

Environment

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Production-related Inputs and Outputs (MGC Alone)

Input	Output
Raw materials, Container/packaging materials 0.77Mt	Production volume 1.37Mt
Energy (as crude oil equivalent) 475ML	GHG emissions 1.01Mt-CO ₂ -e
Water withdrawal 31Mm ³	Water discharge 29Mm ³
	External waste discharge 12kt
	Recycling 24kt

Raw Materials / Production Volume (MGC Alone)

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Raw material input	kt	630	743	798	764
Production volume	kt	1,288	1,469	1,416	1,373

Basic Approach to Climate Change Mitigation

1. Formulate targets for reducing Scope 1 and 2*¹ GHG emissions and steadily reduce them through planning, execution, monitoring and reassessment.
2. Assess, manage, monitor and proactively disclose Scope 3*² GHG emissions and take action to reduce them in collaboration with suppliers.
3. Improve energy efficiency and raw materials' carbon cycle and promote energy transition toward realization of a zero-carbon society by 2050.
4. Contribute to solving energy and climate change challenges through business operations by deploying innovative process technologies and factoring whole-lifecycle GHG emissions into design and development processes.
5. Disclose information through climate change initiatives*³.

*1. Scope 1 emissions are GHG emissions directly generated by MGC. Scope 2 emissions are indirect GHG emissions associated with use of energy (mainly electric power) purchased from external suppliers.

*2. Scope 3 emissions are indirect GHG emissions generated in supply chains through organizational activities such as raw material sourcing, manufacturing, distribution, sales and waste disposal.

*3. MGC proactively participates in various collaborative activities to mitigate climate change (climate change initiatives).

Greenhouse Gas (GHG) Emissions (MGC Alone)

Scope1+2

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
CO ₂ emissions from energy use	t-CO ₂ -e	889,261	928,933	922,370	929,426
CO ₂ emissions from non-energy use	t-CO ₂ -e	78,576	87,062	83,557	84,366
N ₂ O	t-CO ₂ -e	491	524	513	563
CH ₄	t-CO ₂ -e	840	796	753	841
HFCs	t-CO ₂ -e	2,654	1,325	4,257	1,212
PFCs	t-CO ₂ -e	0	0	0	0
SF ₆	t-CO ₂ -e	0	0	0	0
NF ₃	t-CO ₂ -e	0	0	0	0
Total*1	t-CO ₂ -e	971,822	1,018,640	1,011,450	1,016,408
Scope 1	t-CO ₂ -e	749,010	789,021	732,937	783,368
Scope 2 (market based)	t-CO ₂ -e	222,812	229,619	278,513	233,040
GHG emissions intensity ratio per unit to sales	*2	3.2	2.8	2.7	2.9
Index of GHG emissions intensity (GHG emissions intensity ratio per unit to sales, FY2011 as a base of 100)	—	89	76	74	79
GHG emissions intensity ratio per Mton of products	*3	0.75	0.69	0.71	0.70

*1. Due to rounding off figures, there are places where the sums for each item do not match the total.

*2. Amount of emissions (t-CO₂-e)/sales (million yen)

*3. Amount of emissions (t-CO₂-e)/production volume (t)

Scope3

Category	Unit	FY2016	FY2017	FY2018
Purchased goods and services	t-CO ₂ -e	4,606,274	5,329,064	5,128,802
Capital goods	t-CO ₂ -e	70,151	38,576	53,370
Fuel- and energy- related activities not included in Scope 1 or 2	t-CO ₂ -e	83,904	89,624	84,102
Transportation and distribution (upstream)	t-CO ₂ -e	654,329	722,895	715,052
Waste generated in operations	t-CO ₂ -e	3,522	<4,000	<4,000
Business travel	t-CO ₂ -e	3,567	<4,000	<4,000
Employee commuting	t-CO ₂ -e	646	<1,000	<1,000
Leased assets (upstream)	t-CO ₂ -e	6,755	<8,000	<8,000
Transportation and distribution (downstream)	t-CO ₂ -e	157,039	176,928	108,647
Processing of sold products	t-CO ₂ -e	—	—	—
Use of sold products	t-CO ₂ -e	—	—	—
End-of-life treatment of sold products	t-CO ₂ -e	1,534,860	1,760,180	1,312,169
Leased assets (downstream)	t-CO ₂ -e	13,392	13,241	14,365
Franchises	t-CO ₂ -e	—	0	0
Investments	t-CO ₂ -e	—	589,307	513,276
Total	t-CO ₂ -e	7,134,439	8,736,816	7,946,782

*Figures for FY2019 are currently being calculated (as of October 1, 2020)

GHG Emissions/Calculated Value-added GHG Emissions Intensity

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
GHG emissions	kt CO ₂ -e	966	1,014	1,009	1,010
Calculated value added of GHG emissions intensity	100 million yen/ kt CO ₂ -e	0.83	0.97	0.96	0.90

*Calculated value added: The estimated amount of added value calculated based on MGC Alone net sales of MGC multiplied by the value added rate for the chemical industry published by the Ministry of Economy, Trade and Industry.

GHG Emissions in Transportation Sector

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
By rail	kt CO ₂ -e	0.46	0.54	0.59	0.58
By ship	kt CO ₂ -e	11.3	11.5	11.3	10.8
By truck	kt CO ₂ -e	16.6	17.5	17.0	16.2

Energy Management (MGC Alone)

Energy Use (Ratio of grid power, renewable energy and self-generated energy)

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Total energy use*	MWH	4,256,746	4,499,938	4,256,431	4,432,455
Ratio of grid power	—	7.3%	7.0%	9.1%	7.7%
Ratio of renewable energy	—	0.0%	0.0%	0.0%	0.0%
Total self-generated energy	MWH	268,332	296,313	205,432	272,094

*Calculated based on SASB standards

Energy Use (Ratio of renewable/non-renewable energy)

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Nonrenewable fuels purchased and consumed (A) (nuclear fuels, coal, oil, natural gas, etc.)	MWH	3,633,017	3,829,603	3,519,561	3,789,472
Nonrenewable Electricity purchased (B)	MWH- purchased electricity	309,444	316,996	388,671	340,648
Steam, heating, cooling and other energy (nonrenewable) purchased (C)	MWH	340,850	378,879	375,333	334,288
Renewable energy purchased or generated. (D) (wind, energy solar, biomass, hydroelectric, geothermal etc.)	MWH	0	0	0	0
Non-renewable energy sold (E) (electricity and heating & cooling)	MWH	26,564	25,540	27,134	31,952
Total non-renewable Energy Use (A+B+C-E)	MWH	4,256,746	4,499,938	4,256,431	4,432,455

Energy Use (crude oil equivalent)

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Production and research divisions, Corporate Sector	ML-crude oil equivalent	455	480	468	475
Energy intensity index (rate of energy use / sales (FY2011 as a base of 100))	—	96	83	79	86
Logistics division	ML-crude oil equivalent	11	11	11	10
Energy intensity	KL/million ton kilo	19	20	19	19

Energy Use/Calculated Value-added Energy Intensity

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Energy use	ML-crude oil equivalent	455	480	470	475
Energy intensity of calculated added value	100 million yen /ML-crude oil equivalent	1.76	2.04	2.07	1.91

*Calculated value added: The estimated amount of added value calculated based on MGC Alone net sales of MGC multiplied by the value added rate for the chemical industry published by the Ministry of Economy, Trade and Industry.

Water Resources (MGC Alone)

Water Resource Risk Management

MGC uses large quantities of water, both as a raw material of chemical products and for various other purposes, including steam-heating and cooling in chemical manufacturing processes, product refining and cleaning containers. To sustainably use water resources essential to manufacturing chemicals, MGC manages a variety of risks. Specifically, MGC monitors its actual water consumption and uses water efficiently by measuring water withdrawal, water discharge, water usage and water recycling. In drawing from water sources, MGC restricts its intake to permitted quantities in accord with applicable laws or agreements with municipalities. Additionally, MGC discharges wastewater into rivers, the sea or other public water bodies in compliance with effluent standards after treating it to filter out identified pollutants. Data on these water-related environmental impacts are presented in detail on page 13 below.

Additionally, MGC maintains a sanitary water-use environment at all its sites to provide its workforce with access to properly functioning, safely managed sanitary facilities (wash service).

From a business continuity standpoint, MGC has identified production downtime due to drought or flooding of production facilities as a water-related risk, formulated a business continuity plan (BCPs) that addresses this risk and implemented measures to mitigate it. None of the areas in which MGC's plants are located has experienced either adverse impacts on production activities due to water stress or conflicts with stakeholders regarding use of water resources.

Meanwhile, MGC sees opportunities in businesses that provide solutions for issues surrounding the coolant water of air conditioning equipment and cooling systems. Such solutions include water treatment agents that maintain healthy coolant water quality by killing disease-causing legionella bacteria and a comprehensive water treatment system service offered through affiliate Dia Aqua Solutions Co., Inc.

Going forward, MGC will set qualitative and quantitative targets for efficient water usage to more effectively preserve water resources.

Use of Water Resources

Indicator		Unit	FY2016	FY2017	FY2018	FY2019
Water withdrawal	Municipal water supplies (tap water)	1000m ³	413	440	420	407
	Fresh surface water (lakes, rivers, etc.)	1000m ³	9,978	10,415	9,892	9,601
	Ground water	1000m ³	427	406	391	368
	Total	1000m ³	30,811	30,919	29,370	31,089
Water discharge		1000m ³	28,852	29,046	27,248	28,827
Net fresh water consumption ^{*1}		1000m ³	1,960	1,873	2,122	2,262
Percentage of water recycled for use ^{*2}		1000m ³	—	—	23,585	455,345
Ratio of water recycled for use		%	—	—	45	94

*1. Water withdrawal — Water discharge

*2. Value for FY2018 is small due to a narrow survey scope

Water Withdrawal/Calculated Value-added Water Withdrawal Intensity

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Water withdrawal	Mm ³	30.8	30.9	29.4	31.1
Calculated added value of water withdrawal intensity	100 million yen/Mm ³	26.0	31.7	33.1	29.3

*Calculated value added: The estimated amount of added value calculated based on MGC Alone net sales of MGC multiplied by the value added rate for the chemical industry published by the Ministry of Economy, Trade and Industry.

Water Consumption/Calculated Value-added Water Consumption Intensity

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Water consumption	Mm ³	2.0	1.9	2.1	2.3
Calculated added value of water consumption intensity	100 million yen/Mm ³	409	523	458	402

*Calculated value added: The estimated amount of added value calculated based on MGC Alone net sales of MGC multiplied by the value added rate for the chemical industry published by the Ministry of Economy, Trade and Industry.

Resource Recycling (MGC Alone)

Waste

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Volume of waste generation	ton	78,607	82,130	80,575	83,969
Recycled volume	ton	20,909	24,733	23,700	24,228
Final disposal volume	ton	1,054	466	580	671
Recycling rate	%	27	30	29	29

PRTR Substances (MGC Alone)

Emissions of PRTR Substances

Indicator		Unit	FY2016	FY2017	FY2018	FY2019
Emissions of PRTR Substances	Atmosphere	ton	241	213	227	270
	Water bodies	ton	15	15	8	10
	Soil	ton	0	0	0	0
	Total*	ton	256	228	234	280

*Due to rounding off figures, there are places where the sums for each item do not match the total.

High-emission Substances Notified under the PRTR Law

Government-designated number	Substance	Unit	FY2016	FY2017	FY2018	FY2019
296	1,2,4-Trimethylbenzene	ton	144	91	99	150
186	Dichloromethane	ton	58	78	87	74
80	Xylene	ton	16	22	16	18
300	Toluene	ton	10	12	10	12

Pollution Prevention (MGC Alone)

Air Emissions

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Volatile organic compounds (VOCs)	ton	320	296	318	376
NOx	ton	488	573	478	472
SOx	ton	58	62	55	54
Dust	ton	13	12	17	25

Control of Water Discharge

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
COD emissions	ton	182	161	144	157
Total phosphorus emissions	ton	68	60	72	59
Total nitrogen emissions	ton	191	257	230	247

Environmental Accounting (MGC Alone)

Environmental Accounting

Breakdown			Unit	FY2016		FY2017		FY2018		FY2019	
				Investment	Expenses	Investment	Expenses	Investment	Expenses	Investment	Expenses
Onsite cost	Pollution prevention cost	Air pollution prevention	Million yen	213	736	57	771	10	1,021	6	926
		Water pollution prevention	Million yen	103	1,627	56	1,602	83	1,750	106	1,669
		Soil, Noise	Million yen	8	0	17	0	138	12	80	0
	Global environmental protection cost		Million yen	115	1,323	90	1,928	115	1,664	139	1,806
	Resource recycling cost		Million yen	7	873	0	932	70	1,119	0	837
Up or down stream cost			Million yen	0	52	0	56	0	43	0	35
Management activity cost			Million yen	34	517	25	488	43	471	25	475
R&D cost			Million yen	284	2,900	259	2,498	222	2,376	337	2,716
Social contribution cost			Million yen	0	11	0	10	0	9	0	8
Environmental damage cost			Million yen	0	75	0	78	0	71	0	74
Total*			Million yen	763	8,116	504	8,363	680	8,536	692	8,546

*Due to rounding off figures, there are places where the sums for each item do not match the total.

Economic Benefits Associated with Environmental Protection Measures

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Income	Million yen	32	29	30	45
Reduction of expenses	Million yen	564	1,064	183	398

Environment-related Accidents / Violations of Environmental Laws and Regulations (MGC Alone)

Indicator	Unit	FY2016	FY2017	FY2018	FY2019
Violations of environmental laws and regulations	No. of violations	1	0	0	0
Accidents or pollution that could cause (or have caused) environmental problems	No. of cases	0	0	0	1
Complaints regarding environmental problems	No. of complaints	0	0	0	0

Acquisition of ISO14001 Certification (MGC Alone)

Certified Facility	Registration Number	Date Acquired	
		1996 version	2015 version
Niigata Plant	1162-1998-AE-KOB-RvA	June 1998	November 2017
Mizushima Plant	JCQA-E-0145	May 2000	May 2018
Yokkaichi Plant Naniwa Plant Saga Plant	JQA-EM0502	August 1998 (as the Yokkaichi Plant)	August 2017
Kashima Plant	JQA-EM0345	February 1999	January 2018
Yamakita Plant	JQA-EM0859	May 2000	May 2018