consumption by stopping the operation of one blade server and relocating 12 servers from the computer room to a data center.
  Before improvement: 16,500 kWh, after improvement: 0 kWh, effect: 16.5 MWh x 0.486 tCO_2/MWh = 8.0 tCO_2
- **Appropriate operation for the flow of water:**
  Due to changes in the production process, the amount of water treated at the water treatment plant was reduced. In response to the reduced water flow, we changed the pump to a small type, fully opened the flow adjustment valve, and used inverter control.
  Before improvement: 11 kW, after improvement: 2.9 kW, effect: 0.0081 MWh x 7 hrs/day x 244 days x 0.500 tCO_2/MWh = approx. 7 tCO_2

Upgrade to energy-saving equipment

Reduction of approx. 42 tCO_2/yr (Japan)

- **Upgraded the fridge in the employee cafeteria to an energy-saving fridge:**
  ①Before improvement: 2.567 MWh/year, after improvement: 0.937 MWh/year, effect: 1.63 MWh x 0.500 tCO_2/MWh = approx. 0.8 tCO_2
  ②Before improvement: 1.980 MWh/year, after improvement: 0.55 MWh/year, effect: 1.43 MWh x 0.486 tCO_2/MWh = approx. 0.7 tCO_2
- **Upgrading of vending machines:**
  In accordance to the number of products sold, we reviewed the number of installed vending machines and upgraded machines that had been manufactured five years ago.
  Effect: (effect of removing one machine 0.835 MWh + effect of upgrading five machines 8.029 MWh) x 0.486 tCO_2/MWh = approx. 4 tCO_2
- **Upgrading to energy-saving transformers:**
  Effect: before improvement: 21.958 MWh/year, after improvement: 12.117 MWh/year,
  effect: 9.841 MWh x 0.486 tCO_2/MWh = approx. 5 tCO_2
- **Upgrading to energy-saving amp:** We upgraded the amp on the electrodynamic vibration testing machine to an energy-saving amp (automatically selects the mode depending on the test conditions).
  Before improvement: 305.454 MWh/year, after improvement: 240.037 MWh/year,
  effect: 65.417 MWh x 0.486 tCO_2/MWh =approx. 32 tCO_2

Energy-saving amp Eco modes



Reduction of waste

Approx. 39,230 kg/year reduced (consolidated)

- **Return of pallets:**
  We return the pallets used by suppliers for their deliveries so that they can reuse them.
  Effect: 450 kg for wooden pallets, 770 kg for returning other companies' pallets
- **Reduction of waste flax by introducing jet dispensers:** Effect: 1,130 kg
- **Reduction of scrap:** Effect: approx. 33,200 kg
- **Improvement of packaging materials:**
  We changed the packaging for parts from paper to polyester (right),
  and reused packaging materials by returning them to suppliers.
  Effect: approx. 3,680 kg

Employee Comments

Production Department, Nagoya Works
Kenji Kato

The electricity consumption of the compressors accounts for 14% of the entire Nagoya Works. We fitted electricity meters to all compressors so that we could ascertain the load of each machine. This allowed us to stop one compressor and control the number of machines in operation when load is low during holidays, in an effort to optimize the number of compressors in operation and save energy. We also created a graph daily out of the electricity data measurements so that we could visualize and monitor status such as the load of each compressor.

Work Safety Administrator, Russia
Utekhina Tatyana

Since 2014 we are certified according to ISO 14001: 2004. We constantly aim at reducing our negative impact on the environment. Since 2014, we have been replacing lamps in the production hall with energy-saving ones. This allowed us to significantly reduce our energy consumption. Since 2016, we have begun to replace the lights in our office with LED lights.

Initiatives for Biodiversity

Background & Reasons

Our business operation relies on the benefits of biodiversity. To ensure sustainable business activities, it is extremely important to reduce our environmental burden and promote conservation.

Relevant Sustainable Development Goals

Key Standards

- Convention on Biological Diversity
- Sustainable Development Goals
- The Corporate Ecosystem Evaluation
- Basic Act on Biodiversity
- Environmental Policy
- Guidelines for Private Sector Engagement in Biodiversity

Engagement and Support

- Shonan Satokawazukuri Minnano-Kai
- Environmental Partnership Organizing CLUB
- Shiga Central Forestry Union

Biodiversity is said to be one of the challenges facing the world today. The Sustainable Development Goals (SDGs)* include a goal about biodiversity (Goal 15). The following explains our involvement with biodiversity by taking sustainable forest management as an example.

*the United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development.

Impacts

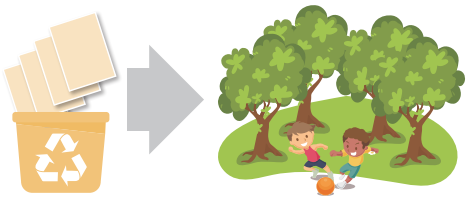
Timber and other wood fiber

- The risk of contributing to forest loss by buying and using paper procured from forests that have not been managed appropriately.
- The risk of a shortage of timber that provides the raw material for paper, leading to a drastic rise in the price of paper, which would affect business activities.

Opportunities

- We contribute to the prevention of forest loss by using paper procured from managed forests and highly recycled paper.
- Through forest conservation and by creating a promenade that makes effective use of wood chips derived from forest thinning, we promote sustainable forest management and provide a place for people to rest and relax.

Examples of activities
- Reduction in paper use
- Green procurement
- Tree planting
- Conservation of trees
- Created a promenade using wood chips derived from forest thinning in the woods.



Challenges

- Ascertain the green procurement status of office supplies and equipment, and switch to products that comply with APGP*.
- Quantification of the effects of initiatives in each region and the connection between our products and biodiversity.

Management Approach

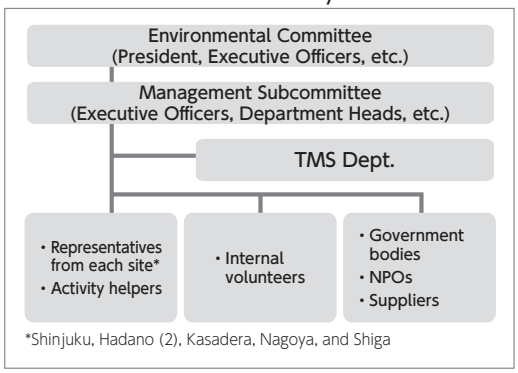
- Set goals in the CSR Medium Term Plan, the medium-term biodiversity plan, and departmental policies. Every month, we check the progress of activities with department heads and managers in each region, and share information about solving problems. We also report to executives every month.

Evaluation

- In external forums and other places, we reported our activities, received feedback from our stakeholders, and rated our activities.
- Executives assessed the activities at the Management Subcommittee and the Environmental Committee. We also attach importance to the opinions of employees who have seen the activities or read our internal reports.

*Act on Promoting Green Procurement

Structure for biodiversity activities



*Shinjuku, Hadano (2), Kasadera, Nagoya, and Shiga

cf pp.11, 12

■ 2016 target: Implement plans at all sites ------ At least one plan in each site.

Performance: ---------- 3-9 in each site

■ Examples of the performance at each site (see pp. 45 and 46 for more details):

120 plants	9%	538 kg
Number of sweet viburnums planted	Reduction in photocopying paper per person (no. of sheets used/ person)	Amount of used work clothes recycled

■ FY 2017 target: Company-wide compliance of 6 new items with the APGP

Evaluation and the Medium Term Plan

In 6 sites, we perform a "Corporate Ecosystem Evaluation" and conduct activities on ecosystem services with high dependence and impact on biodiversity.

Ecosystem service	Dependence	Impact	2011 - 2014	2015	2016	2017
Timber/wood fibers	High	High	Switched photocopying paper	Ascertained green procurement at each site and made changes accordingly	21% company-wide ascertainment, 25% green purchasing, reduced paper use	Company-wide compliance of 6 items
Freshwater	High	High	Installed biotope pond, checked water safety, sponsored, cleaned river		Researched organisms in the biotope pond, took part in forums, etc.	Continuing to check safety and other activities
Air quality/climate regulation	High	High	Energy-saving, switching off lights activities →		Switching off lights, installing green curtains →	
Genetic resources, pollination, etc.	-	High	Planted indigenous species, planted trees, conservation →		Created Green Recreation Promenade	Conserving animals and plants
Waste treatment	-	High		Improving methods for recycling used work-clothes and other items →		

*Biodiversity Medium-Term Plan (excerpts)

Dependence, Impact and Examples of Initiatives

Freshwater

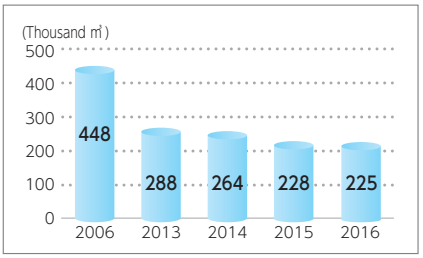
Risks/Impacts Restriction of use of water due to depletion of water resource; risk of contaminating the water quality of the rivers into which water is released.

Opportunities Conservation; contribution to the community; legal compliance

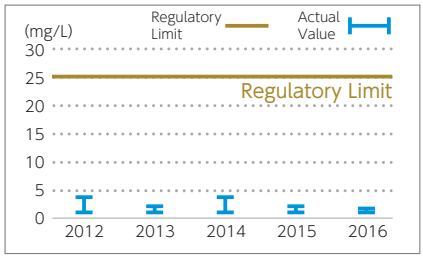
- ✓ Sites comparatively close to protected regions: (Aichi Prefecture) Sales/Marketing & Technical Division (Fujimae-higata), Shiga Works (Lake Biwa)
- ✓ Sites that discharge into rivers: Hatano Works (waste water treatment plant into the Kaname River), Nagoya Works (septic tanks into Ise Bay)
- ✓ Water withdrawal sources (3) for main works/sites: Tanzawa water system (Kanagawa Prefecture), Kiso River water system (Aichi Prefecture), Echi River (Shiga Prefecture)

- Set targets for and reduced water consumption (p. 40). Reused water within the company.
- Managed the water quality risk through water quality inspections and compliance audits.
- Improved washing processes and used detergents with a low environmental burden.
- Before discharging treated water into rivers, checked its impact on organisms in the biotope pond that used water from a waste water treatment plant.

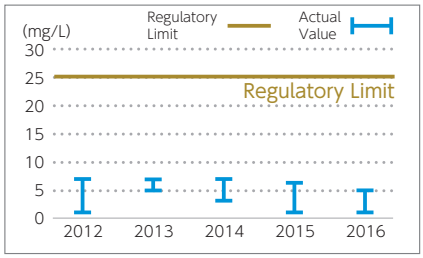
■ Changes in water consumption (Japan)



■ Changes in Biochemical Oxygen Demand (BOD) (Hatano)



■ Changes in Chemical Oxygen Demand (COD) (Hatano)



*The values for BOD and COD are the result of water quality inspections at Hatano Works. Shown as the gap between the minimum and maximum values. Values below 1 mg/L are indicated as 1.

- Conserved indigenous organisms in the biotope pond and a water tank (examples of the number of species being grown: stone moroko (approx. 35), semisulcospira libertina (approx. 200), dragonfly naiad (approx. 80))
- Collected, with local residents, trash from the river that we discharge water into. Sponsored the conservation body for the Kaname River water system, Shonan Satokawazukuri Minnano-Kai (http://www.satokawa.com/). Exchanged opinions with personnel at Kanagawa Prefecture's Planning and Coordination Division. We received opinions about "the importance of corporate participation" and "calling on other companies (to action)."
- Introduced our initiatives at the "2017 Shonan Satokawazukuri Forum". Exchanged opinions with local residents (p.28).

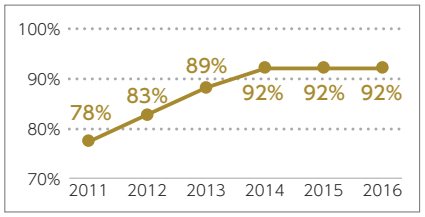
Collaboration: Hadano City Hall and the Kanagawa Prefectural Fisheries Technology Center Freshwater Experiment Station (killifish)

Climate regulation, air quality regulation

Risks/Impacts Impact on rising temperatures caused by CO_2 emissions; risk of increases in the cost of using energy; risk of increased costs in responding to tighter laws and regulations

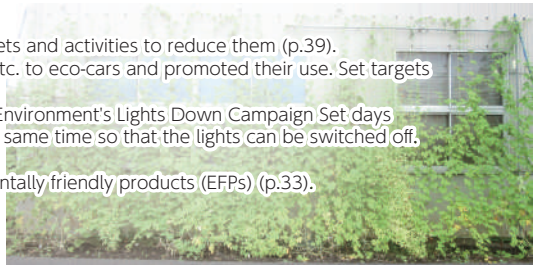
Opportunities Enhancement of the added value in the EFPs and expansion of their market; improvement of operating techniques for energy saving and its technology transfer to overseas; switch to energy-saving equipment.

■ Eco-car* ownership rate (Japan)



*Company cars, long-term contract rental cars, forklifts, etc.

- Energy consumption and CO_2 targets and activities to reduce them (p.39).
- Switched company cars, forklifts, etc. to eco-cars and promoted their use. Set targets and managed them.
- Participated in the Ministry of the Environment's Lights Down Campaign Set days when everyone leaves work at the same time so that the lights can be switched off.
- Installed green curtains (right).
- Promoted the design of environmentally friendly products (EFPs) (p.33).



Waste treatment, fibers, and other general things

Risks/Impacts The risk of damaging the circulation of resources by using and discarding items with a high environmental burden. The risk of tarnishing our own reputation by dealing with inappropriate contractors.

Opportunities To contribute to the circulation of resources by switching to methods of reuse that result in an even lower environmental burden; and by using environmentally friendly producers and contractors.

- Green purchasing (purchasing of products that comply with the "decision criteria" in the basic policy for the promotion of the procurement of eco-friendly goods and services.). Currently investigating whether 274 items that are purchased company-wide comply or not. In order to raise our compliance rate, we have also set target values and are currently switching to compliant goods.
- Continued to reuse packaging materials of parts. Recycled waste plastics (3,435 kg for new efforts in 2016)
- Changed the method for recycling work-clothes (switched from using a base course material to using old clothes/materials), continued to recycle (538 kg).
- Reduced photocopying paper per person (no. of sheets/person) by 9%.

Pollination, genetic resources, and pest regulation

Risks/Impacts Limitation of animal and plant habitat, pollination limitation, limitation of predator's feeding on pests, impact on agriculture, all due to land use.

Opportunities Recovery of nature; conservation of plants and animals; promotion of pollination by bees; creation of rest areas by increasing greenery

✔Total number of species on the red list for prefectures in which we have sites

	Tokyo	Kanagawa Prefecture	Aichi Prefecture
Critically Endangered IA	627	270	104
Endangered IB	456	171	201
Vulnerable II	980	291	206
Near Threatened	718	226	121

	Shiga Prefecture
Critically endangered	168
Endangered	147
Rare	401
Requiring attention	245

*Source:Tokyo: Red Data Book Tokyo http://tokyo-rdb.jp/index.php;
Kanagawa Prefecture: Kanagawa Red Data Book 2006 Web version http://conservation.jp/tanzawa/rdb/rdblists/about_rank;
Aichi Prefecture: Overview of the third red list "Red List Aichi 2015" http://www.pref.aichi.jp/kankyo/sizen-ka/shizen/yasei/redlist/gaiyou.pdf;
Shiga Prefecture: "Wildlife that should be valued in Shiga Prefecture (Shiga Prefecture Red Data Book) 2010 edition" http://www.pref.shiga.lg.jp/d/shizenkankyo/kyoseijourei.html, retrieved May 2017.

- Restoration of nature affected by land use (Examples of new planting in 2016 and continuously conserved animals and plants)

Hatano Works (Kanagawa) Ashitaba (a. 8), Japanese pepper (b. for butterflies, 3), sasanqua camellia (3), pulsatilla cernua (conserved), dianthus superbus (4), lythrum anceps (c. conserved), hyacinth orchid (d. conserved as a Kanagawa Prefecture endangered species IB), Japanese iris (conserved), threeleaf arrowhead (conserved), killifish (conserved), etc.


a


b


c


d

Nagoya Works (Aichi) Buddhist pine (e. 18) **Shiga Works (Shiga)** Japanese maple (f. 5), rhododendron subg. hymenanthes (g), Japanese red pine, sweet viburnum (h. 120 as a protective wall), etc.


e


f


g


h

Collaboration: Hadano City Hall, the Shijuhasse Gawa Shizen Mura NPO and the Shiga Central Forestry Union

- Created a Green Recreation Promenade in the middle of a Japanese red pine forest within the premises of the Shiga Works. Used wood chips made out of lumber remnants for the path. We hope that employees and local people will be close to and enjoy the nature that we are conserving. The President and Plant Manager also celebrated its completion.

Shiga Central Forestry Union
Head of the Hino Site
Sumitaka Tonoike

Opinion of a cooperator

The Japanese red pine forest growing naturally inside the Shiga Works is not only rare, but also a valuable greenery barely left from the pre-war days, as no other cultivation has taken place there. As many of these old unplanted trees are dying away due to the damage caused by pine wood nematode, finding a way to preserve them has become a major challenge. Although we have been protecting them by using nematicides since 2007, some of them are dying because of abnormal weather of recent years and diseases. We therefore would like to focus on growing seedling pines. To get many of the employees interested in Japanese red pines and greenery due to the promenade that was created in the natural forest, the Shiga Central Forestry Union intends to continue carrying out its 50-year forest management project.