

Evolving unique chemical company

Second Quarter, 2013 Financial Results

- Consolidated -

SHOWA DENKO K.K.

August 2, 2013

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This presentation contains statements relating to management's projections of future profits and expectations for the Company's product development program. The Company cannot guarantee that these expectations and projections will be realized or correct. Please note that actual results may differ materially from the forecast due to a variety of factors, including changes in the market conditions. The timely commercialization of products under development by the Company may be disrupted or delayed by a variety of factors, including market acceptance, and the introduction of new products by competitors. The foregoing list of factors is not inclusive.

Consolidated Companies

- Consolidated subsidiaries: 42
 - Newly consolidated: 4
 - Korea Showa Chemicals Co. (Chemicals segment)
 - Showa Denko Sichuan Carbon Inc. (Inorganics segment)
 - Nagoya Kenmazai Kogyo K.K. (Inorganics segment)
 - SHOKO (Shanghai) Co., Ltd. (Others segment)
- Equity method applied: 17
 - Excluded: 2
 - Techno Namiken Co., Ltd. (Others segment, Liquidation)
 - SANYO SHOWA Panel System Corporation (Aluminum segment, Sold)

Selected Data

(Average figure)

	Jan.- Jun. 2012	Jan.- Jun. 2013	Increase
■ Exchange rate: ¥/US\$	79.7	95.6	Yen depreciated by ¥15.9/\$
■ Domestic naphtha price: ¥/kl	57,300	64,650	7,350
■ Aluminum LME price: US\$/T	2,116	1,955	-161

Exchange rate at 2012 year-end: ¥86.6/US\$, at the end of June, 2013 ¥98.6/US\$ ⇒ Yen depreciated by ¥12.0/US\$



Summary

2012 (Jan.1 – Jun.30) v s. 2013 (Jan.1 – Jun.30)

(Unit: Billions of Yen)

	Jan.-Jun. 2012	Jan.-Jun. 2013	Increase
Net Sales	352.3	401.4	49.1
Operating Income	16.0	6.7	-9.3
Non-operating income and expense	-1.6	-1.3	0.3
Interest/Dividend income less expenses	-1.8	-1.3	0.5
Equity in earnings or losses of affiliates	0.5	-0.6	-1.1
Foreign exchange gain or loss	-0.2	1.3	1.6
Other	-0.1	-0.8	-0.7
Ordinary Income	14.4	5.4	-9.0
Extraordinary Income	0.3	1.5	1.2
Extraordinary Loss	-5.5	-2.8	2.7
Income before income taxes and minority interests	9.2	4.1	-5.1
Income Taxes	-0.6	-1.2	-0.7
Income before minority interests	8.7	2.9	-5.8
Minority Interests in income	-0.8	-0.7	0.1
Net Income	7.9	2.2	-5.7

Extraordinary Profit/Loss

(Unit: Billions of Yen)

	Jan.-Jun. 2012	Jan.-Jun. 2013	Increase
■ Extraordinary Profit	0.3	1.5	1.2
● Gain on sale of investment securities	0	0.5	0.5
● Compensation for contract cancellation	—	0.8	0.8
● Other	0.3	0.3	0.0
■ Extraordinary Loss	-5.5	-2.8	2.7
● Loss on sales and retirement of noncurrent assets	-0.8	-0.6	0.2
● Impairment loss	-2.3	-0.3	2.0
● Loss on restructuring of subsidiaries and affiliates	—	-1.4	-1.4
● Other	-2.4	-0.5	2.0
■ Extraordinary Profit/Loss, Net	-5.2	-1.3	3.9

Consolidated Sales by Segment

(Unit: Billions of Yen)

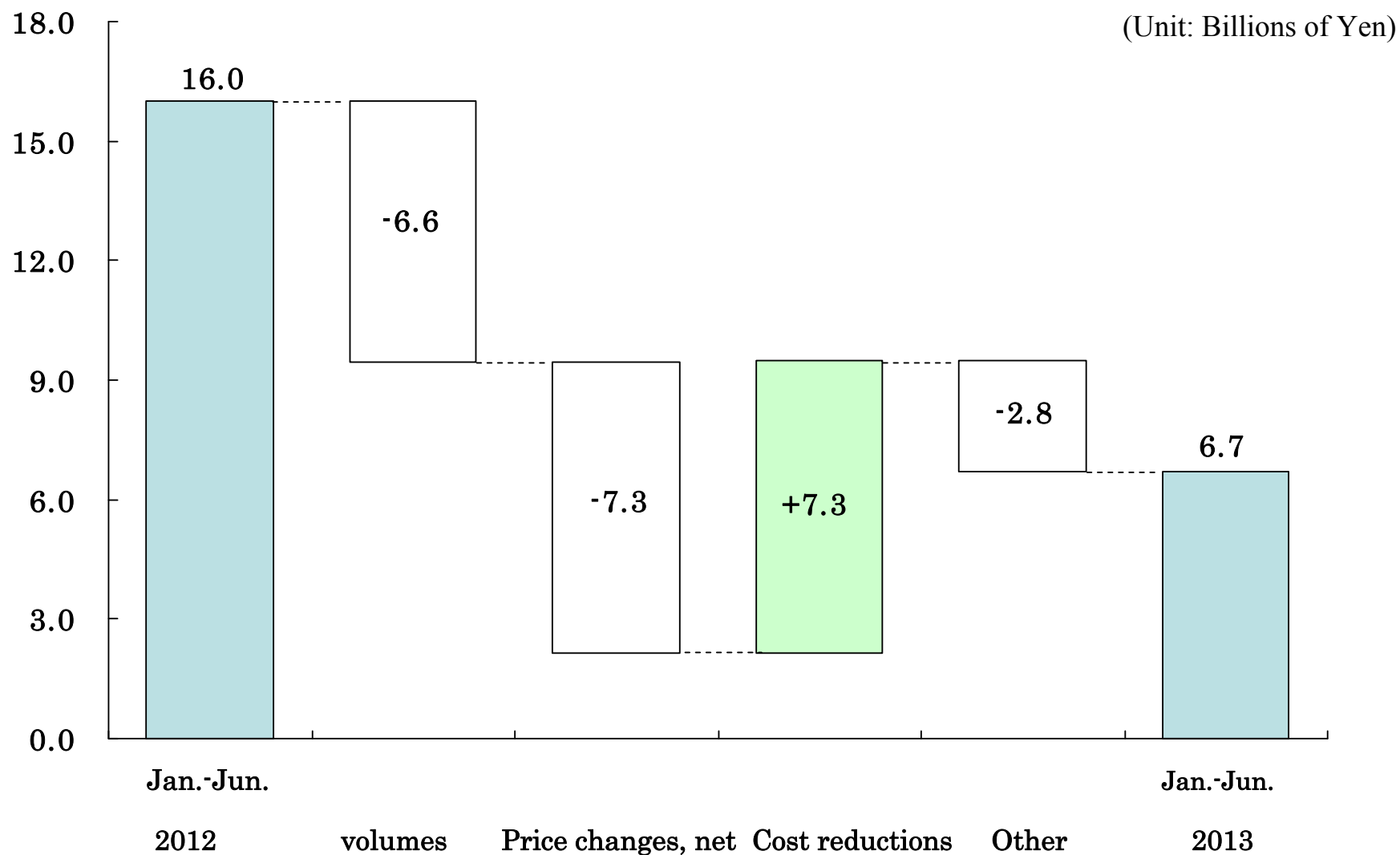
	Jan.-Jun. 2012	Jan.-Jun. 2013	Increase	
Petrochemicals	72.6	135.4	62.8	Olefins: sales increased (shipment volumes up due to the settlement of the problem with ethylene equipment in CQ1, 2012, price up) Organic chemicals: sales increased (shipment volumes of vinyl acetate and ally alcohol up)
Chemicals	62.7	61.9	-0.8	Basic chemicals: sales increased (AN: sales decreased, chloroprene rubber : sales increased) Industrial gases: sales decreased (shipment volumes of dry ice down) Electronic chemicals: sales maintained at the year-earlier level Functional chemicals: sales slightly decreased (shipment volumes down)
Electronics	85.4	66.2	-19.2	HDs: sales decreased (shipment volumes down due to inventory adjustments in HDD industry) Compound semiconductors: sales decreased due to the transfer of the GaN-based blue LED business Rare earth: sales decreased (shipment volumes down, price down)
Inorganics	32.9	31.0	-1.9	Ceramics: sales maintained at the year-earlier level Graphite electrodes: sales decreased (shipment volumes down, price down)
Aluminum	47.6	43.7	-3.9	High-purity foils for capacitors: sales slightly increased (shipment volumes up) Aluminum specialty components: sales decreased (sales of cylinders for LBPs maintained at the year-earlier level, sales of Shotic down) Aluminum cans: sales slightly decreased
Others	68.8	82.3	13.5	LIB materials: sales slightly decreased (shipment volumes for automobiles down) Shoko Co. Ltd.: sales increased Shoko (Shanghai) Co. Ltd. : newly consolidated
Adjustment	-17.7	-19.1	-1.4	
Total	352.3	401.4	49.1	

Consolidated Operating Income by Segment

(Unit: Billions of Yen)

	Jan.-Jun. 2012	Jan.-Jun. 2013	Increase	
Petrochemicals	-2.2	0.0	2.1	Olefins: profit increased (shipment volumes up) Organics chemicals: profit slightly increased (shipment volumes up)
Chemicals	-0.2	0.6	0.8	Basic chemicals: profit increased (profit of AN maintained at the year-earlier level, ammonia and chloroprene rubber up) Industrial gases, Electronic chemicals, Functional chemicals: profit maintained at the year-earlier level
Electronics	17.9	8.4	-9.5	HDs: profit decreased (shipment volumes down) Compound semiconductors: profit increased Rare earth: profit substantially decreased due to the influence of reductions in book value of inventory, shipment volumes down)
Inorganics	2.3	-0.6	-3.0	Ceramics: profit slightly decreased (price for electronic applications down) Graphite electrodes: profit decreased (shipment volumes down, price down)
Aluminum	1.1	2.9	1.8	High-purity foils for capacitors: profit increased (shipment volumes up) Aluminum specialty components: profit maintained at the year-earlier level (profit for cylinders for LBPs up, profit for Shotic up) Aluminum cans: profit increased
Others	0.2	-0.9	-1.1	LiB materials: profit decreased (shipment volumes for automobiles down) SHOKO Co., Ltd., Shoko (Shanghai) Co., Ltd.: profit maintained at the year-earlier level.
Adjustment	-3.2	-3.5	-0.4	
Total	16.0	6.7	-9.3	

Operating Income Breakdown by Factor





Consolidated Balance Sheet

(Unit: Billions of Yen)

Assets	Dec.31, 2012	Jun.30, 2013	Increase/ decrease	Liabilities and Net Assets	Dec.31, 2012	Jun.30, 2013	Increase/ decrease
Cash and deposits	51.6	54.1	2.5	Notes and accounts payable	107.2	110.1	2.8
Notes and accounts receivable	138.2	147.8	9.6	Interest-bearing debt	342.3	365.3	23.0
Inventories	121.8	124.7	3.0	Provision for retirement benefits	23.4	21.9	-1.6
Other current assets	30.6	36.1	5.6	Other liabilities	145.3	139.2	-6.1
<u>Total Current Assets</u>	342.1	362.7	20.6	<u>Total Liabilities</u>	618.2	636.4	18.2
Buildings and structures	81.6	84.8	3.2	Capital stock	140.6	140.6	0.0
Machinery and equipment	115.2	116.4	1.2	Capital surplus	62.2	62.2	0.0
Land	254.3	254.7	0.4	Retained earnings	53.2	51.4	-1.8
Other tangible fixed assets	22.2	31.5	9.3	Treasury stock	-0.1	-0.1	0.0
<u>Tangible Fixed Assets</u>	473.3	487.5	14.2	<u>Total Shareholders' equity</u>	255.8	254.0	-1.8
Intangible Fixed Assets	10.3	11.6	1.3	Valuation difference on available-for-sale securities	0.9	4.7	3.8
Investments and other assets	107.5	105.3	-2.2	Foreign currency translation adjustment, Deferred hedge gains	-12.0	-0.3	11.8
				Revaluation reserve for land	28.0	28.0	0.0
				<u>Total accumulated other comprehensive income</u>	16.9	32.5	15.6
				Minority Interests	42.2	44.2	1.9
<u>Total fixed assets</u>	591.1	604.3	13.3	<u>Total net assets</u>	315.0	330.7	15.7
Total Assets	933.2	967.1	33.9	Total Liabilities and Net Assets	933.2	967.1	33.9

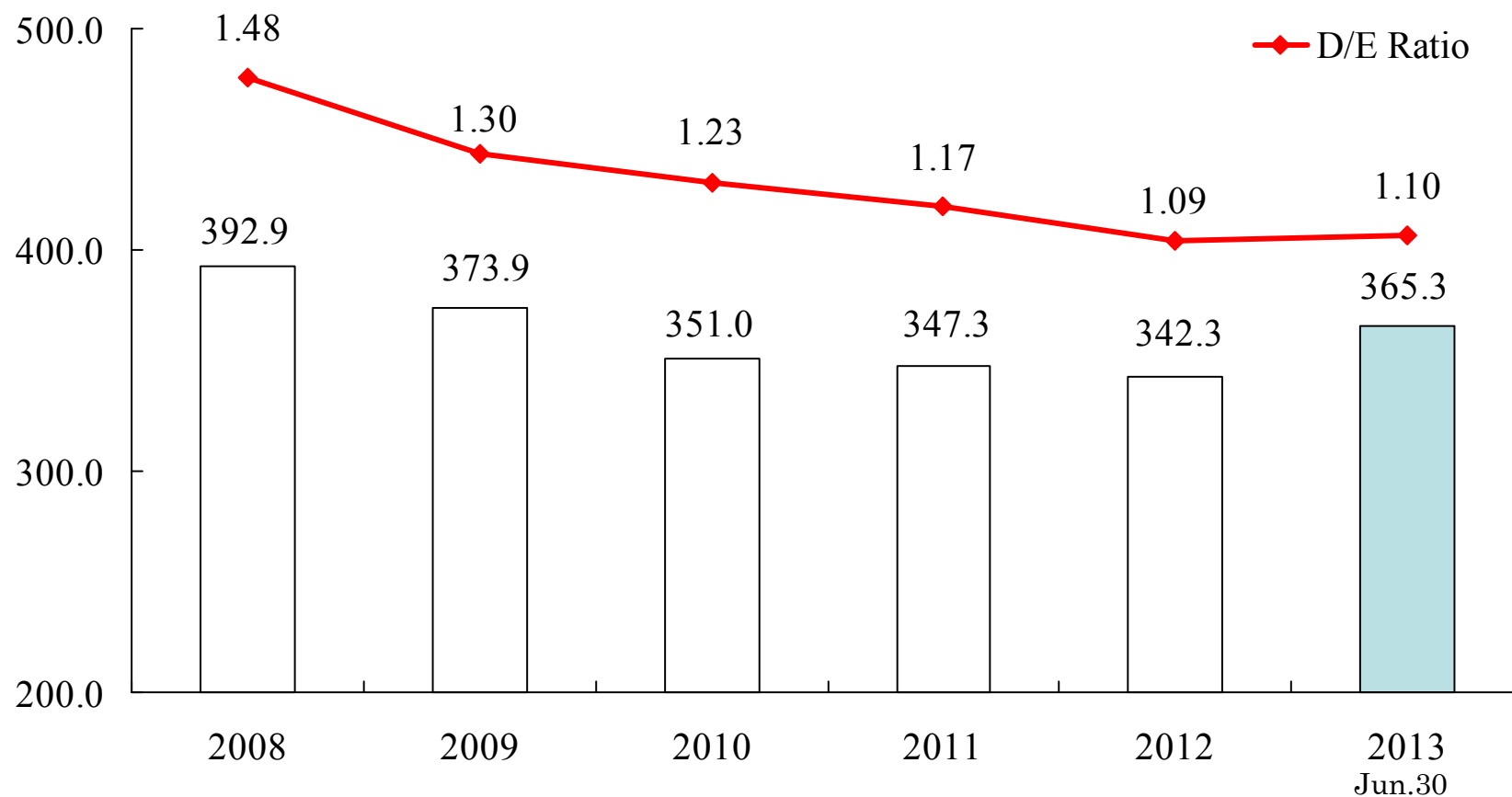
Total Assets Interest-bearing Debt and D/E ratio

(Unit: Billions of Yen)

	Dec.31, 2012	Jun.30, 2013	Increase/ decrease
● Total assets	933.2	967.1	33.9
● Interest-bearing debt	342.3	365.3	23.0
● Debt/Equity ratio	1.09times	1.10times	0.01p
● Stockholders' Equity ratio	29.2%	29.6%	0.4p

Interest-bearing Debt

(Unit: Billions of Yen)



Equity ratio	25.0%	25.5%	26.1%	26.8%	29.2%	29.6%
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Consolidated Cash Flows

(Unit: Billions of Yen)

	2012 Jan.-Jun.	2013 Jan.-Jun.	Increase
●CF from Operating Activities	2.5	17.1	14.6
●CF from Investing Activities	-19.6	-27.3	-7.7
●Free CF	-17.2	-10.3	6.9
●CF from Financing Activities	3.3	8.2	4.8
●Others	1.0	3.2	2.2
Increase of cash and equivalents	-12.8	1.1	13.9

Selected Data (Consolidated)

(Unit: Billions of Yen)

	Jan.-Jun. 2012	Jan.-Jun. 2013	Increase
● Interest/dividend income less interest expenses	-1.8	-1.3	0.5
● Capital expenditures	20.7	20.0	-0.7
● Depreciation and amortization	23.1	20.3	-2.8
● R&D expenditures	10.2	10.0	-0.2
● Number of employees	9,905	10,397	492
● Total employment cost	36.4	36.1	-0.3

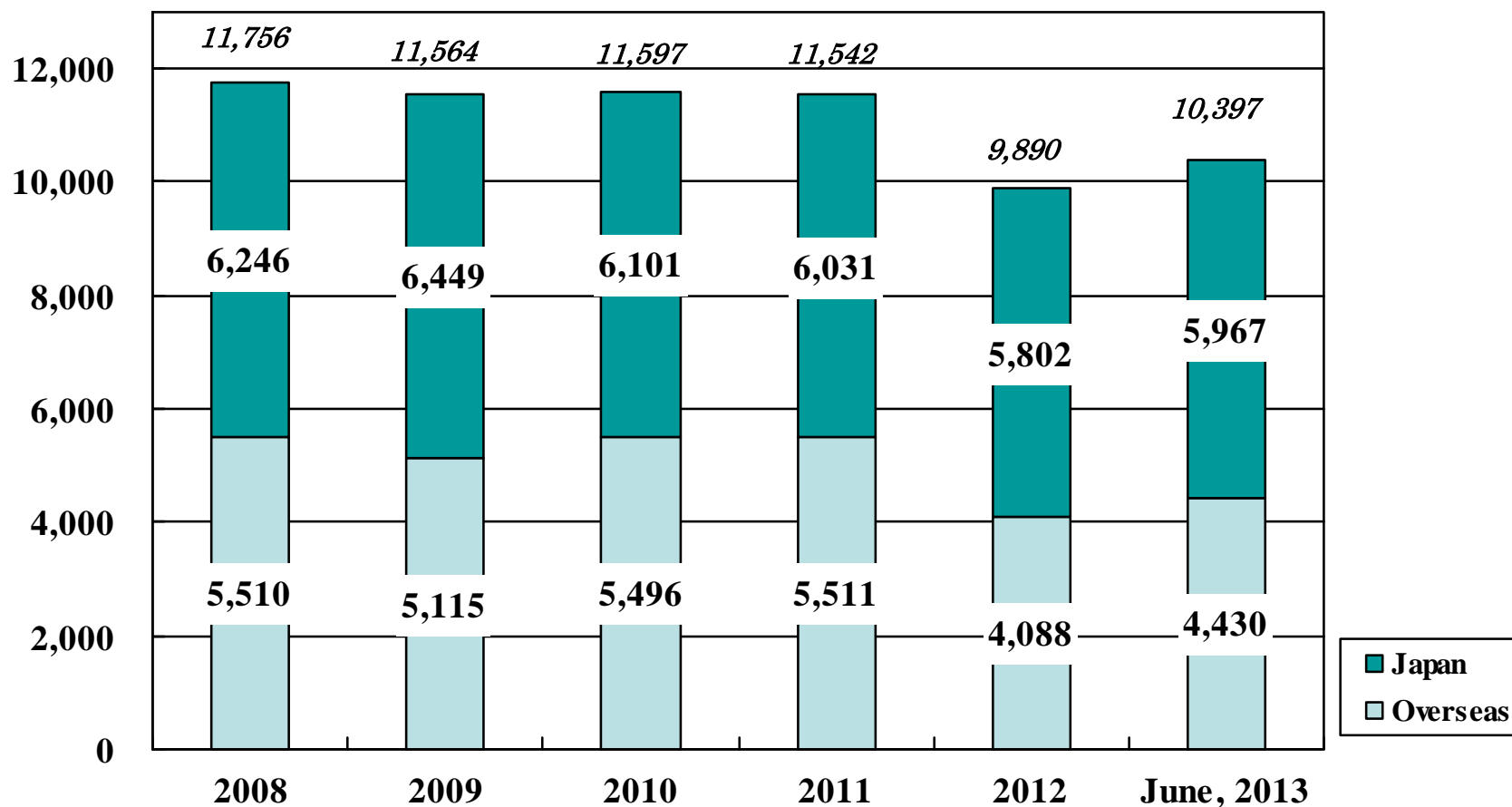


Capital expenditures/ Depreciation by Segment

(Unit: Billions of Yen)

	Jan.-Jun. 2012		Jan.-Jun. 2013		Increase	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	2.2	3.6	1.1	3.2	-1.1	-0.3
Chemicals	4.9	4.6	3.5	3.7	-1.4	-0.9
Electronics	5.1	8.3	3.0	7.6	-2.1	-0.7
Inorganics	3.1	1.7	7.4	1.5	4.2	-0.3
Aluminum	2.0	3.0	2.8	2.1	0.8	-0.9
Others	3.2	1.9	2.2	2.1	-1.0	0.2
Total	20.7	23.1	20.0	20.3	-0.7	-2.8

Total number of employees and breakdown by location



Japan	53.1%	55.8%	52.6%	52.3%	58.7%	57.4%
Overseas	46.9%	44.2%	47.4%	47.7%	41.3%	42.6%

2013 Forecast

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

	2012	2013 Revised Forecast*	Increase	2013 Initial Forecast**	Increase (against initial)
Net Sales	739.8	850.0	110.2	800.0	50.0
Operating Income	28.1	26.0	-2.1	35.0	-9.0
Interest/dividend income less interest expenses	-4.7	-4.0	0.7	-5.0	1.0
Ordinary Income	23.4	22.0	-1.4	30.0	-8.0
Extraordinary Profit	0.8	-4.0	8.2	-5.5	1.5
Extraordinary Loss	-13.0				
Net Income	9.4	10.0	0.6	15.0	-5.0
Net Income per Share	¥6.26	¥6.68	¥0.42	¥10.02	¥-3.34
Cash dividends per Share	¥3.00	¥3.00 (planned)	—	¥3.00 (planned)	—

* 2013 Forecast was revised on July 29, 2013.

**2013 Initial forecast was announced on Feb. 14, 2013.



Consolidated Net Sales by Segment, 2013 Forecast

(Unit: Billions of Yen)

	2012	2013 Revised Forecast*	Increase	2013 Initial Forecast**	Increase (against initial)
Petrochemicals	190.9	270.0	79.1	240.0	30.0
Chemicals	127.4	136.0	8.6	135.0	1.0
Electronics	163.3	148.0	-15.3	140.0	8.0
Inorganics	65.6	71.0	5.4	75.0	-4.0
Aluminum	92.2	98.0	5.8	100.0	-2.0
Others	135.3	170.0	34.7	150.0	20.0
Adjustment	-34.9	-43.0	-8.1	-40.0	-3.0
Total	739.8	850.0	110.2	800.0	50.0

* 2013 Forecast was revised on July 29, 2013.

**2013 Initial forecast was announced on Feb. 14, 2013.



Consolidated Operating Income by Segment, 2013 Forecast

	2012	2013 Revised Forecast*	Increase	(Unit: Billions of Yen)	
				2013 Initial Forecast**	Increase (against initial)
Petrochemicals	-1.0	1.5	2.5	4.0	-2.5
Chemicals	-0.9	4.0	4.9	4.0	0.0
Electronics	32.3	22.5	-9.8	23.5	-1.0
Inorganics	3.0	0.0	-3.0	4.5	-4.5
Aluminum	1.6	6.0	4.4	5.0	1.0
Others	0.1	-0.5	-0.6	1.0	-1.5
Adjustment	-7.0	-7.5	-0.5	-7.0	-0.5
Total	28.1	26.0	-2.1	35.0	-9.0

* 2013 Forecast was revised on July 29, 2013.

**2013 Initial forecast was announced on Feb. 14, 2013.

Selected Data, Forecast

(Unit: Billions of Yen)

	2012 Actual	2013 Revised Forecast*	Increase
● Interest-bearing debt at year end	342.3	360.0	17.7
● Interest/dividend income less interest expenses	-3.5	-3.1	0.4
● R&D expenditures	20.6	20.4	-0.2
● Number of employees	9,890	10,607	717
● Total employment cost	70.6	72.9	2.3
● Exchange rate: ¥/US\$	(1 st half) 80	(1 st half) 96	(1 st half) 16
	(2 nd half) 80	(2 nd half) 98	(2 nd half) 18
● Domestic naphtha price: ¥/kl	(1 st half) 57,300	(1 st half) 64,650	(1 st half) 7,350
	(2 nd half) 52,800	(2 nd half) 60,700	(2 nd half) 7,900
● Aluminum LME price: US\$/T	(1 st half) 2,116	(1 st half) 1,955	(1 st half) -161
	(2 nd half) 1,962	(2 nd half) 1,870	(2 nd half) -92

* 2013 Forecast was revised on July 29, 2013.



Capital expenditures/Depreciation Forecast by Segment for 2013

(Unit: Billions of Yen)

	2012 Actual		2013 Revised forecast		Increase		2013 Initial forecast	
	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation	Capital expenditures	Depreciation
Petrochemicals	3.7	7.2	2.6	6.5	-1.1	-0.7	2.6	6.5
Chemicals	8.5	9.2	7.2	7.3	-1.2	-1.9	6.5	7.0
Electronics	11.7	16.3	10.6	14.2	-1.0	-2.1	9.7	13.2
Inorganics	8.4	3.4	23.3	3.2	14.9	-0.2	19.7	2.8
Aluminum	4.3	6.1	6.3	4.4	2.0	-1.7	5.5	4.5
Others	5.9	4.1	4.5	4.6	-1.4	0.5	7.4	4.3
Total	42.5	46.2	54.6	40.1	12.1	-6.1	51.4	38.3



Summary (Reference)

2012 CQ2 (Apr.1 – Jun.30) v s. 2013 CQ2 (Apr.1 – Jun.30)

(Unit: Billions of Yen)

	CQ2, 2012	CQ2, 2013	Increase
Net Sales	171.0	208.9	38.0
Operating Income	6.5	3.3	-3.1
Non-operating income and expense	-0.4	-1.8	-1.5
Interest/Dividend income less expenses	-0.8	-0.5	0.3
Equity in earnings or losses of affiliates	0.0	-0.9	-0.9
Other	0.4	-0.4	-0.8
Ordinary Income	6.1	1.5	-4.6
Extraordinary Income	0.1	0.6	0.5
Extraordinary Loss	-4.0	-0.5	3.4
Income before income taxes and minority interests	2.2	1.6	-0.6
Income Taxes	0.7	-3.1	-3.8
Income before minority interests	2.9	-1.6	-4.5
Minority Interests in income	-0.4	-0.3	0.0
Net Income	2.6	-1.9	-4.5



Consolidated Sales by Segment

2012 CQ2 (Apr.1 – Jun.30) v s. 2013 CQ2 (Apr.1 – Jun.30)

(Unit: Billions of Yen)

	CQ2, 2012	CQ2, 2013	Increase	
Petrochemicals	25.5	69.5	44.0	Olefins: sales increased (shipment volumes up due to the settlement of the problem with ethylene equipment in CQ1,2012, price up) Organic chemicals: sales increased (shipment volumes of vinyl acetate, ethyl acetate, and allyl alcohol up)
Chemicals	32.1	32.2	0.1	Basic chemicals: sales increased (AN: sales decreased, chloroprene rubber: sales increased) Industrial gases: sales decreased (shipment volumes of dry ice down) Electronic chemicals: sales increased (shipment volumes up) Functional chemicals: sales slightly decreased (shipment volumes down)
Electronics	44.0	34.2	-9.8	HDs: sales decreased (shipment volumes down) Compound semiconductors: sales decreased due to the transfer of the GaN-based blue LED business Rare earth: sales decreased (shipment volumes down, price down)
Inorganics	16.8	15.5	-1.3	Ceramics: sales decreased (shipment volumes for electric materials down) Graphite electrodes: sales decreased (shipment volumes down, price down)
Aluminum	26.1	24.5	-1.6	High purity foils for capacitors: sales increased (shipment volumes up) Aluminum specialty components: sales decreased (sales of cylinders for LBPs, sales of Shotic maintained at the year-earlier level) Aluminum cans : sales decreased (shipment volumes down)
Others	35.2	43.2	8.1	LIB materials: sales decreased (shipment volumes down) Shoko Co. Ltd.:sales increased, Shoko (Shanghai) Co. Ltd. newly consolidated.
Adjustment	-8.7	-10.2	-1.5	
Total	171.0	208.9	38.0	



Consolidated Operating Income by Segment

2012 CQ2 (Apr.1 – Jun.30) v s. 2013 CQ2 (Apr.1 – Jun.30)

(Unit: Billions of Yen)

	CQ2, 2012	CQ2, 2013	Increase	
Petrochemicals	-2.3	-1.0	1.3	Olefins: profit increased (shipment volumes up due to the settlement of the problem with ethylene equipment in CQ1, 2012) Organic chemicals: profit slightly increased
Chemicals	-0.8	-0.2	0.5	Basic chemicals: profit increased (shipment volumes up) Industrial gases: profit slightly increased Electronic chemicals, Functional chemicals: profit maintained at the year-earlier level.
Electronics	9.1	5.8	-3.3	HDs: profit decreased (shipment volumes down) Compound semiconductors: profit decreased Rare earth: profit decreased (shipment volumes down)
Inorganics	0.8	-0.6	-1.4	Ceramics: profit increased Graphite electrodes: profit decreased (shipment volumes down, price down)
Aluminum	1.4	1.9	0.6	High-purity foils for capacitors: profit increased Aluminum specialty components: profit slightly increased Aluminum cans: profit increased
Others	0.1	-0.6	-0.7	LIB materials: profit decreased Shoko Co. Ltd., Shoko (Shanghai) Co. Ltd.: profit maintained at the year-earlier level
Adjustment	-1.9	-2.0	-0.2	
Total	6.5	3.3	-3.1	



CQ2 Summary (Reference)

CQ1 (Jan.1 – Mar.31), 2013 v s. CQ2 (Apr.1 – Jun.30), 2013

(Unit: Billions of Yen)

	CQ1, 2013	CQ2, 2013	Increase
Net Sales	192.5	208.9	16.5
Operating Income	3.4	3.3	0.0
Non-operating income and expense	0.5	-1.8	-2.3
Interest/Dividend income less expenses	-0.8	-0.5	0.2
Equity in earnings or losses of affiliates	0.3	-0.9	-1.2
Foreign exchange gain or loss	1.3	0.0	-1.3
Other	-0.4	-0.4	0.0
Ordinary Income	3.9	1.5	-2.4
Extraordinary Income	1.0	0.6	-0.4
Extraordinary Loss	-2.3	-0.5	1.8
Income before income taxes and minority interests	2.5	1.6	-1.0
Income Taxes	1.9	-3.1	-5.0
Income before minority interests	4.4	-1.6	-6.0
Minority Interests in income	-0.3	-0.3	0
Net Income	4.1	-1.9	-6.0

Consolidated Sales by Segment

(Unit: Billions of Yen)

	CQ1, 2013	CQ2, 2013	Increase/ Decrease	
Petrochemicals	65.9	69.5	3.6	Olefins: sales increased (price up) Organic chemicals: sales increased (price up)
Chemicals	29.7	32.2	2.5	Basic chemicals: sales increased (AN, chloroprene rubber : shipment volumes up) Industrial gases: sales increased (shipment volumes up) Electronic chemicals: sales increased (shipment volumes up) Functional chemicals: sales slightly increased
Electronics	32.0	34.2	2.2	HDs: sales increased (shipment volumes up) Compound semiconductors: sales slightly increased Rare earth: sales increased (shipment volumes up)
Inorganics	15.5	15.5	0.0	Ceramics: sales increased (shipment volumes up) Graphite electrodes: sales slightly decreased
Aluminum	19.1	24.5	5.4	High purity foils for capacitors: sales substantially increased (shipment volumes up) Aluminum specialty components: sales increased (sales of cylinders for LBPs maintained at the CQ1 level, sales of Shotic up) Aluminum cans: sales increased (shipment volumes up, seasonal)
Others	39.1	43.2	4.1	LIB materials: sales increased (shipment volumes up) Shoko Co. Ltd., Shoko (Shanghai) Co. Ltd.: sales increased
Adjustment	-8.9	-10.2	-1.3	
Total	192.5	208.9	16.5	

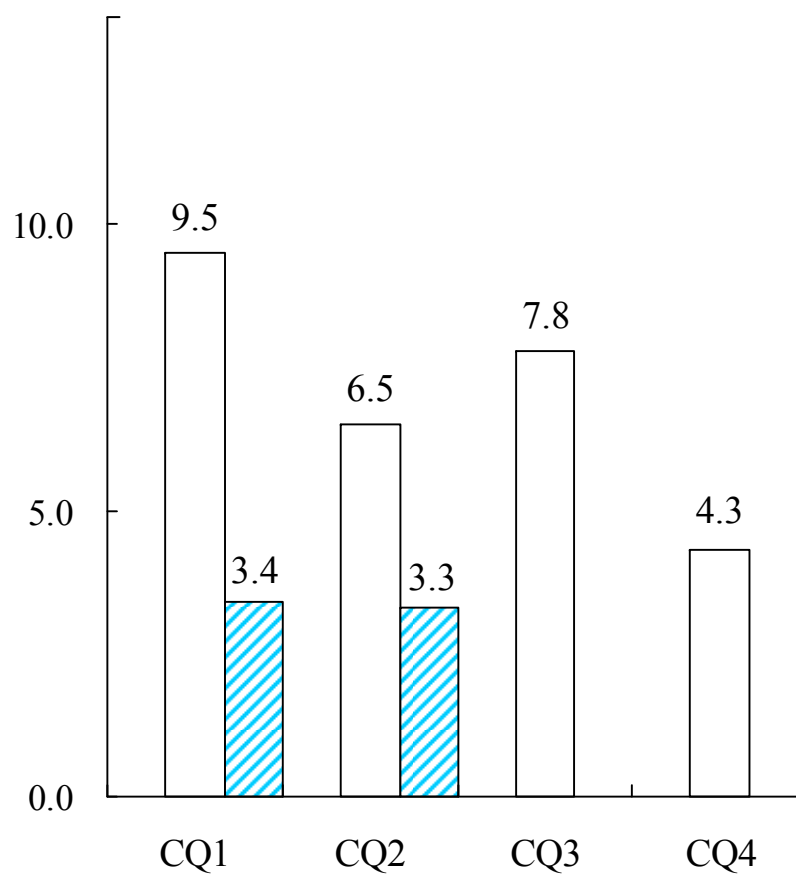
Consolidated Operating Income by Segment

(Unit: Billions of Yen)

	CQ1, 2013	CQ2, 2013	Increase/ Decrease	
Petrochemicals	0.9	-1.0	-1.9	Olefins: profit decreased (price adjustment, shutdown maintenance of derivatives plants) Organic chemicals: profit slightly decreased
Chemicals	0.8	-0.2	-1.0	Basic chemicals: profit decreased (profit of AN down, chloroprene rubber up) Industrial gases: profit slightly increased Electronic chemicals, Functional chemicals: profit maintained at the CQ1 level. IPP : profit decreased (shutdown maintenance, delay of fuel cost adjustment)
Electronics	2.5	5.8	3.3	HDs: profit increased Compound semiconductors: profit slightly increased Rare earth: profit substantially increased as the influence of reductions in book value of inventory diminished
Inorganics	-0.1	-0.6	-0.5	Ceramics: profit increased Graphite electrodes: profit decreased
Aluminum	1.0	1.9	0.9	High-purity foils for capacitors: profit increased (shipment volumes up) Aluminum specialty components: profit slightly increased (profit of cylinders for LBPs maintained at the CQ1 level, profit of Shotic up) Aluminum cans : profit increased (shipment volumes up, seasonal)
Others	-0.3	-0.6	-0.3	LIB materials: profit decreased Shoko Co., Ltd. Shoko (Shanghai) Co., Ltd.: Profit maintained at the CQ1 level.
Adjustment	-1.5	-2.0	-0.5	
Total	3.4	3.3	0.0	

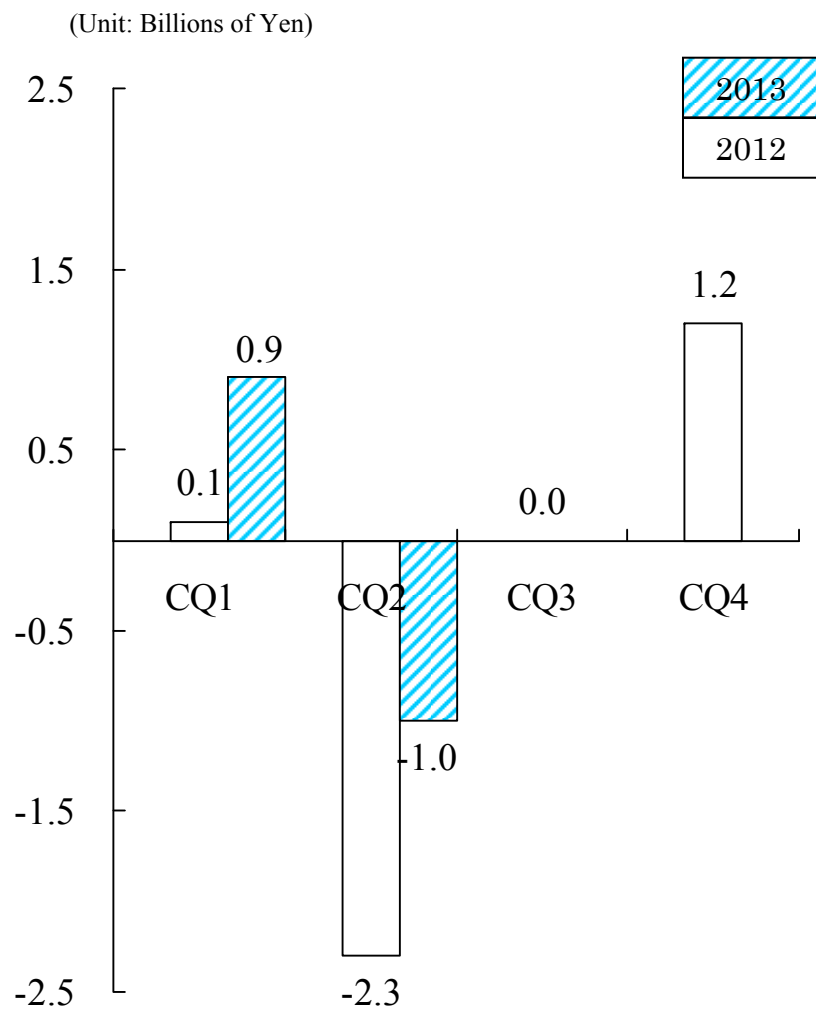
(Reference) Quarterly Operating Income

(Unit: Billions of Yen)

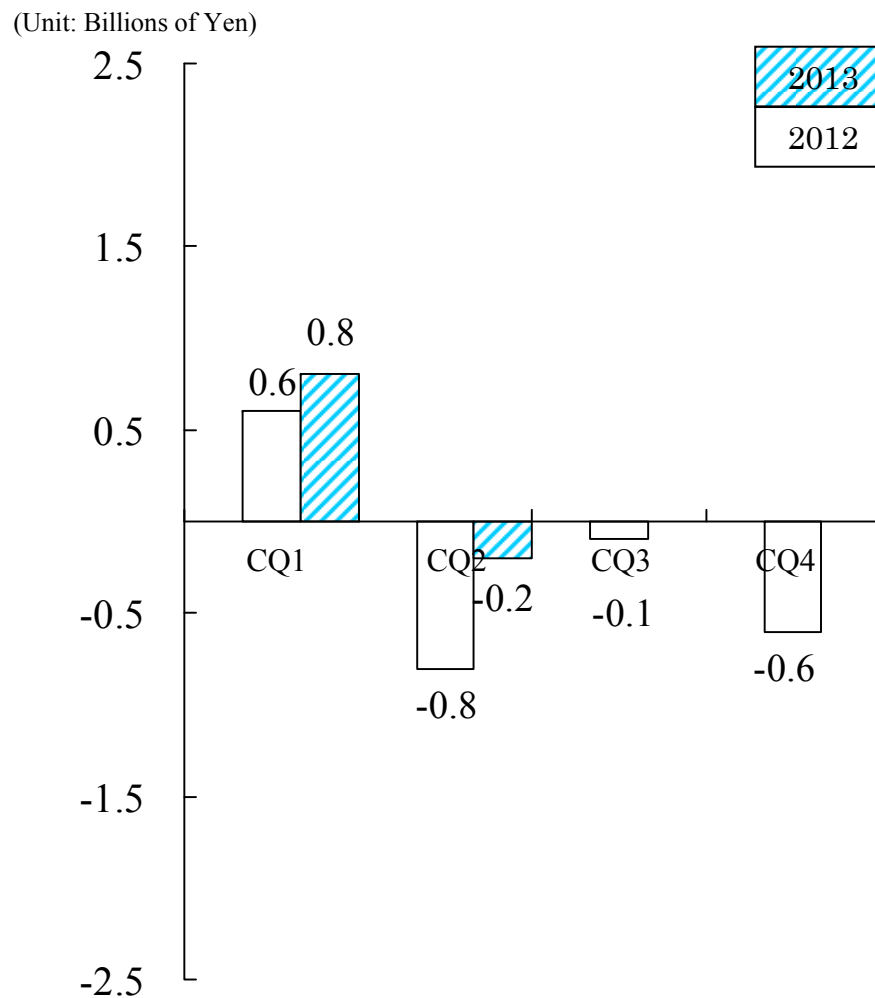


Quarterly Operating Income by Segment

《Petrochemicals》



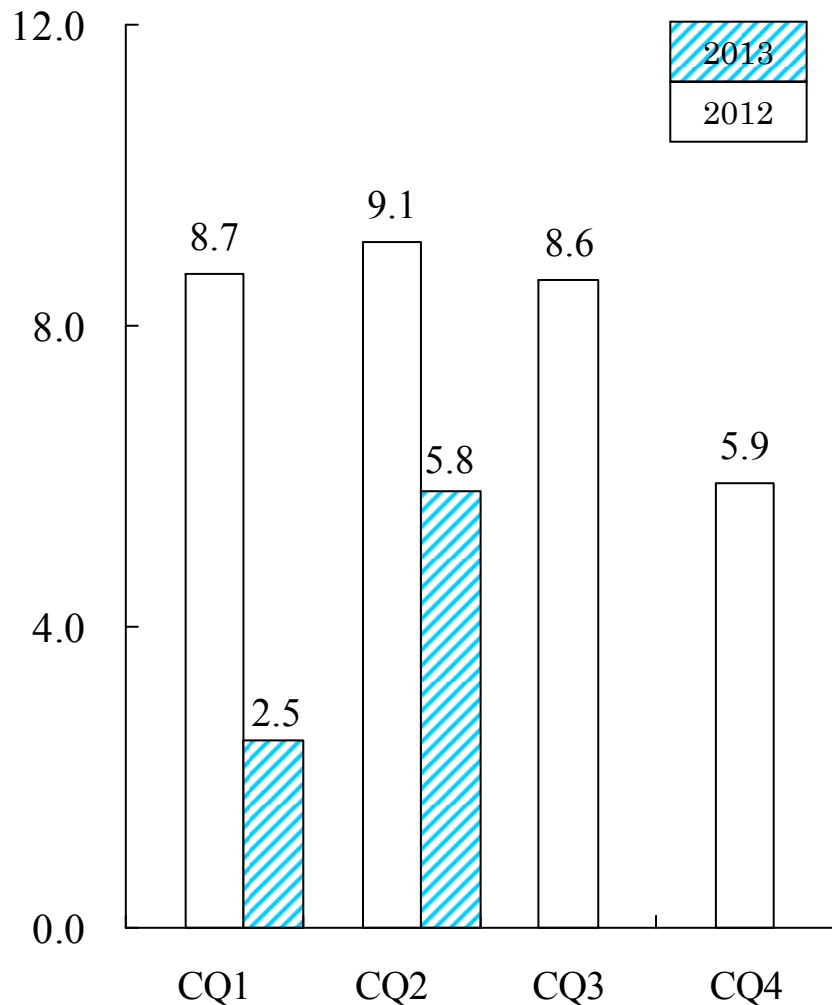
《Chemicals》



(Reference) Quarterly Operating Income by Segment

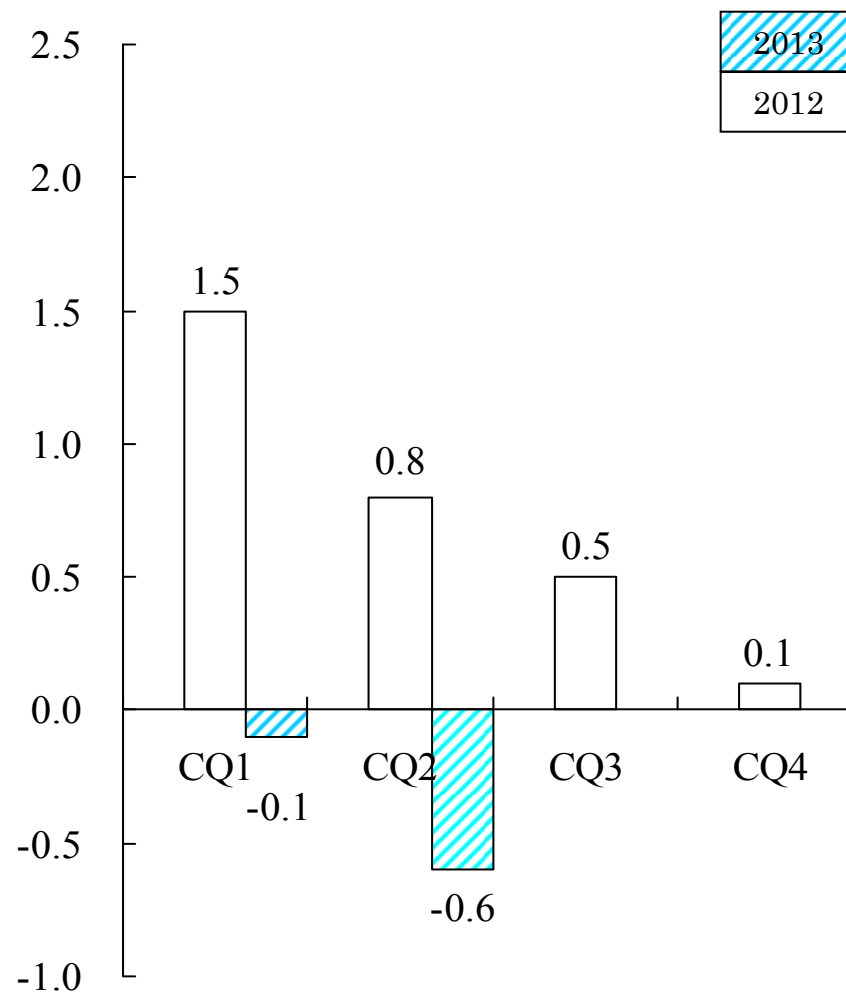
《Electronics》

(Unit: Billions of Yen)



《Inorganics》

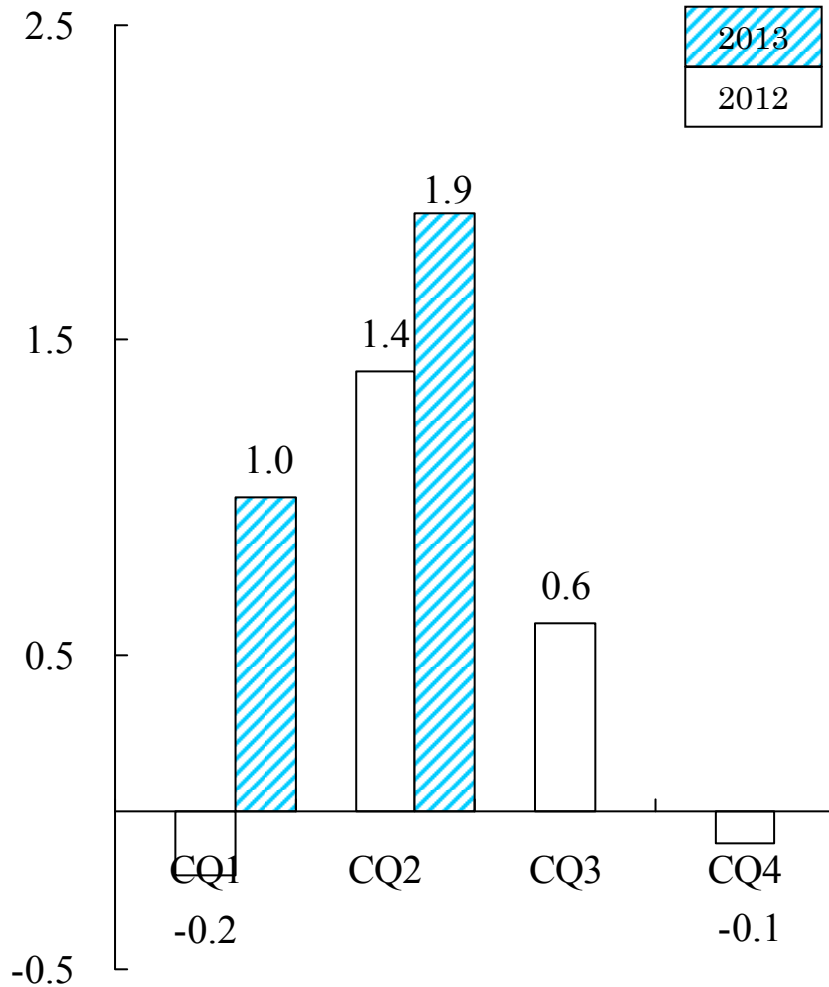
(Unit: Billions of Yen)



(Reference) Quarterly Operating Income by Segment

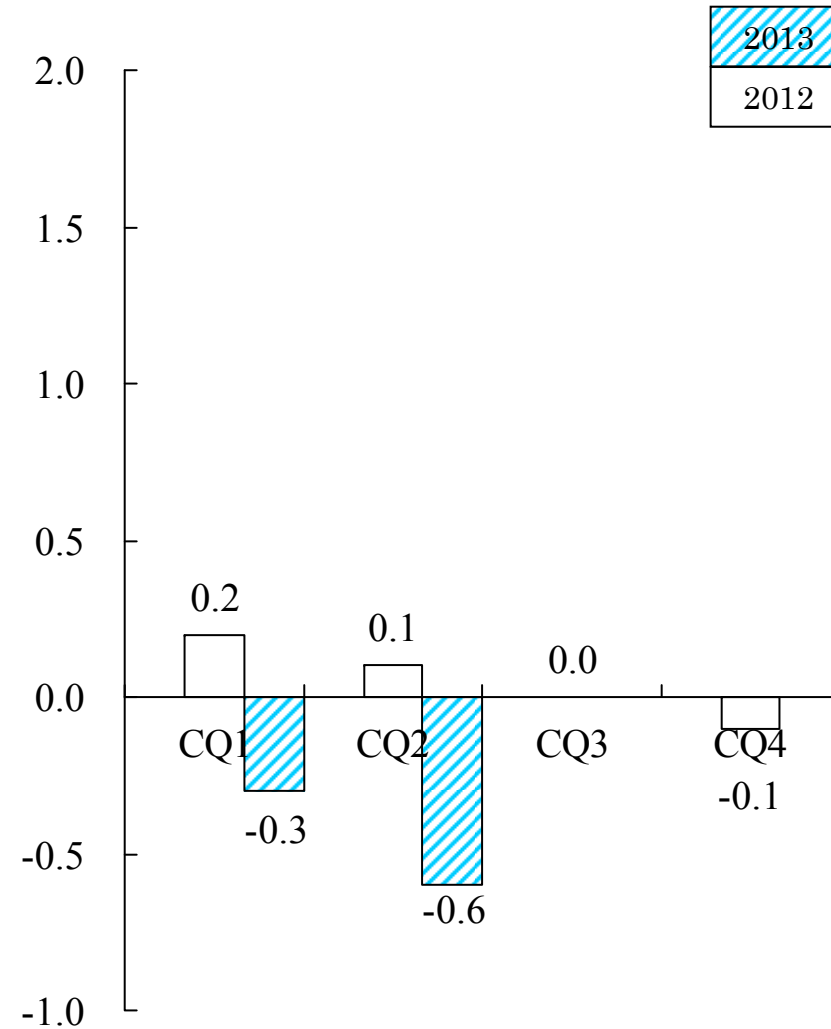
《Aluminum》

(Unit: Billions of Yen)



《Others》

(Unit: Billions of Yen)



■ Corporate

- Strategic partnership in the fullerene business
 - ◆ In January, SDK entered into a strategic partnership with Mitsubishi Corporation (MC) in the fullerene business. As part of the arrangement, SDK acquired from MC a 50% stake in Frontier Carbon Corporation (FCC), a producer and marketer of fullerene products, thereby making FCC a 50-50 joint venture between MC and SDK. Fullerene is a molecule composed entirely of carbon. It takes the form of a soccer ball and is one nanometer in diameter. As the molecule is soluble in organic solvents and is an excellent electron acceptor, it is seen as a promising material in the field of electronics, particularly for such applications as n-type material for organic photovoltaic cells. SDK has over 10 years of experience commercially producing carbon nanotube (VGCFTM). SDK is therefore confident that its nanotechnology acquired through the VGCF business can be practically applied to the fullerene business. SDK and FCC will jointly undertake R&D and marketing activities towards the commercialization of fullerene products.
- Developing technology for volume production of graphene
 - ◆ SDK developed, in cooperation with Tohoku University's Institute of Multidisciplinary Research for Advanced Materials and as part of the Japan Science and Technology Agency's Adaptable and Seamless Technology Transfer Program, a volume production technology for graphene—an innovative carbon material—using supercritical fluid. Graphene, a single-layer sheet of carbon atoms arranged in a regular hexagonal pattern, has advantages such as high electron mobility (more than 100 times that of silicon) and thermal/chemical stability. The newly developed technology enables the speedy and low-cost production of high-quality graphene by using organic solvents in the form of supercritical fluid and by a peeling process. The technology will open up a new field of applications, including light/strong components, battery materials, and power generation, in addition to the existing electronic materials applications.

■ Corporate

- Developing microwave-based new materials for printed electronics
 - ◆ SDK developed an innovative microwave-heating printing technology to form electronic circuits, and started placing printable conductive ink and ink-curing units on the market. In cooperation with Tokyo Institute of Technology, and The National Institute of Advanced Industrial Science and Technology, SDK developed new technology to control spark discharge at the time of microwave heating. SDK also developed a printable silver/carbon hybrid conductive ink optimized for microwave-heating. Furthermore, SDK and Osaka University jointly developed a halogen-free conductive adhesive that can be used under microwave-heating, thereby preventing the problem of short circuits. As a result, it is now possible to easily form electronic circuits and mount devices on flexible printed circuit substrates, in which plastic films and other materials with low heat resistance are used. Printed electronics—the technology to manufacture electronic circuits through printing—is expected to be increasingly used as an efficient production method for electronics, electric appliances, and transport machinery.

- Chairman Takahashi’s receipt of award from the Government of Singapore
 - ◆ In July, SDK Chairman Kyohei Takahashi received The Public Service Star (Distinguished Friends of Singapore) Award from the Government of Singapore. The prestigious Public Service Star awards are given to industrialists who are considered to have made great contributions to the economic growth of Singapore. The DFS Award was granted to Takahashi in recognition of SDK’s active investments in Singapore in the area of the hard disk industry (one of the major industries in Singapore), and its contributions to innovation and job creation. SDK will continue to strengthen the business, expecting further growth in demand for HD media for nearline server and other applications.

■ Chemicals

- Expanding sales of liquefied ammonia in the Tohoku region
 - ◆ In June, SDK started reconstruction work of its liquefied ammonia distribution base in Soma District, Fukushima Prefecture, which had been damaged by the Great East Japan Earthquake. The new facility will open in March 2014. SDK's liquefied ammonia (*Ecoann*TM) is approved as “eco-friendly goods for procurement” by major electric power companies because the product is partly based on used plastics. Liquefied ammonia is used in the production of synthetic fibers. It is also used for removing nitrogen oxides contained in exhaust gas from thermal electric power plants. SDK forecasts steady demand for *Ecoann*TM as thermal electric power plants are expected to continue operating at high rates. To further expand sales of *Ecoann*TM as an important component of the basic chemicals business, SDK decided to operate the liquefied ammonia distribution base in Soma District by itself. In this connection, SDK merged Marusho Kogyo Co., Ltd., a wholly owned subsidiary for operating the base, on April 25.
- Starting commercial production of anode binder for LIBs
 - ◆ In February, SDK started volume production of “*Polysol*TM LB Series” water-based anode binder for LIBs. The product is a water-based emulsion containing acrylic synthetic resin particles, ensuring lower environmental impact at the time of LIB production compared with solvent-based binders. It provides such advantages as low electrical resistance, good temperature characteristics, and good adhesion to anode collectors, thereby contributing toward extending the life and increasing the capacity of LIBs. A binder causes cathode/anode active materials (for release and intake of lithium ions) to stick together. It also causes additives to stick together, and active materials to adhere to collectors. Thus, the product is attracting attention as one of the key materials that largely influence the performance of LIBs.

■ Chemicals

- Receipt of award for energy-saving project
 - ◆ SDK's Kawasaki Plant completed a project for energy-saving by integrating boiler operations at the plant site. Specifically, the steam generated at boiler facilities of the Ohgimachi district is sent to Showa Denko Gas Products' Kawasaki facility (which is located within the same plant site) through a pipeline, and to the Ohkawa district across a canal, using a seabed tunnel. The new system has enabled the Kawasaki Plant to reduce energy consumption by 42% and CO2 emissions by around 2,400 tons a year. Owing to this achievement, the Kawasaki Plant received an award from Kawasaki City on the occasion of its event of "Kawasaki Environment Show Window 2012."

■ Electronics

- Completion of plant growth facility in Fukushima using SDK's specialty LED chips
 - ◆ In April, a new plant growth facility was completed at Kawauchi Village, Fukushima Prefecture, in which SDK's specialty LED chips and innovative cultivation method (the "Shigyo method™") are used. The facility represents a completely closed system cut off from the outside air and insects, enabling agricultural production uninfluenced by changes in weather and atmospheric temperature. The facility has the capability to produce up to 8,000 heads of leaf lettuce and green herbs. The facility uses SDK's LED chips that emit red light with optimized wavelengths for plant growth (660nm) in the highest brightness in the world (as of April 26, 2013) in combination with the "Shigyo method™", which was developed jointly by SDK and Yamaguchi University. Compared with fluorescent-lamp-based plant growth facilities, this system can increase the yield by two times or more, and reduce air-conditioning-related electricity costs, as it involves lower level of heat generation. Thus, the new system enables profitable operation of plant growth facilities.

■ Inorganics

- Establishing a graphite electrode subsidiary in China
 - ◆ SDK completed its procedure for acquiring a controlling stake in Sinosteel Sichuan Carbon Co., Ltd., a manufacturer of graphite electrodes in China. In March, SDK made the company a subsidiary, renaming it as Showa Denko Sichuan Carbon Inc. SDK has so far been supplying high-quality graphite electrodes mainly to the markets in advanced countries from its production sites, one each in Japan and the United States. With the establishment of its Chinese subsidiary, SDK is now ready to supply “volume-zone” products for emerging markets. Thus, SDK will steadily promote its strategy of “being active on two fronts,” serving both the high-end and volume-zone product markets.

■ Aluminum

- New sensor chosen for hospital beds
 - ◆ In February, SDK’s aluminum-based sensor was chosen by France Bed Co., Ltd. for use in its sensor system for hospital beds. Owing to the light and rigid nature of aluminum, the system catches a very small amount of sensor deformation under a bed-user’s weight and converts it into electric signals. SDK’s proprietary algorithm is used to detect a user’s movement, such as turning over, getting up, sitting on, and leaving the bed, based on the changes of weight following the move of a user. SDK is also developing devices for measuring a user’s biological information, such as a non-contact-type sleep (breathing) sensor, aiming to expand sales in the area of health-care and security.

■ Others

- Increasing LIB packaging material production capacity
 - ◆ Showa Denko Packaging Co., Ltd., a subsidiary of SDK, decided to further increase its production capacity for LIB-packaging aluminum laminated films, in addition to the expansion already completed in July. After the additional expansion, Showa Denko Packaging's production capacity at the end of 2014 will be increased by three times before the expansions. Showa Denko Packaging is offering its aluminum laminated film—a composite material of resin film and aluminum foil—for packaging LIBs. Compared with metallic LIBs (such as cylindrical type), aluminum-laminated-film-based pouch type LIBs provide higher flexibility in molding, lighter weight, and better heat dissipation. Thus, the share of pouch type is increasing, and the market for LIB-packaging aluminum laminated films is expected to grow rapidly.