2016–2020 New Medium-term Business Plan

“Project 2020+”

–Shaping the future–

December 11, 2015

SHOWA DENKO K.K.

Hideo Ichikawa, President & CEO

*See notes on page 44

Contents

1. Review of the results of “PEGASUS”

2. New medium-term business plan “Project 2020+”

3. Strategy by business category

4. R&D strategy

5. Final message

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Review of the results of “PEGASUS”

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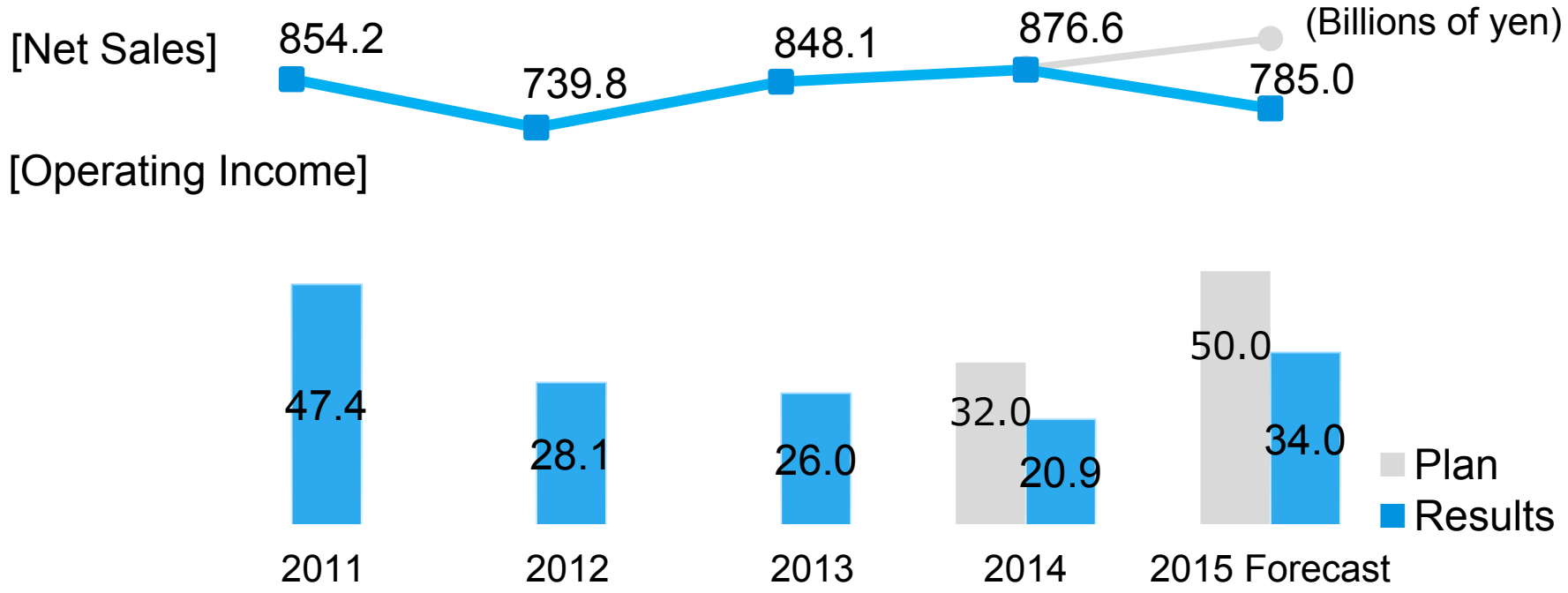
Review of the results of “PEGASUS”

Drastic changes in the business environment
Numerical targets for Phase Ⅱ will not be met



Changes in the business environment

Overcapacity for steel supply in China

Steep rise & fall in naphtha & aluminum prices

Great East Japan Earthquake

Steep rise in energy & electricity prices

PEGASUS Phase Ⅰ | **PEGASUS Phase Ⅱ**

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Major steps taken during the period of “PEGASUS”

Took business measures toward 2016 and beyond

- ✓ Business expansion overseas, mainly in China and ASEAN
- ✓ Reinforcement of domestic competitiveness
- ✓ Concentration of management resources on core businesses

PEGASUS Phase Ⅰ (’11-’13)

HD: Developed frontier technologies (PMR 6G)
Graphite electrodes: Acquired Sichuan Carbon, Decided to expand SDKC’s plant in USA
Shotic™: Established SHOTIC Malaysia
Ceramics: Shifted production to Indonesia
Rare earths: Established rare earth recycling plant in Vietnam

Divested: Aluminum heat-exchangers, alloy and panel businesses
Narrowed development themes: Organic EL, LIB electrolyte

PEGASUS Phase Ⅱ (’14-’15)

Semiconductor-processing high-purity gases: Expanded business in Asia
Aluminum can: Acquired Hanacans of Vietnam
High-purity aluminum foil: Est. a base in China
Functional chemicals: Est. 2nd base in China
LIB materials: Increased production capacity of aluminum laminated film and anode materials
NH_3: Raised ratio of recycled plastic as raw material

Divested: Building material “Lambda” Phenolic resins
Dissolved: Ethyl acetate (Indonesia)
Rare earth magnetic alloy (Baotou, China)

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New medium-term business plan “Project 2020+”

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Megatrends

Many business chances ⇔ Unstable/uncertain business environment

Global warming
Increasing demand for energy, food and water

Climate change
Depletion of natural resources

Changes in demographic structure

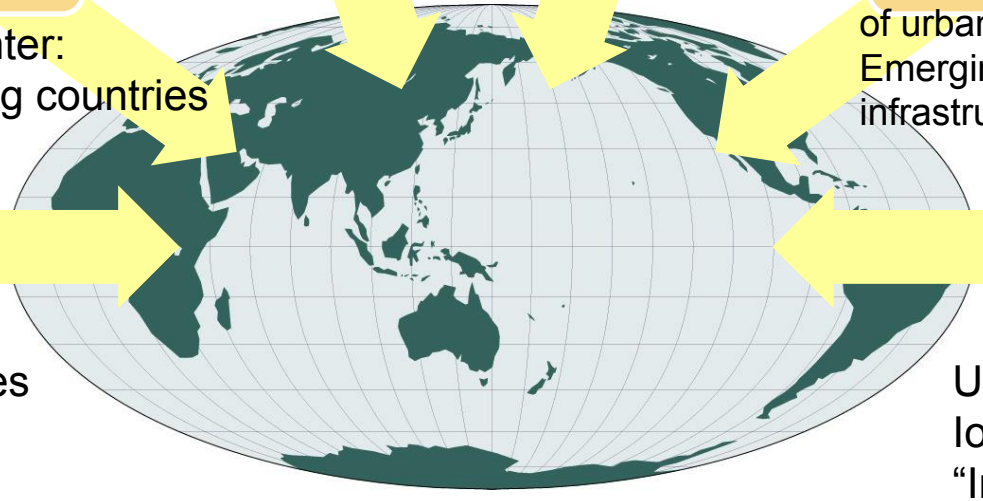
Rising population (Asia, Africa)
⇔ Aging society, Decrease in the working population (Japan, developed countries)

Multipolarized world economy

Economic center:
Developed + emerging countries

Urbanization

Developed countries: Limits of urban infrastructure
Emerging countries: Smart infrastructure development



Drastic changes in feedstock/fuel market

Political/economic changes
Unstable market prices

Technological breakthrough

Use of nanotechnology, IoT, and AI
"Industry 4.0"

⇒In addition to growth & profitability, "stability" is vital.

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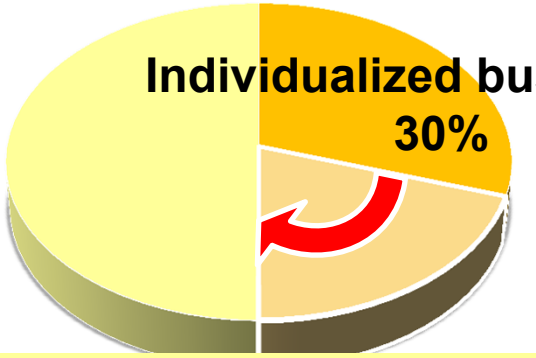
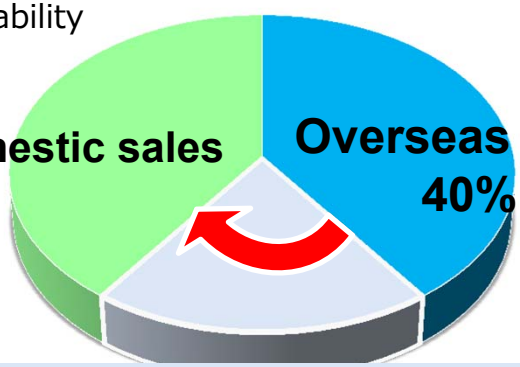
Target image of the Showa Denko Group in 2025

Aiming to have business structure with less rate of change in profitability through expansion of individualized businesses and profitability improvement

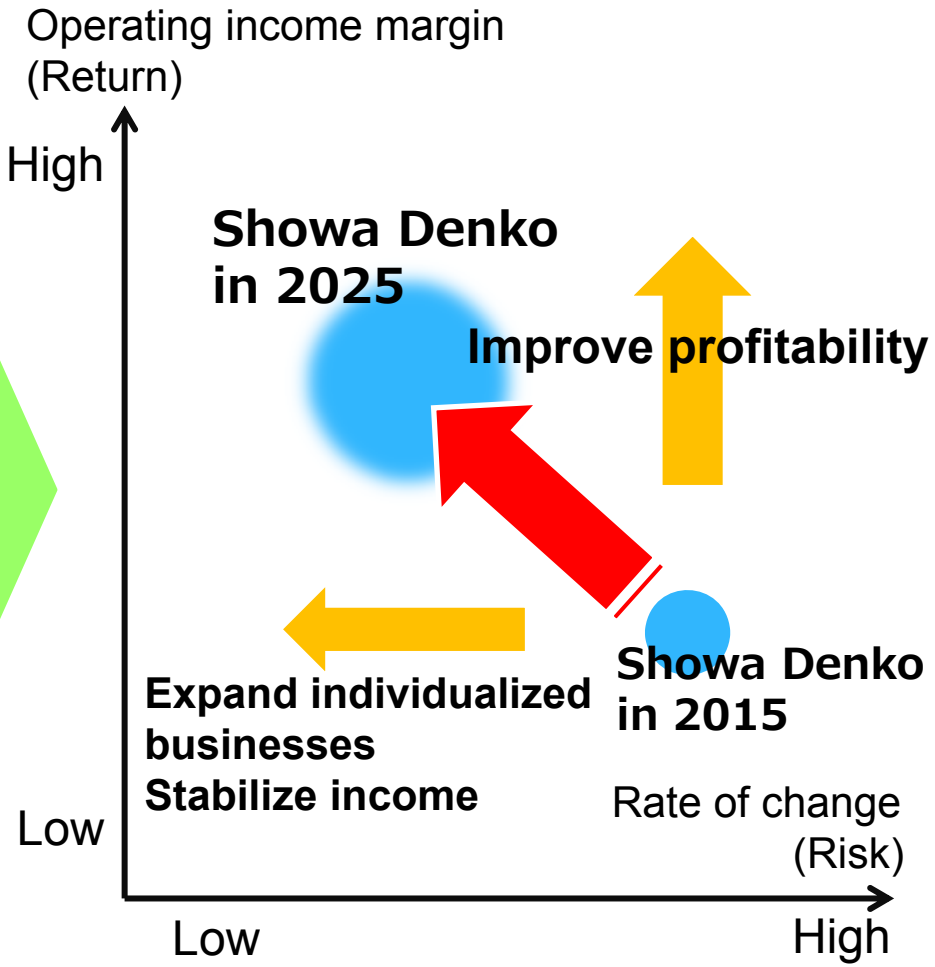


Aiming to make individualized businesses* occupy 50% of net sales

*Businesses with sustainable high-level profitability and stability



Aiming to make overseas sales occupy 60% of net sales



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Social contribution of the Showa Denko Group

We offer high value-adding “products × technology × services” to 5 market domains

Intensive accumulation and dispatch of information

Mitigating environmental burden
Resource recycling



Infra-structure

Electronics





Living environment



Mobility



Energy

Safety/Security
Industrialization of agriculture

Improving resource efficiency
Utilizing alternative energy
Efficient use of electricity
Diversifying energy sources

Safety/Security
Enhanced durability
Emission control
Improving fuel efficiency

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New medium-term business plan “**Project 2020+**”

We will bring this 5-year plan to completion, and realize the target image of the Showa Denko Group in 2025



To realize sustainable growth, we will “make revenue bases strong” and “expand “individualized businesses.”

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Business strategy

Strengthen the Group strategically to achieve sustainable growth

Push up profitability of existing businesses through renewal of business model

- ✓ Maximize operating income and cash flow

Expansion and creation of individualized businesses

- ✓ Expansion of individualized businesses
- ✓ Early manifestation of research results
- ✓ Make the best use of M&A and partnership with other companies
- ✓ Find growth opportunities overseas

R&D strategy

- ✓ Concentrate management resources on R&D to strengthen existing businesses and their peripherals
- ✓ Create next-generation businesses/themes by making best use of open innovation and M&A

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Numerical plan

Target figures for 2016-2018

(Billions of yen)	2015	2016	2017	2018	2020 image
Net sales	785.0	810.0	850.0	855.0	930.0
Operating income	34.0	36.0	50.0	57.0	70.0
Net income	7.0	20.0		30.0	
Free cash flow	15.0	68.0 (3 year total)			
ROA*	3%			6%	
ROE	2%			9%	

*ROA: operating income/net assets

*Revised forecast for 2015 was announced on Dec. 4, 2015.

【Assumptions】

Real GDP growth: US: more than 2.5%, Japan: 1-2%, China: 6% or more
Exchange rate: **¥115/$**
Domestic naphtha: **¥52,000/kl** (MOPJ: $615/t)
Aluminum metal: **$1,800/t**

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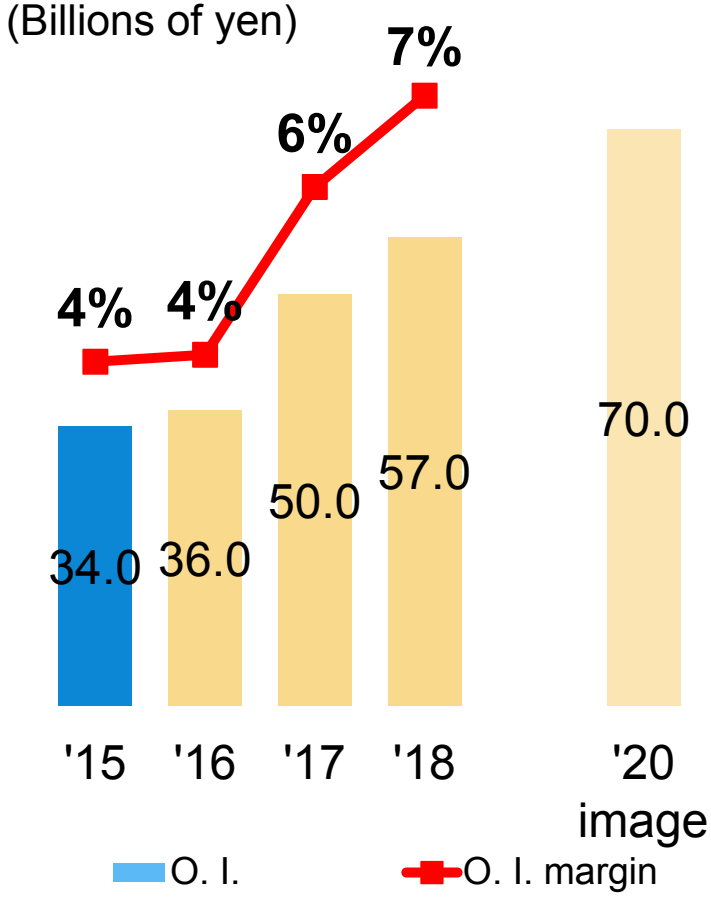
Operating income and free cash flow plans

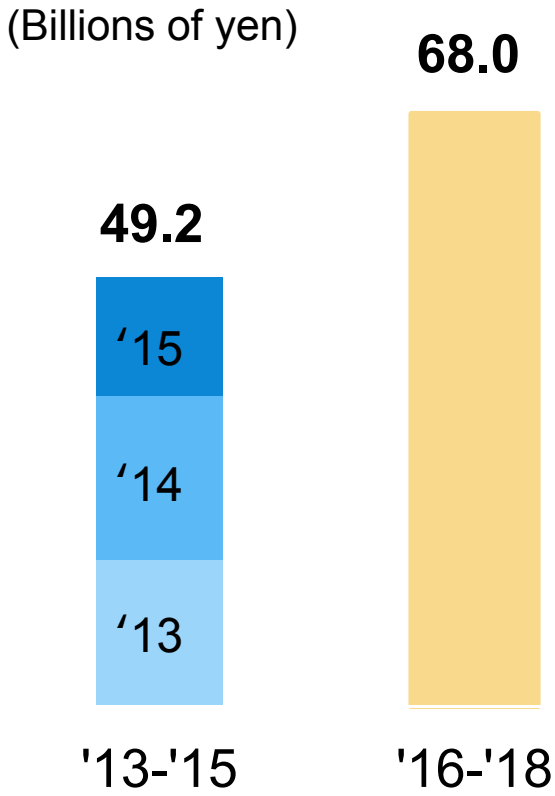
Gain more power to generate FCF by maximizing profitability, accelerating expansion of growth businesses, and selecting investments carefully

[Operating income]



(2018: Periodic maintenance of ethylene plant)

[Free cash flow]



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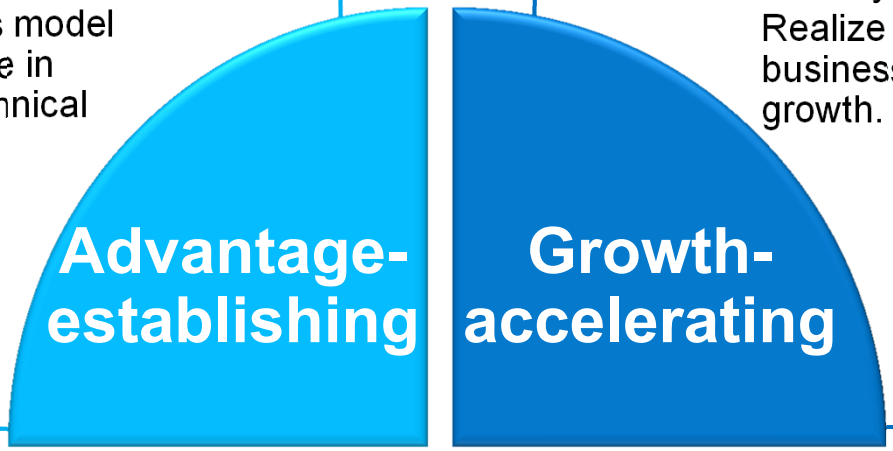
Business portfolio

Redefine mission of each business



To cope with prospective market growth, establish business model with competitive advantage in terms of business and technical development.

LIB materials

SiC epi-wafer for power devices

Actively take strategic measures. Realize rapid expansion of business by preempting market growth.

High-purity gases for electronics

Functional chemicals

Aluminum cans

Rare earths
Ceramics

Aluminum specialty components

Increase profit and cash flow through rebuilding of business environment, profitability and business model.

HD Graphite electrodes
Petrochemicals
Basic chemicals
Industrial gases
***Shotic*™**
High-purity aluminum foil

Market and business have certain scale. Have more power to resist market fluctuation, and make stable profit and cash flow.

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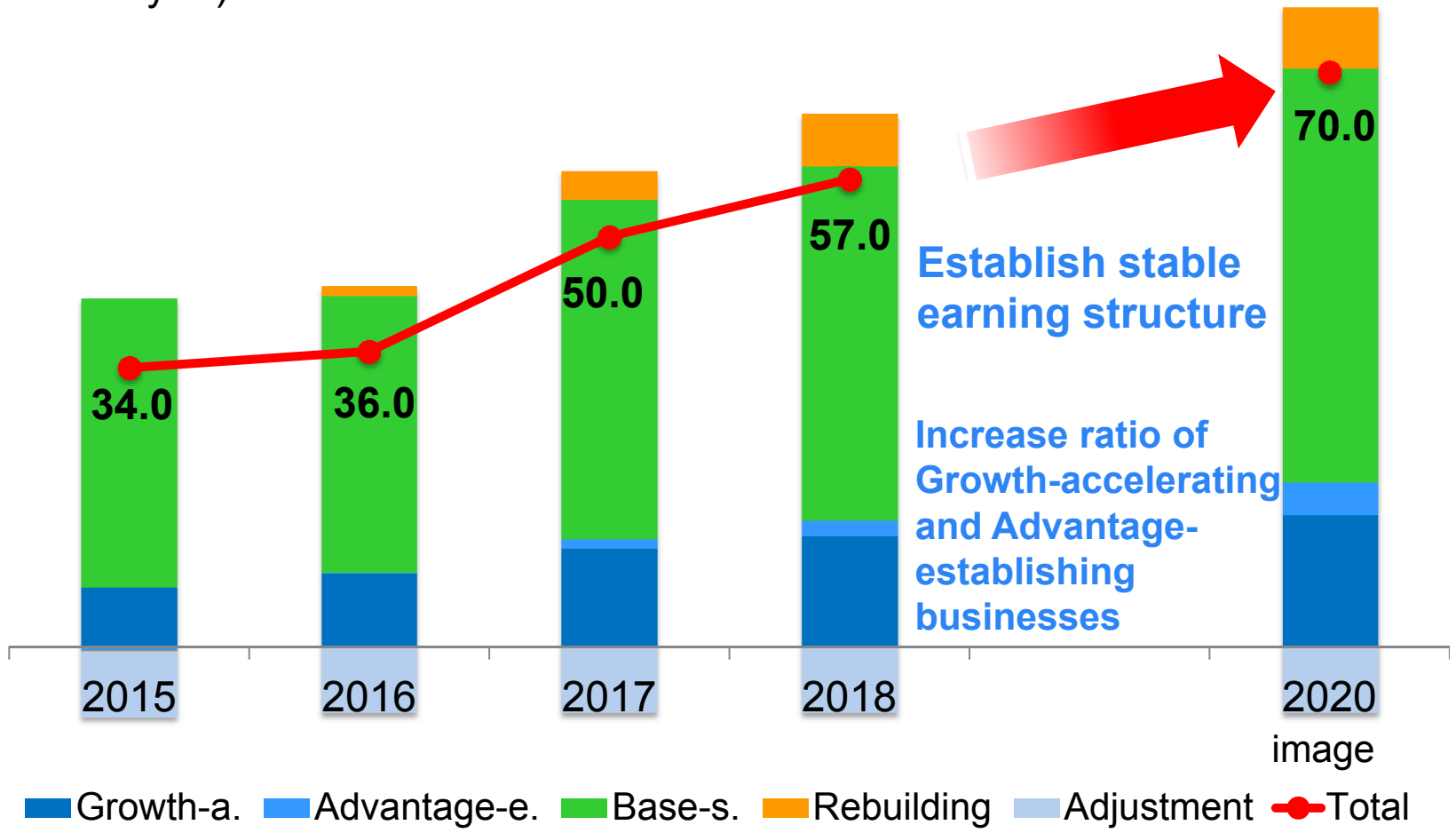
Operating income by business category (2016-2018)

Aim to increase income from “Growth-accelerating” and “Base-shaping” businesses

(Billions of yen)



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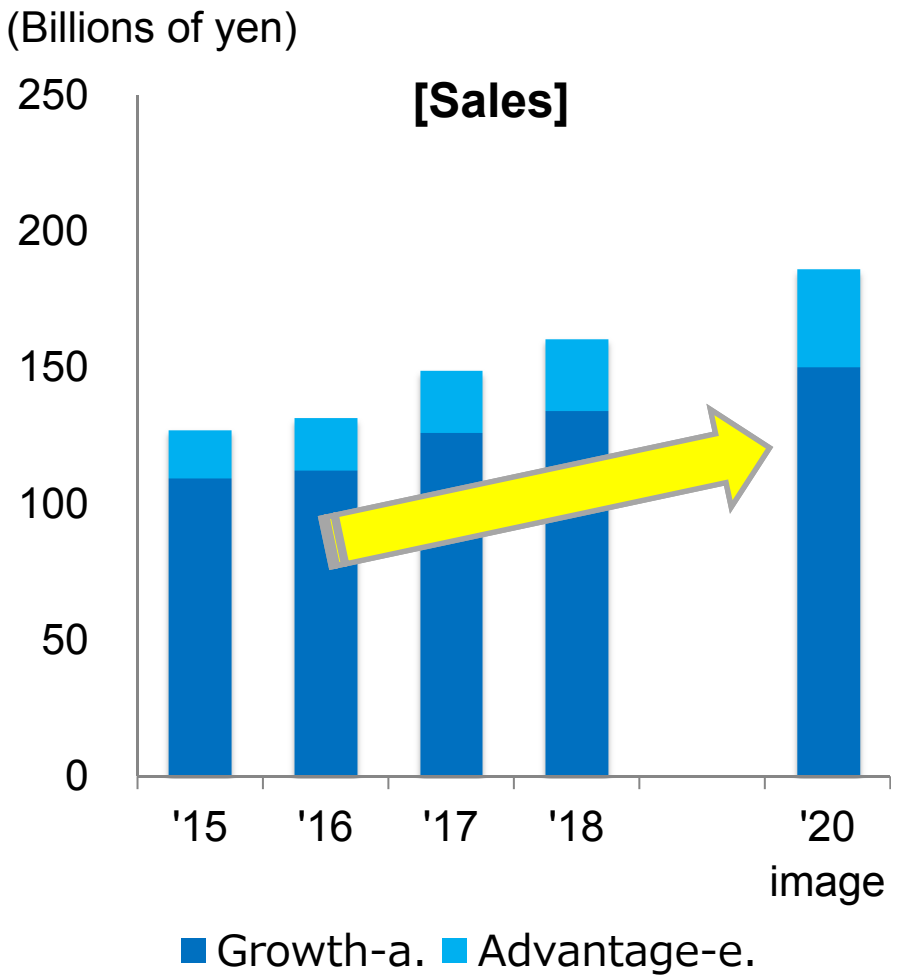
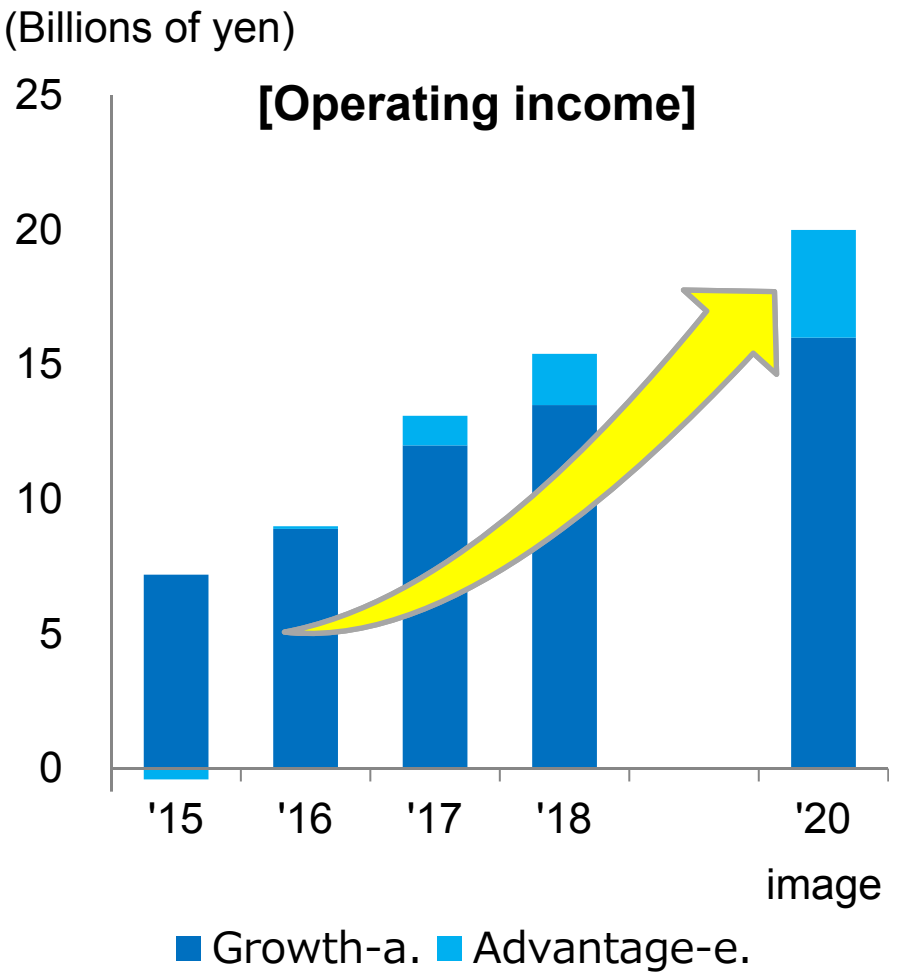
Plans for Growth-accelerating & Advantage-establishing

Expand “Growth-accelerating” and “Advantage-establishing” businesses





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Sales and operating income by segment (2015-2018)

Increase income from all segments

(Billions of yen)	2015 Sales	2015 Operating income	2018 Sales	2018 Operating income
Petrochemicals	**231.0**	**10.5**	**225.0**	*** 8.0**
Chemicals	**145.0**	**11.0**	**170.0**	**17.0**
Electronics	**130.0**	**17.5**	**130.0**	**18.0**
Inorganics	**65.0**	**0.0**	**85.0**	**10.5**
Aluminum	**102.0**	**2.5**	**120.0**	**7.5**
Others	**154.0**	**0.5**	**175.0**	**4.0**
(Adjustment)	**-42.0**	**-8.0**	**-50.0**	**-8.0**
Total	**785.0**	**34.0**	**855.0**	**57.0**

*Petrochemicals: Periodic maintenance is scheduled to be in 2018.

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Capital investment strategy

Carry out positive and strategic investment in Growth-accelerating and Advantage-establishing businesses

Growth-accelerating

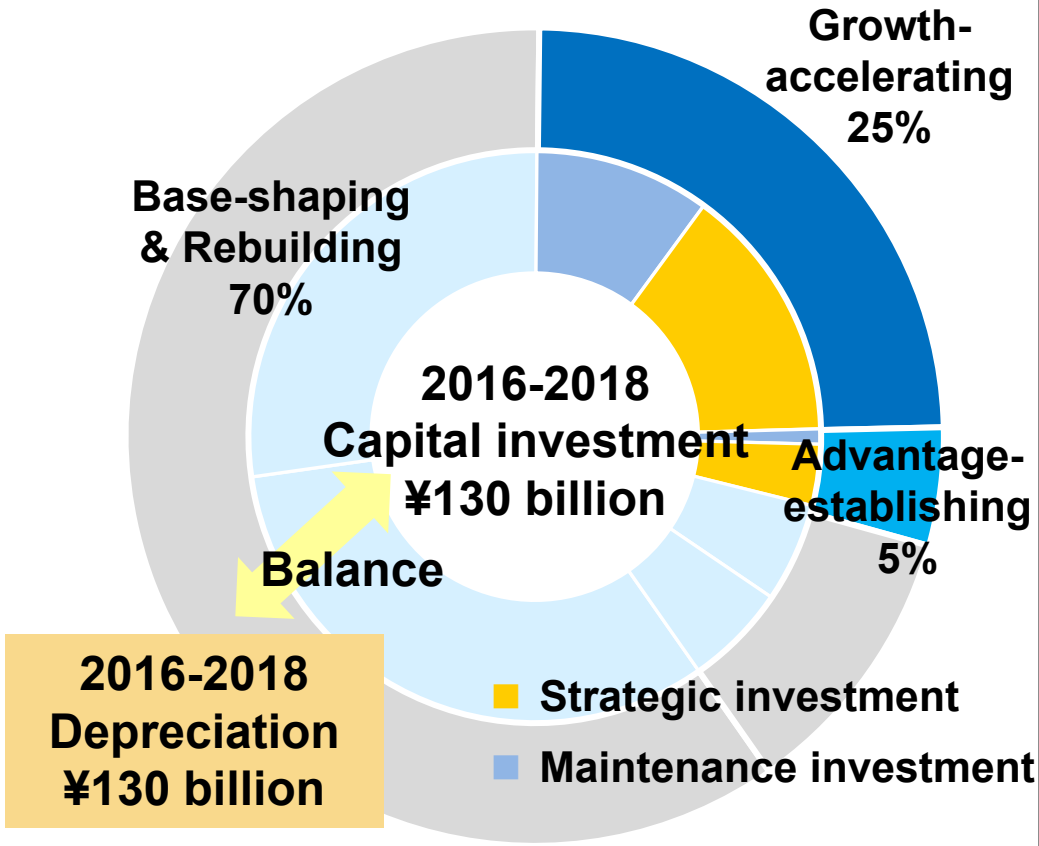
- Aluminum cans: Expand production facilities in Vietnam
- High-purity gases for electronics: Expand capacities of bases in Japan and abroad
- Functional chemicals: Expand business in Asia

Advantage-establishing

- LIB materials: Expand capacity
- R&D: Mass production of SiC epitaxial wafers will take off

Base-shaping

- HD: Take the lead in next-generation technology
- Petrochemicals: Strengthen Oita Complex's cooperation with surrounding facilities



2016-2018 Depreciation ¥130 billion

Enforce investment/business management taking ROIC as a guide

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Investment in energy and environment

Strengthen business base conforming to low-carbon society

Base-shaping

- **Countermeasures against global warming**
  Energy saving (Recovery and utilization of waste heat, etc.)
  Electricity saving
  Introduction of the newest type of hydropower facilities



- **Expand resource recycling businesses**
  Recycling of used plastics
  (Hydrogen/Ammonia/CO_2)
  Promote recycling in cooperation with national/local governments



⇒Contribute to CO_2 reduction & resource recycling

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Cost reduction strategy

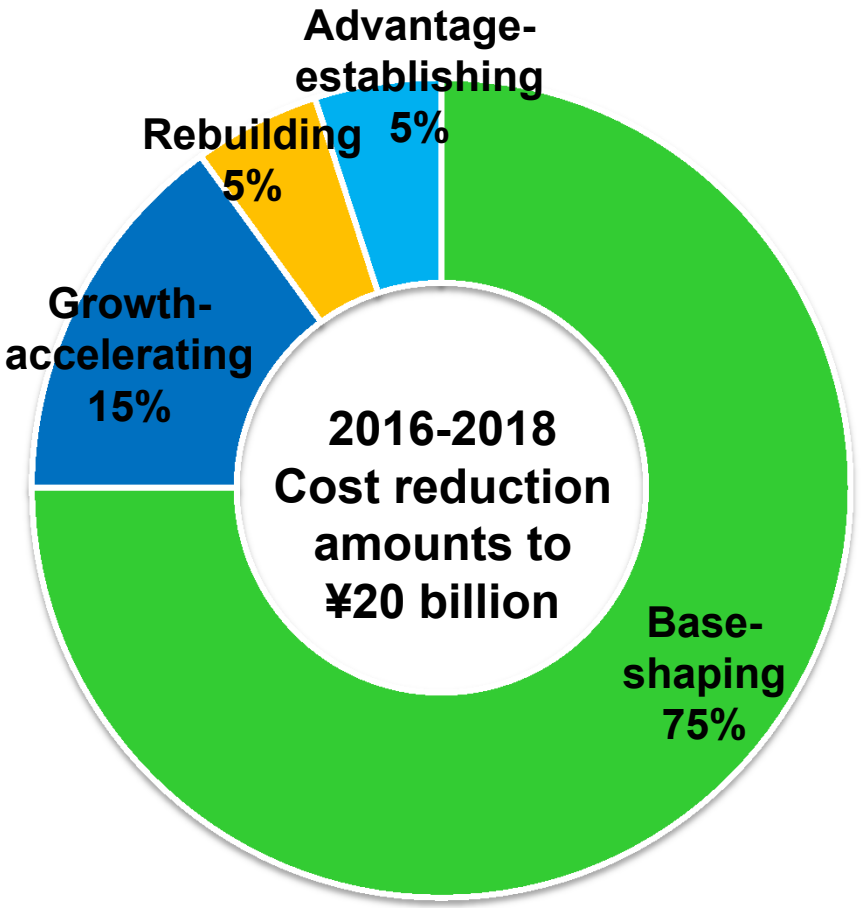
Implement cost reduction measures amounting to ¥20 billion in three years

Base-shaping

- HD: Improve yields, Integrate operation of media and substrate production
- Graphite electrodes: Reduce resource and energy costs
- Petrochemicals: Improve unit energy cost
- Basic chemicals: Increase ratio of used plastics as raw material
- Aluminum: Reduce variable costs, Improve unit resource

Growth-accelerating

- High-purity gases for electronics: Improve turnover of containers, Reduce variable costs
- Aluminum cans: Reduce distribution costs, Improve yields



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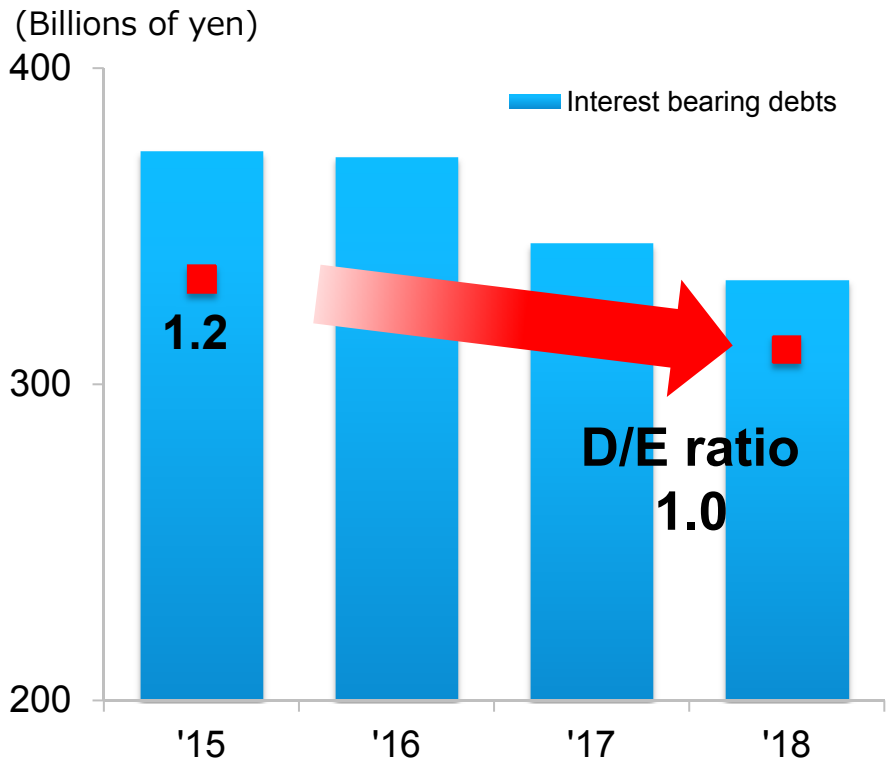
Financial strategy

Improve financial standing + Return to shareholders

- **Make D/E ratio 1.0 in 2018**
  - Increase net income
  - Maximize effects of capital investment
  - Make efficient use of assets
    (Improve inventory turnover, Put squeeze on fixed assets)

- **Improve return to shareholders**
  - Target payout ratio: 30%



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Strategy for each business

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High-purity gases for electronics (1)

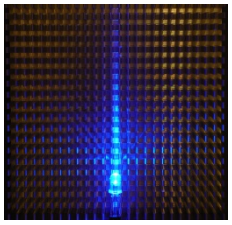
Semiconductors, LCDs, and LEDs: Market expansion, Improvement in performance

Market analysis

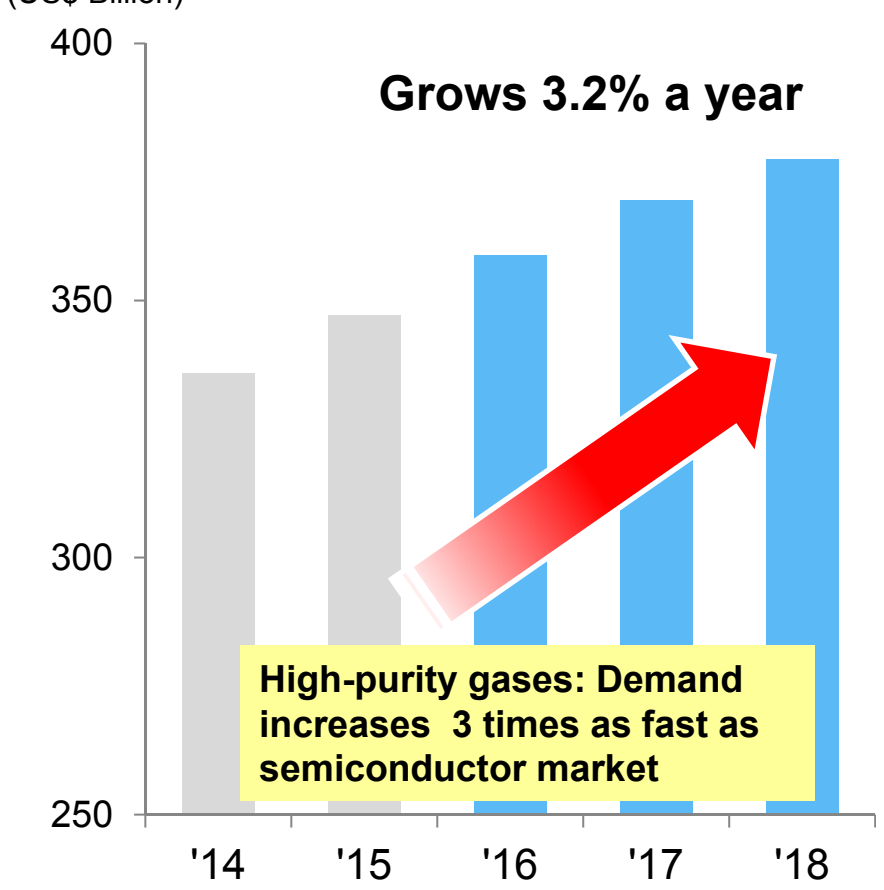
- ✓ Strong demand for electronic parts, centering on smart phones
- ✓ Semiconductors: Market expansion continues, Enhanced micromachining and multilayer structure →Increased gas consumption
- ✓ LCD: Rapid production increase in China
- ✓ LED: Utilized for more purposes, including devices mounted on cars







[Global semiconductor market forecast]



(WSTS, SDK estimates)

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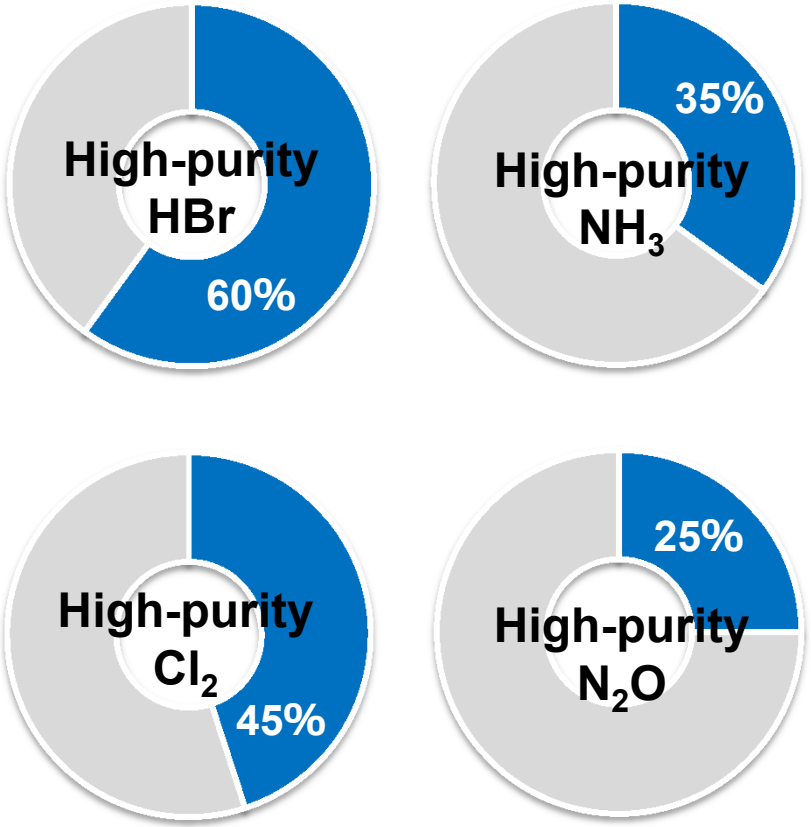
High-purity gases for electronics (2)

Expand business with accelerated global marketing
Aim to be the top firm in the industry

Business strategy

- **Establish global SCM system**
  Strengthen logistics and marketing
- **Strengthen global network**
  New marketing base in North America
  Additional marketing bases in China (Middle & North China)
- **Develop and market high-value-added new gases**
- **Large capital investment**
  ⇒Sales 2018: +40% of 2015
  2020: +60% of 2015
- **Expand business further via "discontinuous" growth through M&A and business alliance**

[Shares of our main 4 products (2014)]



(Fuji Keizai, SDK estimates)

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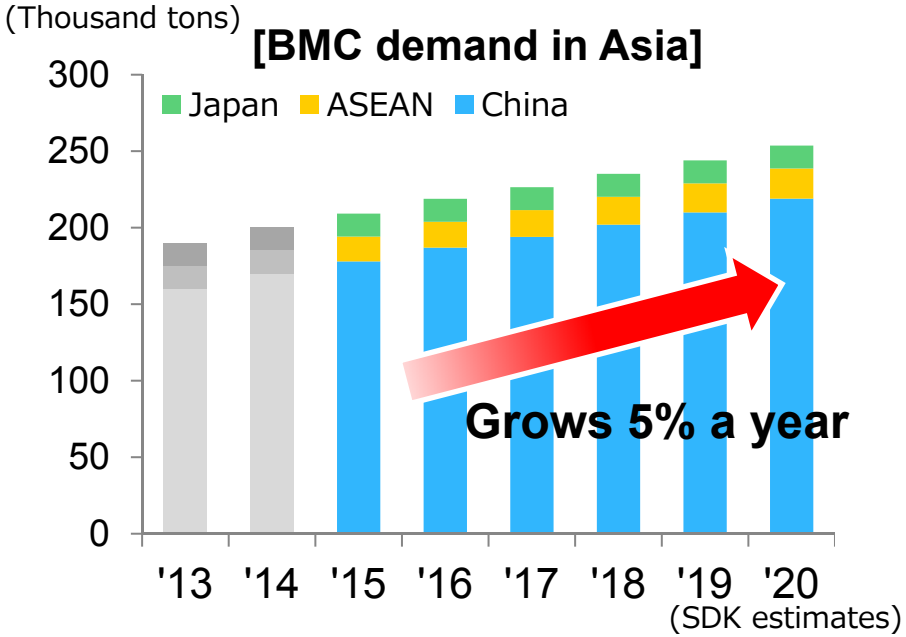
Functional chemicals

Strengthen resin businesses in China and ASEAN
Promote functional monomers aggressively

Market analysis

- ✓ Special boom caused by Olympics and infrastructure renewal
- ✓ Increasing infrastructure construction in China & ASEAN, BMC demand increases 5% a year
- ✓ Paint market for plastics & cars expands



Business strategy

- ☐ **Secure domestic share through aggressive marketing. Increase profitability by stronger R&D**
- ☐ **Make 2nd BMC base in China, join the line as early as possible**
- ☐ **Consider capacity addition in ASEAN after market analysis**
- ☐ **Expand functional monomer**

  Market and promote *AOI-VM*™



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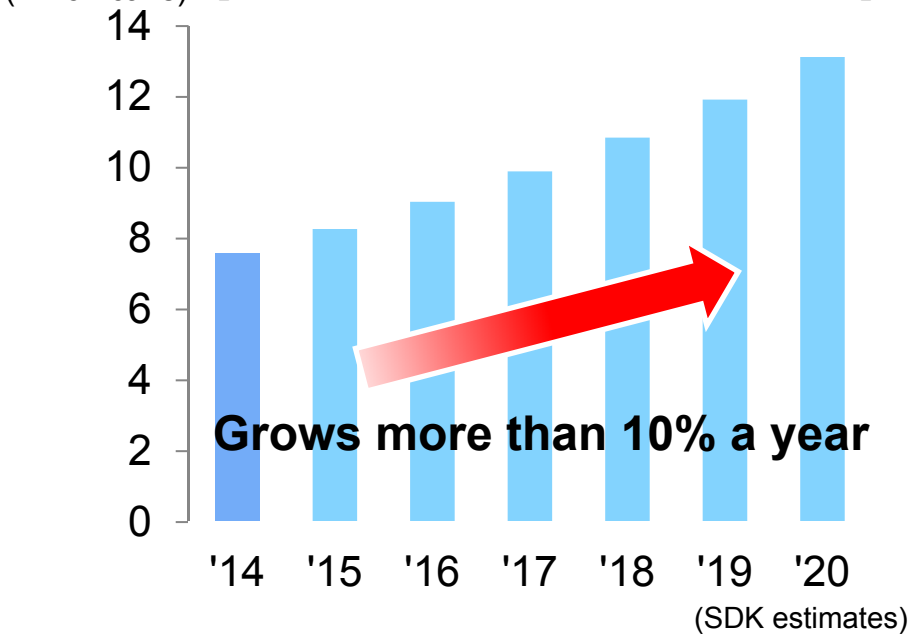
Aluminum cans

Expand the business in Vietnam aggressively
Increase shipment volumes and profitability in Japan

Market analysis

- ✓ Vietnam: Rapidly expanding canned-beer market due to population increase and rise in the standard of living
- ✓ Japan: Steady market for canned beer

[Aluminum can market in Vietnam]



Business strategy

☐ **Vietnam: Aim at business expansion**

Improve quality and cost competitiveness

Cultivate new customers

Explore market opportunities to expand sales

☐ **Japan: Strengthen market position. Stabilize profit**

Improve quality and productivity. Reduce cost further. Respond to introduction of cans for coffee beverages aggressively. Strengthen competitiveness with new printing technology.





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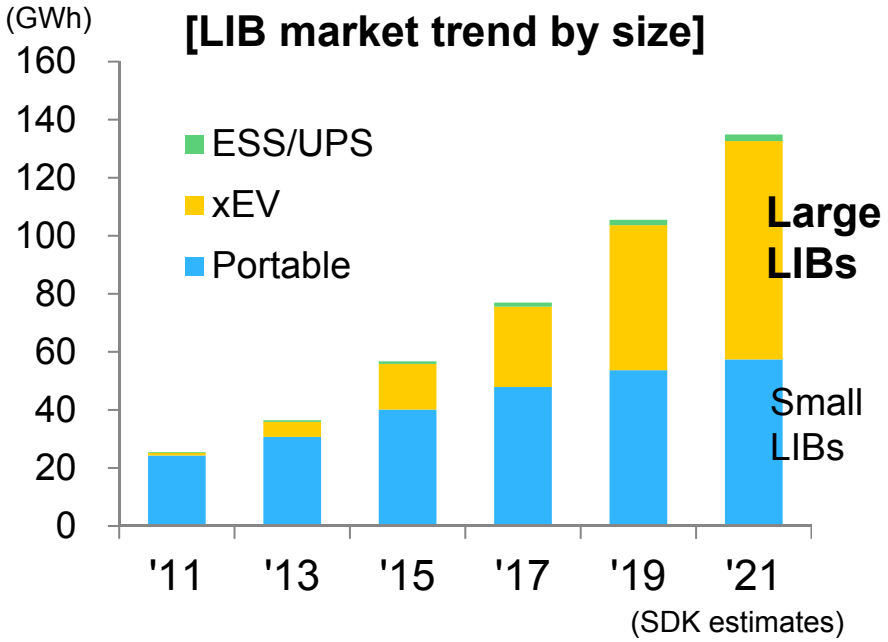
Lithium ion battery (LIB) materials

Expand production capacity to respond to increasing demand for large LIBs

Market analysis

- ✓ Small LIBs: Popularization of smart phones not only in developed countries but also in emerging and developing countries
- ✓ Large LIBs: Use for PHEVs･EVs leads the market



Business strategy

- ☐ ***SCMG*™ (Anode materials)**
  Expand production capacity at home and abroad to respond to demand increase
- ☐ ***VGCF*™ (Conductivity enhancer)**
  Improve productivity→
  Expand production capacity
  Increase sales for large LIB application
- ☐ ***SPALF*™ (Aluminum laminate film)**
  Improve productivity→
  Expand production capacity
  Develop thinning technology



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"Advantage-establishing"

SiC epitaxial wafer for power devices

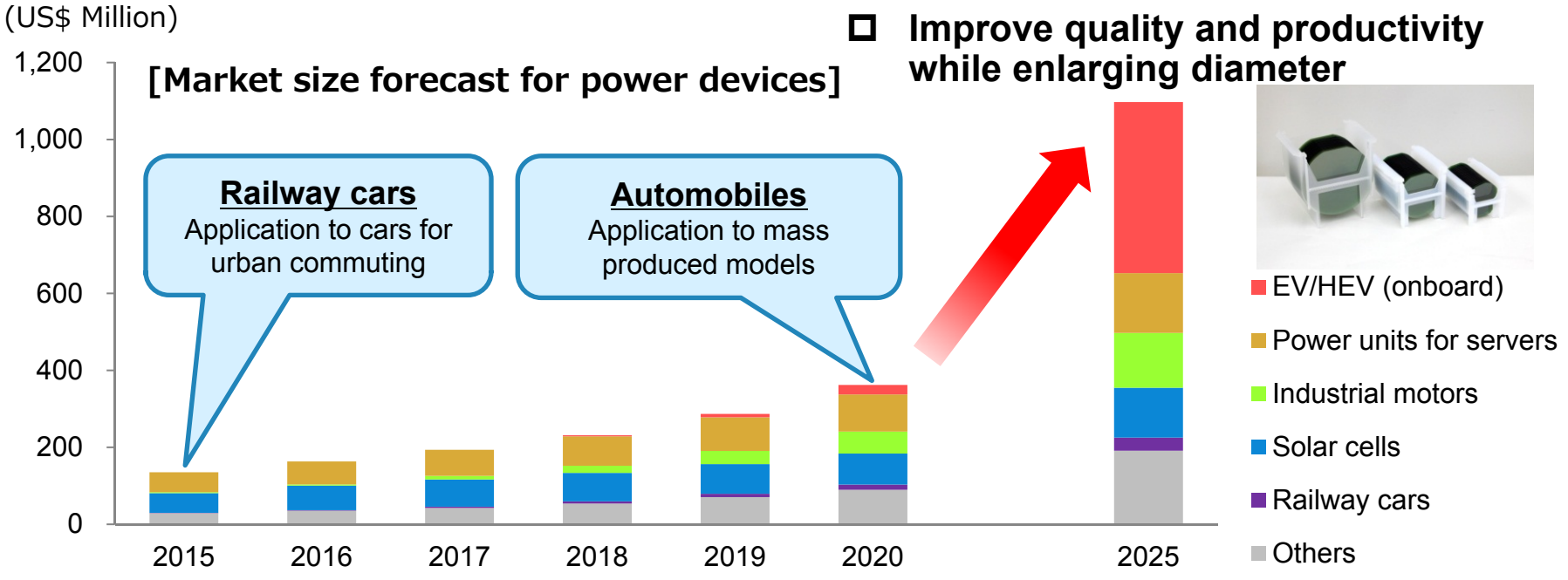
Accelerate technology development toward practical implementation of all SiC power devices

Market analysis and technology trend

- ✓ Diode: Market grows 10% a year
- ✓ Transistor: Market expands due to improvement in reliability of devices

Business strategy

- ☐ **Promote 6-inch wafer→Cultivate new customers**
- ☐ **Increase sales of high-quality epi-wafers for transistors**
- ☐ **Improve quality and productivity while enlarging diameter**



(Yole Développement, Fuji Keizai, SDK estimates)

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HD media (1)

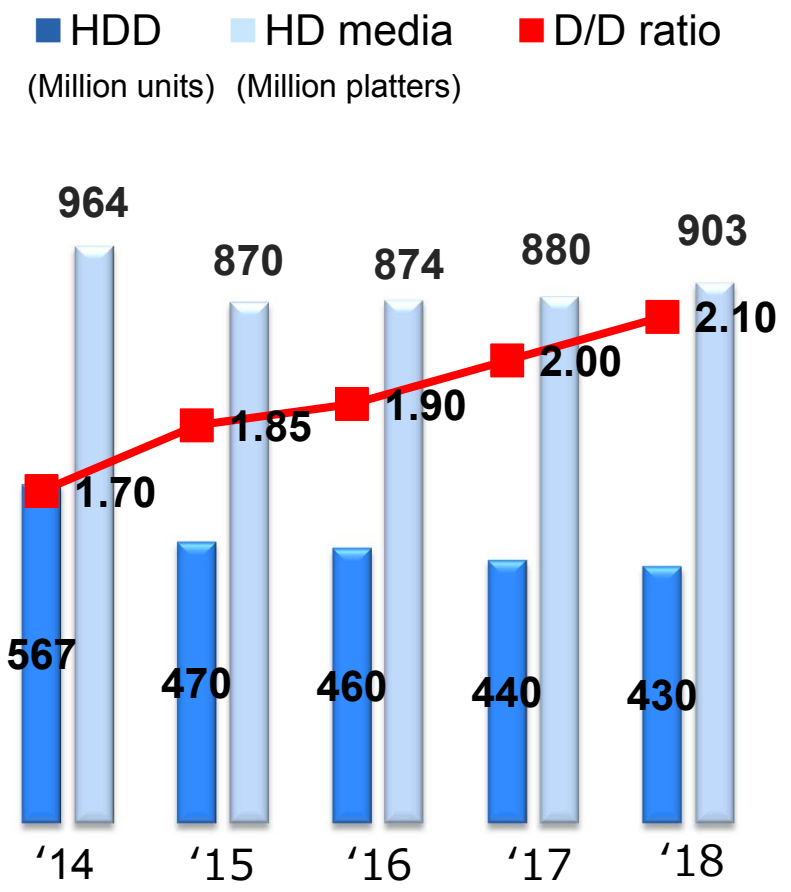
Demand for HD increases steadily due to the growth of generated data

Market analysis

- ✓ HDD: Competition with SSD, Further progress in application shift from PC use to server use
  - Gradual decrease in demand for mobile PC use
  - Increase in demand for use in near-line servers for data centers
- ✓ Demand for media gradually increases due to rise in D/D ratio
- ✓ Cope with changes in the market and next-generation technology



[HDD/HD market forecast]



(SDK estimates based on TSR data)

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"Base-shaping"

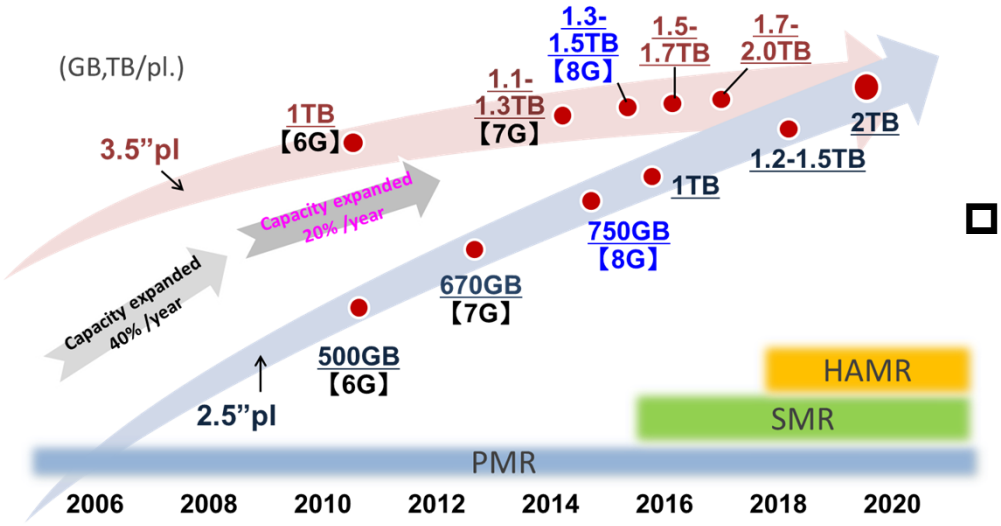
HD media (2)

Maintain "Best-in-Class" status by technology development and strengthening 3.5-inch aluminum media business

Technology trend

- ✓ Storage density increases 20% a year
  →SDK maintains high competitiveness by developing media with excellent electromagnetic property and reliability
- ✓ HAMR media will be launched in 2018
  →Establish process for mass production

[Road map for storage density increase] (SDK forecast)



Business strategy

- ☐ **Continue to be technology leader with "Best-in-Class" strategy**
  Put on the market HD media featuring original leading-edge technology
- ☐ **Strengthen 3.5-inch aluminum media business**
  Produce substrates featuring top-level performance and quality
  Optimize utilization of existing capacity to produce aluminum substrates
  Promote integrated operation of media section and substrate section
- ☐ **Strengthen earning power through cost reduction**
  Improve yield
  Improve R&D efficiency by coordinating activities in multiple bases
  Flexible production system to meet demand

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"Base-shaping"

Graphite electrodes

Execute business structure reform.
Actively take part in a reorganization of the industry.

Market analysis

- ✓ Stagnant steel demand on a medium-term basis

  USA: Gradual increase in steel demand

  Japan: Arising demand increase accompanying Tokyo Olympics

  China: Oversupply will be mitigated on a long term basis

  Asia: Despite inflow of Chinese steel and low utilization rate of electric steel furnaces, demand recovery is expected due to infrastructure construction
- ✓ Ongoing reorganization of electric steel furnace industry and GE capacity reduction in global scale
- ✓ Global steel demand will continue to increase 1% a year→Demand will recover in the long run

Business strategy

- **USA: Utilize expanded capacity and reduce cost by increasing sales to Japan and EU→Better profitability**
- **Omachi: Realize optimum production and sales by reducing capacity from 60,000t/y to 42,000t/y.**
- **Sichuan: Increase customer base and productivity by producing/selling additional products including stainless steel**





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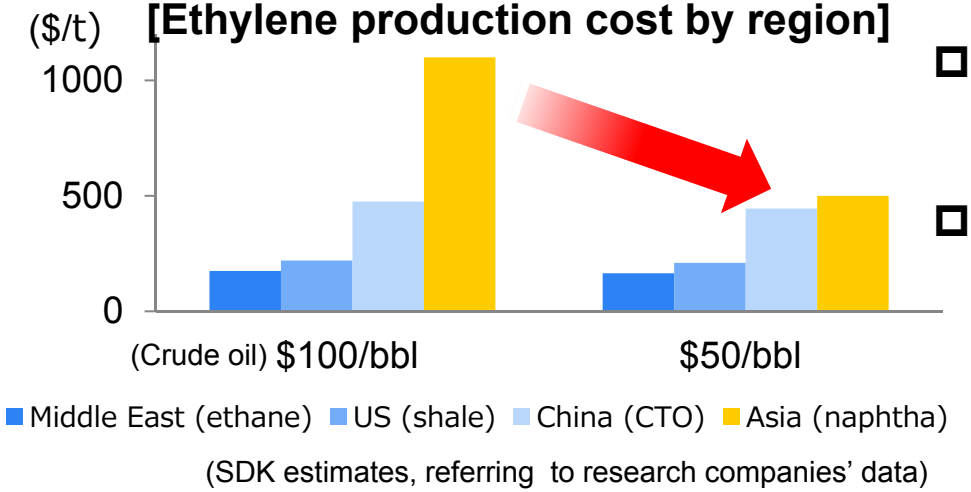
Petrochemicals

Maintain top-in-Asia competitiveness of our ethylene plant

Market analysis

- ✓ Supply-demand balance of ethylene in East Asia will remain tight until 2018
  - China: Excess of import continues in medium-term.
  - Watch market condition since petrochemical plants utilizing shale oil will start operation in U.S. from 2018
  - Propylene market will be stagnant due to establishment of new PDH plants

[Ethylene production cost by region]



(SDK estimates, referring to research companies' data)

Business strategy

- ☐ **Strengthen tie-up with neighbor companies**
  - Increase added value of products by mutual utilization of fractions
- ☐ **Strengthen in-house derivative production business in Oita Complex**
  - Increase added value (Consider launch of butadiene business with new process)
  - Keep operating rate high
- ☐ **Strengthen catalytic acetyls technology**
  - Improve productivity through development of new catalysts
- ☐ **Promote technology licensing**



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High-purity aluminum foil

Increase our global market share through development of new products and improvement in technical service we provide

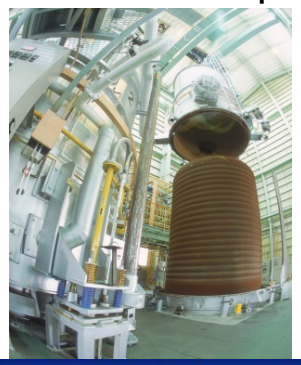
Market analysis

- ✓ Japan: Saturated market
  Demand shifts to high-end products
- ✓ China: Sluggish demand due to recession
  →Demand for capacitors will increase in medium and long term due to increase in application to new energy devices, FA equipment, home appliances, and automobiles
- ✓ Manufactures in China, who are our clients, request advanced technology, better quality, and cost reduction

Business strategy

- ☐ **Japan: Increase our share in high-end + ultra-high-end product market**
  Accelerate development of ultra-high-end products → Promote differentiation
  Function as a mother factory
- ☐ **China: Provide products meeting customer requirements**
  Achieve competitive cost reduction
  Differentiate ourselves through better technical service, performance and quality





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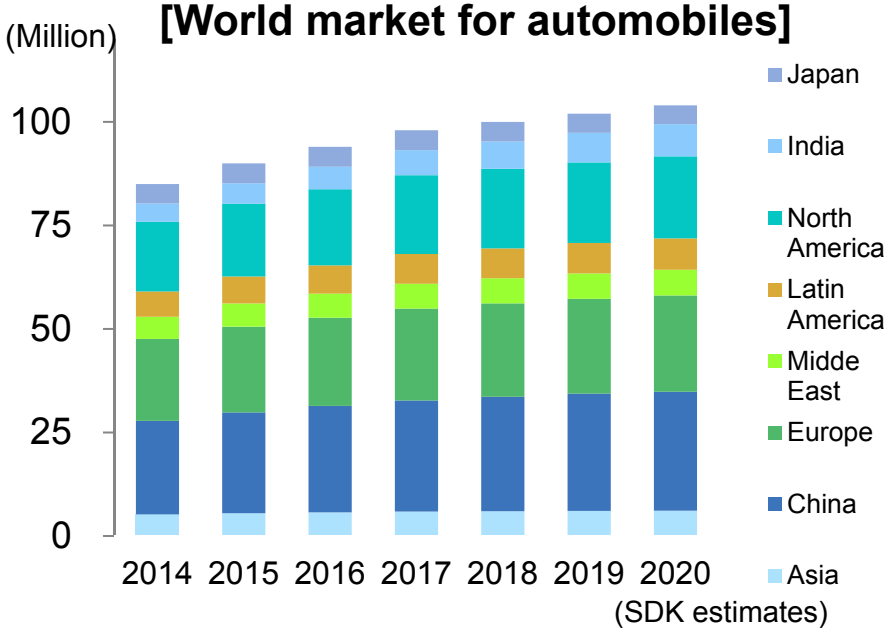
Expand business through product-weight saving and launch of eco-friendly parts, on the basis of compressor parts

Market analysis

- ✓ World automobile market grows steadily with regional differences
- ✓ Need for product-weight saving surely exists from the perspective of energy conservation and reduction of environmental burden

[World market for automobiles]



Business strategy

- ☐ **Expand business by strengthening tie-up among plants in Japan (mother factory), ASEAN, and Europe**

  Expand the plant in Malaysia
- ☐ **Market new forged products with abrasion-resistant property as early as possible**
- ☐ **Promote strategy to increase sales in Europe and North America**



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R&D strategy

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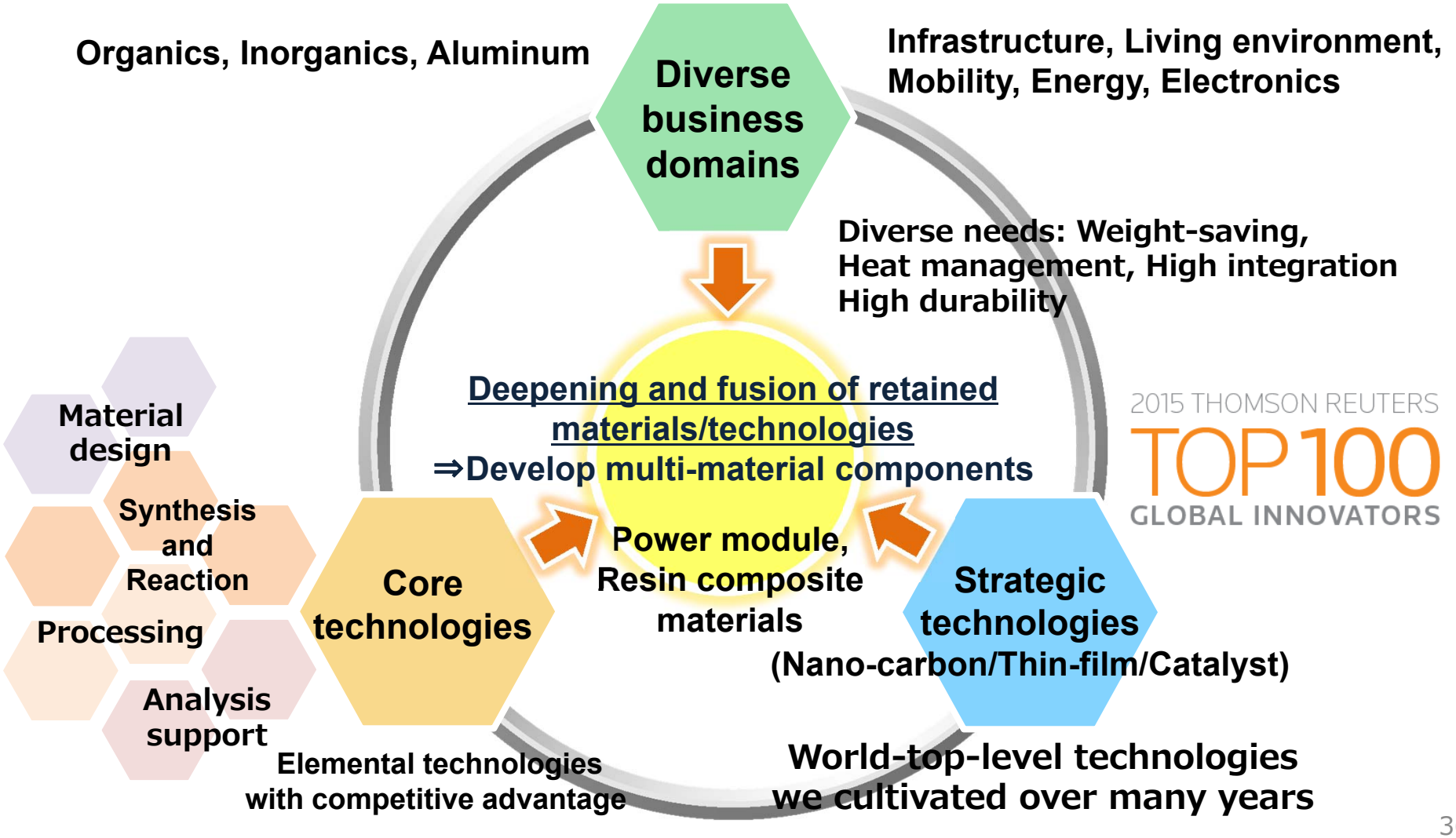
Outline of R&D strategy

Create new value by forging, polishing, and linking diverse individualized technologies



2015 THOMSON REUTERS TOP100 GLOBAL INNOVATORS

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Major themes in R&D strategy

Accelerate R&D centering on “Energy” and “Electronics”



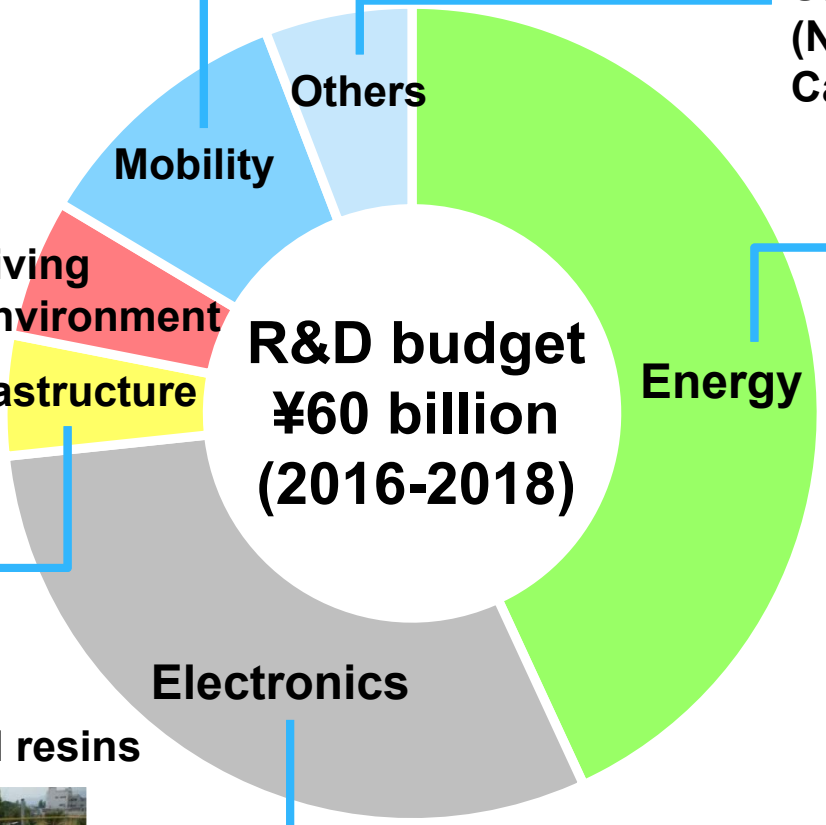
Next-generation magnetic alloy



Materials for cosmetics
Separation/refining base
Plant-cultivation system



Functional resins

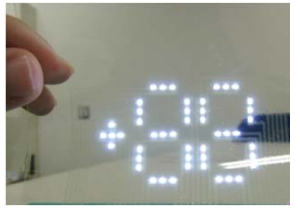


Strategic technologies (Nano-carbon/Thin-film/ Catalyst)

LIB materials
SiC epi-wafer for power devices



Printed electronics
Optical film
Functional monomers



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Multi-material Component for power modules

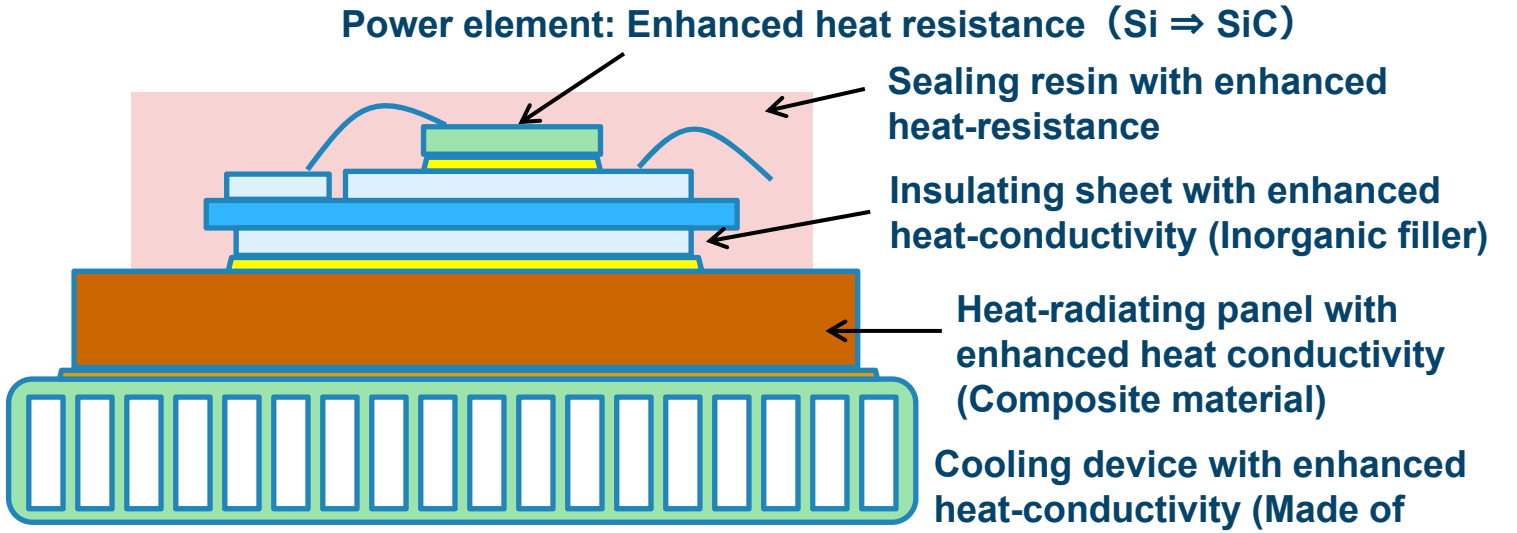
Shaping ideas for multi-material components

Market analysis

- ✓ Needs for heat-radiating solution to cope with higher-output and down-sizing
- ✓ Needs for multi-material structure component to solve material-matching issues

R&D strategy

- ☐ **Improve performance of materials in pursuit of better heat-radiating solution**
- ☐ **Focus on combination of aluminum, resins, and ceramics**



Power module

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Core technology Printed electronics

Accelerate development of core technologies and promote concurrent development of supporting/peripheral materials

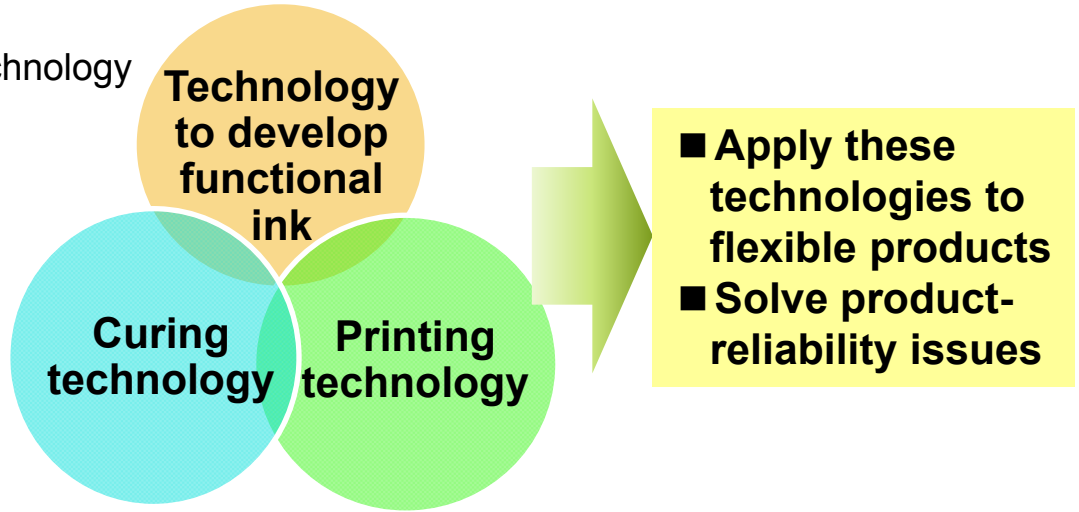
Market analysis

- ✓ Development of flexible/stretchable circuits → Customers require up-grade in printability, electric properties, durability and reliability
- ✓ Mobile displays→Market will expand to cover domains of Mobility, Infrastructure, and Living environment

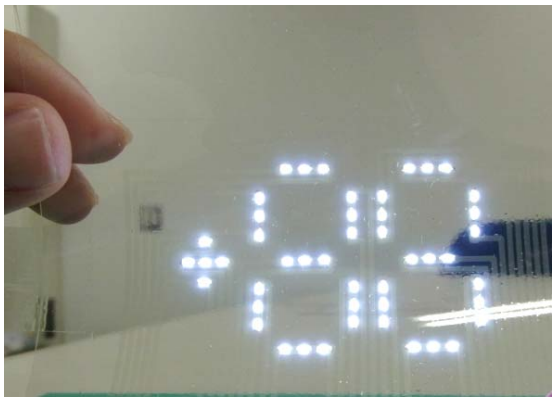
R&D strategy

- ☐ **Acceleration in application of newly developed ink to circuit production process through collaboration with printing/curing-device manufacturers**
- ☐ **Promote development of supporting/peripheral materials on the basis of core technologies**

Base technology



- ■ **Apply these technologies to flexible products**
- ■ **Solve product-reliability issues**



Example of application of transparent wiring ink

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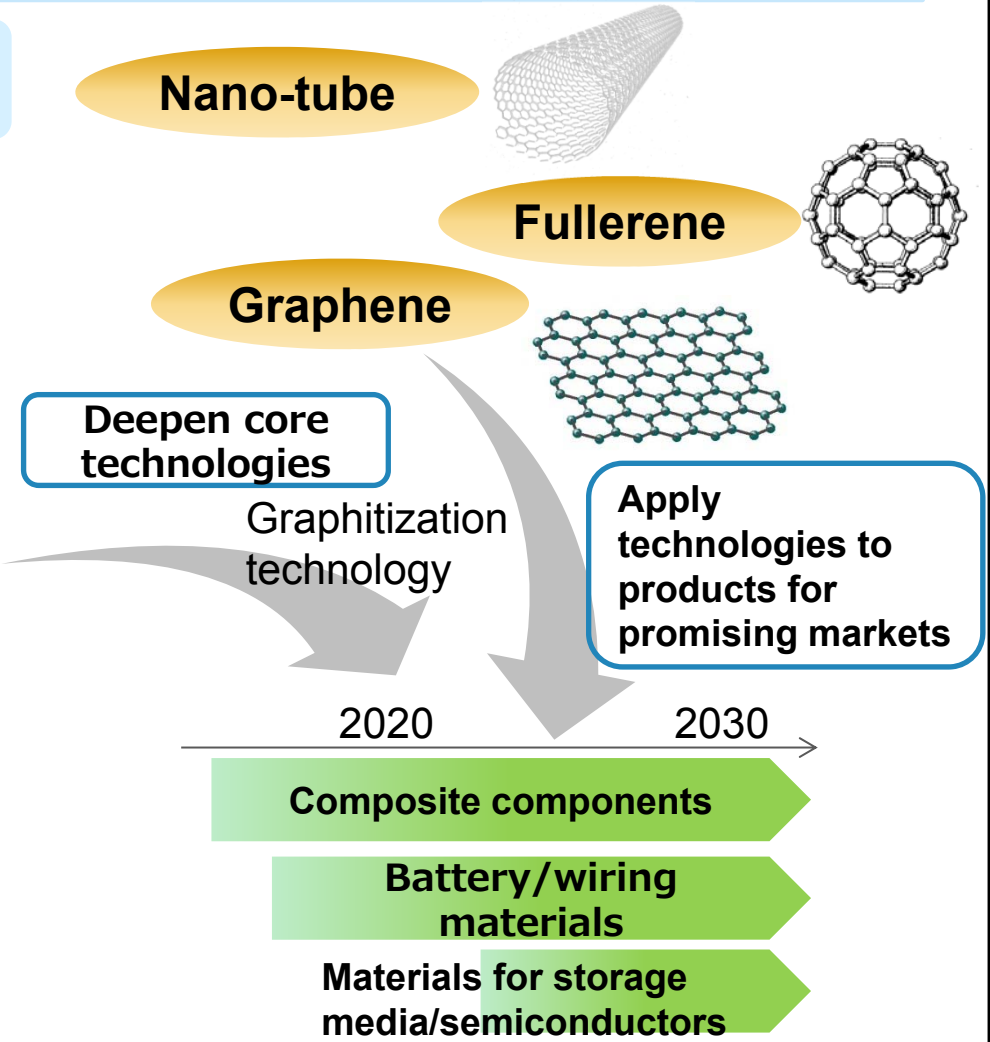
Strategic technology Nano-carbons

Deepen accumulated technologies and apply them to products for promising markets

R&D themes

- **Production process technology**
  Enhance purity, Reduce cost
  →Accelerate development of new method to produce fullerene
- **Technology to develop new functional material**
  Give new function to nano-carbons
  →Create fullerene derivatives
  Form nano-thin-film
- **Material evaluation technology**
  Establish method to evaluate nano-materials



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Final message

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Message from CEO

Safe/stable operation	**Achieve zero-accident/disaster**
Environment protection	**Realize sustainable development harmonized with global environment**
Thorough compliance	**Enforce compliance and internal control**
Strengthen corporate governance	**Strengthen supervising/surveillance functions of the management**
Reform corporate culture	**“Imagine” “Reform” “Be independent” “Pursue” “Create together”**

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Toward 2020 and beyond, Let each of us add new value.



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Notes

Performance forecast and other statements pertaining to the future as contained in this presentation are based on the information available as of today and assumptions as of today regarding risk factors that could affect our future performance. We will announce our consolidated performance forecast for 2016 when we disclose 2015 consolidated financial results.

Actual results may differ materially from the forecast due to a variety of risk factors, including, but not limited to, the economic conditions, costs of naphtha and other raw materials, demand for our products, market conditions, and foreign exchange rates. We undertake no obligation to update the forward-looking statements unless required by law.

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