We "Act" to touch the heart and make society better

2018 Financial Results

- Consolidated -

SHOWA DENKO K.K.

February 14, 2019

Motohiro Takeuchi, CFO
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 such as graphite electrodes and other commodities, market conditions, and foreign exchange rates. We undertake no obligation to update the forward-looking statements unless required by law.

Consolidated Companies

- Consolidated subsidiaries: 58 (4 companies excluded)
  Baotou Showa Rare Earth Hi-tech New Material Co., Ltd. (Electronics, liquidated)
  Showa Denko Rare-Earth Vietnam Co., Ltd. (Electronics, shares sold)
  Be International Co. (Others, merged by Shoko Co., Ltd.)
  Showa Engineering Co., Ltd. (Others, liquidated)
- Equity method applied: 11
  1 company newly applied
  SK Showa Denko Co., Ltd. (Chemicals)
  1 company excluded
  PT. Indonesia Chemical Alumina (Inorganics, shares sold)

Selected Data

(Average)

	2017		2018		Increase/decrease	
		Oct.-Dec.		Oct.-Dec.		Oct.-Dec.
■Exchange rate:						
¥/US$	112.2	113.0	110.4	112.9	-1.8	-0.1
¥/€	126.7	133.0	130.4	128.8	3.8	-4.2
■Domestic naphtha price: ¥/KL	40,400	44,600	51,100	54,200	10,700	9,600
■Aluminum						
LME price: US$/T	1,979	2,118	2,116	1,975	137	-143
Domestic market*: K¥/T	276	291	292	280	16	-11

Exchange rate at December 31, 2017 ¥113.0/US$, at December 31, 2018 ¥111.0/US$
⇒Yen appreciated by ¥2.0/US$

*Domestic market: data from Nikkei

Summary

(Unit: Billions of Yen)

	2017	2018	Increase/decrease
Net sales	780.4	992.1	211.7
Operating income	77.7	180.0	102.3
Non-operating income and expenses, net	-13.9	-1.2	12.7
Interest/Dividends income and expenses	-1.2	-0.6	0.6
Equity in earnings of affiliates	-7.7	1.3	8.9
Foreign exchange gains or losses	-2.8	-0.3	2.4
Other	-2.2	-1.5	0.7
Ordinary income	63.9	178.8	115.0
Extraordinary profit	8.6	2.1	-6.5
Extraordinary loss	-22.0	-35.4	-13.4
Income before income taxes	50.5	145.5	95.0
Income taxes	-10.8	-28.8	-17.9
Net income	39.7	116.8	77.0
Net income attributable to non-controlling interests	-2.3	-5.2	-2.9
Net income attributable to owners of the parent	37.4	111.5	74.1
Net income attributable to owners of the parent per share	¥262.44	¥758.15	¥495.71

Cash dividends per share	¥50*	¥120 (planned)	¥70

* SDK resolved payment of dividends of Yen 30 per share based on the record date of May 11, 2017 at the extraordinary general meeting of shareholders held on June 27, 2017, and paid dividends on the next day. “Cash dividends per share” mentioned in the table above exclude this amount of dividends per share.

(note)The tentative accounting policy applied to calculation of 2017 financial results due to consolidation of former SGL GE Holding GmbH has been finalized. Accordingly, some of the amounts for 2017 have been retroactively changed.

Extraordinary Profit/Loss

(Unit: Billions of Yen)

	2017	2018	Increase/decrease
■Extraordinary profit	8.6	2.1	-6.5
●Gain on sales of investment securities	0.4	1.5	1.1
●Gain on bargain purchase	7.1	—	-7.1
●Gain on liquidation of subsidiaries	0	0.4	0.3
●Other	1.1	0.2	-0.8
■Extraordinary loss	-22.0	-35.4	-13.4
●Loss on sales and retirement of noncurrent assets	-5.3	-5.2	0.1
●Impairment loss	-7.2	-22.6	-15.4
●Provision for loss on guarantees	-2.6	—	2.6
●Other	-6.8	-7.6	-0.8
■Extraordinary profit/loss, net	-13.3	-33.3	-20.0

● Impairment loss (2018)

(Unit: Billions of Yen)

Segments	Businesses	Amount
Aluminum	Aluminum Can (Japan)	-8.8
Electronics	Lithium ion battery (LIB) materials	-4.6
—	Hikone plant	-6.0
—	Institute for Advanced and Core Technology	-1.9
	Other	-1.3
	Total	-22.6

Consolidated Sales by Segment

(Unit: Billions of Yen)

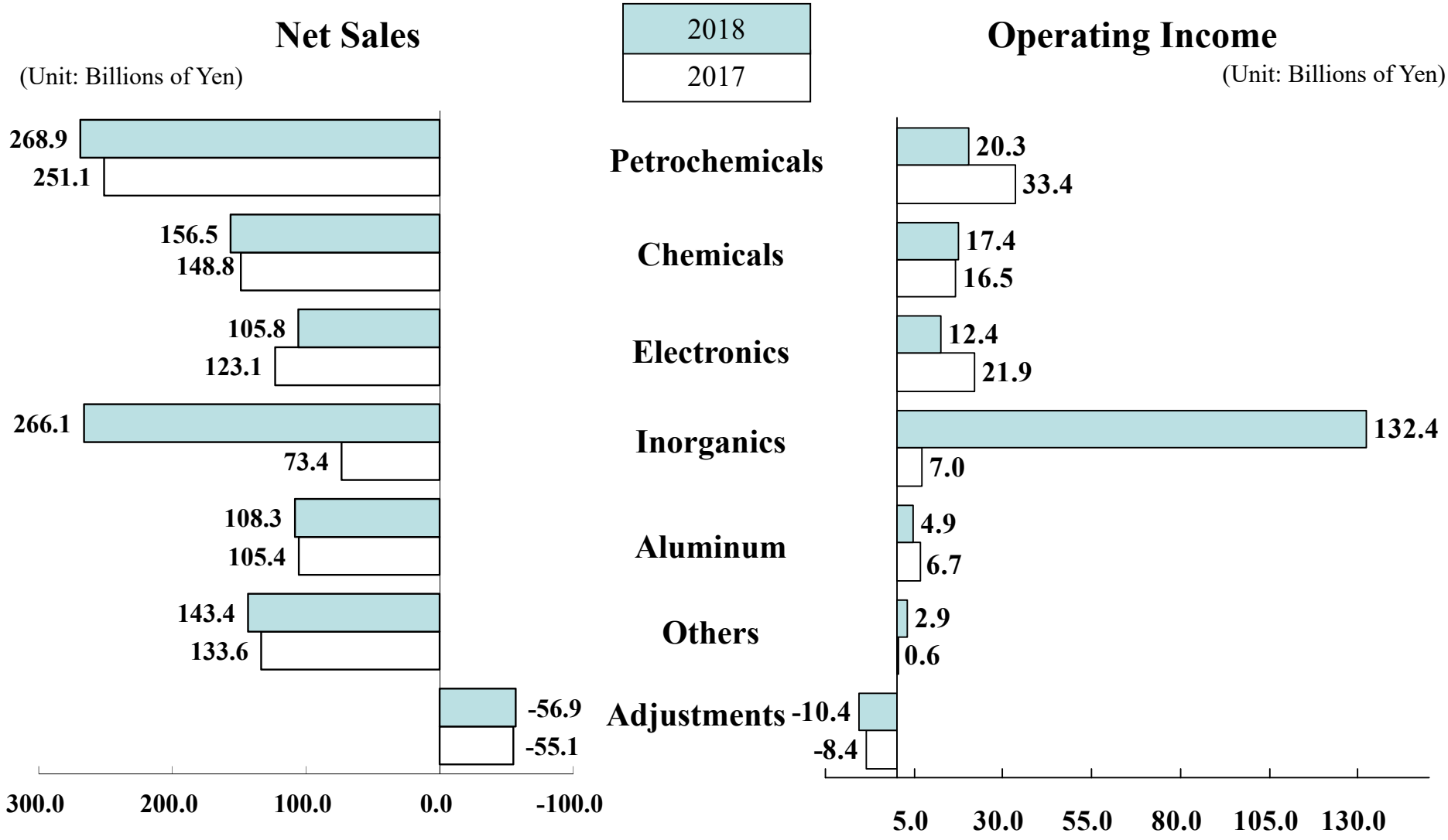
	2017	2018	Increase/ decrease	Comments
Petrochemicals	251.1	268.9	17.8	【Olefins】sales increased (market prices up, shipment volumes down due to shutdown maintenance) 【Organic chemicals】sales increased (vinyl acetate, ethyl acetate: market prices up) 【SunAllomer Ltd. 】sales increased (market prices up)
Chemicals	148.8	156.5	7.8	【Basic chemicals】sales increased (AN, chloroprene rubber: market prices up) 【Electronic chemicals】sales increased (high-purity gases for electronics: shipment volumes up) 【Industrial gases】sales increased (shipment volumes of liquefied carbon dioxide, dry ice up) 【Functional chemicals】sales increased (functional polymer: prices up)
Electronics	123.1	105.8	-17.2	【HDs】sales decreased (shipment volumes for PCs down) 【Compound semiconductors】sales increased (shipment volumes up) 【Rare earths】sales decreased (shipment volumes down due to structural reform) 【LIB materials】sales increased (shipment volumes bound for China up)
Inorganics	73.4	266.1	192.7	【Ceramics】sales decreased (shipment volumes of alumina down) 【Graphite electrodes】sales significantly increased (market prices up), full year contribution of the consolidation of SHOWA DENKO CARBON Holding GmbH (4Q, 2017)
Aluminum	105.4	108.3	2.8	【High-purity foil for capacitors】sales increased (shipment volumes up) 【Aluminum specialty components】sales slightly increased 【Aluminum cans】sales slightly decreased (shipment volumes for domestic market down)
Others	133.6	143.4	9.8	【SHOKO Co., Ltd.】sales increased 【SiC epitaxial wafers】sales increased (shipment volumes up)
Adjustments	-55.1	-56.9	-1.9	
Total	780.4	992.1	211.7	

Consolidated Operating Income by Segment

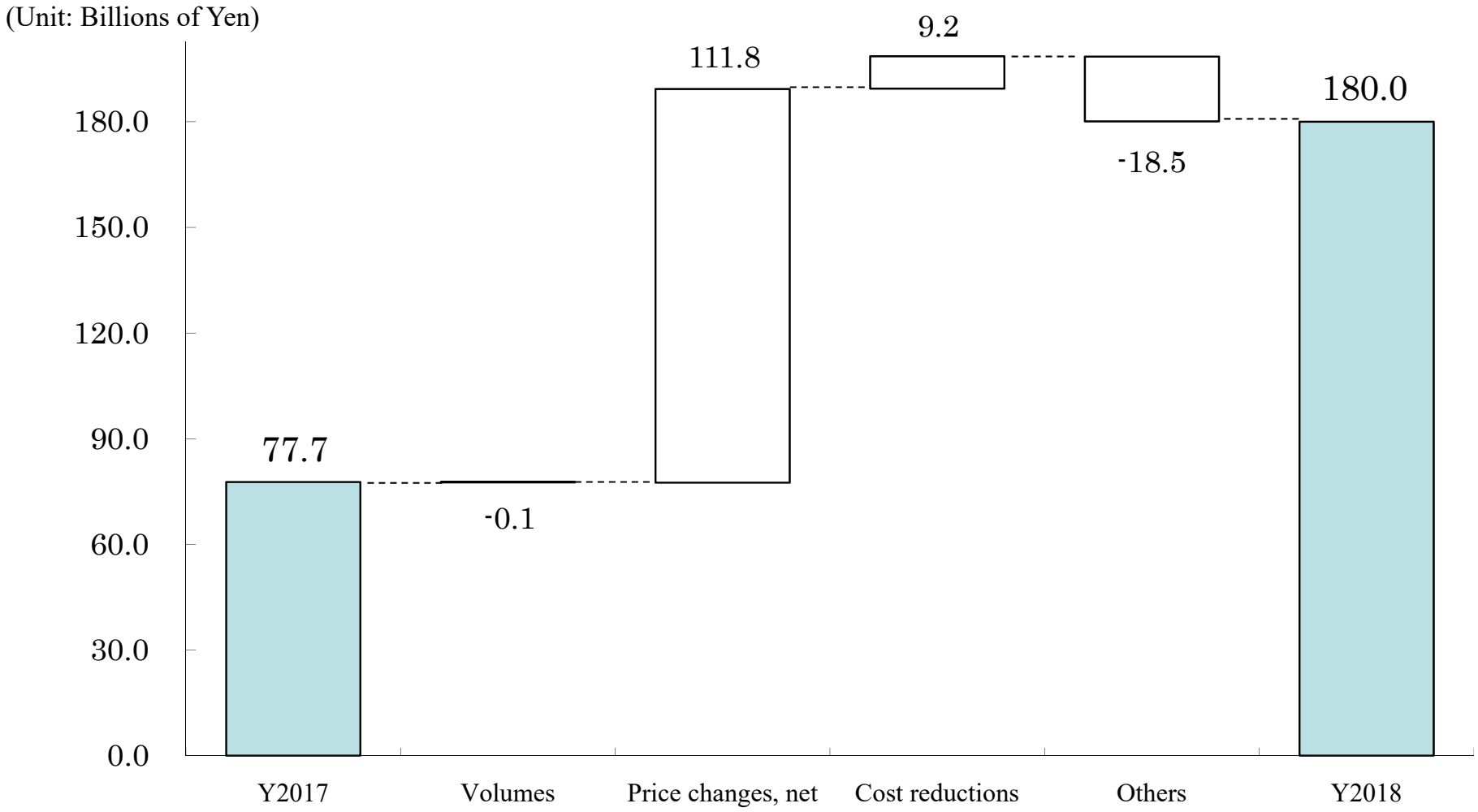
(Unit: Billions of Yen)

	2017	2018	Increase/ decrease	Comments
Petrochemicals	33.4	20.3	-13.0	【Olefins】profit decreased (shipment volumes down due to shutdown maintenance, C4, cracked fuel oil: profit decreased) 【Organic chemicals】profit slightly decreased 【SunAllomer Ltd. 】profit decreased (time lag between the rise in raw material prices that in sales prices)
Chemicals	16.5	17.4	0.9	【Basic chemicals】profit increased (AN, chloroprene rubber, caustic soda: market prices up, ammonia: profit decreased due to shipment volumes down) 【Electronic chemicals】【Industrial gases】profit increased (shipment volumes up) 【Functional chemicals】profit decreased(time lag between the rise in raw material prices and that in sales prices)
Electronics	21.9	12.4	-9.5	【HDs】profit decreased (shipment volumes for PCs down) 【Compound semiconductors】【Rare earths】profit slightly decreased 【LIB materials】profit increased (shipment volumes bound for China up)
Inorganics	7.0	132.4	125.5	【Ceramics】profit increased (shipment volumes for electronic materials up) 【Graphite electrodes】profit significantly increased (market prices up), full year contribution of the consolidation of SHOWA DENKO CARBON Holding GmbH (4Q, 2017)
Aluminum	6.7	4.9	-1.8	【High-purity foil for capacitors】profit increased (shipment volumes up) 【Aluminum specialty components】profit decreased (shipment volumes down) 【Aluminum cans】profit decreased (shipment volumes for domestic market down, metal price up)
Others	0.6	2.9	2.3	【SHOKO Co., Ltd.】profit increased 【SiC epitaxial wafers】profit increased (shipment volumes up)
Adjustments	-8.4	-10.4	-2.0	
Total	77.7	180.0	102.3	

Sales and Operating Income by Segment



Operating Income Breakdown by Factor



Consolidated Balance Sheet

(Unit: Billions of Yen)

Assets	Dec. 31, 2017*	Dec. 31, 2018	Increase/ decrease	Liabilities and net assets	Dec. 31, 2017*	Dec. 31, 2018	Increase/ decrease
Cash and deposits	77.2	113.2	35.9	Notes and accounts payable	120.8	139.4	18.7
Notes and accounts receivable	176.0	203.7	27.7	Interest-bearing debt	346.7	288.0	-58.8
Inventories	114.9	152.8	37.9	Net defined benefit liability	19.0	22.0	3.0
Other current assets	39.0	30.6	-8.4	Other liabilities	171.6	161.0	-10.6
Total current assets	407.2	500.3	93.1	Total liabilities	658.0	610.4	-47.6
Buildings and structures	85.9	78.8	-7.2	Capital stock	140.6	140.6	0
Machinery and equipment	151.6	146.8	-4.9	Capital surplus	61.7	78.9	17.2
Land	244.7	235.0	-9.7	Retained earnings	100.1	197.7	97.6
Other tangible fixed assets	23.7	17.9	-5.8	Treasury stock	-10.5	-11.7	-1.2
Total tangible fixed assets	505.9	478.4	-27.5	Total shareholders' equity	291.8	405.5	113.7
Intangible fixed assets	12.8	15.0	2.1	Valuation difference on available-for-sale securities	16.5	7.5	-9.1
Investments and other assets	101.1	82.1	-18.9	Deferred gains or losses on hedges	3.8	0.8	-2.9
incl. investment securities	89.2	71.9	-17.3	Revaluation reserve for land	29.5	33.3	3.7
				Foreign currency translation adjustment	15.5	7.1	-8.4
				Remeasurements of defined benefit plans	-4.7	-8.2	-3.5
				Total accumulated other comprehensive income	60.7	40.4	-20.2
				Non-controlling interests	16.5	19.4	2.9
Total fixed assets	619.8	575.5	-44.3	Total net assets	369.0	465.3	96.3
Total assets	**1,027.0**	**1,075.7**	**48.7**	**Total liabilities and net assets**	**1,027.0**	**1,075.7**	**48.7**

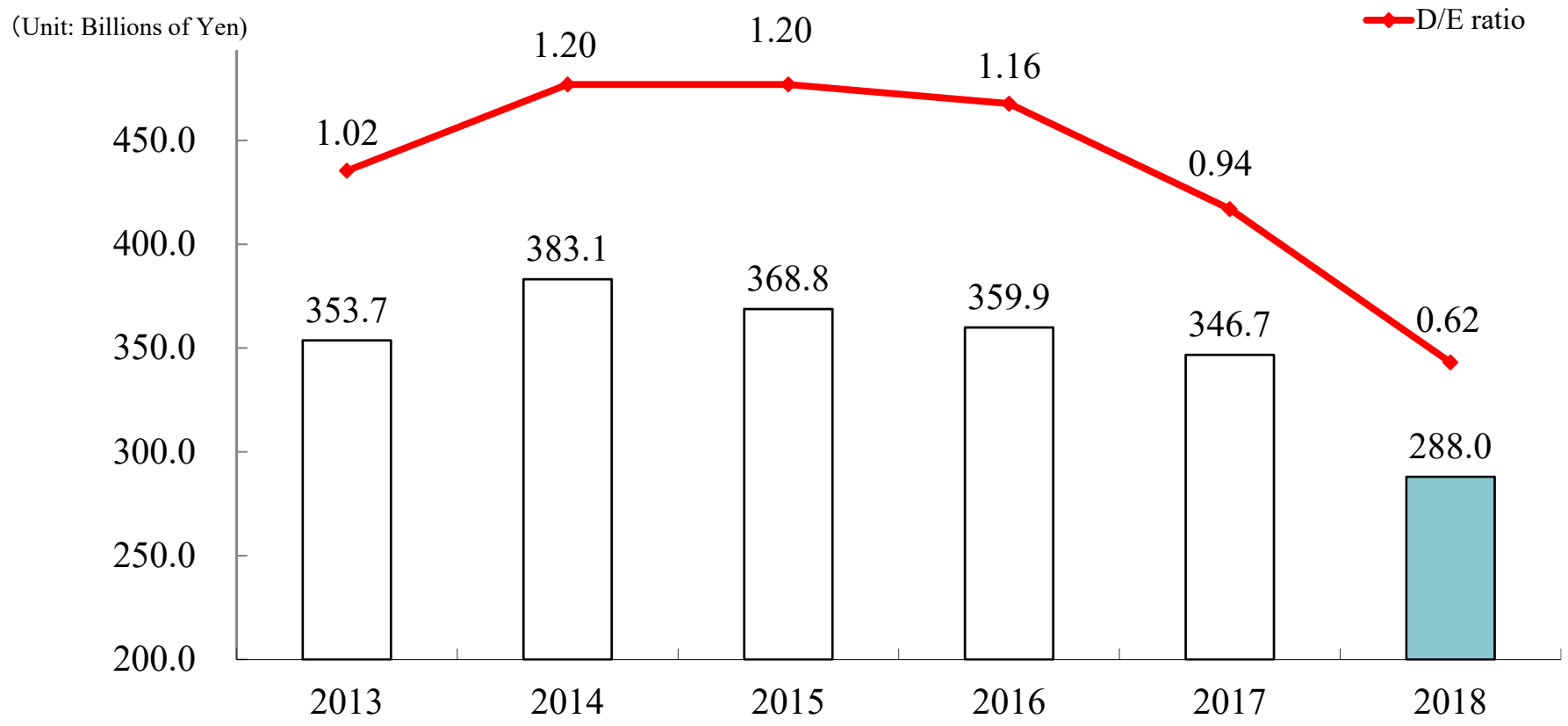
*The tentative accounting policy applied to calculation of 2017 financial results due to consolidation of former SGL GE Holding GmbH has been finalized. Accordingly, some of the amounts for Dec. 31, 2017 have been retroactively changed.

Total Assets
Interest-bearing Debt and D/E ratio

(Unit: Billions of Yen)

	Dec. 31, 2017	Dec. 31, 2018	Increase/ decrease
● Total assets	1,027.0	1,075.7	48.7
● Interest-bearing debt	346.7	288.0	-58.8
● Debt/Equity ratio	0.94 times	0.62 times	-0.32p
● Stockholders' equity ratio	34.3%	41.5%	7.2p

Interest-bearing Debt



Equity ratio	30.6%	29.7%	31.5%	31.8%	34.3%	41.5%

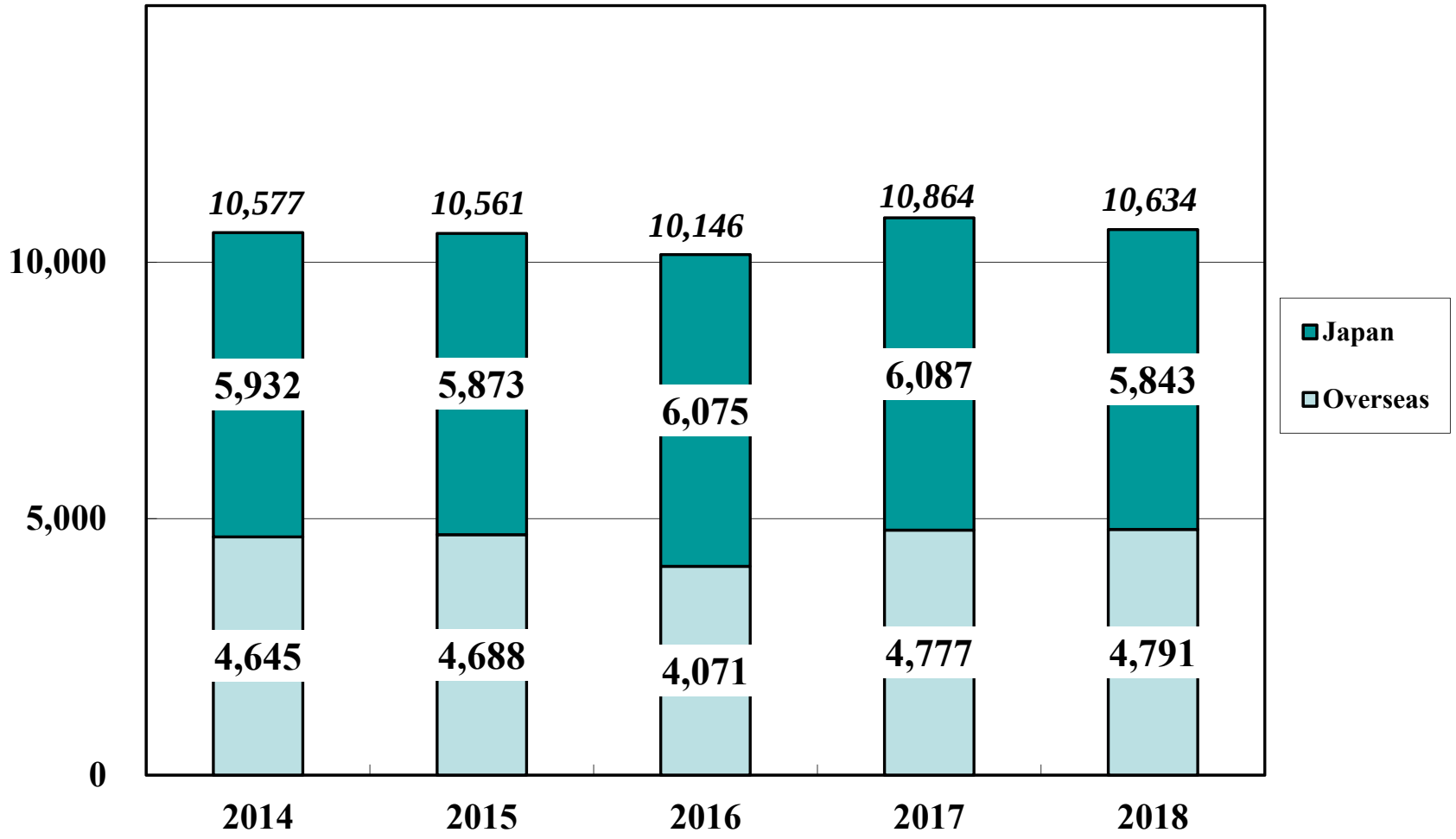
Consolidated Cash Flows

(Unit: Billions of Yen)

	2017	2018	Increase/ decrease
●CF from operating activities	67.2	149.8	82.5
●CF from investing activities	-29.9	-49.3	-19.5
●Free CF	37.4	100.4	63.1
●CF from financing activities	-18.4	-61.1	-42.7
●Others	1.6	-3.4	-5.0
Increase/decrease of cash and equivalents	20.6	36.0	15.4

(note)The tentative accounting policy applied to calculation of 2017 financial results due to consolidation of former SGL GE Holding GmbH has been finalized. Accordingly, some of the amounts for 2017 have been retroactively changed.

Total Number of Employees and Breakdown by Location



Japan	56.1%	55.6%	59.9%	56.0%	54.9%
Overseas	43.9%	44.4%	40.1%	44.0%	45.1%

Capital Expenditures/ Depreciation by Segment

(Unit: Billions of Yen)

	2017		2018		Increase/decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	2.8	6.9	5.1	5.0	2.2	-1.8
Chemicals	9.6	8.5	8.0	8.8	-1.6	0.3
Electronics	11.2	9.6	8.4	9.2	-2.8	-0.4
Inorganics	8.3	5.6	8.1	8.0	-0.2	2.4
Aluminum	8.0	5.4	5.5	5.7	-2.5	0.3
Others	1.8	2.7	6.6	2.8	4.8	0.1
Total	41.8	38.6	41.7	39.5	-0.1	0.9

(note)The tentative accounting policy applied to calculation of 2017 financial results due to consolidation of former SGL GE Holding GmbH has been finalized.
Accordingly, some of the amounts for 2017 have been retroactively changed.

Selected Data 2018, 2019 Forecast (Consolidated)

(*Unit: Billions of Yen)

	2017	2018	2018-2017 Increase/ decrease	2019 Forecast	2019-2018 Increase/ decrease
●Exchange rate: ¥/US$	112.2	110.4	-1.8	105.0	-5.4
¥/€	126.7	130.4	3.8	126.0	-4.4
●Domestic naphtha price: ¥/KL	40,400	51,100	10,700	53,400	2,300
●Aluminum LME price: US$/T	1,979	2,116	137	2,150	34
●Interest-bearing debt*	346.7	288.0	-58.8	300.0	12.0
●Interest/dividend income less interest expenses*	-1.2	-0.6	0.6	0	0.6
●R&D expenditures*	18.5	19.7	1.2	22.6	2.8
●Number of employees: people	10,864	10,634	-230	10,942	308
●Total employment cost*	74.2	79.4	5.2	85.4	6.0

2019 Forecast (Consolidated)

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

	2018	2019 Forecast	Increase/ decrease	2019 Forecast	
				1st Half	2nd Half
Net sales	992.1	1,100.0	107.9	520.0	580.0
Operating income	180.0	190.0	10.0	91.0	99.0
Non-operating income and expenses	-1.2	-5.0	-3.8	-0.5	-4.4
Ordinary income	178.8	185.0	6.2	90.5	94.5
Extraordinary profit	-33.3	-20.0	13.3	-4.2	-15.8
Extraordinary loss					
Net income attributable to owners of the parent	111.5	120.0	8.5	63.0	57.0
Net income attributable to owners of the parent per share	¥758.15	¥822.61	¥64.46		
Cash dividends per share	¥120 (planned)	¥130	¥10	¥50	¥80

Net Sales by Segment, 2019 Forecast (Consolidated)

(Unit: Billions of Yen)

	2018	2019 Forecast	Increase/ decrease	Comments	2019 Forecast 1st Half	2019 Forecast 2nd Half
Petro-chemicals	268.9	290.0	21.1	shipment volumes up due to the 2018 shutdown maintenance	133.0	157.0
Chemicals	156.5	166.0	9.5	Basic chemicals, Industrial gases: sales will be maintained at the previous year's level Electronic chemicals: sales increase expected (shipment volumes up but leveling off expected in 1H) Functional chemicals: sales increase expected (shipment volumes up)	79.0	87.0
Electronics	105.8	106.0	0.2	HDs: sales decrease expected (shipment volumes expected to be down in 1H) SiC: transferred from the Others segment, sales increase expected (shipment volumes up) LED: sales increase expected, Rare earths: sales decrease expected (structural reform) LIB materials: slight sales increase expected	46.0	60.0
Inorganics	266.1	340.0	73.9	Ceramics: sales will be maintained at the previous year's level Graphite electrodes: sales increase expected (market prices up)	168.5	171.5
Aluminum	108.3	110.0	1.7	Rolled products, Aluminum specialty components: sales will be maintained at the previous year's level Aluminum cans: sales increase expected (shipment volumes of Hanacans up)	53.5	56.5
Others	143.4	142.0	-1.4	SiC: transferred to the Electronics segment	67.0	75.0
Adjustments	-56.9	-54.0	2.9		-27.0	-27.0
Total	992.1	1,100.0	107.9		520.0	580.0

(note) SDK changed the segmentation from 2019 (SiC was transferred from "Others" to "Electronics") . Figures of 2018 are based on the previous segmentation.

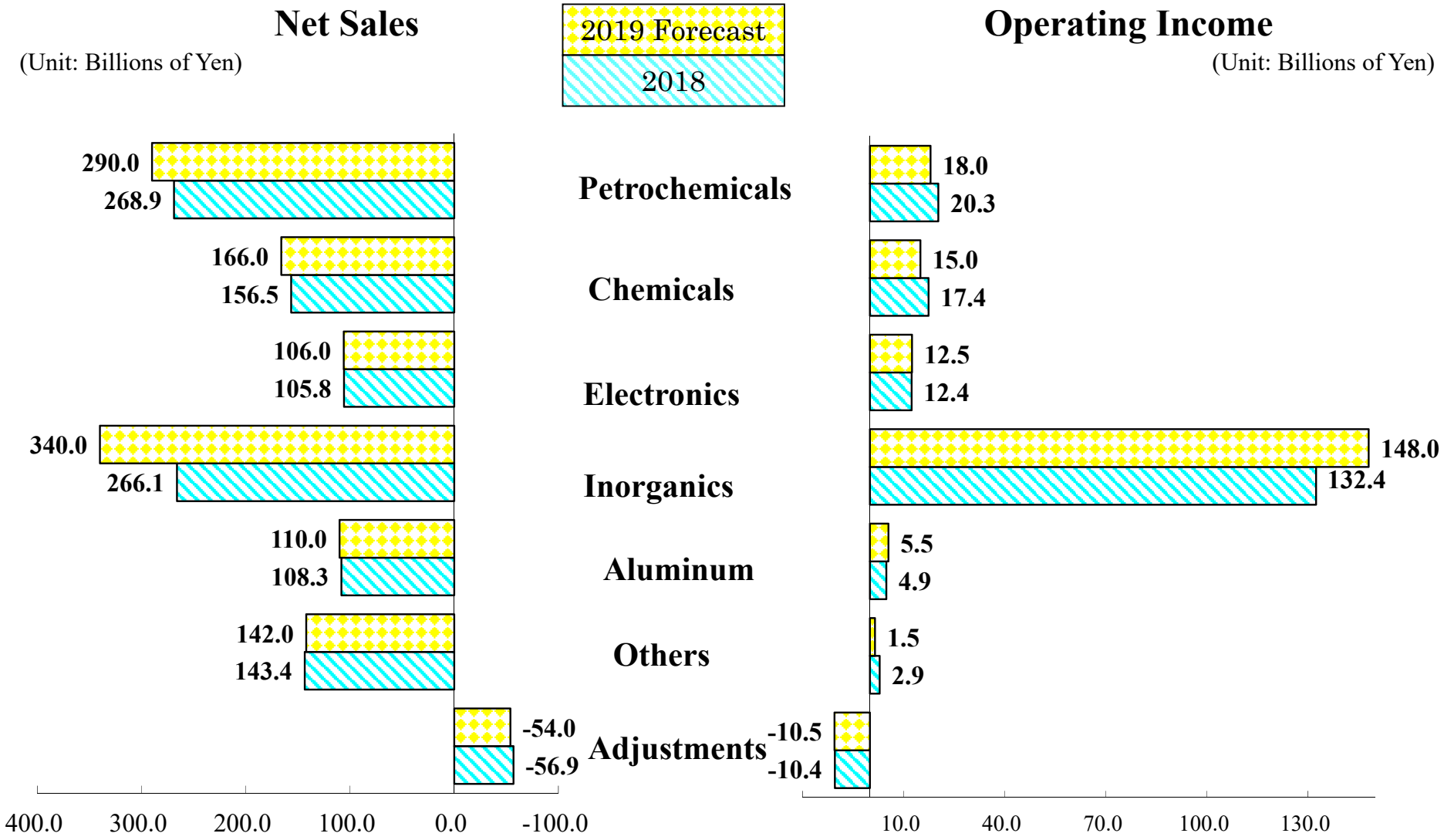
Operating Income by Segment, 2019 Forecast (Consolidated)

(Unit: Billions of Yen)

	2018	2019 Forecast	Increase/ decrease	Comments	2019 Forecast	
					1st Half	2nd Half
Petro-chemicals	20.3	18.0	-2.3	shipment volumes up due to the 2018 shutdown maintenance spread squeeze expected	7.0	11.0
Chemicals	17.4	15.0	-2.4	Basic chemicals: profit decrease expected (AN: market prices down) Electronic chemicals: slight profit increase expected (shipment volumes up but leveling off in 1H, depreciation costs up) Industrial gases, Functional chemicals: profit will be maintained at the previous year's level	6.0	9.0
Electronics	12.4	12.5	0.1	HDs: profit decrease expected (shipment volumes down in 1H) SiC: transferred from the Others segment, profit increase expected (shipment volumes up) LED, Rare earths: profit increase expected LIB materials: profit will be maintained at the previous year's level	3.1	9.4
Inorganics	132.4	148.0	15.6	Ceramics: profit will be maintained at the previous year's level Graphite electrodes: profit increase expected (market prices up)	77.0	71.0
Aluminum	4.9	5.5	0.6	Rolled products, Aluminum specialty components: profit will be maintained at the previous year's level Aluminum cans: profit increase expected (shipment volumes of Hanacans up)	2.2	3.3
Others	2.9	1.5	-1.4	SiC: transferred to the Electronics segment	0.9	0.6
Adjustments	-10.4	-10.5	-0.1		-5.2	-5.3
Total	180.0	190.0	10.0		91.0	99.0

(note) SDK changed the segmentation from 2019 (SiC was transferred from "Others" to "Electronics") . Figures of 2018 are based on the previous segmentation.

Sales and Operating Income, Forecast for 2019



(note) SDK changed the segmentation from 2019 (SiC was transferred from "Others" to "Electronics") . Figures of 2018 are based on the previous segmentation.

Consolidated Cash Flows, 2019 Forecast

(Unit: Billions of Yen)

	2018	2019 Forecast	Increase/ decrease
●CF from operating activities	149.8	135.0	-14.8
●CF from investing activities	-49.3	-80.0	-30.7
●Free CF	100.4	55.0	-45.4
●CF from financing activities	-61.1	-22.8	38.3
●Others	-3.4	0	3.4
Increase/decrease of cash and equivalents	36.0	32.2	-3.8

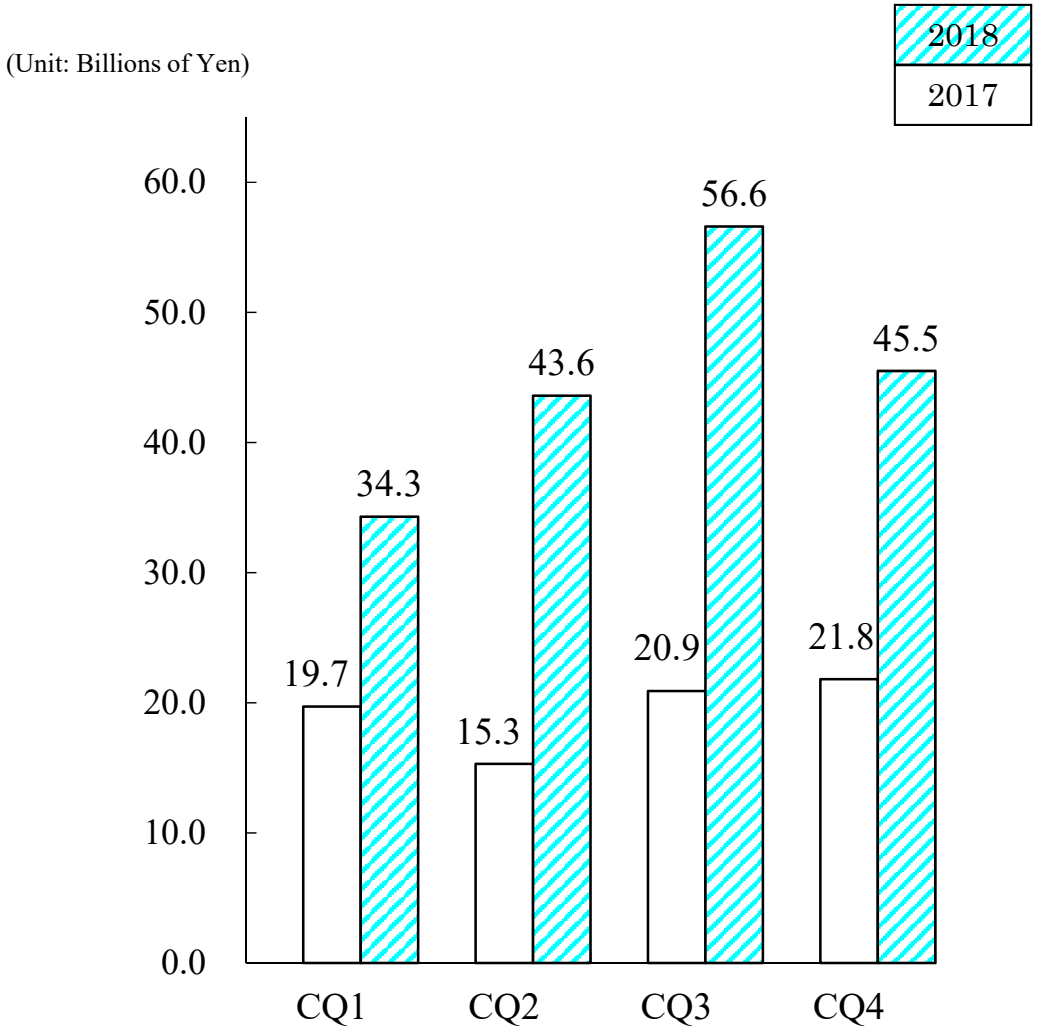
Capital Expenditures/Depreciation by Segment
2019 Forecast

(Unit: Billions of Yen)

	2018		2019 Forecast		Increase/decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	5.1	5.0	6.3	4.3	1.2	-0.8
Chemicals	8.0	8.8	18.3	9.7	10.3	0.9
Electronics	8.4	9.2	14.6	9.5	6.2	0.3
Inorganics	8.1	8.0	13.8	8.9	5.7	1.0
Aluminum	5.5	5.7	6.5	5.1	0.9	-0.6
Others	6.6	2.8	4.7	1.9	-1.8	-0.9
Total	41.7	39.5	64.3	39.4	22.5	-0

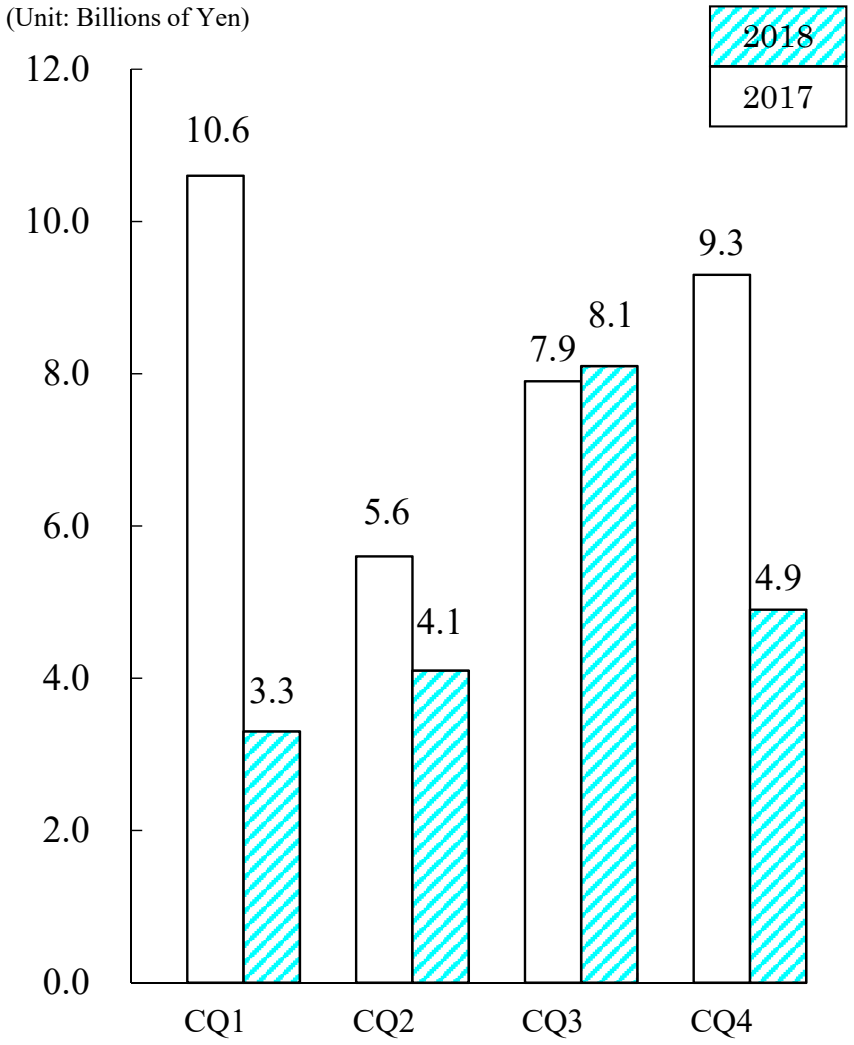
(note) SDK changed the segmentation from 2019 (SiC was transferred from “Others” to “Electronics”) . Figures of 2018 are based on the previous segmentation.

(Reference) Quarterly Operating Income

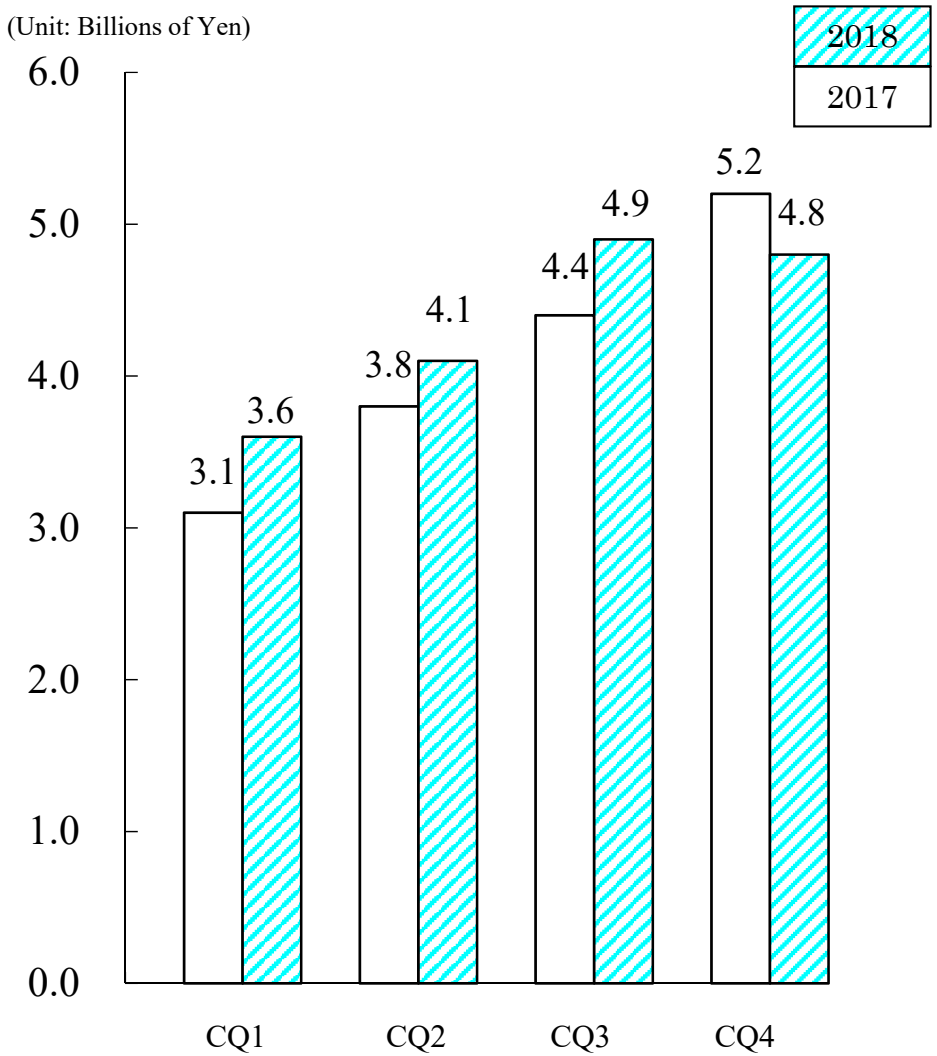


(Reference) Quarterly Operating Income by Segment

《Petrochemicals》

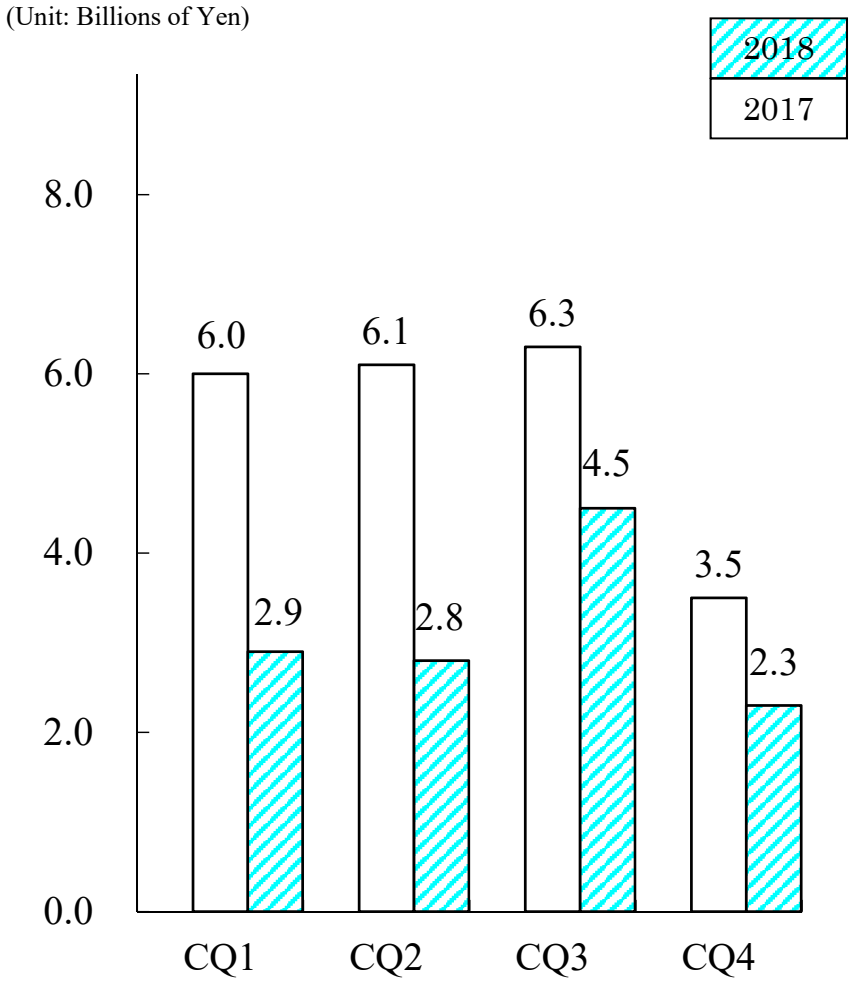


《Chemicals》

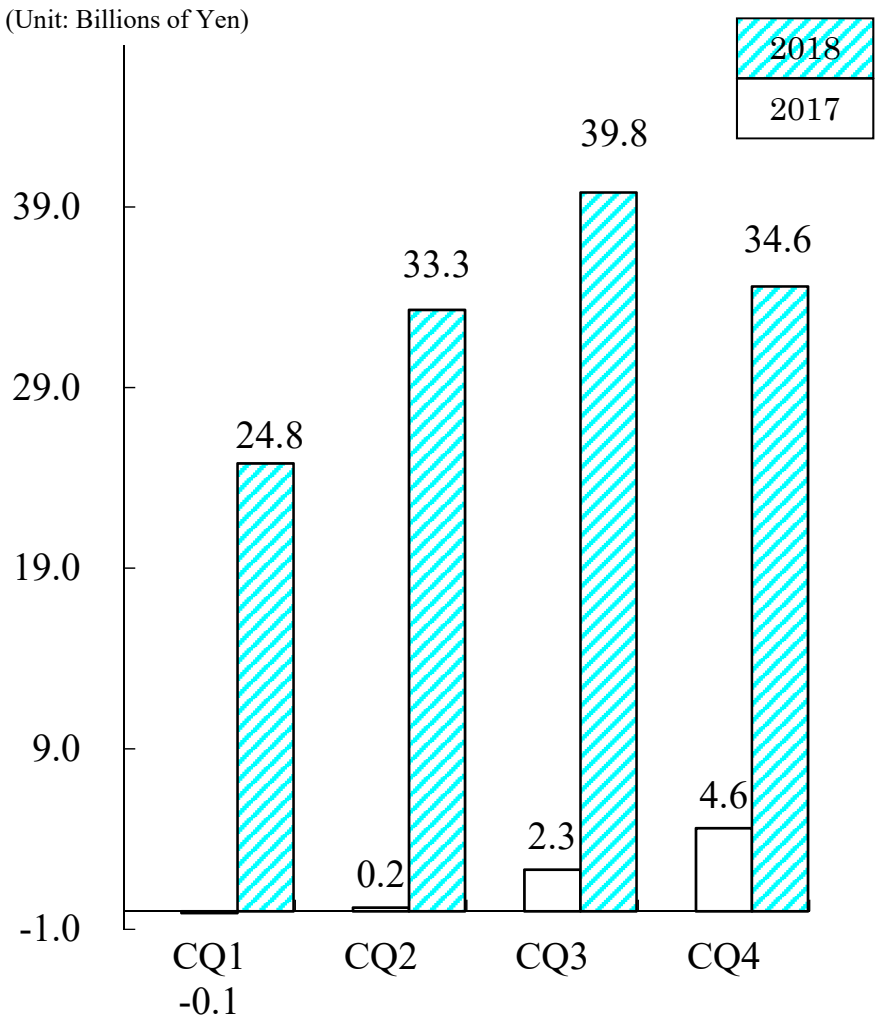


(Reference) Quarterly Operating Income by Segment

《Electronics》

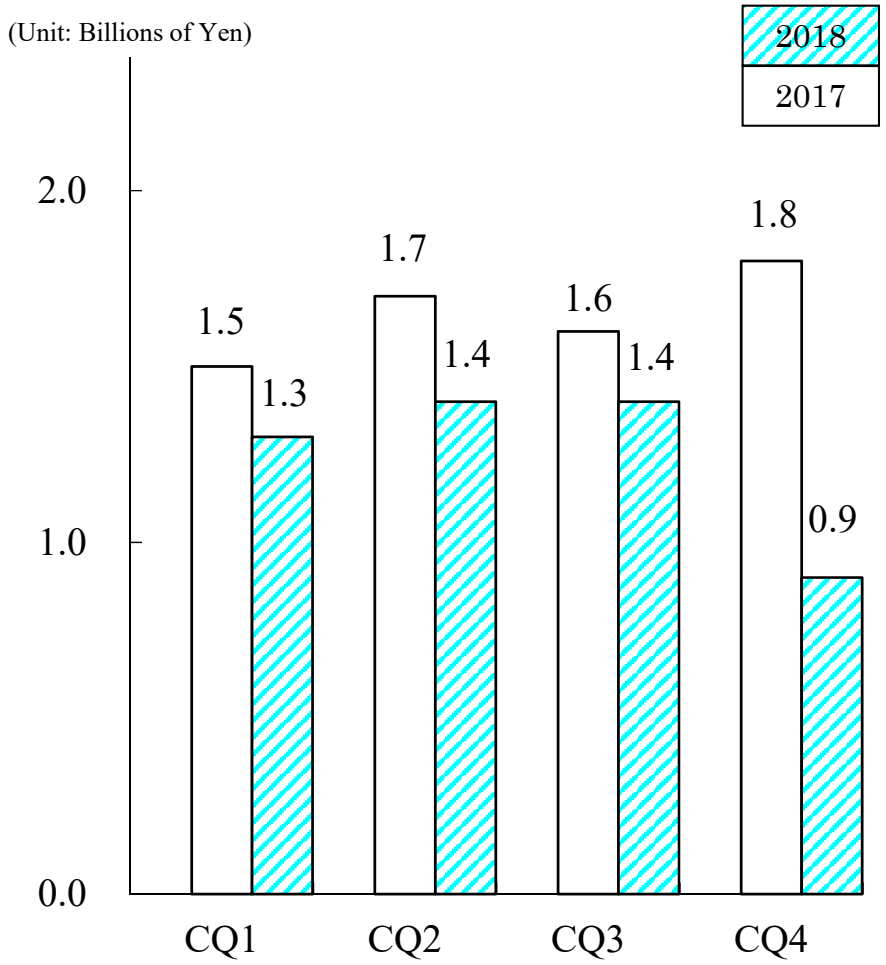


《Inorganics》

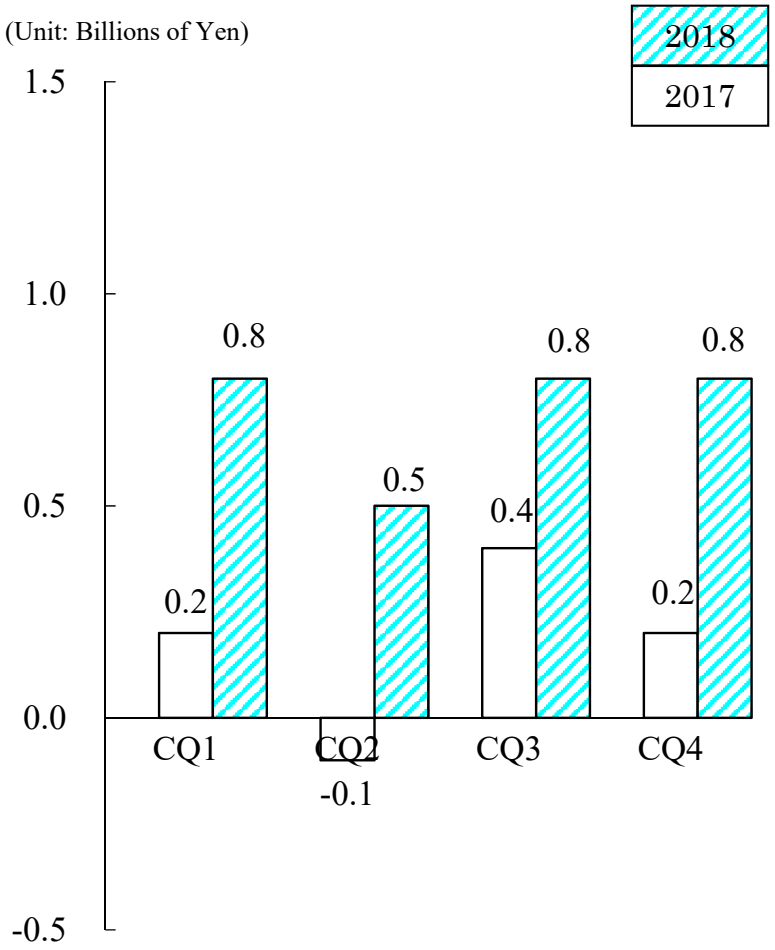


(Reference) Quarterly Operating Income by Segment

《Aluminum》



《Others》



Topics

[General]

- **Started new medium-term consolidated business plan "The TOP 2021"**

In January 2019, SDK started its new medium-term consolidated business plan "The TOP 2021" for the 2019-2021 period. Under the new medium-term business plan "The TOP 2021," the Showa Denko Group will change its course toward long-term business growth and concentrate on expansion of the Group's "KOSEIHA Businesses" (individualized businesses) that maintain profitability and stability at high levels. The Group will positively invest in plants and equipments and implement discontinuous investment including M&A, thereby establishing a stable foundation which will continuously support the Group's growth far into the future. With regard to return to shareholders, the Group will not only strive to continue high dividends but also consider buying treasury stock in timely and continuous manner, aiming to realize total return ratio of 30% by 2021.

- **Incorporated into all of 4 ESG investment indexes**

In July 2018, SDK was incorporated continuously for two straight years into three ESG indexes for investment: "FTSE Blossom Japan Index" provided by FTSE International Limited and Frank Russel Company (FTSE Russel, a member of London Stock Exchange Group); "MSCI Japan ESG Select Leaders Index" and "MSCI Japan Empowering Women Index" provided by MSCI Incorporated (MSCI). FTSE and MSCI are world-famous index providers. FTSE Blossom Japan Index is designed to provide market participants with a tool to identify and measure the performance of Japanese companies that demonstrate strong environment, social and governance (ESG) practices. MSCI Japan ESG Select Leaders Index is constructed using the MSCI Japan IMI Top 500 Index (parent index) and targets best ESG performers among issues included in the parent index. MSCI Japan Empowering Women Index evaluates companies promoting and maintaining gender diversity. In addition to these three ESG indexes, in October 2018, SDK was newly incorporated into an environmental stock index, "S&P/JPX Carbon Efficient Index." Government Pension Investment Fund (GPIF) of Japan has been utilizing abovementioned four stock price indexes to implement full-scale "ESG conscious investment." Moreover, SDK has been included in the "SNAM Sustainability Index," which is provided by Sompo Japan Nipponkoa Asset Management Co., Ltd. (SNAM), for seven consecutive years and the "Morningstar Socially Responsible Investment Index (MS-SRI)," which is provided by Morningstar Japan K.K., for five consecutive years.

Topics

[General]

● Offered treasury stock through International Offering

On March 6, 2018, SDK's Board of Directors resolved that the Company would offer 6 million shares of its treasury stock through an international offering, and SDK completed delivery of those shares to investors on March 23, 2018. With regard to funds of about ¥26.1 billion which SDK received through this transaction, SDK has used a part of them for repayment of a bank loan which the Company borrowed in order to acquire SGL GE Holding GmbH in October 2017, and will use the remaining part for investment at home and abroad to expand production capacities of its plants to produce high-purity gases for electronics and other products.

● Implemented early repayment of subordinated loan

In October 2018, SDK made early repayment of ¥24 billion that it raised in a subordinated loan (the Subordinated Loan) in April 2014. The Subordinated Loan, with a 75% equity credit acknowledged by Japan Credit Rating Agency, Ltd., has contributed to improvement of SDK's financial strength. Since the financing through the Subordinated Loan, SDK has advanced structural reform and expanded its individualized businesses, resulting in stronger business foundation and higher profitability, and also achieved financial level targeted in its medium-term business plan. These accomplishments led to SDK's conclusion that it has completed the important task of enhancing its financial standing with the Subordinated Loan. SDK made an early repayment of the Subordinated Loan based on its judgment that the early repayment reduces financial costs and makes its financial strategy more flexible, which will increase shareholder value.

● Repurchased own shares

At its Board of Directors meeting held on December 11, 2018, SDK resolved to repurchase its own shares, aiming to enhance return to shareholders, improve capital efficiency and implement agile capital policies corresponding to changes in the business environment. SDK started to repurchase own shares on December 12, 2018, and completed repurchase of 2,648,300 shares for about ¥10 billion by December 18, 2018.

Topics

[General]

- **Awarded preferential negotiating rights for establishment and operation of R&D complex from Yokohama City**

  In October 2018, SDK was awarded preferential negotiating rights in a public competition for "The project to establish and operate R&D base in Moriya/Ebisu area at the Keihin Seaside Zone" hosted by Yokohama City. SDK has been operating its main plant to manufacture ceramics in Yokohama City since 1933 when Nihon Alumina Kogyosho, one of predecessors of SDK, started operation. Now SDK's base in Yokohama has many functions including development of materials for lithium ion batteries and other advanced batteries, development of thermo-conductive fillers, and engineering. Taking advantage of the Moriya/Ebisu area which is easily accessed from cities at home and abroad, the Showa Denko Group will establish a new complex, "Stage for Fusion," which will function as the global center of the Group's R&D activities, where diverse talented persons gather from all over the world and work together.

- **SDK and Cinnamon starts to develop database system equipped with AI to utilize technical documents**

  In July 2018, SDK and Cinnamon Inc. (Cinnamon) decided to jointly develop a database system equipped with artificial intelligence (AI) to utilize technical documents. SDK and Cinnamon will promote the development of a database system with the object of utilizing technical documents, in which the system will be equipped with AI-based automatic OCR technology to accurately digitize data on paper containing handwritten characters and highly convenient data search function. The two parties will aim to create an intensely practical database system through close cooperation between Cinnamon which has deep expertise and programming technology on AI and image analysis, and SDK which holds abundant real data (technical documents) that contain expertise in many fields including petrochemical, carbon, and aluminum products. This development program has been accredited as a project to be subsidized by the New Energy and Technology Development Organization (NEDO) as a part of NEDO's "Program to Support Joint Development of AI Systems."

Topics

[General]

● Acquired naming rights to athletic facilities of Oita Sports Park

In October 2018, SDK acquired the naming rights to athletic facilities of Oita Sports Park in Oita City, where SDK's Oita Complex is located, from Oita Prefecture. The naming rights are valid for five years, from March 1, 2019 to February 29, 2024. The rights cover 7 athletic facilities including the main multipurpose stadium, tennis courts and a baseball stadium. SDK will nickname these 7 facilities with names which include our company name, "Showa Denko." For example, SDK will nickname the main multipurpose stadium "Showa Denko Dome Oita." A part of the fee for the naming rights SDK will pay to Oita Prefecture is to be used for promotion of sports and regional development. It is our pleasure to contribute to promotion of sports and regional development in Oita Prefecture in this way, and SDK aims to enhance its CSR activities further.

[Petrochemicals segment]

● Completed expansion of n-propyl acetate plant

SDK expanded its capacity to produce n-propyl acetate (NPAC), which is used in solvents for special gravure printing, from 16,000 tons a year to 18,200 tons a year through modifications to facilities during the period of regular shutdown maintenance of Oita Complex which was implemented in March and April 2018. NPAC is an acetate-based solvent with high safety mainly used for ink for special gravure printing on packaging materials for food. The demand for NPAC is increasing as safe and easy-to-use substitute for toluene and methyl ethyl ketone which has been used as solvent for ink, due to the revision of the Air Pollution Control Act in which a tighter control has been introduced over the emission of volatile organic components. In recent years, the demand for NPAC has been increasing more than 10% a year. SDK will strengthen its system to stably supply NPAC in order to cope appropriately with the expansion of the market.

Topics

[Petrochemicals segment]

- **JXTG Energy and SDK receive subsidy for project to strengthen bases of petroleum complexes in Oita Complex Area**

A joint project of SDK and JXTG Nippon Oil & Energy Corporation (JXTG Energy) to strengthen cooperation between oil refinery and petrochemical complex in Oita complex area (Oita City) has been adopted as a subject for the "2018 Subsidy Program to Support Projects to Enhance Resilience of Oil Supply System" (a program to subsidize projects to strengthen business bases of petroleum complexes among programs to enhance productivity and resilience of petroleum complexes) to which Consortium for Resilient Oil Supply System (CROS) organized public invitation. Details of the project are "increasing the number of propylene rectifying towers" and "establishment of an ethane holder." By interchanging and utilizing products through pipelines, the two parties gain advantages. "Subsidy Program to Support Projects to Enhance Resilience of Oil Supply System" is institutionalized by the Agency of Natural Resources and Energy. Through this joint project, SDK and JXTG Energy will make the most of strong points of facilities in the oil refinery and the petrochemical complex in Oita complex area, and make these complexes prosper with global competitiveness.

[Chemicals segment]

- **Expanded high-purity hydrogen bromide plant**

SDK expanded its annual capacity to produce high-purity hydrogen bromide (HBr) from 600 tons to 900 tons, 1.5 times as much as the previous level. The expanded plant started to produce HBr in March 2018. HBr is a specialty gas mainly used for fine-etching of polysilicon in the manufacturing process of semiconductors including DRAMs and NAND flash memories. The demand for HBr has been increasing due to ongoing expansion of the market for semiconductors caused by acceleration in the spread of IoT, big dada analysis, and automatic driving. SDK will continue responding quickly to the expansion of the electronic parts and materials industry's demand for HBr and scaling up its high-purity specialty gas business.

Topics

[Chemicals segment]

- **Opened the second branch of Shanghai Showa Chemicals Co., Ltd. aiming to strengthen sales of high-purity gases for electronics in China**

In March 2018, SDK established a branch of Shanghai Showa Chemicals Co., Ltd. (SSC) in Wuhan, Hubei Province, China, aiming to strengthen its business to sell high-purity gases for electronics in China. Semiconductor and flat panel display industries are growing rapidly in China due to the Chinese government's policy for the development of these industries and the increase in the global demand for electronic devices. In the past, SDK shipped all of its high-purity gases for electronics to be used by customers in China from SSC located in Shanghai. This time, however, SDK decided to establish a branch of SSC and its warehouse in Wuhan because there has been construction of large factories in Middle China to manufacture semiconductor chips and flat panel displays. The Showa Denko Group will continue enriching its network of bases to sell and distribute high-purity gases for electronics in China, aiming to expand the business in each region of the country and respond properly to the expansion of our customers' businesses.

Topics

[Electronics segment]

● SDK's 3.5-inch Media Now Used in World's-Largest-Capacity 16TB HDD

In January 2019, SDK announced that hard disk (HD) media produced and sold by the Company were adopted in a new model of 3.5-inch 16 terabyte (TB) hard disk drive (HDD) which represents the world's largest storage capacity for this size available on the market.*1 SDK's 3.5-inch HD media were adopted into Toshiba Electronic Devices & Storage Corporation's HDD for near-line storage, "MG08," which realized the total storage capacity of 16TB, the world's largest storage capacity for this size, with Conventional Magnetic Recording (CMR).*2 SDK started supplying its 3.5-inch HD media for this application, using the ninth-generation perpendicular magnetic recording (PMR) technology which realizes storage capacity of 1.8TB/platter. In 2005, SDK became the world's first to manufacture and sell PMR-technology-based HD media. These days, servers in data centers to store data require HDDs with ever larger storage capacities due to the spread of cloud computing and moving image contents. HD media are key components of HDDs, significantly influencing their storage capacity, and SDK has been speedily launching largest-level-capacity HD media. As the world's largest independent HD media supplier, SDK will continue contributing to the expansion of storage capacities of HDDs in accordance with the company's motto of "Best in Class."

*1: As of January 8, 2019

*2: Conventional Magnetic Recording (CMR): CMR HDD uses PMR-technology-based HD media and realizes high-density data recording without using Shingled Magnetic Recording (SMR) technology. CMR HDD features random access to data faster than that of SMR HDD.

● Signed an agreement to transfer the Company's rare earth magnetic alloy R&D sector

In November 2018, SDK agreed to transfer its business sector which conducts research and development on rare earth magnetic alloys to TDK Corporation. The assets subject to this transfer consisted mainly of a business sector which conducts R&D in Chichibu Plant and SDK's intellectual property rights on rare earth magnetic alloys. However, SDK will continue production of rare earth magnetic alloys in its Chichibu Plant even after the transfer.

Topics

[Inorganics segment]

- **Completed expansion of capacity for titanium oxide nanoparticles**

  In November 2018, SDK completed expansion of the capacity to produce nanoparticle titanium oxide, which has been sold under the trade name of *Super-Titania*™, at its wholly owned subsidiary Showa Denko Ceramics Co., Ltd. *Super-Titania*™ is used in the production of multilayer ceramic capacitors (MLCCs). MLCCs are installed in many information devices including smartphones which require downsizing and weight saving, and in digital home appliances including flat-screen TVs. In addition, MLCCs are now widely applied to onboard equipment, and the demand for MLCCs has been growing. *Super-Titania*™ can be used not only as raw material for manufacturing of MLCCs but also as an ingredient of various filling materials and for other services. The Showa Denko Group will continue to meet customer requirements, stably supply high-quality products, and establish leading positions on the market.

- **Completed transfer of the Company's whole shares in ICA**

  In December 2018, SDK completed transfer of its whole shares (20%) in PT. INDONESIA CHEMICAL ALUMINA (ICA) to PT ANTAM Tbk (ANTAM) on the sale of SDK's shares in ICA. Until completion of this transaction, ICA was SDK's affiliated company accounted for by the equity method, while ANTAM remains the parent company of ICA as the majority shareholder.

Topics

[Aluminum segment]

- **Showa Aluminum Can completed second production base in Vietnam**

In June 2018, Showa Aluminum Can Corporation (SAC), a consolidated subsidiary of SDK, completed construction of its subsidiary's new factory to produce aluminum cans in Quang Nam Province, which is in the suburbs of Da Nang City in mid Vietnam, and started operation of the factory. The new factory is Hanacans Joint Stock Company's second production base in Vietnam, and its production line has annual production capacity of 700 million can bodies. Hanacans, which is a Vietnamese subsidiary of SAC, is now also working to increase the capacity of the lines to produce can ends set at its factory in Bach Nin Province in the suburbs of Hanoi. When this work was finished in October 2018, Hanacans' two factories' total capacity to produce can bodies and can ends became that for 2 billion cans a year. Since its acquisition of Hanacans in 2014, SAC has been introducing its leading-edge production technologies and quality control system into Hanacans, and successfully increasing Hanacans' sales in Vietnam centering on northern part of the country. SAC will pursue further increase in its aluminum can sales in mid Vietnam through its effort to make Hanacans' new aluminum can factory the one that quickly and timely offers the best quality products in the region which meet needs of the market.

- **New aluminum can JV completed construction of a factory in Thailand**

In December 2018, SDK, Showa Aluminum Can Corporation (SAC), which is a consolidated subsidiary of SDK, and Carabao Group Public Company Limited (CBG), which is a leading beverage maker headquartered in Bangkok, Thailand, jointly had a ceremony for the completion of a new aluminum can factory owned and operated by Asia Can Manufacturing Co., Ltd. (ACM). ACM is a can manufacturing company established as a joint venture among SDK, SAC and CBG, and had been conducting the project to construct the new factory since then. After the start-up of operations of the new factory, ACM will mainly manufacture aluminum cans for CBG's beverages for export from Thailand. CBG aims to expand its overseas sales, centering on Southeast Asian countries, China and the United Kingdom. ACM will support CBG's overseas operations through stable supply of high-quality aluminum cans manufactured by leading-edge technologies and quality management system built up by SAC over many years. As a result of the completion of the new aluminum can factory of ACM, Showa Denko Group's capacity to manufacture aluminum cans in Southeast Asia has been expanded to 3 billion cans a year, including that of Hanacans Joint Stock Company of Vietnam which has capacity to produce 2 billion cans a year.

Topics

[Aluminum segment]

- **Strengthened R&D function for aluminum alloy materials**

In February 2018, SDK established a laboratory named “Aluminum Product Evaluation Center” in its Kitakata Plant located in Fukushima Prefecture. Kitakata Plant is SDK’s base to develop and manufacture cast and forged aluminum products. SDK’s aluminum products including *SHOTIC*™ are acclaimed by car manufacturers for their high strength, high abrasion resistance, and low thermal expansivity. In order to contribute to further weight reduction of cars, we should furthermore improve our aluminum alloy production technology, aiming to realize higher strength. In the new laboratory, we will develop alloys with higher performance. In addition, the Group aims to propose new multi-material products through composition of organic, inorganic, and metal materials by strengthening the Group’s analysis technology, which will be realized by close cooperation among Aluminum Product Evaluation Center, Analysis & Physical Properties Center, and Computational Science and Technology Information Center. Thus the Group will continue striving to give birth to sprouts of new businesses which will contribute to further growth of the Group in the future.

Topics

[Others segment]

- **Decided to start the third time expansion of high-grade SiC epitaxial-wafer production facilities in these 2 years**

SDK decided to farther expand its capacity to produce high-quality-grade silicon carbide (SiC) epitaxial wafers for power semiconductors, which have already been marketed under the trade name of "High-Grade Epi" (HGE), in addition to currently conducted expansion work of the HGE production facilities. SDK has been gradually expanding its capacity to produce HGE, which was 3,000 wafers* per month in 2017 before these expansion works. After the additional expansion work decided this time, which is to be finished in February 2019, SDK's HGE production capacity will be 9,000 wafers per month, which is three times as much as that in 2017. SDK's SiC epitaxial wafer business has been acclaimed by power semiconductor manufacturers, which are our customers, for the lowest incidence of crystal defects and the highest homogeneity of wafers in the world. SDK decided this time again to farther expand the HGE production facilities in order to respond to the growing need of our customers for HGE resulting from rapid growth of the market for SiC-based power semiconductors. When compared with the currently mainstream silicon-based semiconductors, SiC-based power semiconductors can operate under high-temperature, high-voltage, and high-current conditions, while conserving energy. These features enable device manufacturers to produce smaller, lighter, and more energy-efficient next-generation power control modules. In addition to the use in power modules for dispersion type power sources to utilize new energy sources, power modules for servers in data centers, and inverter modules for railcars, SiC-based power semiconductors are now replacing conventional silicon-based semiconductors for use in on-board battery chargers and rapid charging stations for EVs, in parallel with rapid expansion of the EV market. SDK will continue improving the quality of its SiC epitaxial wafer products and supplying them to the rapidly growing SiC power semiconductor market in timely and stable manner, while securing top-level market share.

* This number is based on a conversion into SiC epitaxial wafers for power devices having withstanding voltage of 1,200 V.