

# FY2013 Progress of Business Strategy

May 2014

 **SUMITOMO METAL MINING CO., LTD.**

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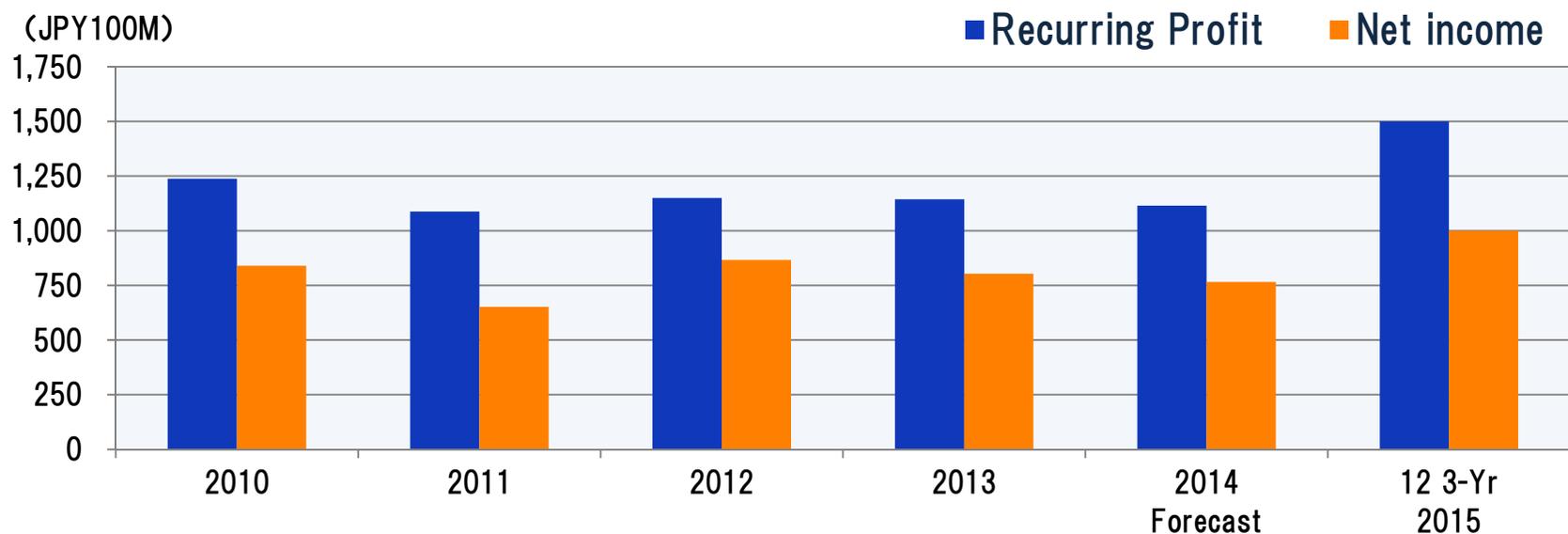
**IV Financial Highlights**

# I . Trend in Business Performance



Taganito HPAL

# 1) Profit Trends

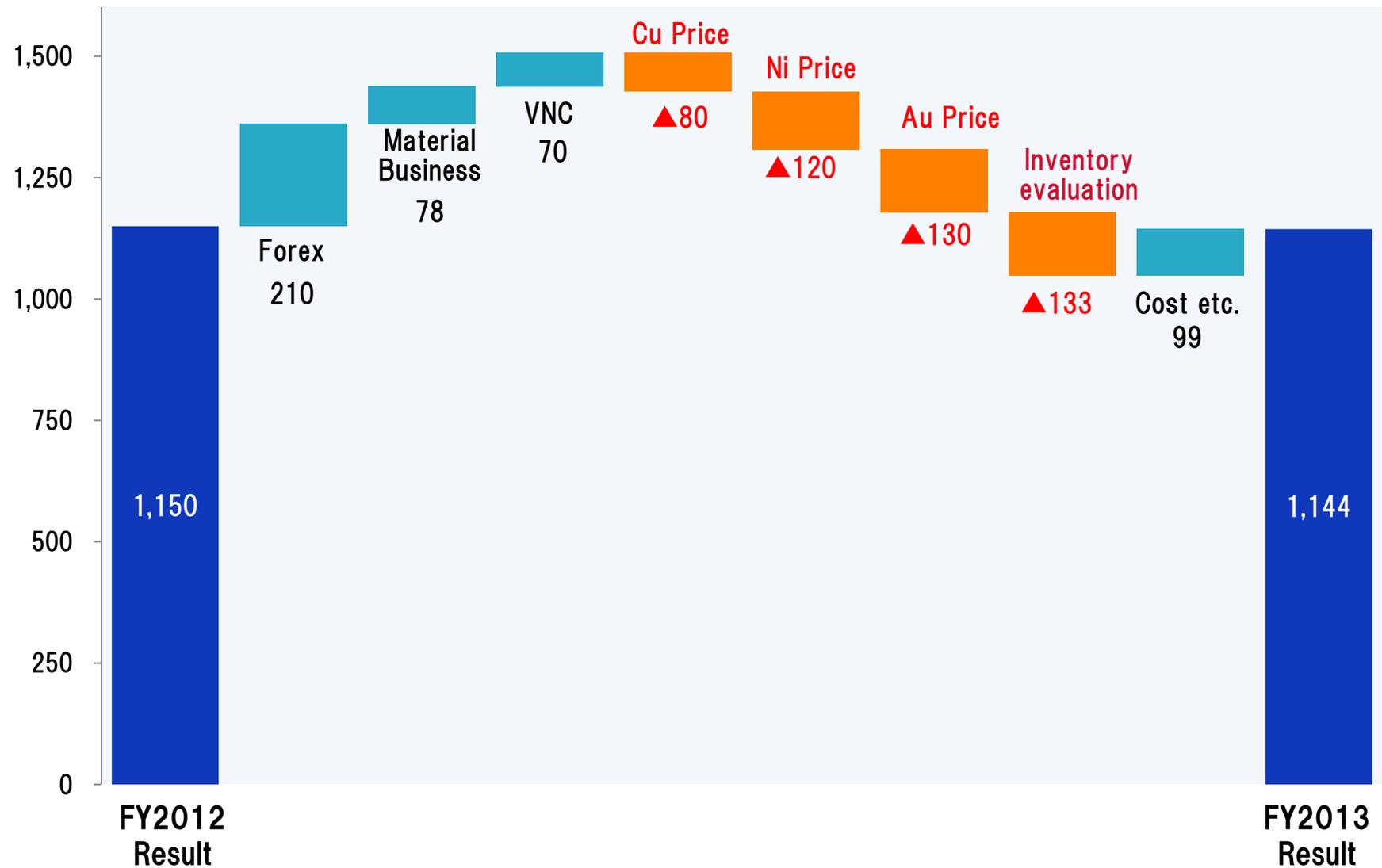


	2010	2011	2012	2013	2014 Forecast	12 3-Yr Forecast 2015
Recurring profit (JPY100M)	1,238	1,088	1,150	1,144	1,120	1,500
Net income (JPY100M)	841	653	866	803	770	1,000
Cu Price (\$/T)	8,140	8,485	7,855	7,104	6,700	7,500
Ni Price (\$/lb)	10.7	9.6	7.7	6.5	7.2	9.0
Au Price (\$/Toz)	1,294	1,646	1,654	1,327	1,150	1,550
Forex (¥/\$)	85.7	79.1	83.1	100.2	103.0	80.0

## 2) Recurring Profit Analysis

### FY2013 Result vs. FY2012 Result

(JPY100M)

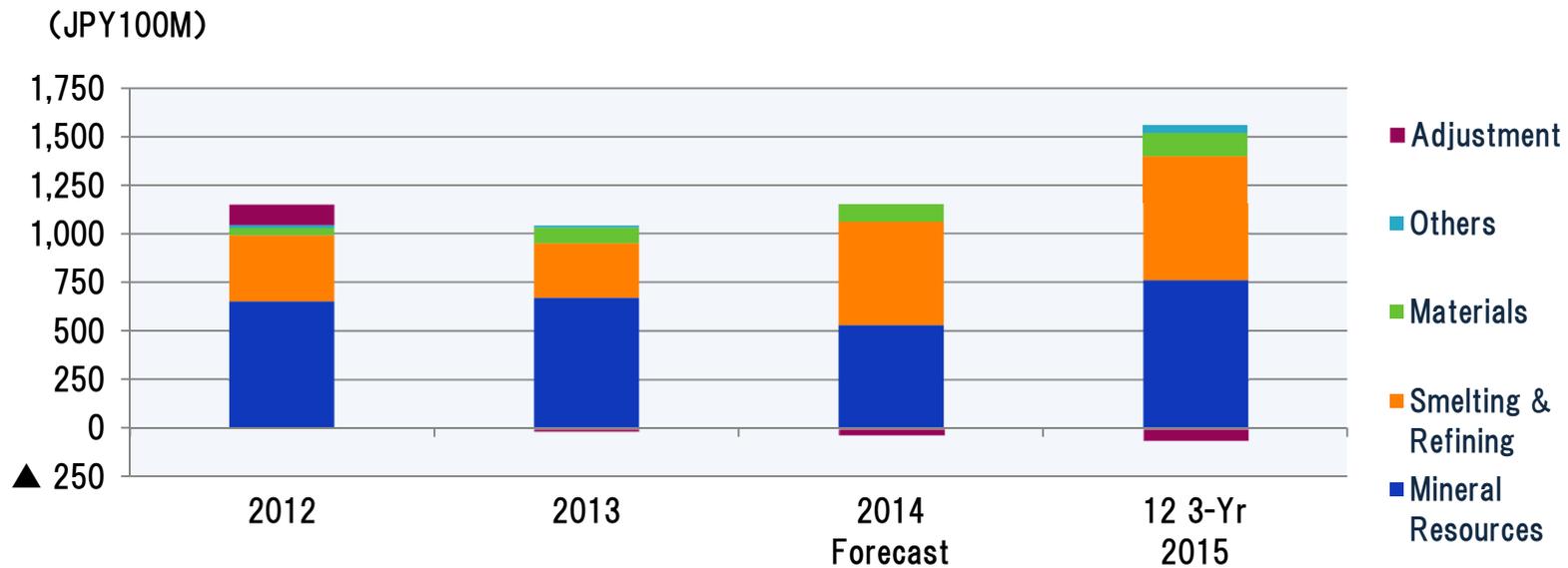


# 3) Recurring Profit Analysis

## FY2013 Result vs. FY2014 Forecast



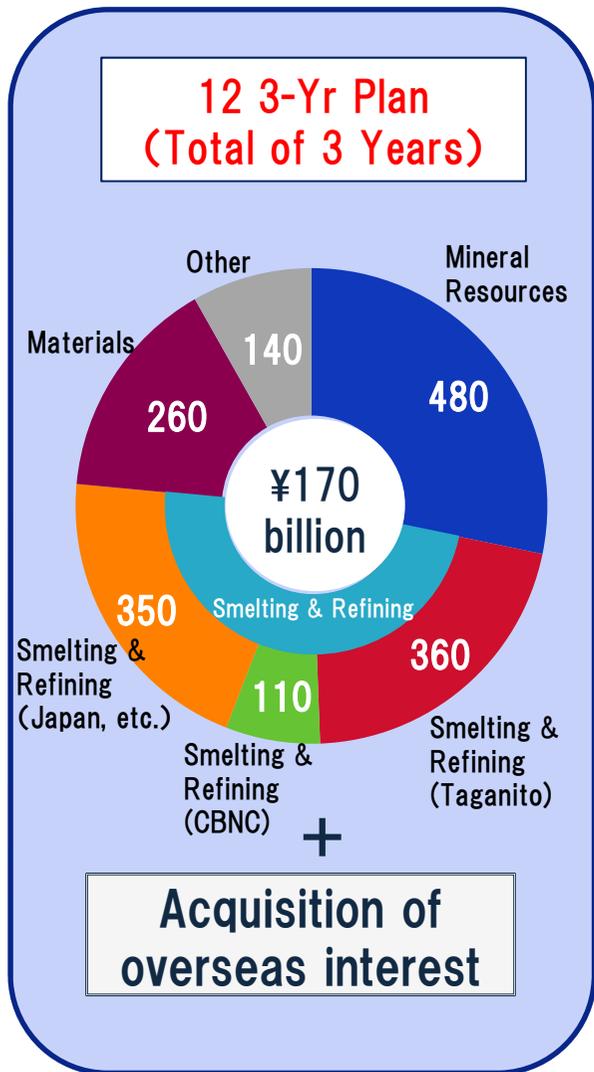
## 4) Profit Trends by Segment



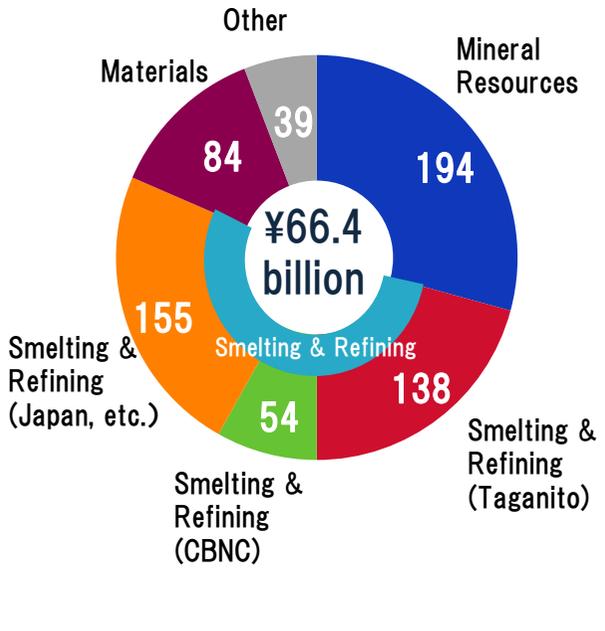
(JPY100M)

		2012	2013	2014 Forecast	12 3-Yr 2015
Segment profit	Mineral Resources	652	691	530	760
	Smelting & Refining	339	291	530	640
	Materials	38	111	90	120
	Others	16	16	0	40
Adjustment		105	35	▲30	▲60
Recurring Profit		1,150	1,144	1,120	1,500

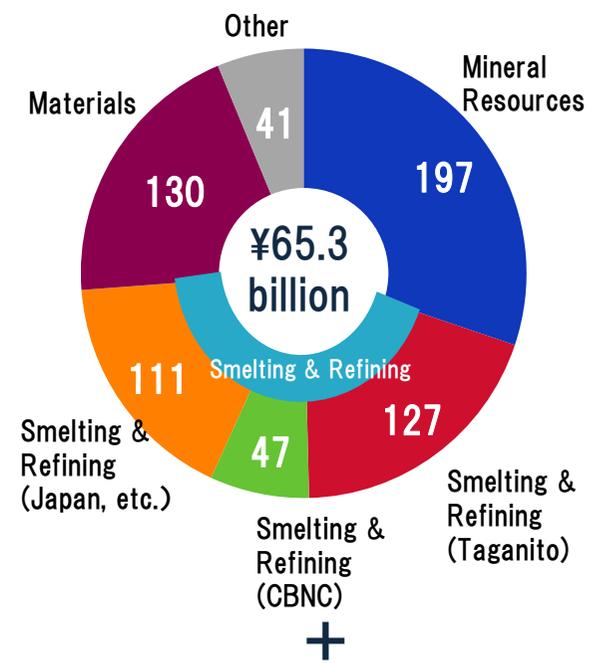
# 5) Capital Expenditure



**FY2013  
Result**

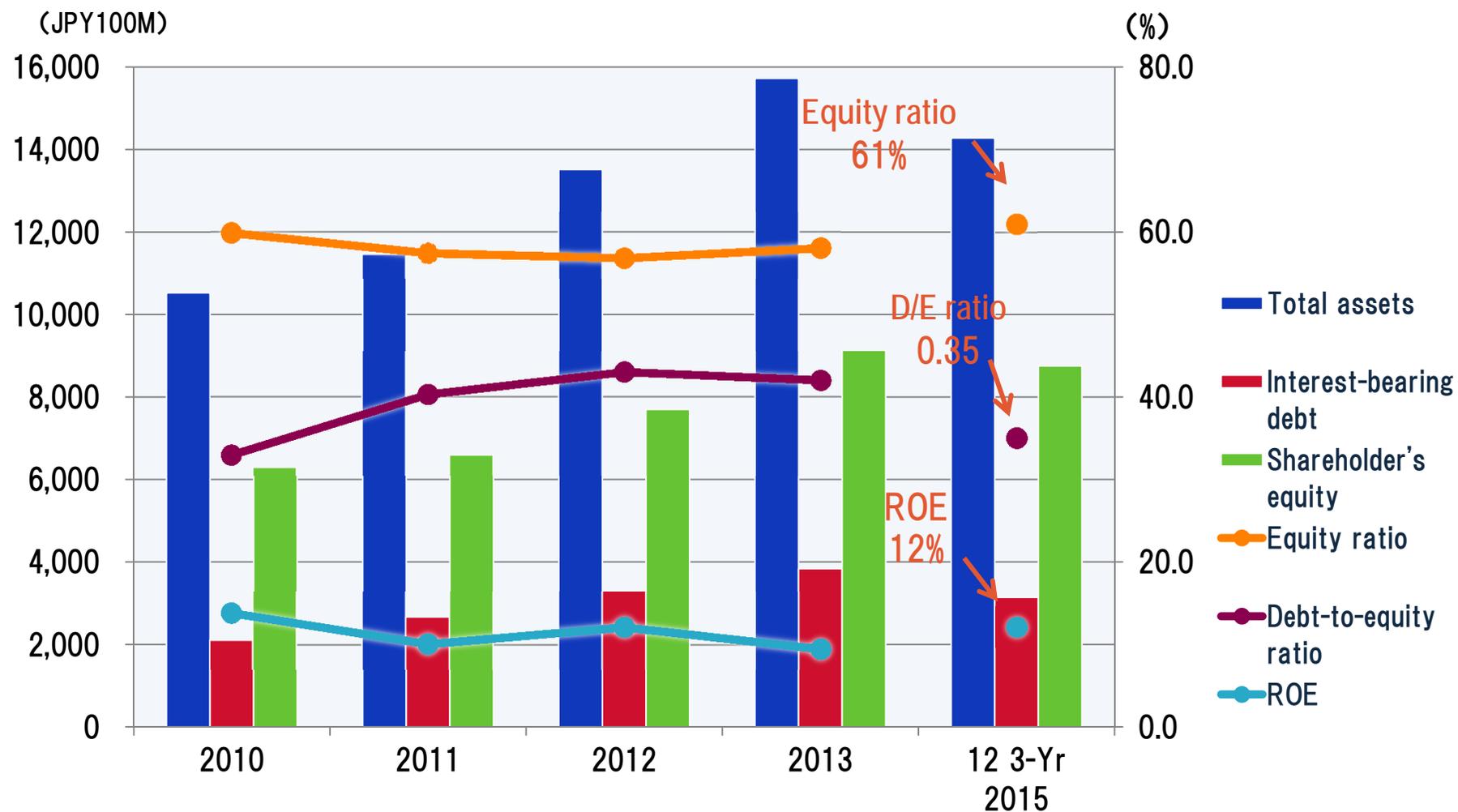


**FY2014  
Plan**

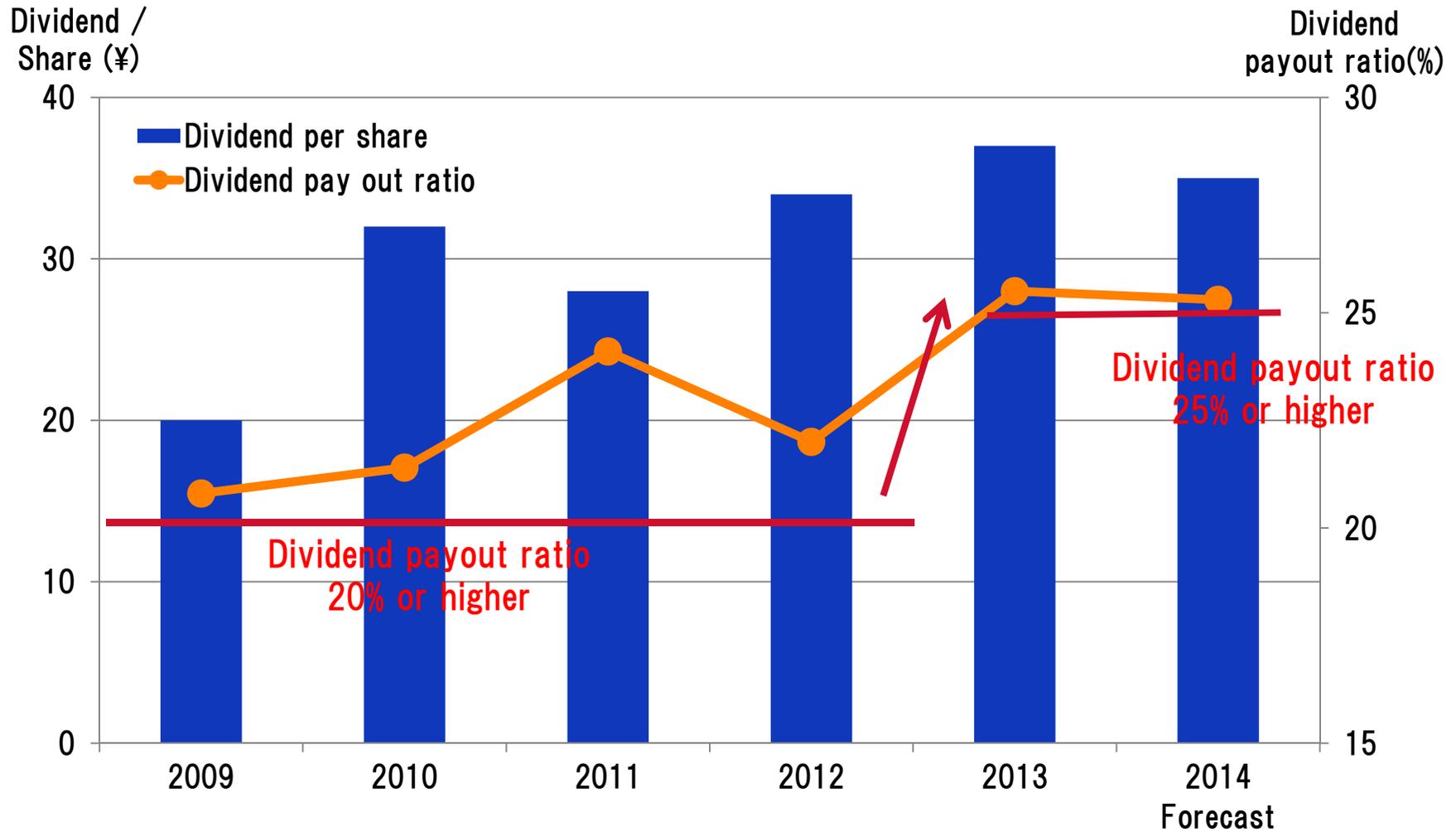


## 6) Financial Strategies

### Maintenance of a Sound Financial Structure



# 7) Trend of Dividend



- Continue performance linked dividend
- Dividend payout ratio raised from 20% or higher  
⇒ 25% or higher from FY2013

## II . Promotion of the 12 3-Yr Plan Strategy



Taganito HPAL

# 1) Mineral Resources

## ① Participation in Mine Development Project Sierra Gorda Project - Cu



### Sierra Gorda Project (Chile)

Equity Interest Ratio	KGHM	55%	Total Investment for Phase 1	\$ 3.9B
	SMM	31.5%		
	Sumitomo			
	Corp.	13.5%		

#### Schedule

- \* 2011 - Decided to participate in the project
- \* 2013 - Promote Phase 1 construction work (110 kt annual production capacity)
- \* 2014 - Start production; Phase 1 ramp-up

#### Current Progress

- Stripping completed as of end of March
- Progress of construction work: Over 90% completed  
Ore transport line, crushing process, concentration process are under construction
- Start of pre-commissioning, beginning with completed facilities
- Ramp-up in second half of 2014

# 1) Mineral Resources

## ② Increasing Production at Existing Mines Morenci - Cu

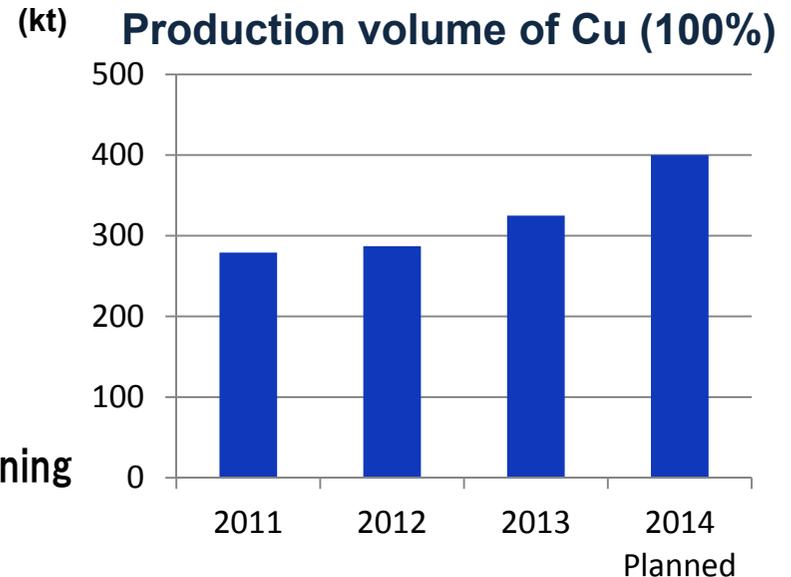


### Morenci Mine (USA) Expansion Project

<b>Equity Interest Ratio</b>	<b>FCX</b>	<b>85%</b>	<b>Total investment</b> <b>\$1.9B</b>
	<b>SMM</b>	<b>12%</b>	
	<b>Sumitomo Corp.</b>	<b>3%</b>	

### Upgrade Plan

	Current status	2014
Mining output	635 kt/day	815 kt/day
Concentration capacity	50 kt/day	115 kt/day
Production volume of copper	280 kt/year	400 kt/year



### Schedule

- \* January 2013 - Decided on participation in project for increasing production
- \* 2014 2Q - Complete construction, start commissioning
- \* 3Q - Launch full-scale operation

# 1) Mineral Resources

## ② Increasing Production at Existing Mines Cerro Verde - Cu



### Cerro Verde Mine (Peru) Expansion Project

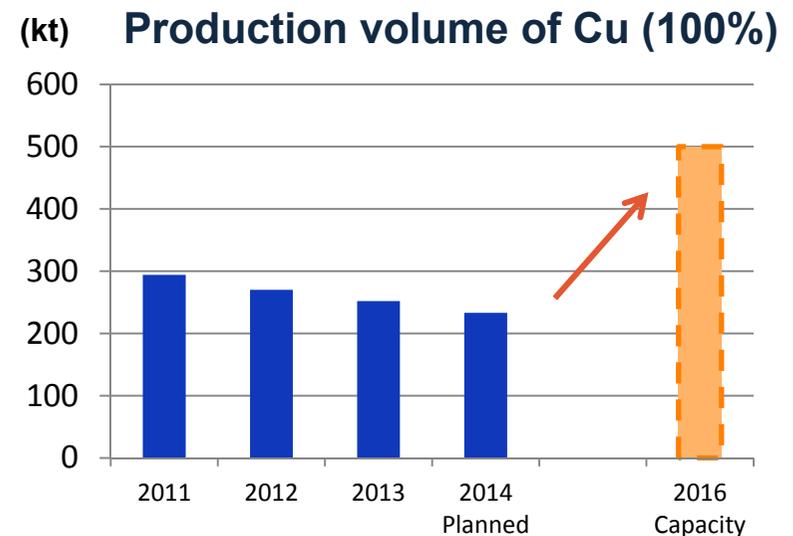
<b>Equity Interest Ratio</b>	<b>FCX</b>	<b>53.56%</b>	<b>Total investment</b> <b>\$4.6B</b>
	<b>SMM</b>	<b>16.80%</b>	
	<b>Sumitomo Corp.</b>	<b>4.20%</b>	
	<b>Other</b>	<b>25.44%</b>	

#### Upgrade Plan

	Current status	2016
Mining output	320 kt/day	850 kt/day
Concentration capacity	120 kt/day	360 kt/day
Production volume of copper	300 kt/year	500 kt/year

#### Schedule

- 2013 - Completed final planning, began construction
- February 2014 - Decided on participation in project for increasing production
- Present - Basic construction is underway
- \* 2016 - Full production



# 1) Mineral Resources

## ③ Maintenance and Expansion of Existing Au Mine Volume



### Hishikari Mine

#### Production volume and gold content

**FY2014 Production plan: 6.5 t**

Lowering of ore grade expected at planned mining face  
Recovery expected in FY2015

**Gold content as of December 31, 2013: 170 t**

**Continue maintaining reserves**

#### Development plan for lower ore body

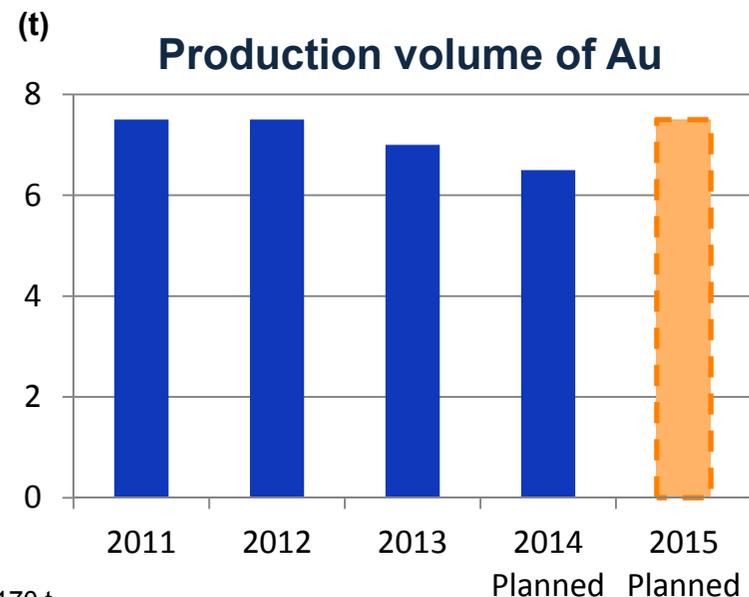
**Confirmed quality mineral vein in the lower part of ore body being mined**

\* Installed hot spring drawdown equipment at 80ML below sea level

Total investment amount: Approx. ¥3.2 billion

\* November, 2012 - Start construction

\* 2018 - Scheduled to start mining



(Note)

Gold content of Hishikari mine: Content of gold in minable ore according to JIS standards: 170 t

# 1) Mineral Resources

## ③ Maintenance and Expansion of Existing Au Mine Volume



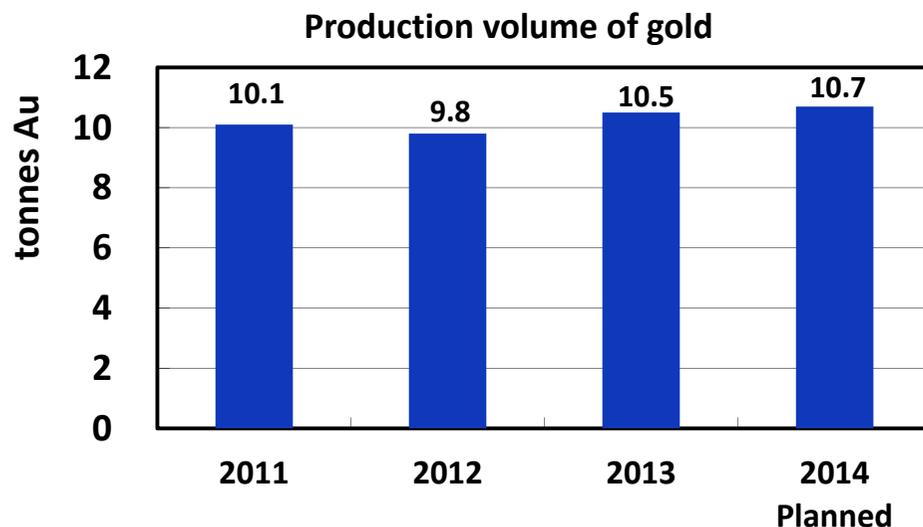
### Pogo Gold Mine

2009 - Acquisition of additional mining interest (51% → 85%)

2014 - Production plan: 10.7 t

Gold content as of December 31, 2013: 144 t

\* Actively continue exploration of the surrounding area



### East Deep Section Development Plan

\* 2014 1Q – Start mining

Construction is progressing steadily; installation of equipment in the mine will take place.

(Note) Gold content of Pogo Gold Mine : Gold contained in reserves plus resources under Canadian standards (Gold content in reserves: 59 t, in resources: 85 t)

# 1) Mineral Resources

## ④ Promotion of Exploration by SMM Stone Boy - Au/ Solomon - Ni

### Stone Boy Project

- Conduct gold exploration in Alaska  
Continue exploration

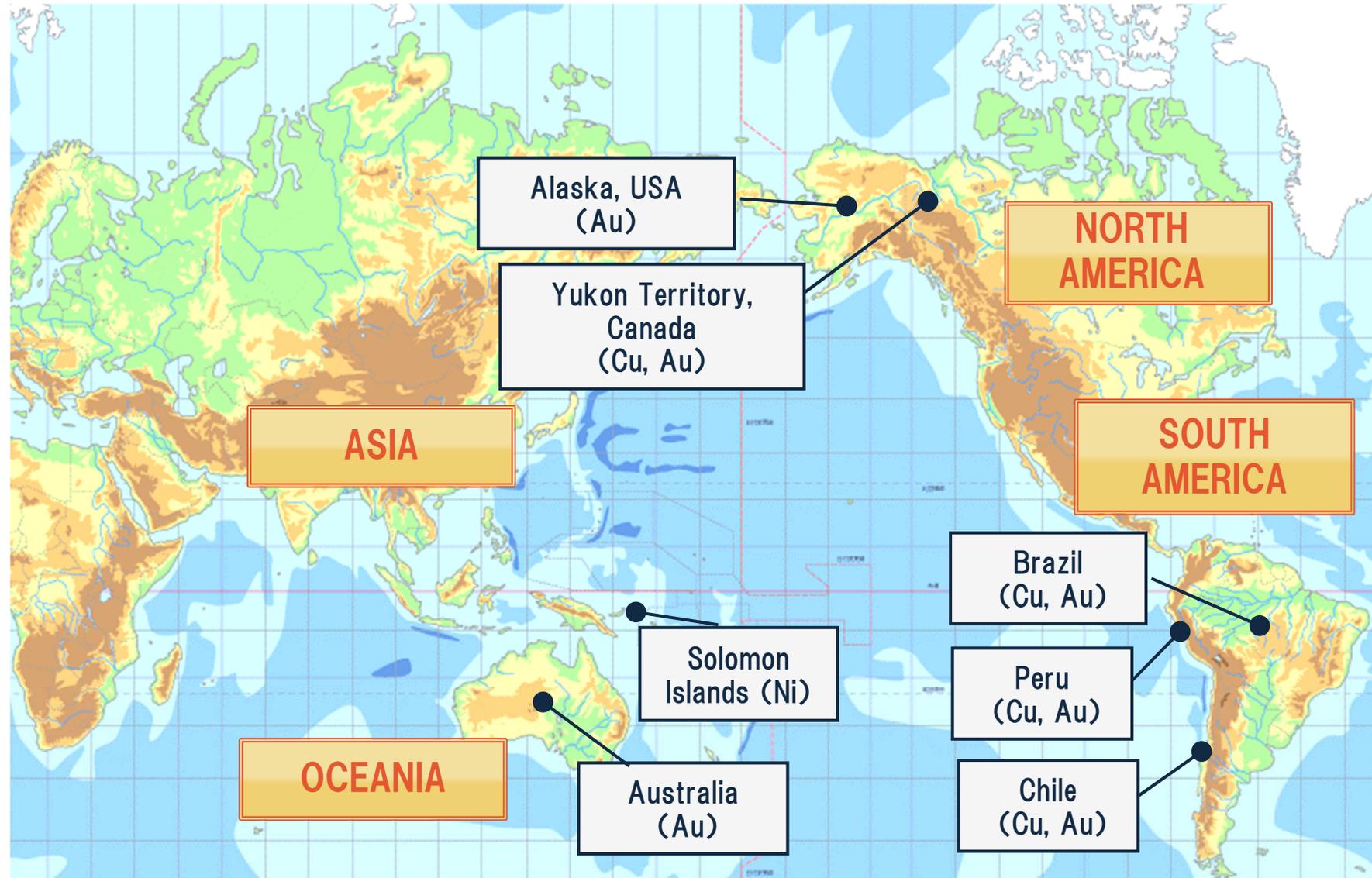
### Solomon Project

- Conduct exploration, environmental research, and Pre/FS in Isabel Area
  - 2010 - Successfully bid **for 3 mining blocks in Isabel Area** in international bidding
    - 2011 - Government of Solomon unilaterally revoked successful bids and conferred mining blocks to Axiom KB Limited
    - In same year, SMM sued government and Axiom KB Limited
- October 2013 - High court Litigation began  
April 2014 (present) - Court case is ongoing



# 1) Mineral Resources

## ④ Promotion of Exploration by SMM – Worldwide Exploration



## 2) Smelting & Refining

### ① Establish a 100kt Capacity for Ni – Taganito HPAL

#### Taganito HPAL Nickel (Mindanao, Philippines)

- Investment ratio: SMM 62.5%, NAC 22.5%, MITSUI & CO., LTD. 15%
- Scheduled period for operation : 30 years
- Investment amount: US\$1.6 billion

Production starts with 30kt per year capacity

→ 36kt capacity in 2016

(20% increase in production)



#### Schedule

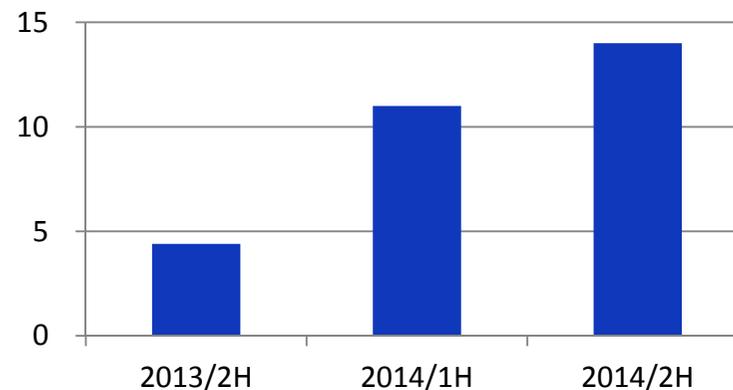
June 2013 – Construction work Completion

Sep – Inauguration Ceremony

Oct 21 – First Ship leaves to Japan

From March 2014 – Operation above 85% level  
Transition to full production structure in middle of FY2014

Production plan of MS (Ni-kt)

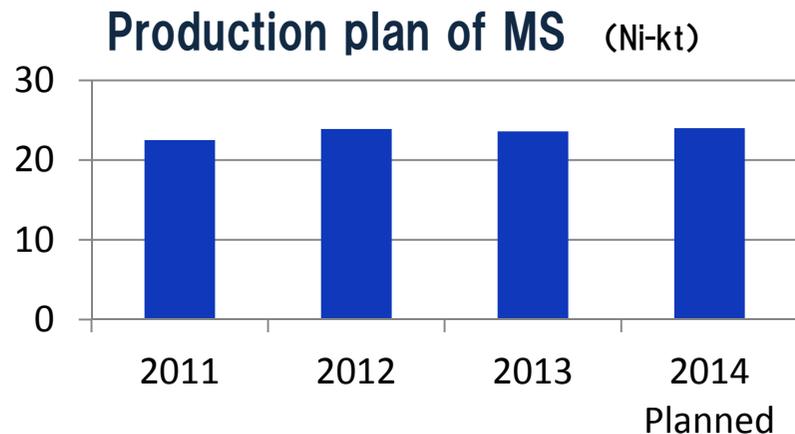


## 2) Smelting & Refining

### ② Establish a 100kt Capacity for Ni – Coral Bay Nickel

#### Coral Bay Nickel (Palawan, Philippines)

Continued full production



HPAL technology (High Pressure Acid Leach) allows Ni-Co recovery from low-grade Ni oxide ores world-first for SMM on commercial scale  
2005 Phase I: Start of production Current Capa: 24ktpa  
MS Ni intermediate produced at CBNC  
E-Ni produced from MS at Ni refinery in Japan



## 2) Smelting & Refining

### ③ Promotion of 65 kt Electrolytic Nickel Production Operation – Ni



#### Increase production at Niihama Nickel Refinery

Production  
Capacity

41 kt/year  
→ 65 kt/year

Total  
investment

¥14 B

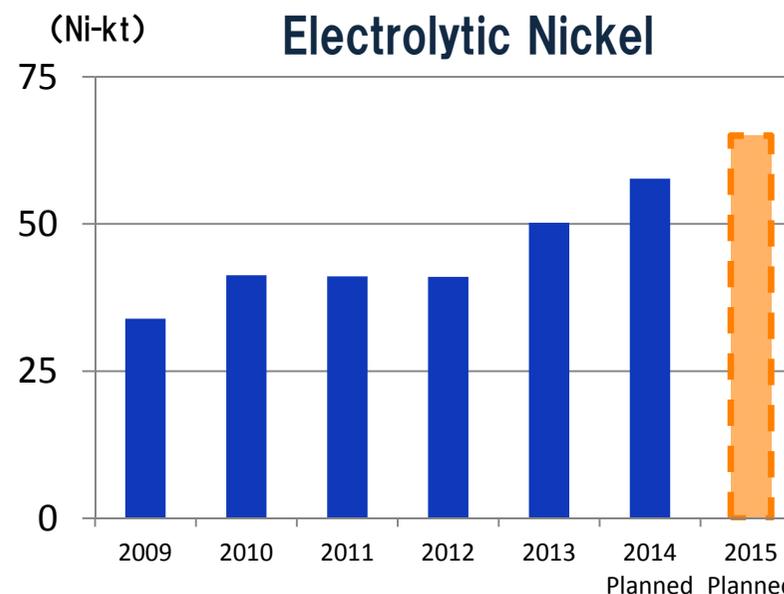
#### Schedule

- \* FY2009 - Completed 41 kt production structure
- \* FY2010 - Decided to invest in 65 kt production operation
- \* End of March 2013 - Refining facility completed
- \* November onward - Receipt of raw materials from Taganito

#### Production Volume

FY2013 – 50 kt  
FY2014 – 58 kt  
FY2015 – 65 kt planned, through increased raw material processing at Taganito

#### Production volume of Electrolytic Nickel



## 2) Smelting & Refining

### ④ Ferronickel Production Plan

#### Hyuga Smelting Co., Ltd. Ferro-nickel Production Plan

- 2014, Jan Ban of export of unprocessed ore from Indonesia  
Centered in raw material from New Caledonia, Indonesia, till FY2013  
→ Increase in raw material from New Caledonia  
Increased production from raw material of Philippines

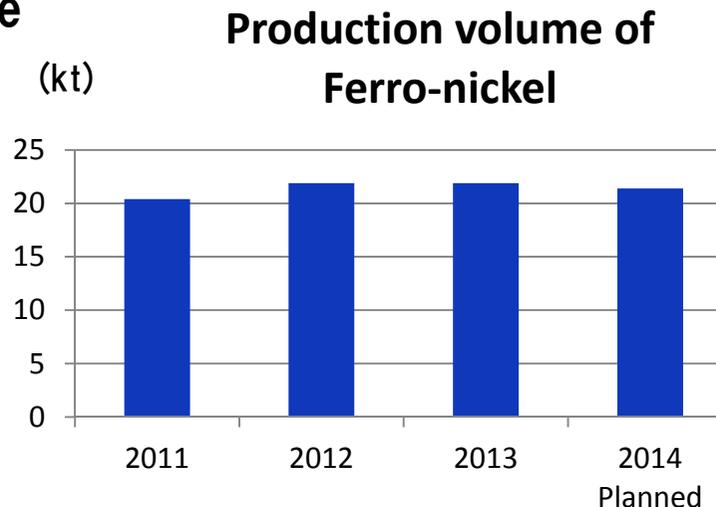
**FY2014: Planned production is almost unchanged from previous year**

#### Cost reduction initiative

Increase in processing volume through reduction in ore grade



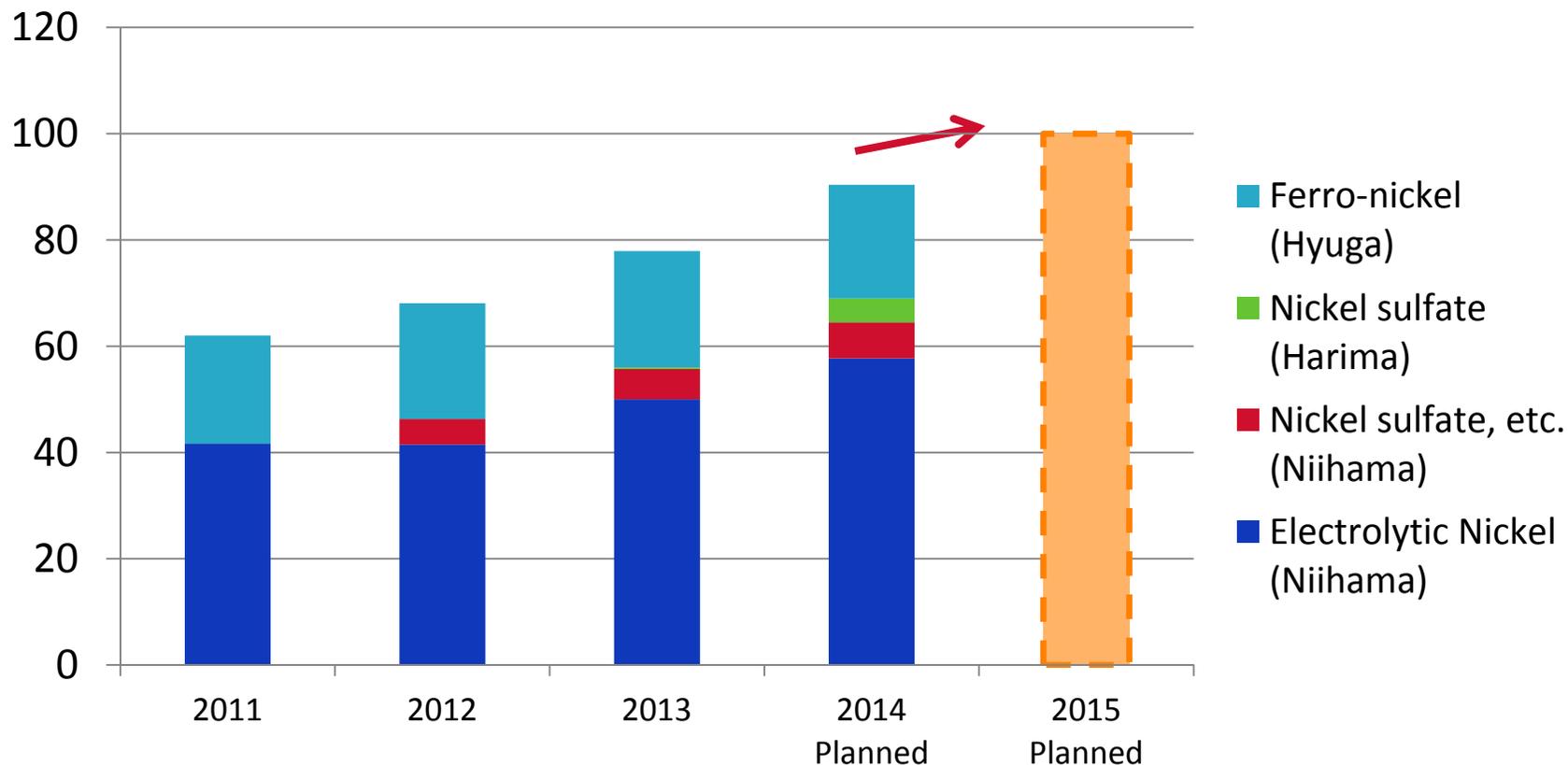
Work toward cost reductions through reduction in electrical consumption, etc.



## 2) Smelting & Refining

### ⑤ Toward a 100 kt Capacity for Nickel

(Ni-kt, Nickel sulfate are indicated in terms of pure nickel content)



#### Toward 100 kt production of nickel

FY2014 - Production volume: 90 kt

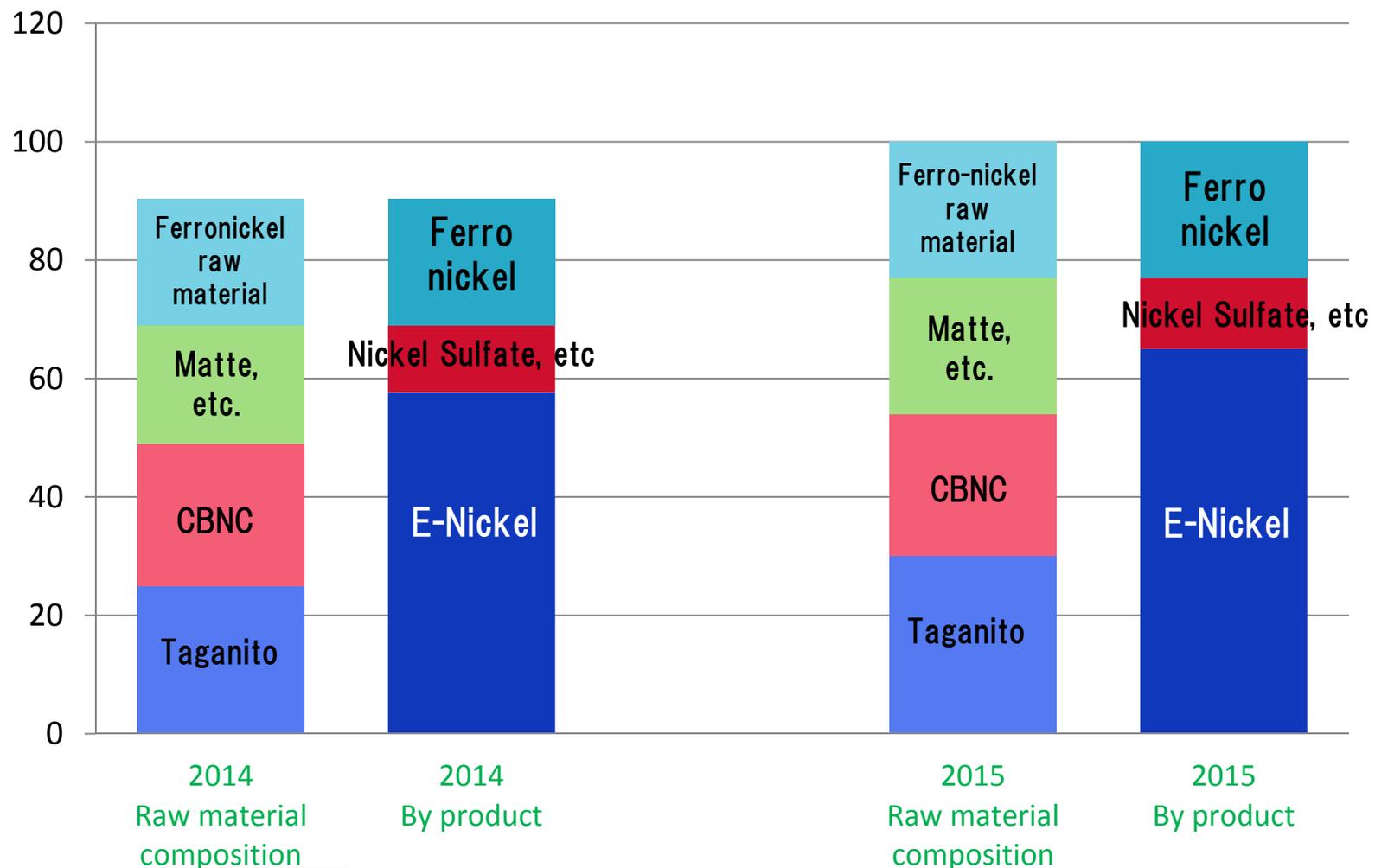
FY2015 - Toward 100 kt production through increase in intermediate products from Taganito

## 2) Smelting & Refining

### ⑤ Toward a 100 kt Capacity for Nickel

## Composition of nickel products and raw materials

(Ni-kt, nickel sulfate are indicated in terms of pure nickel content)



## 2) Smelting & Refining

### ⑥ Expanded Recycling of Valuable Metals

#### Scandium (Sc)

**Recover small quantities of scandium contained in HPAL raw ore at CBNC**

- 2014 - Build pilot plant  
Start trial production (10 kg/month)
- 2016 (scheduled) - Start of commercial production

**Current scandium production and usage status**

- Global production of approx. 10 t/year
- Supplied by the United States, Ukraine, Russia, China, etc.
- Modest volume of production and high price result in limited demand

Additive to aluminum (increases strength)  
Additive to solid electrolyte for fuel cells



Provide stable supply in order to increase new demand

#### Chrome (Cr)

**Recover chrome contained in HPAL raw ore as chromite at Taganito**

- September 2013 - Build pilot plant at CBNC  
Start test operation
- Based on pilot test results, build chrome recovery plant at Taganito

**Current chrome production and usage status**

- Main suppliers: South Africa, Kazakhstan, and India
- Additive for special steels such as stainless steel

#### Hematite

**Recover hematite contained in HPAL residue at Taganito as steel-making materials**

- 2013 3Q - Build pilot plant at THPAL  
2014 2Q - Scheduled completion
- Examining for the possibility of practical use

## Pomalaa Pre F/S

### Overview

- P.T. Vale Indonesia owns mining rights
- Pre F/S is underway

### Background

- June 2012 - Began Pre F/S
- January 2013 - Began environmental impact analysis survey (mandated)

### Current Progress

- Pre F/S is completed; will conduct evaluation
- Apply for logging permit
- PTVI will conduct COW negotiations



## 2) Smelting & Refining

### ⑧ Cu – Enhance Competitiveness of Toyo Smelter



## Toyo Smelter & Refinery (Ehime, Japan)

FY2013 Electrolytic copper production volume: 401 kt

FY2014 Production plan: 436 kt

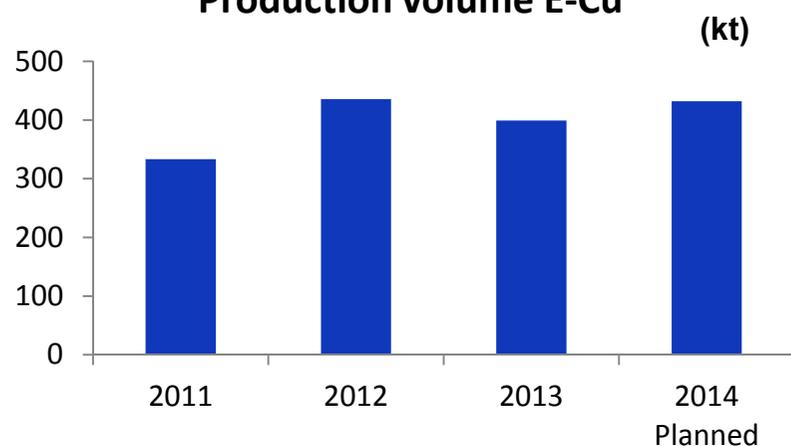
No large-scale shutdown scheduled for FY2014

Stable high-load operation at the flash furnace

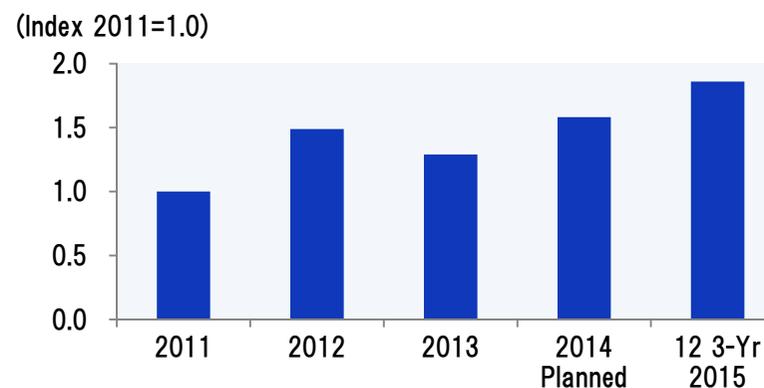
Progressively increased volume of recycled raw materials

Promote further cost reduction measures

Production volume E-Cu



Volume of scrap copper collected



### 3) Materials

#### ① Pursue Selection and Consolidation, Complete Business Structure Changes

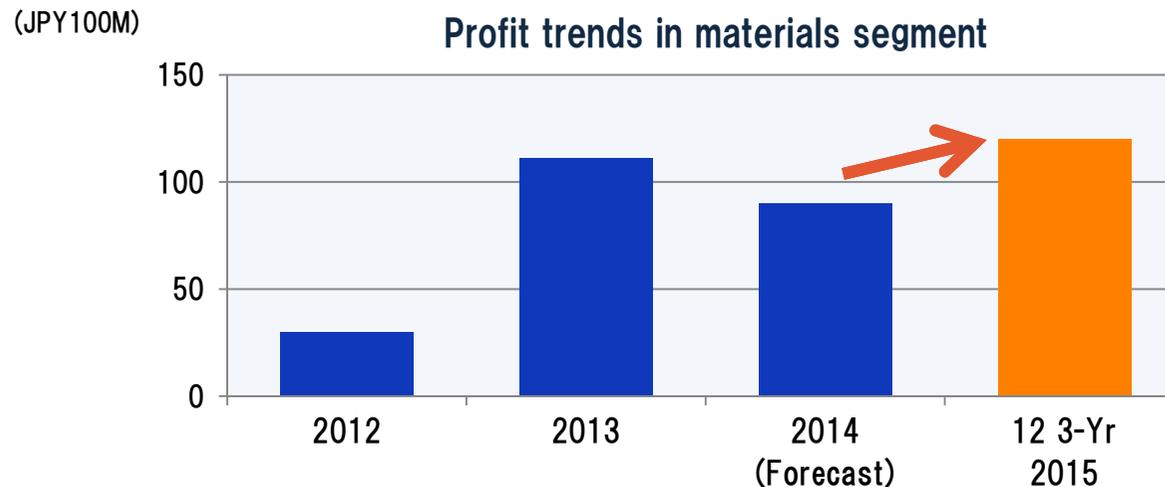
## Promotion of the 12 3-Yr Plan Strategy

### Implement measures toward realigning of business structure

- Withdrawal from and transfer of COF business
- Withdrawal from and operational transfer of MIM (metal powder injection molding product )Business
- Withdrawal from GaP (gallium phosphide) crystal business

### Promote growth strategies

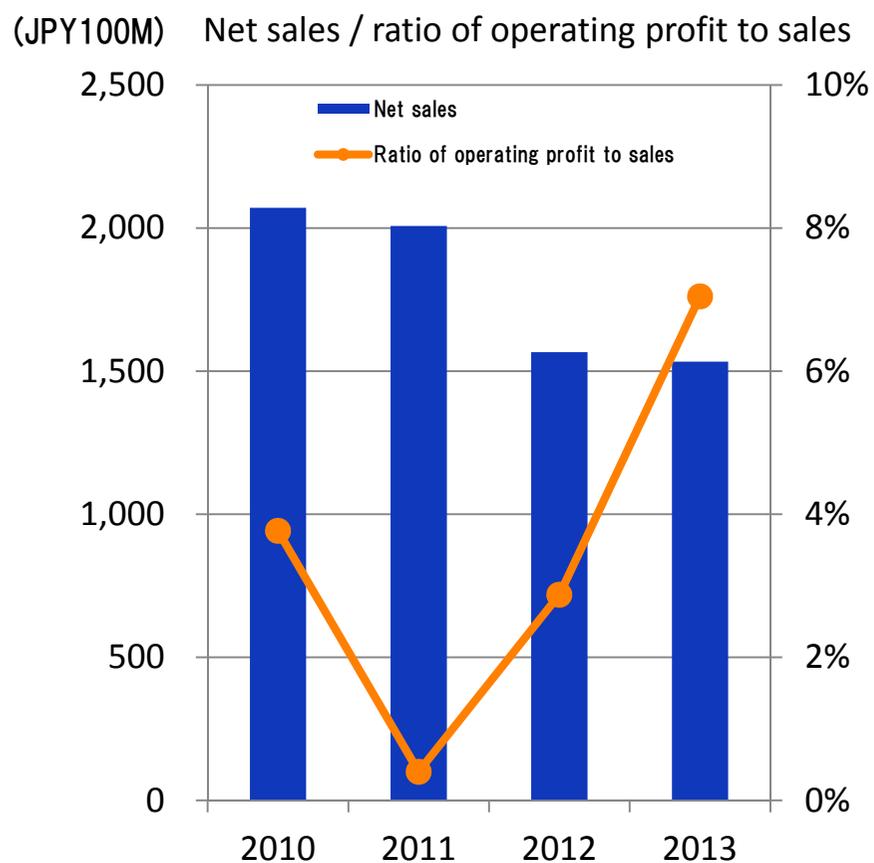
- Increased production of battery materials
- Launch of lead frame integration company
- Improvement of technological and product development capabilities through cooperation with favored customers
- Further speed-up of technological development



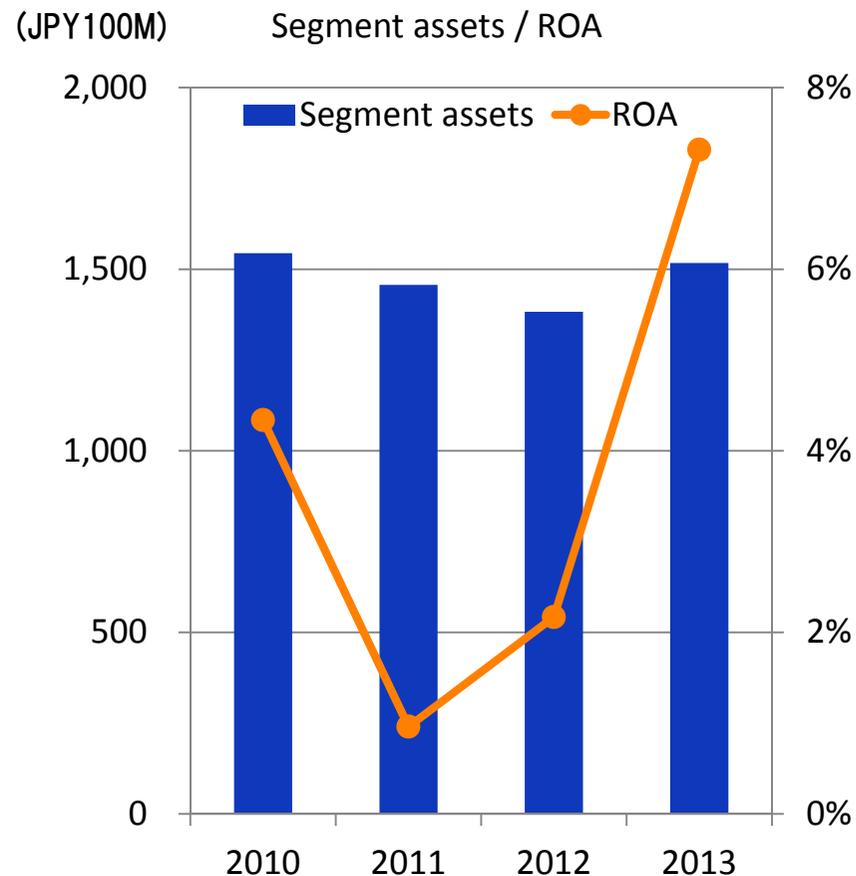
# 3) Materials

## ② Promotion of Growth Strategies

### Steady Recovery of Business Results



\* Decline in sales from 2012 is due to withdrawal from bonding wire business



**Toward a structure able to steadily increase profits**

## 3) Materials ③ Battery Materials

### Battery Materials (Rechargeable Battery Material)

#### Nickel Hydroxide



- Used as cathode material in automotive nickel metal hydride batteries by PEVE\*
- Final user: TOYOTA Motor Corporation (HEV : hybrid cars)
- SMM has large share in battery materials for HEV

\*PEVE: Primearth EV energy Co., Ltd

#### Lithium Nickel Oxide

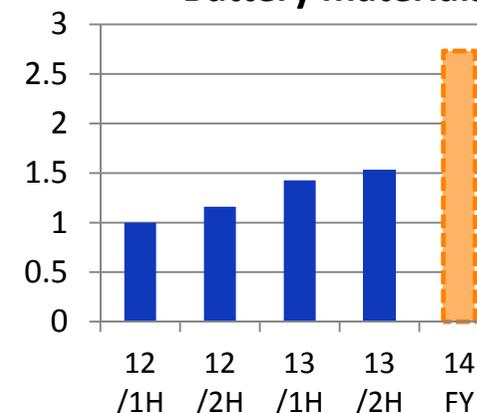


- Used in lithium-ion battery cathode material by Panasonic Corporation
- Used in electric vehicles by Tesla Motors Inc. as final user
- Production capability increase investment: from past 300t/mo to 850t/mo  
Scheduled for completion in June 2014, progressing steadily; some facilities have started operation

**We aim at the global battery cathode materials producer in the in-vehicle / highly functional consumer market by utilizing the strength of our Ni and Co resources possession and technology of the battery materials development.**

(Net sales 12/1H=1)

#### Battery materials

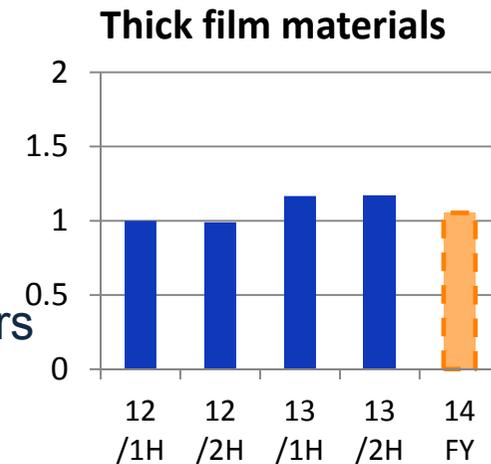


## 3) Materials ④ Thick Film Materials

### Nickel Paste for MLCC

- Used in MLCCs (Multi-Layer Ceramic Capacitors)
- Increased use of MLCCs accompanying increase in smartphone and tablet demand
  - Increase in demand for SMM paste
- Maintain strong sales
- Strengthen relationships with major favored customers

(Net sales 12/1H=1)



### Resistor Paste

- Used in chip resistors vital in electronic circuits
- Demand increasing in line with increase in mobile communications device demand
- Global top share
- Supplied from Ome and SEP (Shanghai) to locations of many customers in China and Taiwan



## 3) Materials ⑤ Integrate Lead Frame Business

### Launch of Integrated Business

July 1, 2013 - Launch

- Lead frames

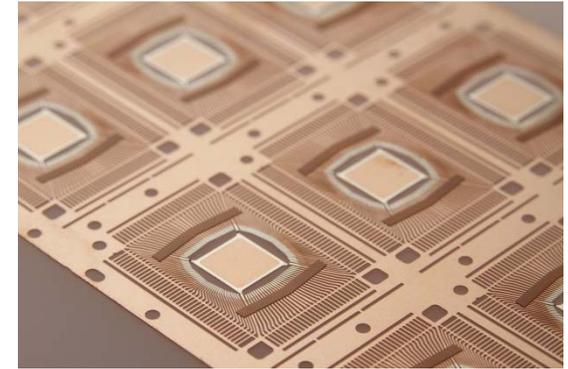
SH Materials Co., Ltd.

Investment ratio: SMM 51%, Hitachi Metals, Ltd. 49%

- Brass and copper

SH Copper Products Co., Ltd. (SHCP)

Investment ratio: SMM 50%, Hitachi Metals, Ltd. 50%

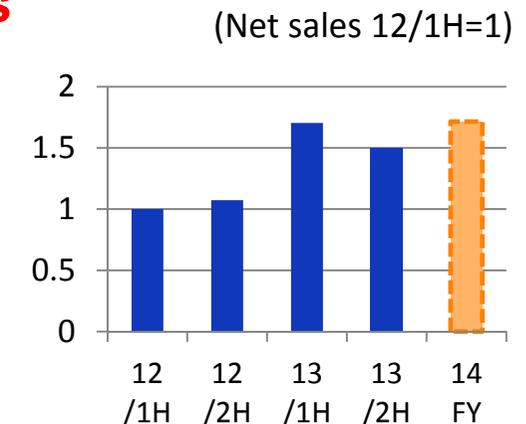


### Vertical Integration

Improve competitiveness in materials development and procurement through capital investment in copper products business

### Structural Reforms

Make effective use of production equipment and facilities  
Construct efficient production systems



**Total Effect: Over ¥1 billion/year**

## 4) Promotion of Research & Development

### Technology Development Measures for 12 3-Yr Business Plan

#### Mineral Resources and Smelting & Refining Business

- **November, 2012 - Decided on construction of new Resource & Hydrometallurgy Process Center**  
Develop world's most advanced processes and facility technologies in the area of mineral resources and smelting & refining
- **April 23 - Completion ceremony**



Resource & Hydrometallurgy Process Center

#### Materials Business

- **Battery Research Laboratory (established October 2010)**  
Support start of lithium nickel oxide production increase project  
Develop cathode materials for next-generation batteries
- **Materials Research & Development Center (established October 2012)**  
Development of products in environmental and energy area  
Respond to decreasing size of final products and increasing speed of communications

## 5) Progress in Cost-Cutting

### Cost-Reduction Measures in 2012 3-Yr Business Plan

#### Reduce costs by ¥10 billion/year

**Period of activity: October 2012 - fully achieve in FY2015**

**Target amount: Reduction of ¥10 billion/year**

**Base: FY2012**

- Improve productivity
- Switch to low-cost materials
- Carefully select fixed costs

#### Progress in FY2013

**Target amount: ¥5 billion**

**Performance: Approx. ¥6 billion**

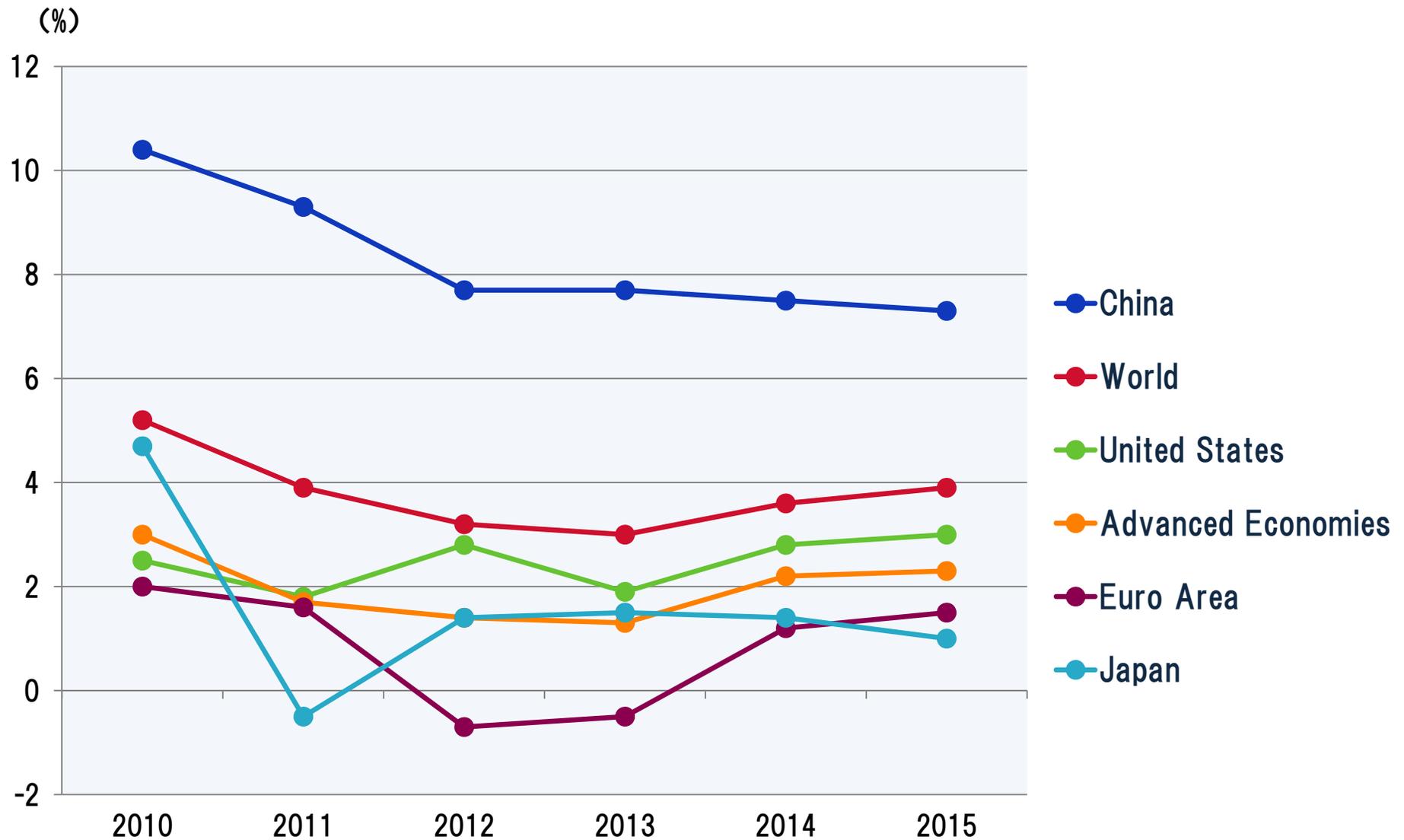
**Continuing cost reduction initiatives in all departments**

### III. External Environment



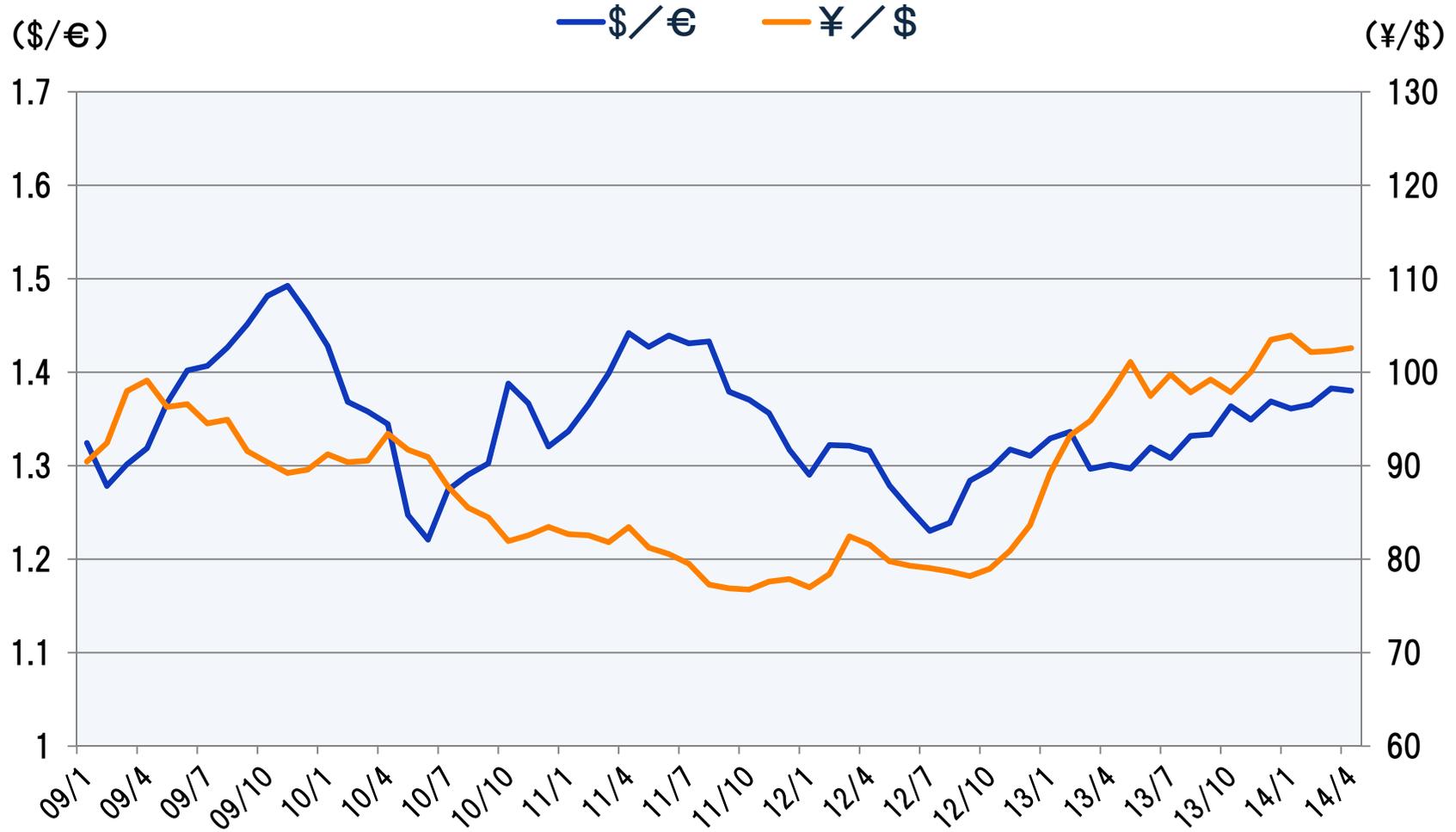
Taganito HPAL

# 1) General Conditions – Global GDP Growth

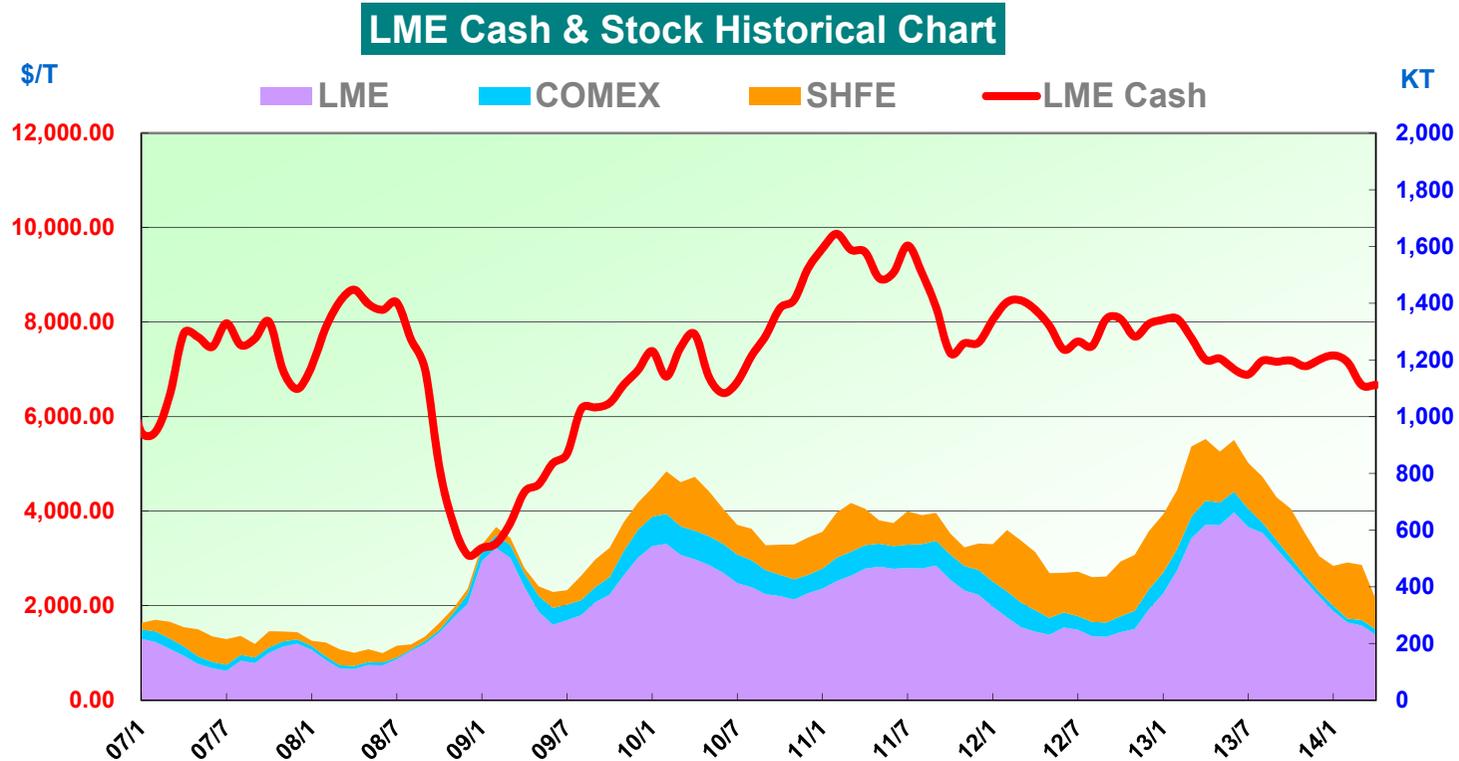


(IMF Apr. 2014 Forecast)

## 2) Forex Trends



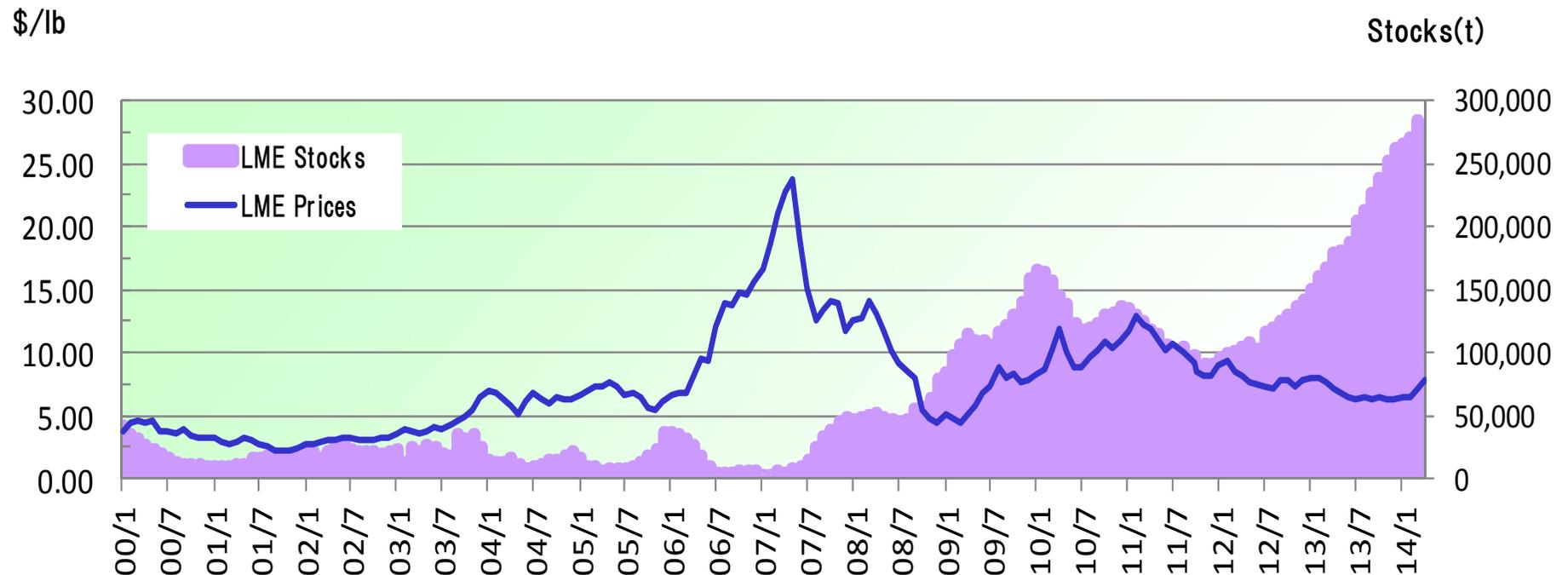
# 3) Cu – Price / Supply & Demand Balance



[ICSG Estimation April 2014]

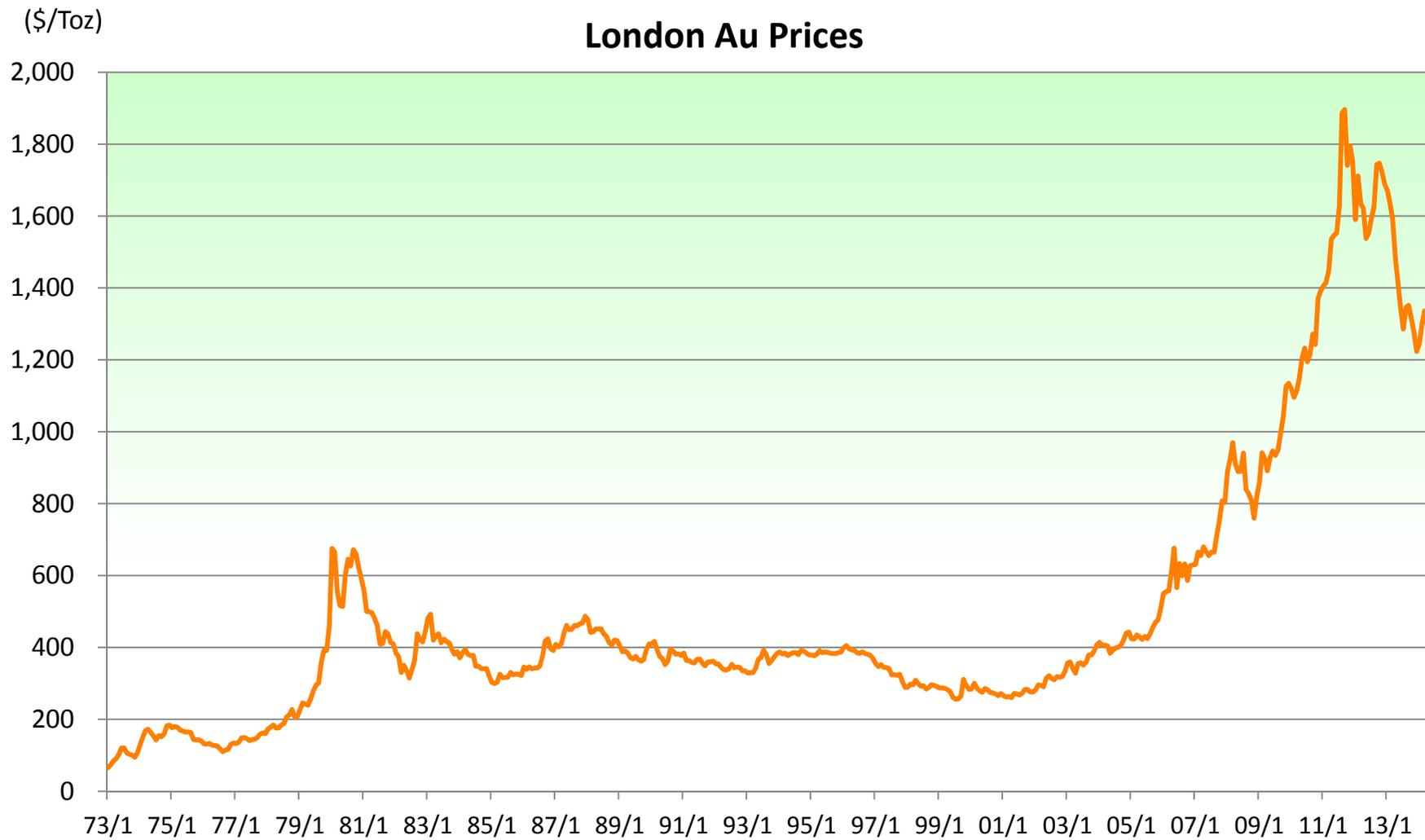
	2013	2014	2015
Production	20,991	22,362	23,335
Usage	21,273	21,957	22,740
Balance	▲282	405	595

## 4) Ni – Price / Supply & Demand Balance



	INSG Estimation Apr.2014 (kt)			SMM Estimation Apr. 2014 (kt)		
	2012	2013	2014	2012	2013	2014
Production	1,754	1,944	1,936	1,748	1,902	1,885
Usage	1,666	1,773	1,889	1,675	1,793	1,915
Balance	88	170	47	73	109	▲30

# 5) Au - Price



# IV. Financial Highlights and Information Materials

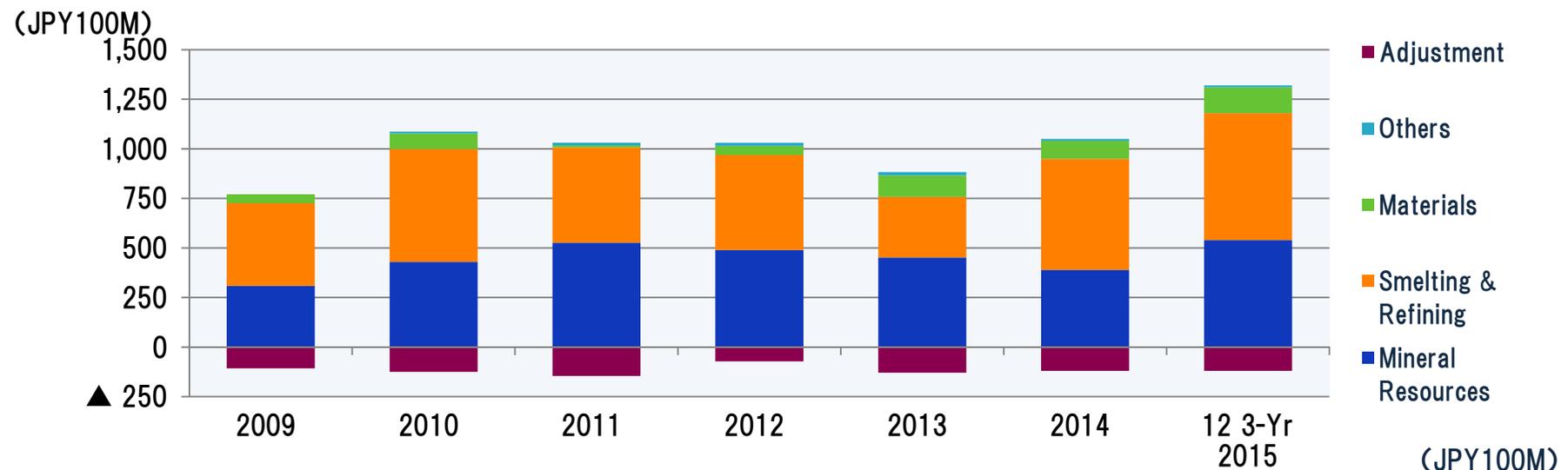


Taganito HPAL

# 1) Performance Trends

	2009	2010	2011	2012	2013	2014 Forecast	12 3-Yr 2015
Net Sales	7,258	8,641	8,479	8,085	8,305	8,650	9,100
Operating Income	663	962	886	958	754	930	1,200
Recurring Profit	879	1,238	1,088	1,150	1,144	1,120	1,500
Equity Method profit	261	348	232	171	307	210	360
Net Income	540	841	653	866	803	770	1,000
ROA(%)	5.8	8.3	5.9	6.9	5.5	N/A	7
ROE(%)	9.9	13.8	10.1	12.1	9.5	N/A	12
Dividend Per Share(¥)	20.0	32.0	28.0	34.0	37.0	35.0	N/A
Copper (\$/t)	6,101	8,140	8,485	7,855	7,104	6,700	7,500
Nickel (\$/lb)	7.7	10.7	9.6	7.7	6.5	7.2	9.0
Gold (\$/Toz)	1,023	1,294	1,646	1,654	1,327	1,150	1,550
Zinc (\$/T)	1,934	2,187	2,101	1,950	1,909	2,000	1,800
Exchange(¥/\$)	92.9	85.7	79.1	83.1	100.2	103.0	80.0

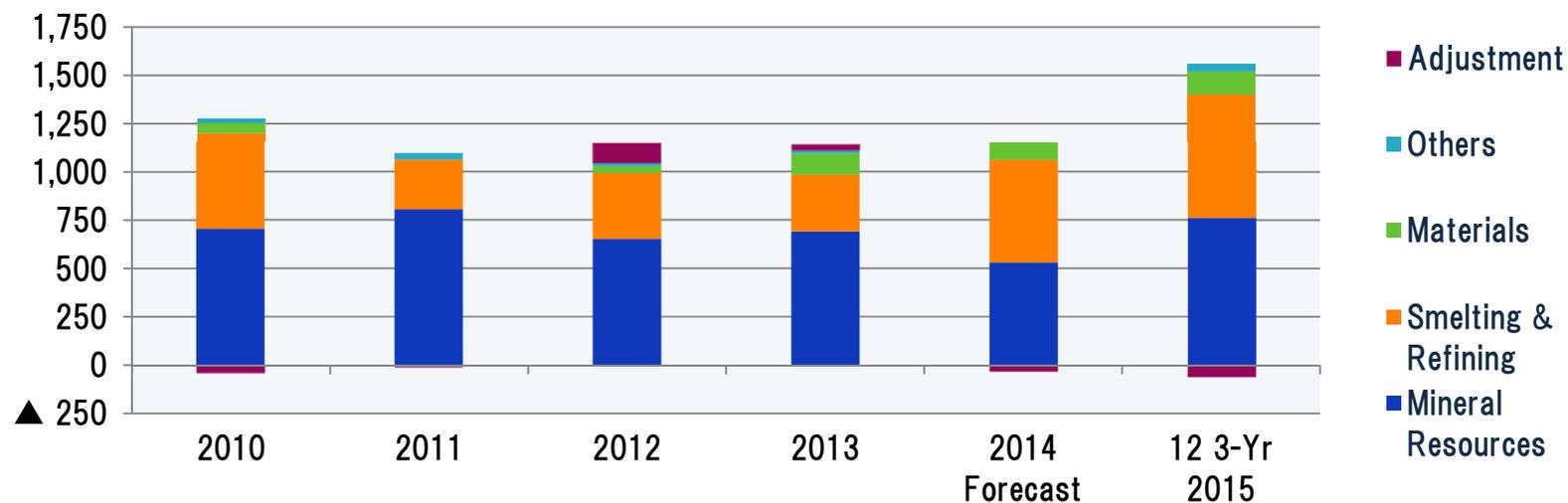
## 2) Operating Income by Segment



	2009	2010	2011	2012	2013	2014 Forecast	12 3-Yr 2015
Mineral Resources	309	432	528	490	452	390	540
Smelting & Refining	417	569	480	479	306	560	640
Materials	45	78	8	45	108	90	130
Others	▲1	10	16	16	17	10	10
Adjustment	▲107	▲127	▲146	▲72	▲129	▲120	▲120
<b>Total</b>	<b>663</b>	<b>962</b>	<b>886</b>	<b>958</b>	<b>754</b>	<b>930</b>	<b>1,200</b>

### 3) Profit Trends by Segment

(JPY100M)

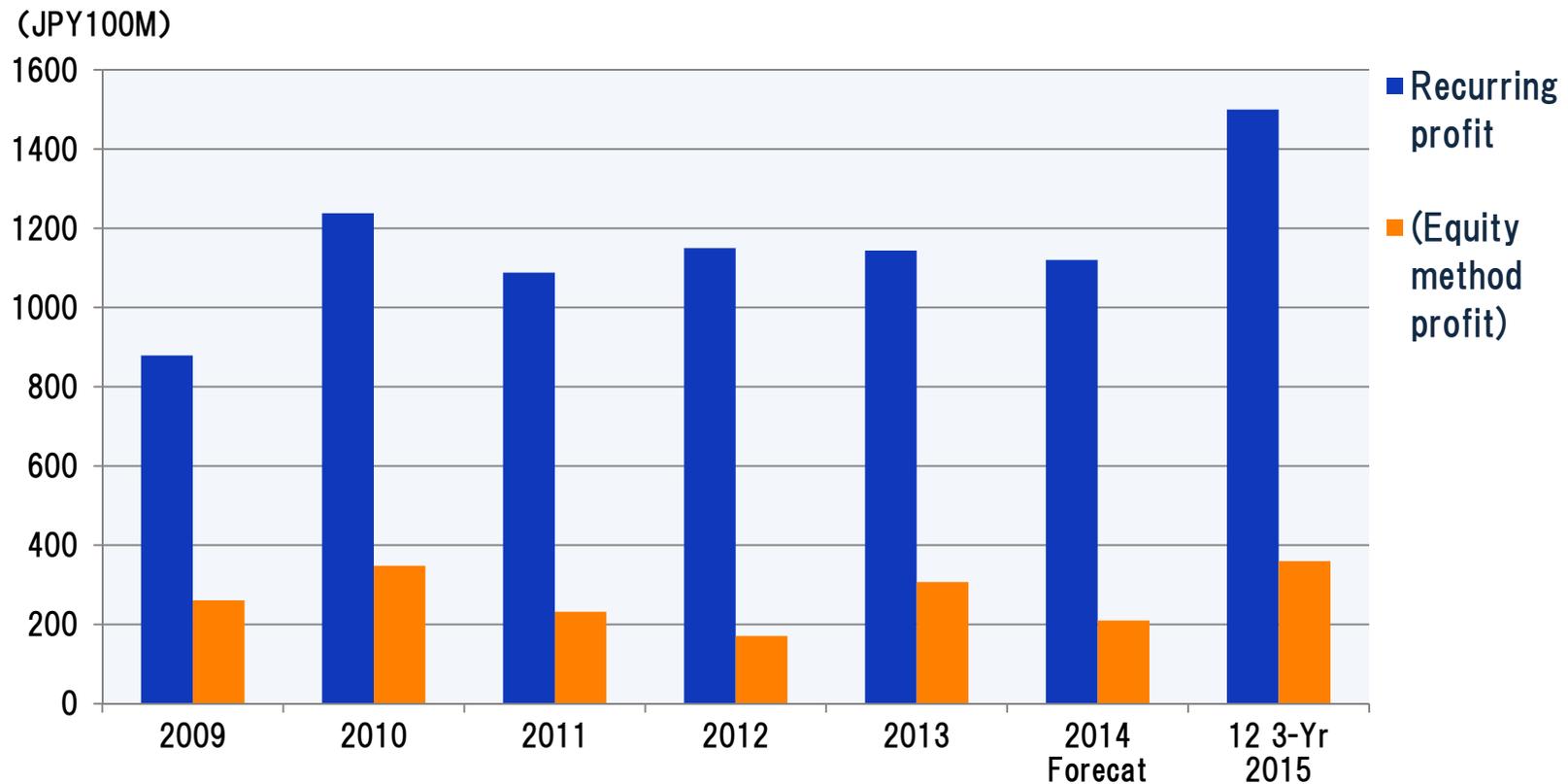


(JPY100M)

		2010	2011	2012	2013	2014 Forecast	12 3-Yr 2015
✕ Segment profit	Mineral Resources	705	806	652	691	530	760
	Smelting & Refining	495	256	339	291	530	640
	Materials	54	14	38	111	90	120
	Others	23	19	16	16	0	40
	Adjustment	▲39	▲7	105	35	▲30	▲60
	Recurring Profit	1,238	1,088	1,150	1,144	1,120	1,500

✕ FY2010-FY2012 : Contribution Margin (Earlier Bases) / FY2013, FY2014 Forecast, 12 3-Yr 2015 : New Segment Profit

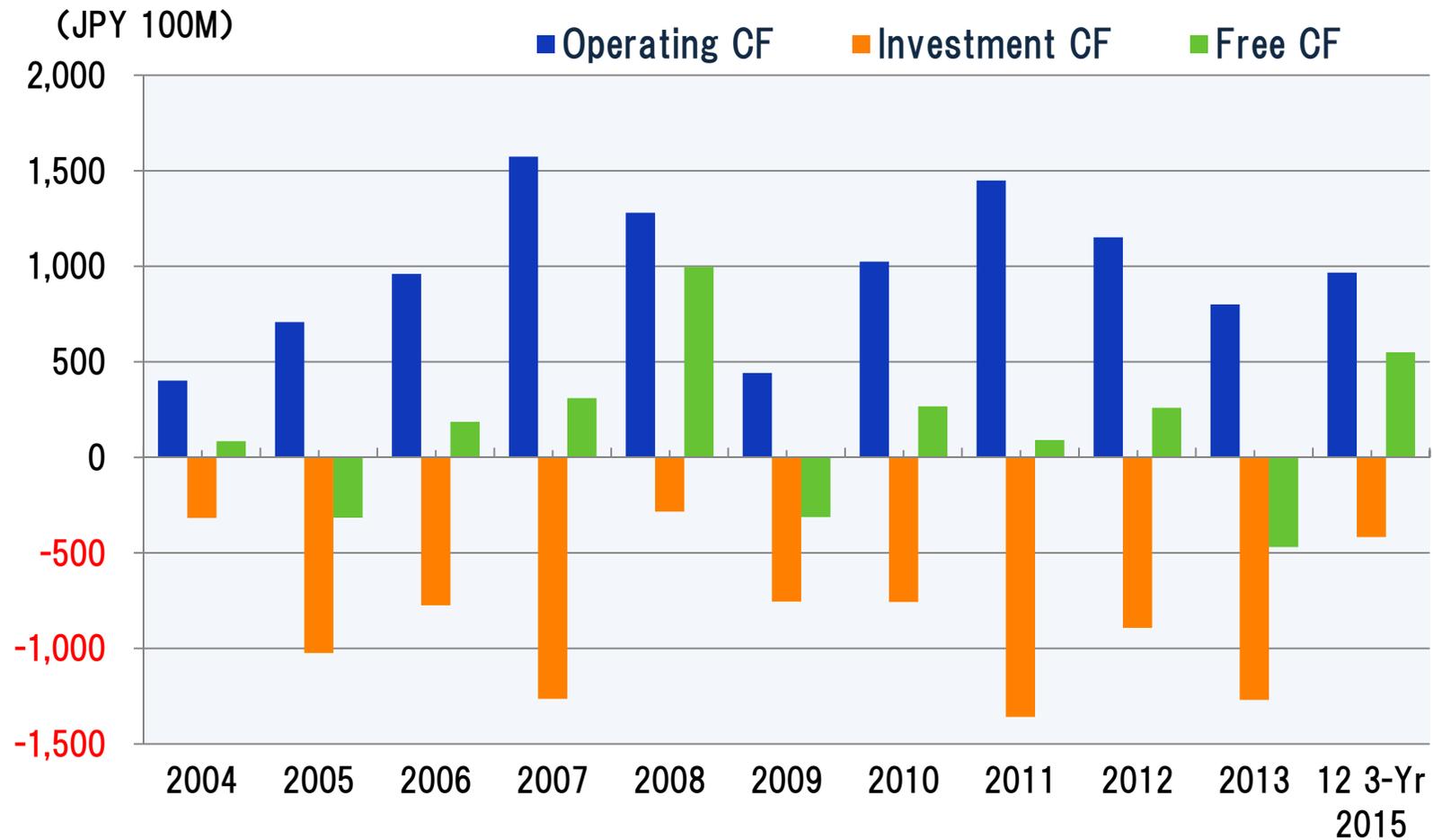
## 4) Recurring Profit / Equity Method Profit



(JPY100M)

	2009	2010	2011	2012	2013	2014	12 3-Yr 2015
Recurring profit	879	1,238	1,088	1,150	1,144	1,120	1,500
(Equity method profit)	261	348	232	171	298	210	360

## 5) Cash Flow Trends



## 6) Sensitivity

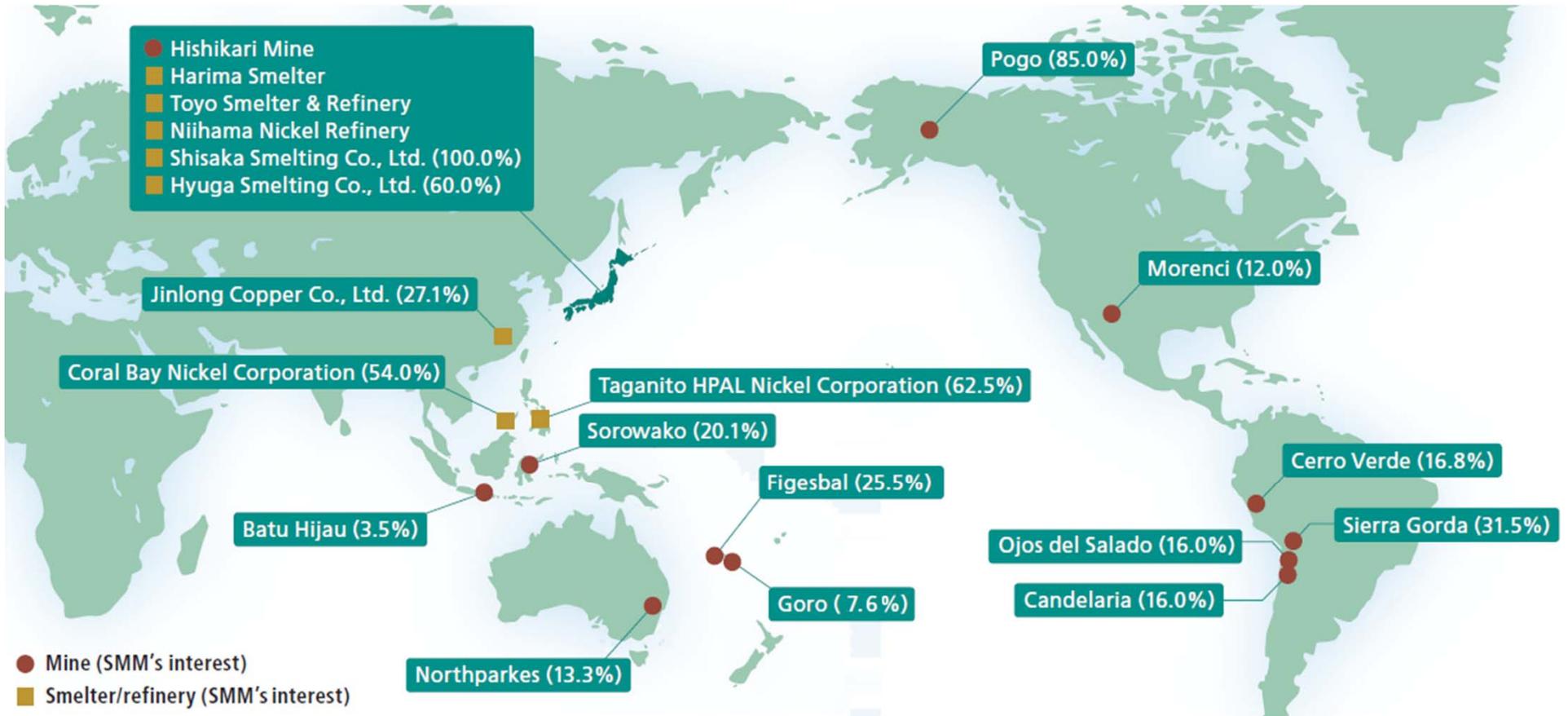
( JPY100M )

Element	Degree of variation	Operating income/ Recurring profit
Cu	±100\$/t	8/13
Ni	±10 ¢ /lb	14/16
Au	±10\$/TOZ	5/5
JPY/USD	±1円/\$	13/14

(Remark)

USD/JPY translation include RC-related and Conversion rate of overseas consolidated / equity-method affiliate companies' profit.

# 7) SMM's Mines and Smelters / Refineries



# 8) Glossary

## Mineral resources and metals

### 1) Metal trading

#### London Metal Exchange (LME)

The LME specializes in trading of non-ferrous metals such as copper, nickel, aluminum, lead and zinc. The LME trading prices for metals are used as the international pricing benchmarks for sales of refined metal and purchases of refining ores.

#### TC/RC

Treatment Charge (TC) and Refining Charge (RC) are commonly used in the terms of purchase for copper concentrate or nickel ore for refining. They are amounts designed to cover refining costs. For example, copper concentrate contracts may define a purchase price based on the LME price at a certain date, minus the TC and RC being used at the time.

#### London fixing

Gold is not traded on the LME. Its price is determined for each transaction between market participants. The financial institutions in the London Bullion Market Association (LBMA) agree a standard price for gold based on these transactions and publish it on the morning and afternoon of each trading day. This “London fixing” price is the benchmark for trading in gold.

#### Pound (lb)

The pound is the standard unit of weight used in measuring and pricing base metals such as copper and nickel, and in TC/RC calculations. One pound is equal to 453.59 grams; an metric ton equals 2,204.62lb.

#### Troy ounce (toz)

The troy ounce is the standard unit of weight for precious metals such as gold and silver. It equals approximately 31.1 grams. It is named after Troyes, a city in the Champagne region of central France that was the site of a major market in Europe in medieval times. Originally used as a unit of exchange for valuing goods in terms of gold or silver weights, the troy ounce is still used today in gold trading.

### 2) Metal refining

#### Smelting and refining

Refining processes extract valuable metals from ores or other raw materials. They fall into two basic types: hydrometallurgical (wet) and pyrometallurgical (dry). At SMM's Toyo facilities in Ehime Prefecture, the copper concentrate pre-processing undertaken at Saijo uses pyrometallurgical processes and the nickel refining at the Niihama site uses hydrometallurgical processes entirely. The term 'smelting' is used for the extraction of metal from ores using melting and heating (pyrometallurgy). The term 'refining' refers to any process that increases the grade or purity of a metal.

#### Pyrometallurgical Smelting

The precursor ore is melted at high temperature in a furnace, and refining techniques are applied to separate the metal in a molten state. Although large amounts of ore can be processed at one time, the equipment needs periodic maintenance for heat proofing.

#### Hydrometallurgical refining

The ore and impurities are dissolved in a solution, and chemical reactions are used to separate out the metal. This approach allows continuous and stable refining, but incurs additional costs due to the refining chemicals consumed.

### 3) Metal ores

#### Sulfide ores

These ores contain copper, nickel or other metals chemically bonded to sulfur. Since the application of heat breaks these bonds, releasing the sulfur, such ores are generally refined using pyrometallurgical techniques.

#### Oxide ores

These ores contain metals in oxidized forms. Unlike sulfide ores, oxides need much more energy to achieve melting. For this reason, the hydrometallurgical approach is generally used to refine these ores.

#### Copper concentrates

Used as raw materials in copper smelting, copper concentrates have a copper content of about 30% by weight. The remainder consists mostly of sulfur and iron. Copper concentrates are made mostly from sulfide ores. Ores extracted from overseas mines have a typical grade of about 1%. The ores are then “dressed” at the mine to increase the purity and produce concentrate. Most of the copper ores imported by SMM for smelting in Japan are concentrates.

#### Nickel oxide ores

Whilst the higher-grade sulfide ores are used predominantly in nickel refining, nickel oxide ores are more prevalent than nickel sulfides. The sulfide-oxide ratio in current nickel reserves is believed to be about 3:7. High refining costs and technical issues have limited use of oxide ores in nickel refining to date, but SMM has succeeded in refining nickel from low-grade oxide ores based on HPAL technology.

#### Mixed sulfide (MS)

CBNC and Taganito produce a mixed nickel-cobalt sulfide intermediate containing about 60% nickel by weight. This is used as a raw material in electrolytic nickel production.

#### Matte

A matte is another term for metal sulfides. For raw material, electrolytic nickel production at SMM also uses a nickel matte (of about 75-80% purity) sourced from PT Inco.

# 8) Glossary

## 4) Metal content in ores

**[Au]**

(Canadian standard)

**Reserve (ore)**

Economically minable part of Measured or Indicated Mineral Resources demonstrated by at least preliminary feasibility study.

**Resource (ore)**

Quantity and of such a grade or quality that it has reasonable prospects for economic extraction.

(Japan Standard (JIS))

**"Prospective Mineable Resource" ("Kasai Kouryo")**

Total weight of the crude ore to be mined within the deposit, which contains the mineable portion of the "Geological Resource" and the waste rocks to be added in the mining process.

**"Geological Resource" ("Maizo Kouryo")**

Total weight of the mineralized material in the crust within the deposit.

**[Cu / Ni]**

"Reserve" or equivalent of the standards in each countries.

## 5) Nickel production process

**Coral Bay Nickel Corporation (CBNC)**

Based in the Philippines, this SMM subsidiary produces mixed nickel-cobalt sulfides using HPAL technology and exports the raw materials to the SMM Group's nickel refining facilities in Niihama, Ehime Prefecture.

**High Pressure Acid Leach (HPAL)**

HPAL technology enables the recovery of nickel from nickel oxide ores that traditionally were difficult to process. SMM was the first company in the world to apply it successfully on a commercial scale. The oxide ores are subjected to high temperature and pressure and reacted under stable conditions with sulfuric acid to produce a nickel-rich refining intermediate.

**Matte Chlorine Leach Electrowinning (MCLE)**

MCLE is the technology used in the manufacturing process at SMM's nickel refinery. The matte and mixed sulfide ores are dissolved in chlorine at high pressure to produce high-grade nickel using electrolysis. MCLE is competitive in cost terms, but poses significant operational challenges. Other than SMM, only two companies are producing nickel based on this kind of technology.

## 6) Main applications for metals

**Copper**

Copper is fabricated into wires, pipes and other forms. Besides power cables, copper is used widely in consumer applications such as wiring in vehicles or houses, and in air conditioning systems.

**Electrolytic nickel**

This form of nickel, which has a purity of at least 99.99%, is used in specialty steels, electronics materials and electroplating, among other applications. SMM is the only producer of electrolytic nickel in Japan.

**Ferronickel**

Ferronickel is an alloy containing nickel (about 20%) and iron. Its main use is in the manufacture of stainless steel, which is about 10% nickel by weight. Based in Hyuga, Miyazaki Prefecture, SMM Group firm Hyuga Smelting produces ferronickel.

**Gold**

Gold is in demand worldwide for investment and decorative purposes. Gold is widely used in Japanese industry within the electronics sector because of its high malleability and ductility.

## Materials

**Copper-clad polyimide film (CCPF)**

CCPF is a polyimide film that is coated using a copper base. It is used as a material for making COF substrates.

**Lead frames (L/F)**

Lead frames are electronic packaging materials used to form connections in semiconductor chips and printed circuit boards. They contain thin strips of a metal alloy containing mostly nickel or copper.

**Secondary batteries**

Secondary batteries are ones that can be recharged and used again. SMM supplies battery materials that are used in the anodes of nickel metal hydride batteries and lithium-ion rechargeable batteries, which supply power for hybrid vehicles or notebook computers, among other consumer applications.

# Note

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