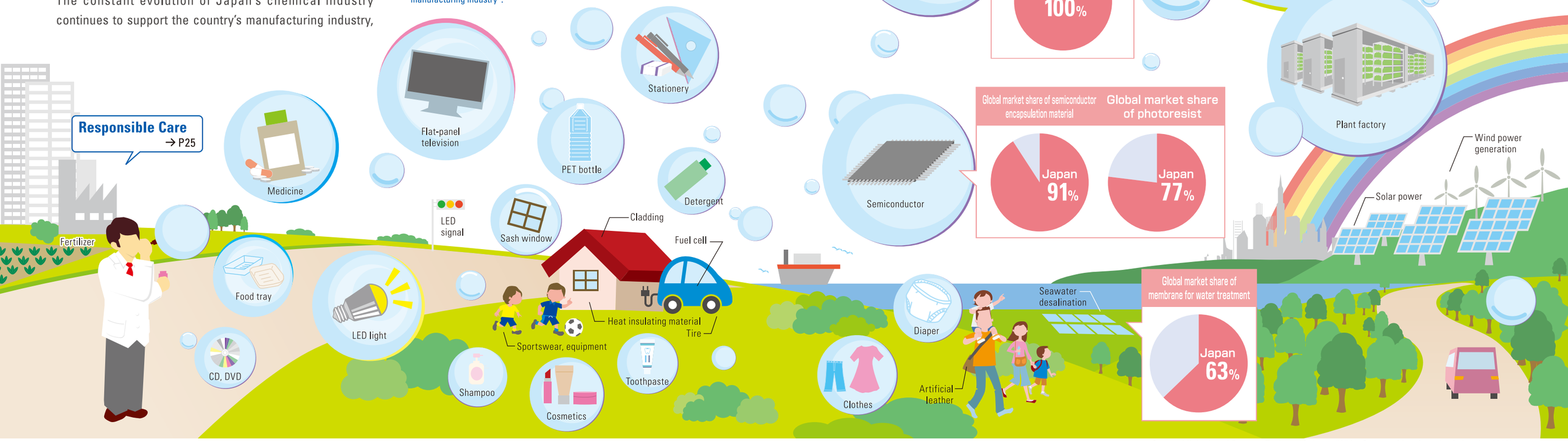
Chemical Industry of Japan 2013

Chemistry – Our Life, Our Future

Automobiles, cellular phones, home electric appliances, clothes…. There are a variety of things around us, most of which are produced by using the "power of chemistry" (that is, chemical reactions and chemical technologies). In fact, the presence of chemistry is much closer to us than many realize.
The chemical industry produces diversified products, from those which we directly use, to raw materials that other industries use by utilizing the power of chemistry. The industry, in particular, has helped strengthen advanced technologies and continues to create high-quality, highly original value-added products. The industry also invests a large amount of resources and money for research and development every year to create innovative technologies and products.
The constant evolution of Japan's chemical industry continues to support the country's manufacturing industry, and also helps to contribute to Japan's international competitiveness. At the same time, the chemical industry also works to create solutions for more global-scale issues, including issues of climate change, energy, safe food and water consumption, and environmental preservation.
The chemical industry is a very important industry which not only supports our daily lives and the development of new industries and economies, but also protects the future of the earth.

Note: Since the chemical industry is vast, with a wide range and scope of work, content may vary depending on different classifications. Therefore, in this brochure, we have conformed to Japan Standard Industrial Classification (second classification : chemical industry). Throughout the brochure, we have provided footnotes regarding these variances. For reference, the chemical industry in wider meaning is the "chemical industry" based on Japan Standard Industrial Classification based on the additions of the "plastic product manufacturing industry" and the "rubber product manufacturing industry".



Source: Ministries of Economy,Trade and Industry [White Paper on Manufacturing Industries 2013]

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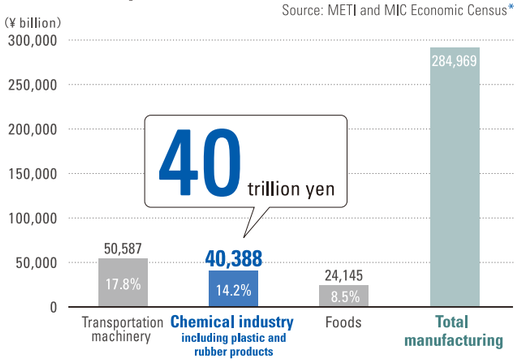
Chemical industry supports people's lives and other industries

Raw materials	Intermediates			Primary products		
Water	Hydrogen	Soda ash	Propylene	Pigments	Dyes	Surfactants
Air	Nitrogen	Hydrochloric acid	Butylene	Industrial gas	Fertilizers	Agricultural chemicals
Salt	Oxygen	Nitric acid	Butadiene	Printing ink	Paints	Petrochemicals
Oil (Naphtha)	Chlorine	Sulfuric acid	Benzene	Synthetic fiber	Synthetic rubbers	Plastics
Natural gas	Carbon dioxide	Phosphoric acid	Toluene	Cosmetics	Tooth-powder	Pharmaceuticals
Coal	Carbon monoxide	Methanol	Xylene	Solvents	Fuel	Disinfectant
Ore	Inactive gas	Ethanol	Styrene	Bleach	Adhesives	Synthetic detergents
Animals and plants	Caustic soda	Ethylene		Oil and fat products	Photo-sensitive chemicals	

Japan's chemical industry viewed by figures and graphs

Value of shipments (2011)

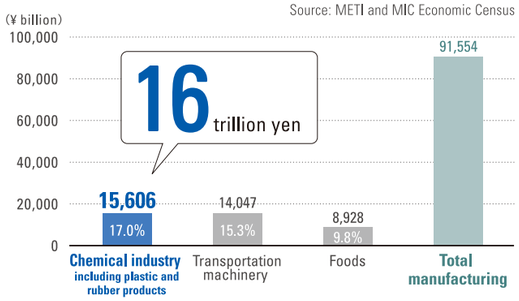
Source: METI and MIC Economic Census*



The chemical industry, on a broad scale, ships goods amounting to approximately 40 trillion yen, the 2nd largest in manufacturing industry.

Amount of value added (2011)

Source: METI and MIC Economic Census

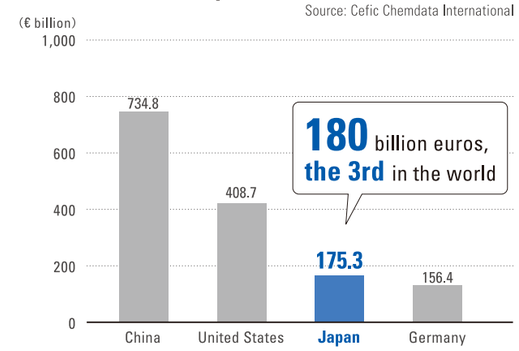


The total amount of value added by the chemical industry, on a broad scale, amounted to 16 trillion yen (the largest in manufacturing industry). It supports a wide range of industries as Japan's basic industry.

Note: Value added = Production amount minus cost for using raw materials, etc. minus domestic consumption tax, etc. minus depreciation cost.

Global chemical shipments (2011)

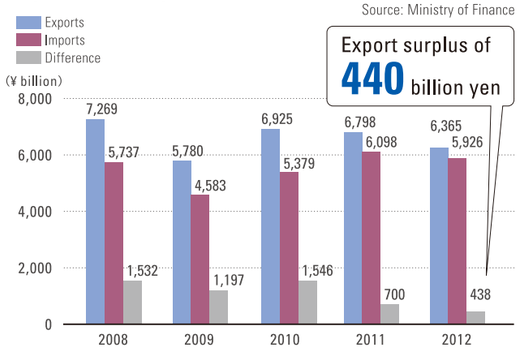
Source: Cefic Chemdata International



Japan's chemical industry ranks 3rd in global chemical shipments.

Exports and imports (2012)

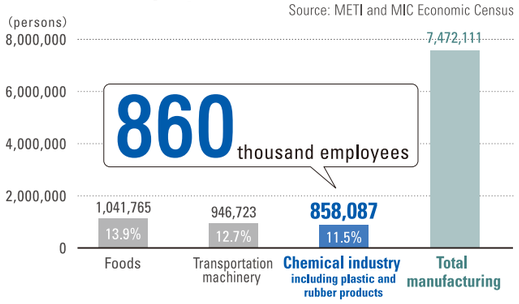
Source: Ministry of Finance



The chemical industry's exports have exceeded imports since 1991.

Number of employees (2011)

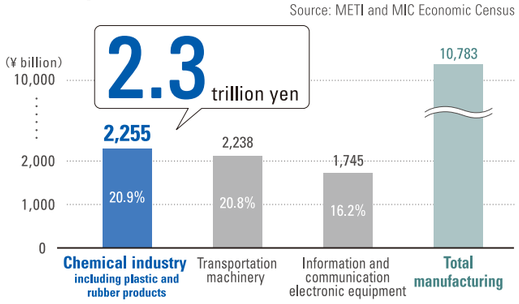
Source: METI and MIC Economic Census



On a larger scale, the chemical industry employs 860,000 people, which is the 3rd biggest in manufacturing industries.

R&D expenditures (FY2011)

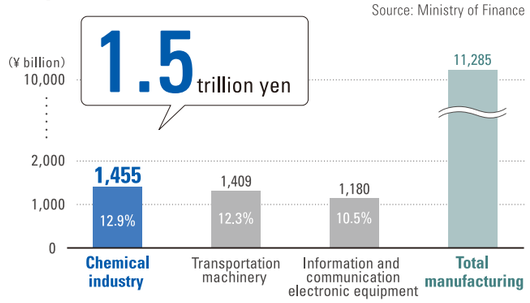
Source: METI and MIC Economic Census



The chemical industry in wider sense invests 2.3 trillion yen in R & D. This makes it the No. 1 in total manufacturing industries, accounting for 21% of the total. The chemical industry is an R&D-oriented industry.

Capital investment (FY2011)

Source: Ministry of Finance



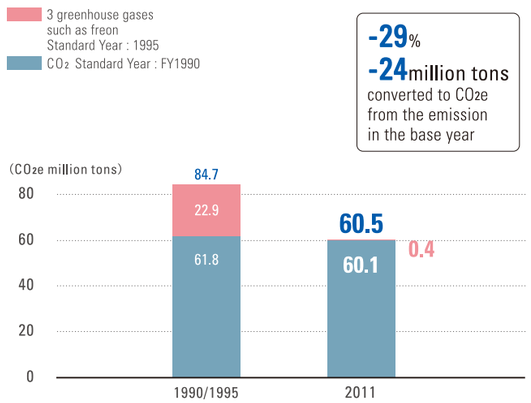
Capital investment by the chemical industry ranks 1st in all industries with the amount of 1.5 trillion yen, which accounts for 13%.

*Ministry of Economy, Trade and Industry (METI) and Ministry of Internal Affairs and Communications (MIC) "2012 Economic Census for Business Activity"

Chemical industry contributes to the reduction of GHG

Reduction of GHG emissions under the voluntary action plan

Source: Japan Chemical Industry Association

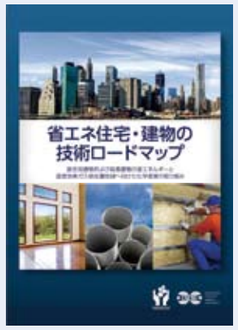


Comparing with emissions amounts back to the base year, 24 million tons of greenhouse gases equivalent (or 29%) have been reduced.

Published "Building Technology Road map", a long-term prospective report on the effect of greenhouse gas emissions reduction

This booklet introduces about energy efficiency rate and greenhouse gas emissions reduction by chemicals in the field of architecture which can be achieved by 2050, issues accompanying with the use of construction materials utilizing chemical technology, and necessary efforts in the future.

http://www.nikkakyo.org/upload_files/documents/ICCABTR2013.pdf



Chemical industry looks to minimize chemical risks

Aiming at achieving WSSD 2020 target

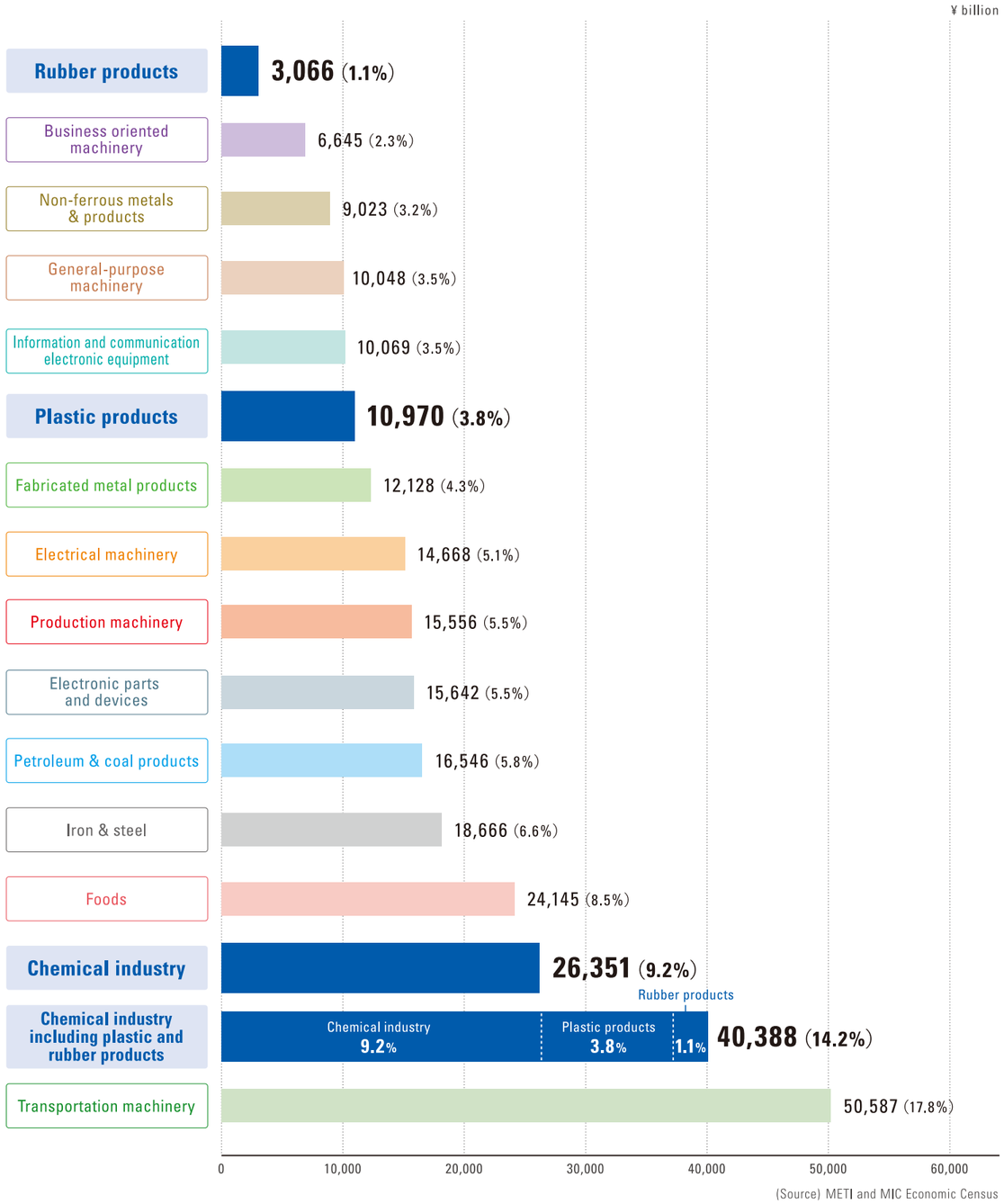
Chemicals can be used safely with adequate risk management. To protect the environment and health, the goal decided at the World Summit for Sustainable Development (WSSD) in 1992 was aimed to minimize the risk of chemicals by 2020. Toward achieving that goal, the global chemical industry is advancing its Global Product Strategy (GPS), an initiative to use chemicals properly, by minimizing the risk of chemicals across the entire supply chain. JCIA has been promoting the Japan Initiative of Product Stewardship (GPS/JIPS) to carry out the GPS in Japan. JCIA has done this in cooperation with downstream users, such as processors, assemblers, and sales companies. The upstream companies, such as manufacturers and distributors of chemicals, conduct risk assessments of these chemicals and properly manage them throughout the supply chain by providing safety information. The initiative has been underway in full-scale mode since April 2011, and we are working to provide the general public with the safety information of chemicals extensively through the website of the International Council of Chemical Associations (ICCA) listed below. In preparation for 4th Session of the International Conference on Chemicals Management (ICCM-4), which will be held in 2015, JCIA will further promote the GPS/JIPS activities.

GPS Chemicals Portal: http://www.icca-chem.org/Home/ICCA-initiatives/Global-product-strategy/

1 Total production (shipments) of chemical industry amounts to 40 trillion yen

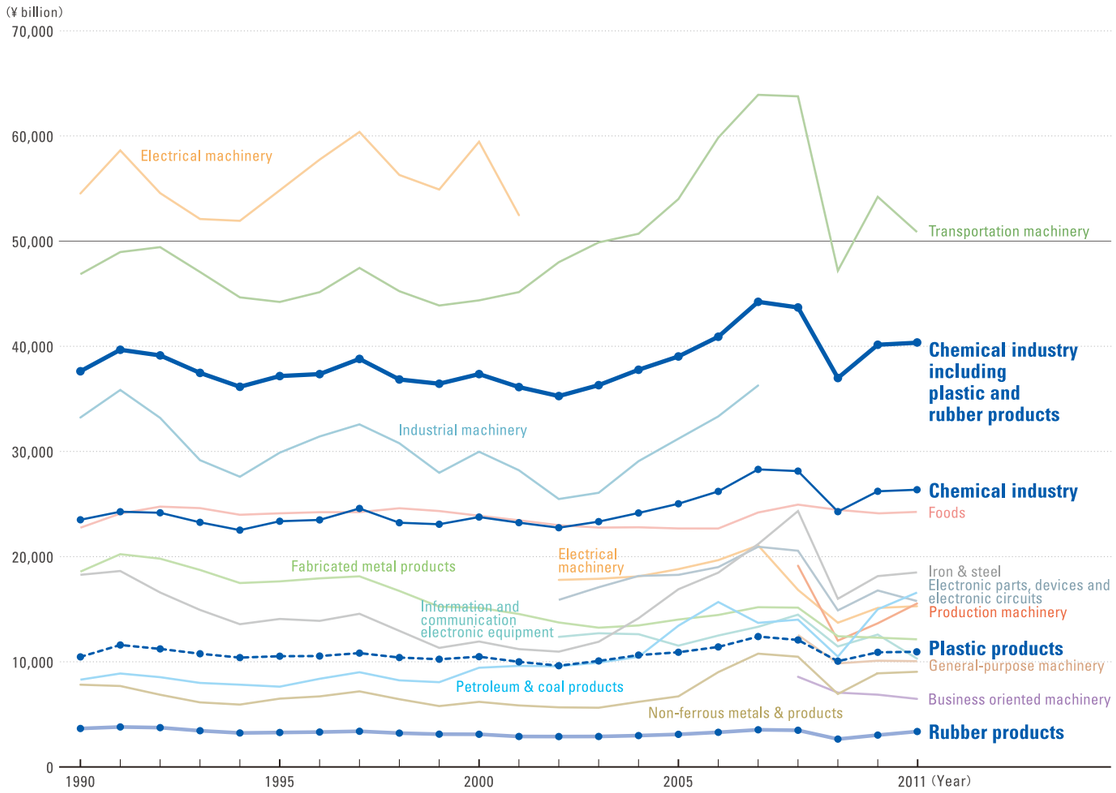
Chemical industry's total shipment value in 2011 amounted to 40 trillion yen, accounting for 14.2% of entire manufacturing industry.

Shipment value of chemical industry in manufacturing industries in 2011



(Source) METI and MIC Economic Census

Trend in shipment value



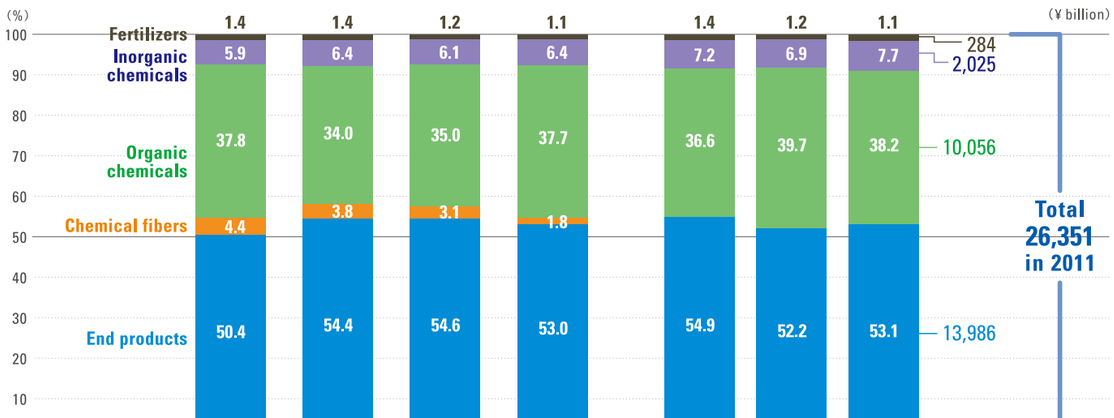
¥ billion

Industry \ year	Every 5th year				Recent three years			
	1990	1995	2000	2005	2009	2010	2011	
Chemical industry	23,503	23,363	23,762	25,027	24,276	26,212	26,351	9.2%
Plastic products	10,466	10,530	10,486	10,906	10,057	10,903	10,970	3.8%
Rubber products	3,656	3,275	3,107	3,099	2,649	3,029	3,066	1.1%
Chemical industry including plastic and rubber products	37,624	37,168	37,356	39,032	36,982	40,144	40,388	14.2%
Foods	22,748	24,117	23,888	22,678	24,448	24,114	24,145	8.5%
Petroleum & coal products	8,298	7,635	9,434	13,429	10,487	14,992	16,546	5.8%
Iron & steel	18,269	14,073	11,927	16,896	15,988	18,146	18,666	6.6%
Non-ferrous metals & products	7,822	6,496	6,191	6,712	6,940	8,911	9,023	3.2%
Fabricated metal products	18,574	17,646	15,143	14,016	12,427	12,292	12,128	4.3%
Industrial machinery	33,225	29,884	29,972	31,211	–	–	–	–
General-purpose machinery	–	–	–	–	9,849	10,100	10,048	3.5%
Production machinery	–	–	–	–	12,015	13,646	15,556	5.5%
Business oriented machinery	–	–	–	–	7,068	6,873	6,645	2.3%
Electrical machinery	54,529	54,831	59,449	18,812	13,713	15,120	14,668	5.1%
Information and communication electronic equipment	–	–	–	11,534	11,457	12,585	10,069	3.5%
Electronic parts, devices and electronic circuits	–	–	–	18,265	14,889	16,633	15,642	5.5%
Transportation machinery	46,858	44,215	44,367	54,000	47,187	54,214	50,587	17.8%
Others	75,427	69,965	62,752	48,760	41,810	41,391	40,859	14.3%
Total manufacturing	323,373	306,030	300,478	295,346	265,259	289,108	284,969	100.0%

(Source) METI and MIC Economic Census
(Note) 1. Statistics of facilities with four or more employees.
2. Electrical machinery was divided into electrical machinery, information and communication electronic equipment, and electronic parts and devices in 2002. Industrial machinery was divided into general-purpose machinery, production machinery, and business oriented machinery in 2008.
3. Because "other revenues" have been added to the amount of total shipment since the survey conducted in 2007, the total shipment amount cannot be compared with that in 2006.
4. Electronic circuits has been added to electronic parts and devices since 2011.

2 Chemical products that meet the needs of various fields

Trend of shipments composition in chemical industry

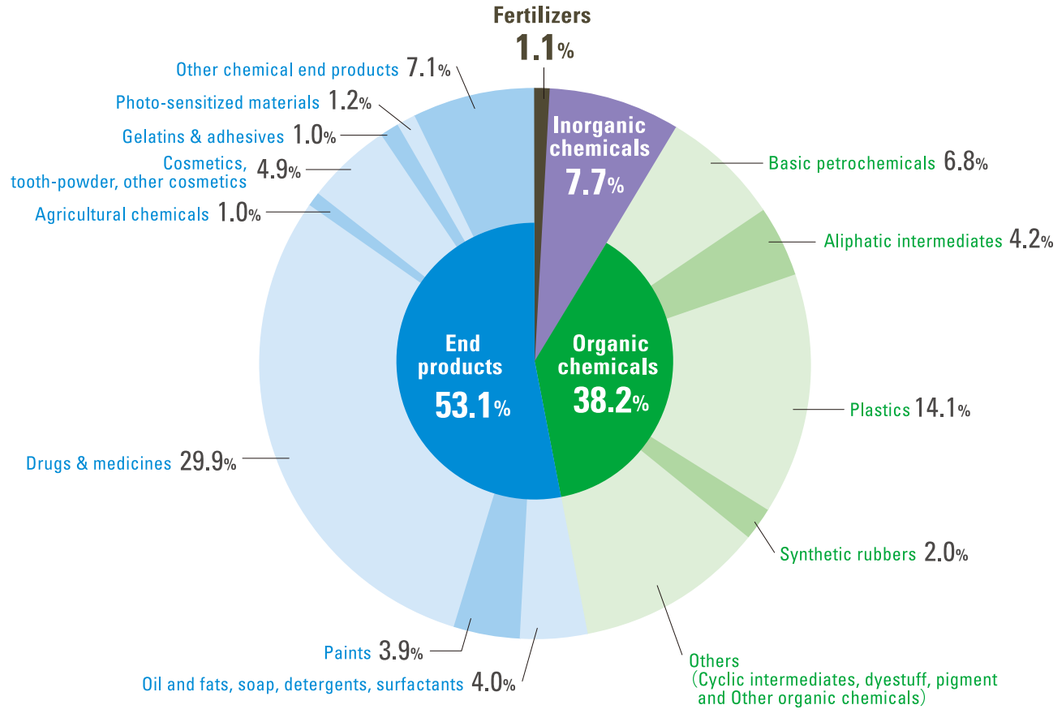


%

Industry \ year	Every 5th year				Recent three years		
	1990	1995	2000	2005	2009	2010	2011
Fertilizers	1.4	1.4	1.2	1.1	1.4	1.2	1.1
Inorganic chemicals	5.9	6.4	6.1	6.4	7.2	6.9	7.7
Organic chemicals	37.8	34.0	35.0	37.7	36.6	39.7	38.2
▶ Basic petrochemicals	5.1	2.6	2.9	6.3	4.4	6.6	6.8
▶ Aliphatic intermediates	4.5	5.5	7.1	6.1	5.1	5.9	4.2
▶ Cyclic intermediates, dyestuff, pigment	6.9	6.9	6.1	7.6	6.6	6.8	N.A.
▶ Plastics	15.4	14.0	13.6	11.0	12.8	13.2	14.1
▶ Synthetic rubbers	2.3	1.7	1.5	2.0	2.0	1.6	2.0
▶ Other organic chemicals	3.6	3.3	3.8	4.7	5.6	5.5	N.A.
Chemical fibers	4.4	3.8	3.1	1.8	–	–	–
End products	50.4	54.4	54.6	53.0	54.9	52.2	53.1
▶ Oil and fats, soap, detergents, surfactants	4.1	4.0	3.5	4.1	4.0	4.2	4.0
▶ Paints	4.9	4.6	4.1	3.7	3.8	4.0	3.9
▶ Drugs & medicines	21.9	25.7	27.0	28.0	30.5	28.1	29.9
▶ Agricultural chemicals	1.6	1.6	1.4	1.1	1.1	1.0	1.0
▶ Cosmetics, tooth-powder, other cosmetics	5.9	6.4	6.0	5.6	5.8	5.3	4.9
▶ Gelatins & adhesives	1.0	1.0	1.0	1.0	1.1	1.2	1.0
▶ Photo-sensitized materials	4.1	4.6	4.4	2.5	1.7	1.7	1.2
▶ Other chemical end products	6.9	6.6	7.2	7.0	6.8	6.8	7.1
Chemical industry	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Chemical industry	62.5	62.9	63.6	64.1	65.6	65.3	65.2
Plastic products	27.8	28.3	28.1	27.9	27.2	27.2	27.2
Rubber products	9.7	8.8	8.3	7.9	7.2	7.5	7.6
Chemical industry in a broad sense (including palstic and rubber products)	100	100	100	100	100	100	100

(Source) METI and MIC Economic Census
(Note) 1. Statistics of facilities with four or more employees.
2. Chemical fibers have been moved to textile industry since 2008.
3. When there are no reports, it is indicated as "N.A.".

Composition of chemical products shipped in 2011



Major chemical industry indices with breakdown by product in 2011

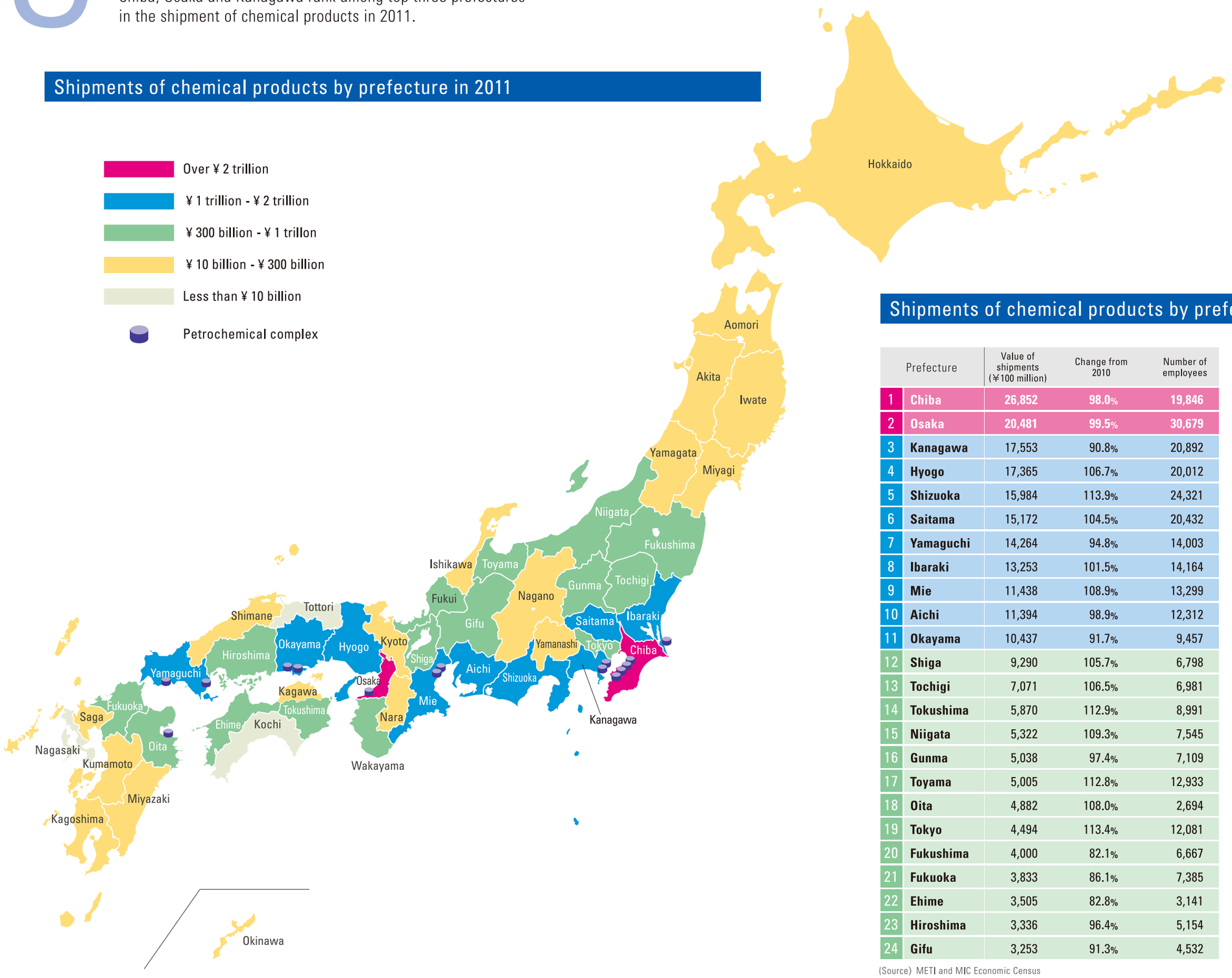
Industry	Major indices				Composition (%)			
	Number of establishments	Number of employees	Value of shipments (¥ billion)	Amount of value added (¥ billion)	Number of establishments	Number of employees	Value of shipments	Amount of value added
Fertilizers	173	4,339	284	78	3.4	1.3	1.1	0.8
Inorganic chemicals	831	36,155	2,025	641	16.6	10.8	7.7	6.3
Organic chemicals	748	84,119	10,056	2,513	14.9	25.1	38.2	24.6
▶ Basic petrochemicals	13	5,440	1,792	176	0.3	1.6	6.8	1.7
▶ Aliphatic intermediates	63	7,523	1,118	449	1.3	2.2	4.2	4.4
▶ Cyclic intermediates, dyestuff, pigment	145	13,206	N.A.	N.A.	2.9	3.9	N.A.	N.A.
▶ Plastics	246	33,702	3,703	930	4.9	10.0	14.1	9.1
▶ Synthetic rubbers	19	6,330	527	139	0.4	1.9	2.0	1.4
▶ Other organic chemicals	262	17,918	N.A.	N.A.	5.2	5.3	N.A.	N.A.
End products	3,265	211,177	13,986	6,967	65.1	62.9	53.1	68.3
▶ Oil and fats, soap, detergents, surfactants	277	14,624	1,064	501	5.5	4.4	4.0	4.9
▶ Paints	411	15,693	1,024	383	8.2	4.7	3.9	3.8
▶ Drugs & medicines	822	90,533	7,889	4,355	16.4	27.0	29.9	42.7
▶ Agricultural chemicals	71	3,914	259	116	1.4	1.2	1.0	1.1
▶ Cosmetics, tooth-powder, other cosmetics	519	31,147	1,291	750	10.3	9.3	4.9	7.4
▶ Gelatins & adhesives	153	6,079	272	91	3.0	1.8	1.0	0.9
▶ Photo-sensitized materials	54	9,035	318	107	1.1	2.7	1.2	1.0
▶ Other chemical end products	958	40,152	1,869	665	19.1	12.0	7.1	6.5
Chemical industry	**5,017**	**335,790**	**26,351**	**10,200**	**100.0**	**100.0**	**100.0**	**100.0**
Chemical industry	5,017	335,790	26,351	10,200	22.6	39.1	65.2	65.4
Plastic products	14,372	405,512	10,970	4,156	64.6	47.3	27.2	26.6
Rubber products	2,846	116,785	3,066	1,250	12.8	13.6	7.6	8.0
Chemical industry in a broad sense (including palstic and rubber products)	22,235	858,087	40,388	15,606	100.0	100.0	100.0	100.0

(Source) METI and MIC Economic Census
(Note) 1. Statistics of facilities with four or more employees.
2. When there are no reports, it is indicated as "N.A.".

3 Shipments by prefecture

Chiba, Osaka and Kanagawa rank among top three prefectures in the shipment of chemical products in 2011.

Shipments of chemical products by prefecture in 2011



Shipments of chemical products by prefecture in 2011

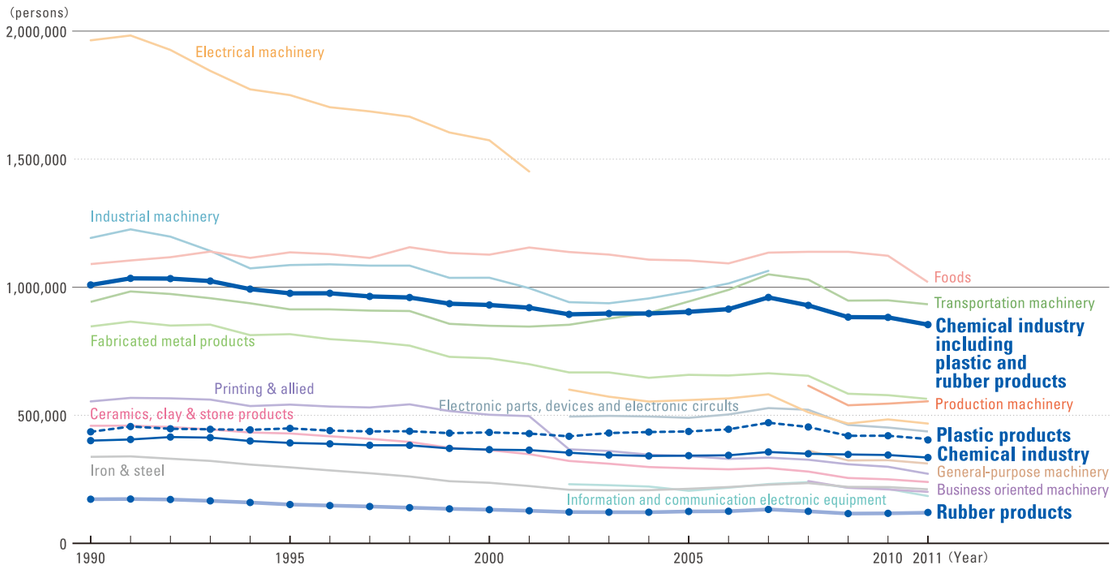
	Prefecture	Value of shipments (¥100 million)	Change from 2010	Number of employees
1	**Chiba**	26,852	98.0%	19,846
2	**Osaka**	20,481	99.5%	30,679
3	**Kanagawa**	17,553	90.8%	20,892
4	**Hyogo**	17,365	106.7%	20,012
5	**Shizuoka**	15,984	113.9%	24,321
6	**Saitama**	15,172	104.5%	20,432
7	**Yamaguchi**	14,264	94.8%	14,003
8	**Ibaraki**	13,253	101.5%	14,164
9	**Mie**	11,438	108.9%	13,299
10	**Aichi**	11,394	98.9%	12,312
11	**Okayama**	10,437	91.7%	9,457
12	**Shiga**	9,290	105.7%	6,798
13	**Tochigi**	7,071	106.5%	6,981
14	**Tokushima**	5,870	112.9%	8,991
15	**Niigata**	5,322	109.3%	7,545
16	**Gunma**	5,038	97.4%	7,109
17	**Toyama**	5,005	112.8%	12,933
18	**Oita**	4,882	108.0%	2,694
19	**Tokyo**	4,494	113.4%	12,081
20	**Fukushima**	4,000	82.1%	6,667
21	**Fukuoka**	3,833	86.1%	7,385
22	**Ehime**	3,505	82.8%	3,141
23	**Hiroshima**	3,336	96.4%	5,154
24	**Gifu**	3,253	91.3%	4,532
25	**Wakayama**	3,214	106.5%	4,894
26	**Fukui**	3,168	114.3%	3,684
27	**Saga**	1,827	122.9%	2,039
28	**Kyoto**	1,724	87.1%	4,853
29	**Miyazaki**	1,692	110.3%	1,444
30	**Hokkaido**	1,566	97.1%	3,142
31	**Yamagata**	1,472	97.6%	2,138
32	**Kumamoto**	1,389	77.2%	3,556
33	**Kagawa**	1,349	94.2%	3,289
34	**Nagano**	1,301	107.8%	1,726
35	**Ishikawa**	1,148	110.4%	1,682
36	**Nara**	957	112.3%	3,242
37	**Akita**	756	89.6%	1,553
38	**Miyagi**	670	83.0%	1,578
39	**Iwate**	596	89.3%	1,593
40	**Yamanashi**	396	71.0%	970
41	**Shimane**	349	154.0%	657
42	**Aomori**	306	89.6%	622
43	**Kagoshima**	231	86.4%	452
44	**Okinawa**	126	116.9%	738
45	**Nagasaki**	89	74.2%	235
46	**Kochi**	74	101.3%	223
47	**Tottori**	18	86.9%	52
	Total	263,512	100.5%	335,790

(Source) METI and MIC Economic Census
(Note) Statistics of facilities with four or more employees.

4 860 thousand workers are employed

The number of employees in chemical industry including plastic and rubber products accounted for 11.5% in entire manufacturing industry.

Changes in the number of employees by industry



persons

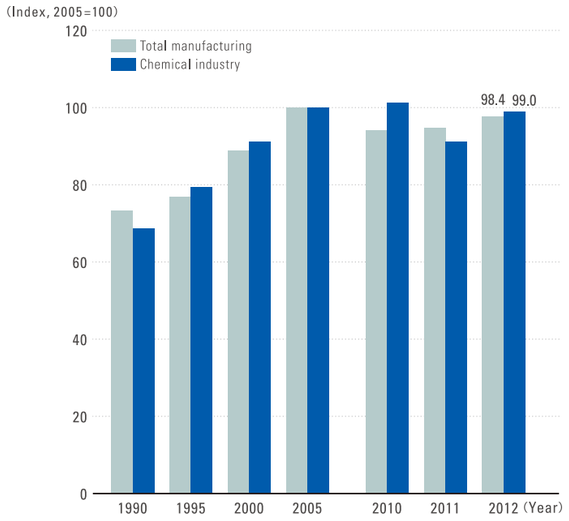
Industry \ year	Every 5th year				Recent three years			
	1990	1995	2000	2005	2009	2010	2011	
Chemical industry	401,076	392,109	365,953	342,481	347,103	344,968	335,790	4.5%
Plastic products	435,523	448,939	433,177	436,897	419,936	420,179	405,512	5.4%
Rubber products	172,284	151,601	131,532	124,613	116,266	117,176	116,785	1.6%
Chemical industry including plastic and rubber products	**1,008,883**	**992,649**	**930,662**	**903,991**	**883,305**	**882,323**	**858,087**	**11.5%**
Foods	1,090,403	1,136,236	1,127,177	1,104,292	1,125,413	1,122,817	1,041,765	13.9%
Printing & allied	554,155	541,688	502,184	340,890	308,878	299,038	286,590	3.8%
Ceramics, clay & stone products	459,040	429,023	363,997	293,013	255,159	250,001	245,146	3.3%
Iron & steel	337,811	296,824	236,525	213,056	220,518	219,983	220,335	2.9%
Fabricated metal products	846,915	816,694	722,425	657,942	584,127	578,559	571,135	7.6%
Industrial machinery	1,192,406	1,086,575	1,037,079	983,449	–	–	–	–
General-purpose machinery	–	–	–	–	323,766	324,636	310,437	4.2%
Production machinery	–	–	–	–	536,630	543,070	552,073	7.4%
Business oriented machinery	–	–	–	–	218,516	211,834	202,405	2.7%
Electrical machinery	1,939,729	1,750,103	1,573,683	559,413	476,765	483,979	474,257	6.3%
Information and communication electronic equipment	–	–	–	205,331	217,348	212,466	194,105	2.6%
Electronic parts, devices and electronic circuits	–	–	–	490,140	462,543	452,169	444,256	5.9%
Transportation machinery	942,795	913,535	849,517	944,352	947,704	948,824	946,723	12.7%
Others	2,800,692	2,357,256	1,840,584	1,461,123	1,175,117	1,134,148	1,124,797	15.1%
Total manufacturing	11,172,829	10,320,583	9,183,833	8,156,992	7,735,789	7,663,847	7,472,111	100.0%

(Source) METI and MIC Economic Census
(Note) 1. Statistics of facilities with four or more employees.
2. Electrical machinery was divided into electrical machinery, information and communication electronic equipment, and electronic parts and devices in 2002. Industrial machinery was divided into general-purpose machinery, production machinery, and business oriented machinery in 2008.
3. Electronic circuits has been added to electronic parts and devices since 2011.

5 Labor productivity / Working hours

In 2012, the labor productivity index of chemical industry has increased.

Index of physical labor productivity

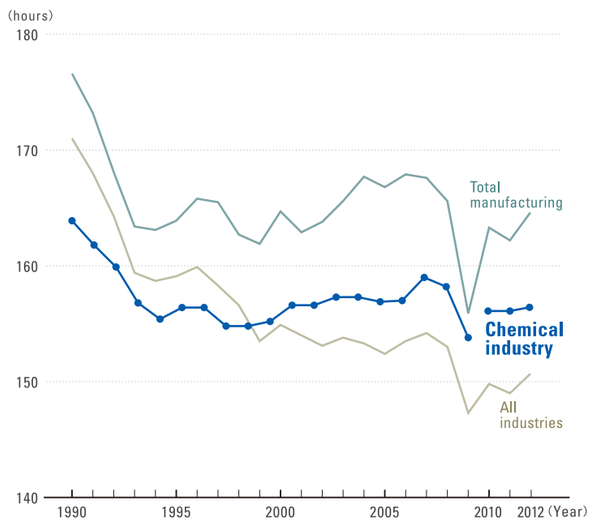


(Index, 2005=100)

Industry \ year		Total manufacturing		Chemical industry	
		Index	Increase rate	Index	Increase rate
Every 5th year	1990	73.3	2.8%	68.6	4.6%
	1995	76.8	4.6%	79.4	8.2%
	2000	88.8	6.6%	91.2	2.1%
	2005	100.0	1.8%	100.0	▲0.5%
Recent three years	2010	94.0	10.6%	103.5	15.4%
	2011	94.2	0.2%	90.1	▲12.9%
	2012	98.4	4.5%	99.0	9.9%

(Source) Japan Productivity Center
(Note) Since 2010, petrochemical and coal product manufactures have been included in the chemical industry.

Working hours(monthly average of total net working hours)



(hours)

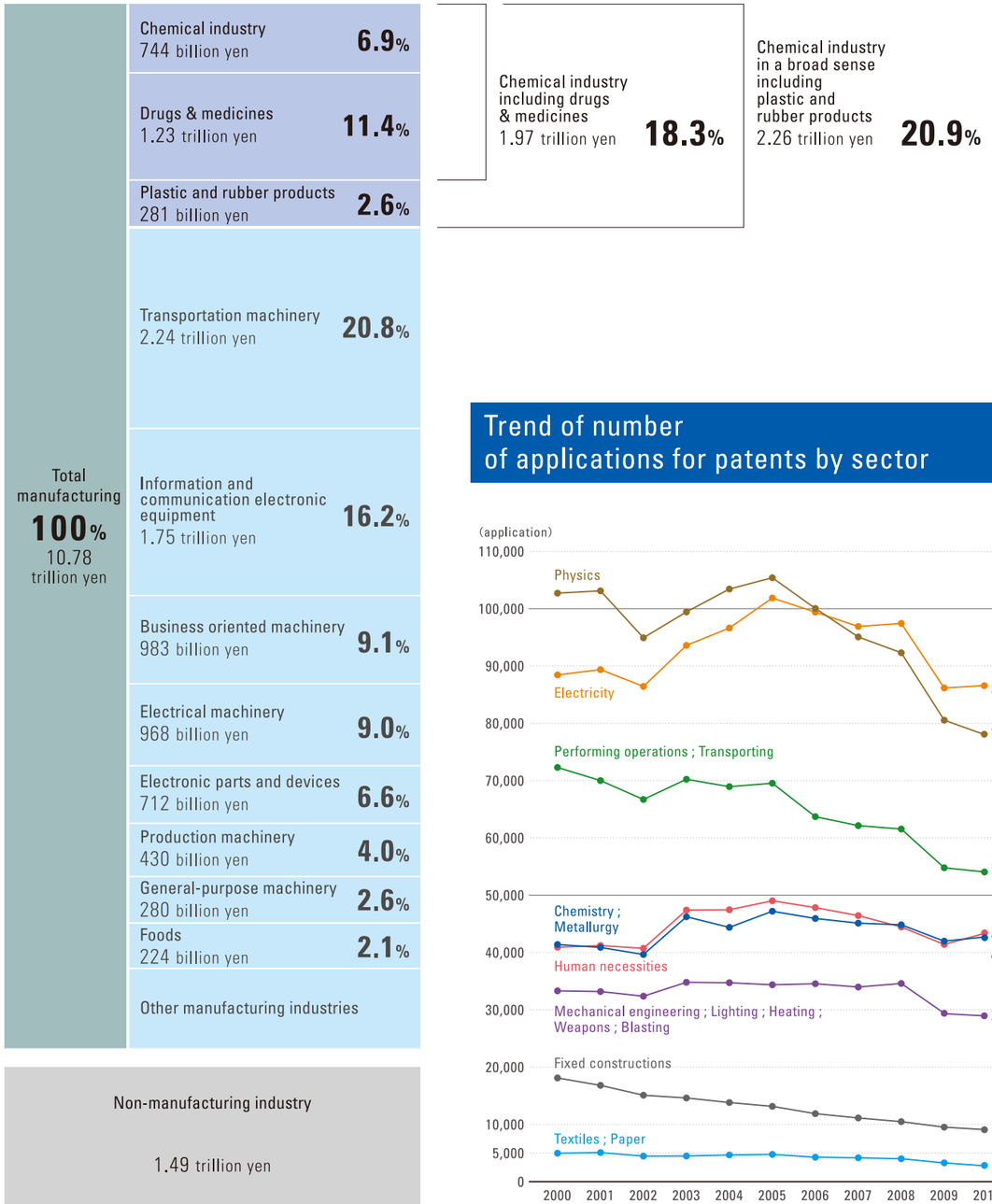
Industry \ year		All industries	Total manufacturing	Chemical industry
Every 5th year	1990	171.0	176.6	163.9
	1995	159.1	163.9	156.1
	2000	154.9	164.7	156.6
	2005	152.4	166.8	157.0
Recent three years	2010	149.8	163.3	156.1
	2011	149.0	162.2	155.9
	2012	150.7	164.6	156.6

(Source) Ministry of Health, Labour and Welfare [Monthly Labour Survey]
(Note) Since 2010, petrochemical and coal product manufactures have been included in the chemical industry.

6 2.3 trillion yen spent for research and development

Research and development expenditures of chemical industry including plastic and rubber products amounted to 2.3 trillion yen, accounting for 20.9% of all industry R&D expenditures.

Ratio of R&D expenditures by industry in FY 2011

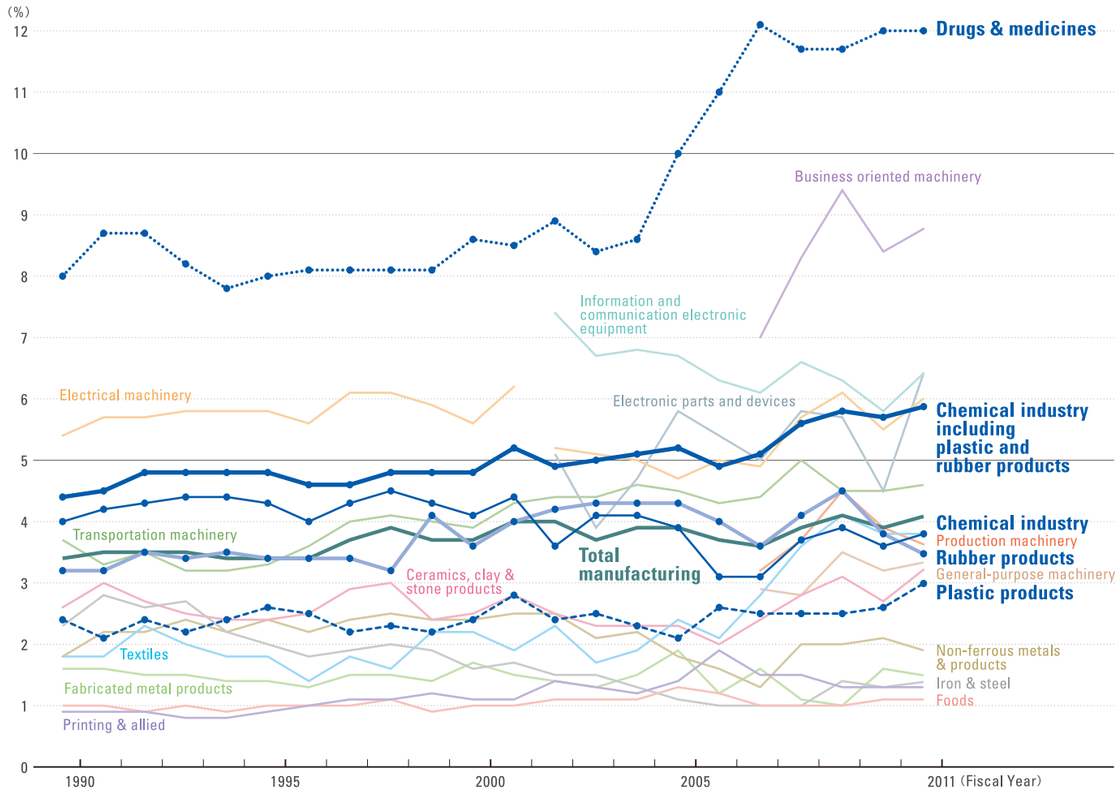


(Source) Ministry of Internal Affairs and Communications [Survey of Research and Development]

Trend of number of applications for patents by sector

(Source) Japan Patent Office

Ratio of R&D expenditures to sales by industry



%

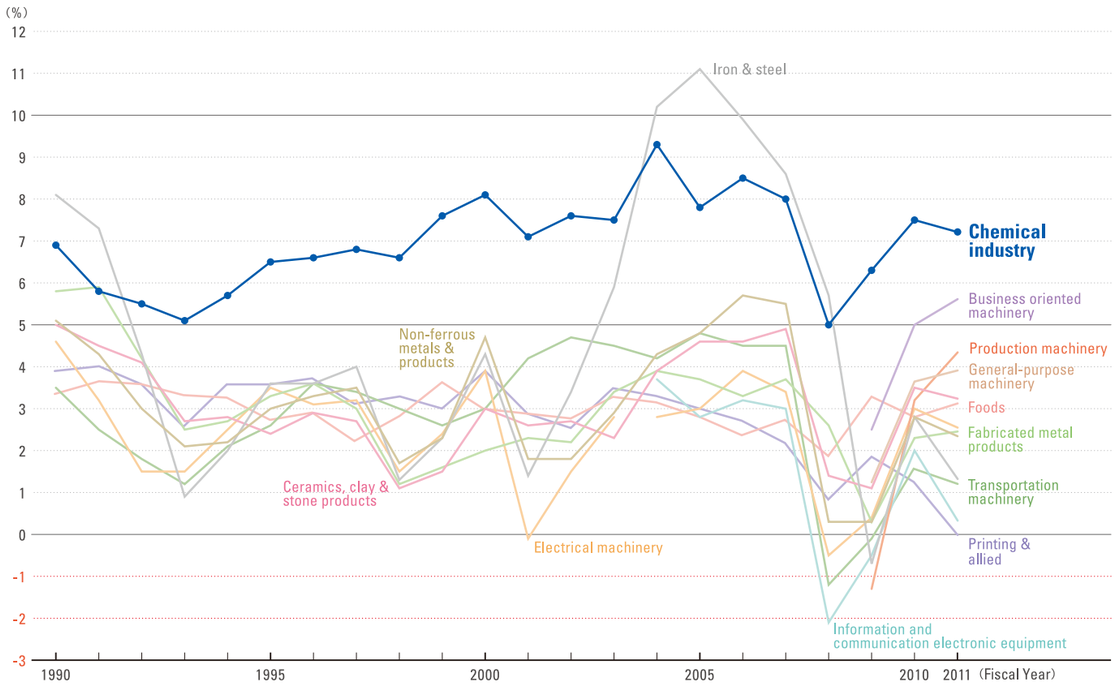
Industry \ fiscal year	Every 5th year				Recent three years		
	1990	1995	2000	2005	2009	2010	2011
Chemical industry	4.0	4.3	4.1	3.9	3.9	3.6	3.8
Drugs & medicines	8.0	8.0	8.6	10.0	11.7	12.0	12.0
Chemical Industry including drugs & medicines	4.9	5.3	5.4	5.9	6.5	6.4	6.6
Plastic products	2.4	2.6	2.4	2.1	2.5	2.6	3.0
Rubber products	3.2	3.4	3.6	4.3	4.5	3.8	3.5
Chemical industry including plastic products and rubber products	4.4	4.8	4.8	5.2	5.8	5.7	5.9
Foods	1.0	1.0	1.0	1.3	1.0	1.1	1.1
Textiles	1.8	1.8	2.2	2.4	4.1	3.8	3.8
Printing & allied	0.9	0.9	1.1	1.4	1.3	1.3	1.3
Ceramics, clay & stone products	2.6	2.4	2.5	2.3	3.1	2.7	3.2
Iron & steel	2.3	2.0	1.6	1.1	1.4	1.3	1.4
Non-ferrous metals & products	1.8	2.4	2.4	1.8	2.0	2.1	1.9
Fabricated metal products	1.6	1.4	1.7	1.9	1.0	1.6	1.5
General-purpose machinery	–	–	–	–	3.5	3.2	3.4
Production machinery	–	–	–	–	4.5	3.9	3.6
Business oriented machinery	–	–	–	–	9.4	8.4	8.8
Electrical machinery	5.4	5.8	5.6	4.7	6.1	5.5	6.0
Information and communication electronic equipment	–	–	–	6.7	6.3	5.8	6.4
Electronic parts and devices	–	–	–	5.8	5.7	4.5	6.4
Transportation machinery	3.7	3.3	3.9	4.5	4.5	4.5	4.6
Total manufacturing	3.4	3.4	3.7	3.9	4.1	3.9	4.1

(Source) Ministry of Internal Affairs and Communications [Survey of Research and Development]
(Note) Drugs & medicines are excluded from the chemical industry.

7 Chemical industry ranks 1st in operating profit margin

Operating profit margin remains high compared to other manufacturing industries.

Trend of operating profit margin by industry



%

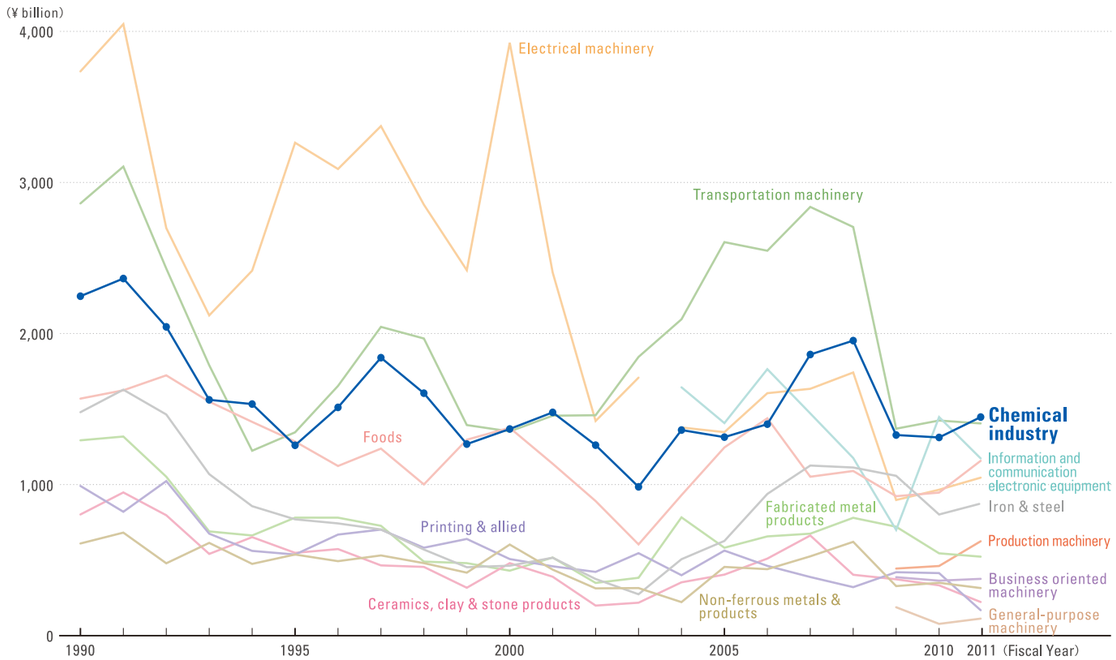
Industry \ fiscal year	Every 5th year				Recent three years		
	1990	1995	2000	2005	2009	2010	2011
Chemical industry	**6.9**	**6.5**	**8.1**	**7.8**	**6.3**	**7.5**	**7.2**
Foods	3.3	2.8	3.0	2.8	3.2	2.8	3.1
Printing & allied	3.9	3.6	3.9	3.0	1.9	1.2	0.0
Ceramics, clay & stone products	5.0	2.4	3.0	4.6	1.1	3.5	3.2
Iron & steel	8.1	3.6	4.3	11.1	-0.7	2.8	1.3
Non-ferrous metals & products	5.1	3.0	4.7	4.8	0.3	2.8	2.3
Fabricated metal products	5.8	3.3	2.0	3.7	0.3	2.3	2.4
General-purpose machinery	–	–	–	–	1.2	3.5	3.9
Production machinery	6.4	3.1	4.0	5.2	-1.3	3.2	4.4
Business oriented machinery	5.8	5.1	6.0	7.6	2.5	5.0	5.6
Electrical machinery	4.6	3.5	3.9	3.0	0.4	3.0	2.5
Information and communication electronic equipment	–	–	–	2.8	-0.5	2.0	0.4
Transportation machinery	3.5	2.6	3.0	4.8	-0.1	1.6	1.1
Total manufacturing	4.8	3.3	3.8	4.5	1.5	3.2	2.8

(Source) Ministry of Finance [Financial Statements Statistics of Corporations by Industry]
(Note) Rubber & plastic products are excluded from the chemical industry.

8 Chemical industry ranks 1st in capital investment

Capital investment by chemical industry accounted for 12.9% of all manufacturing industries.

Trend of capital investment by industry



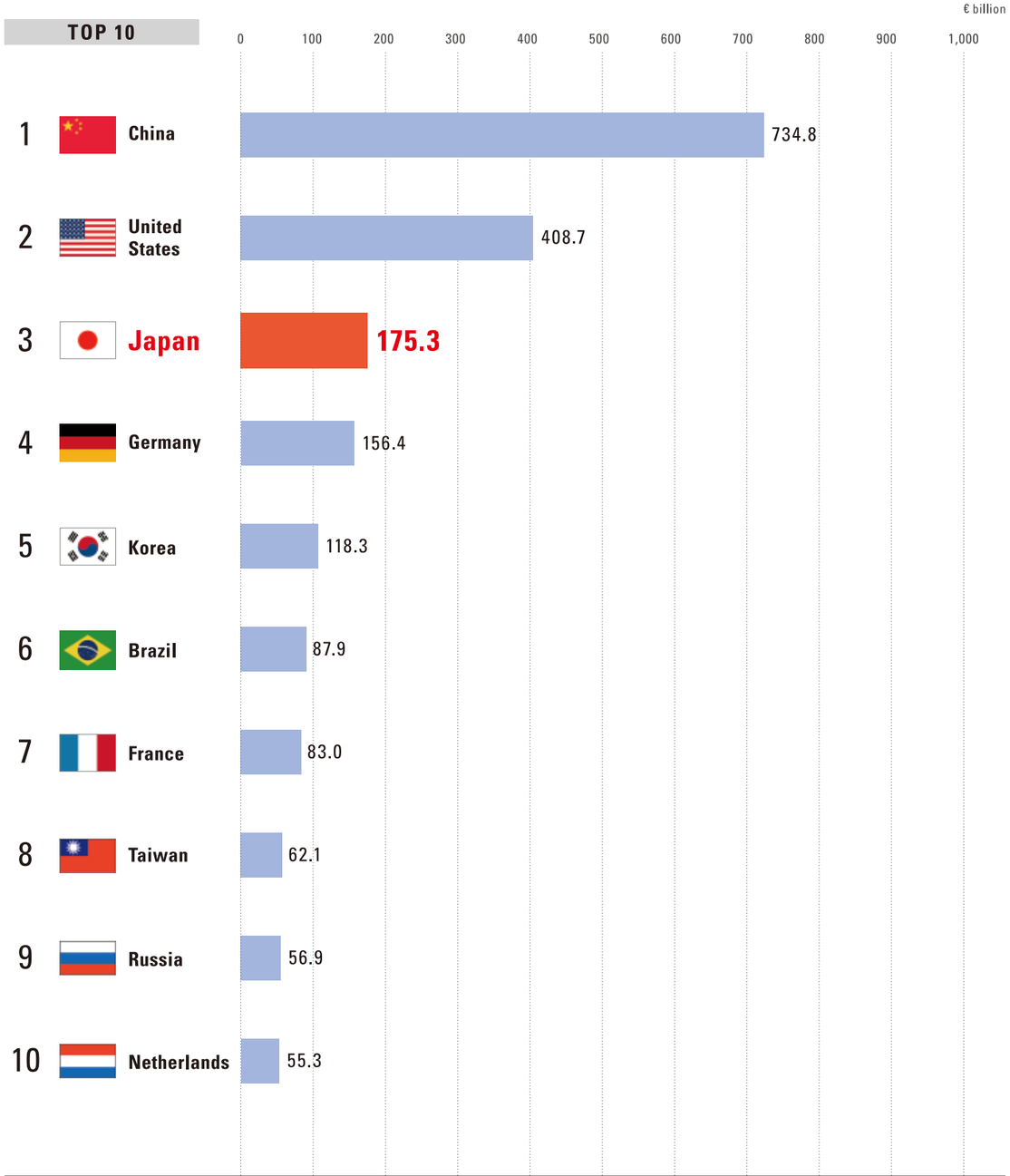
¥ billion

Industry \ fiscal year	Every 5th year				Recent three years			
	1990	1995	2000	2005	2009	2010	2011	
Chemical industry	**2,247**	**1,260**	**1,368**	**1,314**	**1,328**	**1,312**	**1,455**	**12.9%**
Foods	1,569	1,285	1,376	1,246	923	947	1,175	10.4%
Printing & allied	991	537	507	563	420	414	188	1.7%
Ceramics, clay & stone products	802	548	480	404	373	333	235	2.1%
Iron & steel	1,479	770	463	627	1,058	802	879	7.8%
Non-ferrous metals & products	610	537	603	455	328	350	315	2.8%
Fabricated metal products	1,293	781	430	582	721	545	531	4.7%
General-purpose machinery	–	–	–	–	188	78	109	1.0%
Production machinery	–	–	–	–	444	461	633	5.6%
Business oriented machinery	–	–	–	–	387	364	381	3.4%
Electrical machinery	3,737	3,265	3,927	1,347	898	966	1,142	10.1%
Information and communication electronic equipment	–	–	–	1,407	700	1,447	1,180	10.5%
Transportation machinery	2,861	1,346	1,352	2,605	1,370	1,424	1,409	12.5%
Others	2,291	1,840	1,032	784	1,754	1,828	1,652	14.6%
Total manufacturing	21,483	13,849	13,238	14,343	10,893	11,272	11,285	100.0%

(Source) Ministry of Finance [Financial Statements Statistics of Corporations by Industry]
(Note) Rubber & plastic products are excluded from the chemical industry.

9 Japan's chemical industry ranks 3rd in global shipments

Shipments of chemical products by country in 2011



(Source) Cefic Chemdata International
(Note) Drugs & medicines are excluded.

The world's leading chemical companies in 2011

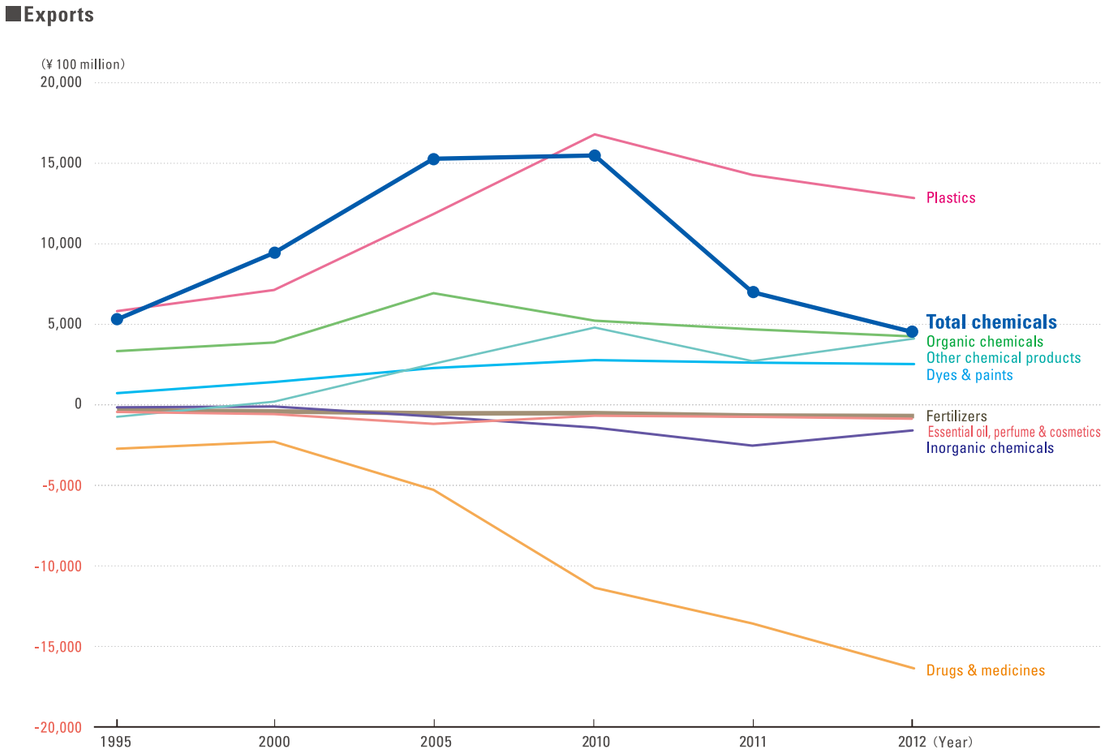
Ranking	Company	Country	Chemical sales			Chemical operating profits		
			2011 ($ million)	Change from 2010 (%)	Chemical sales as of total sales	2011 ($ million)	Change from 2010 (%)	Operating profit margin
1	**BASF**	Germany	85,603	15.8%	83.6%	9,021	19.3%	10.5%
2	**Dow Chemical**	U.S.	59,985	11.8%	100.0%	4,522	24.7%	7.5%
3	**Sinopec**	China	57,068	29.1%	15.0%	3,915	71.3%	6.9%
4	**Exxon Mobil**	U.S.	41,942	18.1%	9.0%	4,383	-10.8%	10.5%
5	**SABIC**	Saudi Arabia	41,730	23.8%	82.4%	14,452	25.8%	34.6%
6	**Formosa Plastics**	Taiwan	37,612	1.2%	63.0%	4,120	-22.3%	11.0%
7	**DuPont**	U.S.	34,763	15.6%	91.6%	5,547	22.8%	16.0%
8	**LyondellBasell Industries**	Netherlands	32,214	16.4%	63.1%	3,301	23.8%	10.2%
9	**Mitsubishi Chemical**	Japan	29,687	3.6%	73.8%	806	-55.5%	2.7%
10	**Total**	France	27,134	11.4%	10.5%	917	-31.7%	3.4%
11	**Bayer**	Germany	25,198	6.5%	49.5%	1,665	14.8%	6.6%
12	**Ineos Group Holdings**	Switzerland	24,500	-6.0%	100.0%	2,430	5.4%	9.9%
13	**AkzoNobel**	Netherlands	21,868	7.2%	100.0%	1,442	-13.0%	6.6%
14	**Mitsui Chemicals**	Japan	21,383	4.8%	100.0%	289	-46.5%	1.4%
15	**LG Chem**	South Korea	20,818	16.3%	100.0%	2,561	0.5%	12.3%
16	**Braskem**	Brazil	19,839	30.1%	100.0%	1,142	-17.5%	5.8%
17	**Evonik Industries**	Germany	19,682	9.5%	97.2%	3,551	17.2%	18.0%
18	**Air Liquide**	France	19,158	8.0%	95.1%	3,521	7.0%	18.4%
19	**Sumitomo Chemical**	Japan	18,996	-0.7%	77.7%	665	-34.8%	3.5%
20	**Reliance Industries**	India	18,562	27.7%	39.5%	1,945	-5.0%	10.5%
21	**Toray Industries**	Japan	16,693	-4.0%	83.7%	1,442	9.3%	8.6%
22	**Linde**	Germany	15,410	8.1%	80.2%	4,237	9.9%	27.5%
23	**Yara**	Norway	14,343	22.9%	100.0%	2,395	36.9%	16.7%
24	**Chevron Phillips**	U.S.	13,935	24.4%	100.0%	na	na	na
25	**PPG Industries**	U.S.	13,824	11.1%	92.9%	1,930	17.1%	14.0%
26	**SK Innovation**	South Korea	13,601	368.3%	22.0%	699	1,024.1%	5.1%
27	**Shin-Etsu Chemical**	Japan	13,146	-1.0%	100.0%	1,877	0.3%	14.3%
28	**DSM**	Netherlands	12,807	1.6%	100.0%	1,117	-8.7%	8.7%
29	**Lanxess**	Germany	12,225	23.2%	100.0%	1,127	19.1%	9.2%
30	**Asahi Kasei**	Japan	12,044	-2.8%	58.7%	678	-34.8%	5.6%

(Source) Chemical & Engineering News
(Note) 1.Drugs & medicines are excluded.
2.na=not available.

10 Change of the amount of exports and imports

In 2012, Japan recorded trade surplus of 440 billion yen.

Trade balance of chemicals by product



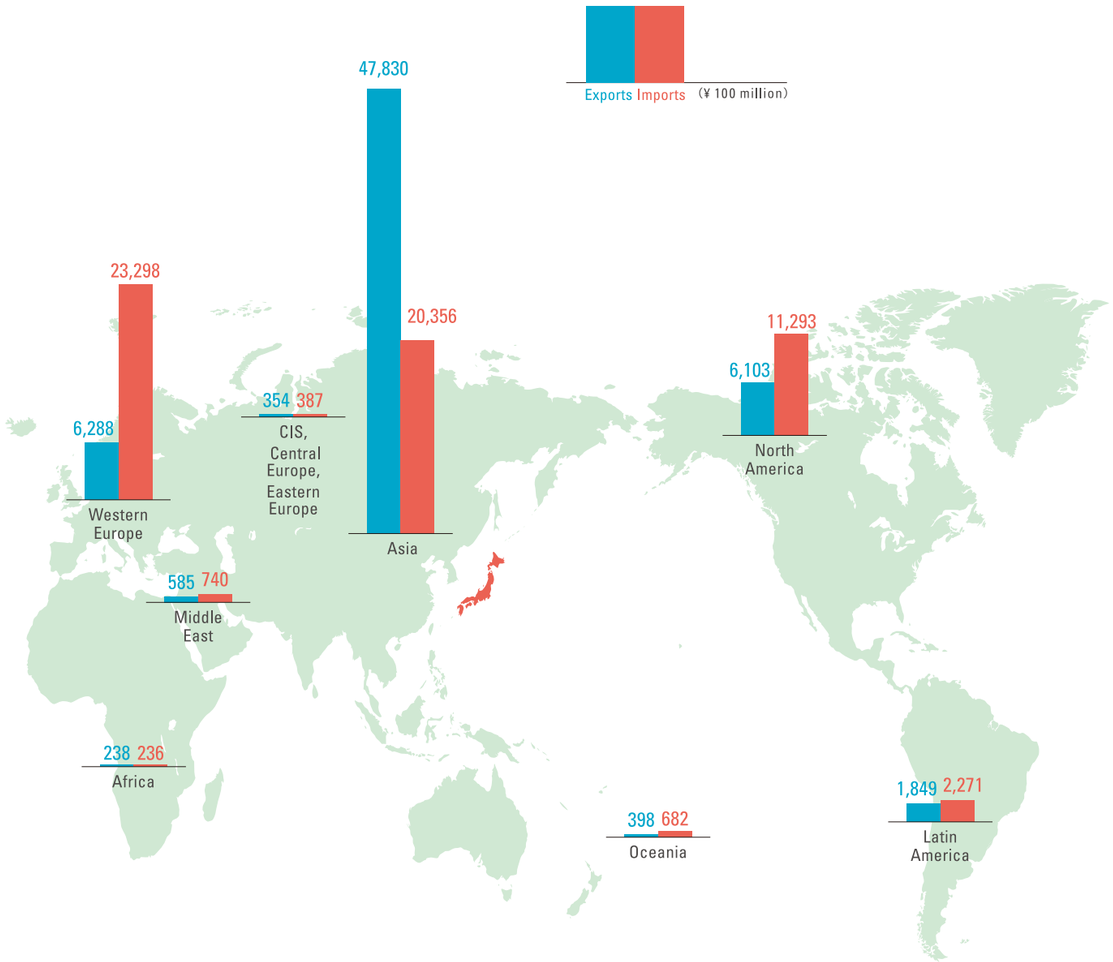
Exports and imports of chemicals

¥ 100 million

Exports						Articles	Imports					
Every 5th year			Recent three years				Every 5th year			Recent three years		
1995	2000	2005	2010	2011	2012		1995	2000	2005	2010	2011	2012
115	100	121	128	163	158	Fertilizers	496	570	783	745	841	861
1,589	2,221	3,109	3,772	3,710	3,297	Inorganic chemicals	1,834	2,287	3,935	5,237	6,294	4,936
10,317	11,927	18,832	18,728	19,080	18,183	Organic chemicals	6,969	7,993	11,843	13,496	14,295	13,977
8,091	10,575	17,157	23,360	21,878	20,429	Plastics	2,171	3,476	5,324	6,542	7,410	7,462
1,814	2,626	3,323	3,255	4,036	3,928	Dyes & paints	856	948	1,187	1,343	1,426	1,296
1,729	2,944	3,677	3,787	3,590	3,204	Drugs & medicines	4,615	5,149	9,060	15,226	17,250	19,407
838	1,292	1,820	2,479	2,520	2,447	Essential oil , perfume & cosmetics	1,410	1,944	2,909	3,087	3,137	3,423
3,800	6,361	10,442	13,743	13,004	12,000	Other chemical products	4,741	6,183	8,172	8,119	10,324	7,900
28,293	38,047	58,480	69,253	67,980	63,646	Total chemicals	23,092	28,550	43,212	53,794	60,976	59,263

(Source) Ministry of Finance [Trade Statistics]
(Note) Chemical fiber products are excluded from the chemical industry.

Exports and imports of chemicals by region



Exports and imports of chemicals by region

¥ 100 million

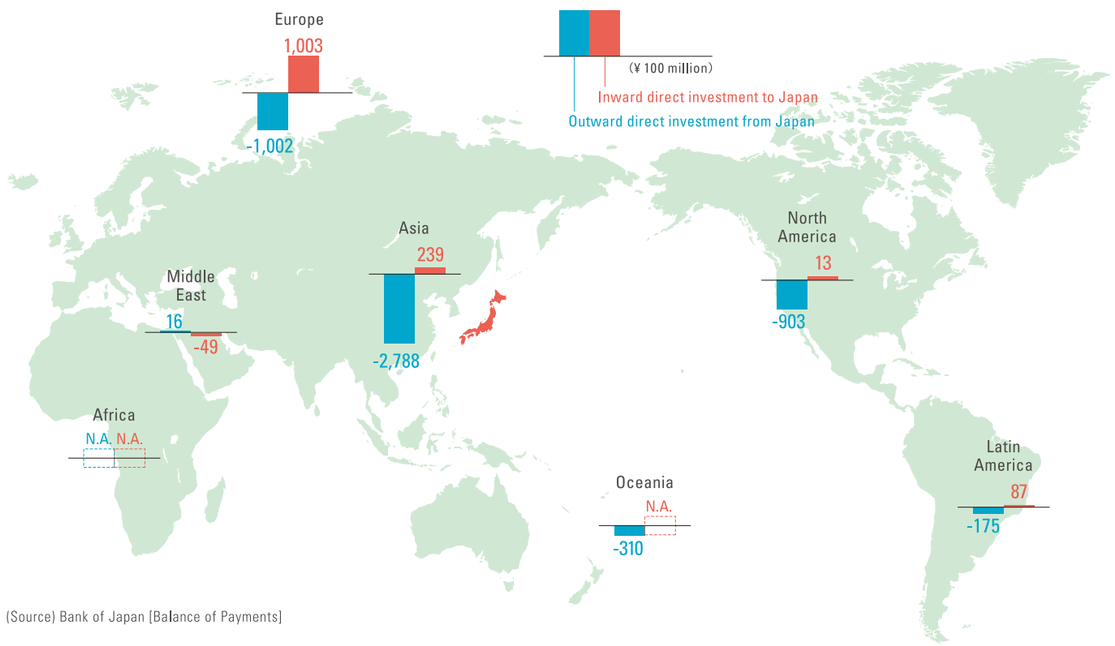
Exports						Region	Imports					
Every 5th year			Recent three years				Every 5th year			Recent three years		
1995	2000	2005	2010	2011	2012		1995	2000	2005	2010	2011	2012
17,203	22,742	40,150	51,799	51,244	47,830	Asia	3,894	6,414	12,974	17,474	22,151	20,356
191	224	364	580	610	585	Middle East	564	521	692	652	794	740
4,939	5,948	7,609	7,084	7,051	6,288	Western Europe	10,122	12,065	17,398	21,413	23,197	23,298
4,641	7,065	7,743	6,824	6,181	6,103	North America	7,040	8,198	9,364	11,190	11,462	11,293
661	1,402	1,629	1,819	1,776	1,849	Latin America	790	694	1,790	2,013	2,103	2,271
142	163	196	278	299	238	Africa	80	54	177	128	245	236
450	419	586	494	461	398	Oceania	455	457	520	595	625	682
66	84	204	374	360	354	CIS, Central Europe,Eastern Europe	147	147	298	330	400	387
28,293	38,047	58,480	69,253	67,980	63,646	Total	23,092	28,550	43,212	53,794	60,976	59,263

(Source) Ministry of Finance [Trade Statistics]
(Note) Chemical fiber products are excluded from the chemical industry.

11 Outward direct investment amounts to 520 billion yen

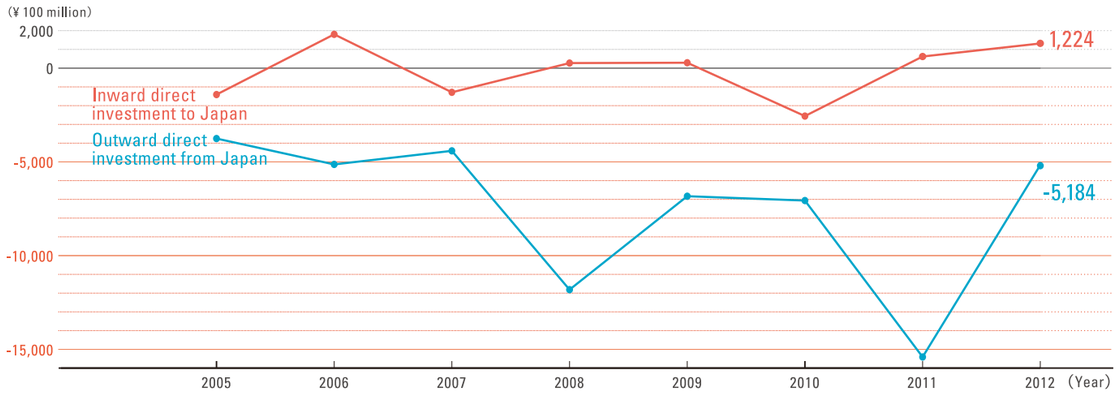
In 2012, outward direct investment of
Japanese chemical industry amounted to 520 billion yen.

Outward direct investment of Japanese chemical industry and inward direct investment to chemical industry in Japan in 2012



(Source) Bank of Japan [Balance of Payments]

Actual outward direct investment of Japanese chemical industry and inward direct investment to chemical industry in Japan



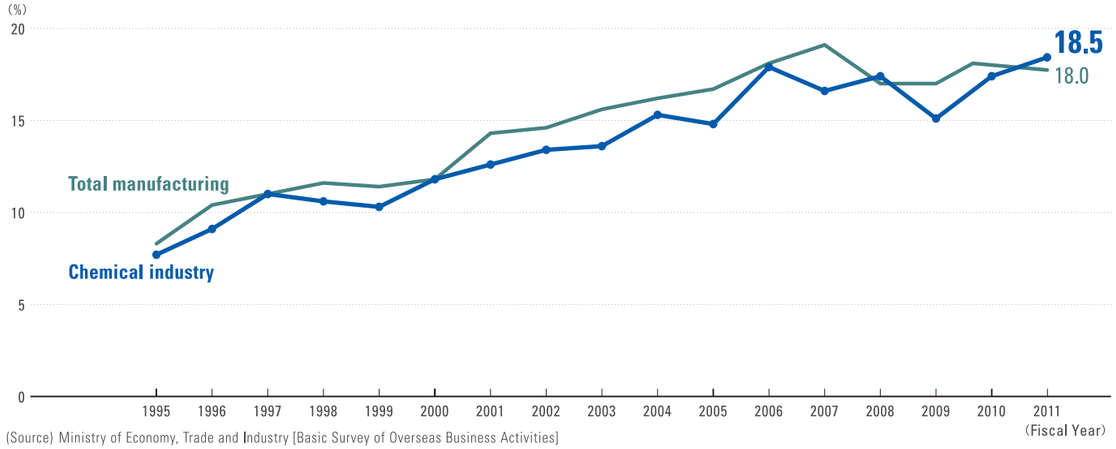
(Source) Bank of Japan [Balance of Payments statistics]

(Note) 1. When there are no reports, it is indicated as "N.A.".
2. As regards to direct investment, there are "outward direct investment", in which Japanese companies make direct investment abroad, and "inward direct investment", in which overseas companies make direct investment in Japan. The amount of direct investment by Japanese chemical industry is the amount of "inflow of capital to Japan" from which "outflow of capital to overseas" is subtracted. Minus figures show the outflow of capital (outward direct investment is the implementation of investment by companies in Japan while inward direct investment is the repatriation of investment by overseas companies).
3. Drugs & medicines are included in the chemical industry.

12 Continued progress seen in overseas business activity

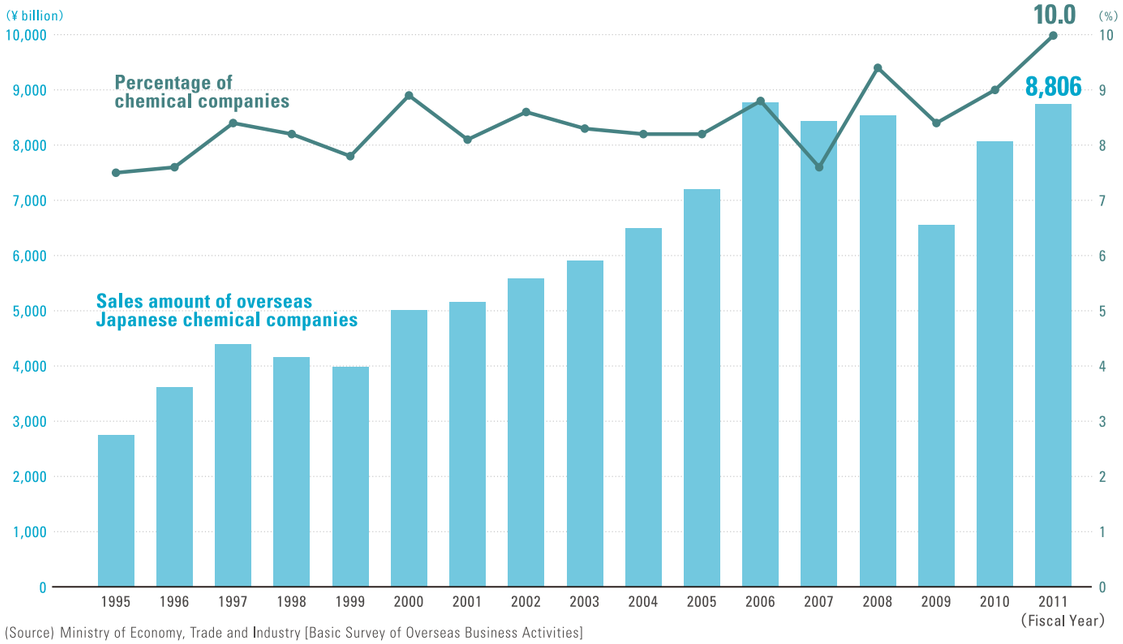
Overseas production of Japanese chemical industry
accounted for 18.5% in 2011.

Trend of overseas production of Japanese companies



(Source) Ministry of Economy, Trade and Industry [Basic Survey of Overseas Business Activities]
(Note) Chemical fiber products are excluded from the chemical industry.

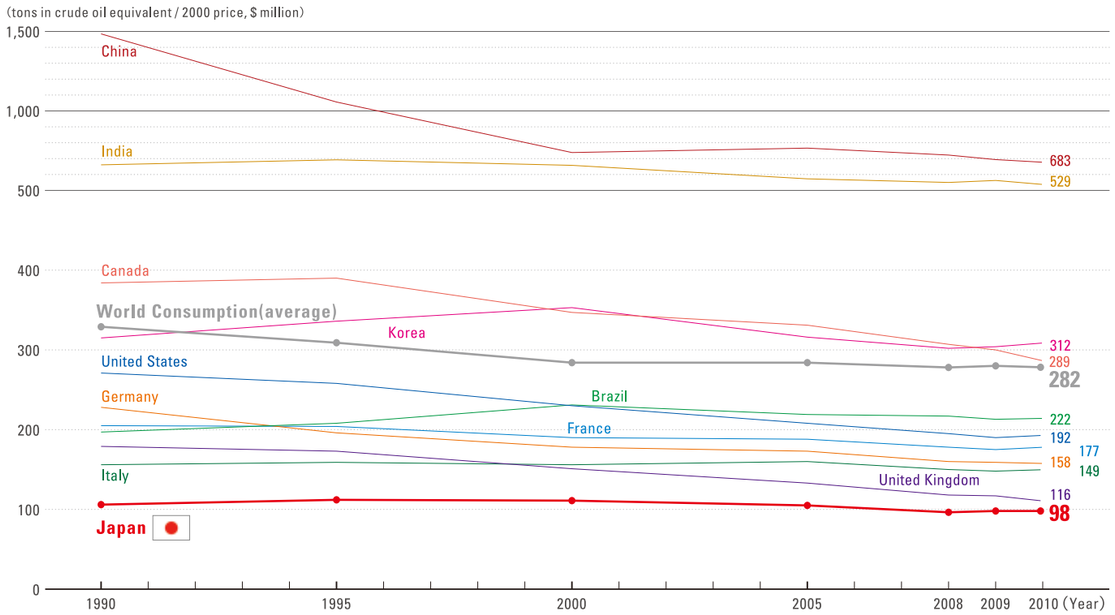
Sales of Japanese chemical companies based overseas and its percentage of all overseas Japanese manufacturing companies' sales



(Source) Ministry of Economy, Trade and Industry [Basic Survey of Overseas Business Activities]
(Note) Chemical fiber products are excluded from the chemical industry.

13 Efforts to conserve energy and prevent global warming

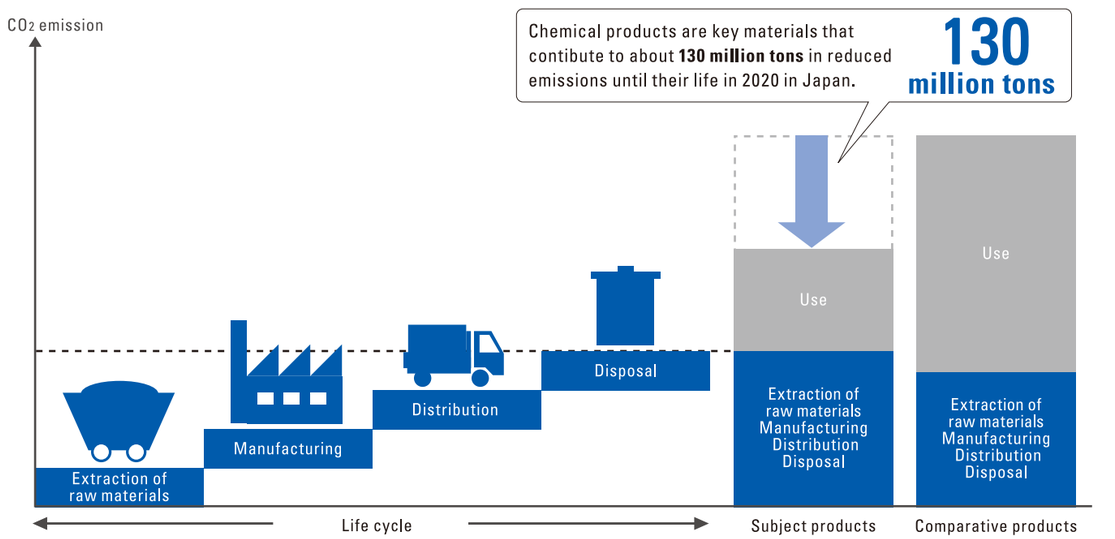
Primary energy consumption per GDP by country



(Source) The Energy Conservation Center, Japan [Handbook of Energy & Economic Statistics in Japan]

The avoided CO_2 emissions calculated based on cLCA

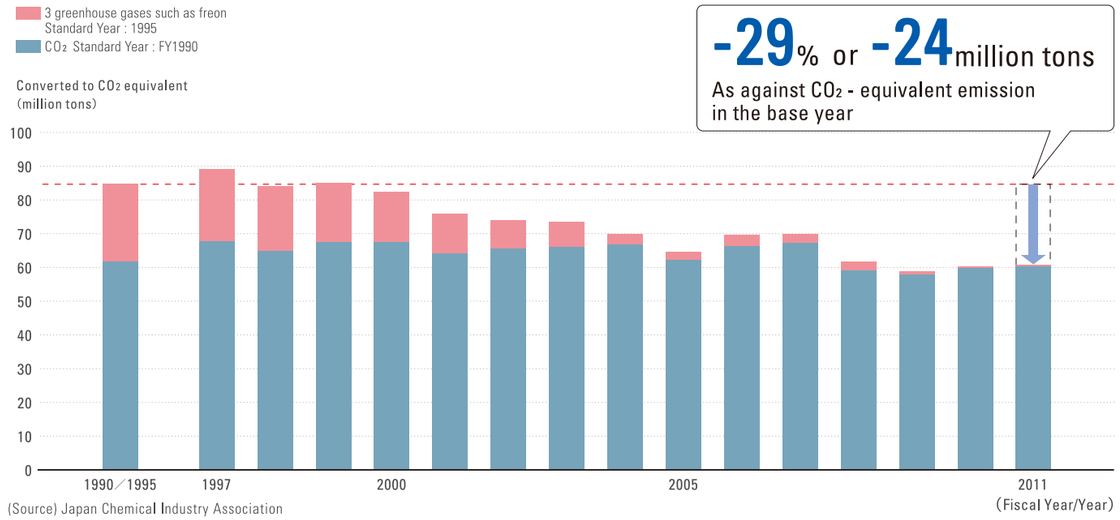
Concept of Carbon Life Cycle Analysis (cLCA): Difference of CO_2 emission between chemical products and their comparable products based on the complete products



Solar power generation, wind power generation, automobiles, airplanes, tires for automobiles, LED electric bulbs, heat insulation materials for home, air-conditioners, piping materials, and apartment houses

(Source) Japan Chemical Industry Association [Life Cycle Analysis of Chemical Products in Japan and around the World]

Greenhouse gases emissions under the voluntary action plan of chemical industry

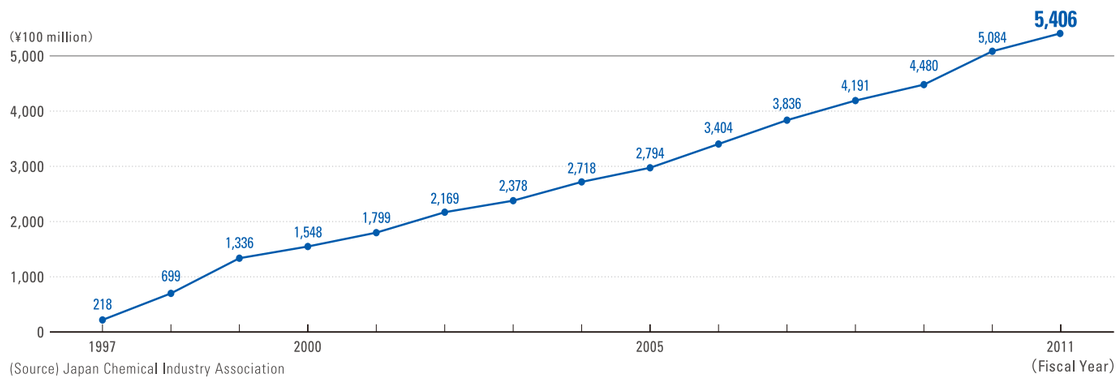


(Source) Japan Chemical Industry Association

Energy conservation capital investment(FY2011)

(Source) Japan Chemical Industry Association

Energy conservation capital investment(cumulative FY1997-FY2011)



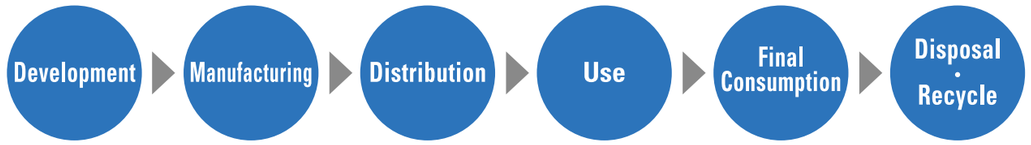
(Source) Japan Chemical Industry Association

Do you know about Responsible Care?

Efforts of chemical industry to preserve health, safety and the environment

What is Responsible Care?

In the chemical industry, each company that handles chemicals is committed to conducting safe, responsible, and sustainable management in all processes, from the development of chemicals to manufacturing, distribution, use, final consumption and disposal/recycling. To implement such management, chemical companies have been carrying out the Responsible Care program in which they voluntarily secure all processes related to environment, safety and health, make public the achievements of the program, and conduct dialogues and communications with society about the program.



History of Responsible Care

1985 Responsible Care was initiated in Canada.

1989 International Council of Chemical Associations (ICCA) was established and global development of Responsible Care activity began.

1995 Japan Responsible Care Council (JRCC) was established in Japan Chemical Industry Association (JCIA) and activities concerning environment/safety/health were unified and revitalized in the chemical industry as a whole.

2001 JRCC started to promote Responsible Care activity in other Asian countries.

2006 Responsible Care Global Charter was approved.

2010 JRCC was integrated into JCIA, and its organization was changed to JCIA Responsible Care Committee.

2012 As the interim period was completed, the JRCC has completely been unified to JCIA.

Responsible Care logo

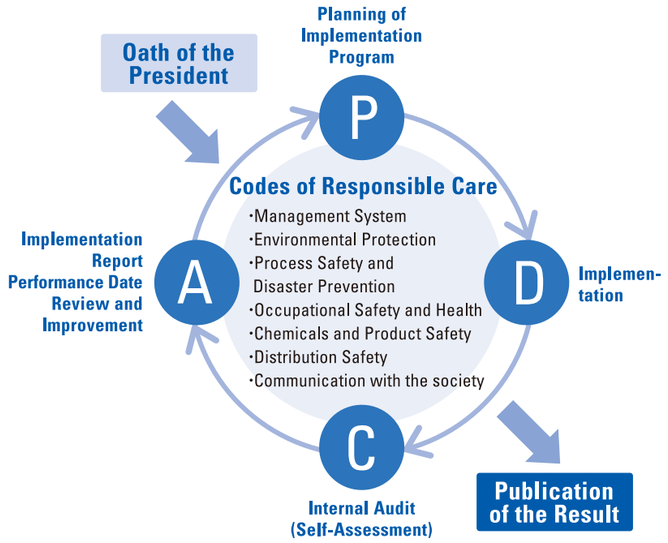
The logo, depicting a pair of hands and a model of a molecule, expresses the key message in handling chemical substances with care, and the ICCA has adopted the logo as an international mark to be used by corporations and associations that implement Responsible Care. Permission to use the logo has been granted to chemical industry associations in all ICCA member countries, as well as the respective members of those associations. In Japan, the Responsible Care logo can be used only by the JCIA, RC committee and RC committee members.

Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY

Procedures for implementing Responsible Care

Member companies of the RC Committee implement RC in accordance with the Codes and Guidelines for the Implementation of Responsible Care. RC should be implemented in accordance with the Plan-Do-Check-Act (PDCA) cycle. Member companies of the RC Committee must present their implementation plans and performance results to the RC Committee annually by submitting a Responsible Care Implementation Plan, a Responsible Care Implementation Report, and a Responsible Care Internal Audit Certificate.

The RC Committee compiles the RC Report on the activities and achievements of member companies and publishes it for the public. Most of the member companies publish their own RC Report and CSR Report, thereby making their activities and achievements known to the public.



Responsible Care implementation items

The RC Committee and its members collectively take action in five principal areas:

Environmental Protection
protecting nature and health globally

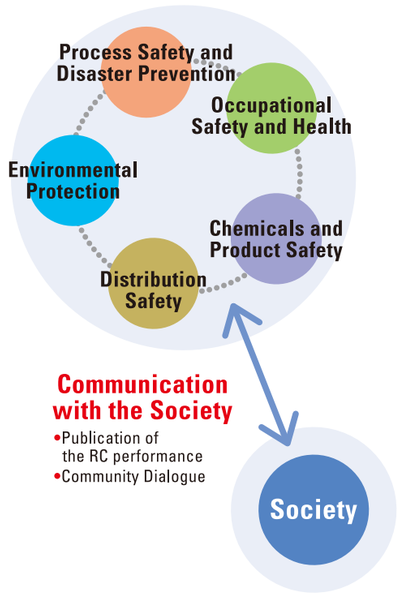
Process Safety and Disaster Prevention
striving to prevent disasters at industrial facilities and enacting countermeasures for natural disasters

Occupational Safety and Health
protecting the safety and health of workers

Chemicals and Product Safety
clearly identifying the properties and handling methods of chemical products and protecting health, safety and the environment of all persons who handles these products, including customers

Distribution Safety
preventing accidents during the transportation of chemicals and protecting human safety and the environment

The RC Committee and its members publicly report the results of these efforts to promote interaction and **Communication with the Society**.



Dream Chemistry 21

Chemistry and chemical products play an extremely important role in many aspects of daily living. To raise the awareness and understanding of such chemical technology and its various products, the Japan Chemical Industry Association has established the "Dream Chemistry 21" Organizing Committee. The "Dream Chemistry 21" campaign aims at promoting the importance of chemical technology and the usefulness of chemical products, particularly by appealing to young people's interest in the wonders of chemistry and, at the same time, fostering internationally-active chemists.

The activities of this Committee will include "Dream Chemistry 21" Children's Chemical Experiment Show, "Dream Chemistry 21" Weekend Experiment Classroom, Chemical Experiments in the Classroom program, Chemistry Grand Prix, and support for the participation in the International Chemistry Olympiad.

JCIA

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