Environmental Performance

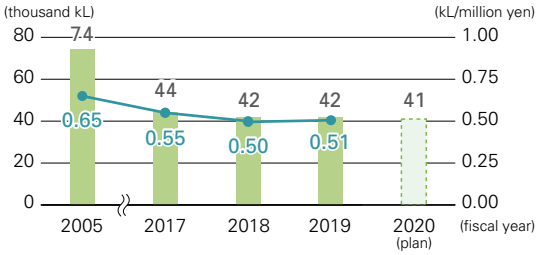
Reducing Energy Use and CO_2 Emissions

Regarding energy usage at our business sites in Japan, our per production amount value rose slightly due to the decrease in production. As for CO_2 emissions, both emissions and per production amount value are on a downward trajectory, but we expect that our emissions will increase slightly in 2020 due to the recovery of production and the emissions coefficient of our energy suppliers.

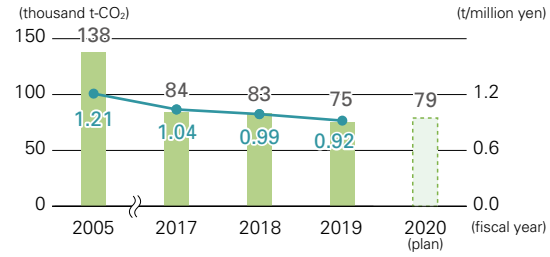
At our overseas business sites, both our energy consumption and CO_2 emissions declined from the previous year, but our per production amount value increased due to the decrease in production. As we expect production to recover in 2020 we anticipate that our energy consumption will increase, but we anticipate reductions in CO_2 based on our efforts to achieve this.

Business sites in Japan

▶ Energy usage per production amount value[*1]

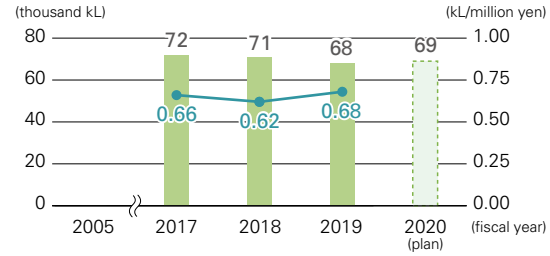


▶ CO_2 emissions per production amount value[*2]

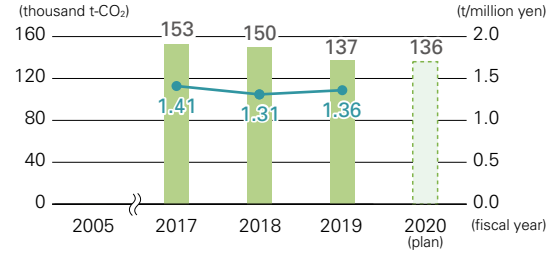


Business sites overseas

▶ Energy usage per production amount value



▶ CO_2 emissions per production amount value



Disclosure of Scope 3[*3] Data

In 2015, our Group began calculating and disclosing Scope 3 emissions in the supply chain of business sites belonging to Group companies in Japan because of the growing importance of understanding CO_2 emissions covering the entire supply chain. In fiscal 2018, we enlarged the scope to cover overseas business sites. The scope of said disclosures cover a total of eight categories including Category 1 "Purchased goods and services." In addition, we confirmed that three categories including Category 8 "Upstream leased assets" are not applicable.

Similar to past years, Category 1 "Purchased goods and services" accounted for a large portion of CO_2 emissions, and this includes the portion from overseas. However, emissions have been declining since fiscal 2018 due to the drop in purchase volumes, primarily at overseas business sites.

Moving forward, we will continue to calculate and disclose data on other categories and work to increase the accuracy of the data for each category, while also promoting ongoing efforts to reduce CO_2 emissions across the entire supply chain.

*3 See the glossary on page 108.

▶ CO_2 Emissions in Certain Categories of Scope 3 and Other Scopes (In Japan and Oversea Sites)

No.	Category	Emissions (thousand t-CO_2 / year)
1	Purchased goods and services ☑	893
2	Capital goods	30
3	Fuel- and energy-related activities not included in Scope 1&2	38
4	Upstream transportation and distribution	76
5	Waste generated in operations	9
6	Business travel	3
7	Employee commuting	4
8	Upstream leased assets	Not applicable
13	Downstream leased assets	Not applicable
14	Franchises	Not applicable
15	Investments	6
	Scope 3 Total	1,059
	Scope 1 (All direct emissions)	81
	Scope 2 (Indirect emissions associated with purchased power and steam)	131

* Data covers all the business sites in Japan and Oversea listed on page 3.

Calculation method:

We calculated the amount of emissions in accordance with the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain Ver. 3 issued by the Ministry of the Environment and the Ministry of Economy, Trade and Industry of Japan, using the emission coefficient stated in the basic database IDEA Ver. 2.3 Carbon Footprint Communication Program developed jointly by the National Institute of Advanced Industrial Science and Technology and the Japan Environmental Management Association for Industry as well as the Emissions Intensity Database for Calculating Greenhouse Gas Emissions of Organizations through the Supply Chain

*1 Energy usage per production amount value is determined using the following equation: Energy usage per production amount value = energy usage/(production amount x unit price) Energy consumption is calculated as a crude oil equivalent.

*2 CO_2 emissions per production amount value are determined using the following equation: CO_2 emissions per production amount value = CO_2 emissions/(production amount x unit price) Also, CO_2 emissions are the sum of Scope 1 and Scope 2 emissions.

* See the business sites listed on page 3 about the boundary.

Reducing Material Loss

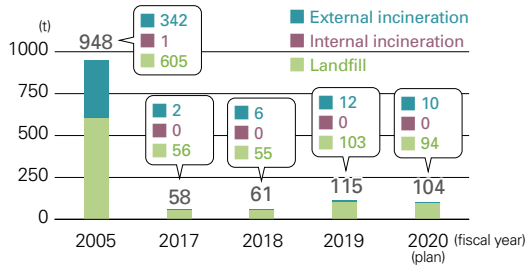
Our group is working to increase the efficiency of resource utilization, because it regards the reduction of environmental impacts as an opportunity to improve profitability. Through our efforts toward material flow cost accounting (MFCA[*1]), we are promoting the improvement of effective use of raw materials by reducing material loss, including not only waste but also valuable resources.

The Group is implementing measures to attain zero emissions of waste in Japan by promoting recycling and reuse instead of disposing of waste in landfills or treating it in simple incinerators without heat recovery in an effort to reduce the environmental impact of our waste.

The graph shows the volume of materials subject to zero emissions measures for the base year of fiscal 2005 and recent years. Owing to the circumstances with our treatment providers, the amount of waste we disposed of in landfills increased in fiscal 2019 due to the generation of waste that will be switched from recycling to landfill disposal. Our expectation is that this will gradually decline from fiscal 2020 onward. We intend to continue promoting further reductions through analysis of losses in our processes using MFCA.

*1 See the glossary on page 108.

▶ Material Subject to Zero Emissions Measures in Japan



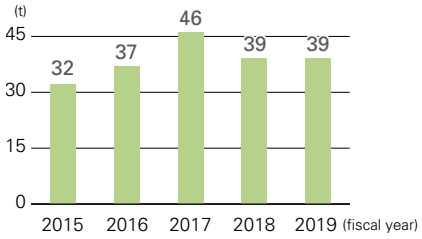
* Zero-emissions-targeted substances comprise landfill waste, internally incinerated waste, and externally incinerated waste. No waste was internally incinerated at business sites in Japan from fiscal 2012 onward.

* Data covers all the business sites in Japan listed on page 3.

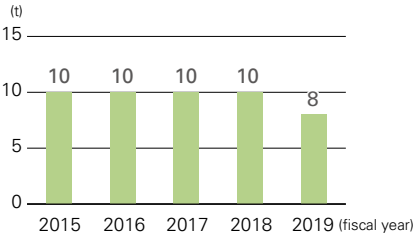
Emissions into the Atmosphere

The Group's business sites in Japan have been promoting a shift of boiler fuel from heavy oil to city gas since fiscal 2004. Fuel conversion was completed in fiscal 2019 at our Shizuoka Plant, which had a few remaining heavy oil boilers, and therefore emissions of SOx[*2] fell. Heavy oil is still in use at some business sites in regions where city gas supplies are unavailable, and we are working to optimize the combustion conditions and keep both emissions of SOx and soot and dust[*3] down at low levels. Emissions of NOx[*4] have seen some degree of variance due to an increase in the nitrogen content of the city gas used and fluctuations depending on the conditions of the combustion of city gas. But on the whole these increases have been and continue to be within expectations.

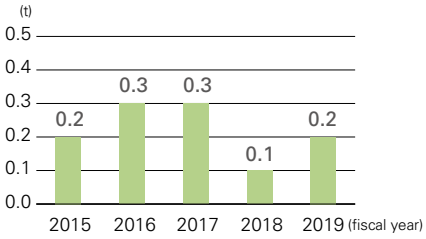
▶ NOx Emission



▶ SOx Emissions



▶ Soot and Dust Emissions



* Data of NOx, SOx, Soot and Dust cover all the business sites in Japan listed on page 3.

* 2,3,4 See the glossary on page 108.

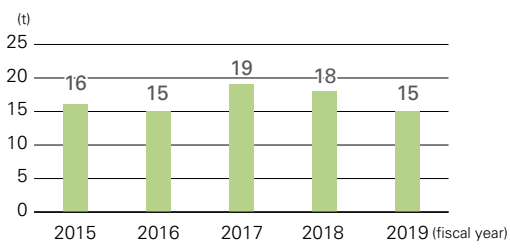
Emissions into the Hydrosphere

Effluent discharged from plants includes pollutants, which are categorized into industrial and household sewage. Treatment facilities, such as high-concentration phenol recovery equipment and activated sludge treatment equipment, and surveillance systems for constant monitoring are in place to ensure compliance with environmental standards and laws and regulations at the national and local government levels. Additionally risk assessments are conducted on leakages into rainwater that also includes cooling water to prevent sudden and unexpected increases in environmental impacts.

COD,[*5] which is used as a water quality indicator, is trending downward after improving the problems with the activated sludge treatment equipment at the Shizuoka Plant. Over the long term it has remained low.

*5 See the glossary on page 108.

▶ COD



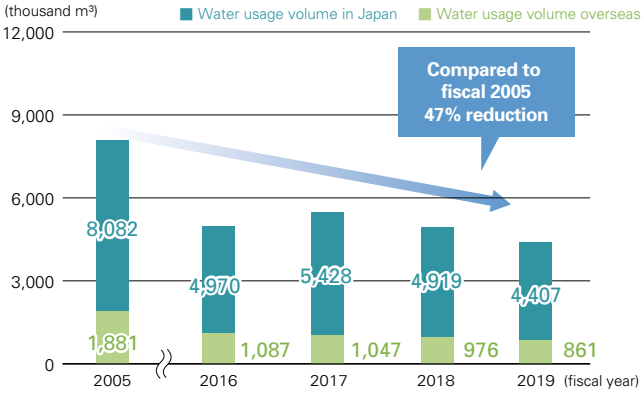
* Data covers all the business sites in Japan listed on page 3.

Conservation of Water Resources

When it comes to the water used at our Group's locations, in Japan a large share of the water used comes from groundwater, while overseas a large share of this comes from waterworks. The water used in our plants in Japan accounts for 84% of the water used by the entire Group.

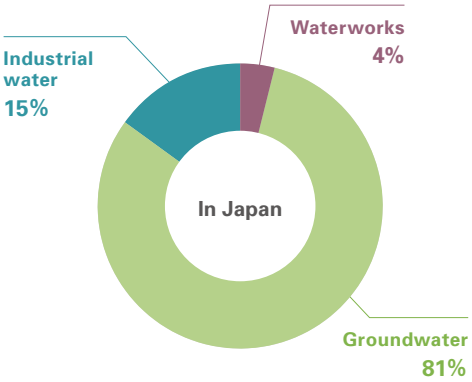
The Group has worked to reduce the amount of water it uses. In particular, we are promoting ongoing reductions of water usage at our Shizuoka Plant, which accounts for a large percentage of the Group's water usage in Japan, and have achieved substantial decreases in its water usage for two years in a row. Overall, water usage by the Group in Japan and overseas has been reduced by 47% compared to fiscal 2005. Moving forward, we will promote internal reviews in order to set company-wide targets for reducing our water usage. As it had come to light that our Shizuoka Plant had been aggregating its water usage on a January–December basis, this was revised so that it was being aggregated on an April–March basis the same as our other locations, with this applied retroactively back to 2005. There were no changes to the overall trends from this. Furthermore, it also came to light that there were errors in the method by which water was being aggregated at Vaupell's Ballard & Everett Plant, and so this was corrected starting from the aggregation of fiscal 2019 figures.

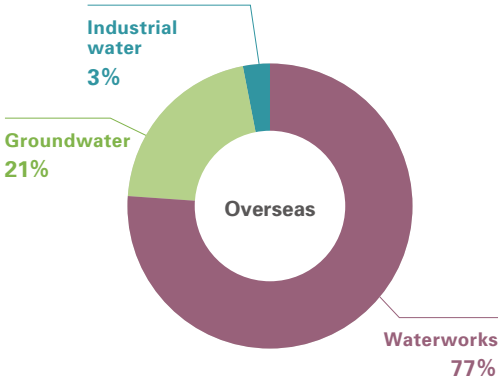
Water Usage Volume



* See the business sites listed on page 3 about the boundary.

Water Usage by Source in Fiscal 2019





Assessment of Water-Related Risk in Fiscal 2019

Since fiscal 2015, we have been continuously surveying the regional watershed risk of all major plants in the Group (11 sites in Japan and 24 sites overseas). Continuing on from fiscal 2018, in fiscal 2019 there were significant changes to the WRI Aqueduct*1 tool. While the risk level for our business sites in Japan fell, conversely the risk level for districts in China worsened.

Our Group revised risk levels based on the results of WRI studies and independent studies performed on each business site. We compiled the results into a table that contains the risks facing each of the regions in which the Group operates. Using these results, going forward, we will continue working to preserve water resources more effectively.

*1 A tool providing information on water risks developed and published by the World Resources Institute (WRI).

Assessment of Water-Related Risk in Fiscal 2019

Region		Risk level					Total
		Extremely high	High	Medium to high	Low to medium	Low	
Japan	Number of bases				**7**	**3**	**10**
	Water consumption (thousand m³)				3,751	642	4,393
China (and Taiwan)	Number of bases		**1**	**4**	**2**		**7**
	Water consumption (thousand m³)		42	160	73		275
Southeast Asia	Number of bases		**2**	**1**		**2**	**5**
	Water consumption (thousand m³)		51	95		25	172
North America	Number of bases			**1**	**2**	**6**	**9**
	Water consumption (thousand m³)			7	112	180	298
Europe	Number of bases			**1**	**2**		**3**
	Water consumption (thousand m³)			61	39		100

Soil/Underground Water Pollution Countermeasures

Response to Soil/Underground Water Pollution

Our Group carries out risk assessments relating to leakage of chemical substances at all of our business sites, and we promote both the development and implementation of preventive frameworks. At the same time, when contamination caused by past leakage accidents is confirmed, we actively undertake voluntary surveys and institute countermeasures in order to prevent the environmental impact and health damage from spreading.

We did not suffer any severe leakage accidents in fiscal 2019.

▶ Results of Soil and Groundwater Studies, Related Actions, and Monitoring Results ☑

Site	Results of Investigation	Countermeasures and monitoring results
Amagasaki Plant	Lead was detected by soil content sampling in 2009 and 2010 (max. 500 mg/kg whereas the standard is 150 mg/kg). No groundwater contamination was detected.	Heavy metals exceeding the standard values of the Soil Contamination Countermeasures Act were detected at the business sites on the left. Monitoring of the groundwater is conducted at these sites every year and their contamination levels have been confirmed to be below standard values.
Akita Sumitomo Bakelite	Lead was detected by soil elution sampling in 2005 (max. 0.032 mg/L whereas the standard is 0.01 mg/L). No groundwater contamination was detected.	
Yamaroku Kasei Industry	In January 2016, 1,4-Dioxane in excess of the standard concentrations was detected in the company's cooling water effluent, with concentrations of a similar amount confirmed in well water drawn from on the premises that had been used. In consultation with the government, the plant stopped drawing water and switched to a closed water cooling system. The company has no history of using the substance in question.	The company cooperates with an ongoing monitoring survey of the groundwater quality that is regularly conducted by Osaka Prefecture, and also continues to perform independent examinations as well. The latest measurement results were 1.48mg/L (standard value of 0.05mg/L).

Initiatives for resource recycling

Marine plastics

When it comes to the problem of marine plastics, we are moving ahead with activities to contribute to reducing plastic marine waste via a number of initiatives based on the Japanese government's Plastic Resource Recycling Strategy. These initiatives include managing the raw materials used and the plastic products we manufacture, promoting the recycling of said products, and developing new products.

We are currently taking part in the Japan Initiative for Marine Environment (JaIME), which was established by major companies and industry organizations in the chemical industry, as well as the Clean Ocean Material Alliance (CLOMA), which was established by a broad range of business operators related to supply chains for plastic products, including those in the chemical industry and distribution/retail industries, with the goal of forming cross-industry partnerships. Through this, we are working to address a variety of challenges by aiming to curb plastic waste across our supply chain as a whole and promoting recycling via 3R activities for plastic products.

Recycling

Our Group promotes recycling as a means to make effective use of resources. This recycling includes the recovery and recycling of phenol from waste liquid produced by phenolic resin reactions during the product production process, fine grinding of offcuts from phenolic laminated sheets and decorative melamine resin laminate for use as a filler in phenolic resin molding compounds reuse of molded article by-products (sprues and runners) as raw material for molding materials, as well as reuse of excess sludge from activated sludge effluent treatment equipment as compost (organic fertilizer).