SHOWA DENKO

PROJECT 2020+

Evolving unique chemical company

2015 Financial Results
- Consolidated -

SHOWA DENKO K.K.

February 10, 2016

Saburo Muto, CFO
Director & Managing Corporate Officer

Performance forecast and other statements pertaining to the future as contained in this presentation are based on the information available as of today and assumptions as of today regarding risk factors that could affect our future performance. Actual results may differ materially from the forecast due to a variety of risk factors, including, but not limited to, the economic conditions, costs of naphtha and other raw materials, demand for our products, market conditions, and foreign exchange rates. We undertake no obligation to update the forward-looking statements unless required by law.

Consolidated Companies

- Consolidated subsidiaries: 48

  4 companies newly consolidated

  Shanghai Showa Electronics Materials Co., Ltd.
  Showa Specialty Gas Singapore Pte. Ltd.
  Shanghai Showa Highpolymer Co., Ltd.
  SHOTIC MALAYSIA SDN. BHD.

  1 company excluded

  Shotan Shoji Kaisha Ltd.

- Equity method applied: 13

  1 company newly applied

  PT. Indonesia Chemical Alumina

Selected Data

(Average)

	2014		2015		Increase/decrease	
		Oct.-Dec.		Oct.-Dec.		Oct.-Dec.
Exchange rate: ¥/US$	105.9	114.5	121.1	121.5	Yen depreciated by ¥15.2/$	Yen depreciated by ¥7.0/$
Domestic naphtha price: ¥/kl	69,700	66,000	46,000	40,900	-23,700	-25,100
Aluminum						
LME price: US$/T	1,893	1,976	1,682	1,508	-211	-468
Domestic market*: K¥/T	277	317	273	237	-4	-80

Exchange rate at 2014 year-end: ¥120.6/US$, at 2015 year-end: ¥120.6/US$

*Domestic market: data from Nikkei

Summary

2014 (Jan.1 – Dec.31) vs. 2015 (Jan.1 – Dec.31)

(Unit: Billions of Yen)

	2014	2015	Increase/decrease
Net Sales	876.6	781.0	-95.6
Operating Income	20.9	33.7	12.8
Non-operating income and expenses	1.2	-1.4	-2.6
Interest/Dividend income less interest expenses	-0.8	-2.2	-1.3
Equity in earnings or losses of affiliates	1.2	1.9	0.7
Currency exchange gain or loss	4.4	-0.4	-4.9
Other	-3.6	-0.8	2.9
Ordinary Income	22.1	32.2	10.1
Extraordinary Profit	3.5	8.4	4.9
Extraordinary Loss	-15.6	-34.4	-18.7
Income before income taxes and minority interests	10.0	6.2	-3.7
Income Taxes	-6.8	-13.9	-7.1
Minority Interests in income	0.4	8.7	8.3
Net Income	3.5	1.0	-2.5
Net Income per share	¥2.38	¥0.68	¥-1.70

Cash dividends per Share	¥3.00	¥3.00(planned)	—

Extraordinary Profit/Loss

(Unit: Billions of Yen)

	2014	2015	Increase/decrease
■Extraordinary Profit	3.5	8.4	4.9
●Gain on sales of investment securities	3.0	8.1	5.1
●Other	0.5	0.3	-0.2
■Extraordinary Loss	-15.6	-34.4	-18.7
●Loss on sales and retirement of noncurrent assets	-4.2	-4.1	0.1
●Impairment loss	-3.7	-10.7	-6.9
●Loss on valuation of investment securities	-4.0	-1.8	2.2
●Provision of allowance for doubtful accounts	—	-13.4	-13.4
●Other	-3.6	-4.4	-0.8
■Extraordinary Profit/Loss, Net	-12.1	-26.0	-13.8

Consolidated Sales by Segment

(Unit: Billions of Yen)

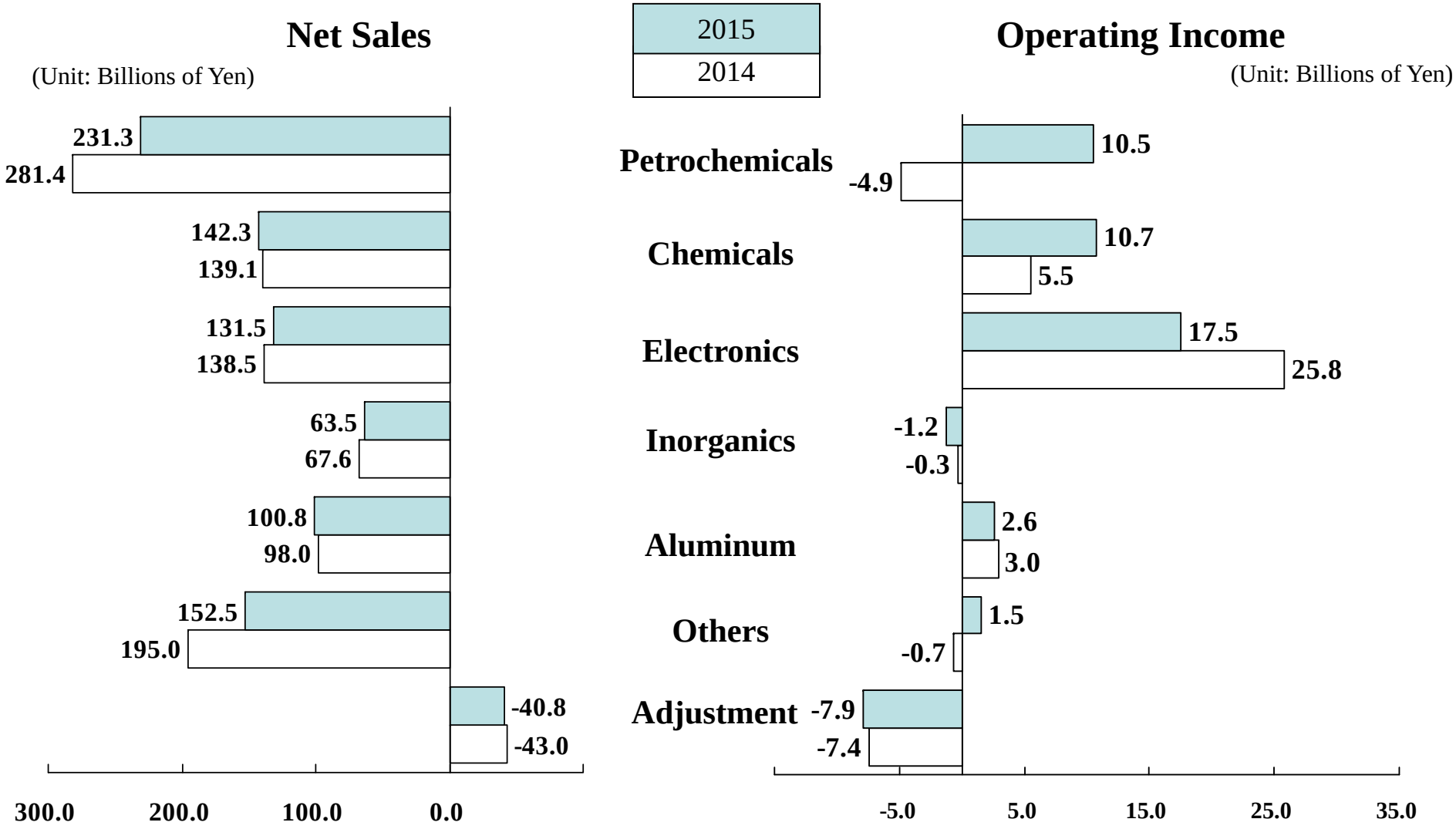
	2014	2015	Increase/ decrease	
Petrochemicals	281.4	231.3	-50.1	【Olefins】sales decreased (market price down due to the fall in naphtha price, shipment volumes up as there was no shutdown maintenance in 2015) 【Organic chemicals】sales decreased (ethyl acetate: sales up due to higher shipment volumes, vinyl acetate: sales down due to lower market price)
Chemicals	139.1	142.3	3.2	【Basic chemicals】sales decreased (AN: market price down, Ammonia: shipment volumes down) 【Electronic chemicals】sales increased (shipment volumes of high-purity gases for electronics up in Japan and abroad) 【Functional chemicals】sales increased (Shanghai Showa Highpolymer Co., Ltd.: newly consolidated) 【Industrial gases】sales maintained at the year-earlier level
Electronics	138.5	131.5	-7.0	【HDs】sales decreased (shipment volumes down) 【Compound semiconductors】sales decreased (shipment volumes down) 【Rare earth】sales decreased (shipment volumes down, market price down)
Inorganics	67.6	63.5	-4.1	【Ceramics】sales slightly decreased 【Graphite electrodes】sales decreased (shipment volumes for Asia down)
Aluminum	98.0	100.8	2.8	【High-purity foil for capacitors】sales slightly increased (shipment volumes in Japan down, shipment volumes in China up) 【Aluminum specialty components】sales decreased (shipment volumes for automotive applications down) 【Aluminum cans】sales increased (Hanacans Joint Stock Company: newly consolidated at the end of June, 2014)
Others	195.0	152.5	-42.6	【LIB materials】sales increased (shipment volumes up for smartphone and automotive applications) 【SHOKO Co., Ltd.】sales substantially decreased (steel-related business in China)
Adjustment	-43.0	-40.8	2.2	
Total	876.6	781.0	-95.6	

Consolidated Operating Income by Segment

(Unit: Billions of Yen)

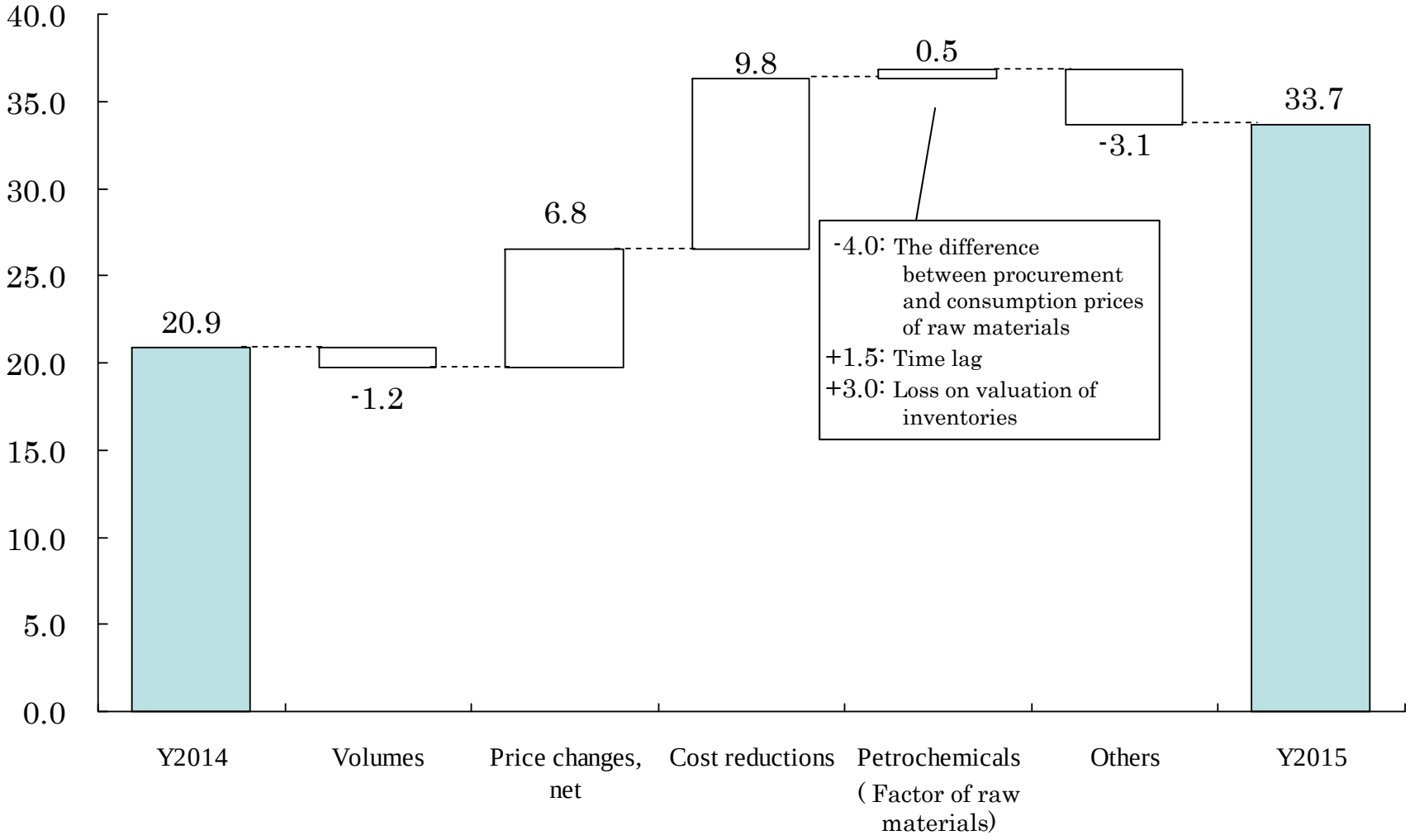
	2014	2015	Increase/ decrease	
Petrochemicals	-4.9	10.5	15.5	【Olefins】profit substantially increased (improved export margin in CQ2; shipment volumes up as there was no shutdown maintenance in 2015) 【Organic chemicals】profit increased (ethyl acetate: shipment volumes up, the effect of plant switch, vinyl acetate: improved market price)
Chemicals	5.5	10.7	5.2	【Basic chemicals】profit increased (chloroprene rubber: export steady) 【Electronic chemicals】profit increased (shipment volumes of high-purity gases for electronics up) 【Functional chemicals】profit increased(Shanghai Showa Highpolymer Co., Ltd.: newly consolidated) 【Industrial gases】,【Power generating business】profit increased
Electronics	25.8	17.5	-8.3	【HDs】profit decreased (shipment volumes for PCs down) 【Compound semiconductors】profit slightly increased 【Rare earth】profit decreased (shipment volumes down, reductions in the book value of inventories in CQ2)
Inorganics	-0.3	-1.2	-0.9	【Ceramics】profit increased (shipment volumes for abrasive and electronic applications up) 【Graphite electrodes】profit decreased (shipment volumes down, Sichuan: reductions in the book value of inventories in CQ4)
Aluminum	3.0	2.6	-0.4	【High-purity foil for capacitors】profit slightly decreased 【Aluminum specialty components】profit decreased (shipment volumes for automotive applications down) 【Aluminum cans】profit increased (shipment volumes in Vietnam up)
Others	-0.7	1.5	2.2	【LIB materials】profit increased (shipment volumes up) 【SHOKO Co., Ltd.】profit maintained at the year-earlier level
Adjustment	-7.4	-7.9	-0.5	
Total	20.9	33.7	12.8	

Sales and Operating Income by Segment



Operating Income Breakdown by Factor

(Unit: Billions of Yen)



Consolidated Balance Sheet

(Unit: Billions of Yen)

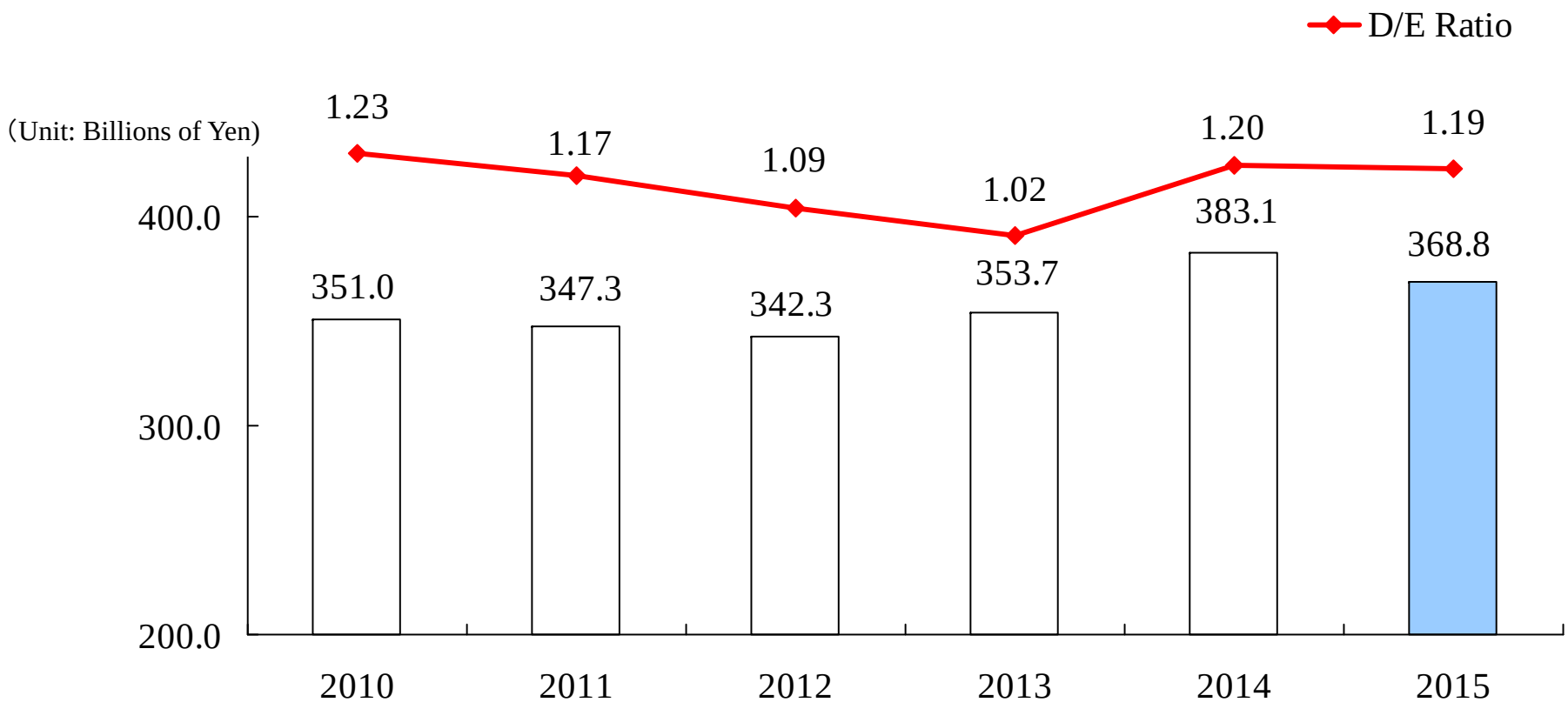
Assets	Dec.31, 2014	Dec.31, 2015	Increase/ decrease	Liabilities and Net Assets	Dec.31, 2014	Dec.31, 2015	Increase/ decrease
Cash and deposits	66.8	64.1	-2.8	Notes and accounts payable	127.2	103.9	-23.3
Notes and accounts receivable	156.9	136.6	-20.3	Interest-bearing debt	383.1	368.8	-14.3
Inventories	123.6	105.9	-17.7	Net defined benefit liability	22.1	15.2	-6.9
Other current assets	33.1	26.5	-6.6	Other liabilities	158.1	143.6	-14.5
Total Current Assets	380.4	333.1	-47.4	Total Liabilities	690.6	631.5	-59.0
Buildings and structures	85.9	81.5	-4.4	Capital stock	140.6	140.6	0.0
Machinery and equipment	119.9	112.9	-7.0	Capital surplus	62.2	62.2	0.0
Land	254.1	251.9	-2.3	Retained earnings	57.5	55.8	-1.6
Other tangible fixed assets	53.7	55.0	1.3	Treasury stock	-10.2	-10.2	0.0
Total Tangible Fixed Assets	513.7	501.3	-12.4	Total Shareholders' equity	250.1	248.4	-1.6
Intangible Fixed Assets	13.7	12.5	-1.2	Valuation difference on available-for-sale securities	6.8	3.9	-2.9
Investments and other assets	103.3	94.4	-8.9	Foreign currency translation adjustment, Deferred hedge gains	20.3	18.3	-2.0
incl. investment securities	76.1	76.6	0.5	Revaluation reserve for land	27.9	31.3	3.4
				Remeasurements of defined benefit plans	-4.9	-4.8	0.1
				Total accumulated other comprehensive income	50.1	48.7	-1.4
				Minority Interests	20.3	12.6	-7.7
Total fixed assets	630.6	608.2	-22.4	Total net assets	320.5	309.8	-10.7
Total Assets	**1,011.1**	**941.3**	**-69.8**	**Total Liabilities and Net Assets**	**1,011.1**	**941.3**	**-69.8**

Total Assets
Interest-bearing Debt and D/E ratio

(Unit: Billions of Yen)

	Dec. 31, 2014	Dec. 31, 2015	Increase/ decrease
● **Total assets**	1,011.1	941.3	-69.8
● **Interest-bearing debt**	383.1	368.8	-14.3
● **Debt/Equity ratio**	1.20times	1.19times	-0.01p
● **Stockholders' Equity ratio**	29.7%	31.6%	1.9p

Interest-bearing Debt



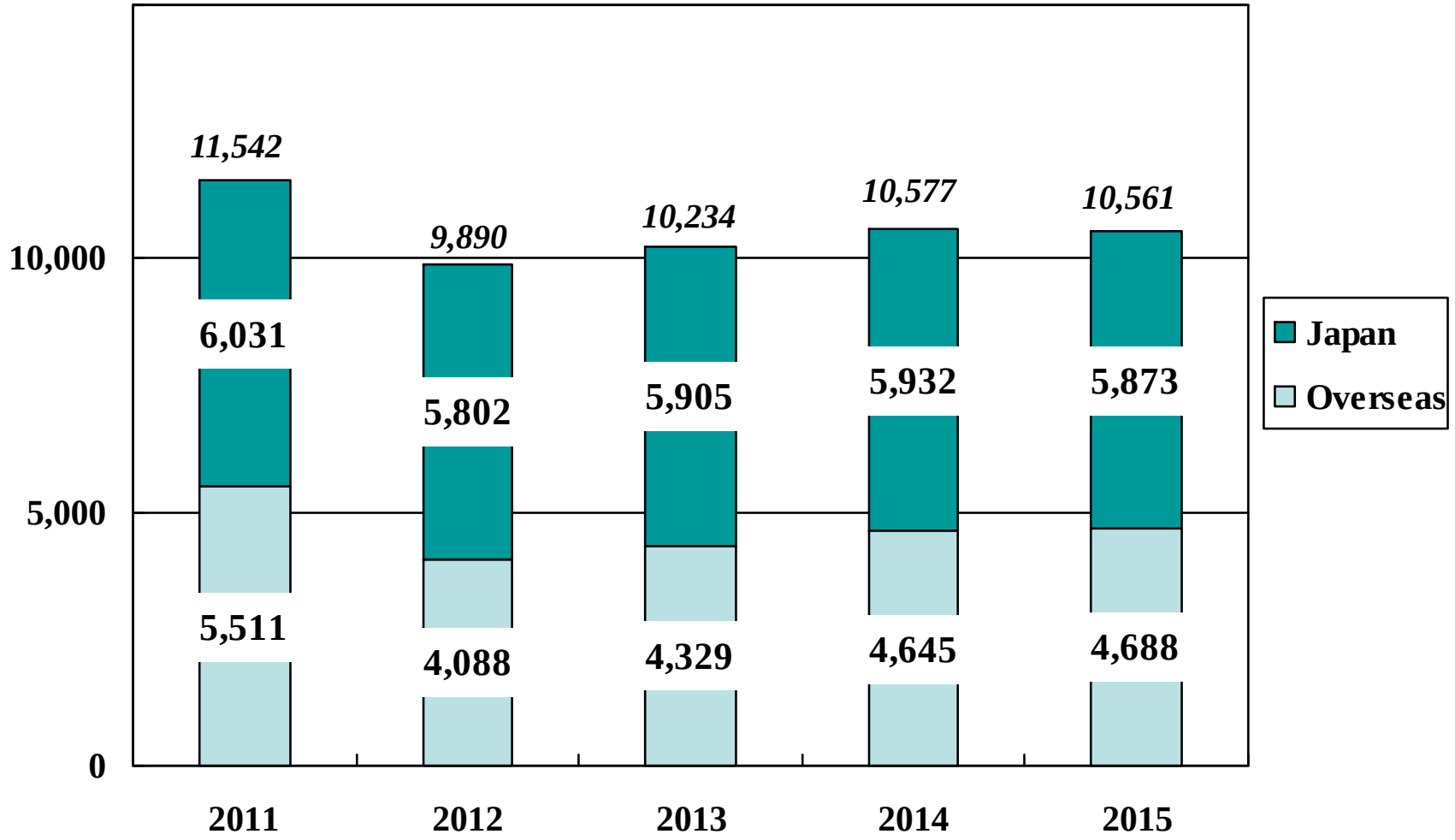
Equity ratio	26.1%	26.8 %	29.2%	30.6%	29.7%	31.6%

Consolidated Cash Flows

(Unit: Billions of Yen)

	2014	2015	Increase/ decrease
●CF from Operating Activities	66.0	62.4	-3.6
●CF from Investing Activities	-47.2	-43.9	3.3
●Free CF	18.8	18.5	-0.3
●CF from Financing Activities	-25.0	-23.2	1.8
●Others	3.6	-1.3	-4.9
Increase of cash and equivalents	-2.7	-6.0	-3.4

Total number of employees and breakdown by location



	2011	2012	2013	2014	2015
Japan	52.3%	58.7%	57.7%	56.1%	55.6%
Overseas	47.7%	41.3%	42.3%	43.9%	44.4%

Capital expenditures/ Depreciation by Segment

(Unit: Billions of Yen)

	2014		2015		Increase/decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	4.2	6.5	2.0	5.8	-2.2	-0.7
Chemicals	7.8	7.5	10.3	7.6	2.6	0.1
Electronics	7.8	13.2	11.1	14.0	3.3	0.7
Inorganics	15.4	3.6	10.2	4.1	-5.2	0.5
Aluminum	7.1	5.3	6.1	6.0	-1.0	0.7
Others	5.0	4.6	4.3	4.7	-0.7	0.1
Total	47.3	40.7	44.1	42.1	-3.3	1.5

Selected Data 2015, 2016 Forecast (Consolidated)

(* Unit: Billions of Yen)

	2014	2015	2015-2014 Increase/ decrease	2016 Forecast	2016-2015 Increase/ decrease
●Exchange rate: ¥/US$	105.9	121.1	15.2	119.0	Yen will appreciate by 2.1
●Domestic naphtha price: ¥/kl	69,700	46,000	-23,700	42,200	-3,800
●Aluminum LME price: US$/t	1,893	1,682	-211	1,650	-32
●Interest-bearing debt*	383.1	368.8	-14.3	370.0	1.2
●Interest/dividend income less interest expenses*	-0.8	-2.2	-1.3	-2.4	-0.2
●R&D expenditures*	20.4	20.3	-0.1	20.4	0.2
●Number of employees: people	10,577	10,561	-16	10,665	104
●Total employment cost*	72.0	71.9	-0.1	75.1	3.2

2016 Forecast (Consolidated)

(Unit: Billions of Yen except Cash dividends per Share and Net income per Share)

	2015	2016 Forecast	Increase/ decrease	2016 Forecast	
				1st Half	2nd Half
Net Sales	781.0	765.0	-16.0	360.0	405.0
Operating Income	33.7	36.0	2.3	10.0	26.0
Non-operating income and expenses	-1.4	-5.0	-3.6	-2.5	-2.5
Ordinary Income	32.2	31.0	-1.2	7.5	23.5
Extraordinary Profit	-26.0	-8.0	18.0	-4.5	-3.5
Extraordinary Loss					
Profit attributable to owners of parent	1.0	20.0	19.0	2.0	18.0
Profit attributable to owners of parent per share	¥0.68	¥14.00	¥13.32		

Cash dividends per Share	¥3.00 (planned)	¥3.00	-

(note) SDK will consolidate every ten shares of its common stock into one share on July 1, 2016. However, the above numbers are calculated on the basis of the number of outstanding shares before this consolidation.

Net Sales by Segment, 2016 Forecast (Consolidated)

(Unit: Billions of Yen)

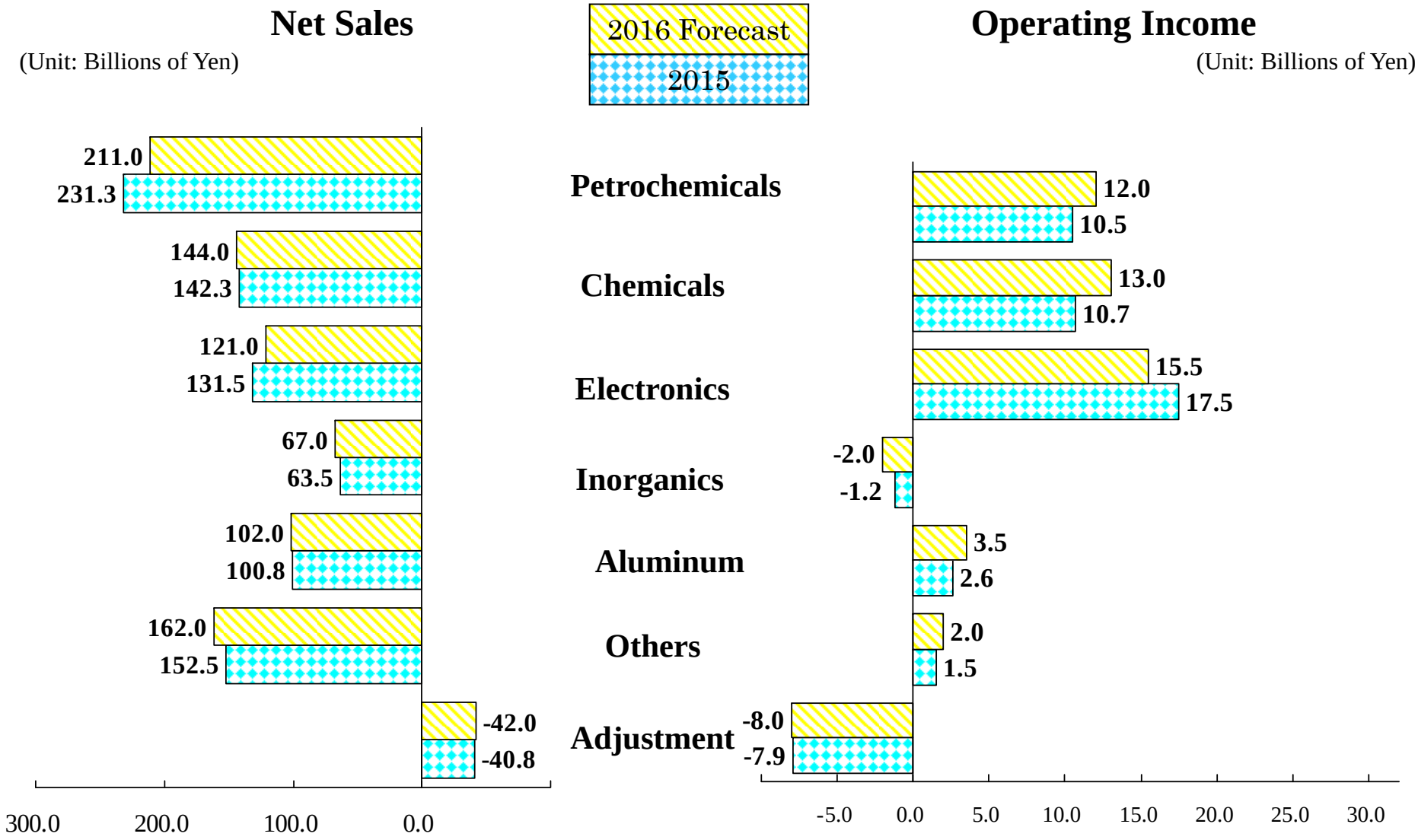
	2015	2016 Forecast	Increase/ decrease	Comments	2016 Forecast	
					1st Half	2nd Half
Petrochemicals	231.3	211.0	-20.3	Market price down due to the fall in naphtha price	100.0	111.0
Chemicals	142.3	144.0	1.7	Basic chemicals: sales decrease expected (market price of AN down) Electronic chemicals: sales increase expected Functional chemicals: sales increase expected	70.0	74.0
Electronics	131.5	121.0	-10.5	HDs: shipment volumes decrease expected (for PCs) Rare earth: market price down	57.0	64.0
Inorganics	63.5	67.0	3.5	Ceramics: sales increase expected (shipment volumes up) Graphite electrodes: sales decrease expected (price down)	31.0	36.0
Aluminum	100.8	102.0	1.2	Rolled products: sales increase expected (shipment volumes up) Specialty products: sales decrease expected (shipment volumes for auto down) Cans: sales increase expected (shipment volumes up in Vietnam)	48.0	54.0
Others	152.5	162.0	9.5	LIB Materials: sales increase expected (shipment volumes up) SHOKO Co., Ltd.: sales increase expected	75.0	87.0
Adjustment	-40.8	-42.0	-1.2		-21.0	-21.0
Total	781.0	765.0	-16.0		360.0	405.0

Operating Income, 2016 Forecast (Consolidated)

(Unit: Billions of Yen)

	2015	2016 Forecast	Increase/ decrease	Comments	2016 Forecast	
					1st Half	2nd Half
Petrochemicals	10.5	12.0	1.5	Full-capacity operation of ethylene plant, The difference between procurement and consumption prices of raw materials will be improved	4.5	7.5
Chemicals	10.7	13.0	2.3	Basic chemicals: profit increase expected (Ammonia: the effect of the change of raw material sources) Electronic chemicals, Functional chemicals: profit increase expected	5.0	8.0
Electronics	17.5	15.5	-2.0	HDs: profit decrease expected (assumption of the decrease of shipment volume) Rare earth: profit increase expected (The difference between procurement and consumption prices of raw materials will be improved)	6.0	9.5
Inorganics	-1.2	-2.0	-0.8	Ceramics: profit decrease expected Graphite electrodes: profit increase expected (Sichuan: the difference between procurement and consumption prices of raw materials will be improved, Renovation of the hydropower facilities)	-3.5	1.5
Aluminum	2.6	3.5	0.9	Rolled products: profit increase expected (shipment volumes up) Specialty products: profit decrease expected (shipment volumes down) Cans: profit increase expected (shipment volumes in Vietnam up) The effect of lower price of aluminum ingot	1.0	2.5
Others	1.5	2.0	0.5	LIB materials: profit increase expected (shipment volumes up) SHOKO Co., Ltd.: profit increase expected	1.0	1.0
Adjustment	-7.9	-8.0	-0.1		-4.0	-4.0
Total	33.7	36.0	2.3		10.0	26.0

Sales and Operating Income
Forecast for 2016



Consolidated Cash Flows, 2016 Forecast

(Unit: Billions of Yen)

	2015	2016 Forecast	Increase/ decrease
●CF from Operating Activities	62.4	69.0	6.6
●CF from Investing Activities	-43.9	-53.0	-9.1
●Free CF	18.5	16.0	-2.5
●CF from Financing Activities	-23.2	-7.8	15.4
●Others	-1.3	0.0	1.3
Increase of cash and equivalents	-6.0	8.2	14.2

Capital expenditures/Depreciation by Segment
2016 Forecast

(Unit: Billions of Yen)

	2015		2016 Forecast		Increase/decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	2.0	5.8	3.7	5.4	1.8	-0.4
Chemicals	10.3	7.6	16.4	7.1	6.0	-0.4
Electronics	11.1	14.0	11.1	12.9	-0.1	-1.1
Inorganics	10.2	4.1	9.7	4.3	-0.5	0.2
Aluminum	6.1	6.0	5.8	5.9	-0.3	-0.2
Others	4.3	4.7	3.7	4.8	-0.6	0.1
Total	44.1	42.1	50.3	40.4	6.3	-1.7

(Reference) Summary

CQ4 (Oct.1 – Dec.31), 2014 vs. CQ4 (Oct.1 – Dec.31), 2015

(Unit: Billions of Yen)

	CQ4, 2014	CQ4, 2015	Increase/decrease
Net Sales	230.3	186.9	-43.4
Operating Income	2.7	8.2	5.5
Non-operating income and expense	2.4	-1.9	-4.3
Interest/Dividend income less expenses	-0.8	-0.7	0.1
Foreign exchange gain or loss	0.8	-0.2	-1.0
Equity in earnings or losses of affiliates	3.2	-0.4	-3.7
Other	-0.8	-0.5	0.3
Ordinary Income	5.1	6.3	1.2
Extraordinary Income	2.4	6.3	3.9
Extraordinary Loss	-4.3	-15.5	-11.2
Income before income taxes and minority interests	3.1	-2.9	-6.0
Income Taxes	-2.3	-1.9	0.4
Minority Interests in income	0.5	1.6	1.0
Net Income	1.3	-3.2	-4.6

(Reference) Consolidated Sales by Segment

CQ4 (Oct.1 – Dec.31), 2014 vs. CQ4 (Oct.1 – Dec.31), 2015

(Unit: Billions of Yen)

	CQ4, 2014	CQ4, 2015	Increase/ decrease	
Petrochemicals	78.8	52.7	-26.1	【Olefins】sales decreased (market price down due to the fall in naphtha price) 【Organic chemicals】sales decreased (vinyl acetate: market price down)
Chemicals	36.6	35.6	-1.0	【Basic chemicals】sales decreased (AN: market price down) 【Functional chemicals】sales maintained at the year-earlier level 【Industrial gases】sales maintained at the year-earlier level 【Electronic chemicals】sales increased (shipment volumes of high-purity gases for electronics up)
Electronics	35.9	33.0	-2.9	【HDs】sales slightly decreased (shipment volumes for PCs down) 【Compound semiconductors】sales decreased (shipment volumes down) 【Rare earth】sales decreased (shipment volumes down, market price down)
Inorganics	16.6	14.2	-2.4	【Ceramics】sales slightly decreased (shipment volumes of alumina down) 【Graphite electrodes】sales decreased (shipment volumes down)
Aluminum	27.1	24.8	-2.2	【High-purity foil for capacitors】sales maintained at the year-earlier level 【Aluminum specialty components】sales decreased (shipment volumes for automotive applications down) 【Aluminum cans】sales decreased (Vietnam: shipment volumes up)
Others	46.3	36.7	-9.6	【LIB materials】sales increased (shipment volumes for smartphone and automotive applications up) 【SHOKO Co., Ltd.】sales decreased (steel-related business in China)
Adjustment	-11.1	-10.2	1.0	
Total	230.3	186.9	-43.4	

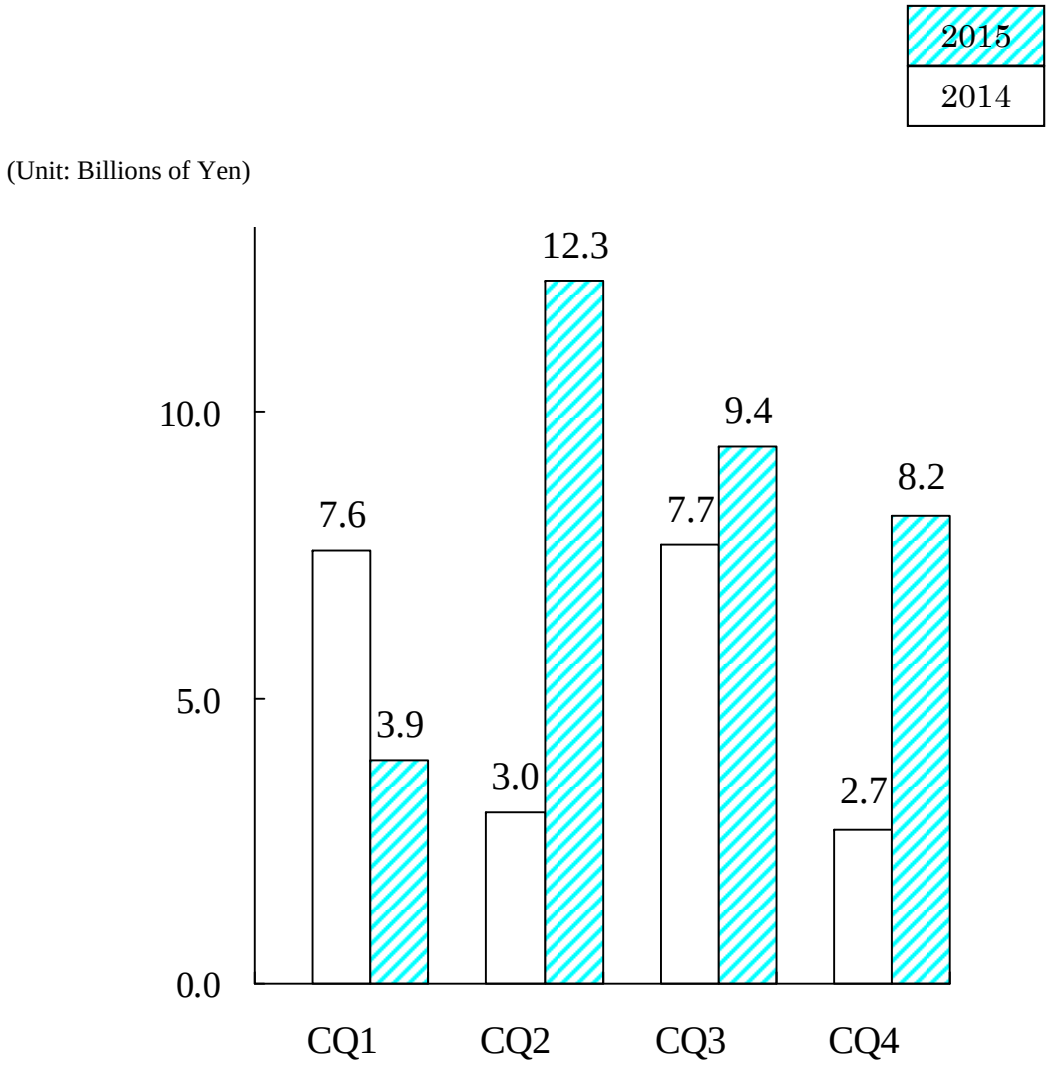
(Reference) Consolidated Operating Income by Segment

CQ4 (Oct.1 – Dec.31), 2014 vs. CQ4 (Oct.1 – Dec.31), 2015

(Unit: Billions of Yen)

	CQ4, 2014	CQ4, 2015	Increase/ decrease	
Petrochemicals	-4.3	1.9	6.3	【Olefins】profit increased (market price and the difference between procurement and consumption prices of raw materials improved, the difference of loss on valuation of inventories) 【Organic chemicals】profit increased (shipment volumes of ethyl acetate up)
Chemicals	2.3	3.1	0.9	【Basic chemicals】profit maintained at the year-earlier level 【Industrial gases】profit increased (shipment volumes of dry ice up) 【Electronic chemicals】profit increased (shipment volumes of high-purity gases for electronics up) 【Functional chemicals】profit increased (Shanghai Showa Highpolymer Co., Ltd.: newly consolidated) 【Power generating business】profit maintained at the year-earlier level
Electronics	6.9	5.4	-1.5	【HDs】profit decreased (shipment volumes for PCs down) 【Compound semiconductors】profit decreased (shipment volumes down) 【Rare earth】profit decreased (shipment volumes down, price down)
Inorganics	0.4	-1.9	-2.3	【Ceramics】profit decreased (shipment volumes down) 【Graphite electrodes】profit decreased (shipment volumes down, Sichuan: reductions in the book value of inventories in CQ4)
Aluminum	0.5	0.1	-0.4	【High-purity foil for capacitors】profit slightly decreased (shipment volumes in Japan down) 【Aluminum specialty components】profit slightly decreased (shipment volumes for automotive applications down) 【Aluminum cans】profit slightly increased
Others	-1.1	1.5	2.7	【LIB materials】profit increased (shipment volumes for smartphone and automotive applications up) 【SHOKO Co., Ltd.】profit increased
Adjustment	-1.9	-2.0	-0.1	
Total	2.7	8.2	5.5	

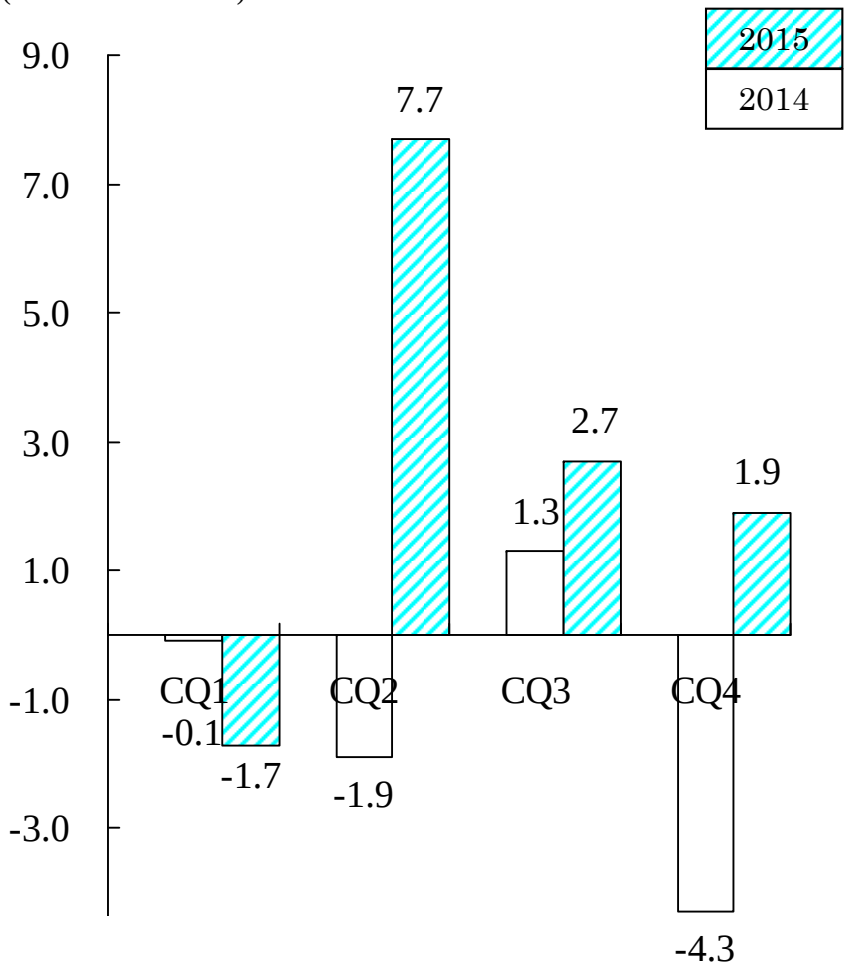
(Reference)　Quarterly Operating Income



(Reference) Quarterly Operating Income by Segment

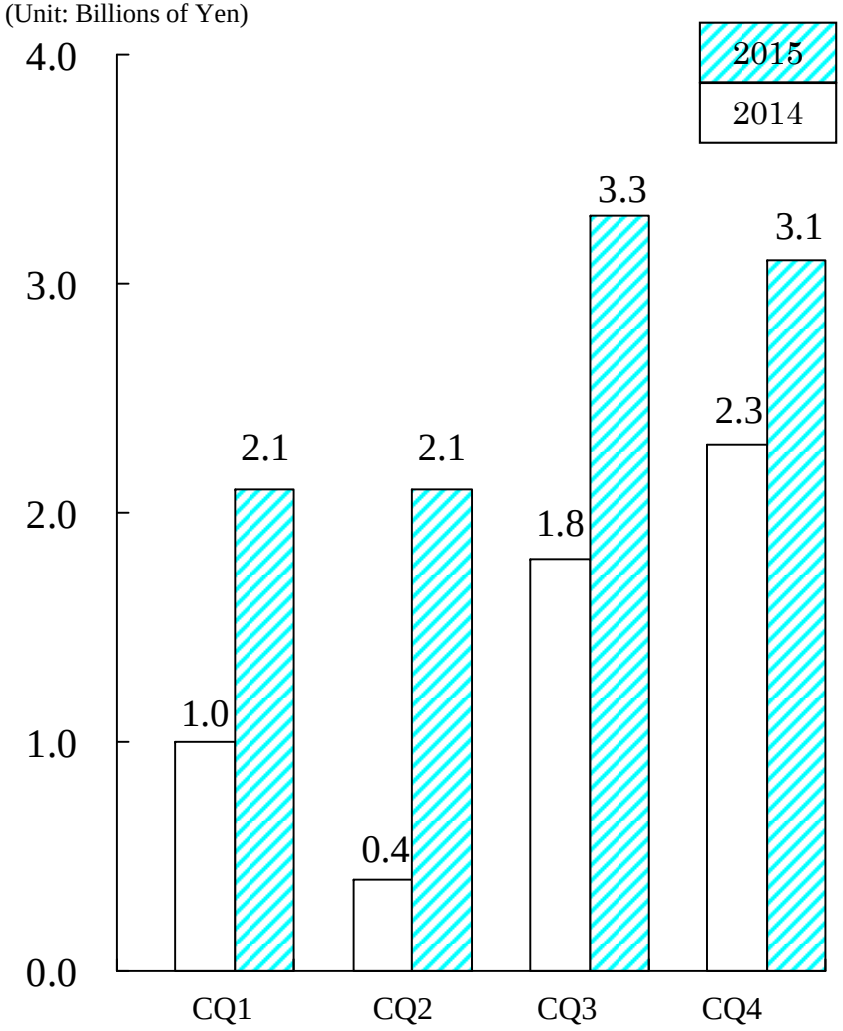
《Petrochemicals》

(Unit: Billions of Yen)



《Chemicals》

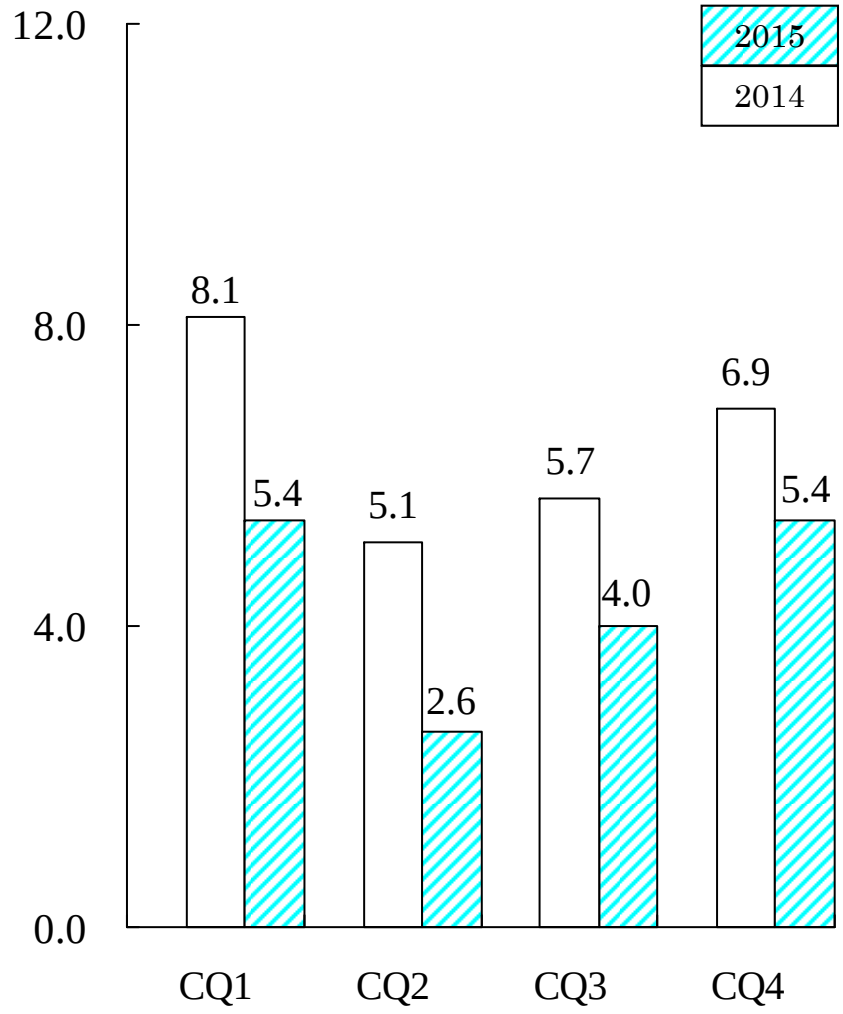
(Unit: Billions of Yen)



(Reference) Quarterly Operating Income by Segment

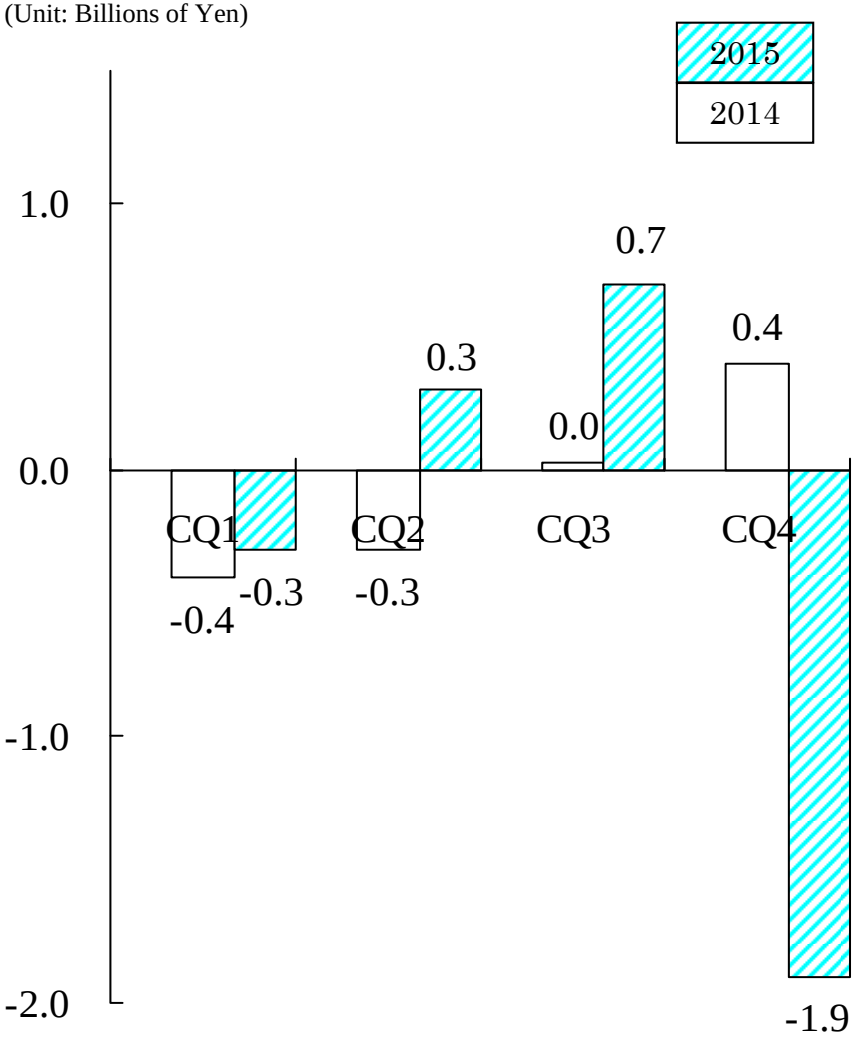
《Electronics》

(Unit: Billions of Yen)



《Inorganics》

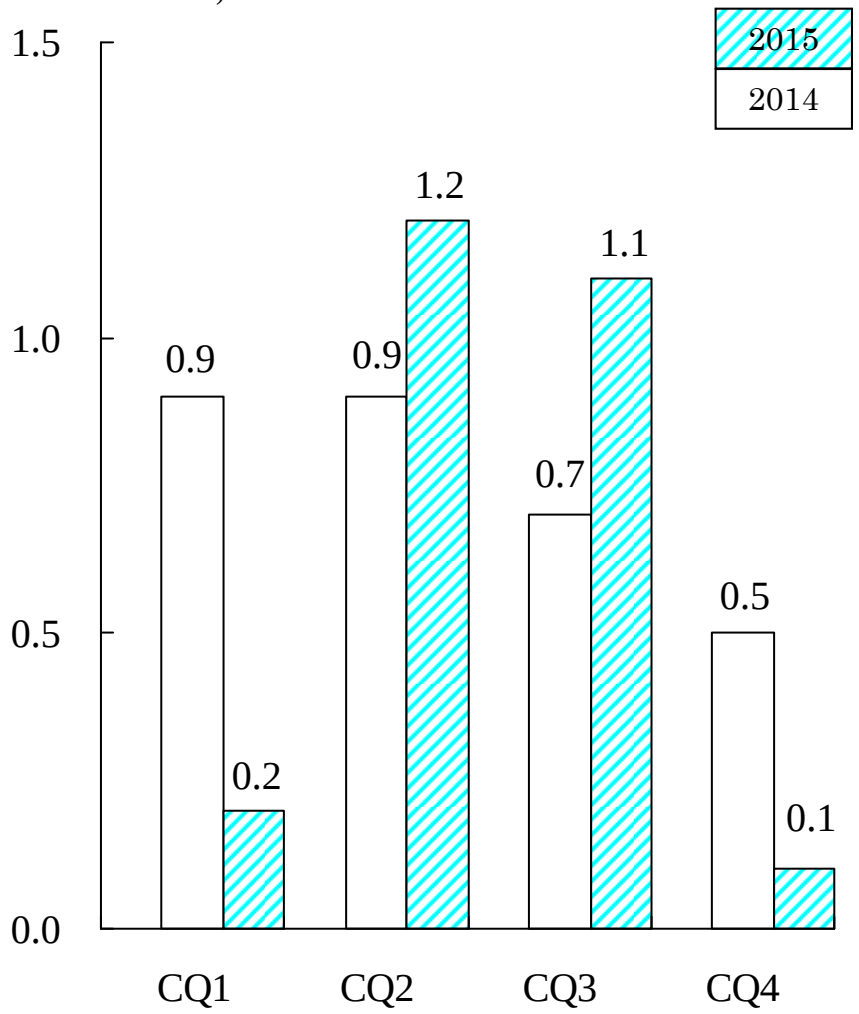
(Unit: Billions of Yen)



(Reference) Quarterly Operating Income by Segment

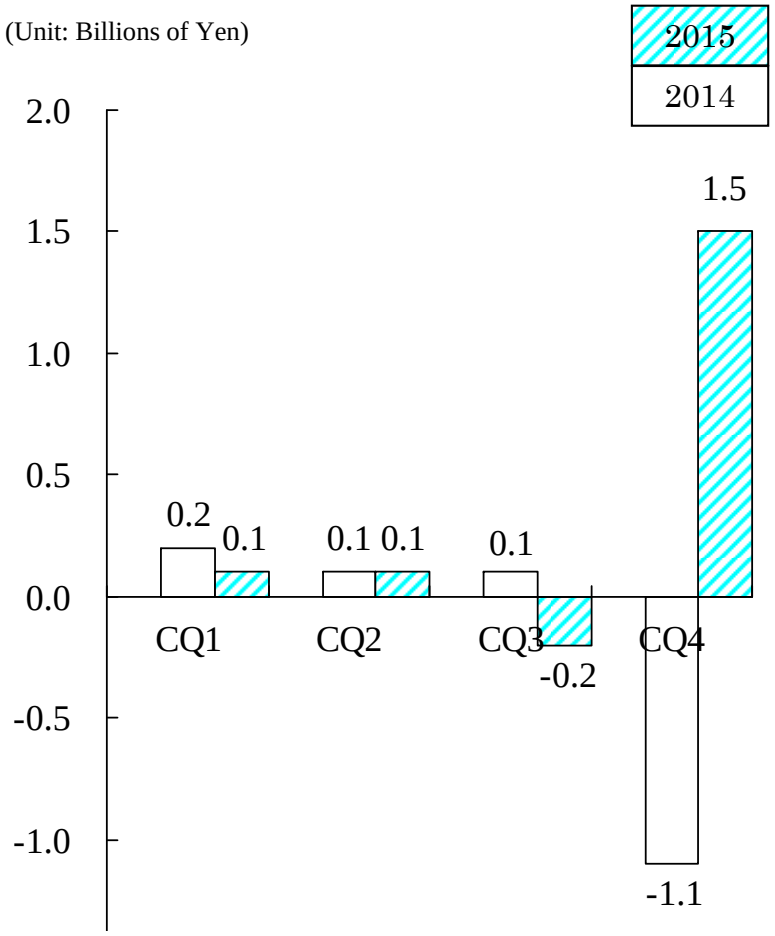
《Aluminum》

(Unit: Billions of Yen)



《Others》

(Unit: Billions of Yen)



Topics

[General]

- **Formulation of new medium-term business plan “Project 2020+”**

  In January 2016, SDK launched its new medium-term consolidated business plan “Project 2020+” for the 2016-2020 period. In the global market, SDK will expand its “individualized businesses” which are expected to maintain their high-level profitability and stability, and make as many businesses as possible to have large shares in the market, aiming to strengthen the Group’s capacity to resist market fluctuations and enhance the value of the Group. The details of the plan including strategies and numerical targets are explained in “5. Management Policy, (2) Medium to long-term business strategy.”

- **Receiving “Thomson Reuters 2015 Top 100 Global Innovators Award”**

  SDK received “The Thomson Reuters 2015 Top 100 Global Innovators” award. Thomson Reuters honors the world leaders in innovation each year, utilizing its value-added patent citation database and intellectual property intelligence platform with scientific and objective methodology. SDK has been recognized for its achievements in globalization and citation influence concerning its patents. The Showa Denko Group is working to establish its competitive advantages for its global business activities, positively applying for patents to protect inventions across the major world markets. The Group will continue promoting its intellectual property strategy through close integration with business and R&D strategies.

- **Starting mass-production of transparent conductive ink for electronics**

  In May 2015, SDK and Microwave Chemical Co., Ltd. jointly developed a technology to mass produce silver nanowire ink that forms transparent electro-conductive patterns through utilization of printing technology. In 2012, SDK developed printable silver nanowire ink jointly with National University Corporation Osaka University. However, establishment of technology that realizes stable mass production of silver nanowires was a problem. This time, SDK and Microwave Chemical jointly developed a method to synthesize silver nanowires with microwave heating. This production method utilizes the property of silver nanoparticles that, when microwave is irradiated on silver nanoparticles in their growth process to silver nanowires, only the growing ends absorb energy and generate heat. Through this method, we successfully produced slender nanowires with great efficiency.

Topics

[Petrochemicals segment]

- **Signing multi-technology acetyls licensing agreement with KBR of the US**

  In January 2015, SDK concluded a business alliance agreement with KBR Inc., an engineering company headquartered in Texas, to cooperatively market SDK's proprietary technologies to produce acetic acid and its derivatives (acetyls). Under this licensing agreement, SDK will provide KBR with its proprietary technologies to catalyze and process acetic acid to produce its derivatives, and its skills and know-how on plant operation, which were cultivated over many years. SDK will aim to seek more opportunities to license its proprietary acetyls-related technologies by utilizing KBR's sales network.

[Chemicals segment]

- **Expanding utilization of used plastic to produce liquefied ammonia "*ECOANN*™"**

  In July 2015, SDK completed the expansion of used-plastic gasification facility at the Kawasaki Plant. After the expansion, the percentage of hydrogen from used plastic to produce liquefied ammonia "*ECOANN*™" will increase to 65%. This investment is partly subsidized by the Ministry of Economy, Trade and Industry's interest subsidy program for the promotion of effective utilization of resources*. Under the program, SDK received a loan from the Development Bank of Japan, Inc. The method to produce hydrogen from used plastic entails significantly lower environmental burden compared to the conventional methods to produce hydrogen from petroleum-derived raw materials. *ECOANN*™ has been approved and rated high as "eco-friendly goods for procurement" by major electric power companies. Moreover, in July 2015, SDK's proprietary process to produce this liquefied ammonia was accredited by Japan Environment Association, which sponsors the "Eco Mark Program" to praise environment friendly products/processes, to be eligible for Eco Mark, an official Japanese program in conformity with Type-1 environmental labelling principles hosed by Global Eco-labelling Network*, as the first case of production process in the world. In January 2016, SDK was awarded a "Silver Prize in the Eco-Mark Awards 2015***" from Japan Environment Association. SDK will continue developing environment friendly products and production processes.

*Under this program, the Japanese government provides interest subsidies for bank loans to firms investing in plant and equipment that promote effective utilization of recyclable resources.

**Eco Mark Program is hosted by Japan Environment Association, which is a member of Global Eco-labelling Network. Eco Mark is awarded to products/processes certified by third party certification authorities to have environmental superiority. Certification process of Eco Mark is operated in conformity with Type-1 environmental labelling principles defined in ISO 14024.

***"Eco Mark Awards" is a program established by Japan Environment Association in 2015 to commend companies and organizations that made enormous contribution to the "formulation of sustainable society where companies strive to realize better environment and consumers can choose environment-conscious goods and services," which is the purpose of the Eco Mark Program hosted by Japan Environment Association, through production, sale and spread of environment conscious products and services including eco-mark products.

Topics

[Chemicals segment]

- Expanding and strengthening overseas bases to produce electronic-materials-processing high-purity gases

a) Strengthening high-purity N2O base in South Korea

SDK has increased its capacity for supplying high-purity nitrous oxide (N2O), a specialty gas used to form oxide film in the process of producing semiconductors or LCDs, by cooperating with Dooam Industrial (Dooam), headquartered in Anseong, Gyeonggi Province, South Korea. Having jointly constructed a purification facility within the premises of Dooam's plant near Seoul, the two companies started full-scale operation of the new facility in March 2015. With the addition of the newly completed 600t/y facility in South Korea to the existing 1,200t/y plant in Japan, the Showa Denko Group's high-purity N2O supply capacity increased to 1.5 times of the previous level.

b)Expanding capacities to produce high-purity hydrogen fluoride and high-purity hydrogen bromide

In March 2015, SDK expanded capacities to produce high-purity hydrogen fluoride (HF) and high-purity hydrogen bromide (HBr), which are specialty gases for semiconductor production. High-purity HF is mainly used as a cleaning gas. In recent years, the number of cases where HF is used as an etching gas in the process of dry etching is increasing. Therefore, SDK expanded its HF production facility in Kawasaki Plant to double the capacity. SDK also decided to build a new facility to produce high-purity HF in the premises of its wholly-owned subsidiary Shanghai Showa Electronics Materials Co. Ltd. High-purity HBr is used for etching of polysilicon in the manufacturing process of semiconductors including NAND flash memories and DRAMs. SDK is the sole company in the world that has integrated HBr production system from synthesis of crude HBr to purification of it to produce high-purity HBr gas. SDK has been expanding the amount of sales of HBr with its efficient and flexible production system and its advanced purification, analysis and quality control technologies. Since the demand for semiconductor memories is increasing very rapidly centering on the use in portable terminals and data centers, in the second quarter of 2015, SDK expanded its capacity to produce high-purity HBr to 600t/y, which is 1.5 times of the previous level.

Topics

c)Boosting high-purity ammonia production in Taiwan

In December 2015, SDK expanded its capacity to supply high-purity ammonia by stepping up the production capacity of a plant owned by Taiwan Showa Chemicals Manufacturing Co., Ltd., a manufacturing subsidiary, from 2,500t/y to 3,500t/y. The Showa Denko Group has three bases to produce high-purity ammonia, which are located in Japan, Taiwan and China. As a result of this step-up, the total production capacity of these three bases was increased to 7,000t/y. Our sales of high-purity ammonia in Taiwan have been favorably increasing not only because the market for compound semiconductors and LCD panels in Taiwan has been expanding, but also because our efficient production system and advanced purification, analysis and quality-control technologies are highly acclaimed by local customers.

SDK will surely respond to and make the most of the increase in demand for electronic-materials-processing high-purity gases in East Asia by expanding and strengthening its production bases and establishing reliable supply chain management system in global scale.

- Launching new multipurpose isocyanate monomer *AOI-VM*™

In December 2015, SDK started to sell "*AOI-VM*™", a new grade product of high-performance isocyanate monomer "*Karenz AOI*™"* which is widely used as resisting material for microfabrication in production of LCDs and semiconductors. *AOI-VM*™ is designed for general industrial use. *AOI-VM*™ can perform isocyanate-curing at relatively low temperature. Therefore, *AOI-VM*™ can contribute to energy conservation in paint coating processes for plastic goods and automobiles through synthesis of high-performance resins taking advantage of *AOI-VM*™'s low-temperature thermo-curing property. *Karenz AOI*™ is absolutely unique product which is mass produced only by SDK. SDK will meet customers' expectations through addition of general industrial grade product *AOI-VM*™ to the lineup of its isocyanate monomer, in addition to *Karenz AOI*™ which is specialized as material for electronics.

*Karenz AOI™ is an isocyanate monomer, whose molecular has a reactive isocyanato group and a polymerizable acrylic group.

Topics

[Chemicals segment]

- **Locating second bulk molding compound plant in China**

  In July 2015, SDK established Showa Denko New Material (Zhuhai) Co., Ltd., a new production site for thermosetting bulk molding compound (BMC*) in Zhuhai, Guangdong Province, China, as its second BMC plant in China, jointly with Eternal Materials Co., Ltd., a synthetic resin manufacturer based in Taiwan. SDK Group's BMC business sector has production sites at three locations, in Japan, Shanghai, and Thailand. SDK Group's sales of BMC in China is expected to continue recording annual growth rate of 15% in average for quite a while, and will exceed the production capacity of the BMC plant in Shanghai. By establishing another BMC plant, SDK Group will strengthen its BMC supply system in the growing Chinese market.

  *BMC is a thermosetting bulk molding compound resin made from unsaturated polyester resin as main component, kneaded together with glass fiber and other additives. BMC is used as headlamp reflectors and engine covers for car applications, and encapsulation material for home electrical appliances and precision parts.

- **Splitting and transferring phenolic resin business**

  SDK split and transferred its phenolic resin business to its wholly owned subsidiary AICA SDK PHENOL CO., LTD. on September 1, 2015. On the same day, SDK transferred 85% of the AICA SDK PHENOL's share to Aica Kogyo Company, Limited, whose head office is located in Kiyosu City, Aichi Prefecture, Japan, to make AICA SDK PHENOL a joint corporation.

Topics

[Electronics segment]

- **Starting commercial production of 2.5-inch 750 GB HD media**

  In March 2015, SDK started shipment of 2.5-inch hard disk (HD) media with storage capacity of 750 gigabytes per platter, the world's highest storage capacity for this size available on the market to date*. The new 2.5-inch HD media we started to ship is classified into the eighth-generation of perpendicular magnetic recording (PMR) technology based media. As the world's largest independent HD media supplier, SDK will aim to continue leading the development of HD media with higher capacities including next generation 2.5-inch HD media with storage capacity of 1 terabyte, following the launch of 750 gigabyte media. SDK will also aim to continue meeting expectations of our customers in HDD industry by ensuring stable supply of high-capacity media.

  *As of February 5, 2015 (To the best of SDK's knowledge)

- **SDK's media now used in world's-highest-capacity 10TB HDD**

  SDK's HD media have been adopted in helium-filled 10 terabyte HDDs, which represent the world's highest storage capacity*. The 3.5-inch HD media adopted this time have storage capacity of 1.3-1.5TB per platter, using the eighth-generation PMR technology. HDDs are now increasingly used in data centers, reflecting exponential growth in data in line with the progress of cloud computing. Compared with unsealed PMR HDDs, helium-filled HDDs help reduce power consumption. Thus helium-filled HDDs will be used more and more in data centers.

  *As of December 11, 2015 (To the best of SDK's knowledge)

- **Baotou Showa Rare Earth High-Tech New Material to be dissolved**

  In July 2015, SDK decided to dissolve its consolidated subsidiary Baotou Showa Rare Earth High-Tech Material Co., Ltd. (BSR) located in Baotou, Inner Mongolia, China. BSR had been producing rare earth materials from mines in China, producing magnetic alloy and selling that to Japanese and Chinese markets since its establishment. However, since 2012, when the Chinese government terminated export duty exemption for rare earth magnetic alloy, BSR's sales to customers in Japan had been significantly reduced. Thus SDK and its partners decided to dissolve BSR. SDK will concentrate its production and sale of rare earth magnetic alloy in China into Ganzhou Zhaori Rare Earth New Materials Co., Ltd. (GSR). SDK will aim to accelerate development of new-generation rare earth magnetic alloy, and strengthen its sales activities in China.

Topics

[Inorganics segment]

- **Starting commercial operation of a new chemical alumina plant in Indonesia**

  In February 2015, PT. Indonesia Chemical Alumina, a joint corporation owned by SDK and PT. ANTAM (Persero) Tbk, of Indonesia, started commercial operation of its new chemical alumina plant established in the Tayan District, West Kalimantan, Indonesia. Chemical alumina is used for various industrial applications including electronic materials, chemicals for water treatment, abrasives, and thermal conductive fillers.

- **Photocatalyst "*LUMI-RESH*™" now used in Shikibo Ltd.'s high-functioning fiber**

  In November 2015, visible-light-reactive photocatalyst *LUMI-RESH*™, which was developed by Showa Denko Ceramics Co., Ltd., a subsidiary of SDK, started to be applied to Shikibo Ltd.'s "*TINTA*™ V" high-functioning fiber for linen products. Generally, fluorescent dyestuffs are used to finish white linens. Application of photocatalyst to linens had a problem that the photocatalyst lessens its effects after treatment with fluorescent dyestuffs. However, it was confirmed that *LUMI-RESH*™ keeps its effect even after treatment with fluorescent dyestuffs. Thus Shikibo decided to adopt *LUMI-RESH*™. When rays of light strike photocatalyst, that photocatalyst catalyzes water vapor and oxygen in the air, and generates active oxygen, which inactivates bacteria and viruses adhering to surfaces of substances containing the photocatalyst. Unlike conventional photocatalysts, *LUMI-RESH*™ can be highly activated by visible low-energy light emitted by indoor lighting apparatus including fluorescent lights and LEDs.

Topics

[Aluminum segment]

● Expansion of high-purity aluminum foil plant in China

In April 2015, Showa Denko Aluminum (Nantong) Co., Ltd. (SDAN), a consolidated subsidiary of SDK, completed construction work to expand its capacity to produce high-purity aluminum foil for high-voltage use* to be applied to aluminum electrolytic capacitors from 400 tons per month to 600 tons per month, and started its commercial operation. Aluminum electrolytic capacitors are used in wide areas such as electric appliances, IT devices, electric vehicles, and hybrid cars. Especially in China, the demand for medium- and high-voltage electrolytic capacitors is increasing in applications including environment friendly cars and power conditioners for solar power generation. SDK will continue strengthening of SDAN as a base to provide our customers in China with high-purity aluminum foil for high-voltage use in a timely manner.

*High-purity aluminum foil for high-voltage use is electrolytic foil made from 99.99% purity of aluminum or higher, and has a withstanding voltage of 200V or higher.

● Starting supply of cans for coffee beverages with milk

Showa Aluminum Can Corporation, a subsidiary of SDK, set up a new facility to produce aluminum cans for coffee beverages in its Oyama Plant located in Tochigi Prefecture, and started its commercial operation. The scale of domestic market for cans to be used to contain coffee beverages is about 10 billion cans per year, most of which were made of steel in the past. In 2014, the self-restraint guideline set by the beverage makers' association was changed to allow use of aluminum cans to contain coffee with milk. Aluminum cans are expected to increase its share in the coffee beverage container market because aluminum cans are of lighter weight and recycle-friendly.

Topics

[Aluminum segment]

- **Establishing integrated aluminum can production system in Vietnam**

  Hanacans Joint Stock Company, of Vietnam, a subsidiary of SDK, newly constructed can-end production lines and went into quantity production of can-ends in October 2015. This time, through the introduction of the new facilities, Hanacans established an integrated system to produce cans and can-ends, and will achieve further quality improvement and stable production in its whole product lines. In August 2015, Hanacans was successfully certified that it meets FSSC 22000, which is an international standard for food safety management system. Since the acquisition by the Showa Denko Group in May 2014, Hanacans has been successfully increasing its sales in Vietnam by introducing Showa Aluminum Can Corporation's advanced manufacturing technology and latest quality management system. The demand for canned beer in Vietnam increases about 10% every year, as a result of the rise in the standard of living. The Showa Denko Group aims to expand its aluminum beverage can business in Vietnam through stable and speedy supply of products that meet customers' requirement for quality.

Topics

[Others segment]

- Offering SiC epitaxial wafers with very low defect density

  SDK developed a new grade of silicon carbide (SiC) epitaxial wafers for power devices with very low defect density. In October 2015, SDK started commercial shipments of the new grade, in two different sizes of four inches and six inches in diameter, under the trade name of “High-Grade Epi” (HGE). Power modules for high-voltage, high-current applications mainly contain devices with the structure of SBD (Schottky barrier diode) and transistors with the structure of MOSFET (metal-oxide-semiconductor field-effect transistor). While SiC is increasingly used in SBD, reduction of defects in SiC epitaxial wafers was a matter to be solved in order to realize use of SiC in MOSFET. In the new product “HGE,” SDK has succeeded in significantly reducing defect density by controlling the number of surface defects (SD) within one-third the current level of SDK’s conventional product and of basal plane dislocation (BPD) within one-hundredth compared with conventional product. As a result, it is now possible to eliminate device defects attributable to BPD. SDK believes that the new product will realize practical application of SiC-MOSFET and greatly contribute to the commercialization and market expansion of “full-SiC” power modules. When compared with the mainstream silicon-based semiconductors, SiC-based power devices can operate under high-temperature, high-voltage, and high-current conditions, while substantially reducing energy loss. These features enable the production of smaller, lighter, and more energy-efficient next-generation power control modules. SiC power devices are already used as power sources of servers, distributed power supply systems for new energies, and in railcars. Demand for SiC power devices as onboard equipment is expected to grow further. Moreover, efforts are under way to develop SiC-based ultra-high-voltage devices for use in power generation/transmission systems. SDK will continue its efforts to meet requirements for higher quality, contributing toward expansion of the market.

Topics

[Others segment]

- Introduction of plant growth system including *SHIGYO*™ Unit is in progress

  "*SHIGYO*™ Method," which is a proprietary high-speed plant growth technology jointly developed by SDK and National University Corporation Yamaguchi University, and "*SHIGYO*™ Unit," which is a solution package for plant factories including LED lighting equipment, heat insulation panels and other necessary equipment, have been adopted by Kyoei Kogyo Co., Ltd., and will be applied to its large-scale plant factory to be established in Mino City, Gifu Prefecture. The new plant is scheduled to be completed in April 2016. Moreover, SDK's proprietary LED illuminant for plant factories and aluminum stands have been adopted by Sekishin Electric Co., Ltd. and Sony Business Solutions Corporation, and applied to a jointly developed LED lighting system to accelerate growth of natural grass in stadiums. The LED illuminant adopted this time includes our proprietary LED chips that emit deep-red light optimum for plant's photosynthesis at the world's highest level of efficiency and LED chips that emit blue light. Thus the LED illuminant efficiently accelerates photosynthesis by grass, while contributing to reduction of electricity consumption. Our light-weight aluminum stands contribute to reduction of load on grass. SDK will further promote development of technologies for plant growth, aiming to promote dissemination of plant growth system that realizes stable supply of safe vegetables and fast growth of plant.

PROJECT 2020+

