



FY 2017 ~ FY 2019 Medium-term Business Plan

Tosoh Corporation



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Tosoh's fiscal year runs from April to March of the following year and is named after the year in which it ends in all English materials.

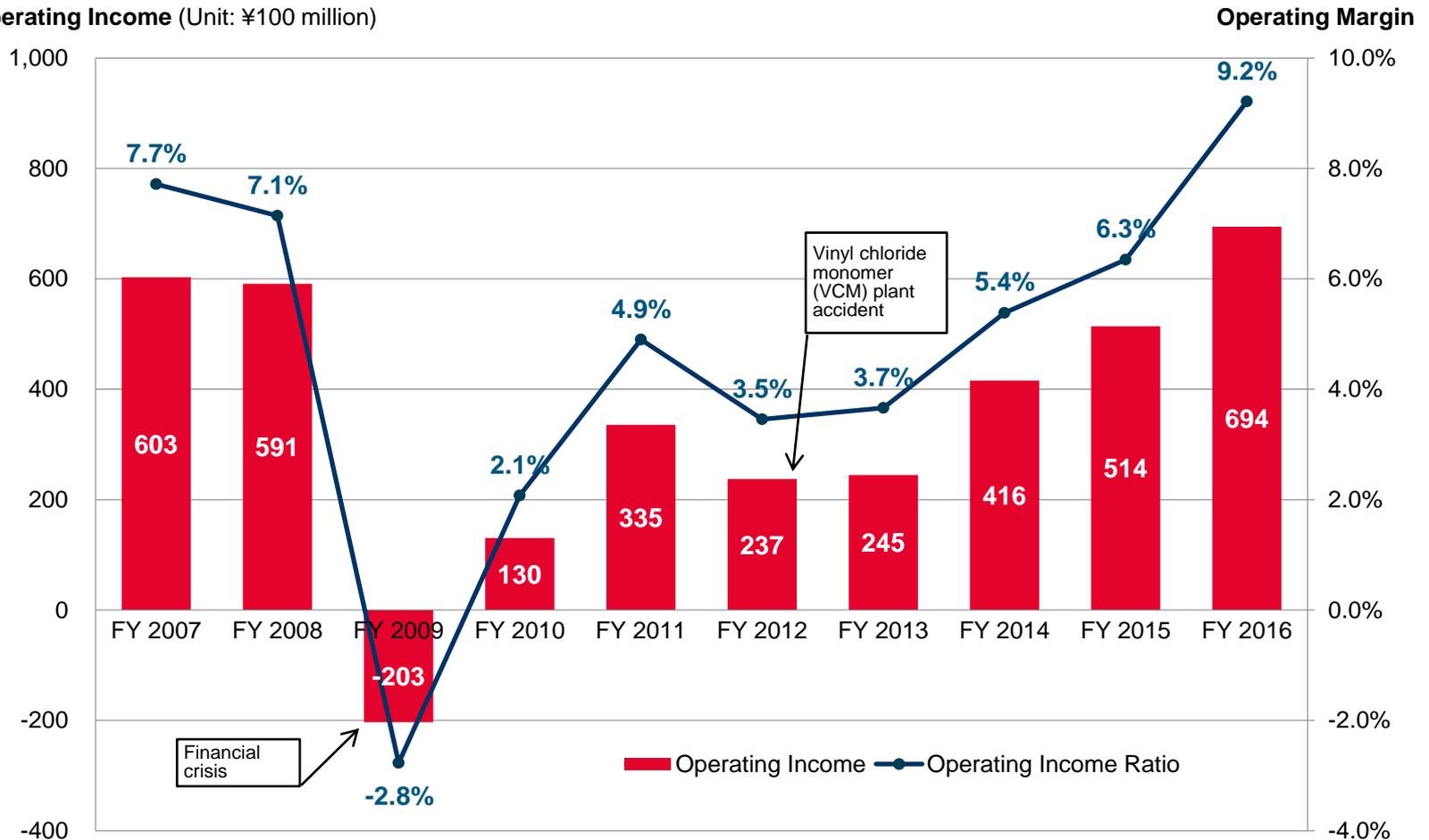


1. Current Metrics

Current Metrics: Earnings Strength

- World financial crisis (FY 2009) and vinyl chloride plant accident (FY 2012) ⇒ reduced earnings strength
- Record profits in FY 2016 through reconstruction of the vinyl isocyanate chain and

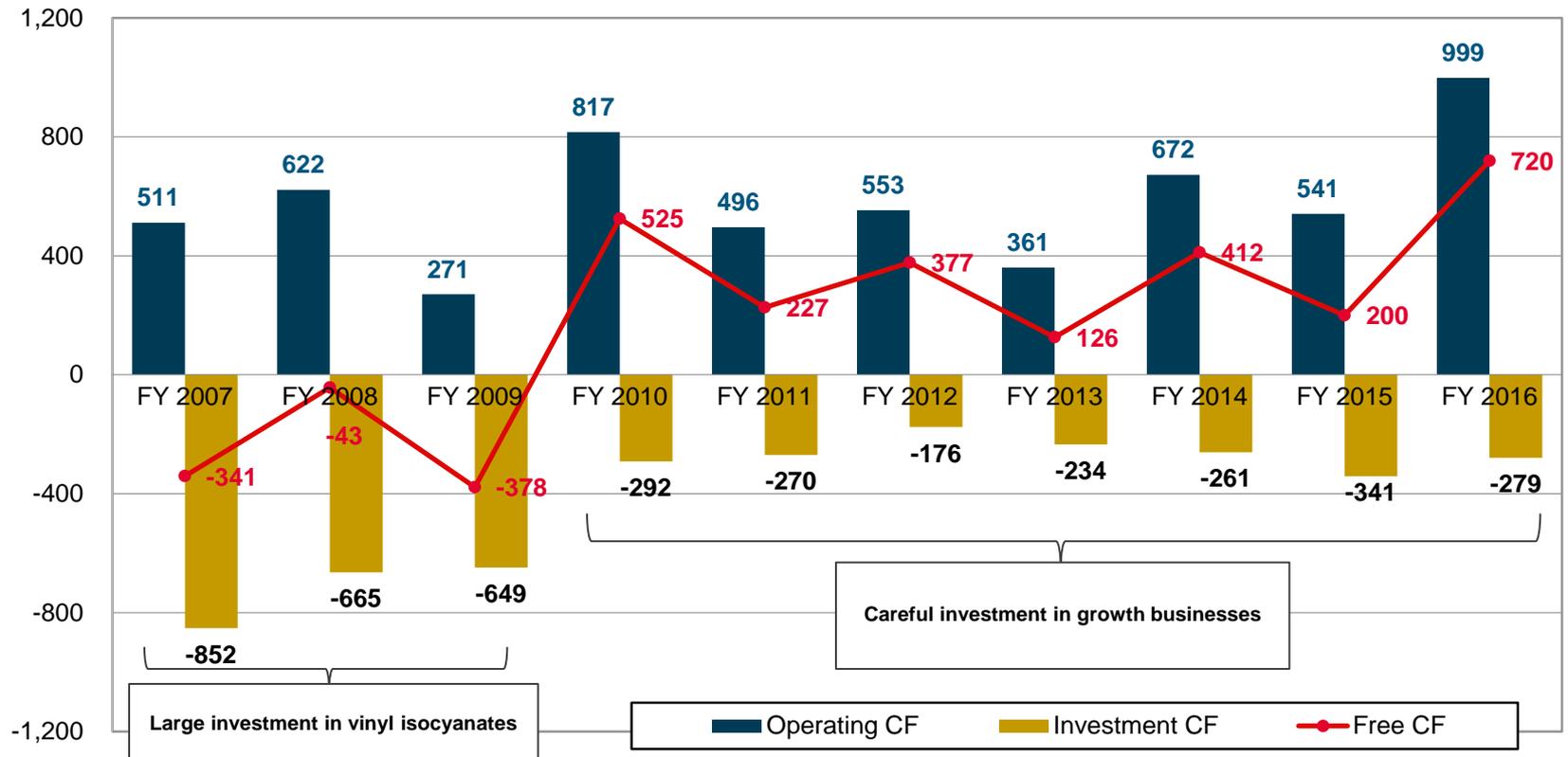
Operating Income (Unit: ¥100 million)



Current Metrics: Cash Flow

- ~FY2009: Major investment in vinyl isocyanates led to a downturn in free cash flow which combined with the global financial crisis, resulted in deterioration of our financial position
- FY2010~: Rigorous selection of growth businesses to rebuild financial position led to improvements in cash flow

(Unit: ¥100 million)

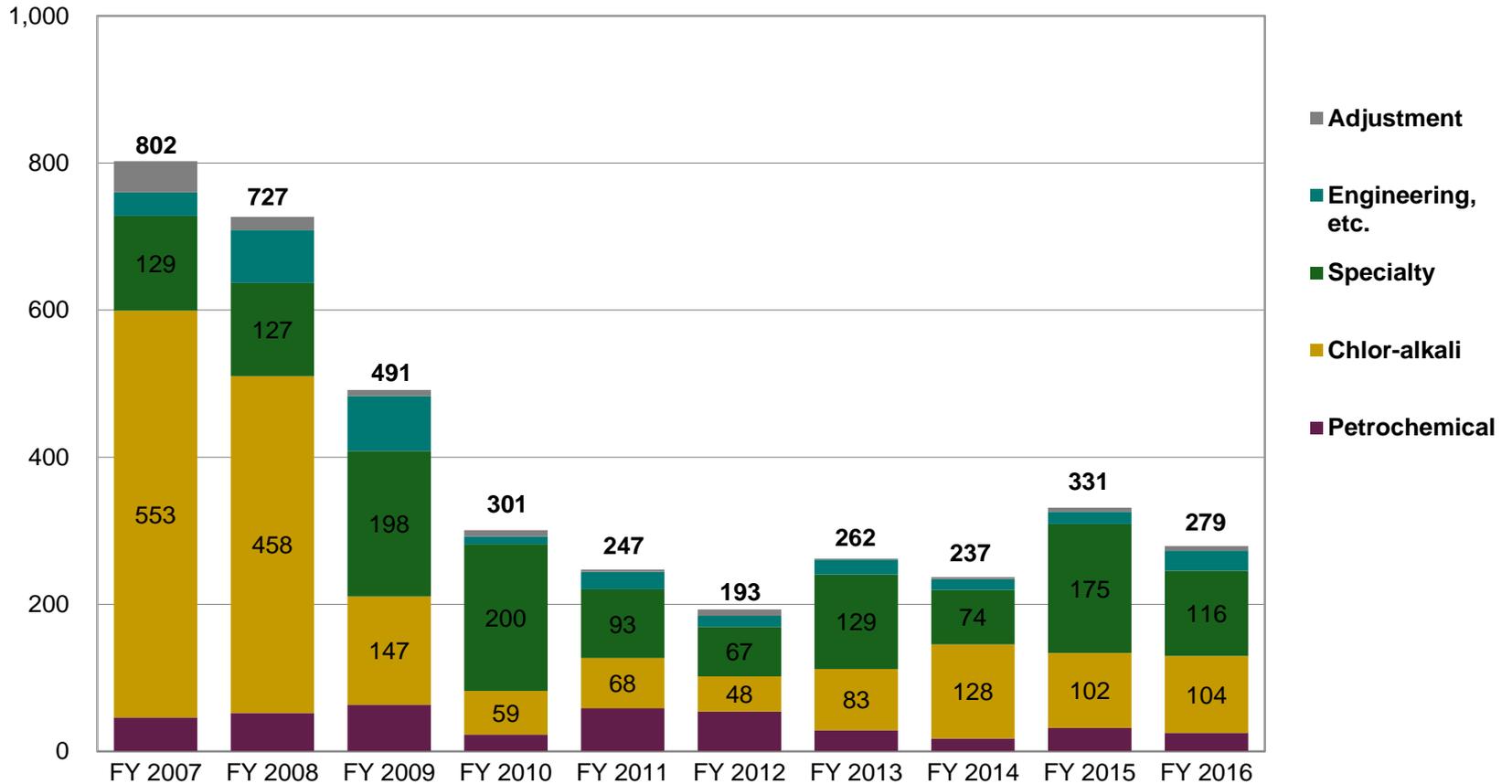


Current Metrics: Capital Spending

● Post FY2010, controlled spending on Commodities and careful investments in Specialties

(Unit: ¥100 million)

※Booked assets (construction in progress) basis

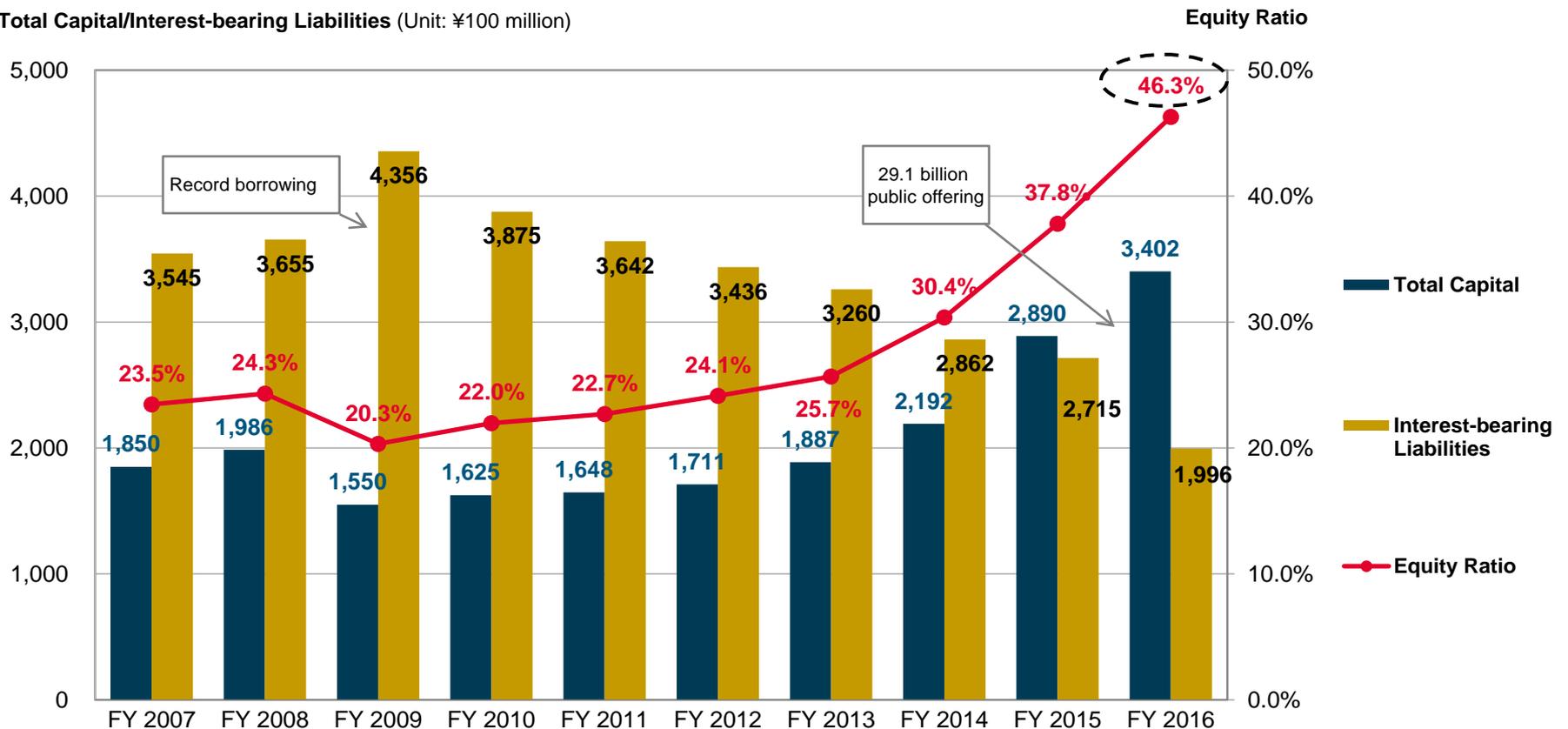




Current Metrics: Equity Ratio and Interest-bearing Liabilities

- Major investments in vinyl isocyanates results in record borrowing at the end of FY 2009
- Consistent financial restructuring through careful investment in growth businesses, increased capital, and stronger profitability.
 ⇒ FY 2016: Equity ratio of 46.3%, net debt to equity ratio of 0.36, leads to upward rating adjustment of “A-” to “A”.

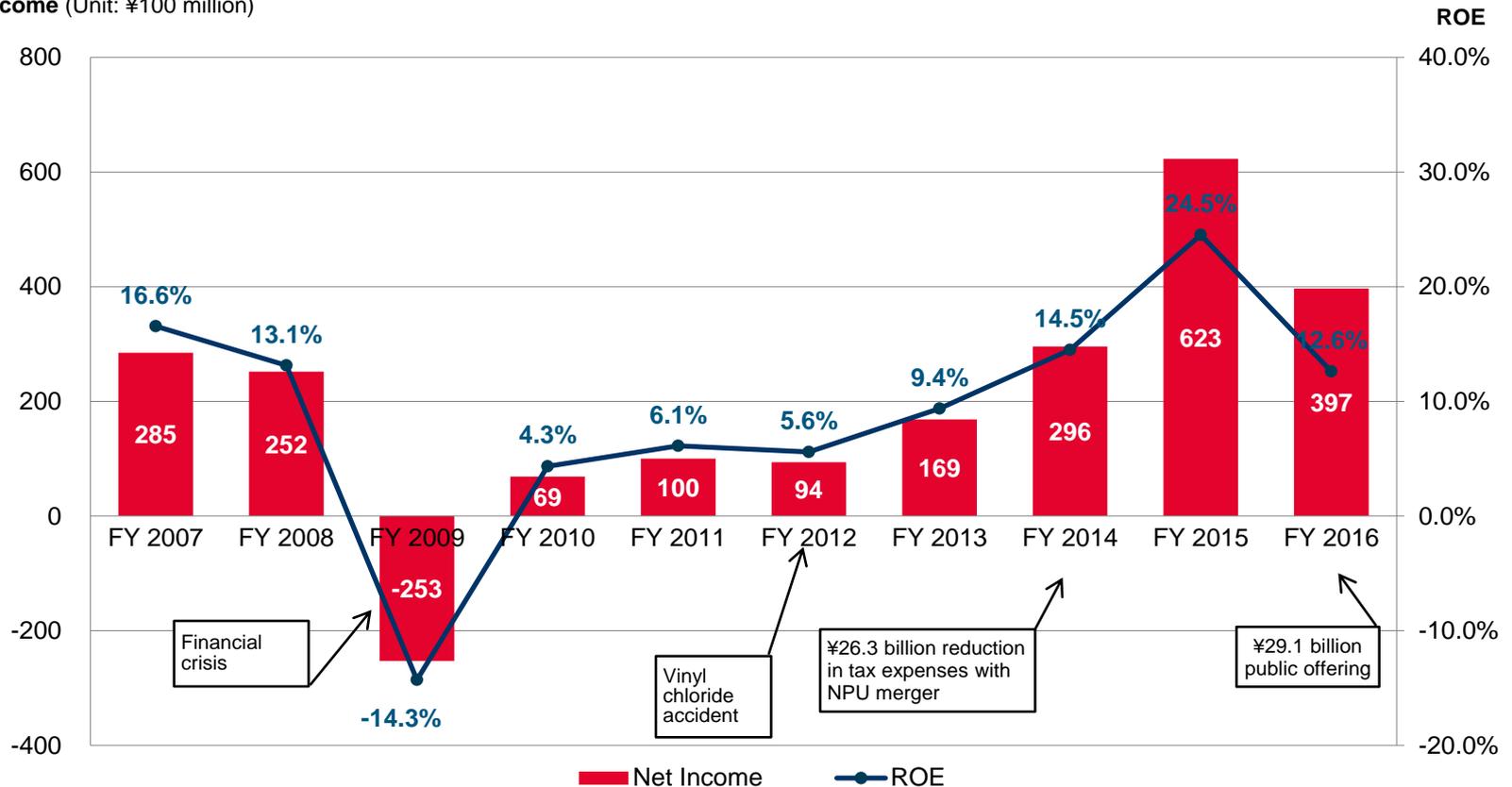
Total Capital/Interest-bearing Liabilities (Unit: ¥100 million)



Current Metrics: Return on Equity

- **FY2015: Sharp rise in ROE due to unique factors (¥26.3 billion decrease in tax expenses due to merger with Nippon Polyurethane Industry, Co., Ltd. (NPU))**
- **FY2016: Maintained ROE over 10% with high profit levels despite capital increase (¥29.1 billion)**

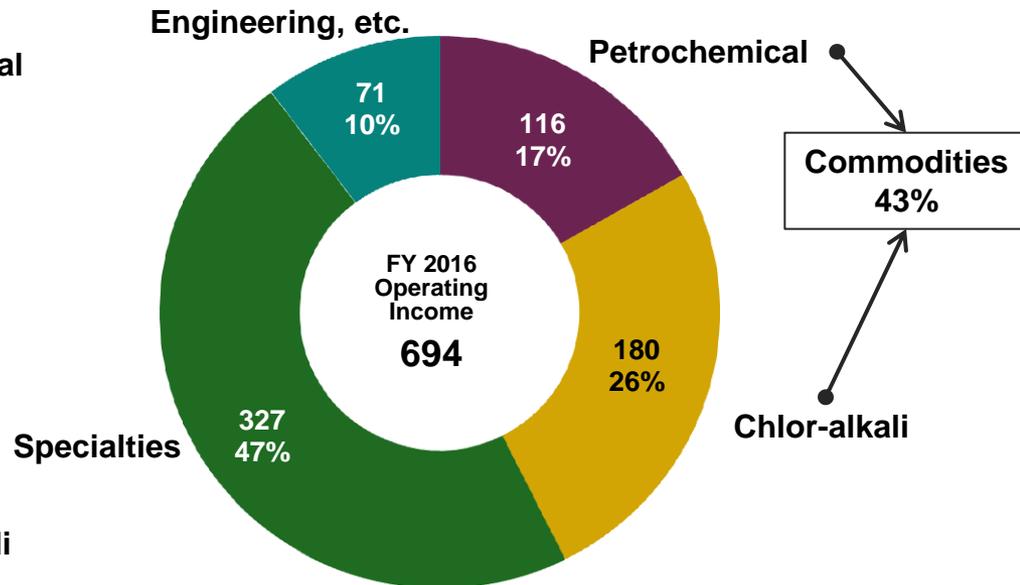
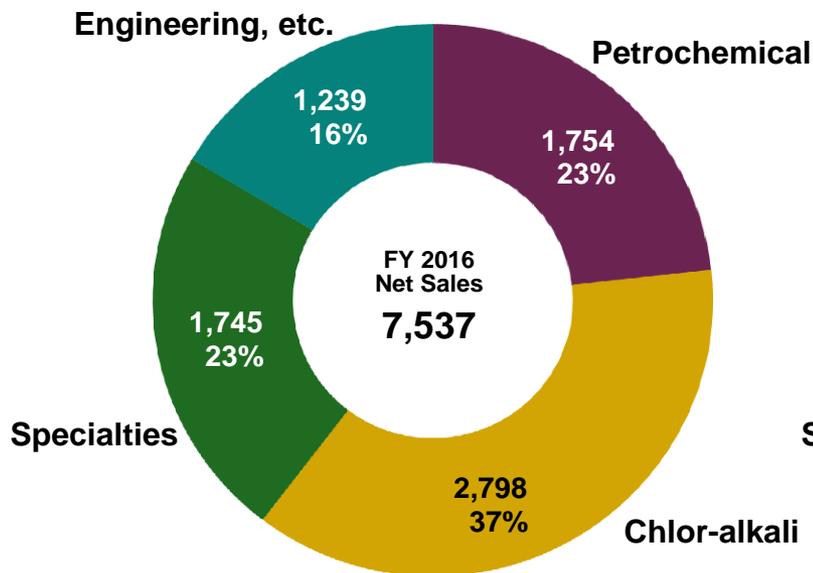
Net Income (Unit: ¥100 million)





Current Metrics: Business Portfolio

- Operating profit contribution ratio:
Commodities (Petrochemicals, Chlor-alkali) 43% vs. Specialties 47%
- Operating profit ratio:
Specialties (functional products) 18.7% + commodities (petrochemicals, chlor-alkali) 6.5%
⇒ Gross operating profit ratio: 9.2%



(Unit: ¥100 million)



TOSOH

2. Management Policies



Management Policies: Basic Policies

Strengthen Commodities and Specialties Management

- Strengthen the balance between Commodities and Specialties
- Commodities: Increase competitiveness and profitability with current capacities
- Specialties: Increase businesses by increasing investment in growth businesses, by R&D, and by M&A

Maintain and Strengthen the Financial Base

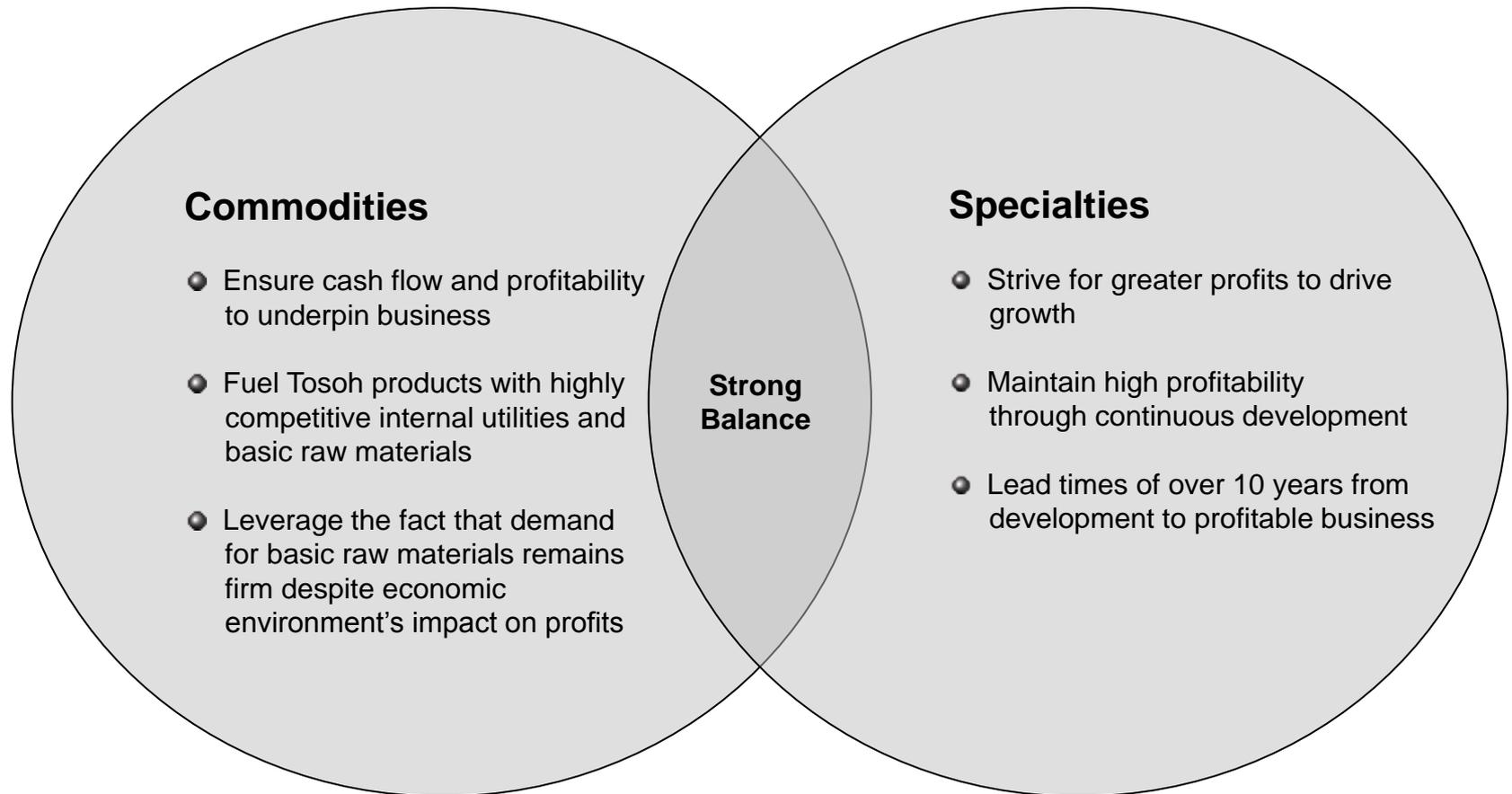
- Build a rock-solid financial foundation that enables flexible investment in growth

Promote Safety Reforms

- Establish technologies for safe and stable operations
- Eliminate problems and abnormal conditions

Management Policies: Business Positioning

- **Strengthen the Commodities and Specialties balance through building a business portfolio that can withstand changes in the operating environment, therefore increasing corporate value.**



Management Policies: Targets (consolidated)

- Overall operating income ratio over 10% comprising ROS of 5% for Commodities and over 20% for Specialties

(Unit: ¥100 million)	FY 2016 Actual	FY 2017 Forecast	FY 2019 Target
Net Sales	7,537	7,200	7,500
Operating Income	694	720	850
Operating Income Ratio	9.2%	10.0%	>10%
ROE	12.6%	>10%	>10%

Note: Sales forecast and target based on the below assumptions

Exchange rates	USD	120 ¥/\$US	110 ¥/\$US	110 ¥/\$US
	EUR	133 ¥/EUR	120 ¥/EUR	120 ¥/EUR
	Domestic Naphtha Price	42,775 ¥/kl	40,000 ¥/kl	40,000 ¥/kl



Management Policies: Targets (by group)

- **Commodities (Petrochemicals, Chlor-alkali) ROS: FY 2016 6.5% ⇒ FY 2019 8.6%**
- **Specialties ROS : FY 2016 18.7% ⇒ FY 2019 21.7%**

(Unit: ¥100 million)		FY 2016 Actual		FY 2017 Forecast		FY 2019 Target	
Net Sales	Petrochemicals	1,754		1,623		1,640	
	Chlor-alkali	2,798		2,638		2,770	
	Commodities Total	4,553		4,261		4,410	
	Specialties	1,745		1,651		1,840	
	Engineering, etc.	1,239		1,288		1,250	
	Total	7,537		7,200		7,500	
Operating Income / ratio (%)	Petrochemicals	116	6.6%	150	9.3%	170	10.4%
	Chlor-alkali	180	6.4%	190	7.2%	210	7.6%
	Commodities Total	296	6.5%	340	8.0%	380	8.6%
	Specialties	327	18.7%	319	19.3%	400	21.7%
	Engineering, etc.	71	5.8%	61	4.7%	70	5.6%
	Total	694	9.2%	720	10.0%	850	11.3%



3. Investment Policies



Investment Policies: Basic Policy

- **Commodities:** Invest to maintain and strengthen competitiveness
- **Specialties:** Invest towards growth

FY 2010 ~ FY 2016

- **Selective investment in Specialty growth businesses to rebuild financial position**
- **Invest no more than the minimum in Commodities**

**Consistent goal of
strengthening our
financial foundation**

Medium-term Plan (FY 2017 ~ FY 2019)

Commodities

- **Focus expenditure on renewal and productivity enhancements that maintain and improve our supply stability and competitiveness**

Specialties

- **Greater investment in growth businesses**
- **Widen business scope through R&D* and M&A****

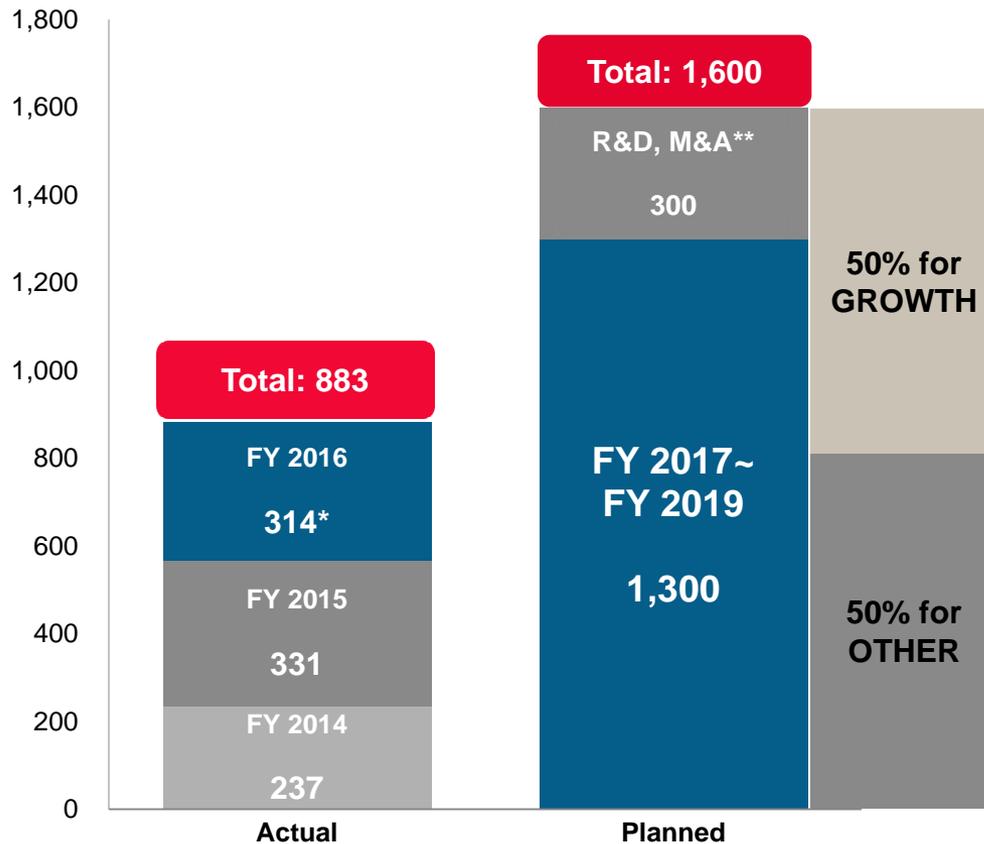
*1 Including collaboration with academia and venture businesses

*2 Especially for Bioscience business

Investment Policies: Primary Spending Plan

● FY2017~2019: Capital spending ¥130 billion + M&A ¥30 billion = ¥160 billion

(Unit: ¥100 million)



Primary Capital Investments

Manufacturing capacity increases:

- High-silica zeolite (HSZ®)
- Zirconia
- Toyoparl® (bioseparation and purification media)
- Polyvinylchloride (at Philippines subsidiary)
- Functional polymers and polyurethane
- Increase electric power generation efficiency

* Including ¥ 3.5 billion in M&A

** M&A, research funds, and other investments



4. Research and Development



4. Research and Development

- Accelerate research and development initiatives in three critical areas

Life Sciences

- Clinical diagnostic systems and reagents
- Separation and purification media for pharmaceuticals
- Polymer materials for medical
- Ceramic materials for dental applications

Electronic Materials

- Thin film materials for electronic devices
- Electronic and hole transport materials for organic EL
- Optical polymers for display devices
- Quartz glass for semiconductors and LCDs

Environment & Energy

- Chemicals for environmental remediation
- Zeolites for catalysts
- Materials for lithium-ion batteries
- Advanced polymers



Measures to accelerate R&D

- Strengthen industry-academic-government cooperation
- Strengthen technical knowledge gathering capabilities through investment in research funds
- M&A

Leading to expanded business scope and acquisition of new technologies



5. Strengthening Our Financial Base



Strengthening Our Financial Base: Policies

Equity ratio

- Aim to exceed 50%

Interest-bearing debt

- Continually strive to reduce interest-bearing debt



6. Business Positioning



Growth Strategies: Chlor-Alkali

- **FY2019: Operating profit of ¥21 billion (up ¥3 billion from FY 2016) and operating income ratio of 7.6% (up 1.2% from FY 2016)**

Basic Chemicals

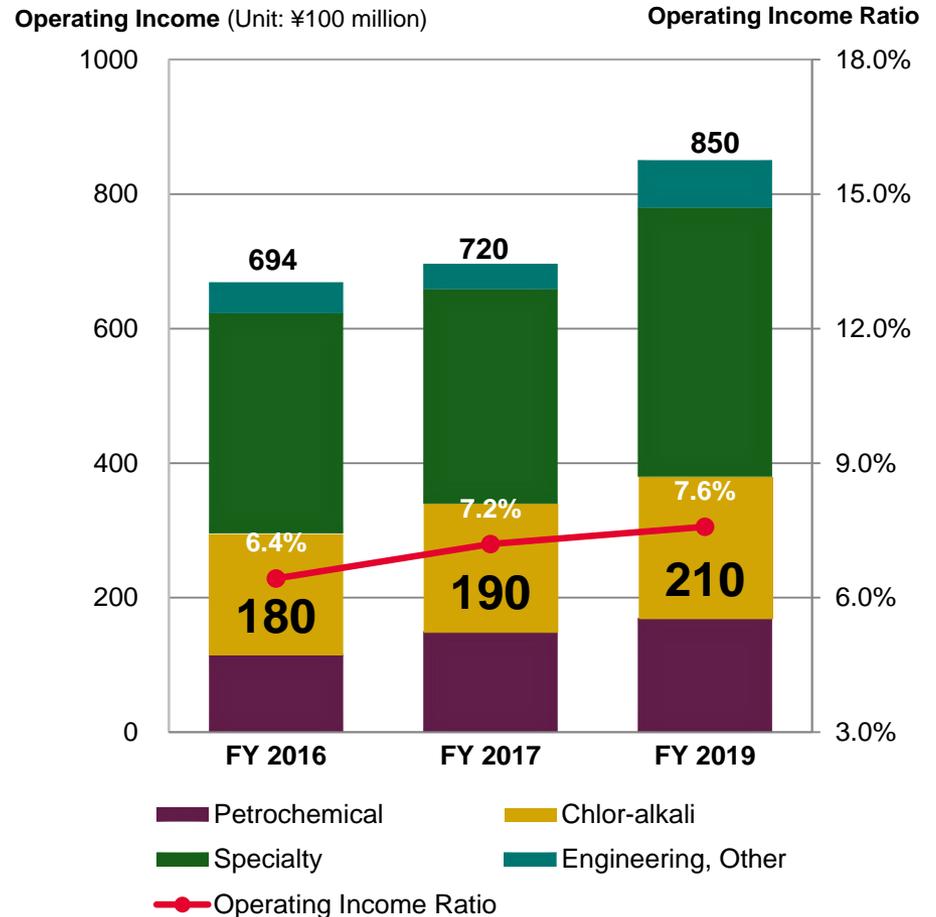
- PVC (polyvinyl chloride resin)
- VCM (vinyl chloride monomer)
- Caustic soda
- Soda and chlorine derivatives

Polyurethane

- MDI (urethane raw material)
- Functional urethanes

Cement

- Portland cement

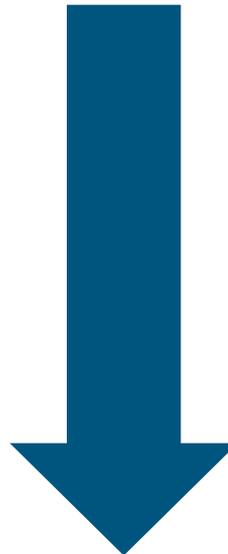
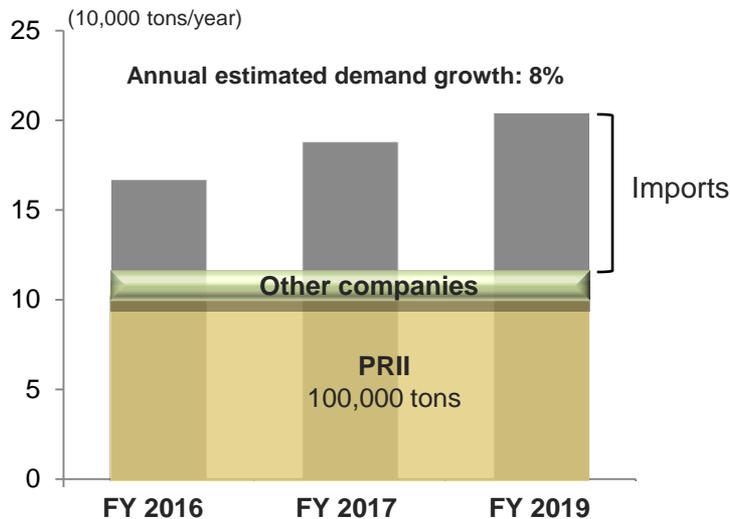


Growth Strategies: Chlor-Alkali

Basic Chemicals: PVC (polyvinyl chloride resin), VCM (vinyl chloride monomer), caustic soda, chlorine derivatives

- Maximize profits through full optimization of the vinyl chain

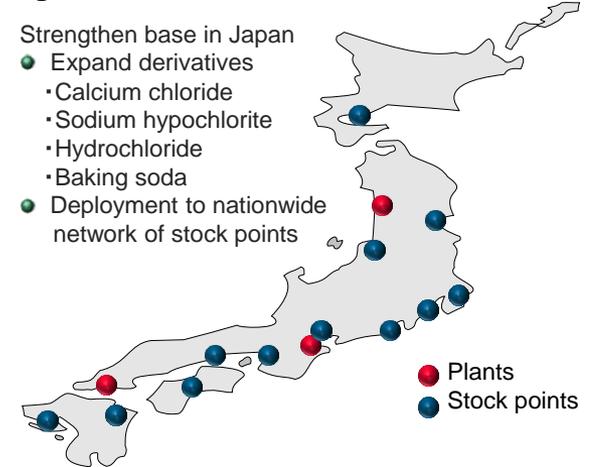
Philippines PVC Demand vs. Production Capacity (Tosoh estimates)



Strengthen Soda and Chlorine Derivative Products

Strengthen base in Japan

- Expand derivatives
 - Calcium chloride
 - Sodium hypochlorite
 - Hydrochloride
 - Baking soda
- Deployment to nationwide network of stock points



- Pursue stable procurement of competitive raw materials
- Build competitiveness through greater efficiencies in power generation, power consignment, and other measures
- Increase PVC production capacity at subsidiary Philippine Resins Industry, Inc. (PRII)
- Strengthen the profitability of our soda and chlorine derivative products

Growth Strategies: Polyurethane

Polyurethane: Methylene diphenyl diisocyanate (MDI, urethane raw material), functional urethanes

- Shift to high value-added MDI and strengthen functional urethanes



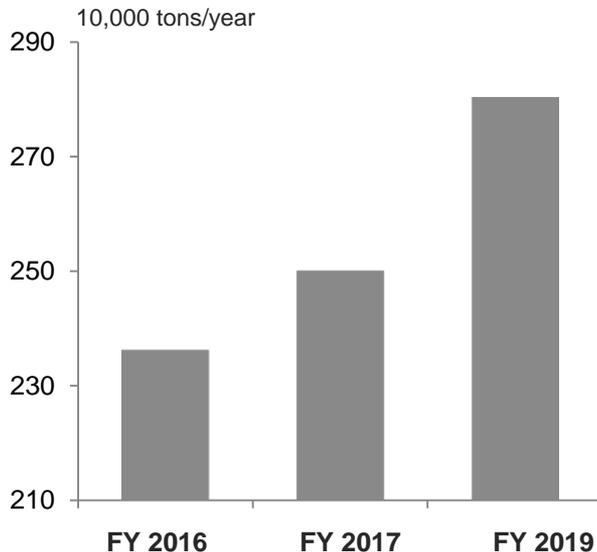
Cushion material



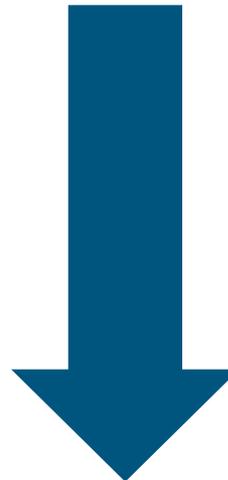
Insulation



MDI demand in Asia (Tosoh estimates)



Overall Asian annual estimated demand growth: 6%
(India 10%, SE Asia 8%)



MDI

- Accelerate the shift from commodity products to specialty products, and from single-item sales to system sales
- Strengthen sales in Southeast Asia, India, and the US

Functional urethanes

- Sales promotion in medical fields (sealing materials, etc.)
- Add production capacity for HDI-derivatives



Growth Strategies: Petrochemical

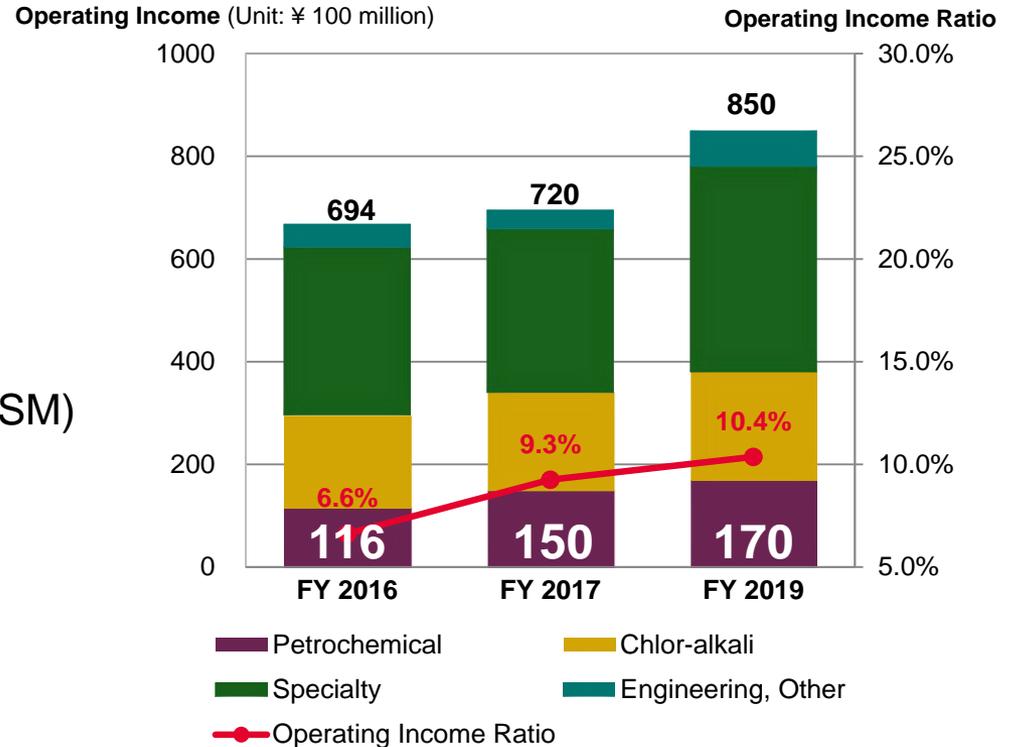
- **FY2019: Operating profit of ¥17 billion (up by ¥5.4 billion in FY2016) and operating income ratio of 10.4% (up by 3.7% in FY2016)**

Olefins

- Ethylene
- Propylene
- Cumene

Polymers

- Polyethylene
- Synthetic rubber (CR and CSM)
- PPS resin
- Petroleum resins

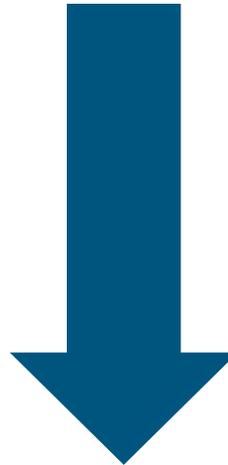
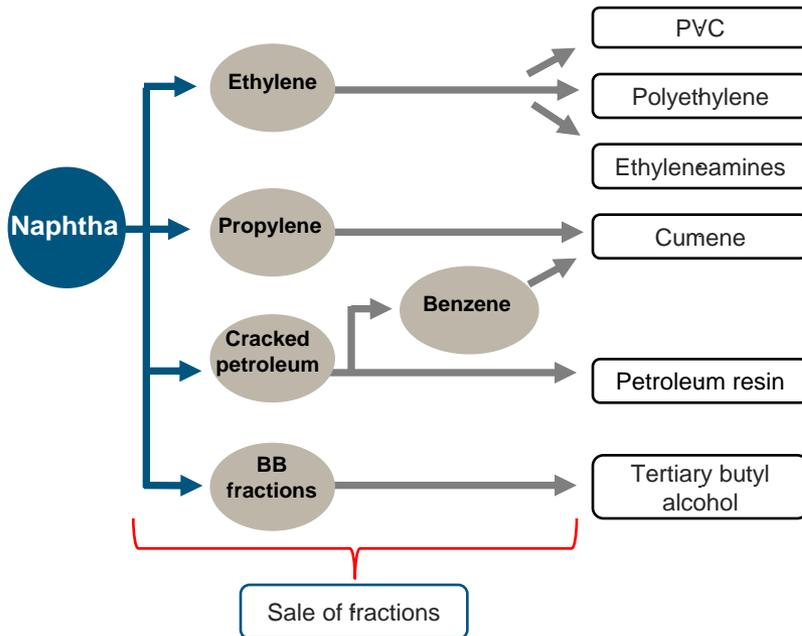


Growth Strategies: Petrochemical

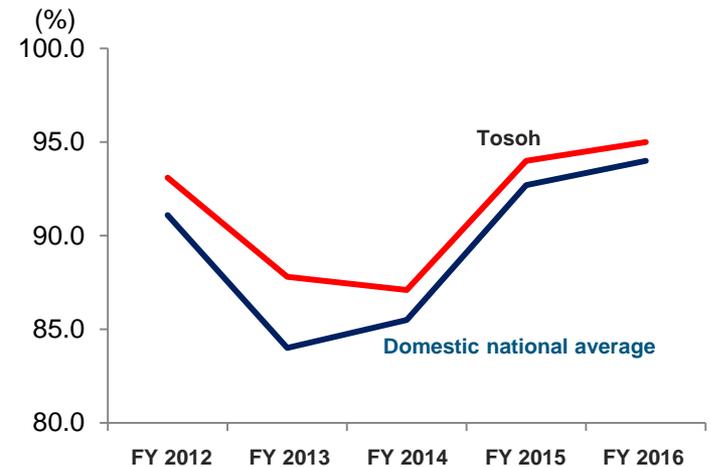
Olefins: Ethylene, propylene, cumene

- Significantly increase profitability by maintaining optimal naphtha cracker operation levels

Main Products Flow Chart



Naphtha Cracker Operating Rate Trends



- Implement operating rates that exceed the national average in Japan
- Prevail in the Nagoya area as the only central company while leveraging the balance of large-scale ethylene purchases

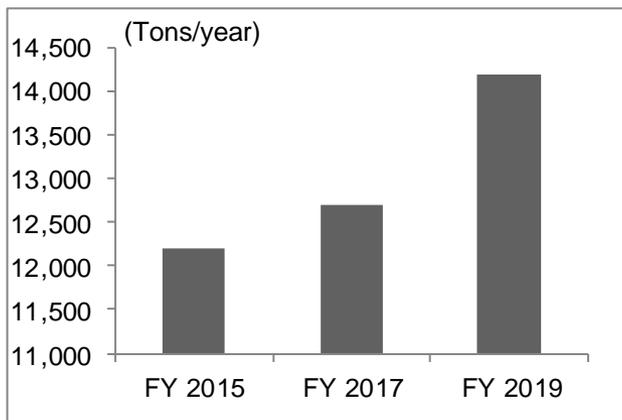
- Achieve good balance between consumption and sale of each fraction to maintain high naphtha cracker operating rates
- Become more competitive by improving our energy inputs
- Build a pricing system that has an appropriate spread

Growth Strategies: Petrochemical

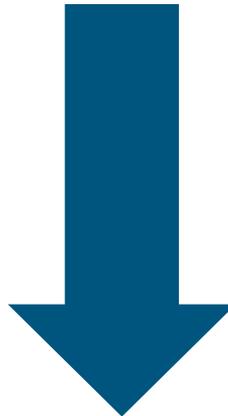
Polymers: Polyethylene, functional polymers (chloroprene rubber, chlorosulphonated polyethylene)

- Shift to unique, high value-added products

CSM Sales Outlook



- Anticipate developing new markets through the development of new grades



Medical Applications for Polyethylene



IV packs

Eye drops containers



Polyethylene

- Expand domestic sales and strengthened overseas deployment of special grades for foods, medical, and electronics
- Enter high-end fields through quality improvements

Functional polymers

- Promote special CR grades (sulfur-modified, non-fouling metal molds, etc.)
- New construction of No.2 CSM plant
- Bring new (improved oil resistance) polymers to market

Growth Strategies: Specialties

- **FY 2019: Operating income of ¥40 billion (up ¥7.3 billion from FY 2016), and operating income ratio of 21.7% (up 3% from FY 2016)**

Advanced Materials

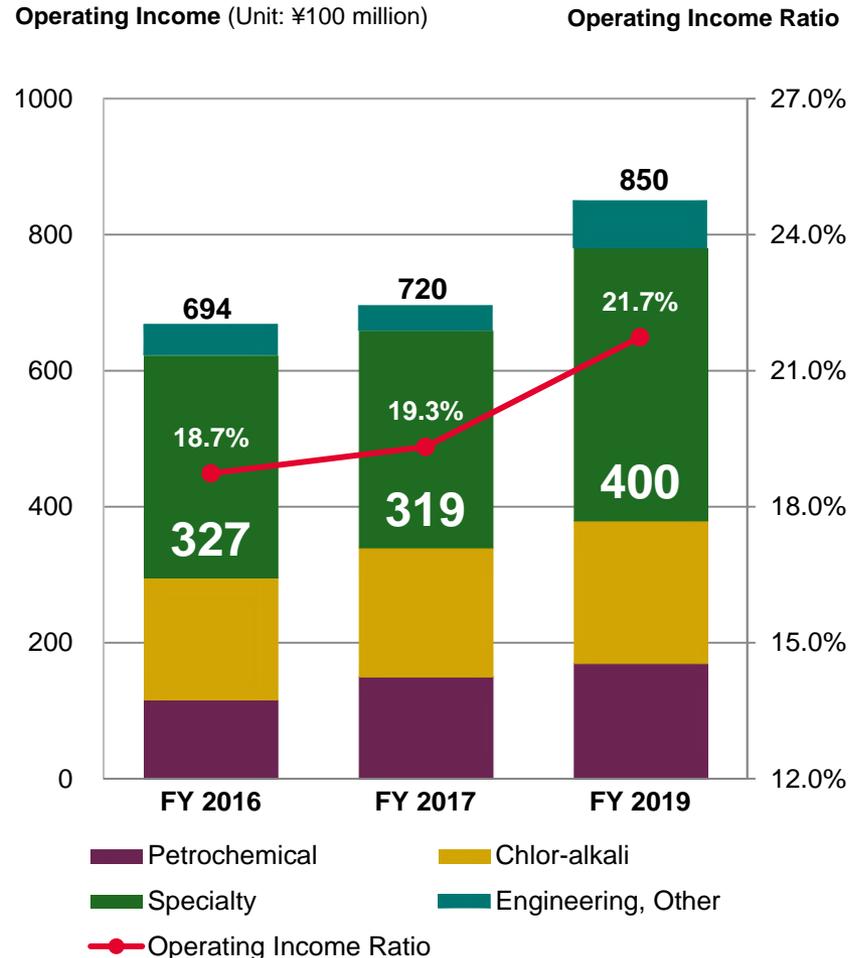
- High silica zeolite (HSZ®)
- Zirconia (ceramics)
- Electrolytic manganese dioxide (battery materials)
- Quartz glass
- Sputtering targets

Organic Chemicals

- Ethyleneamines
- Polyurethane catalysts (TEDA, TOYOCAT®, RZETA®)
- Bromine and flame retardants

Bioscience

- Chromatographic instruments, columns, separation and purification media
- Immunoassay analyzers and reagents

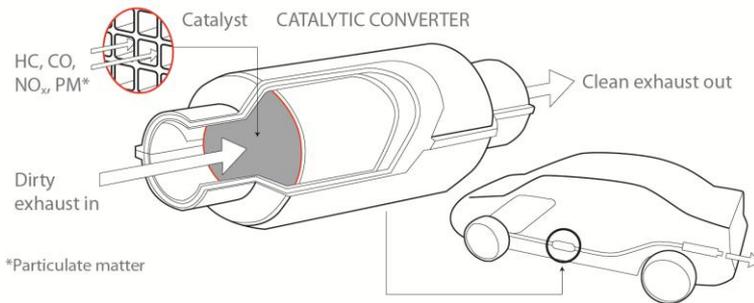
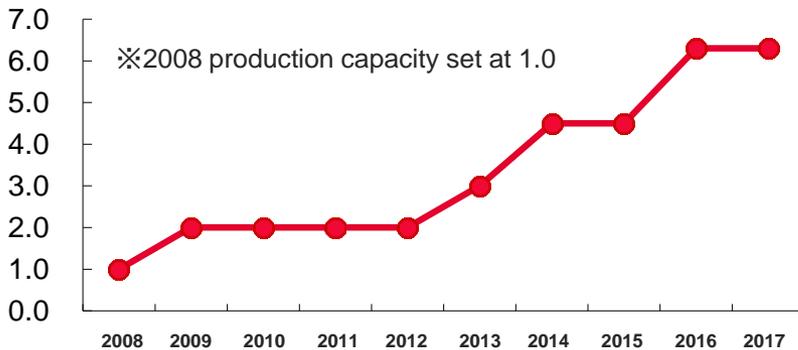


Growth Strategies: Specialties

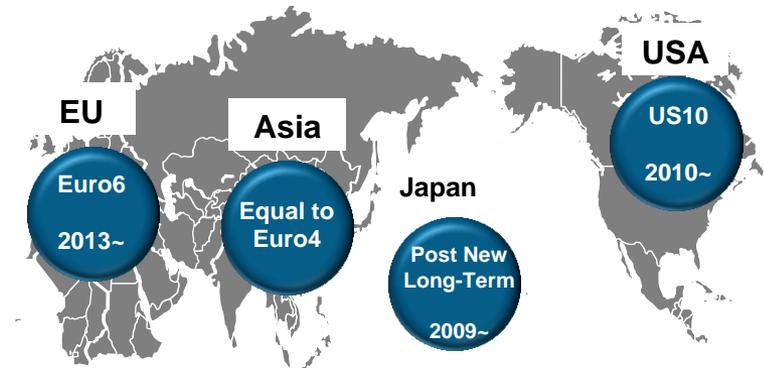
Advanced Materials: High silica zeolite (HSZ)

- Timely development of new grades and additional capacity

HSZ Capacity Increases



Automotive Emissions Regulations



- EU: Beyond 2017, stronger regulations in response to Volkswagen issue
- China: Introducing regulations similar to Euro6

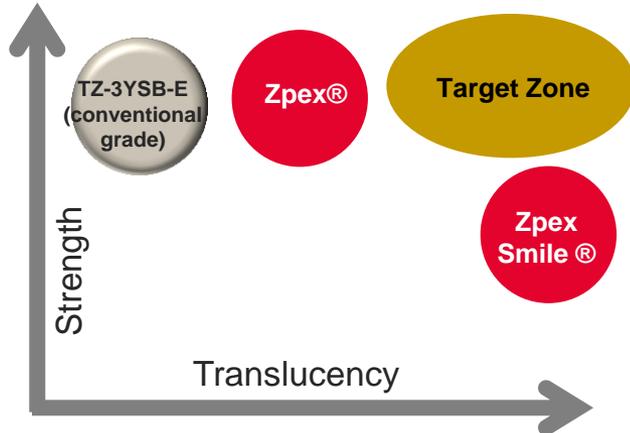
Increased demand, higher functionality

- More robust system for developing new grades
- New HSZ production facilities in Malaysia (construction completion in fall 2016)
- Increased capacity next fiscal year

Advanced Materials: Zirconia

- Continuous marketing of differentiated grades and increased manufacturing capacity

Grades Differentiation



Zirconia dental materials penetration

※Tosoh estimates

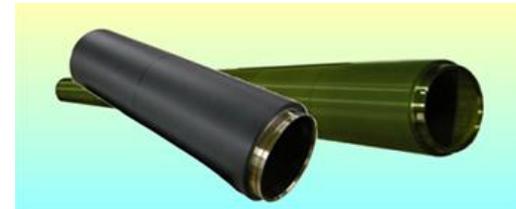


- Dental materials: Expand translucency grades
- Decorative uses: Quick development of materials to meet customer needs
- Increase zirconia production capacity (Facility at Yokkaichi Complex to be completed in fall 2016)
- Develop new uses and increase capacity next fiscal year

Growth Strategies: Specialties

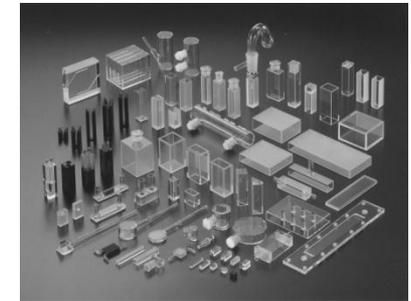
Advanced Materials: Electrolytic manganese dioxide, quartz glass, sputtering targets

● Shift to advanced functionality



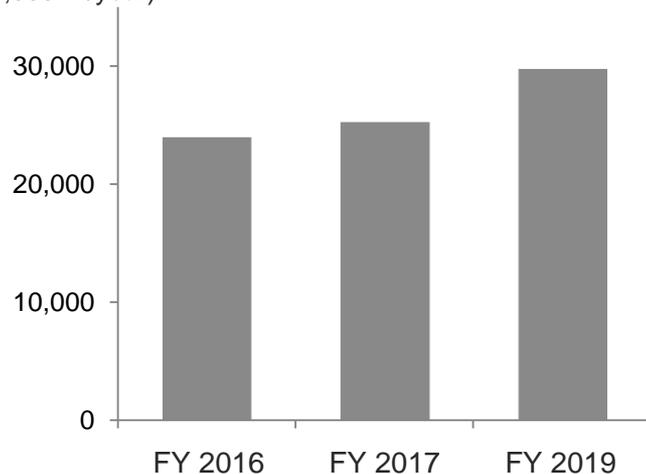
Target materials

Quartz glass

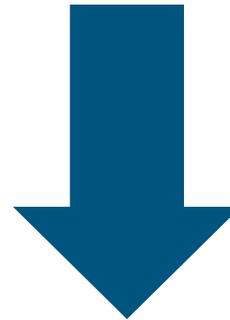


Touchscreen Market (Tosoh estimates)

(1,000m²/year)



● Demand projected to grow as newly emerging economies follow the lead of developed countries in expanded smartphone usage.



Electrolytic manganese dioxide

● Setting ourselves apart with advanced dry cell applications

Quartz glass

● More competitiveness through reductions in manufacturing costs and development of new materials

Sputtering targets

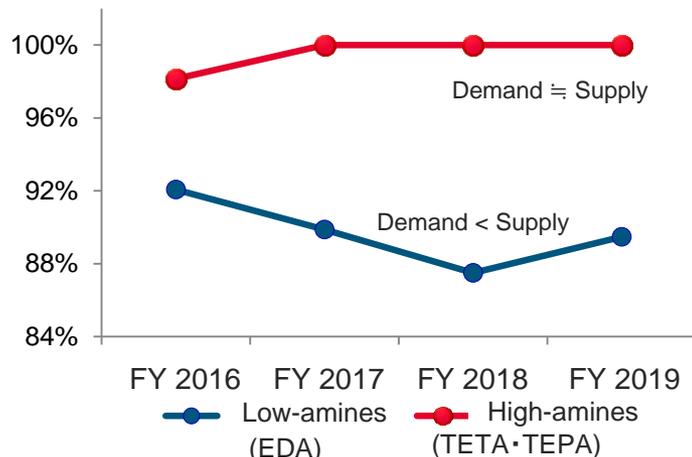
● Marketing for touchscreen applications and development of high-performance products

Growth Strategies: Specialties

Organic Chemicals: Ethyleneamines, polyurethane foaming catalysts, bromine and flame retardants

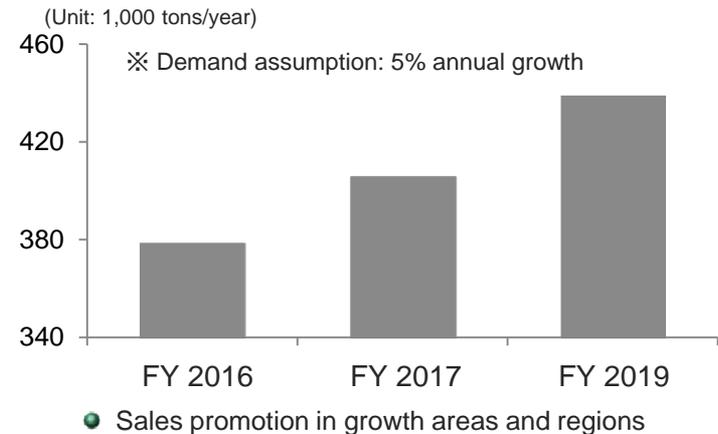
- **Improve profitability of existing products and stabilize new product businesses**

Worldwide Ethyleneamine Supply and Demand Balance (Tosoh estimates)



- We anticipate that the EO method, with its high low-amine generation rate, will continue to grow.
- Implementation of the high-amine method, with its ability to reduce low-amine generation to zero.

Bromine demand in Asia (Tosoh estimates)



Ethyleneamines

- **Significant improvement in profitability from shift to high-amines**

Polyurethane catalysts

- **TOYOCAT: Focus on high-functionality product sales**
- **RZETA: Increase marketing in Europe and USA**

Bromine and flame retardants

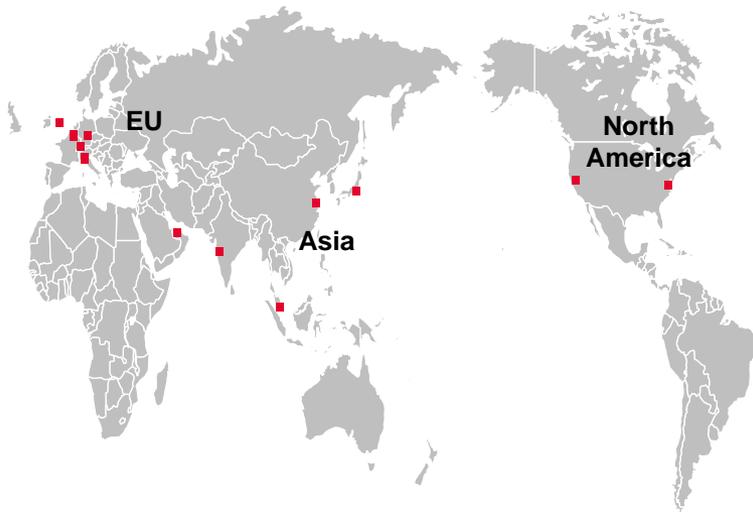
- **Investment in more efficient bromine production facilities (completion in spring 2017)**

Growth Strategies: Specialties

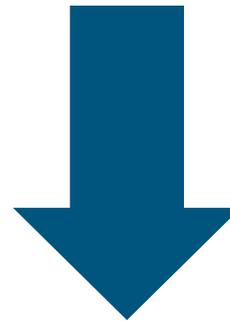
Bioscience: Chromatography instruments, columns, separation and purification media, immunoassay analyzers and reagents

- Expand markets through R&D as well as M&A and promote in newly-emerging economies

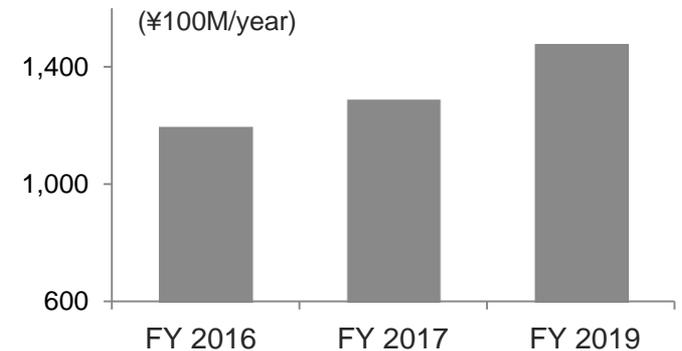
Business units in Japan and overseas



- Tosoh has 15 business units in 10 countries



Separation Media Market (Tosoh estimates)



- Acquire new technologies and products by leveraging M&A

Separations

- Develop new columns and separation media grades for the biopharmaceuticals market
- Increase our TOYOPEARL (separation media) production capacity

Diagnostics

- Expand differentiated reagents in growth areas
- Develop the Indian market through Tosoh India (formerly Lilac Medicare Pvt. Ltd., acquired in fiscal 2015)



7. Safety Reform Initiatives



7. Safety Reform Initiatives

Establish safe and stable operating technologies

- Improve safety by benchmarking the know-how and skills of experienced operators

Eliminate problems and abnormal conditions

- Invested ¥10 billion in 3 years starting in 2014 with the goal of improving facilities, safety (additional investments as necessary)
- Implement facility safety policies over the medium- to long-term

Enhance education and training programs

- Implement practical education at chemical plant training facilities
- Cultivate operators' ability to respond to problems



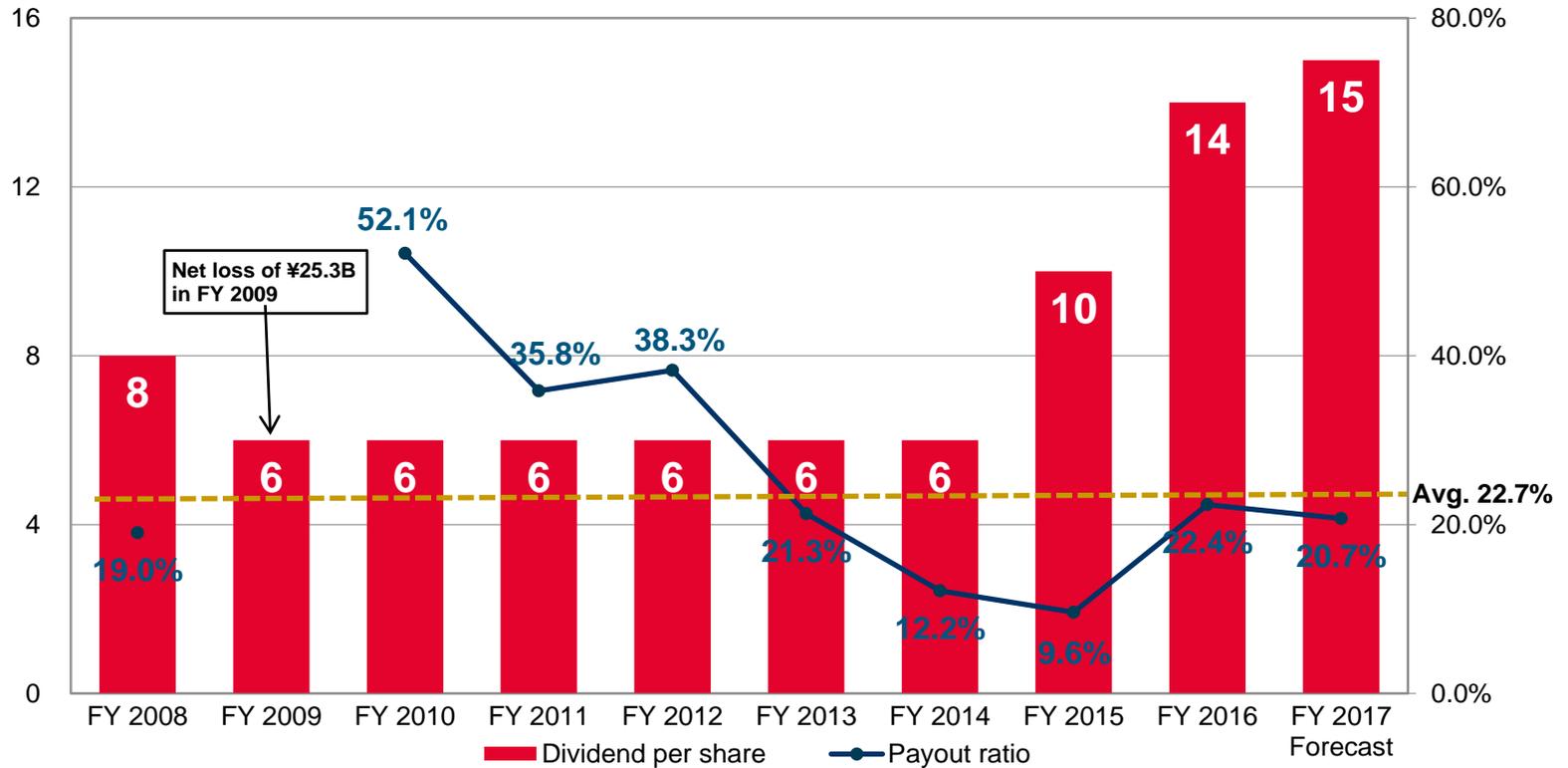
8. Shareholder Return Strategies

8. Shareholder Return Strategies

- Continue fundamental policy of stable dividends
- Dividends determined based on a comprehensive assessment of results for the period, free cash flow, future business development, and other factors
- Over the medium- to long-term, aim for a payout ratio of 30%

Dividends Per Share (yen)

Payout Ratio

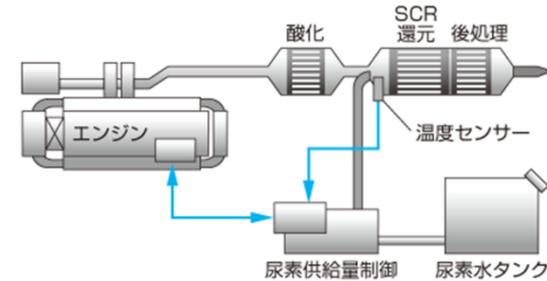


Attachment: NOx Reduction Technologies

Urea Selective Catalytic Reduction (SCR) System

- **Oxydation** and SCR catalysts (uses **HSZ**)
- Reduces NOx in urea water $4\text{NO} + 4\text{NH}_3 + \text{O}_2 \rightarrow 4\text{N}_2 + 6\text{H}_2\text{O}$
- Feature: Uses urea water as the reducing agent

■ディーゼル車用尿素SCRシステムの構成図



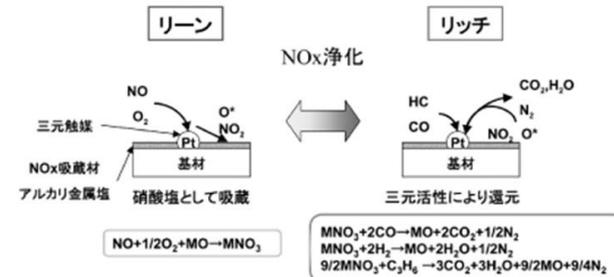
Source: New Energy and Industrial Technology Development Organization <http://www.nedo.go.jp/hyoukabu/articles/200804nissan/>

Lean NOx Trap (LNT) System

- Uses a NOx adsorber catalyst (does not use HSZ)
- Occludes NOx during travel, reduces NOx in fuel
- Feature: Uses the fuel as the reducing agent

※Occlusion: phenomenon where a gas is absorbed and incorporated into a solid

図12 ●DPNR触媒におけるNOx, PMの同時低減メカニズム(5)



Source: Japan Automobile Manufacturers Association Kusashika, Hitoshi. *JAMAGAZINE*. Mar 2008.

Exhaust Gas Reduction (EGR) System

- No use of catalyst (does not use HSZ)
- Reduces NOx by lowering combustion temperature from emission gas recirculation
- Feature: Reduces NOx at the engine

Used by Mazda's "SKYACTIV-D"



Source: Japan Automobile Manufacturers Association Kusashika, Hitoshi. *JAMAGAZINE*. Mar 2012.



«Note»

This presentation contains information and medium-term plans and forecasts based on data available at the present time of creation. As such, Tosoh Corporation makes no guarantees regarding forward-looking plans or forecasts as the operating environment is subject to risks and uncertainties that may result in substantial changes in the future.

END