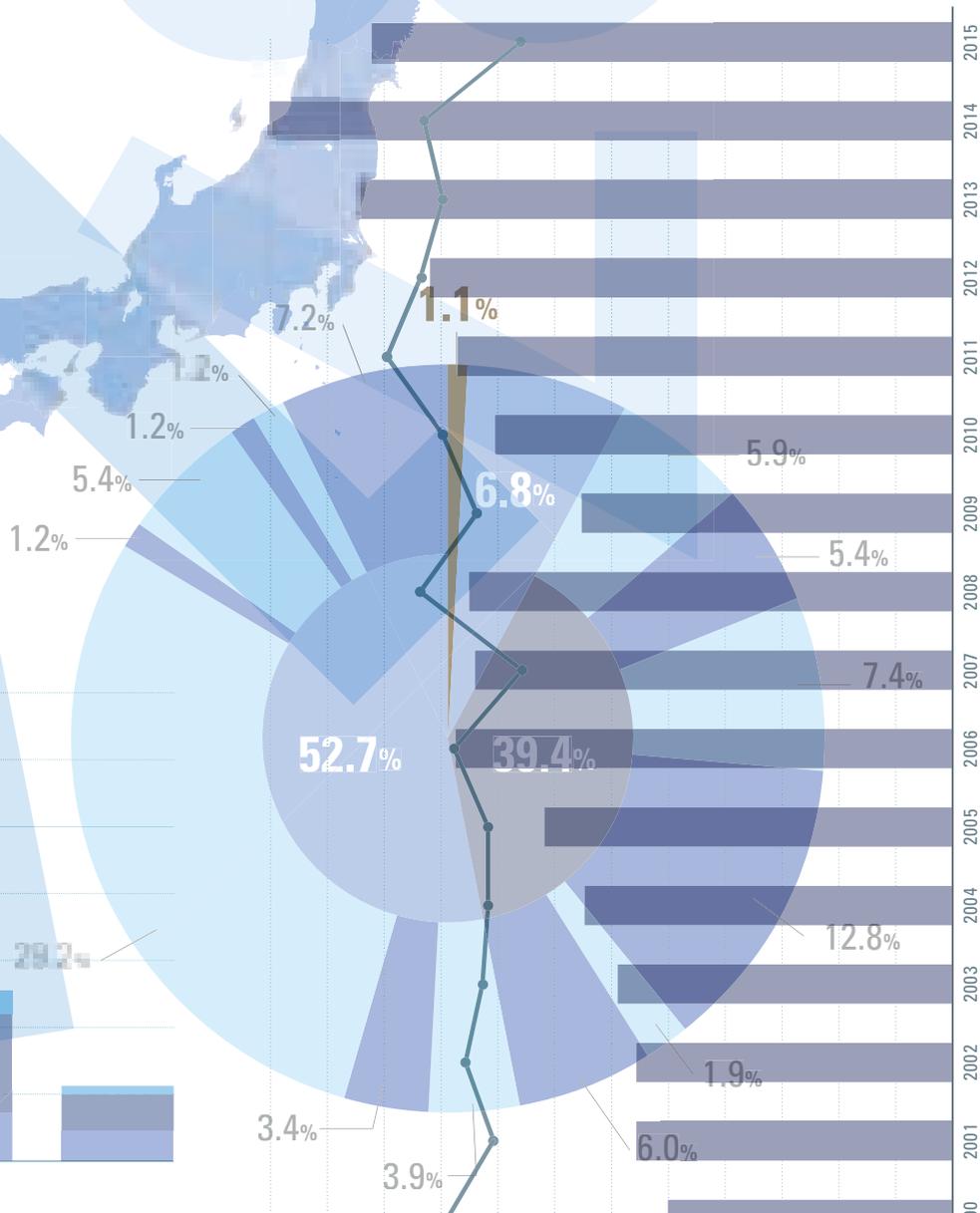
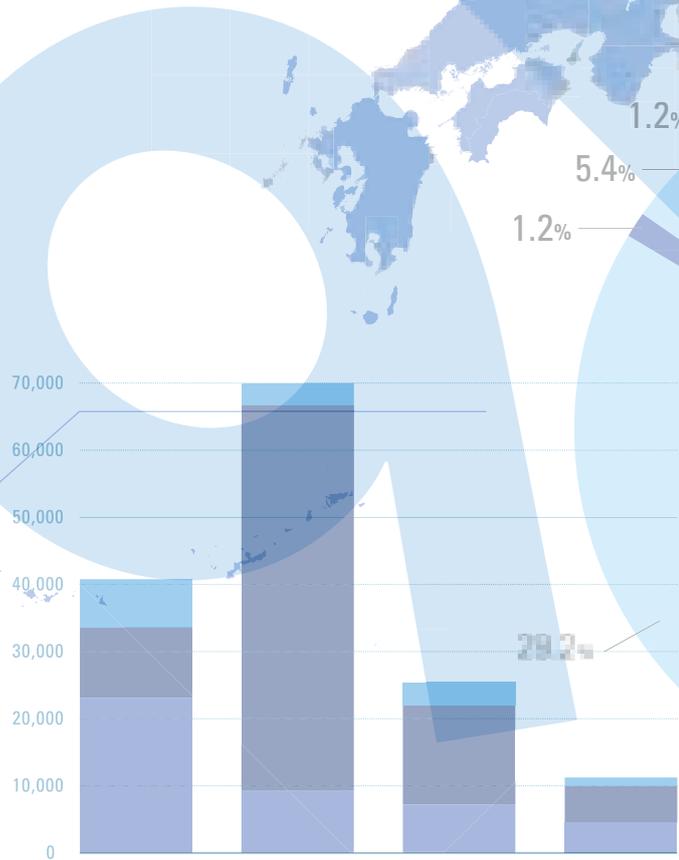
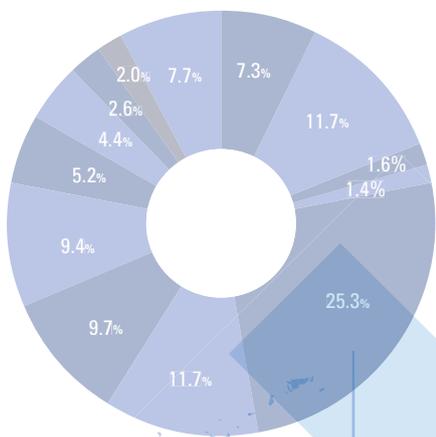
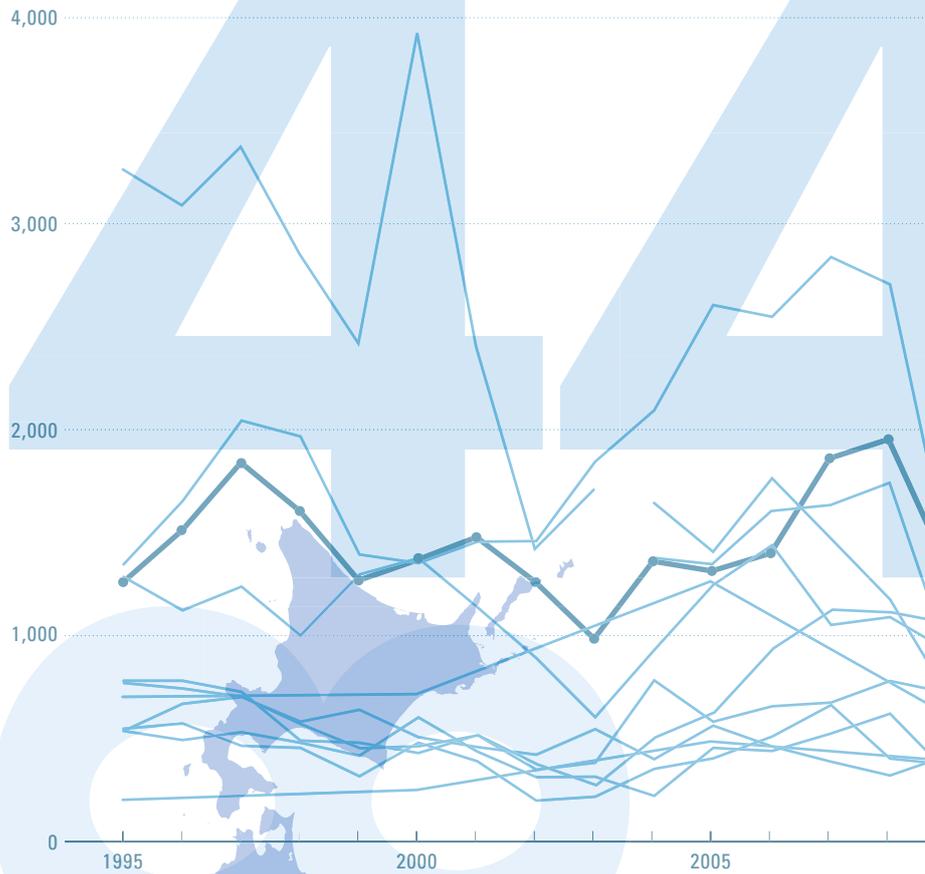
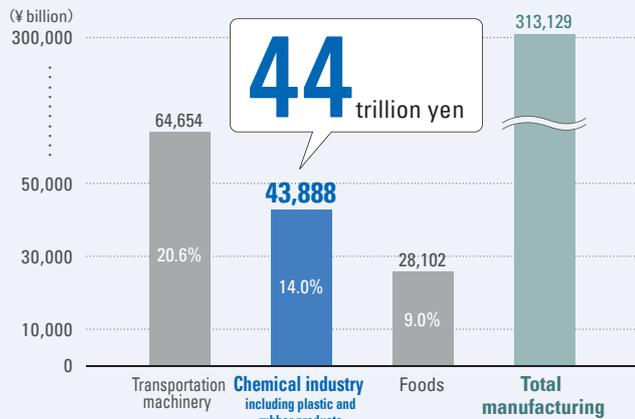


Chemical Industry of Japan 2017



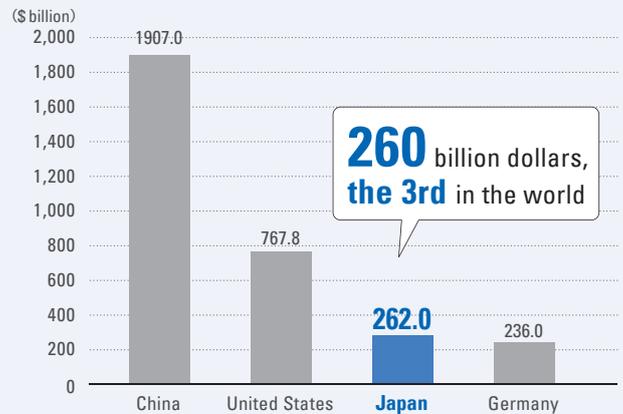
Japan's chemical industry viewed by figures and graphs

Value of shipments (2015) Source:MIC,METI [Economic Census]*



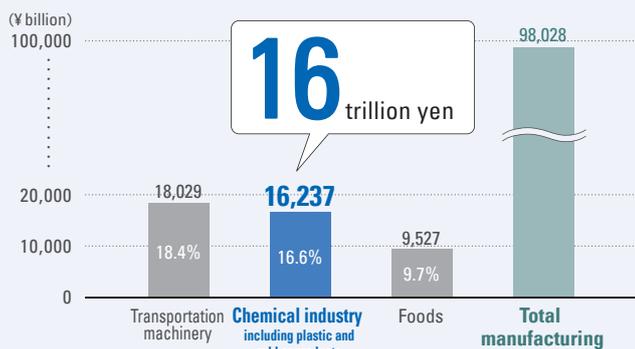
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Global chemical shipments (2016) Source:ACC [Guide to the Business of Chemistry 2016]



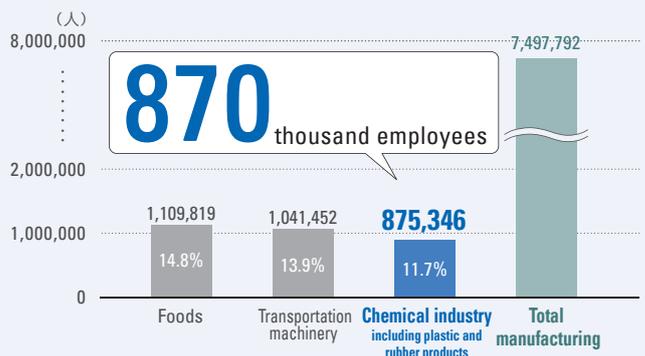
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Amount of value added (2015) Source:MIC,METI [Economic Census]



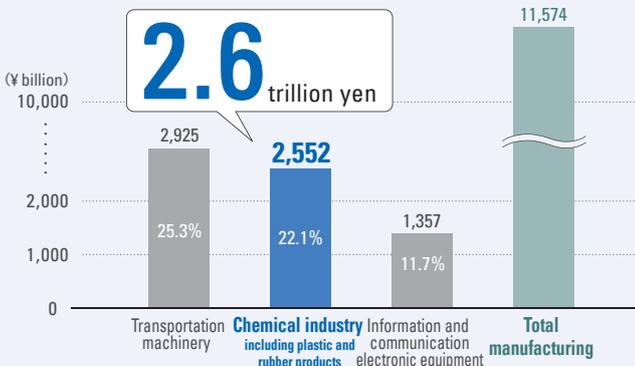
Note: Value added = Production amount – Cost for using raw materials – Domestic consumption tax – Depreciation cost, etc.

Number of employees (FY2016) Source:MIC,METI [Economic Census]



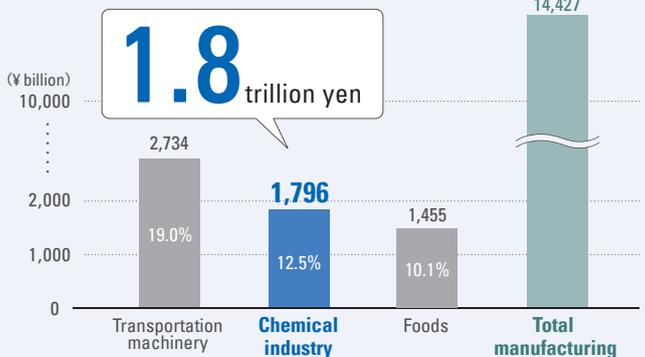
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R&D expenditures (FY2016) Source:MIC [Survey of Research and Development]



➔ page 11

Capital investment (FY2016) Source:MOF [Financial Statements Statistics of Corporations by Industry]



➔ page 13

*Ministry of Internal Affairs and Communications (MIC) and Ministry of Economy, Trade and Industry (METI) "2016 Economic Census for Business Activity"

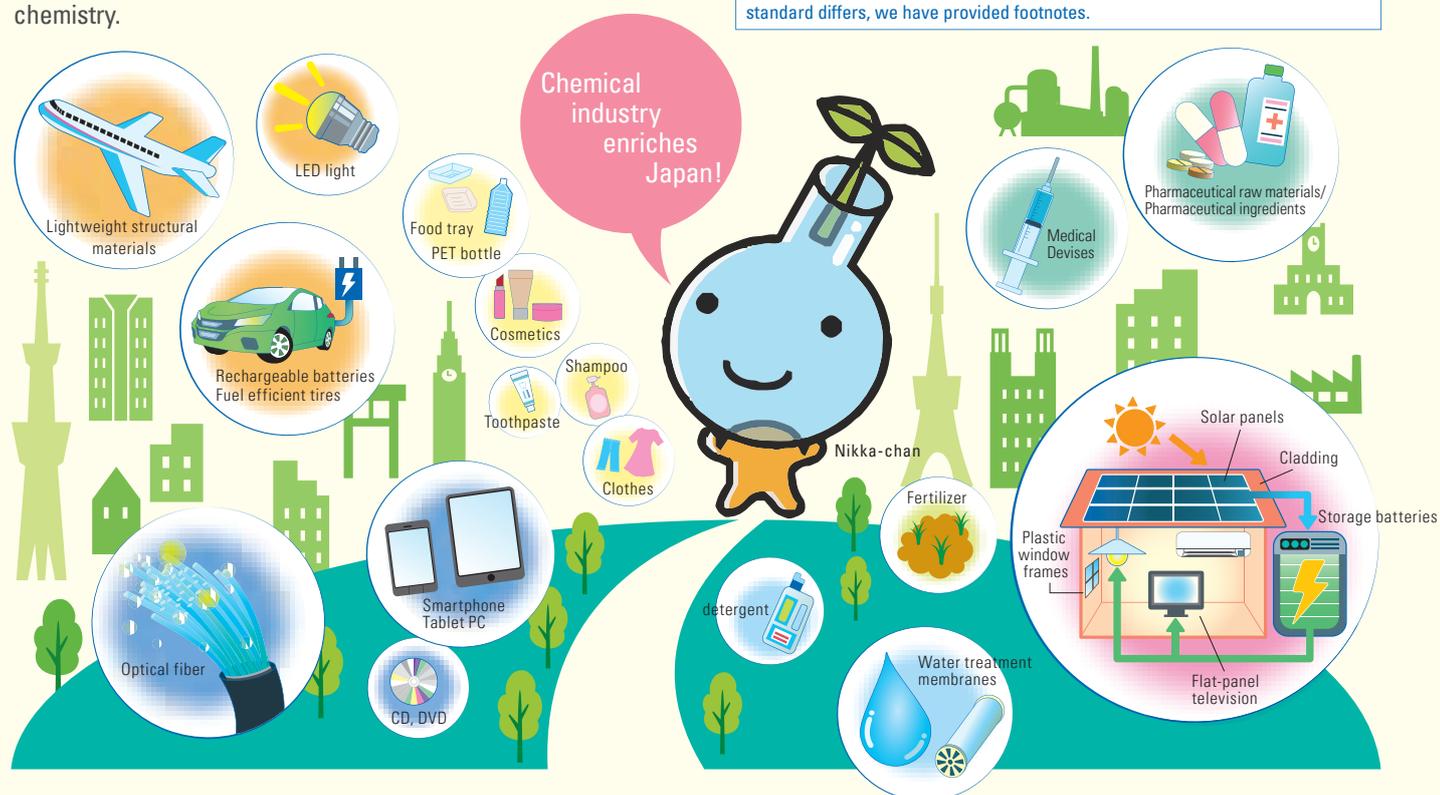
Japan's chemical industry supports people's lives and other industries

Japan's chemical industry supports innovation across entire industries by supplying materials which offer a wide range of functionality as basic ingredients for many different types of industry.

The products which are then generated bring about improvements in people's lives in every realm, the purification of water and the environment, better utilization of renewable energy, energy saving and resource saving, development of an information-based society, the advancement of medical care, a stable food supply, and the recycling of waste. They also make a significant contribution in terms of sustainable development. Such a diversified contribution is a distinctive feature of the chemical industry, one that is never seen in other industries, and one that demonstrates the infinite potential of chemistry.

The total shipments and amount of value added of "chemical industry including plastic and rubber products" amounted to Yen 44 trillion and Yen 16 trillion, respectively, in 2015, ranking those as the second biggest industry that contributes to the Japanese economy following the transportation machinery. The number of employees is more than 870,000 (as of June 1, 2016). Thus, the industry significantly supports the people's lives also in employment. Although it may be difficult for people to understand overall chemical industry because it manufactures diverse products*, we introduce the industry with data and graphs in this "Chemical Industry of Japan".

* 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). Detail of the content is described on Page 5. When the standard differs, we have provided footnotes.



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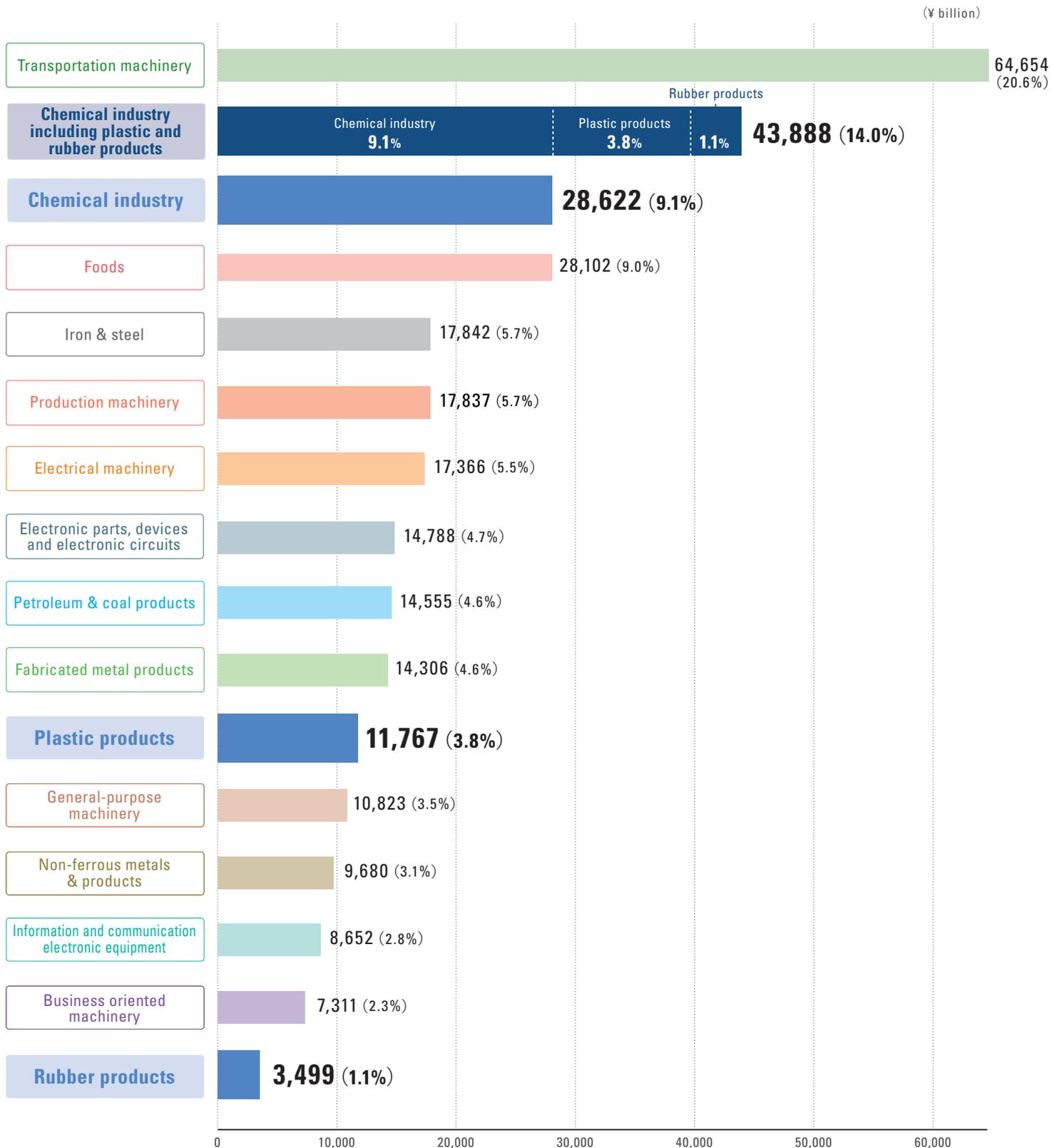
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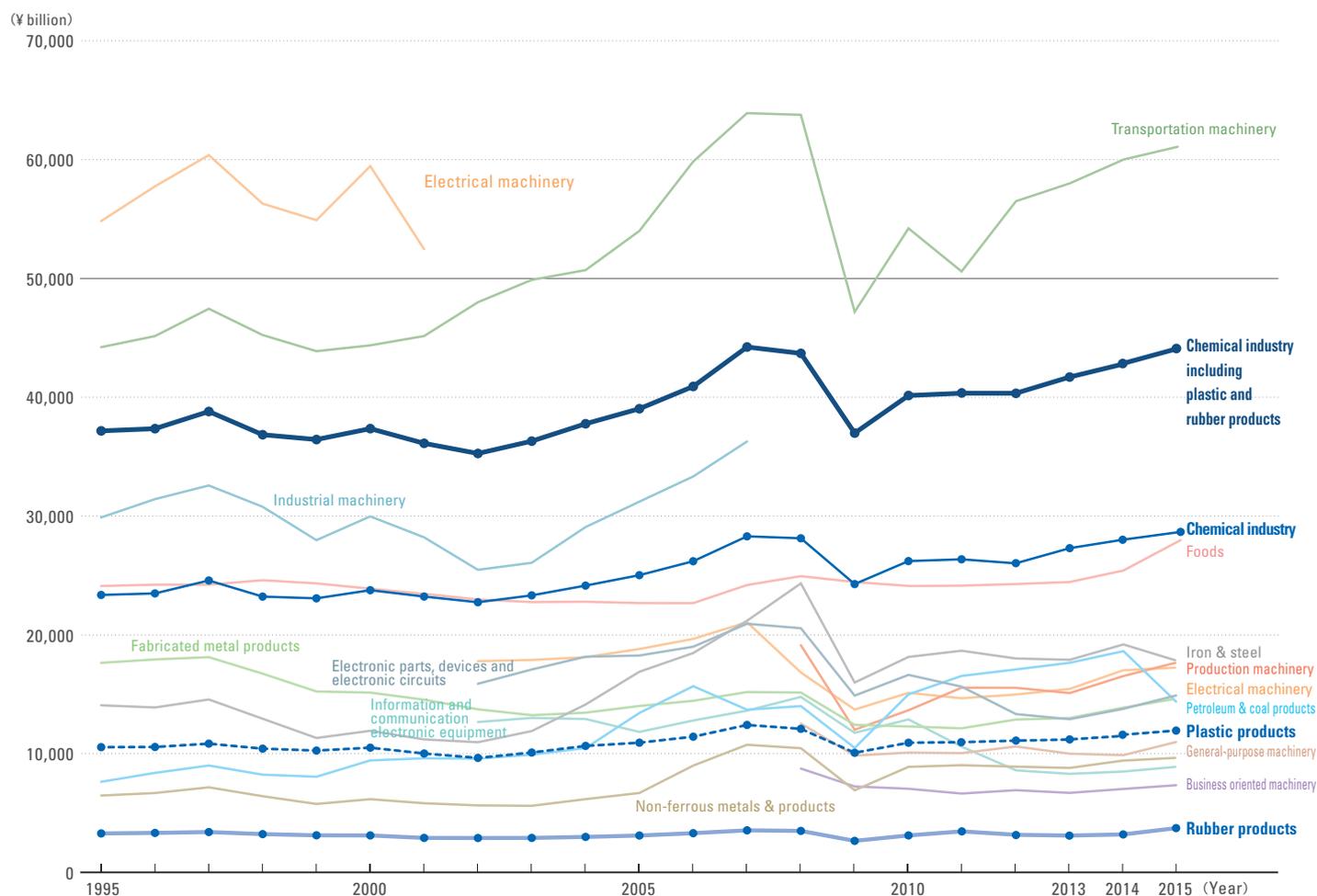
Shipments

Total shipment value of chemical industry ranks 2nd in manufacturing industries amounting to 44 trillion yen.

Value of shipments by manufacturing industry in 2015



Trend in shipment value (1995-2015)



(¥ billion)

Industry	Year	Every 5th year				Recent three years			
		1995	2000	2005	2010	2013	2014	2015	
Chemical industry		23,363	23,762	25,027	26,212	27,409	28,123	28,622	9.1%
Plastic products		10,530	10,486	10,906	10,903	11,237	11,533	11,767	3.8%
Rubber products		3,275	3,107	3,099	3,029	3,113	3,207	3,499	1.1%
Chemical industry including plastic and rubber products		37,168	37,356	39,032	40,144	41,759	42,863	43,888	14.0%
Foods		24,117	23,888	22,678	24,114	24,948	25,936	28,102	9.0%
Petroleum & coal products		7,635	9,434	13,429	14,992	17,676	18,659	14,555	4.6%
Iron & steel		14,073	11,927	16,896	18,146	17,905	19,202	17,842	5.7%
Non-ferrous metals & products		6,496	6,191	6,712	8,911	8,806	9,422	9,680	3.1%
Fabricated metal products		17,646	15,143	14,016	12,292	13,061	13,933	14,306	4.6%
Industrial machinery		29,884	29,972	31,211	—	—	—	—	—
General-purpose machinery		—	—	—	10,100	10,231	10,103	10,823	3.5%
Production machinery		—	—	—	13,646	15,155	16,591	17,837	5.7%
Business oriented machinery		—	—	—	6,873	6,705	7,034	7,311	2.3%
Electrical machinery		54,831	59,449	18,812	15,120	15,458	17,032	17,366	5.5%
Information and communication electronic equipment		—	—	11,534	12,585	8,427	8,628	8,652	2.8%
Electronic parts, devices and electronic circuits		—	—	18,265	16,633	12,943	13,818	14,788	4.7%
Transportation machinery		44,215	44,367	54,000	54,214	58,203	60,063	64,654	20.6%
Others		69,965	62,752	48,760	41,338	40,815	41,857	43,324	13.8%
Total manufacturing		306,030	300,478	295,346	289,108	292,092	305,140	313,128	100.0%

(Source) Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry [Economic Census]

(Note) 1. 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.

Electronic circuits have been added to electronic parts and devices since 2011.

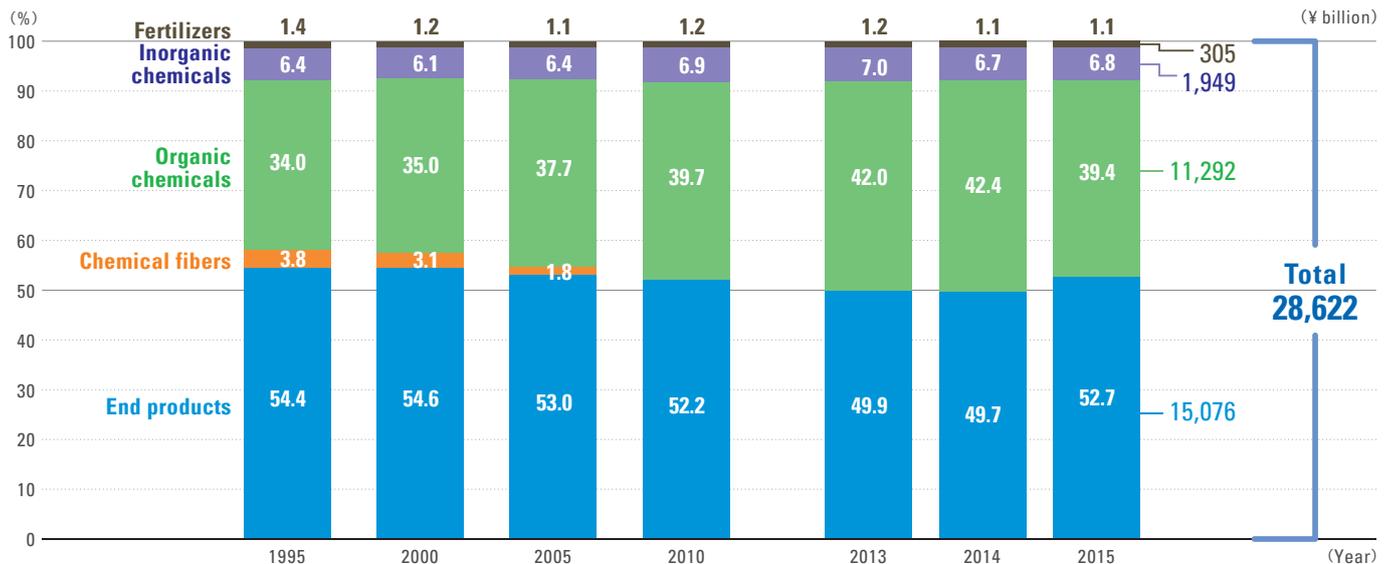
2. Because "other revenues" have been added to the amount of total shipment since the survey conducted in 2007, the total shipment amount cannot be compared with that in 2006.

2

Shipment by products/Major indices

Chemical products meet the needs of various fields.

Trend of shipments composition in chemical industry (1995-2015)



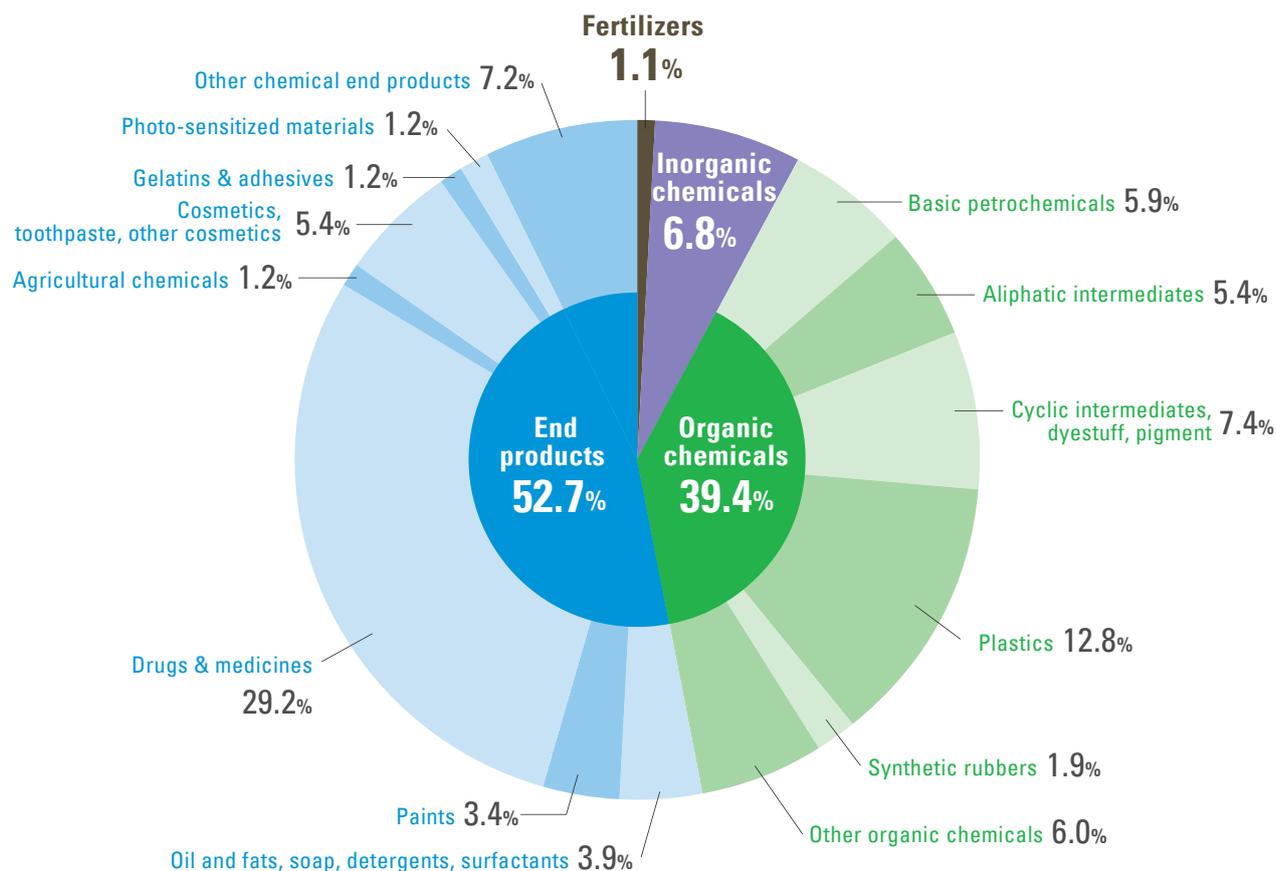
Industry	Year	Every 5th year				Recent three years		
		1995	2000	2005	2010	2013	2014	2015
Fertilizers		1.4	1.2	1.1	1.2	1.2	1.1	1.1
Inorganic chemicals		6.4	6.1	6.4	6.9	7.0	6.7	6.8
Organic chemicals		34.0	35.0	37.7	39.7	42.0	42.4	39.4
▶ Basic petrochemicals		2.6	2.9	6.3	6.6	9.4	8.7	5.9
▶ Aliphatic intermediates		5.5	7.1	6.1	5.9	4.8	5.1	5.4
▶ Cyclic intermediates, dyestuff, pigment		6.9	6.1	7.6	6.8	7.5	7.6	7.4
▶ Plastics		14.0	13.6	11.0	13.2	12.7	13.0	12.8
▶ Synthetic rubbers		1.7	1.5	2.0	1.6	2.0	2.0	1.9
▶ Other organic chemicals		3.3	3.8	4.7	5.5	5.5	6.0	6.0
Chemical fibers		3.8	3.1	1.8	-	-	-	-
End products		54.4	54.6	53.0	52.2	49.9	49.7	52.7
▶ Oil and fats, soap, detergents, surfactants		4.0	3.5	4.1	4.2	3.9	3.8	3.9
▶ Paints		4.6	4.1	3.7	4.0	3.5	3.4	3.4
▶ Drugs & medicines		25.7	27.0	28.0	28.1	27.8	27.0	29.2
▶ Agricultural chemicals		1.6	1.4	1.1	1.0	1.1	1.3	1.2
▶ Cosmetics, toothpaste, other cosmetics		6.4	6.0	5.6	5.3	4.8	5.0	5.4
▶ Gelatins & adhesives		1.0	1.0	1.0	1.2	1.1	1.3	1.2
▶ Photo-sensitized materials		4.6	4.4	2.5	1.7	1.1	1.1	1.2
▶ Other chemical end products		6.6	7.2	7.0	6.8	6.5	6.8	7.2
Chemical industry		100	100	100	100	100	100	100
Chemical industry		62.9	63.6	64.1	65.3	65.6	65.6	65.2
Plastic products		28.3	28.1	27.9	27.2	26.9	26.9	26.8
Rubber products		8.8	8.3	7.9	7.5	7.5	7.5	8.0
Chemical industry in a broad sense (including plastic and rubber products)		100	100	100	100	100	100	100

(Source) Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry [Economic Census]

(Note) 1. Statistics of facilities with four or more employees.

2. Chemical fibers have been moved to textile industry since 2008.

Composition of chemical products shipped in 2015



Major chemical industry indices with breakdown by product in 2015

Industry	Major indices, Composition							
	Number of facilities	%	Number of employees	%	Value of shipments (¥ billion)		Amount of value added (¥ billion)	
Fertilizers	169	3.4	3,751	1.1	305	1.1	74	0.7
Inorganic chemicals	837	16.9	31,645	9.1	1,949	6.8	599	5.7
Organic chemicals	807	16.3	96,087	27.5	11,292	39.4	2,896	27.5
▶ Basic petrochemicals	11	0.2	4,946	1.4	1,697	5.9	344	3.3
▶ Aliphatic intermediates	62	1.3	10,551	3.0	1,535	5.4	472	4.5
▶ Cyclic intermediates, dyestuff, pigment	150	3.0	15,522	4.4	2,116	7.4	377	3.6
▶ Plastics	275	5.5	33,830	9.7	3,677	12.8	998	9.5
▶ Synthetic rubbers	17	0.3	6,320	1.8	544	1.9	144	1.4
▶ Other organic chemicals	292	5.9	24,918	7.1	1,723	6.0	561	5.3
End products	3,144	63.4	217,412	62.3	15,076	52.7	6,979	66.2
▶ Oil and fats, soap, detergents, surfactants	313	6.3	14,427	4.1	1,115	3.9	512	4.9
▶ Paints	375	7.6	14,810	4.2	988	3.4	372	3.5
▶ Drugs & medicines	790	15.9	96,095	27.5	8,362	29.2	4,139	39.2
▶ Agricultural chemicals	77	1.6	4,213	1.2	337	1.2	141	1.3
▶ Cosmetics, toothpaste, other cosmetics	524	10.6	35,944	10.3	1,555	5.4	833	7.9
▶ Gelatins & adhesives	126	2.5	5,283	1.5	334	1.2	117	1.1
▶ Photo-sensitized materials	46	0.9	7,371	2.1	332	1.2	126	1.2
▶ Other chemical end products	893	18.0	39,269	11.3	2,053	7.2	738	7.0
Chemical industry	4,957	100	348,895	100	28,622	100	10,546	100
Chemical industry	4,957	23.3	348,895	39.9	28,622	65.2	10,546	65.0
Plastic products	13,631	64.1	411,676	47.0	11,767	26.8	4,237	26.1
Rubber products	2,664	12.5	114,775	13.1	3,499	8.0	1,454	9.0
Chemical industry in a broad sense (including plastic and rubber products)	21,252	100.0	875,346	100.0	43,889	100.0	16,237	100.0

(Source) Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry [Economic Census]

(Note) 1. Statistics of facilities with four or more employees.

2. Member of facilities and member of employees as of June 1, 2016.

3

Shipment, number of employed workers and number of facilities by prefecture

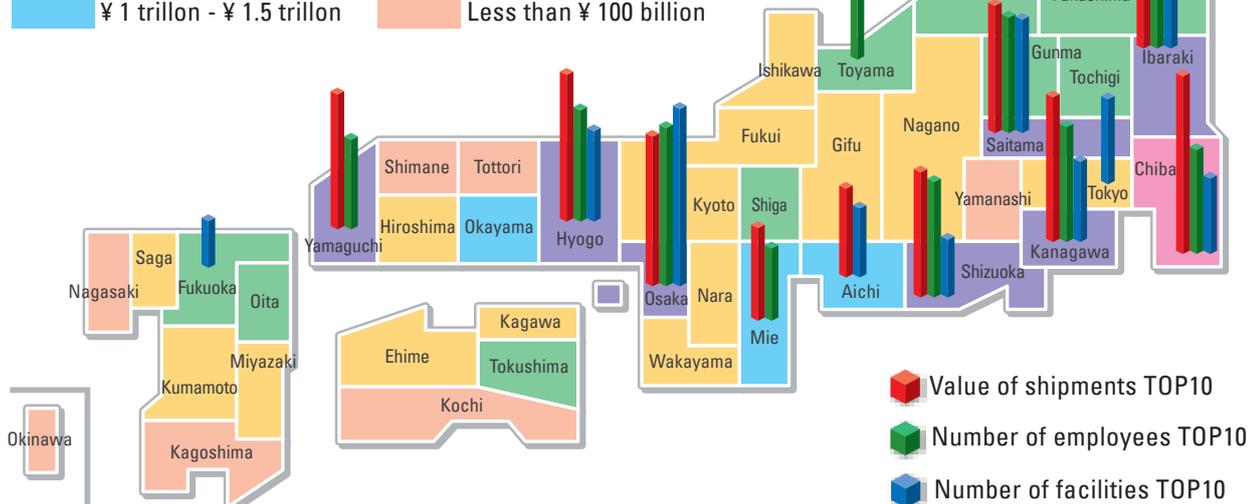
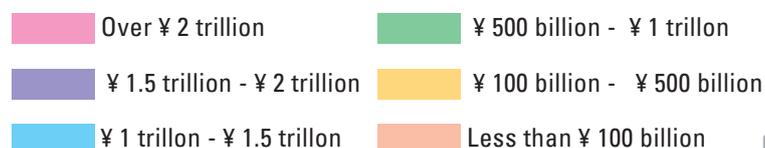
Top 3 prefectures in shipments are Osaka, Saitama and Shizuoka.

Shipment, number of employed workers and number of facilities by prefecture in 2015

Prefecture	Value of shipments (¥100 million)	Change from 2014	Number of employees	Number of facilities	Prefecture	Value of shipments (¥100 million)	Change from 2014	Number of employees	Number of facilities
1 Chiba	23,571	75.3%	19,782	250	25 Gifu	3,216	114.2%	6,366	102
2 Osaka	19,829	104.0%	30,089	587	26 Yamagata	2,726	118.7%	3,163	33
3 Hyogo	19,414	109.4%	21,131	300	27 Fukui	2,263	85.7%	3,643	63
4 Kanagawa	19,112	104.4%	21,654	265	28 Kumamoto	2,080	128.3%	4,775	42
5 Yamaguchi	17,976	109.2%	17,047	101	29 Hokkaido	1,948	102.1%	3,376	95
6 Saitama	16,964	109.4%	21,995	376	30 Kyoto	1,937	100.9%	5,293	113
7 Shizuoka	16,697	110.0%	21,844	192	31 Saga	1,884	110.7%	2,178	34
8 Ibaraki	16,082	107.8%	14,465	188	32 Miyazaki	1,675	110.8%	1,810	27
9 Mie	12,385	90.7%	13,723	122	33 Kagawa	1,498	99.5%	3,362	43
10 Aichi	11,844	98.0%	13,133	229	34 Ishikawa	1,466	98.3%	1,740	28
11 Okayama	10,786	83.0%	10,562	116	35 Nagano	1,329	98.9%	1,765	50
12 Shiga	9,746	115.5%	7,321	107	36 Nara	1,063	102.6%	3,304	71
13 Gunma	7,355	136.3%	8,402	98	37 Miyagi	857	95.8%	1,693	41
14 Toyama	7,122	118.8%	14,040	120	38 Akita	826	105.3%	1,398	16
15 Tochigi	6,454	109.1%	6,624	91	39 Iwate	534	100.3%	1,490	23
16 Oita	6,009	94.5%	3,021	32	40 Yamanashi	428	118.2%	1,097	20
17 Niigata	5,981	98.8%	8,137	81	41 Aomori	380	112.5%	513	14
18 Fukuoka	5,354	100.9%	8,669	155	42 Shimane	274	-	783	7
19 Tokushima	5,353	94.5%	5,708	41	43 Kagoshima	264	111.4%	408	21
20 Fukushima	5,153	116.6%	7,329	100	44 Okinawa	110	90.3%	563	32
21 Tokyo	4,845	122.5%	10,807	282	45 Nagasaki	82	91.2%	311	14
22 Hiroshima	4,156	99.7%	5,720	89	46 Kochi	74	98.9%	238	13
23 Ehime	3,564	103.2%	3,157	51	47 Tottori	8	-	56	4
24 Wakayama	3,542	103.8%	5,210	78	Total	286,222	101.9%	348,895	4,957

(Source) Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry [Economic Census]
 (Note) 1. Statistics of facilities with four or more employees.
 2. Member of facilities and member of employees as of June 1, 2016.

Shipments of chemical products by prefecture in 2015

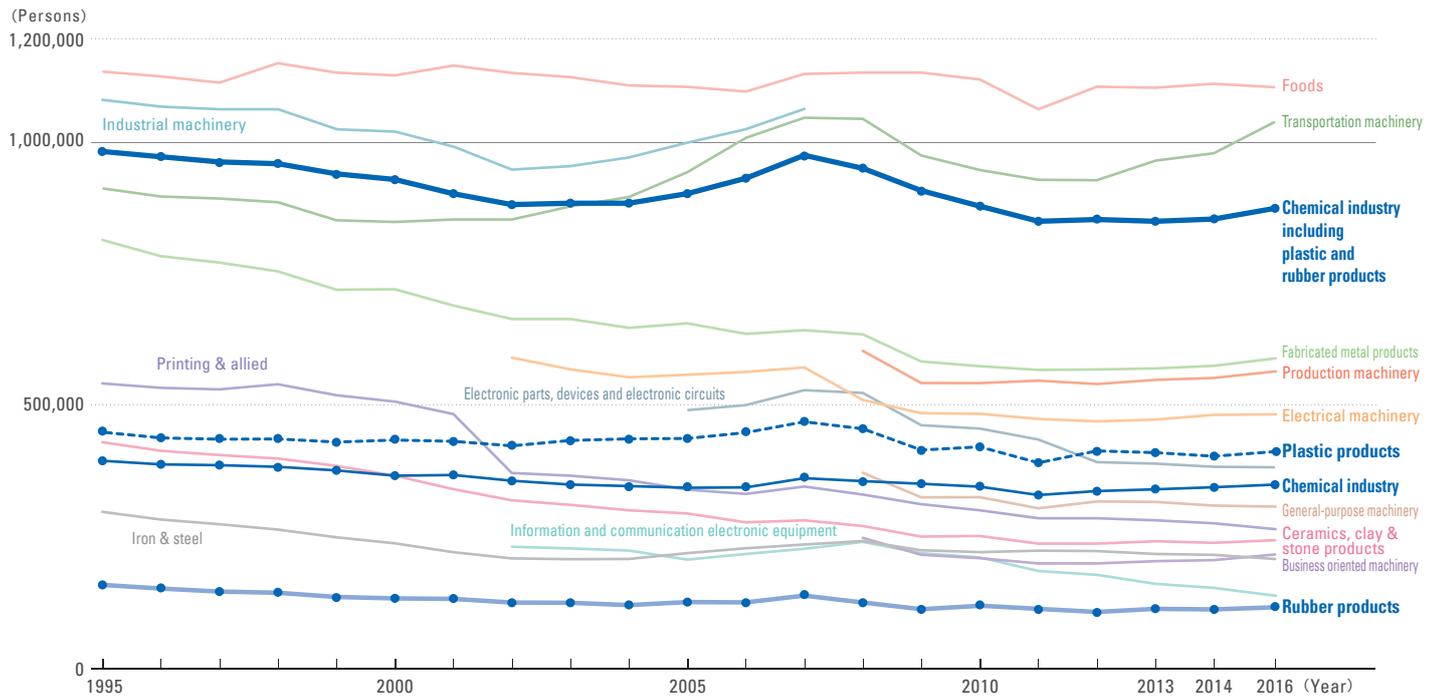


4

Number of employed workers

Over 870,000 workers are employed making the industry to rank 3rd among manufacturing industries.

Changes in the number of employees by manufacturing industry (1995-2016)



Industry	Year	Every 5th year				Recent three years			(Persons)
		1995	2000	2005	2010	2013	2014	2016	
Chemical industry		392,109	365,953	342,481	344,968	339,708	343,416	348,895	4.7%
Plastic products		448,939	433,177	436,897	420,179	409,136	405,938	411,676	5.5%
Rubber products		151,601	131,532	124,613	117,176	111,826	110,987	114,775	1.5%
Chemical industry including plastic and rubber products		992,649	930,662	903,991	882,323	860,670	860,341	875,346	11.7%
Foods		1,136,236	1,127,177	1,104,292	1,122,817	1,105,813	1,112,433	1,109,819	14.8%
Printing & allied		541,688	502,184	340,890	299,038	276,620	268,880	263,891	3.5%
Ceramics, clay & stone products		429,023	363,997	293,013	250,001	240,177	237,733	242,816	3.2%
Iron & steel		296,824	236,525	213,056	219,983	216,280	214,988	209,748	2.8%
Fabricated metal products		816,694	722,425	657,942	578,559	571,976	576,707	583,664	7.8%
Industrial machinery		1,086,575	1,037,079	983,449	—	—	—	—	—
General-purpose machinery		—	—	—	324,636	315,928	308,841	306,415	4.1%
Production machinery		—	—	—	543,070	543,449	550,642	564,958	7.5%
Business oriented machinery		—	—	—	211,834	202,652	204,404	210,084	2.8%
Electrical machinery		1,750,103	1,573,683	559,413	483,979	472,547	481,936	482,552	6.4%
Information and communication electronic equipment		—	—	205,331	212,466	157,425	151,851	136,141	1.8%
Electronic parts, devices and electronic circuits		—	—	490,140	452,169	388,209	382,110	381,686	5.1%
Transportation machinery		913,535	849,517	944,352	948,824	966,741	980,505	1,041,452	13.9%
Others		3,443,831	2,877,663	2,444,572	1,134,148	1,084,497	1,071,898	1,089,220	14.5%
Total manufacturing		10,320,583	9,183,833	8,156,992	7,663,847	7,402,984	7,403,269	7,497,792	30.2%

(Source) Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry [Economic Census]

(Note) 1. 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.

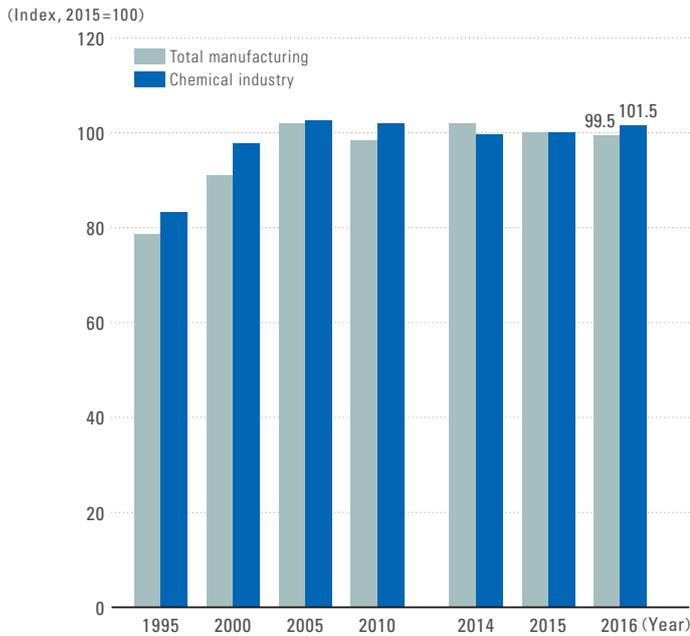
2. Electronic circuits have been added to electronic parts and devices since 2011.

3. The figures for 2015 are not published.

5

Labor productivity/Working hours

Index of physical labor productivity (1995-2016)

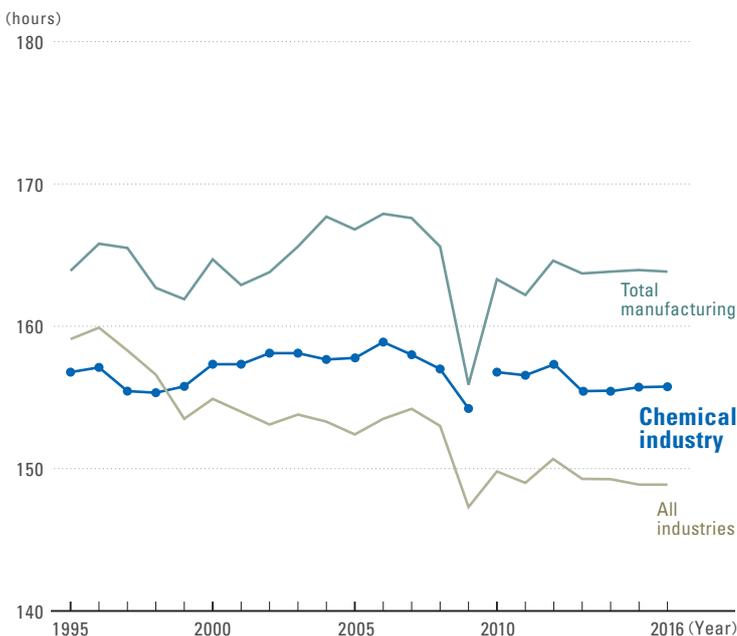


Industry		(Index, 2015=100)			
		Total manufacturing		Chemical industry	
Year		Index	Increase rate	Index	Increase rate
Every 5th year	1995	78.7	4.5%	83.2	7.8%
	2000	91.1	6.8%	97.6	2.3%
	2005	102.6	1.9%	106.6	▲0.4%
	2010	98.6	11.5%	103.6	5.2%
Recent three years	2014	101.6	2.7%	99.6	▲1.8%
	2015	100	▲1.6%	100	0.4%
	2016	99.5	▲0.5%	101.5	1.5%

(Source) Japan Productivity Center

(Note) 1. Since 2010, petrochemical and coal product manufactures have been included in the chemical industry.
2. The base year was changed to 2015, in 2017.

Working hours (monthly average of total net working hours) (1995-2016)



Industry		(hours)		
		All industries	Total manufacturing	Chemical industry
Year				
Every 5th year	1995	159.1	163.9	156.1
	2000	154.9	164.7	156.6
	2005	152.4	166.8	157.0
	2010	149.8	163.3	156.1
Recent three years	2014	149.0	164.6	155.2
	2015	148.7	164.7	157.3
	2016	148.6	164.6	157.4

(Source) Ministry of Health, Labour and Welfare [Monthly Labour Survey]

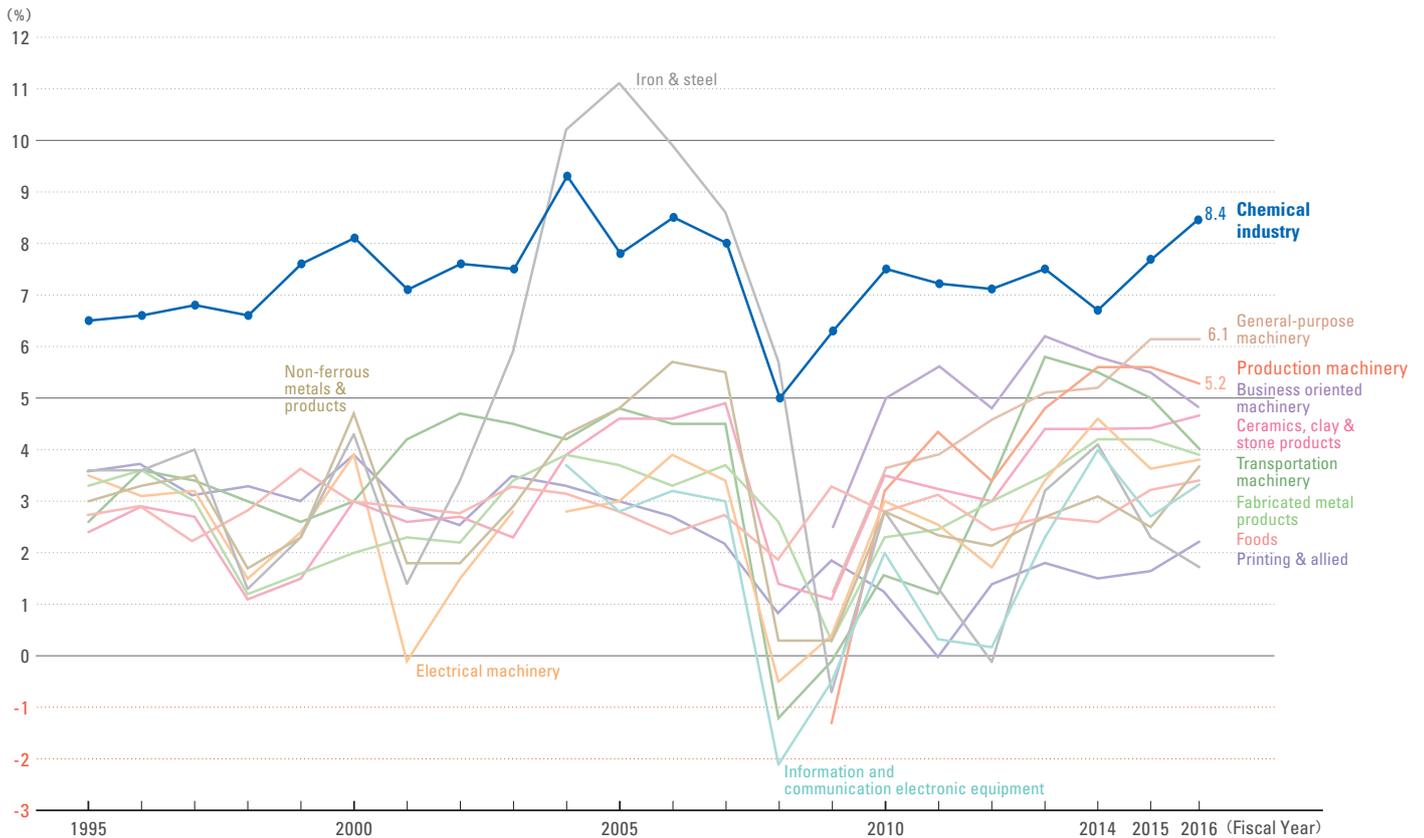
(Note) Since 2010, petrochemical and coal product manufactures have been included in the chemical industry.

6

Operating profit margin

Chemical industry is the No.1 in operating profit margin.

Trend of operating profit margin by manufacturing industry (FY1995-FY2016)



Industry	Fiscal year	Every 5th year				Recent three years		
		1995	2000	2005	2010	2014	2015	2016
Chemical industry		6.5	8.1	7.8	7.5	6.7	7.7	8.4
Foods		2.8	3.0	2.8	2.8	2.6	3.2	3.8
Printing & allied		3.6	3.9	3.0	1.2	1.5	1.8	2.3
Ceramics, clay & stone products		2.4	3.0	4.6	3.5	4.4	4.4	4.7
Iron & steel		3.6	4.3	11.1	2.8	4.1	2.3	1.7
Non-ferrous metals & products		3.0	4.7	4.8	2.8	3.1	2.6	3.6
Fabricated metal products		3.3	2.0	3.7	2.3	4.2	4.2	3.9
General-purpose machinery		-	-	-	3.5	5.2	6.1	6.1
Production machinery		3.1	4.0	5.2	3.2	5.6	5.6	5.2
Business oriented machinery		5.1	6.0	7.6	5.0	5.8	5.5	4.9
Electrical machinery		3.5	3.9	3.0	3.0	4.6	3.7	3.8
Information and communication electronic equipment		-	-	2.8	2.0	4.0	2.7	3.4
Transportation machinery		2.6	3.0	4.8	1.6	5.5	5.0	4.0
Total manufacturing		3.3	3.8	4.5	3.2	4.2	4.3	4.4

(Source) Ministry of Finance (Financial Statements Statistics of Corporations by Industry)

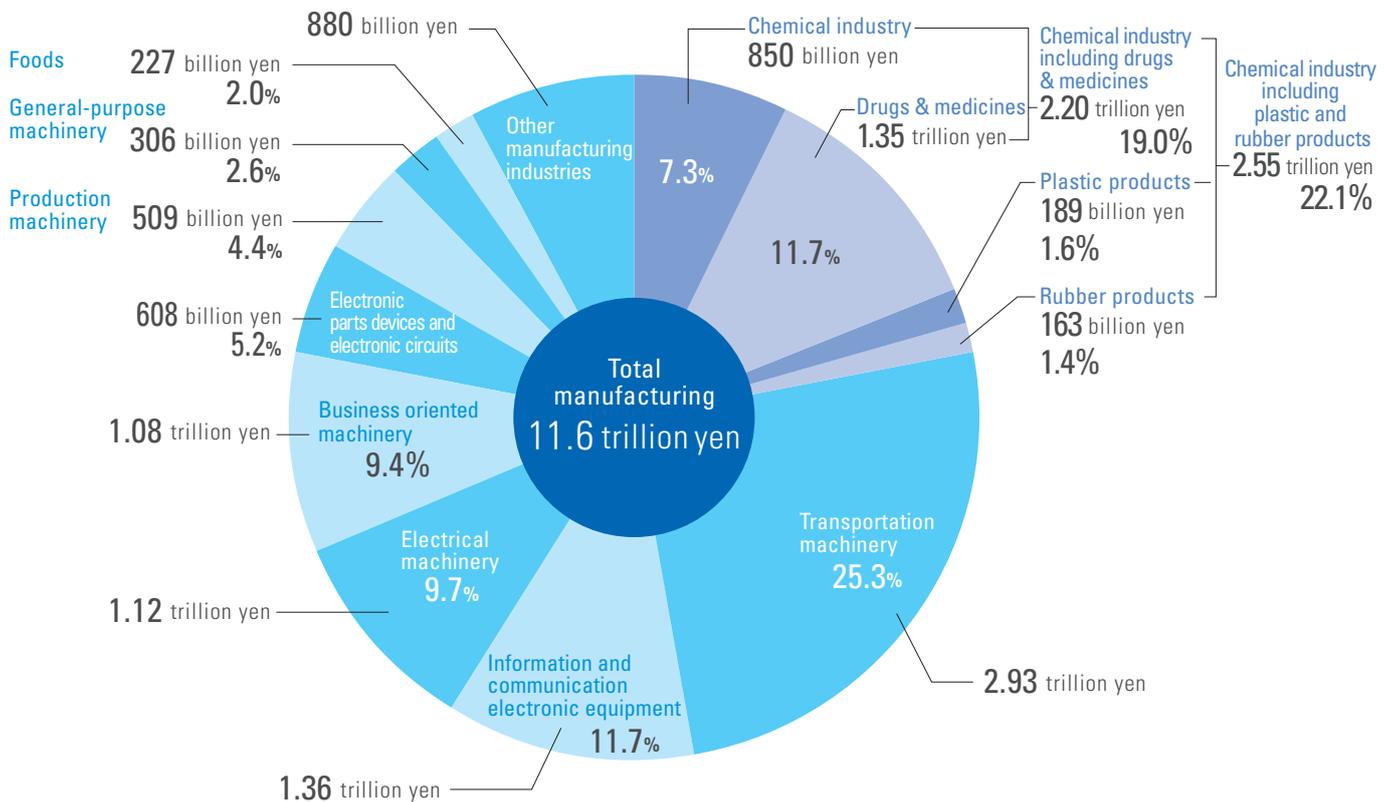
(Note) Rubber & plastic products are excluded from the chemical industry.

7

Research and development expenditures

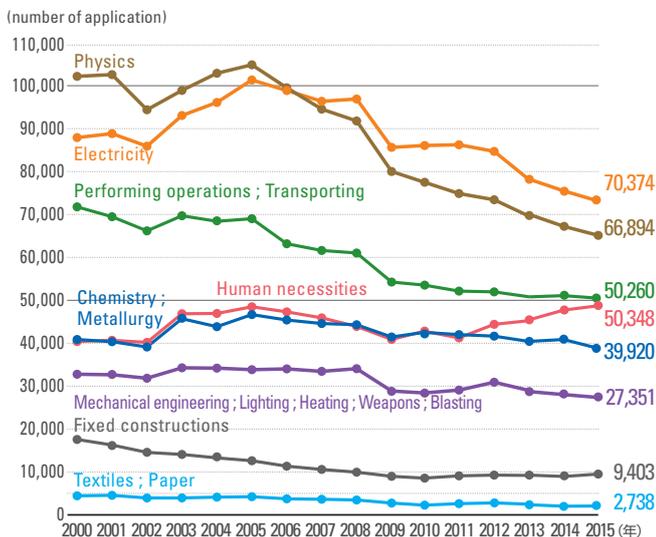
R&D expenditures of chemical industry amounted to 2.6 trillion yen.

Ratio of R&D expenditures by manufacturing industry in FY 2016



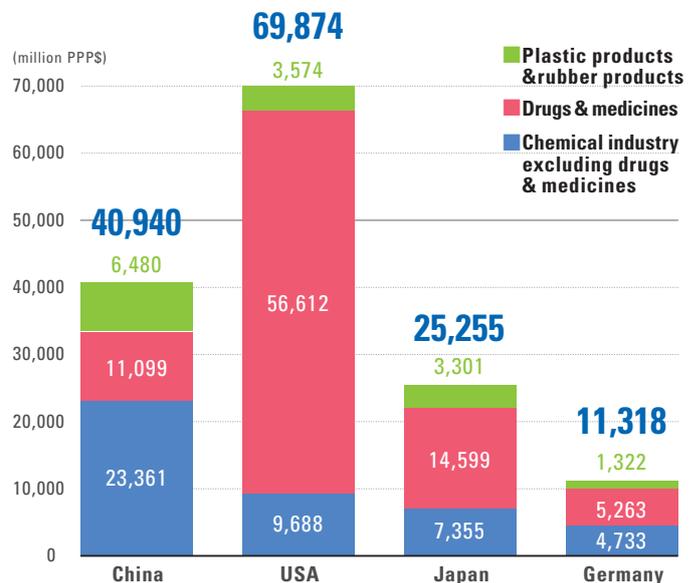
(Source) Ministry of Internal Affairs and Communications
[Survey of Research and Development]

Trend of number of applications for patents by classification (2000-2015)



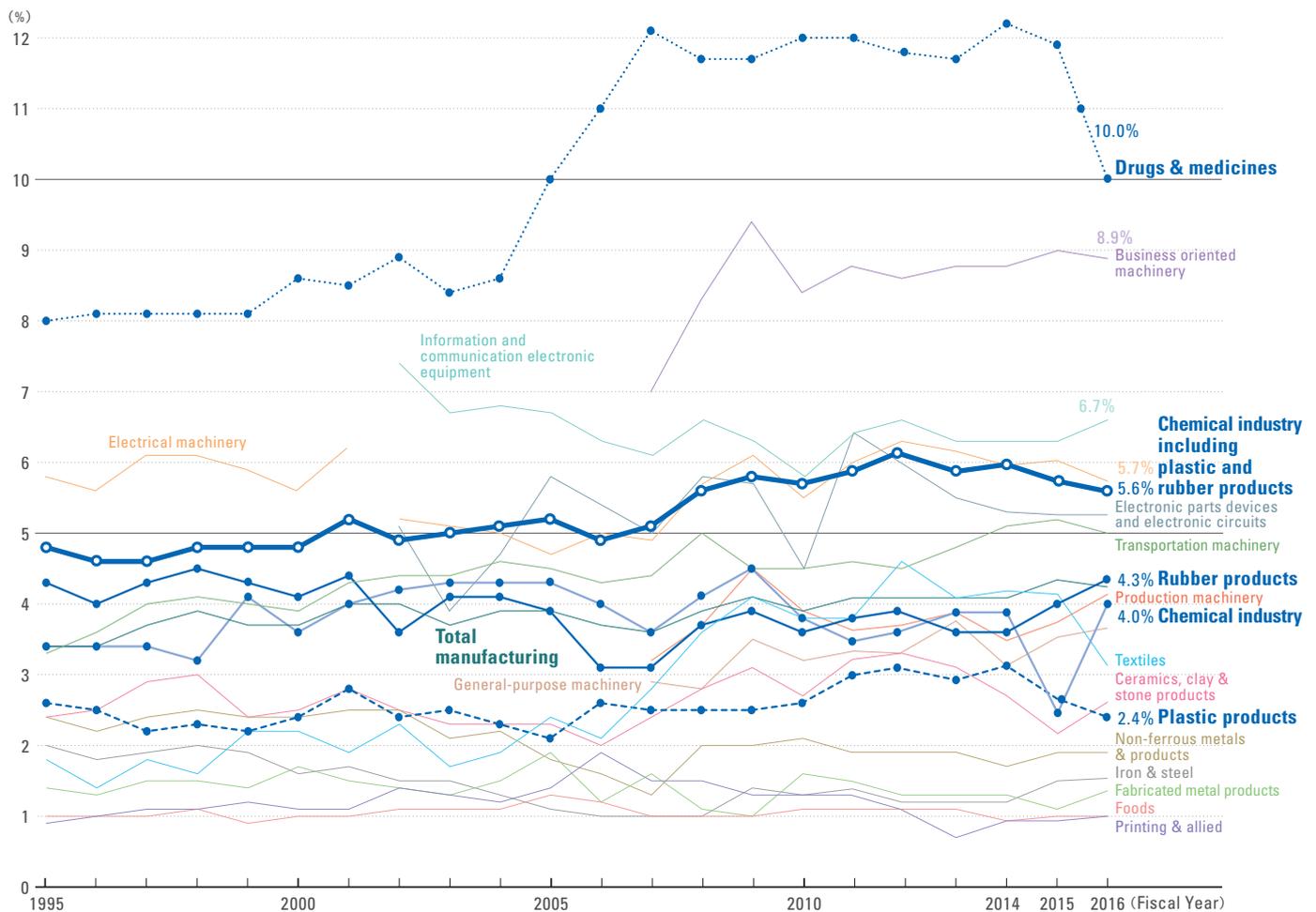
(Source) Japan Patent Office

R&D expenditures of chemical industry in the top four countries in shipment (2014)



(Source) OECD.Stat Extracts as of April 2016
(Note) PPP: Purchasing Power Parity

Ratio of R&D expenditures to sales by manufacturing industry (FY1995-FY2016)



Industry	Fiscal year	Every 5th year				Recent three years		
		1995	2000	2005	2010	2014	2015	2016
Chemical industry		4.3	4.1	3.9	3.6	3.6	4.0	4.3
Drugs & medicines		8.0	8.6	10.0	12.0	12.2	11.9	10.0
Chemical industry including drugs & medicines		5.3	5.4	5.9	6.4	6.8	6.9	6.6
Plastic products		2.6	2.4	2.1	2.6	3.1	2.7	2.4
Rubber products		3.4	3.6	4.3	3.8	3.9	2.4	4.0
Chemical industry including plastic and rubber products		4.8	4.8	5.2	5.7	6.0	5.7	5.6
Foods		1.0	1.0	1.3	1.1	0.9	1.0	1.0
Textiles		1.8	2.2	2.4	3.8	4.2	4.1	3.1
Printing & allied		0.9	1.1	1.4	1.3	0.9	0.9	1.0
Ceramics, clay & stone products		2.4	2.5	2.3	2.7	2.7	2.1	2.6
Iron & steel		2.0	1.6	1.1	1.3	1.2	1.5	1.6
Non-ferrous metals & products		2.4	2.4	1.8	2.1	1.7	1.9	1.9
Fabricated metal products		1.4	1.7	1.9	1.6	1.3	1.1	1.4
General-purpose machinery		—	—	—	3.2	3.1	3.5	3.7
Production machinery		—	—	—	3.9	3.5	3.8	4.1
Business oriented machinery		—	—	—	8.4	8.8	9.0	8.9
Electrical machinery		5.8	5.6	4.7	5.5	6.0	6.0	5.7
Information and communication electronic equipment		—	—	6.7	5.8	6.3	6.3	6.7
Electronic parts devices and electronic circuits		—	—	5.8	4.5	5.3	5.2	5.2
Transportation machinery		3.3	3.9	4.5	4.5	5.1	5.2	5.0
Total manufacturing		3.4	3.7	3.9	3.9	4.1	4.3	4.2

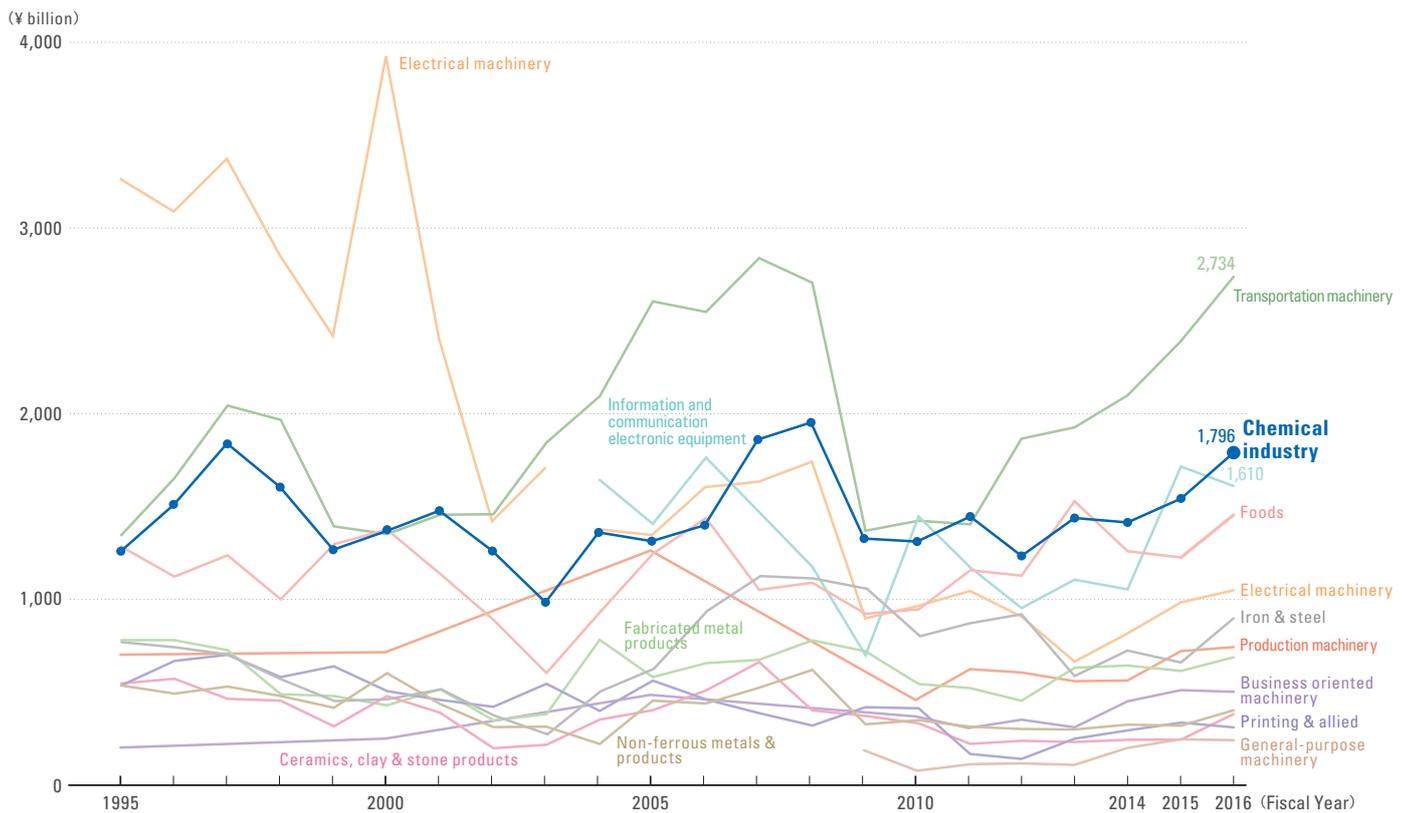
(Source) Ministry of Internal Affairs and Communications [Survey of Research and Development]

8

Amount of capital investment

Capital investment of chemical industry amounted to 1.4 trillion yen making it ranked 2nd in manufacturing industries.

Trend of capital investment by manufacturing industry (FY1995-FY2016)



Industry	Fiscal year	Every 5th year				Recent three years			%
		1995	2000	2005	2010	2014	2015	2016	
Chemical industry		1,260	1,368	1,314	1,312	1,426	1,548	1,796	12.5%
Foods		1,285	1,376	1,246	947	1,249	1,229	1,455	10.1%
Printing & allied		537	507	563	414	284	333	309	2.1%
Ceramics, clay & stone products		548	480	404	333	246	242	380	2.6%
Iron & steel		770	463	627	802	735	659	838	5.8%
Non-ferrous metals & products		537	603	455	350	326	317	403	2.8%
Fabricated metal products		781	430	582	545	619	616	688	4.8%
General-purpose machinery		—	—	—	78	200	242	237	1.6%
Production machinery		705	692	1,266	461	566	719	742	5.1%
Business oriented machinery		268	316	480	364	517	509	500	3.5%
Electrical machinery		3,265	3,927	1,347	966	812	986	1,050	7.3%
Information and communication electronic equipment		—	—	1,407	1,447	1,114	1,710	1,610	11.2%
Transportation machinery		1,346	1,352	2,605	1,424	2,072	2,385	2,734	19.0%
Others		2,545	1,724	2,049	1,828	1,747	1,857	1,686	11.7%
Total manufacturing		13,849	13,238	14,343	11,272	11,913	13,351	14,427	100.0%

(Source) Ministry of Finance [Financial Statements Statistics of Corporations by Industry]

(Note) Rubber & plastic products are excluded from the chemical industry.

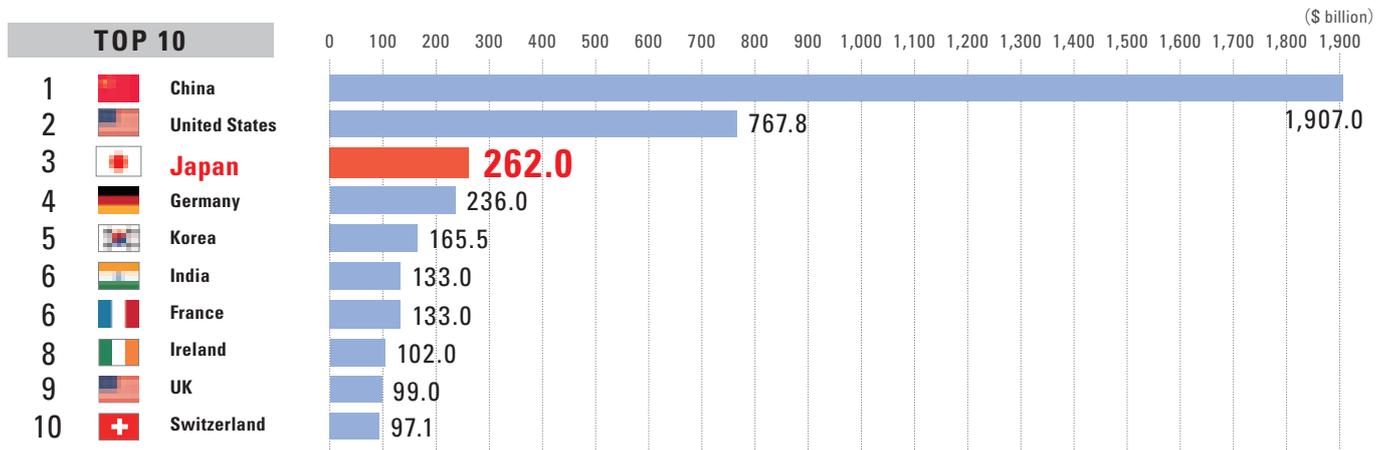
9

Shipments by country

Japan ranks 3rd in the world after China and the US.

Five Japanese companies are included among the world's leading chemical companies.

Shipments of chemical products by country in 2016



(Source) American Chemistry Council(ACC) "Guide to the Business of Chemistry 2017"

The world's 30 leading chemical companies in 2015

Ranking	Company	Country	Chemical sales			Chemical operating profits		
			2015 (\$ million)	Change from 2014 (%)	Chemical sales as of total sales	2015 (\$ million)	Change from 2014 (%)	Operating profit margin
1	BASF	Germany	63,749	-2.9%	81.5	5,743	-12.8%	9.0%
2	Dow Chemical	U.S.	48,778	-16.1%	100.0	6,373	7.1%	13.1%
3	Sinopec	China	43,799	-22.9%	13.9	3,134	N.M.	7.2%
4	SABIC	Saudi Arabia	34,349	-20.7%	87.0	10,683	-11.2%	31.1%
5	Formosa Plastics	Taiwan	29,209	-16.1%	63.9	2,502	80.5%	8.6%
6	Ineos	Switzerland	28,493	15.2%	100.0	4,248	83.9%	14.9%
7	ExxonMobil	U.S.	28,134	-26.3%	10.8	5,697	-0.1%	20.2%
8	LyondellBasell Industries	Netherlands	26,676	-23.4%	81.5	6,353	3.8%	23.8%
9	Mitsubishi Chemical	Japan	24,348	5.0%	77.1	1,456	90.8%	6.0%
10	DuPont	U.S.	20,700	-30.9%	82.4	N.A.	N.A.	N.A.
11	LG Chem	South Korea	18,173	-9.0%	100.0	1,612	4.6%	8.9%
12	Air Liquide	France	17,316	8.0%	95.3	3,363	9.3%	19.4%
13	Linde	Germany	16,831	8.5%	84.5	4,606	8.2%	27.4%
14	AkzoNobel	Netherlands	16,488	3.9%	100.0	1,622	36.4%	9.8%
15	Toray Industries	Japan	15,520	4.5%	89.3	1,326	23.3%	8.5%
16	Evonik Industries	Germany	14,988	4.6%	100.0	2,038	40.7%	13.6%
17	PPG Industries	U.S.	14,241	-0.1%	92.9	2,287	6.1%	16.1%
18	Braskem	Brazil	14,174	2.7%	100.0	2,325	123.6%	16.4%
19	Yara	Norway	13,869	17.4%	100.0	2,499	44.4%	18.0%
20	Covestro	Germany	13,407	2.7%	100.0	721	30.0%	5.4%
21	Sumitomo Chemical	Japan	13,297	-14.6%	76.6	1,065	17.1%	8.0%
22	Reliance Industries	India	12,854	-14.9%	29.8	1,594	23.3%	12.4%
23	Solvay	Belgium	12,258	3.9%	100.0	1,282	6.3%	10.5%
24	Bayer	Germany	11,504	-51.0%	30.2	2,087	-22.8%	18.1%
25	Mitsui Chemicals	Japan	11,102	-13.3%	100.0	643	62.1%	5.8%
26	Praxair	U.S.	10,776	-12.2%	100.0	3,571	-8.6%	33.1%
27	Shin-Etsu Chemical industry	Japan	10,573	1.9%	100.0	1,723	12.5%	16.3%
28	Lotte Chemical	South Korea	10,357	-21.2%	100.0	1,424	359.1%	13.8%
29	Huntsman Corp.	U.S.	10,299	-11.0%	100.0	706	-10.3%	6.9%
30	Syngenta	Switzerland	9,925	-12.1%	74.0	N.A.	N.A.	N.A.

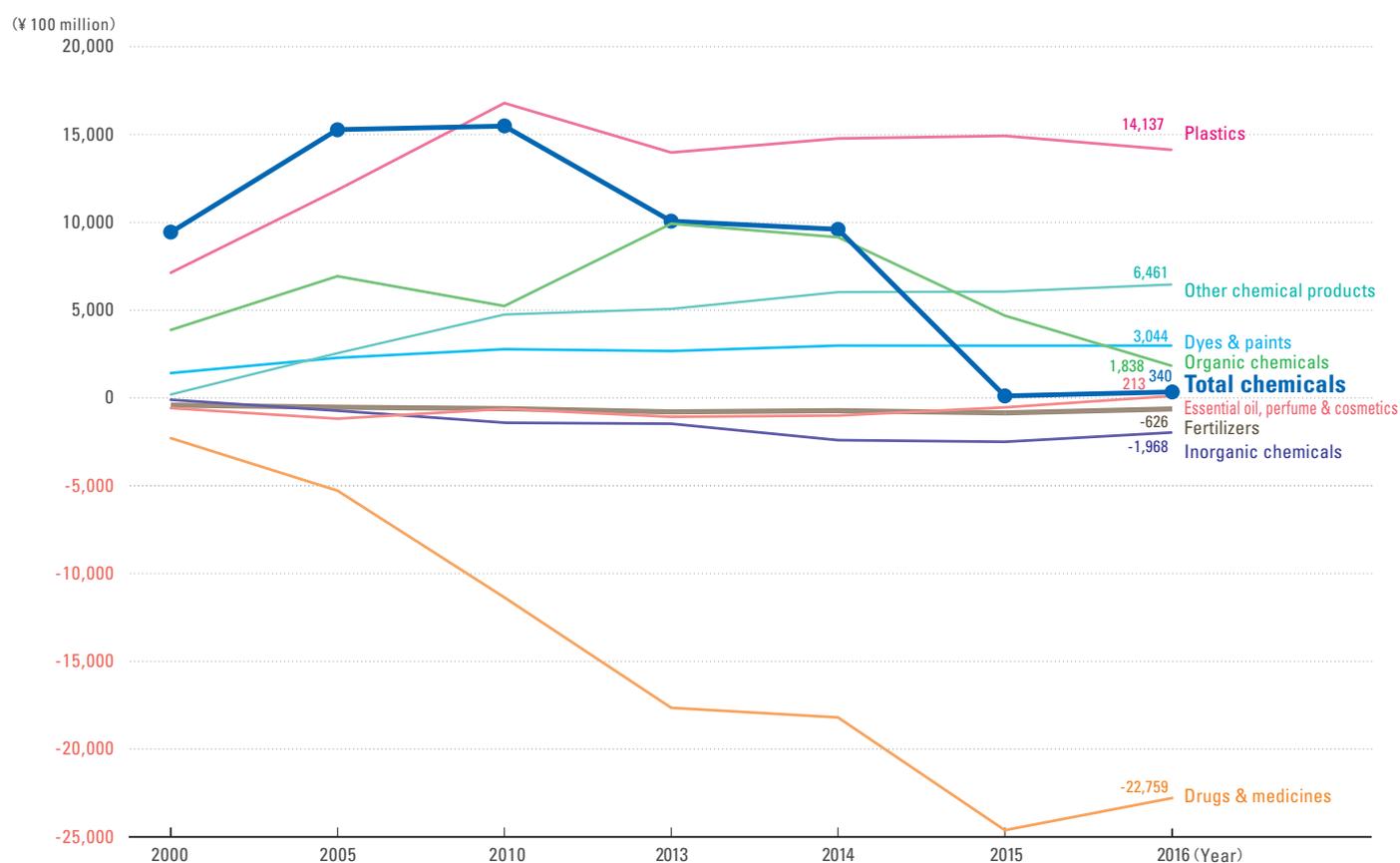
(Source) Chemical and Engineering News

(Note) Drugs & medicines are excluded.

10 Trade balance

Trade surplus in 2016 amounts to 34 billion yen.

Trade balance of chemicals by product (2000-2016)



Exports and imports of chemicals (2000-2016)

(¥ 100 million)

Exports						Articles	Imports					
Every 5th year			Recent three years				Every 5th year			Recent three years		
2000	2005	2010	2014	2015	2016		2000	2005	2010	2014	2015	2016
100	121	128	124	142	113	Fertilizers	570	783	745	929	990	739
2,221	3,109	3,772	3,839	4,034	3,898	Inorganic chemicals	2,287	3,935	5,237	6,258	6,529	5,866
11,927	18,832	18,728	24,396	21,166	16,822	Organic chemicals	7,993	11,843	13,496	15,490	16,499	14,984
10,575	17,157	23,360	24,129	24,441	22,717	Plastics	3,476	5,324	6,542	9,631	9,523	8,580
2,626	3,323	4,048	4,488	4,629	4,524	Dyes & paints	948	1,187	1,343	1,576	1,655	1,480
2,944	3,677	3,787	3,530	4,623	4,901	Drugs & medicines	5,149	9,060	15,226	22,140	29,241	27,660
1,292	1,820	2,479	3,005	3,676	4,341	Essential oil, perfume & cosmetics	1,944	2,909	3,087	3,987	4,213	4,128
6,361	10,442	12,950	14,665	14,883	13,922	Other chemical products	6,183	8,172	8,119	8,631	8,828	7,461
38,047	58,480	69,253	78,177	77,594	71,238	Total chemicals	28,550	43,212	53,794	68,642	77,479	70,898

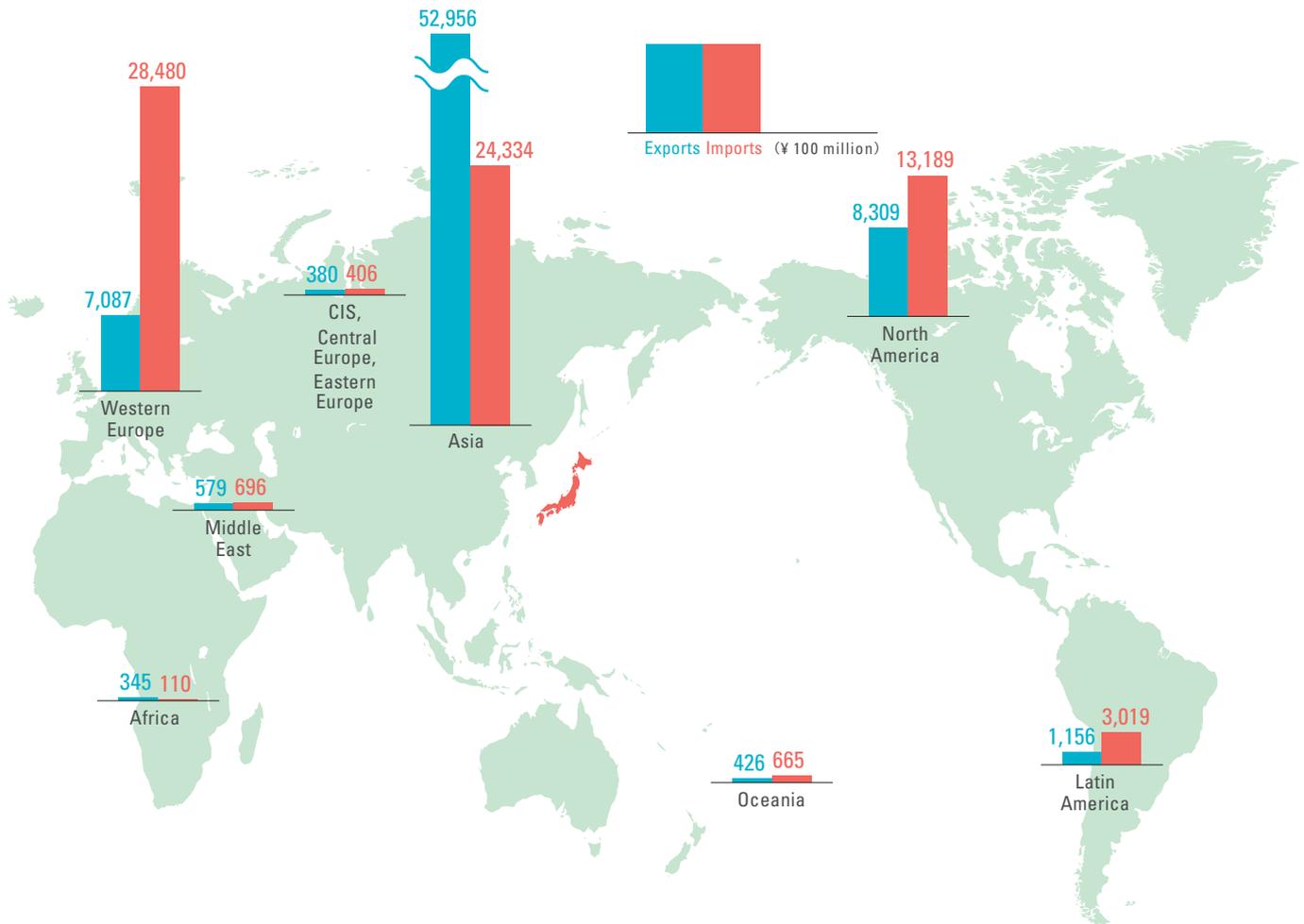
(Source) Ministry of Finance [Trade Statistics]

11

Exports and imports of chemicals by region

Exports to Asia have increased.

Exports and imports of chemicals by region in 2016



Exports and imports of chemicals by region (2000-2016)

(¥ 100 million)

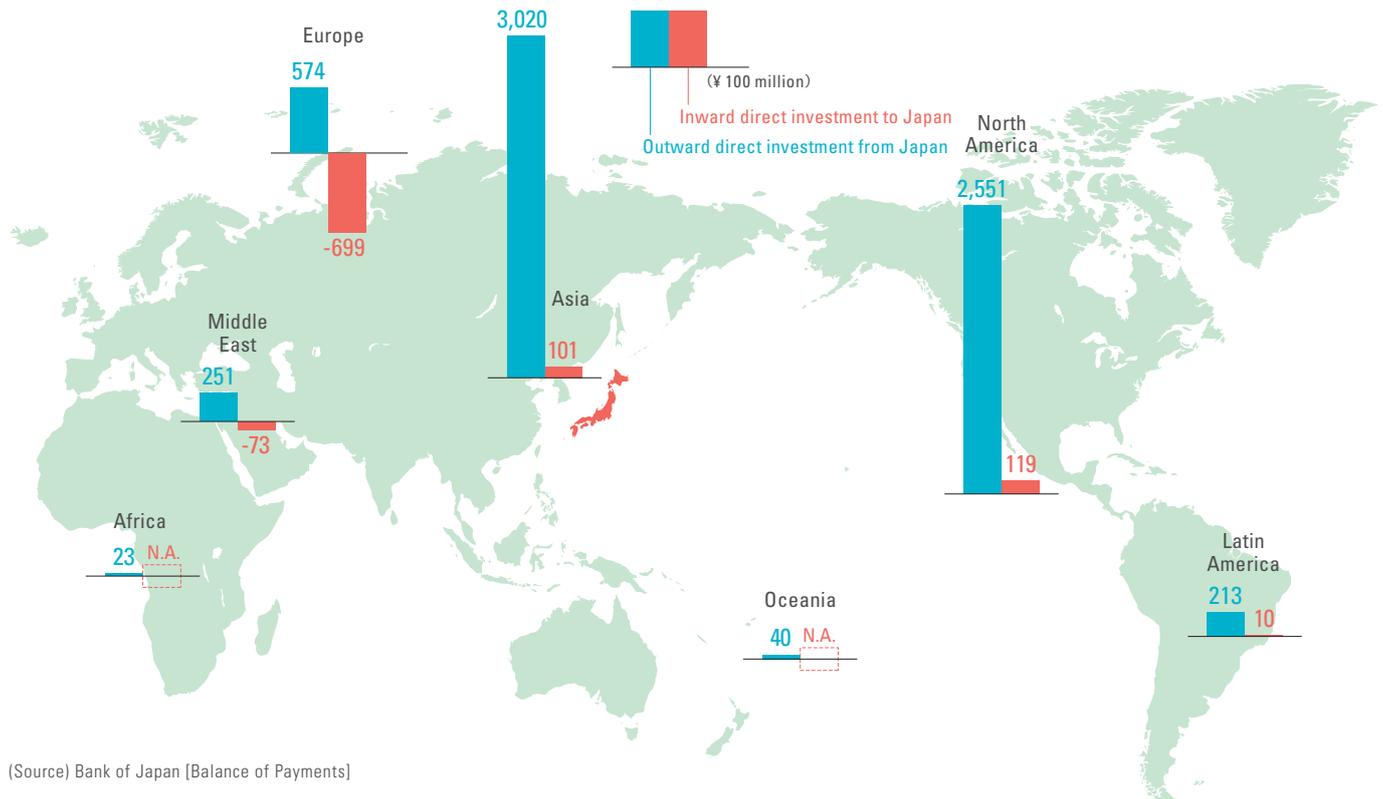
Exports						Region	Imports					
Every 5th year			Recent three years				Every 5th year			Recent three years		
2000	2005	2010	2014	2015	2016		2000	2005	2010	2014	2015	2016
22,742	40,150	51,799	58,563	57,502	52,956	Asia	6,414	12,974	17,474	25,249	26,428	24,334
224	364	580	617	693	579	Middle East	521	692	652	1,066	880	696
5,948	7,609	7,084	7,398	7,689	7,087	Western Europe	12,065	17,398	21,413	24,612	31,367	28,480
7,065	7,743	6,824	7,893	9,048	8,309	North America	8,198	9,364	11,190	13,438	14,194	13,189
1,402	1,629	1,819	2,613	1,488	1,156	Latin America	694	1,790	2,013	2,657	3,082	3,019
163	196	278	302	288	345	Africa	54	177	128	215	183	110
419	586	494	392	460	426	Oceania	457	520	595	925	803	665
84	204	374	399	425	380	CIS, Central Europe, Eastern Europe	147	298	330	480	541	406
38,047	58,480	69,253	78,177	77,594	71,238	Total	28,550	43,212	53,794	68,642	77,479	70,898

(Source) Ministry of Finance [Trade Statistics]

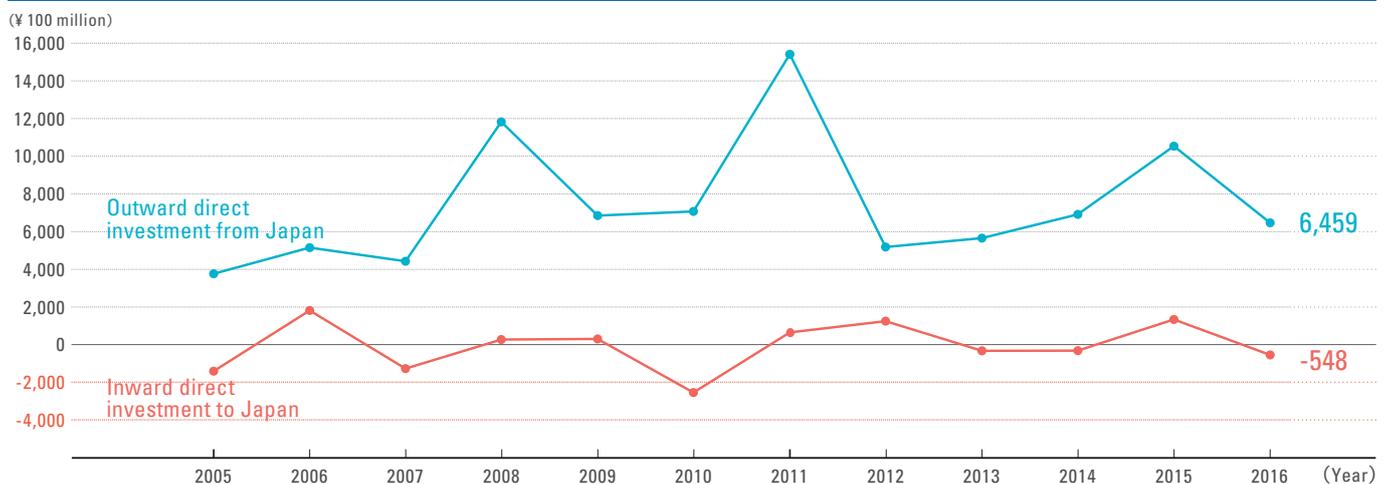
12

Outward/inward direct investments

Outward direct investment of Japanese chemical industry and inward direct investment to chemical industry in Japan in 2016



Actual outward direct investment of Japanese chemical industry and inward direct investment to chemical industry in Japan (2005-2016)



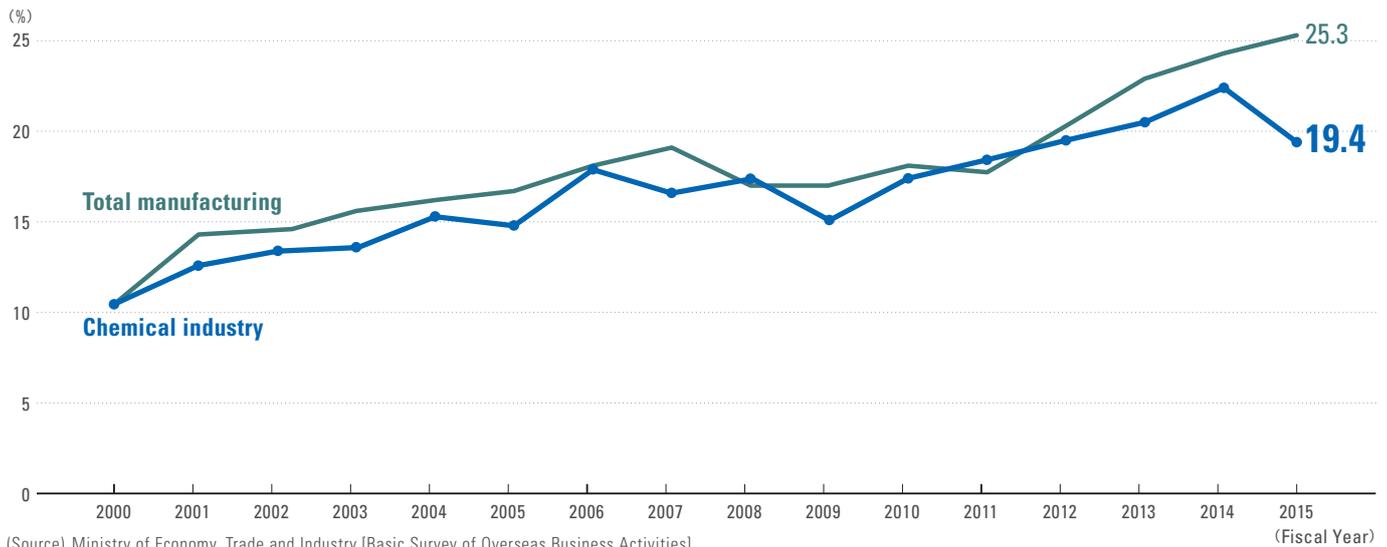
(Source) Bank of Japan [Balance of Payments statistics]

- (Note) 1. Outward direct investment from Japan is the investment that domestic companies perform for foreign countries, and Inward direct investment to Japan is the investment that overseas companies perform for Japan, and it shows minus in case of withdrawal and collection of the investment.
 2. Because Balance of Payments statistics have been based on the BPM6 since January 2014, sign of "outward direct investment" was changed from minus figures to plus figures retroactively to the past.
 3. Drugs & medicines are included in the chemical industry.

13

Ratio of overseas production/Sales of overseas subsidiary companies

Trend of overseas production of Japanese companies (FY2000-FY2015)



(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 (FY2000-FY2015)



(Source) Ministry of Economy, Trade and Industry [Basic Survey of Overseas Business Activities]

日本の化学が花開く!

10/23は
化学の日

化学の日
とは?

化学とは物質の学問です。そして世の中に存在する物質はすべてとても小さなツブツブ（粒子）からできています。例えば、水は H_2O という粒子（分子）の集まりで、その分子量は18です。この分子量にgをつけた量が1モルとなります。つまり、水18gは1モルとなります。また1モルの物質中には粒子が 6.02×10^{23} 個集まっており、これを「アボガドロ定数」とよびます。化学では物質をくっつけたり、離したりするので、モルという単位はとても便利な物質質量として使われています。



ニッカちゃん



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