Water Management

With regard to water used and discharged by facilities that generate effluents (which are located only in Japan and not abroad), we have conducted risk management using our HSSE-MS since 2000 and practiced the PDCA cycle for continuous improvement.

In 2016, we reconfirmed the flow of water of domestic facilities (refineries) with large water usage from water intake to discharge. We also reviewed water shortage risks with our water management system (HSSE-MS) using the World Resources Institute (WRI)'s AQUEDUCT tool and water shortage information published by the Ministry of Land, Infrastructure, Transport and Tourism, in addition to conventional water risk assessments. As a result, we reviewed conventional response measures (operational changes) for each water intake restriction level through collaboration with local governments.

With regards to water usage, we strive to recycle the approximately 160 million kL (97% of the Group's water usage) of fresh water used at Group refineries. In 2017, we have kept the volume of newly sourced water to about 3% of our total fresh water usage.

Industrial water used in refining processes is treated through wastewater purification, either via oil separators, chemical treatment using flocculating agents, or the use of activated sludge treatment equipment. In this way, we ensure that wastewater meets environmental regulations related to chemical oxygen demand (COD) along with chemical and oil content before it is expelled. In addition, we have a system in place to constantly monitor concentration levels of regulated substances in wastewater. This system reports readings to applicable local governments in real time. If a violation occurs, details are made public.

Chemical Substance Management

The Company practices proper management of the chemical substances used in its manufacturing processes, basing management procedures on domestic and overseas laws and in-house chemical substance management regulations.

For chemical substances contained in the Company's products, we perform evaluations and management based on the Occupational Health and Safety Act, the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR Law), and the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. In addition, the Company conducts labelling in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) *1 scheme, maintains safety data sheets (SDSs), and takes other appropriate measures including steps to track chemical release and transfer volumes and submit the necessary reports.

Furthermore, we quickly and appropriately respond to any revisions and additions to industry and customer lists of chemical substances to be managed and are working to minimize product risk and build systems we can offer to our customers.

We hold seminars for relevant persons at applicable business sites including affiliate companies to provide information about legal revisions. Furthermore, laws regarding rationalization of use and optimization of management of CFCs were revised in 2013. According to new requirements, CFC utilizing equipment that conforms to the law must be installed and thorough maintenance and inspection conducted. In the event that leakage exceeds a predetermined amount, equipment must be immediately repaired and the amount of leakage officially reported. We are conducting a survey to determine the status of such equipment in possession and spreading awareness in relevant facilities to ensure reporting should leakage be discovered. In 2017, no such leakage requiring reporting to government authorities was identified.

*1 GHS label: GHS, Globally Harmonized System of Classification and Labelling of Chemicals, intends to prevent accidents as well as protect people's health and the environment by classifying the hazards of chemical products in accordance with a harmonized worldwide standard, by defining those hazards using illustrations and other means, and by communicating health and safety information on labels and safety data sheets (SDS).

Release and Transfer Volumes of PRTR Substances at Group Refineries

We reported results for 2016 as follows to each relevant local government with regard to PRTR substances.

PRTR Substances	Unit	Release Volume				Transfer Volume
		Air	Water	Soil	Total	
2-Aminoethanol	kg	0	1.5	0	1.5	0
Asbestos	kg	0	0	0	0	810
Ethylbenzene	kg	900	0	0	900	0
Xylene	kg	5,470	8.7	0	5,478.7	0
Cyclohexylamine	kg	0	4.6	0	4.6	0
Dioxins	mg-TEQ	1.7×10^{-5}	1.3	0	1.3	0
Tetrachloroethylene	kg	0	0	0	0	0
1,2,4-Trimethylbenzene	kg	610	0	0	610	0
1,3,5-Trimethylbenzene	kg	5	0	0	5	0
Toluene	kg	22,900	0	0	22,900	0
Hydrazine	kg	0	4.8	0	4.8	0
Normal hexane	kg	69,200	0	0	69,200	0
Benzene	kg	7,030	56	0	7,086	0

Our Stance on Biodiversity

Basic Policy for Biodiversity

The Company defines its basic policy for maintaining ecosystems and protecting biodiversity as follows:

1. Pledge

The Company pledges the following based on its awareness of the importance of biodiversity.

(1) Cooperate to maintain ecosystems

(2) Respect the basic concept of protected areas

(3) Seek out partnerships that can actively contribute to the protection of biodiversity worldwide

2. Environmental impact assessment

The Company will conduct environmental impact assessments including on the potential impacts on biodiversity prior to establishing all new businesses and making significant changes to existing businesses.

3. Consultation

The Company will pay close attention to internationally recognized "biodiversity hotspots" (a biogeographic region that is both a significant reservoir of biodiversity and is threatened with destruction) and conduct early consultations after confirming with major stakeholders.

The Company has formulated the Basic Policy for Biodiversity, recognizing the importance of protecting ecosystems. For new land use or significant changes to existing businesses, we carry out development in consideration of biodiversity by conducting environmental impact assessments and other means. At production sites, we take measures to reduce wastewater, mitigate impacts on water quality, and impacts chemicals have on the ecosystem. Also, we support the Declaration of Biodiversity by Keidanren (the Japan Business Federation). As a standing member of the Keidanren Committee on Nature Conservation, we conduct awareness-raising activities on environmental conservation and biodiversity for corporations.

Initiatives for Ships Undertaking International Voyages

Ballast water is used to balance empty VLCCs (Very Large Crude oil Carriers) for safety reasons. Prior to arriving in port, our VLCCs replace this ballast water with seawater in the open ocean, where there is less of an impact on the ecosystem. This curtails the movement of microorganisms that might cause environmental or human health problems and preserves biodiversity.

Initiatives of the Head Office

We participate in the Public-Private Cooperation Forum for Tokyo Bay Restoration. As part of our involvement, we have created a performance index and conducted water quality and other surveys to assist in the restoration of Tokyo Bay's biodiversity.

Initiatives of Business Sites (*Teruha no Mori Ongaeshi* Forest Support Project)

Participants to date
169

Solar Frontier's Kunitomi Plant uses groundwater from Aya Town, Miyazaki Prefecture, which is known for having one of Japan's largest laurel forests. Since 2005, Aya Town has been involved in an initiative to protect and restore its laurel forests through a public-private partnership, with Teruha Forest Association Inc. serving as the secretariat. In 2012, the forest was officially recognized as the Aya Biosphere Reserve, owing to these conservation activities as well as the industrial promotion that aims for sustainable development while maintaining harmony with nature. Although Japan's original laurel forests have nearly been lost due to thinning and development, Aya's large laurel forest is home to a number of rare wildlife and endangered species. As it benefits from this rich and abundant forest, in an effort to return the favor, the Kunitomi Plant has participated in the *Teruha no Mori Ongaeshi* Project every year since 2012. In 2017, a total of 27 persons including employees and their families took part, helping to carry out tree thinning of artificially transplanted Japanese cedar and cypress. Repeated thinning helps more sunlight reach the forest floor, promoting the growth of laurel trees. We will continue with activities to leave future generations a vibrant natural environment through our involvement in this project.

Participants of *Teruha no Mori Ongaeshi* Project

Tree thinning work