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

2020 Financial Results

- Consolidated -

SHOWA DENKO K.K.

February 17, 2021

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Representative 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 influence of the coronavirus disease 2019 (COVID-19) on the world economy, 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.

Overview of 2020 Financial Results

- Net Sales: 973.7 billion yen (increased by 67.2 billion yen from 2019),
  Operating Income: -19.4 billion yen (decreased by 140.2 billion yen from 2019)
  - Net sales increased: Showa Denko Materials Company, Ltd. was newly consolidated from the beginning of the 3Q, 2020 as Showa Denko Materials segment
    In existing businesses, Inorganics and Petrochemicals segments were down
  - Operating income significantly decreased: Electronics segment was up but Inorganics was down significantly
  - Showa Denko Materials segment was created as a new segment
    Net sales: 302.7 billion yen,
    Operating income: -6.3 billion yen due to posting of temporary expenses

- Special factors (impact on 2020 results) (ref. page 5)
  Influence of COVID-19 on operating income: 18.6 billion yen
  Influence of the integration with Showa Denko Materials: 38.9 billion yen

- Return to shareholders
  Year-end dividends per share for 2020: 65.0 yen (planned)

Consolidated Companies

- Consolidated subsidiaries: 151 [+90 (newly consolidated 91, excluded 1)]
  +91 : 90 companies related to Showa Denko Materials (former Hitachi Chemical),
  Showa Denko Photonics Co., Ltd.
  -1: Integrated European subsidiaries (Showa Denko Europe was merged into Showa Denko Carbon Holding)
- Equity method applied: 13 [+2 (newly applied)]
  +2: 2 companies related to Showa Denko Materials (former Hitachi Chemical)

Selected Data

(Average)

	2019	2019 Oct.-Dec.	2020	2020 Oct.-Dec.	Increase/decrease	Increase/decrease Oct.-Dec.
■Exchange rate:					Yen appreciated by	Yen appreciated by
¥/US$	109.1	108.8	106.8	104.5	2.2/$	4.3/$
¥/€	122.1	120.3	121.8	124.5	Yen appreciated by 0.3/€	Yen depreciated by 4.2/€
■Domestic naphtha price: ¥/KL	42,000	41,300	32,800	31,300	-9,200	-10,000
■Aluminum						
LME price: US$/T	1,811	1,758	1,728	1,931	-84	173
Domestic market*: K¥/T	250	246	232	252	-18	6

Exchange rate at December 31, 2019 ¥109.6/US$, at December 31, 2020 ¥103.5/US$
⇒Yen appreciated by ¥6.1/US$

*Domestic market: data from Nikkei

Summary

(Unit: Billions of Yen)

	2019	2020	Increase/ decrease
Net sales	906.5	973.7	67.2
Operating income	120.8	-19.4	-140.2
Non-operating income and expenses, net	-1.5	-24.5	-23.0
Interest/Dividends income and expenses	0.3	-4.6	-4.9
Equity in earnings of affiliates	0.7	1.2	0.5
Foreign exchange gains or losses	-0.7	-3.0	-2.3
Other	-1.8	-18.2	-16.4
Ordinary income	119.3	-44.0	-163.3
Extraordinary profit	2.9	8.4	5.5
Extraordinary loss	-24.3	-32.7	-8.4
Income before income taxes	97.9	-68.3	-166.1
Income taxes	-22.6	3.2	25.7
Net income	75.3	-65.1	-140.4
Net income attributable to non-controlling interests	-2.2	-11.2	-9.0
Net income attributable to owners of the parent	73.1	-76.3	-149.4
EBITDA	158.6	58.5	-100.1
	17.5%	6.0%	-11.5%
Net income attributable to owners of the parent per share	¥501.03	-¥523.06	-¥1,024.09
Cash dividends per share	¥130	¥65(planned)	-¥65

Special factors (impact on 2020 results)

(Unit: Billions of Yen)

Major item	Breakdown	2020	Oct.-Dec.
Petrochemicals	Negative influence of the difference between the receipts and disbursements of raw materials, reflecting the sharp decline in naphtha prices, time-lag factor	-4.5	+2.0
Graphite Electrodes	Devaluation of inventory in accordance with the “lower of cost or market” accounting method	-17.2	+1.6
Influence of COVID-19 on operating income		-18.6	-8.2
Influence of the integration with Showa Denko Materials Company, Ltd.	Advisory fee, attorney’s fee, etc. (Operating expenses)	-3.5	—
	Post-merger integration (PMI) expenses* (Operating expenses)	-4.7	-2.2
	Expenses related to fund-raising, registration tax, etc. (Non-operating expenses)	-16.1	-0.0
	Interest on borrowing related to share acquisition, etc. (Non-operating expenses)	-5.1	-2.1
	Expenses related to changes in firm names (Extraordinary losses)	-0.7	-0.3
	Preferred stock dividends (Net income attributable to non-controlling interests)	-8.8	-3.2
	Total of integration-related expenses	-38.9	-7.8
Extraordinary loss	Closure of Meitingen Plant, Germany, in the graphite electrode business	-5.1	0.0
	Total amount of the impact of special factors	**-84.3**	**-12.4**

* PMI expenses: expenses related to merger processes such as management and operation to maximize the effect of integration after merger.

Quarterly results for amortization of goodwill, etc. and expenses for step-up of inventories belonging to the Showa Denko Materials segment

(Unit: Billions of Yen)

	Jul. – Sept., 2020	Oct.- Dec., 2020	Second half, 2020
■Goodwill, depreciation on intangible fixed assets	6.0*3	11.2	17.2
■Expenses for step-up of inventories*1	0*3	10.9	10.9
Subtotal (Operating expenses)	6.0*3	22.1	28.0
■Investments and other assets*2 (Non-operating expenses)	0	1.1	1.1
Total	6.0*3	23.2	29.1

*1. Cost of goods sold related to inventory step-up

2. Step-up related to Equity in earnings of affiliates (investment securities)

3. The amount was calculated by tentative treatment which excluded Purchase Price Allocation (PPA) and "squeeze out" procedures because PPA and "squeeze out" procedures were not completed at the end of the third quarter, 2020.

PPA is an evaluation procedure, based on Accounting Standard for Business Combination, to distribute acquisition cost incurred during the process of M&A to the acquiring company's assets and liabilities.

Extraordinary Profit/Loss

(Unit: Billions of Yen)

	2019	2020	Increase/ decrease
■Extraordinary Profit	2.9	8.4	5.5
●Gain on sales of non-current assets	0.7	3.0	2.3
●Gain on sales of investment securities	1.7	5.0	3.2
●Other	0.5	0.5	0.0
■Extraordinary Loss	-24.3	-32.7	-8.4
●Loss on sales and retirement of non-current assets	-5.2	-3.0	2.2
●Business restructuring expenses	-1.7	-5.9	-4.2
●Impairment loss	-15.7	-16.6	-0.9
●Other	-1.8	-7.3	-5.4
■Extraordinary Profit/Loss, Net	-21.4	-24.3	-2.9

● **Impairment loss (2020)**

(Unit: Billions of Yen)

Segments	Businesses	Amount
Inorganics	Ceramics	-6.2
	Carbons	-2.6*
Aluminum	High-purity foil for capacitors	-8.8
	Other	-1.0
	Total	-18.5

(*Posted as business restructuring expense, etc.)

Asset streamlining
(Long-term Vision for Newly Integrated Company* : Short-to-medium-term synergy)

(Unit: Billions of Yen)

	Target amount (~ 2021)	2020 results
■ Reduction of Working capital ● Squeeze inventory through supply chain improvement, etc.	25.0	42.6
■ Sell-off of marketable securities ● Sell off cross-held shares	20.0	22.7
■ Sell-off of other assets ● Sell off shares of affiliates ● Sell off excess assets	5.0	7.7
■ Companywide total	50.0	73.1

*announced on Dec. 10, 2020

Consolidated Sales and Operating Income by Segment (1)

(Unit: Billions of Yen)

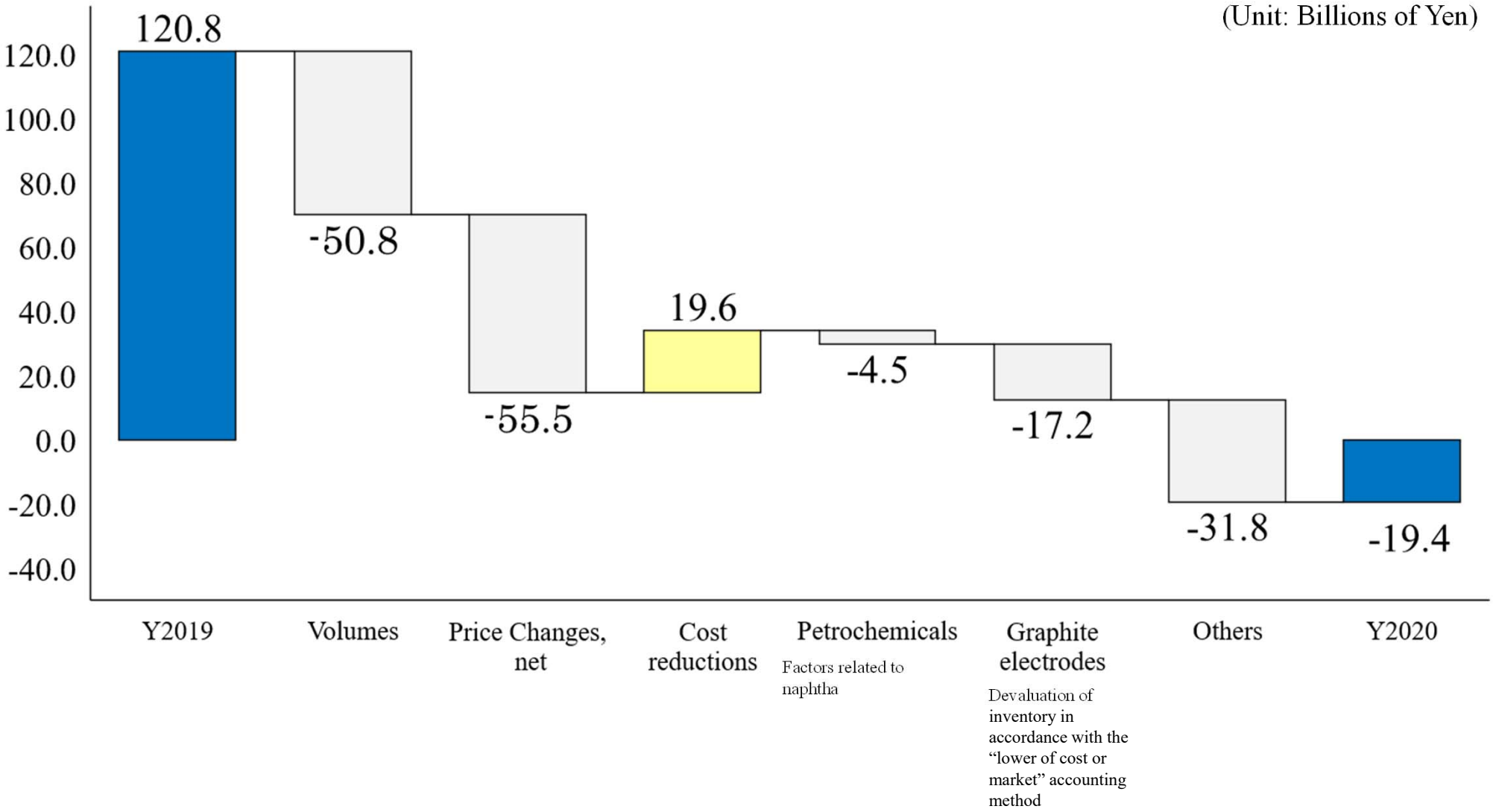
		2019	2020	Increase/ decrease	
Petrochemicals	Sales	250.7	193.4	-57.3	Olefins: sales decreased (market prices down, shipment volumes down) Organic chemicals: sales decreased (vinyl acetate, ethyl acetate: shipment volumes down due to shutdown maintenance, market prices down) SunAllomer Ltd.: sales decreased (market prices down, shipment volumes down)
	Operating income	17.2	4.9	-12.3	Olefins: profit decreased (depreciation of naphtha inventory due to a fall in market price, shipment volumes down) Organic chemicals: profit decreased (vinyl acetate, ethyl acetate: shipment volumes down, market prices down) SunAllomer Ltd.: profit decreased (shipment volumes down)
Chemicals	Sales	157.5	155.8	-1.7	Basic chemicals: sales decreased (ammonia, chloroprene rubber: shipment volumes down, AN: shipment volumes down, market prices down) Electronic chemicals: sales increased (shipment volumes up) Industrial gases: sales decreased (shipment volumes of carbon dioxide down) Functional chemicals: sales decreased (shipment volumes down) Coating materials: sales increased, newly consolidated in 2H, 2019
	Operating income	13.7	13.5	-0.2	Basic chemicals: profit decreased (AN, chloroprene rubber: profit down, ammonia: profit up) Electronic chemicals: profit increased (shipment volumes up) Industrial gases: profit maintained at the year-earlier level Functional chemicals: profit decreased (shipment volumes down)
Electronics	Sales	96.4	97.4	1.0	HDs: sales decreased (shipment volumes down) Compound semiconductors: sales increased (shipment volumes for export up) LIB materials: sales increased (shipment volumes of *SPALF*™ up) SiC epitaxial wafers: sales increased (shipment volumes for Japan up)
	Operating income	4.9	9.1	4.3	HDs: profit maintained at the year-earlier level Compound semiconductors: profit increased (shipment volumes for export up) LIB materials: profit increased (shipment volumes of *SPALF*™ up) SiC epitaxial wafers: profit increased (shipment volumes for Japan up)
Inorganics	Sales	230.1	82.9	-147.2	Ceramics: sales decreased (shipment volumes of abrasives for auto and steel industries down) Graphite electrodes: sales significantly decreased (shipment volumes down due to further reduced production, market prices down)
	Operating income	89.3	-32.3	-121.6	Ceramics: profit increased (lower of cost or market accounting method) Graphite electrodes: profit significantly decreased (devaluation of inventory in accordance with the "lower of cost or market" accounting method, shipment volumes down due to further reduction in production, market prices down)

Consolidated Sales and Operating Income by Segment (2)

(Unit: Billions of Yen)

		2019	2020	Increase/ decrease	
Aluminum	Sales	97.5	80.2	-17.4	High-purity foil for capacitors: sales decreased (shipment volumes down) Aluminum specialty components: sales decreased (shipment volumes for auto application, OA and FA industries down) Aluminum cans: sales decreased (shipment volumes for Japan and Vietnam down)
	Operating income	1.7	0.4	-1.3	High-purity foil for capacitors: profit slightly increased Aluminum specialty components: profit decreased (shipment volumes down) Aluminum cans: profit decreased (shipment volumes for Japan and Vietnam down)
Showa Denko Materials	Sales	—	302.7	302.7	At the beginning of the third quarter 2020, we started to incorporate net sales, profit and loss of Showa Denko Materials Co., Ltd. into the consolidated financial statements.
	Operating income	—	-6.3 *(+21.8)*	-6.3 *(+21.8)*	Operating income includes expense of 28.0 billion yen to cover amortization of goodwill which was reckoned as a result of acquisition of shares in Showa Denko Materials and amount of adjustment of cost of sales on a consolidated basis due to market valuation of inventories on consolidation. **Amounts in parentheses are those excluding amortization of goodwill, etc. and expenses for step-up of inventories, and are for reference*
and	Sales	126.2	107.3	-18.9	SHOKO: sales decreased (market prices down in metal ceramics business)
	Operating income	1.8	1.2	-0.6	SHOKO: profit decreased
Adjustments	Sales	-52.0	-46.0	6.0	
	Operating income	-7.8	-10.0	-2.2	Expenses related to integration with Showa Denko Materials Company, Ltd.
Total	Sales	906.5	973.7	67.2	
	Operating income	120.8	-19.4	-140.2	

Operating Income Breakdown by Factor



Consolidated Balance Sheet

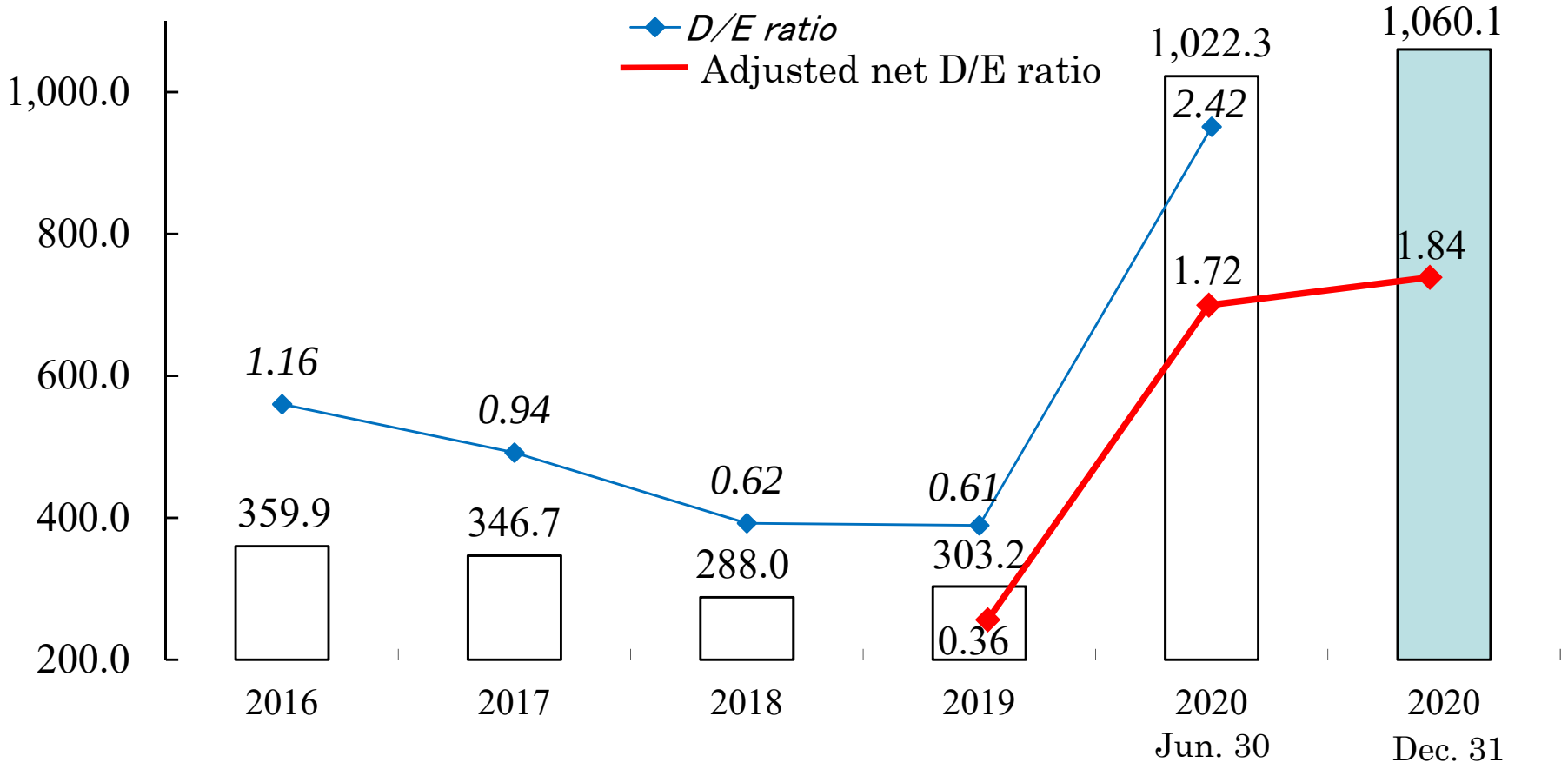
(Unit: Billions of Yen)

Assets	Dec. 31, 2019	Dec. 31, 2020	Increase/ decrease	Liabilities and net assets	Dec. 31, 2019	Dec. 31, 2020	Increase/ decrease
Cash and deposits	122.1	199.0	76.9	Notes and accounts payable	117.5	164.4	46.8
Notes and accounts receivable	170.3	271.6	101.3	Interest-bearing debt	303.2	1,060.1	757.0
Inventories	173.7	190.2	16.5	Net defined benefit liability	10.0	24.7	14.8
Other current assets	31.0	61.8	30.8	Other liabilities	126.3	236.3	109.9
Total current assets	497.1	722.6	225.6	Total liabilities	556.9	1,485.5	928.6
Buildings and structures	77.1	142.3	65.2	Capital stock	140.6	140.6	0
Machinery and equipment	140.3	222.0	81.7	Capital surplus	78.9	78.2	-0.7
Land	224.0	264.6	40.6	Retained earnings	249.2	165.6	-83.7
Other tangible fixed assets	31.7	98.2	66.5	Treasury stock	-11.7	-11.7	0
Total tangible fixed assets	473.2	727.1	254.0	Total shareholders' equity	457.1	372.7	-84.4
Goodwill	3.3	359.2	355.9	Valuation difference on available-for-sale securities	9.8	3.7	-6.1
Other intangible fixed assets	19.3	239.2	219.9	Deferred gains or losses on hedges	0.4	0.9	0.5
Total intangible fixed assets	22.6	598.4	575.8	Revaluation reserve for land	33.1	29.0	-4.0
Investments and other assets	83.5	155.4	71.9	Foreign currency translation adjustment	4.1	-0.5	-4.6
incl. investment securities	71.8	106.4	34.6	Remeasurements of defined benefit plans	-5.1	0.1	5.2
				Total accumulated other comprehensive income	42.3	33.3	-9.0
				Non-controlling interests	20.1	312.1	292.1
Total fixed assets	579.3	1,481.0	901.6	Total net assets	519.4	718.1	198.6
Total assets	**1,076.4**	**2,203.6**	**1,127.2**	**Total liabilities and net assets**	**1,076.4**	**2,203.6**	**1,127.2**

Showa Denko K.K. (SDK) has made Hitachi Chemical Company, Ltd. a consolidated subsidiary, considering the end of this second quarter (June 30, 2020) as acquisition date, and consolidated Hitachi Chemical's financial results into Showa Denko's consolidated financial statements. SDK started to include leasing liabilities in interest-bearing debts in this third quarter. Accordingly, we retrospectively adjusted interest-bearing debts as of December 31, 2019 and June 30, 2020 in the same way.

Interest-bearing Debt and D/E ratio

(Unit: Billions of Yen)



Equity ratio	31.8%	34.3%	41.5%	46.4%	20.0%	18.4%

(note) SDK started to include leasing liabilities in interest-bearing debts in this third quarter. Accordingly, we retrospectively adjusted interest-bearing debts as of December 31, 2019 and June 30, 2020 in the same way. In accordance with the consolidation of Showa Denko Materials Company, Ltd., SDK calculated its D/E ratio with an assumption as follows, starting from the third quarter of the fiscal year ending December 31, 2020. Regarding preferred stocks issued by HC Holdings K.K., which is a subsidiary of SDK, we will add the amount equivalent to 50% of the value of issued preferred stocks to interest-bearing debts and the remaining 50% of it to the equity capital of SDK. We will also add lease liability to the equity capital of SDK, and use net interest-bearing debt (interest-bearing debt minus cash and deposits) in calculation of D/E ratio. The assumption that we consider 50% of the total value of issued preferred stocks as equity capital is based on the credit rating given by Japan Credit Rating Agency, Ltd. on April 21, 2020.

Consolidated Cash Flows

(Unit: Billions of Yen)

	2019	2020	Increase/ decrease
●CF from operating activities	78.6	109.3	30.7
●CF from investing activities	-48.2	-930.0	-881.9
●Free CF	30.4	-820.8	-851.2
●CF from financing activities	-18.5	896.5	915.1
●Others	-3.0	0.4	3.4
Increase/decrease of cash and equivalents	8.9	76.2	67.3

Capital Expenditures/ Depreciation by Segment

(Unit: Billions of Yen)

	2019		2020		Increase/decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	4.4	4.1	5.1	4.2	0.7	0.1
Chemicals	11.4	9.3	11.4	9.5	0.0	0.2
Electronics	10.5	9.3	8.3	9.4	-2.2	0.1
Inorganics	11.7	8.0	8.1	8.3	-3.6	0.2
Aluminum	8.5	4.8	9.7	4.5	1.2	-0.3
Showa Denko Materials*	—	—	23.1	21.5	23.1	21.5
Others	3.8	2.1	3.4	3.2	-0.4	1.1
Total	50.2	37.7	69.1	60.6	18.8	22.9

* Excluding depreciation of intangible fixed assets caused by application of PPA (Purchase Price Allocation)

Selected Data 2020, 2021 Forecast (Consolidated)

(*Unit: Billions of Yen)

	2019	2020	2020-2019 Increase/ decrease	2021 Forecast	2021-2020 Increase/ decrease
●Exchange rate: ¥/US$	109.1	106.8	appreciated by 2.2	105.0	appreciated by 1.8
¥/€	122.1	121.8	appreciated by 0.3	125.0	depreciated by 3.2
●Domestic naphtha price: ¥/KL	42,000	32,800	-9,200	33,200	400
●Aluminum LME price: US$/T	1,811	1,728	-83	1,700	-28
●Interest-bearing debt*	303.2	1,060.1	757.0	1,030.0	-30.1
●Interest/dividend income less interest expenses*	0.3	-4.6	-4.9	-9.3	-4.7
●R&D expenditures*	20.6	34.4	13.8	53.0	18.6
●Number of employees: people	10,813	33,684	22,871	32,221	-1,463
●Total employment cost*	85.9	142.2	56.3	199.3	-57.1

2021 Forecast (Consolidated)

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

	2020	2021 Forecast	Increase/ decrease	2021 Forecast	
				1st Half	2nd Half
Net sales	973.7	1,280.0	306.3	630.0	650.0
Operating income	-19.4	45.0	64.4	11.0	34.0
Non-operating income and expenses	-24.5	-10.0	14.5	-5.0	-5.0
Ordinary income	-44.0	35.0	79.0	6.0	29.0
Extraordinary profit/loss	-24.3	-20.0	4.3	-10.0	-10.0
Net income	-65.1	0.0	65.1	-9.0	9.0
Net income attributable to owners of the parent	-76.3	-14.0	62.3	-16.0	2.0
EBITDA	58.5	165.1	106.6		
	6.0%	12.9%	6.9%		
Net income attributable to owners of the parent per share	-¥523.06	-¥95.97	¥427.09		
Cash dividends per share	¥65 (planned)	¥65	¥0		

Special factors (impact on 2021 forecast)

(Unit: Billions of Yen)

Major item	Breakdown	Amount
Temporary Expenses	Total	**-18.8**
Influence of COVID-19	Chemicals segment	-1.1
	Aluminum segment	-1.1
	Showa Denko Materials segment	-15.7
	Other	-0.9
Continuous Expenses	Total	**-29.4**
Expenses pertaining to the integration with Showa Denko Materials Co., Ltd.	Post-merger integration (PMI) expenses (Operating expenses)	-8.0
	Interest on borrowing related to share acquisition, etc. (Non-operating expenses)	-8.5
	Preferred stock dividends (Net income attributable to non-controlling interests)	-12.9
Total amount of the impact of special factors on full year forecast		**-48.2**

PPA Results and Amortization of Assets Pertaining to Showa Denko Materials Co., Ltd.

(Unit: Billions of Yen)

	Recognized amount	Amortization period	Amortization amount	
			2020	2021 Forecast
■Intangible Fixed Assets	215.9		8.1	16.1
●Customer related assets	154.9	20 years	3.9	7.7
●Technology related assets	57.1	7 years	4.1	8.2
●Other	3.9	20 years	0.1	0.2
■Goodwill	365.1	20 years	9.1	18.3
Subtotal (Operating expenses)	581.0		17.2	34.4
■Investments and other assets ●Equity in earnings of affiliates (investment securities) (Non-operating expenses)	44.9	20 years	1.1	2.2
Total	625.9		18.3	36.6

*PPA (Purchase Price Allocation) is an evaluation procedure, based on Accounting Standard for Business Combination, to distribute acquisition cost incurred during the process of M&A to the acquiring company's assets and liabilities.

Sales and Operating Income by Segment, 2021 Forecast (Consolidated) (1)

(Unit: Billions of Yen)

		2020	2021 Forecast	Increase/ decrease		2021 Forecast	
						1st Half	2nd Half
Petro -chemicals	Sales	193.4	196.0	2.6	Olefins: firm demand in Asia is expected, ethylene plant will operate at full capacity	96.0	100.0
	Operating income	4.9	11.5	6.6	Naphtha factor of 2020 expected to be dissolved, spreads will improve	4.5	7.0
Chemicals	Sales	155.8	166.0	10.2	Basic chemicals, Industrial gases: impact of COVID-19 will diminish, High-purity gases for electronics: bullish market	79.0	87.0
	Operating income	13.5	15.5	2.0		6.5	9.0
Electronics	Sales	97.4	110.0	12.6	HDs: shipment volumes for NL servers in data centers expected to increase, Compound semiconductors: shipment volumes expected to increase LIB materials: shipment volumes of *SPALF*™ expected to increase	47.0	63.0
	Operating income	9.1	12.5	3.4		2.5	10.0
Inorganics	Sales	82.9	77.0	-5.9	Carbon: sales decrease expected (sales volumes up, market prices expected to rise gradually, but its annual average expected to be lower than before) Ceramics: sales decrease expected (recovery of abrasives expected to be slow)	37.0	40.0
	Operating income	-32.3	3.0	35.3	Carbon: profit increase expected (sales volumes up) Ceramics: slight profit decrease expected	0.0	3.0

Sales and Operating Income by Segment, 2021 Forecast (Consolidated) (2)

(Unit: Billions of Yen)

		2020	2021 Forecast	Increase/ decrease		2021 Forecast	
						1st Half	2nd Half
Alumi-num	Sales	80.2	58.0	-22.2	Rolled products, Aluminum cans: sales and income/loss are to be posted until the end of 1st half, 2021	42.0	16.0
	Operating income	0.4	3.5	3.1	Aluminum specialty components: profit increase expected: shipment volumes up	2.5	1.0
Showa Denko Materials	Sales	302.7	610.0	307.3	Full year contribution in 2021, Temporary factors (expenses for step-up of inventories) expected to be dissolved, Materials for semiconductors expected to remain strong well above the market growth, Sales volumes expected to increase due to recovery of automobile production and Sales volumes for new models are expected to increase *Amounts in parentheses are those excluding amortization of goodwill, etc. and expenses for step-up of inventories, and are for reference*	300.0	310.0
	Operating income	-6.3 *(+21.8)*	10.0 *(+44.4)*	16.3 *(+22.6)*		1.0	9.0
Others	Sales	107.3	111.0	3.7		53.0	58.0
	Operating income	1.2	1.0	-0.2		0.5	0.5
Adjust-ments	Sales	-46.0	-48.0	-2.0		-24.0	-24.0
	Operating income	-10.0	-12.0	-2.0		-6.5	-5.5
Total	Sales	973.7	1,280.0	306.3		630.0	650.0
	Operating income	-19.4	45.0	64.4		11.0	34.0

Consolidated Cash Flows, 2021 Forecast

(Unit: Billions of Yen)

	2020	2021 Forecast	Increase/ decrease
●CF from operating activities	109.3	135.0	25.7
●CF from investing activities	-930.0	-75.0	855.0
●Free CF	-820.8	60.0	880.8
●CF from financing activities	896.5	-60.0	-956.5
●Others	0.4	0.0	-0.4
Increase/decrease of cash and equivalents	76.2	0.0	-76.2

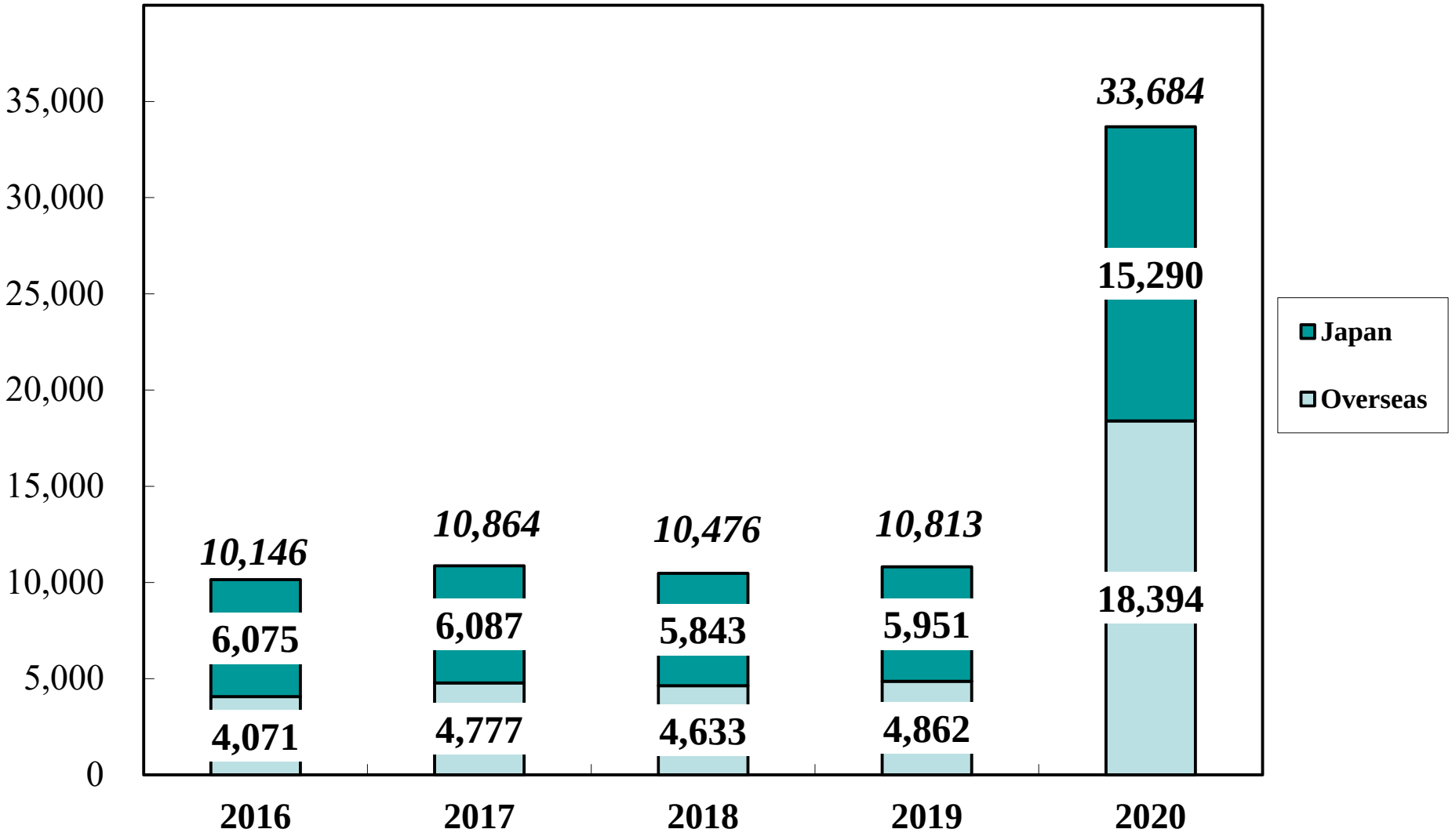
Capital Expenditures/Depreciation by Segment
2021 Forecast

(Unit: Billions of Yen)

	2020		2021 Forecast		Increase/decrease	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	5.1	4.2	2.9	4.3	-2.2	0.1
Chemicals	11.4	9.5	7.4	9.8	-4.0	0.3
Electronics	8.3	9.4	15.7	9.5	7.4	0.1
Inorganics	8.1	8.3	8.4	8.2	0.3	-0.1
Aluminum	9.7	4.5	4.9	4.8	-4.8	0.3
Showa Denko Materials	23.1	21.5	52.4	45.6	29.3	24.1
Others	3.4	3.2	2.8	3.3	-0.6	0.1
Total	69.1	60.6	94.6	85.5	25.5	24.9

* Excluding depreciation of intangible fixed assets caused by application of PPA (Purchase Price Allocation)

(Reference) Total Number of Employees and Breakdown by Location



Japan	59.9%	56.0%	55.8%	55.0%	45.4%
Overseas	40.1%	44.0%	44.2%	45.0%	54.6%

(Reference) Summary

CQ3 (Jul.1 – Sept.30), 2020 vs. CQ4 (Oct.1 – Dec.31), 2020

(Unit: Billions of Yen)

	CQ3, 2020	CQ4, 2020	Increase/ decrease
Net sales	309.4	337.7	28.4
Operating income	10.4	-4.0	-14.4
Non-operating income and expenses, net	-3.9	-3.2	0.8
Interest/Dividends income and expenses	-1.8	-1.9	-0.1
Equity in earnings of affiliates	0.6	0.2	-0.4
Foreign exchange gains or losses	-1.9	-1.1	0.7
Other	-0.9	-0.3	0.5
Ordinary income	6.4	-7.2	-13.6
Extraordinary profit	0.4	5.9	5.5
Extraordinary loss	-3.7	-20.6	-16.9
Income before income taxes	3.2	-21.8	-25.0
Income taxes	-2.4	7.3	9.8
Net income	0.7	-14.5	-15.3
Net income attributable to non-controlling interests	-3.8	-4.1	-0.3
Net income attributable to owners of the parent	-3.1	-18.6	-15.6

EBITDA	36.6	28.2	-8.4
	11.8%	8.4%	-3.4%

(Reference) Consolidated Sales and Operating Income by Segment (1)

(Unit: Billions of Yen)

		CQ3, 2020	CQ4, 2020	Increase/ decrease	
Petrochemicals	Sales	46.8	50.8	4.0	Olefins: sales increased (shipment volumes up, market prices up) Organic chemicals: sales increased (vinyl acetate, ethyl acetate: shipment volumes up) SunAllomer Ltd.: sales maintained at CQ3, 2020 level
	Operating income	5.0	3.6	-1.3	Olefins: profit decreased (due to naphtha factor) Organic chemicals: profit increased (shipment volumes up) SunAllomer Ltd.: profit decreased
Chemicals	Sales	41.0	42.8	1.8	Basic chemicals: sales increased (ammonia, chloroprene rubber: shipment volumes up) Electronic chemicals: sales increased (shipment volumes up) Industrial gases: sales slightly decreased Functional chemicals: sales increased Coating materials: sales maintained at CQ3, 2020 level
	Operating income	4.3	4.2	-0.1	Basic chemicals: profit increased (ammonia, chloroprene rubber, AN: profit up) Electronic chemicals, Functional chemicals: profit maintained at CQ3, 2020 level Industrial gases: profit decreased Coating materials: profit slightly decreased
Electronics	Sales	24.1	28.7	4.5	HDs: sales increased (shipment volumes up) Compound semiconductors: sales maintained at CQ3, 2020 level LIB materials: sales increased (shipment volumes of *SPALF*™ up) SiC epitaxial wafers: sales increased (shipment volumes up)
	Operating income	3.0	4.3	1.3	HDs: profit increased (shipment volumes up) Compound semiconductors : profit maintained at CQ3, 2020 level LIB materials: profit increased (shipment volumes up) SiC epitaxial wafers: profit increased (shipment volumes up)
Inorganics	Sales	18.3	21.6	3.3	Ceramics: sales increased (shipment volumes of abrasives for auto and steel industry up) Graphite electrodes: sales increased (shipment volumes up)
	Operating income	-3.3	-6.1	-2.8	Ceramics: profit decreased Graphite electrodes: profit decreased (shipment volumes up but market prices down)

(Reference) Consolidated Sales and Operating Income by Segment (2)

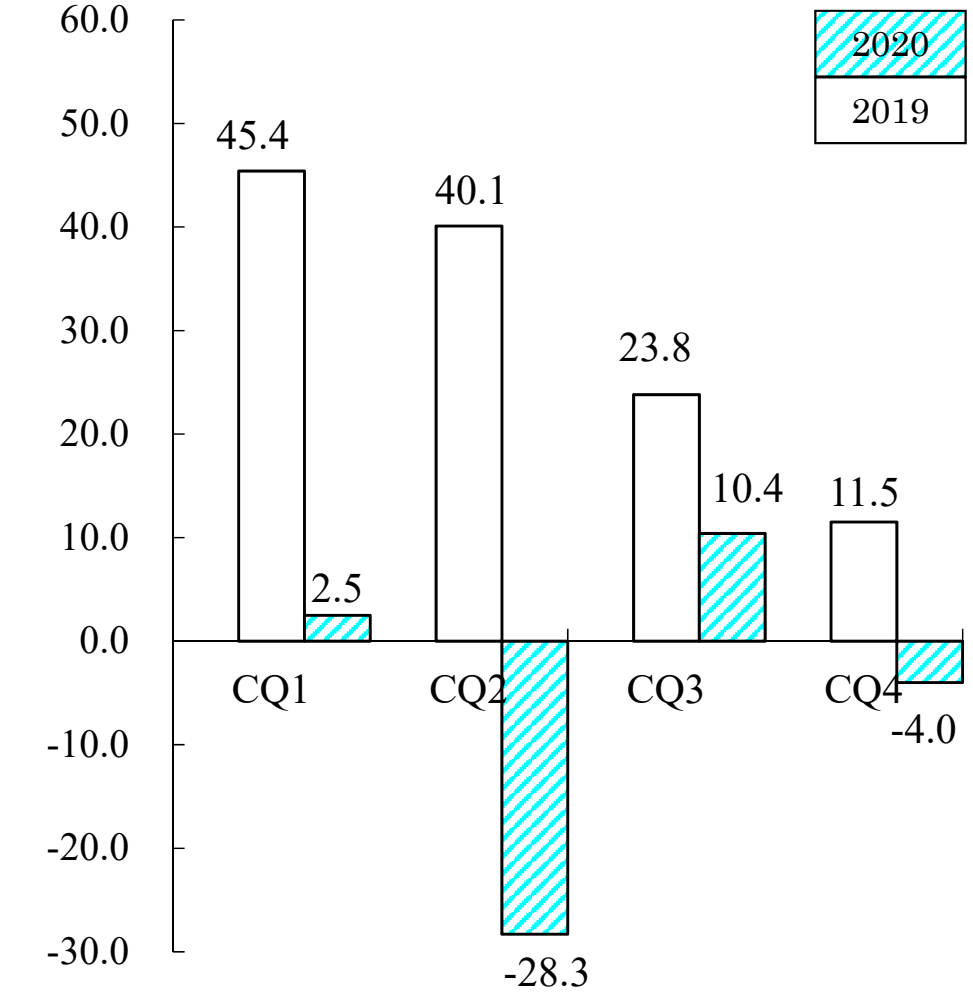
(Unit: Billions of Yen)

		CQ3, 2020	CQ4, 2020	Increase/ decrease	
Aluminum	Sales	19.6	21.7	2.2	High-purity foil for capacitors: sales increased (shipment volumes up) Aluminum specialty components: sales increased (shipment volumes for auto application partially up) Aluminum cans: sales slightly decreased
	Operating income	-0.1	0.7	0.8	High-purity foil for capacitors: profit increased (shipment volumes up) Aluminum specialty components: profit increased (shipment volumes up) Aluminum cans: profit decreased
Showa Denko Materials	Sales	144.8	157.9	13.1	Electronic materials, Printed Wiring Board Materials : sales increased(Sales of semiconductor-related materials remained strong) Mobility components, Energy Storage Devices and Systems : sales increased(Increase in automobile production)
	Operating income	2.8 *(+8.8)*	-9.1 *(+13.0)*	-11.9 *(+4.2)*	Increasing sales should have raised profits, but profits actually decreased due to an increase in amortization of goodwill and amount of adjustment of cost of sales on a consolidated basis due to market valuation of inventories on consolidation. **Amounts in parentheses are those excluding amortization of goodwill, etc. and expenses for step-up of inventories, and are for reference*
Others	Sales	24.5	27.3	2.8	SHOKO: sales increased
	Operating income	0.1	0.6	0.4	
Adjustments	Sales	-9.8	-13.1	-3.3	
	Operating income	-1.4	-2.3	-0.8	
Total	Sales	309.4	337.7	28.4	
	Operating income	10.4	-4.0	-14.4	

(Reference) Quarterly Operating Income by Segment

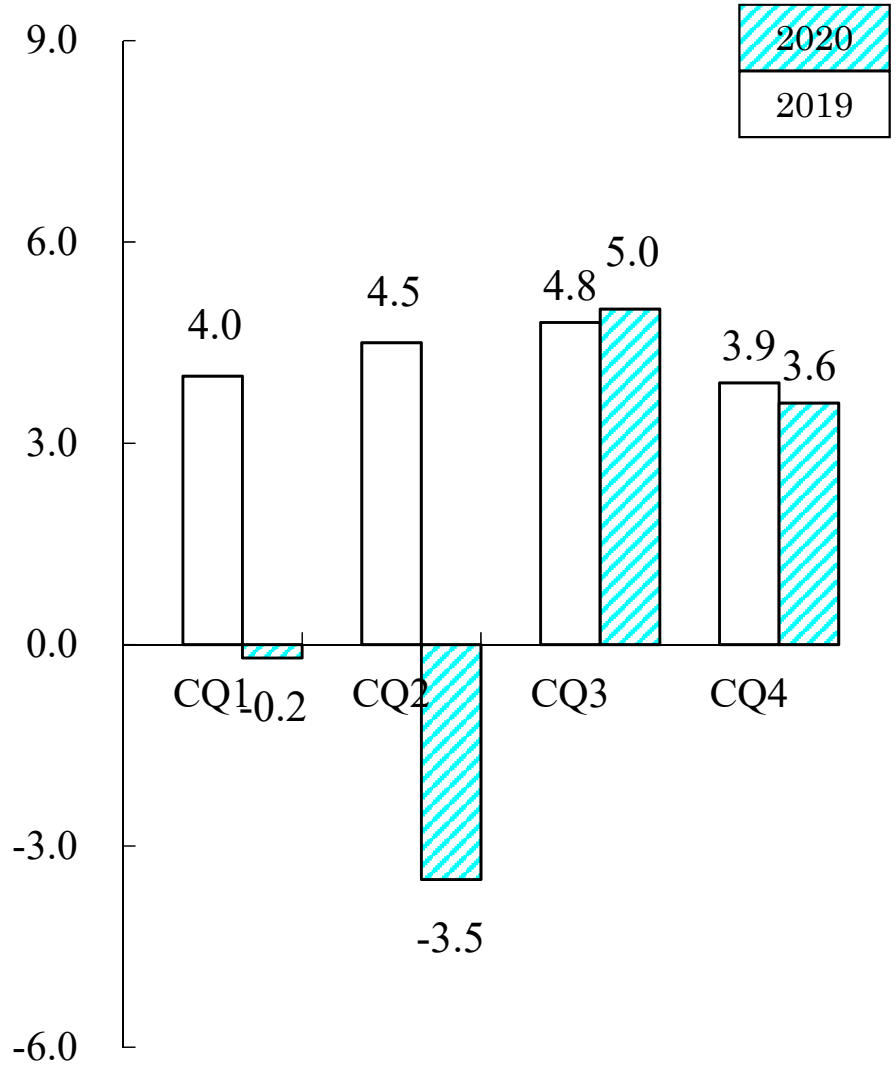
《Total》

(Unit: Billions of Yen)



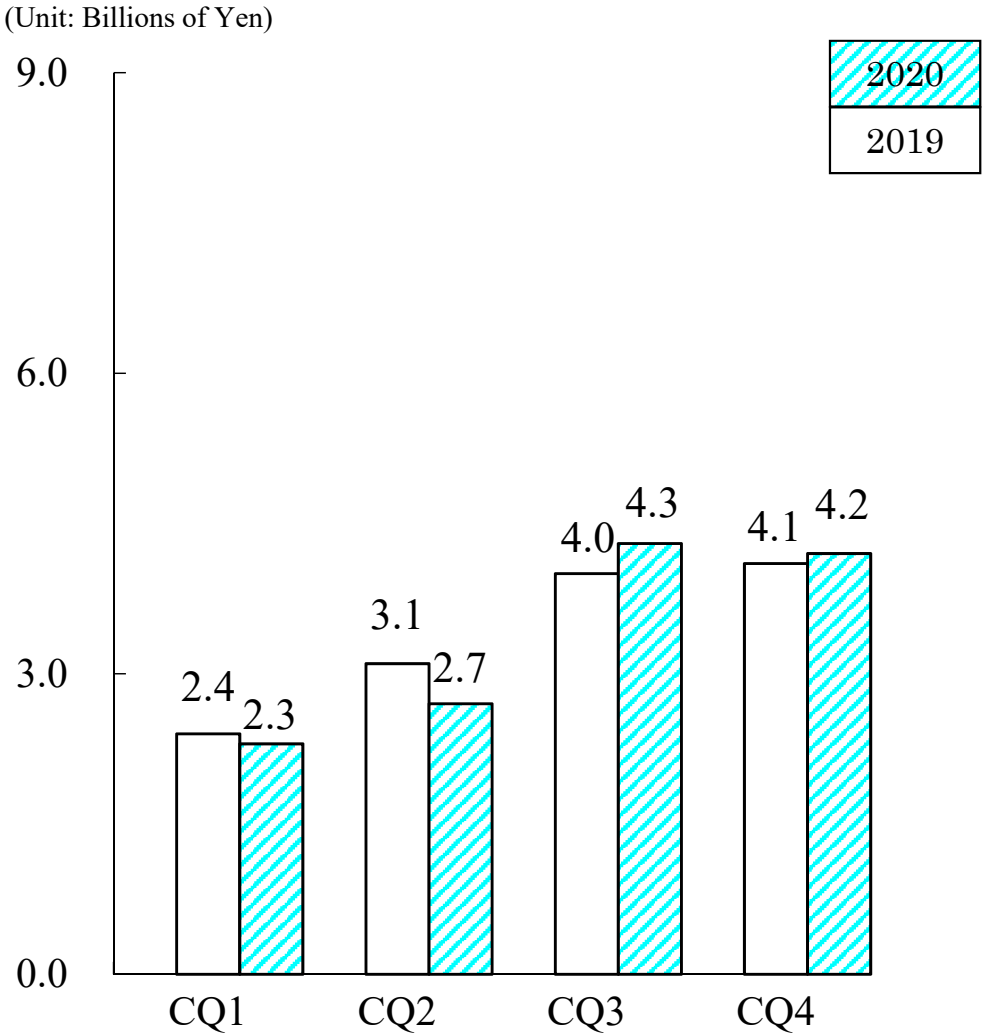
《Petrochemicals》

(Unit: Billions of Yen)

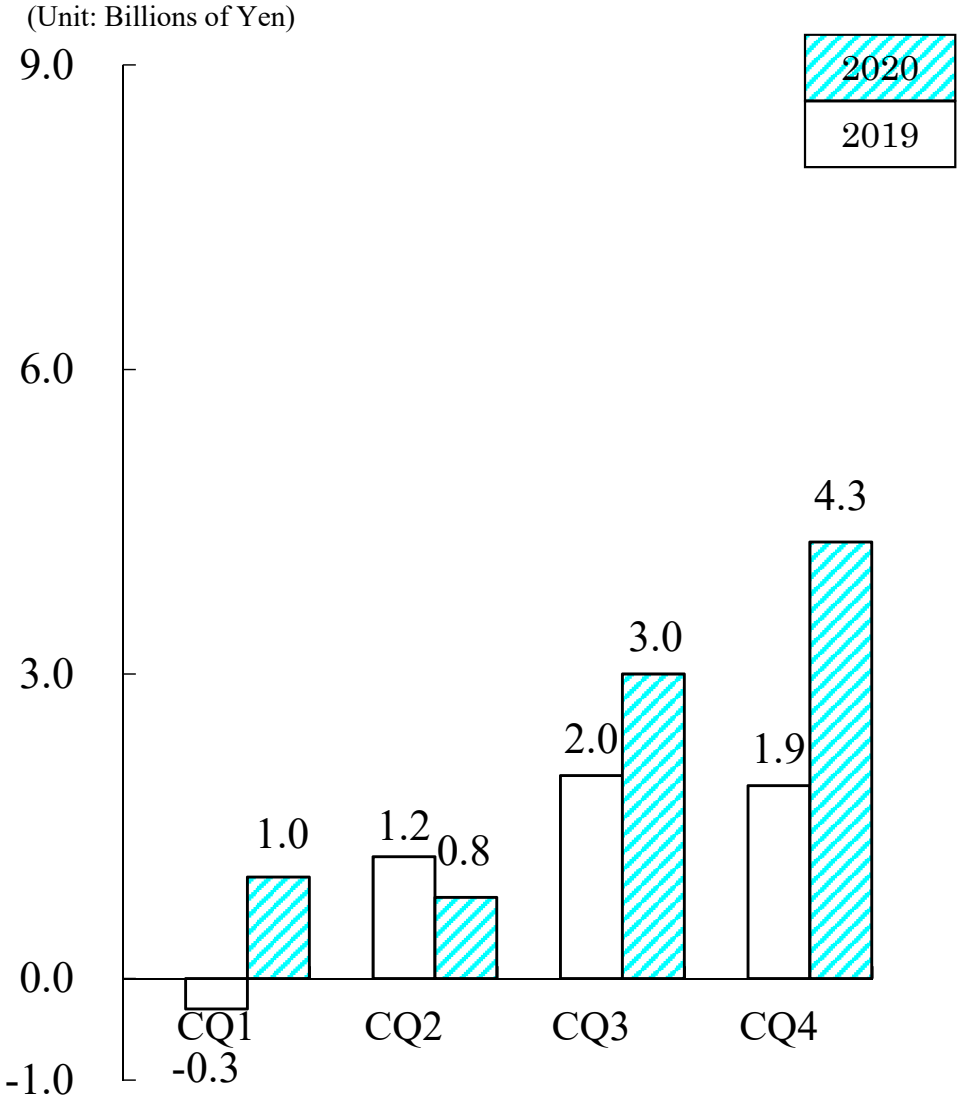


(Reference) Quarterly Operating Income by Segment

《Chemicals》

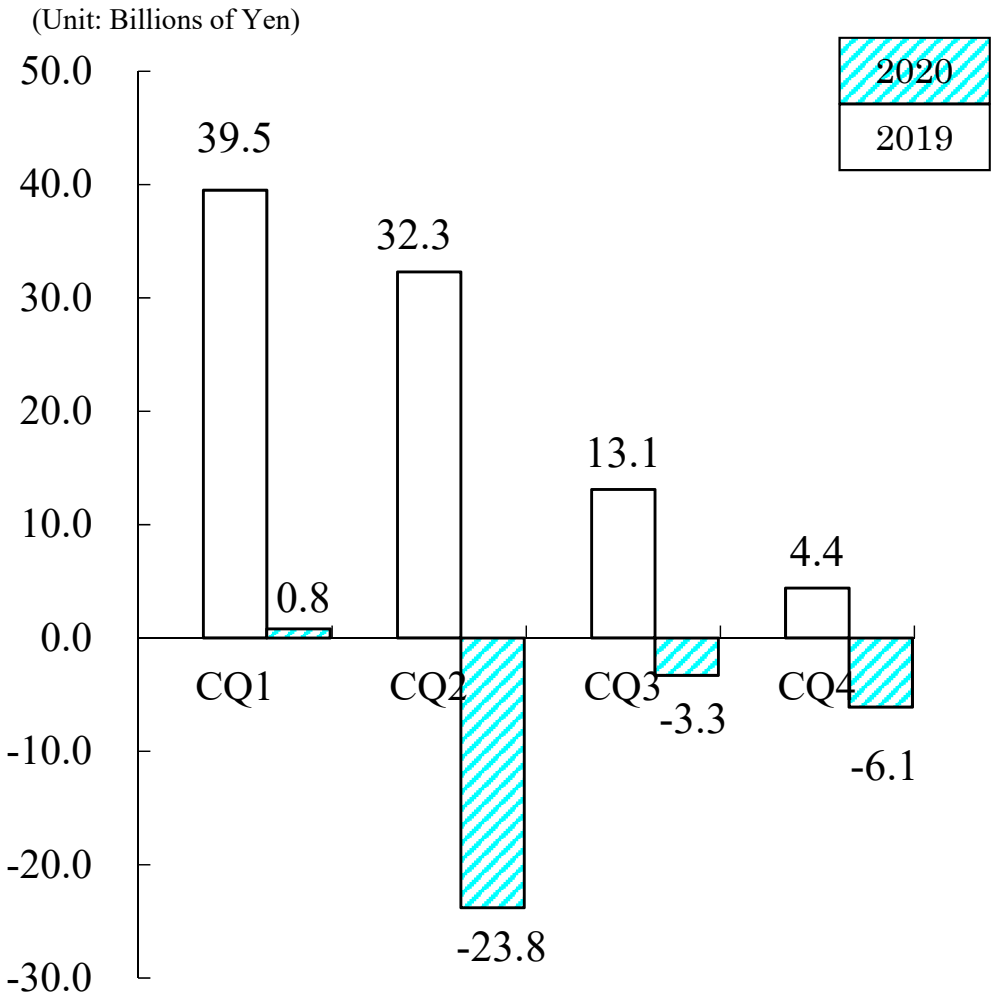


《Electronics》

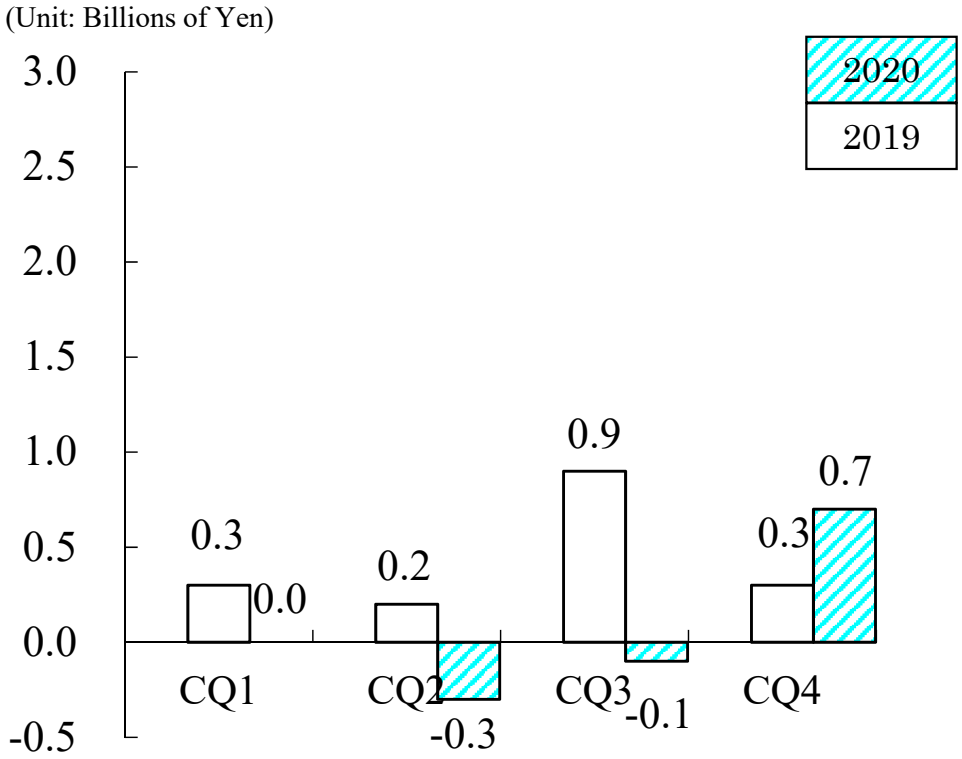


(Reference) Quarterly Operating Income by Segment

《Inorganics》

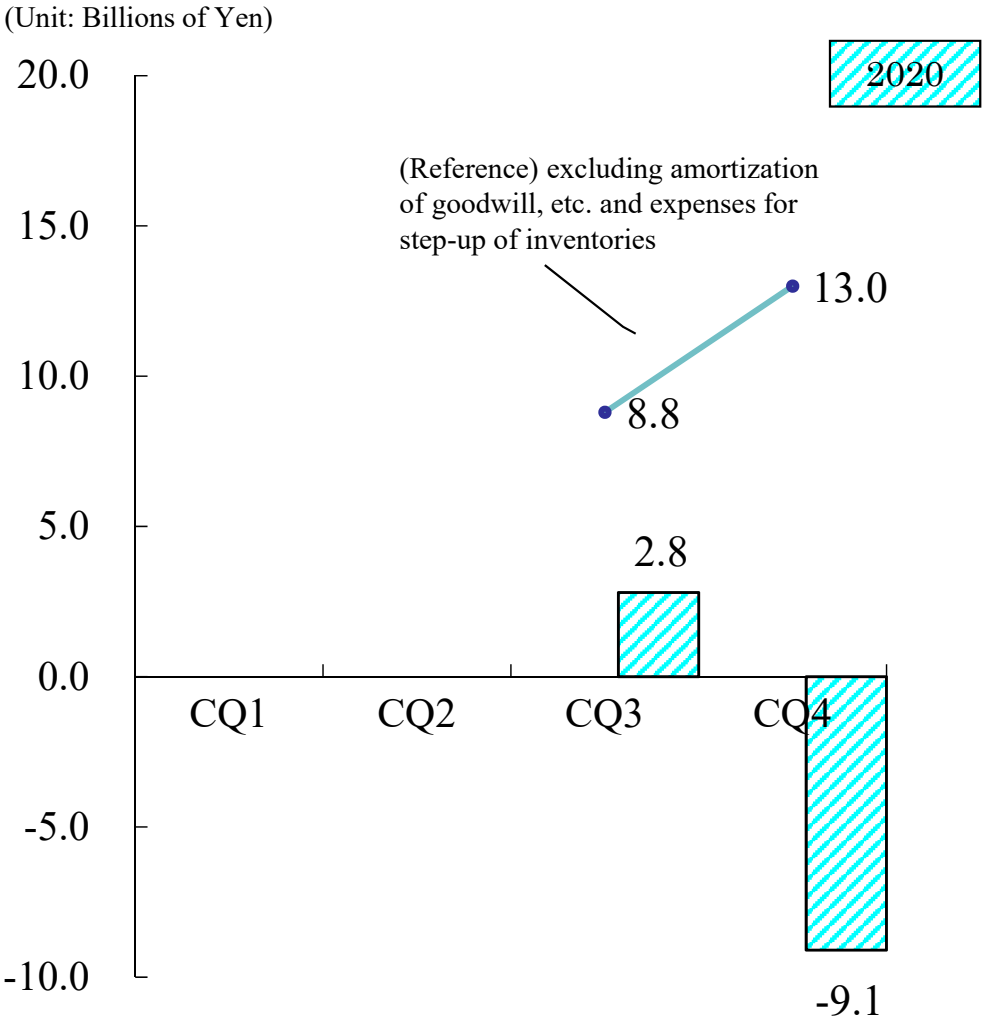


《Aluminum》

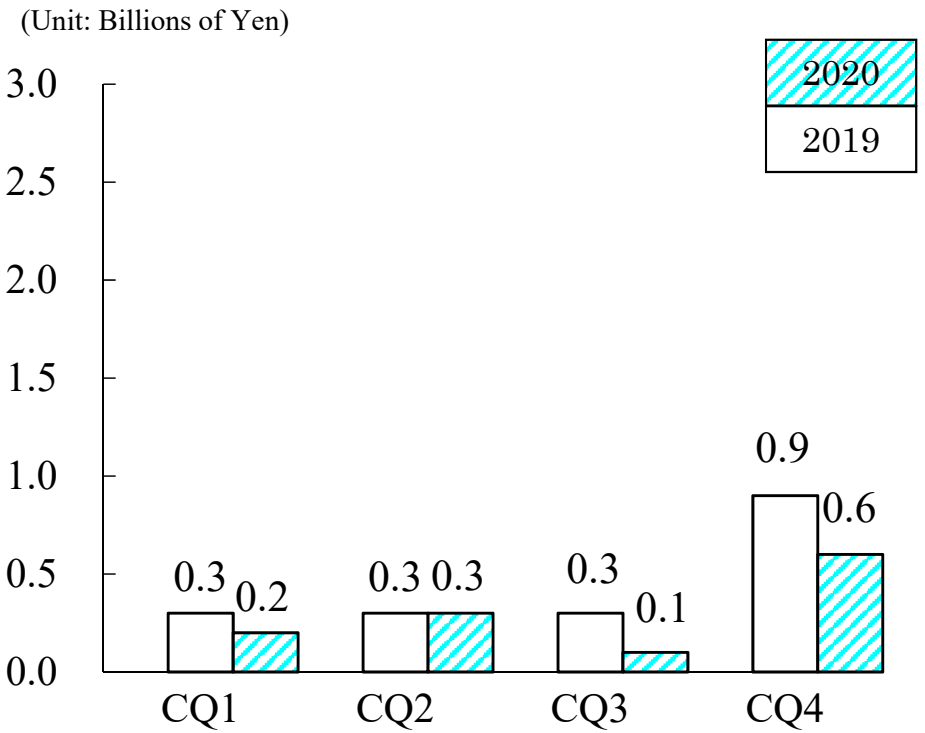


(Reference) Quarterly Operating Income by Segment

《Showa Denko Materials》



《Others》



Showa Denko K.K. made Showa Denko Materials Co., Ltd. a consolidated subsidiary and started on July 1, 2020 to incorporate Showa Denko Materials' sales figures and incomes/losses into its consolidated financial statements.

Topics

[General]

In April 2020, Showa Denko made then Hitachi Chemical Company, Ltd. a subsidiary through tender offer.

In October 2020, former Hitachi Chemical Company, Ltd. changed its firm name into Showa Denko Materials Co., Ltd.

For detail, please refer to our news releases announced on April 21 and June 23, 2020.

● Formulated “Long-term Vision (2021-2030) for Newly Integrated Company”

On December 10, 2020, Showa Denko announced “Long-term Vision (2021-2030) for Newly Integrated Company” under which the Company aims to establish a foundation for future growth through integration with Showa Denko Materials Co., Ltd. In the Long-term Vision, SDK defined its purpose as “Change society through the power of chemistry.” To fulfill this purpose, SDK will aim to create functions required of the times as an advanced material partner, and contribute to a sustainable development of the global society. SDK also announced its ideal state as to become “a company that can win the global competition” and “a company that contributes to a sustainable global society,” and will strive to realize this ideal state. For the detail of the Long-term Vision including the newly integrated company’s strategy and numerical targets, please refer to “3. Management Policy, (1) Medium- to long-term business strategy, 1) Long-term Vision (2021-2030) for Newly Integrated Company.” SDK will aim to achieve substantial integration including that of the chain of command and corporate function in July 2021, and integration as a corporate entity in January 2023.

Topics

[General]

- Joined “The Valuable 500”

In September 2020, SDK signed a document to declare joining “The Valuable 500,” an international initiative to promote inclusion of persons with disabilities, because the Company endorsed the aim and activities of the initiative. The Valuable 500 was launched to promote inclusion of persons with disabilities under an idea that “inclusive business creates inclusive society.” The Valuable 500 aims to encourage business leaders to make their own companies’ businesses inclusive ones in order to let persons with disabilities demonstrate their potential to add value to businesses, society and economy. The Showa Denko Group will promote diversity and inclusion, aiming to let all employees shine in the company as a stage, regardless of whether each employee has been disabled or not. We will act to move people’s heart and society, and provide the world with surprises and excitements.

1. Under the slogan that “We change unique personality into power” which aims to promote inclusion of persons with disabilities, the Showa Denko Group will promote establishment of inclusive workplaces where each employee, whether with or without disabilities or medical conditions, can feel peace of mind and show what everybody can do.
2. We will provide differently abled employees with environment and opportunities that enable them to show what they can do, career vision that fit to their personalities, and support to realize these.
3. We will promote employment of persons with disabilities (inclusion of persons with disabilities) with specific targets.

The Showa Denko Group will continue promoting diversity and inclusion, aiming to become a corporate group that contributes to creation of sustainable society, and let “everybody in this organization have power to yield profit and create new value through cooperative work among diversified persons who make the most of each other’s uniqueness, values and ideas.”

Topics

[General]

- SDK's used-plastic chemical recycling business was acclaimed for contribution to environmental protection

Since 2003, SDK's Kawasaki Plant has been operating "plastic chemical recycling business," a business to recycle used plastics as raw materials for chemicals under the provisions of Containers and Packaging Recycling Law. We gasify used plastics under high temperature, and decompose them to the level of molecules. Then gasified plastics are converted into hydrogen (low-carbon hydrogen) and carbon dioxide (CO_2). We use low-carbon hydrogen as raw material to produce ammonia, and CO_2 as raw material to produce dry ice and carbonated drinks. SDK is the only company in the world that has track record of long-term commercial operation of plastic chemical recycling through gasification. SDK gasifies about 60,000 tons of used plastics per year, and use the generated gases as materials to produce chemicals mentioned above. In addition, since 2015, SDK has been utilizing the generated gases in a project to provide fuel-cell cars and a hotel equipped with fuel cells with hydrogen gas. This project was accredited by the Ministry of the Environment as an officially entrusted project to demonstrate usability of hydrogen gas as an energy source. Thus, SDK has been contributing to implementation of projects to promote realization of low-carbon society. In February 2020, SDK's used-plastic chemical recycling business received "The Award from Chairman of the Japan Business Federation" as a part of Fujisankei Communications Group's 29th Grand Prize for the Global Environment Award[*1] on the basis of the fact that the business promotes resource recycling on land and reduces marine pollution by plastic, while reducing CO_2 emissions by avoiding incineration of used plastic. In addition, in November 2020, the business received "The Grand Prize, Award from the Minister of Economy, Trade and Industry" as a part of Green Purchasing Network's[*2] 21st Green Purchasing Award[*3] on the basis of the fact that the business effectively deals with plastic waste problem, global warming problem and construction of recycling-oriented society. In addition to this chemical recycling of used plastics, the Showa Denko Group is conducting various environment-friendly business, including the global supply of graphite electrodes for recycling of steel and production of aluminum through recycling of used aluminum cans (can-to-can recycling) as the first company in Japan to start an aluminum can recycling project. The Group will continue positively promoting environment friendly business activities.

*1: The Grand Prize for the Global Environment Award was established in 1992 by Fujisankei Communications Group with special cooperation from World Wide Fund for Nature (WWF) Japan. The award aims at encouraging the development of new technologies and products that will prevent global warming and promote a recycling-oriented society. It also aims at promoting environmental protection measures and enhancing global environment awareness. The award is granted to corporations recognized as having accomplished distinguished achievements in these areas.

*2: Out of recognition that green purchasing plays important role in formation of the market for environment-friendly products, promotes development of environment-friendly products and effectively contributes to construction of sustainable society, Green Purchasing Network was established in 1998 as a non-profit organization based on a mild network of companies, governmental bodies and private organizations who positively conduct green purchasing.

*3: Green Purchasing Award was organized by Green Purchasing Network as a program to commend parties that implements activities contributing to expansion of the market for green products and achievement of Sustainable Development Goals (SDGs), taking into consideration that SDGs include "Goal 12: Sustainable consumption and production."

Topics

[General]

- **Introduced AI system to examine capital investment**

SDK introduced an artificial-intelligence-based search system to look efficiently for information useful for capital investment evaluation from the company's knowledge databases. This new search engine uses an AI system named "KIBIT*" and searches the company's document database for knowledge useful for its internal examination and screening of investment plans. SDK started operation of the new system at the end of January 2020. KIBIT is an AI which simulates "tacit knowledge" held by experts and skilled workers. In order to search databases for cases appropriate to refer, this AI looks up not only key words but also structure of writing and the line of thought in documents on databases, including those in documents contained in attached files. This system enables us to extract cases of investment similar to newly suggested investment plans under screening not reliant on examiners' experiences. In a trial run of the new system conducted in SDK, we confirmed that the KIBIT-based system searched our document databases for similar cases of investment and judged degree of similarity within almost one tenth of the time needed by conventional search systems. In addition, the KIBIT-based system enables us to pick up many similar cases simultaneously, and make the most of our knowledge and know-how about facility-safety measures. SDK will put this new search system into regular use in its process to judge appropriateness of capital investment plans, and consider to extend the use of the news search system to cover search for similar cases of accidents and abnormalities in production fields.

*KIBIT: An artificial intelligence originally developed by FRONTEO, Inc. This AI is equipped with FRONTEO's original mechanical learning algorithm and powerful natural-language processing technology. It can learn deeply from small amount of teaching data, and conduct high precision analysis of database in a short time.

Topics

[Chemicals segment]

- **Strengthened the business to supply high-purity gases for electronics in China**

The market for semiconductors has been growing due to the spread of the 5th generation mobile communication systems (5G) and other information communication technologies. The Chinese market for semiconductors has been expanding very rapidly due to the Chinese government's policy to nurture the electronics industry. As in below, to cope with the growing demand for semiconductors in China, SDK has been positively taking various measures to expand its business to supply high-purity gases for electronics, which is used in the process to produce semiconductors. In January 2020, SDK decided to establish the second factory of Shanghai Showa Electronics Materials Co., Ltd. (SSE), which is a consolidated subsidiary of SDK, to produce high-purity nitrous oxide (N_2O) and high-purity octafluorocyclobutane (C_4F_8) gases and a dangerous goods warehouse to stock high-pressure gases. In November 2020, SDK established Chengdu Kemeite Showa Electronic Materials Co., Ltd. in Chengdu, China, jointly with Chengdu Kemeite Special Gas Co., Ltd. of China. The new company started its operation in January 2021, and it will mainly be in charge of the implementation of final process in the manufacturing process of high-purity CF_4 (tetrafluoromethane). In December 2020, Shanghai Showa Chemicals Co., Ltd. (SSC), a Chinese subsidiary of SDK, established a branch in Xi'an, Shaanxi Province, and started operation of the branch. The new branch is SSC's third business base in China to sell and distribute high-purity gases for electronics. In addition, SDK's subsidiary "Taiwan Showa Chemicals Manufacturing Co., Ltd." established a new facility to produce high-purity C_4F_8, which started operation in May 2020. We will continue to make "thorough customer orientation" and "local consumption of locally produced products" our basic policies, aiming to maximize customer experience. And we will expand our business to produce and sell high-purity gases for electronics by responding positively to the lasting vigorous demand for high-purity gases.

Topics

[Chemicals segment]

- **Completed expansion of lines to produce vinyl ester resin and synthetic resin emulsion in Shanghai**

  In June 2020, SDK expanded production lines to produce vinyl ester resin (VE) and synthetic resin emulsion (EM) in the premises of Shanghai Showa Highpolymer Co., Ltd. (SSHP), a Chinese subsidiary of SDK, and has increased production of VE and EM there, aiming to expand the Showa Denko Group's functional resin business in China. The market for electronic parts such as liquid crystal displays (LCDs) and touch panels has been expanding due to the progress in telecommunication technologies including 5th Generation mobile communication system. As a result, the demand for VE, which is used in the process to produce electronic parts including LCDs and touch panels, has been rapidly increasing in China. In addition, since VE has excellent corrosion resistance and chemical resistance, the demand for VE for use as corrosion-resistant inner lining material has also been increasing. This use includes inner lining for desulfurization equipment increasingly introduced to thermal power plants to prevent air pollution, wastewater treatment equipment for electronic parts factories, garbage plants and storage tanks for chemicals. In China, regulation against volatile organic compound (VOC) as an environmental protection policy started in 2015, and, since then, there has been strict regulation for use of paints and adhesives containing organic solvents. As a result, switching over to aqueous paints and aqueous adhesives utilizing EM has been in progress, and therefore the demand for EM has been increasing.

Topics

[Chemicals segment]

- Started marketing of *PNVA*™ "GE191 Series" for use as binder to form heat-resisting ceramic layer in separators for LIBs

  In October 2020, SDK started full-swing marketing of Poly-N-vinylacetamide (*PNVA*™) optimized for use as a binder to form heat-resisting ceramic layer in separators to be used in lithium-ion batteries (LIBs), under the trade name of "GE191 Series." *PNVA*™ is a water-soluble polymer synthesized through polymerization of N-vinylacetamide, and SDK is the only company in the world which produce N-vinylacetamide on a commercial basis. *PNVA*™ is designed to have many hydrogen bonds. It has heat-resisting property, and can make oxidized-metal particles disperse uniformly and stably. "GE191 Series" is a grade of *PNVA*™ that fulfills requirements for use as heat-resisting ceramic layer, and contributes to improvement in heat-resisting property and thinness of the layer. Thus GE191 Series is acclaimed as additive for separators in LIBs that can improve safety and durability of LIBs through improvement in heat-resisting property of coating layers in separators, and adopted for use in onboard LIBs. Global LIB market is expected to continue rapid growth due to the progress in 5G telecommunication technology and CASE (connected, autonomous/automated, shared, electric) related automotive technologies. SDK has many products that improve performance of LIBs including *PNVA*™, aqueous binder resin "*POLYSOL*™," pouch-type LIB packaging material "*SPALF*™," and additive for anode and cathode "*VGCF*™." Making the most of these products, SDK will aim to expand its LIB material business further through provision of optimum solutions that respond to the demands of customers.

Topics

[Electronics segment]

- **Developed HAMR-technology-based HD media**

SDK developed the technology of manufacturing media for next-generation hard disk drives (HDDs) based on the Heat Assisted Magnetic Recording (HAMR*) technology. Due to the rapid expansion of cloud service, video content, and image-sharing website, the world's data generation volume is growing rapidly. Thus, data centers need HDDs with larger storage capacity. While HD media record information through the polarity of magnetic particles, the speed of improving recording density has slowed down under conventional magnetic recording methods. As a result, there is a need for new recording methods, including HAMR. Also, there is a need for next-generation HD media corresponding to such new recording methods. To contribute toward commercialization of HAMR-based HDDs, SDK has successfully manufactured a new type of HD media. The new product has magnetic coercivity several times as high as the existing most-advanced HD media, while achieving low noise due to very small crystal grain size and optimized grain size distribution control. The new product embodies the highest levels in the industry in terms of read-write characteristics and durability. HD media are key parts for HDDs to determine their storage capacities. As the largest independent HD media supplier, SDK aims to quickly launch top-quality media based on innovative technologies. In accordance with its motto of "Best in Class," SDK will continue contributing to the increases in storage capacities of HDDs.

*HAMR represents a recording method in which magnetic film is locally heated at the time of recording. This technology has been developed to solve the "magnetic recording trilemma": difficulty in simultaneously meeting the three requirements of fine-particle structure, resistance to thermal fluctuation, and ease of magnetization. Compared with the recording density of approx. 1.14 Tb/in2 for HD media based on conventional magnetic recording methods, it is said that HAMR-based HD media will achieve recording density of 5-6 Tb/in2 in the future. Provided that the same number of disks are used, it is estimated that a 3.5-inch HDD will achieve storage capacity of approx. 70-80 TB per unit.

Topics

[Electronics segment]

- **DENSO adopted SDK's SiC epitaxial wafers for power devices as parts of next-generation boosting power modules for fuel cell EVs**

  Silicon carbide epitaxial wafers (SiC epi-wafers), which are main materials for power semiconductors, with a diameter of six inches (150mm) manufactured by SDK was adopted by DENSO Corporation as parts of next-generation boosting power modules for fuel cell electric vehicles. Due to their high quality, SDK's SiC epi-wafers, which were launched into the market in 2009, have been adopted by electronic device manufacturers as parts of various devices including power supply for servers of cloud computing systems, quick charging stands for EVs, and railcars. This time, DENSO adopted SDK's SiC epi-wafers as parts of the new power modules because DENSO recognized high value in SDK's SiC epi-wafers' track record of adoption by device manufacturers, its highest level homogeneity in properties, low density of surface defect, and low frequency of basal plane dislocation. 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 substantially reducing energy loss. These features enable device manufacturers to produce smaller, lighter, and more energy-efficient power control modules. SiC power semiconductors are already used in on-board battery chargers and quick charging stands for EVs, and railcars. In addition, SiC power semiconductors are expected to be used in full scale as parts of power control units (PCUs) for EVs in and after 2025. Thus the demand for SiC-based power semiconductors is expected to grow further. As the largest independent manufacturer of SiC epitaxial wafers, and under a motto of "Best in Class," SDK will continue coping with rapid expansion of the market for SiC epitaxial wafers and providing the market with high-performance and highly-reliable products, thereby contributing to the spread of SiC-based devices.

Topics

[Electronics segment]

- Decided to install equipment to mass-produce *SPALF*™ packaging material for large onboard LIBs

Showa Denko Packaging Co., Ltd. (SPA), a consolidated subsidiary of SDK, has developed a new product to be added to the lineup of *SPALF*™ aluminum laminate film which is used as packaging material for pouch-type lithium-ion batteries (LIBs), and decided to install equipment to mass-produce the new product. This new product is specialized for large-sized LIBs, which are mainly used for cars. Operation of the new production equipment is scheduled to be started in March, 2021. *SPALF*™ is laminated composite film consisting of resin films and aluminum foil, and is mainly used as packaging material for pouch-type LIBs. Pouch-type LIBs have outstanding flexibility in shaping. In recent years, pouch-type LIBs have begun to be widely used in large-sized equipment including EVs because pouch-type LIBs' high quality has been widely recognized and there has been considerable progress in verification of pouch-type LIBs' safety. Since development of EVs is in progress not only in China but also in Europe, the demand for pouch-type LIBs has been increasing. The global demand for LIBs (in electrical capacitance) is expected to increase 30% a year until 2025*. The Showa Denko Group produces and sells various LIB materials with distinguishing advantages, such as *SPALF*™, *VGCF*™ additives for anode/cathode materials, and *POLYSOL*™ aqueous binding resin. By increasing sales of these LIB materials, the Group will aim to contribute to the growth of LIB market and improvement in functions of LIBs, and make the Group's LIB materials business grow to be established as a KOSEIHA Business in the field of advanced battery materials.

*SDK's estimate

Topics

[Inorganics segment]

- About closing of a graphite electrode production site in Germany

In June 2020, the Showa Denko Group completed labor-management consultations concerning planned closure of a production site in Meitingen, Germany, under the jurisdiction of consolidated subsidiaries SHOWA DENKO CARBON Products Germany GmbH & Co. KG and SHOWA DENKO CARBON Germany GmbH. The Meitingen site is currently producing connecting pins* for graphite electrodes. When the site is closed, the Showa Denko Group's connecting pin production will be concentrated at Omachi Plant in Japan. When production at Meitingen is stopped, the Showa Denko Group's global graphite electrode production capacity will decrease by 40,000 t/y, to 210,000 t/y. The Group has the leading share in the global ultrahigh power (UHP) graphite electrode market. However, electric steelmakers are continuing to adjust their inventory of graphite electrodes since the second half of 2019. Thus, our operating rates have fallen in the European market, where economic slowdown is noticeable. In addition, we have started temporary idling for a limited period at SHOWA DENKO CARBON Austria GmbH's Steeg site. These two actions will result in a rebalancing of capacity in Europe in line with projected graphite electrode demand. SDK will continue taking various measures to achieve "Value in Use No. 1" for customers and to further increase competitiveness and profitability.

*A connecting pin is used for connecting rods of graphite electrodes.

Topics

[Aluminum segment]

- Announced execution of master agreement regarding series of transactions to effect, among other matters, the succession of the aluminum can and aluminum rolling businesses through company splits (simplified absorption-type company splits), and result in certain consolidated subsidiary ceasing to be a consolidated subsidiary of SDK

SDK decided to execute a master agreement with a special-purpose company formed by funds managed by affiliates of Apollo Global Management, Inc. (collectively, hereinafter referred to as “Apollo”), regarding a series of transactions, including the succession of the aluminum can business of the Company to Showa Aluminum Can Corp., which is a wholly owned consolidated subsidiary of the Company, and the succession of the aluminum rolling business to Showa Denko Sakai Aluminum Corp., which is a wholly owned non-consolidated subsidiary of the Company, by company splits (absorption-type company split), with tentative effective dates of June 1 2021 and August 2 2021, respectively.

In light of the rapidly changing business environment, the Company has been examining the optimal allocation of management resources and portfolio management to realize sustainable growth. After careful consideration of all available options, the Company reached the conclusion that the expansion of the aluminum can business and the aluminum rolling business would be best achieved through business partners that have specialized knowledge and management resources to enable future growth of these businesses together with the employees engaged in the respective business. Taking these factors into consideration, the Company decided to execute the transactions set forth in the Master Agreement with Apollo, which is one of the world’s leading alternative investment managers and has a wealth of experience supporting aluminum-related industries for more than 20 years.

Topics

[Showa Denko Materials segment]

- **Showa Denko Materials launched mass production of 5G-compatible printed wiring board material "MCL-HS200" with low transmission loss and low warpage properties**

In March 2020, Showa Denko Materials Co., Ltd. (SDMC), a consolidated subsidiary of SDK, launched mass production of "MCL-HS200," an advanced functional laminate material for printed wiring boards, with low transmission loss and low warpage properties required for semiconductor packaging substrates used in such fields as fifth-generation mobile communications systems (5G), advanced driver-assistance systems (ADAS)*1, and artificial intelligence (AI).

With technological innovations like the Internet of Things (IoT) for electronics-related products, ADAS, and AI making strides in recent years, 5G networks providing high speed, high capacity, low latency, and multiple connections have become indispensable for the widespread use of these technologies. Demand for 5G is also rising as people around the world spend more time working remotely amid the coronavirus pandemic. Applications such as 5G and ADAS require higher frequency bands than electric signals used by fourth-generation mobile communications systems (4G), but with electric signals suffering significant attenuation (transmission loss) at higher frequencies, lower transmission loss is required for high frequency circuit boards. Reducing signal delay is also an important requirement. Furthermore, as devices mounted on smartphones, etc. become smaller and more functionally sophisticated, demand is growing for thinner circuit boards that also minimize warpage caused by semiconductor packaging. However, creating a material capable of not only reducing transmission loss and signal delay but also minimizing warpage presented a difficult challenge.

By applying low polarity resin materials and low dielectric glass cloth, SDMC achieved lower transmission loss properties (low dielectric loss tangent) and lower dielectric constant*2, reducing signal delay. In addition, SDMC attained superior low warpage properties required for thinner modules by using low coefficient of thermal expansion (CTE) resins and increasing the filler content. SDMC combined its low CTE technology for semiconductor packaging substrates and low dielectric constant technology for multilayer substrate materials designed for high-speed communications, which successfully developed a material with high-dimensional properties of low CTE 10ppm/°C and low dielectric constant (Dk) 3.4 (10 GHz).

SDMC is currently pursuing the development of even thinner and lower dielectric constant materials. SDMC will continue to contribute to more advanced functional printed wiring boards through our superior technologies and new product development.boards through our superior technologies and new product development.

*1: Advanced driver-assistance systems (ADAS) are systems to prevent accidents by detecting the vehicle's surroundings through sensors mounted on its front, sides and rear.

*2: Dielectric constant is the value representing the degree of electronic polarization of a substance in an electric field that exerts force on a charged object, expressed as the ratio of the dielectric constants of two substances.

Topics

[Showa Denko Materials segment]

- SDMC to boost its production capacity for CMP slurries, laminate materials for printed wiring boards, and photosensitive solder resists in Taiwan, and a new CMP slurry factory will also be built in South Korea to meet growing demand

In December 2020, Showa Denko Materials Co., Ltd. (SDMC), a consolidated subsidiary of SDK, announced the decision to boost its production capacity for polishing materials for flattening semiconductor circuits (CMP slurry), laminate materials for printed wiring boards (prepreg), and photosensitive solder resists in its consolidated subsidiary Showa Denko Semiconductor Materials (Taiwan) Co., Ltd. (SDSMT) in Taiwan, and to build a new factory for CMP slurries in its consolidated subsidiary Showa Denko Electronic Materials (Korea) Co., Ltd. (SDMKR) in South Korea. SDMC will invest a total of approximately 20 billion yen in these projects. SDMKR's new factory is scheduled to start operation in October 2021, while SDSMT will begin expanding its production capacity for CMP slurries in January 2022 and mass-producing prepregs and photosensitive solder resists in January 2023, thereby responding to the ever-increasing demand for these materials in the future.