Environment Safety and Climate Change Strategy

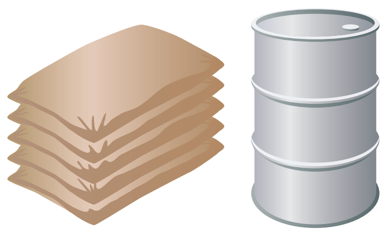
Environmental Impact from Production Activities

The figure below shows the inputs of raw materials, energy and water for production and emissions to the atmosphere, waters, soil and waste. This is the summary of environmental impact yielded by the company.

FY2016 Environmental Impact Results

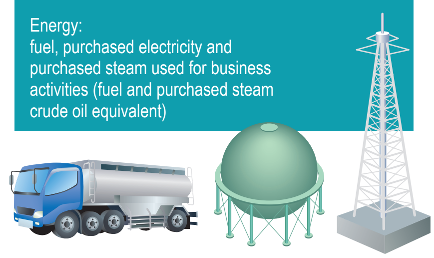
INPUT

Raw Materials



Energy Input
99,438kl (Crude oil equivalent)

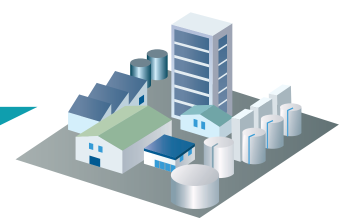
Energy:
fuel, purchased electricity and purchased steam used for business activities (fuel and purchased steam crude oil equivalent)



Water Resources Input
42,231,000m^3

Water resources:
tap water, ground water and industrial water used for business activities

Production Activities (Five plants)



OUTPUT

Emissions to the Atmosphere

CO_2	246,000 tons-CO_2
GHG other than CO_2	187,000 tons-CO_2
NOx	148 tons
SOx	382 tons
Dust	25 tons
PRTR substances	1.47 tons

Emissions to the Atmosphere
CO_2: the amount of CO_2 emitted from business activities
GHG other than CO_2: the amount of CH_4, N_2O, HFC and SF_6
NOx, SOx, dust: the amount of NOx, SOx and dust included in emissions from each burning facility

Emissions into waters

Effluent	14,990,000 m^3
COD	294 tons
Total nitrogen	3,356 tons
Total phosphorus	18 tons
PRTR substances	0.38 tons

Emissions into waters
COD, Total nitrogen, Total phosphorus: volume that was calculated by multiplying effluent to the public waters by the concentration of nitrogen, phosphorus and COD

Emissions to the soil

PRTR substances	N/A

Waste

Total volume	33,689 tons
Recycled volume	3,819 tons
External disposal volume	1,113 tons

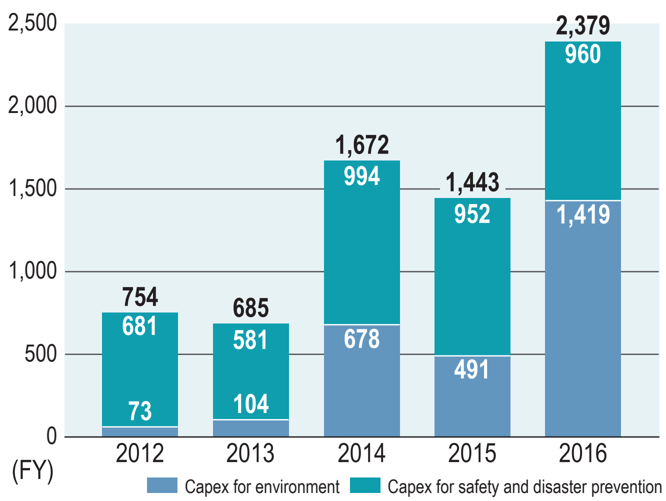
Waste
Recycled volume: the amount of waste recycled
External disposal volume: the final amount of landfill disposal by contractor

Capital Investment for the Environment and Safety and its Economic Effects

Investment:

We have made active capital investments such as changing the feedstock for manufacturing ammonia at the Toyama Plant in our efforts to save energy and reduce GHG emissions. We also renovate aging facilities and implement constructions for labor safety and work environment improvement measures in a well-planned manner to ensure safety and disaster prevention and maintain safe operations.

Capex for environment and safety [million yen]



Economic effects:

Fuel conversion from naphtha to natural gas, conversion of industrial waste into valuables, and changes to treatment methods produced the following economic effects in FY2016.

Type of cost reduction	Amount [million yen]	
	FY2015	FY2016
Energy saving	173	40
Resource saving	49	92
Reuse and recycling	32	41

TOPICS

Toyama Plant: Expanded Use of Natural Gas

In August 2016, the Toyama Plant switched from naphtha to natural gas as the fuel and feedstock used for ammonia. Efforts for CO_2 emission reduction at its production facilities have produced significant results. In August 2017, we switched from heavy oil to natural gas as the fuel for melamine furnaces. Moving forward, we will consider expanding the use of natural gas as fuel for other boilers. Natural gas does not generate any sulfur oxide or soot dust when it is burned. The amount of NOx (nitrogen oxide) emitted by natural gas is 30% to 40% less than that of petroleum, thereby helping to protect the global environment and prevent climate change.

▲ Melamine furnaces

Amount of Energy Consumption and Energy Consumption Rate

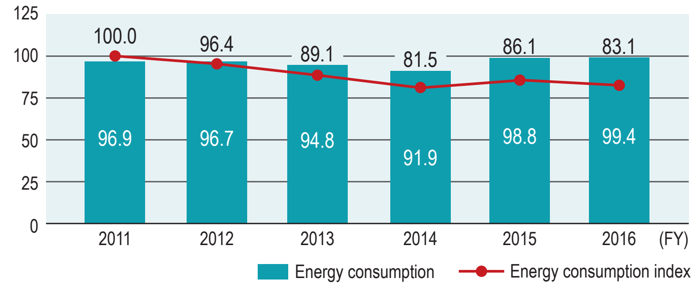
Production and research:

In accordance with “the Act on the Rational Use of Energy”, we collect data on the amount of energy consumed at all of our business establishments and submit this data to the national government, along with data on our energy consumption rate. Our energy consumption in FY2016 was almost equal to the previous fiscal year’s level in crude oil equivalent. We have a product matrix that covers a wide range of products, from commodity chemicals to agrochemicals, pharmaceuticals and functional products for electronic materials. This makes it difficult to evaluate the energy consumption rate based on the simple quantity of production, which is why we calculate it based on sales. Our energy consumption rate improved from the previous year by 3%. This is attributed mainly to the increased sales of high value added products.

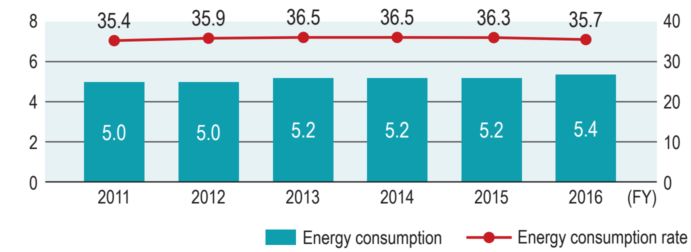
Logistics:

As a cargo owner, we work together with Nissan Butsuryu Co., Ltd., a group company which handles our logistics operations, to promote the rational use of energy for transportation. In FY2016, the amount of energy consumption in crude oil equivalent increased slightly from the previous fiscal year. However, the energy consumption rate was improved from the previous fiscal year. We will continue striving to improve our energy consumption rate through measures such as promoting modal shifts, replacing vehicles with energy-saving and practicing eco-driving.

Energy consumption (crude oil equivalent 1,000kl)
and energy consumption index (FY2011 as a base of 100) in production and research



Energy consumption (left axis: crude oil equivalent 1,000kl)
and energy consumption rate (right axis: kl / one million ton kilo) in logistics



TOPICS

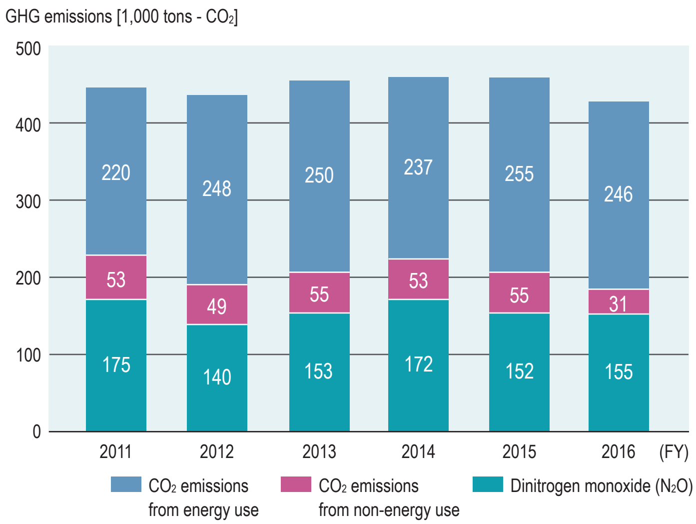
Centralized Management of Environmental Data

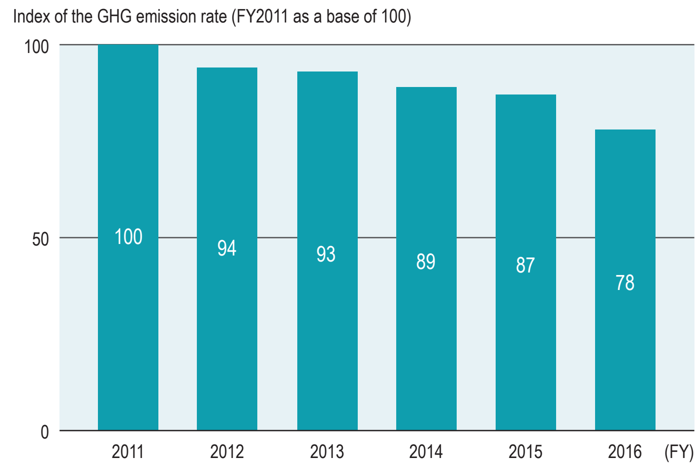
We have introduced the “FUJITSU Sustainability Solution Eco Track” as a support tool for the visualization of environmental action plans and the results of the actions for their application to sustainability activities, global information disclosure, and third-party verification, in addition to the response to environmental laws and regulations and the reduction of the environmental impact. We have named the system the Nissan Eco Track System (NEco) and commenced the centralized management of environmental data from plants, laboratories and affiliates. We use the system for presenting environmental data in this report, responding to the CDP climate change and water questionnaire, and other purposes.

▲ NEco

Reduction of Greenhouse Gas Emissions

In accordance with "the Act on Promotion of Global Warming Countermeasures", we collect data on the emissions of carbon dioxide (CO_2) and other greenhouse gases from all of our business establishments, including our plants, laboratories, and head office and report this data to the national government. In FY2016, we were able to reduce GHG emissions from energy use and non-energy use because we changed fuel and feedstock for manufacturing ammonia from naphtha to natural gas with fewer GHG emissions. The GHG emission rate, which is calculated as the ratio between emissions and sales (emission / sales), fell steadily over the course of six years from FY2011 to FY2016. In FY2016, the GHG emission rate was reduced to 78% compared to the FY2011 level.



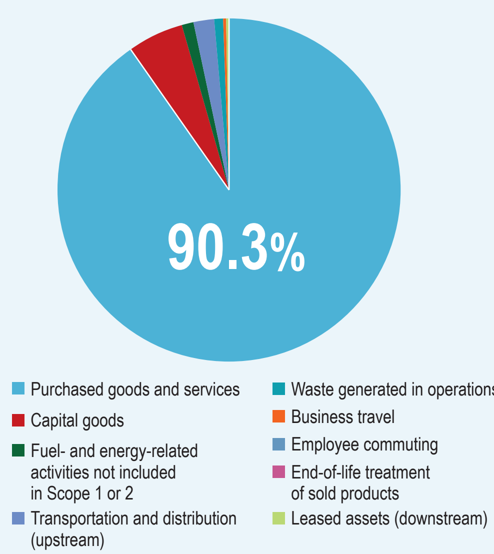


Calculation of Scope 3 Emissions: Indirect Emissions of Greenhouse Gas (GHG) via the Supply Chain

To discover our GHG emissions throughout the supply chain, from the purchase of raw materials to use and disposal by customers, we calculated our indirect GHG emissions via the supply chain (Scope 3 emissions) in addition to our direct GHG emissions (Scope 1) and indirect emissions derived from energy (Scope 2). As a result of the calculations of our Scope 3 emissions based on the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (Ver. 2.2) and Database of Emissions Unit Values for Accounting of Greenhouse Gas Emissions, etc., by Organizations Throughout the Supply Chain (Ver. 2.4) provided by the Ministry of Economy, Trade and Industry and the Ministry of the Environment of Japan, we found that emissions from purchased goods and services accounted for 90% of all the items that were included in the calculation.

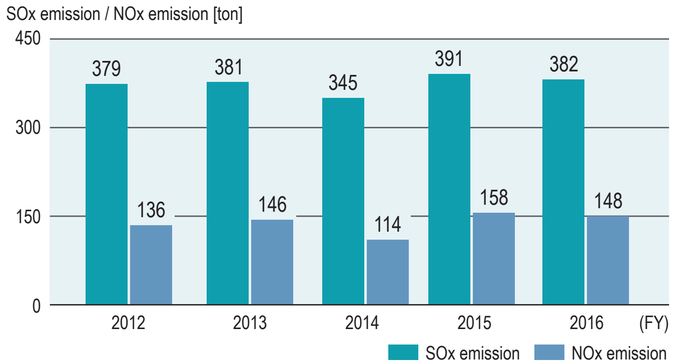
Scope-3

No.	Item	Calculated value (tCO_2e)
1	Purchased goods and services	670,794
2	Capital goods	40,752
3	Fuel- and energy-related activities not included in Scope 1 or 2	7,870
4	Transportation and distribution (upstream)	13,848
5	Waste generated in operations	7,076
6	Business travel	1,443
7	Employee commuting	370
8	Leased assets (upstream)	Included in Scope 1 or 2
9	Transportation and distribution (downstream)	Being studied
10	Processing of sold products	Being studied
11	Use of sold products	Not applicable
12	End-of-life treatment of sold products	255
13	Leased assets (downstream)	203
14	Franchises	Not applicable
15	Investments	Not applicable



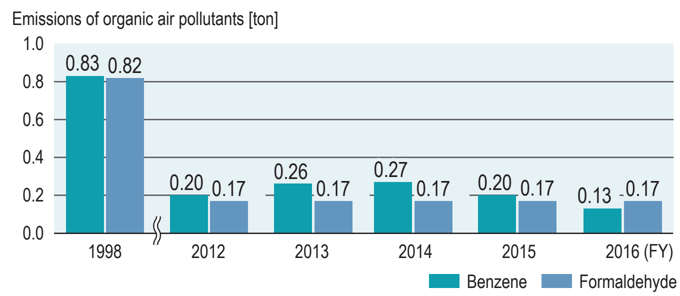
Control of Exhaust Gas

We control exhaust gas by observing the discharge standards stipulated in "the Air Pollution Control Act" and regulatory values based on agreements with local communities. We maintain the proper conditions in our desulfurization facilities and denitrification facilities in an effort to control the emissions of air pollutants such as sulfur oxide (SOx) and nitrogen oxide (NOx).



Reduction of Emissions of VOCs

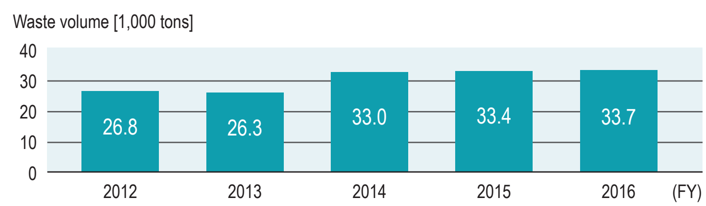
We regularly take initiatives to reduce emissions of volatile organic compounds (VOCs), which cause the formation of photochemical oxidants. We have not emitted any 1,2-dichloroethane into the atmosphere since 2006 due to the introduction of VOC eliminators and other initiatives. Our emissions of other VOCs (benzene and formaldehyde) have also remained at around 25% of the level of 2006 and earlier. In FY2016, our emissions of benzene were reduced further because we changed the fuel and feedstock for manufacturing ammonia from naphtha to natural gas.

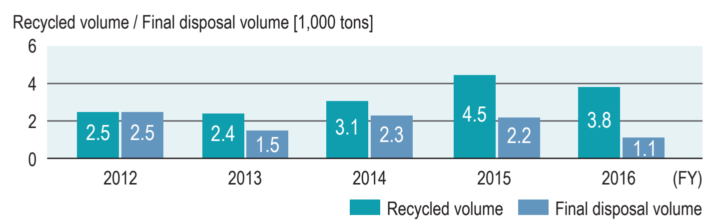


Reduction of Waste

We thoroughly implement control measures to ensure the proper disposal of waste, while also striving to reduce industrial waste. We introduced the PBasis from Panasonic ET Solutions Co., Ltd. as the legal compliance system for waste. We also applied electronic manifests.

Waste water discharged in the manufacturing process accounts for the majority of our industrial waste. We treat this waste internally by means of combustion. The amount of waste generated began to rise in FY2014 due to an increase in the production volume of organic fine chemicals and flame retardants attributed to their new uses. As for solid waste, we reuse sludge as feedstock for the base course material of roads and cement. In addition, at the Toyama Plant, we promote the recycling of waste plastics and the conversion of such plastics to valuables, and we have changed the method of their intermediate processing. As a result, the final disposal volume was reduced by half from FY2015. We have set a goal of reducing the final disposal volume to 800 tons by FY2020.





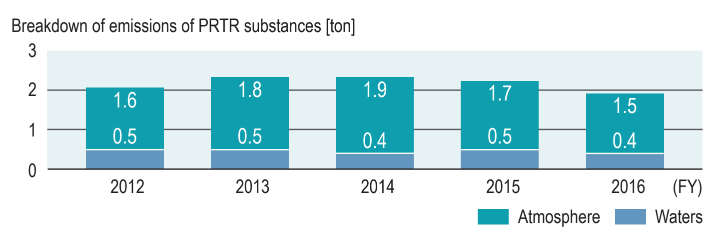
Reduction of Emissions of PRTR Substances

In FY2016, we emitted 60 chemical substances whose emissions must be registered in accordance with "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)". The main substances emitted were formaldehyde and n-hexane. Formaldehyde is used as a reaction solvent, while n-hexane is found in naphtha, which is used as a fuel or feedstock. Emissions of n-hexane also decreased in FY2016 because we changed the feedstock for manufacturing ammonia.

We emitted a total of 1.9 tons of these substances, including 1.5 tons into the atmosphere and 0.4 tons into waters. Emissions into the atmosphere decreased from the previous fiscal year. We will continue to take steps to control the emissions. We did not emit these substances into the soil.

Emissions of PRTR substances [ton]

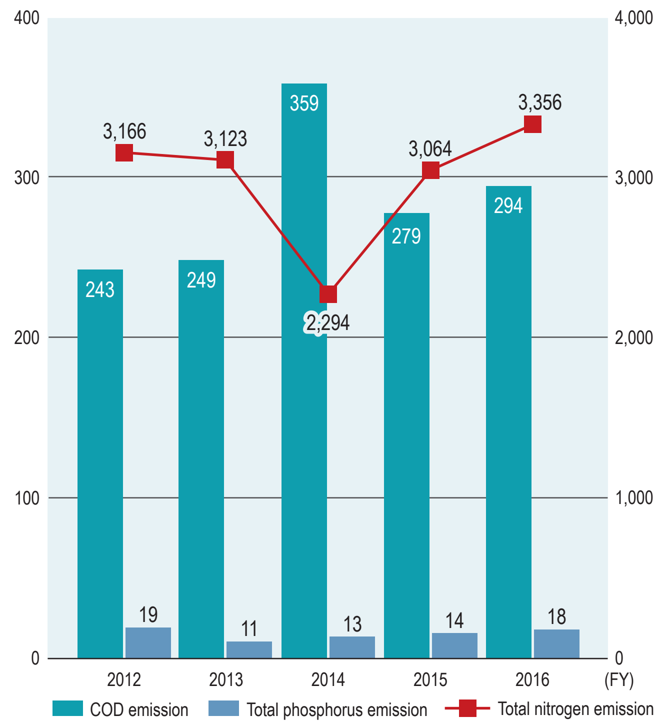
Substance	FY2012	FY2013	FY2014	FY2015	FY2016
Formaldehyde	0.5	0.5	0.4	0.5	0.3
n-Hexane	1.2	1.4	1.4	1.3	1.1
Others	0.3	0.4	0.5	0.4	0.4
Total	2.0	2.3	2.3	2.2	1.8



Control of Waste Water

Our plants observe the discharge standards stipulated in "the Water Pollution Control Act" and regulatory values based on agreements with local communities. We monitor the chemical oxygen demand (COD), the total nitrogen and total phosphorous concentration in waste water. In FY2016, the emissions of all of them increased due to the increase in production volume.

COD (left axis) / Total phosphorus (left axis) / Total nitrogen (right axis) emissions [ton]



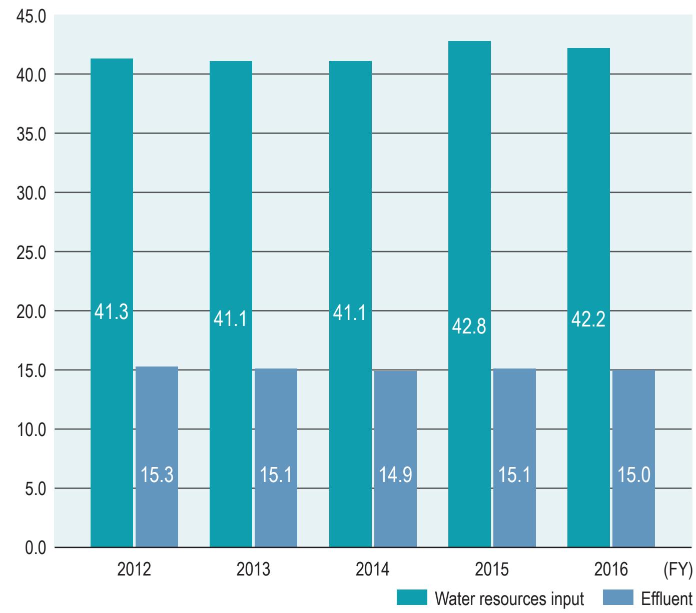
▲ Shomyo Falls and Hannoki Falls, into which meltwater from the Tateyama Mountain Range flows

Efficient Use of Water Resources

At each plant, we carry out exhaustive water-saving activities by observing environmental laws and regulations and cooperating with local organizations. These activities ensure that our operations do not place an impact on natural water circulation. We also clean waste water before returning it to nature to prevent it from negatively impacting the environment.

At the Toyama Plant, we have been promoting the rational use of groundwater as a member of the groundwater use council in the Toyama area, a local council that works to protect the local natural environment and promote the sound development of local communities. At the Onoda Plant, we have been taking measures to maintain the quality of waste water discharged from the plant in line with "the Act on Special Measures concerning Conservation of the Environment of the Seto Inland Sea."

Water input / Effluent [Million m^3]



▲ Toyama Plant and Tateyama Mountain Range seen from the Ida River