NEWS RELEASE

SHOWA DENKO K.K.
13-9, Shiba Daimon 1-chome
Minato-ku, Tokyo 105-8518

December 12, 2017

Progress in 2017 and Tasks and Strategies for 2018 on the Business Plan
—The Essence of Business Strategy Briefing on "Project 2020＋"—

Showa Denko (SDK) (Tokyo: 4004) today held a conference in Tokyo to explain its management conditions for 2017 and business strategy for 2018. The essence of the briefing offered at the conference is as follows:

1. Estimated business results for 2017

   SDK announced today a revision of its earlier forecast of consolidated business results for full-year 2017 in view of the recent business trends. SDK expects that its operating income for full year 2017 will exceed the earlier forecast announced on July 24, 2017, which was ¥50 billion, and it will also exceed the target operating income for 2017 set in its medium-term business plan "Project 2020＋," which was ¥60 billion. In SDK's Petrochemicals segment, the spreads (the differences between the prices of products and raw naphtha as main material) of ethylene, propylene, etc. hover above the earlier forecast, reflecting the tight supply-demand situation in the East Asian market throughout the year and high operating rate of domestic ethylene plants. In its hard disk (HD) media business, operating income is expected to increase due to the year-round contribution of the streamlining of production capacity and cost reduction both of which we implemented in 2016, in addition to the increase in shipment volumes of HD media from that in the previous year. In its graphite electrode business, operating income is expected to exceed the earlier forecast due to high operating rate of our production facilities and the increase in shipment volumes, in addition to the sudden increase in prices of graphite electrodes in the Chinese market. (For further details, please refer to the news release "Showa Denko Revises 2017 Performance Forecast" announced today.)

   As for SDK's performance forecast for 2018, SDK will announce it simultaneously with the announcement of its 2017 financial results, which is scheduled to be in February 2018, because SDK's negotiation with customers for graphite electrodes concerning sales prices for 2018 still continues and we cannot fix the forecast of average sales prices of graphite electrodes, which will affect our 2018 performance forecast significantly. In addition, it takes time for SDK to calculate the goodwill to be posted concerning the acquisition of former SGL GE Holding GmbH and the new rate of taxation after the acquisition.

2. Progress in 2016-2017 and tasks and strategies for 2018 under “Project 2020＋”

(1) Measures taken (2016-2017)

In Growth-accelerating and Advantage-establishing businesses, SDK favorably expanded its businesses. In businesses of high-purity gases for electronics, functional chemicals, and aluminum cans, which are Growth-accelerating businesses, SDK decided and/or executed establishment or expansion of its production/sales bases, and accelerated expansion of its overseas business operations. As for Base-shaping businesses, in HD media business, we streamlined production capacity and implemented cost reduction measures. In graphite electrode business, we implemented acquisition of SGL GE Holding GmbH and, simultaneously, streamlined our domestic production capacity and took cost reduction measures. In petrochemicals business, we continued safe and stable operation of plants throughout the year, improved and maintained profitability through consolidation of polypropylene production subsidiary. As for Rebuilding businesses, we promoted structural reform in order to change earnings structure. Thus SDK steadily took measures to improve profitability, and its profitability is continuously improving. However, we are also aware that we need implementation of further steps to expand our individualized businesses.

(2) Business strategies for 2018

In the five market domains on which we focus our efforts, namely “Electronics,” “Mobility,” “Energy,” “Infrastructure,” and “Living environment,” expansions of markets are accelerating. In the market domain of “Electronics,” the spread of “Internet of things” (IoT) and “artificial intelligence” (AI), substantial increase in generated data, and progress in utilization of big data will lead to the expansion of the market for semiconductors and storage devices. Also in the market domain of “Mobility,” the need for weight reduction, downsizing, automation and electrification is increasing. It is our mission to provide these market domains with our products, technologies and services in an appropriate and timely manner. SDK will promote establishment and strengthening of individualized businesses, and execute strategic measures in each business, aiming to improve its business portfolio and increase the share of overseas sales in its net sales.

3. Measures to be taken for each business

(1) Establishment of individualized businesses

① Graphite electrodes

The global market for graphite electrodes continues to be strong due to a rise in operating rate of electric steel furnaces in the United States, the increase in demand for special steel for automotive parts, and the special procurement boom caused by the 2020 Olympic Games in Japan. Moreover, we expect that the tightening of environmental regulation in China and the progress in the reduction of graphite electrode production capacity in global scale will make the tight supply-demand situation in the global graphite electrode market continue throughout 2018. SDK’s graphite electrode production bases in Japan, the United States and China maintain high operating rates. In addition, the new graphite electrode production facility with annual production capacity of 30,000 tons established in the Showa Denko Group’s production base in the United States will start mass production at the beginning of 2018. Thus SDK will maintain stable supply of graphite electrodes to its customers.

In November 2017, SDK completed integration of its graphite electrode business with that of former SGL GE Holding GmbH. SDK will realize the effect of this business integration as early as possible, aiming to establish its position as the leading supplier of graphite electrodes in terms of production capacity, product quality and cost competitiveness. In this way, SDK will strive to realize its medium-term image of a graphite electrode manufacturer which constantly achieves operating income rate of 10% or more.

② HD media

With regard to global shipment volumes of hard disk drives (HDDs), SDK expects that those with large capacity for use in data centers will remain strong, though those for use in PCs will decrease. Thus coexistence of solid state drives (SSDs) and HDDs as storage media will continue. SDK has been pioneering development and launch of leading-edge HD media. For example, in September 2017, SDK launched 2.5-inch HD media with capacity of 1TB per platter, which is the largest in this class. SDK will continue to launch large-capacity HD media for use in data centers, develop next-generation HD media, and improve productivity, thereby supplying leading-edge HD media to the global market.

③ Lithium-ion battery (LIB) materials

The market for new-energy-driven cars including electric vehicles (EVs) and plug-in hybrid vehicles (PHVs) is expected to expand faster than the previous forecasts. In addition, the need for advanced properties of LIBs including fast charging, long-range cruising, and enhanced safety is increasing. SDK has been developing and manufacturing LIB materials that provide LIBs with such values as “high capacity, low resistance, and long life.” In 2017, SDK expanded its production capacity for *VGCF*™: carbon nanofiber added to cathodes and anodes of LIBs to improve electrical conductivity. In the future, SDK will soon launch Si-graphite hybrid anode additives, of which SDK is now evaluating samples, and promote further expansion of its *VGCF*™ production facilities, thereby responding to the need of customers.

④ SiC epitaxial wafer for power devices

SiC-based power devices are key devices for energy conservation, and the demand for them is expected to continue increasing in medium to long term. SDK has been producing SiC epitaxial wafer for power devices with top-level quality in the world. In 2017, SDK decided to acquire assets and intellectual properties concerning SiC wafers from Nippon Steel & Sumitomo Metal Group, and also decided to further expand its capacity to produce high-grade SiC epitaxial wafer marketed under the trade name of “High-Grade Epi.” SDK will continue development of technologies that promote practical use of full-SiC-based power modules, aiming to contribute to full-swing spread of SiC-based power devices.

(2) Acceleration in expansion of global business operation

① High-purity gases for electronics

The amount of high purity gases for electronics used in manufacturing of semiconductors, LEDs, etc. is increasing due to the take-off of the production of 3D-NANDs in 2017. Under these circumstances, SDK newly established and/or expanded its facilities to produce etching gases, its sales bases in North America and China, and strengthened its administrative functions for logistics, procurement,

and marketing. In 2018, SDK will continue implementation of measures including development and launch of high-value-added new gases, investment in plant and equipment, and formulation of alliances with other companies, aiming to achieve the target concerning increase in sales set under the medium-term business plan, which is 40% increase in sales by 2018 from those of 2015.

② Aluminum cans

In the East Asian markets including that of Vietnam, the demand for aluminum cans for beverages continues to increase. In 2017, SDK decided to establish its Vietnamese subsidiary's second can manufacturing plant in Da Nang City, Vietnam, and also decided to establish a joint corporation and its new plant with a leading beverage manufacturer in Thailand. In 2018, SDK will finish construction of these new plants and start to provide customers with our Group's high-quality aluminum cans. On the other hand, in the domestic aluminum can market which has already matured, our customers need further improvement in the quality of aluminum cans. Therefore, SDK will strengthen its aluminum can production system to make it further optimized for production of multiple models in smaller lots.

4. Other topics

(1) Research and development strategy

Since the establishment of "Institute for Integrated Product Development" in January 2016, SDK has been accelerating integration and harmonization of R&D activities of the Group companies under the leadership of the Institute, aiming to enhance profitability and competitiveness of the Group's existing businesses and expand the Group's business domain into promising fields surrounding our existing businesses.

With regard to the enhancement of profitability and competitiveness of existing businesses, SDK continues R&D activities which are expected to contribute to the expansion of its "individualized businesses." For example, SDK is promoting: development of technologies for realization of ammonia-based hydrogen station, which realizes easy production of hydrogen gas for fuel cell vehicles from ammonia; development of aqueous binder for anodes of LIBs; and development of repairing materials to be used in cold districts. As for the expansion of the Group's business domain into promising fields surrounding our existing businesses, for example, our customers ask SDK to provide them with high performance materials which help realization of heat solutions including thermal resistance and heat radiation. Supply of these materials for heat solutions is expected to enable our automotive industry customers to promote electrification, miniaturization, and weight reduction of cars. SDK will continue responding to our customers' needs with proposals of hybrid materials developed through combination of our aluminum, resin and ceramics products.

As for our strategic technology to produce fullerene, which is a carbon material, we will promote expansion of the range of its use and accelerate development of technologies to establish high-yield production process.

(2) Financial strategy

Our performance concerning the financial targets we set in "Project 2020＋," namely D/E ratio, free cash flow, ROA and ROE, favorably continue to surpass

these targets. In 2018, we will aim to surpass our targets concerning management indexes through continuous pursuit of improvement in profitability, efficient use of business assets, inventory reduction, etc. As for the dividend payout ratio, we will aim to achieve 30% in 2018.

(3) Next medium-term business plan

In order to contribute to sustainable growth of society, the Showa Denko Group deals with social issues through its business activities. Aiming to “contribute to the creation of society where prosperity and sustainability are harmonized,” the Group makes the most of its business portfolio, appropriately grasps values that society and customers desire, and adds peerless value to products. When we provide products, technologies, and services, we give thoughtful attention to environment and recycling of resources more than ever. In addition, we will make the Group a “stage” where each employee, who creates values mentioned above, can work lively, and we will strive continuously to keep the Showa Denko Group growing.

We plan to start formulation of our next medium-term business plan from 2019. In the next medium-term business plan, we will focus on numerical targets, aiming to promote management filled with a sense of speed, in order to cope with rapidly changing business environment, while maintaining medium- to long-term perspective.

For further information, contact:
Public Relations Office (Phone: 81-3-5470-3235)

Note: Performance forecast and other statements pertaining to the future as contained in this news release are based on the information available as of today and assumptions as of today regarding risk factors that could affect our future performance. Actual results may differ materially from the forecast due to a variety of risk factors, including, but not limited to, the economic conditions, cost of naphtha and other raw materials, demand for our products, market conditions, and foreign exchange rates.

PROJECT 2020+

Medium-term Business Plan
“Project 2020+”
Progress in 2017; Tasks and Strategies for 2018

December 12, 2017

SHOWA DENKO K.K.

Kohei Morikawa, President & CEO

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AGENDA

Ⅰ. “Project 2020+” Progress in the first half

Ⅱ. Business strategies for 2018

- SDK Group’s target market domains
- SDK Group’s target image
  1. Expansion of individualized businesses
  2. Improvement in business portfolio
  3. Increase the ratio of overseas sales
- Strategies for each business
- R&D strategy
- Toward 2018

Ⅲ. Tasks under a long term vision

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2017 performance forecast

Operating income will exceed the forecast announced in July and mid-term plan

(Billions of yen)

	2016 actual results	**2017 forecast* (July)**	**2017 revised forecast****	Increase from July forecast	2017 Project 2020＋
Net sales	671.2	**762.0**	**773.0**	+11.0	850.0
Operating income	42.1	**60.0**	**70.0**	+10.0	50.0
Ordinary income	38.7	**43.5**	**55.0**	+11.5	–
Net income attributable to owners of the parent	12.3	**21.0**	**21.0**	0	–

*Announced on July 24, 2017

**Announced on December 12, 2017

The revised forecast of 2017 net income attributable to owners of the parent remains the same as that in the earlier forecast because it takes time to scrutinize the effect of the acquisition of former SGL GE Holding GmbH (currently SHOWA DENKO CARBON Holding GmbH). SDK will announce the goodwill to be posted and administrative cost concerning the acquisition of former SGL GE Holding GmbH as soon as they become clear.

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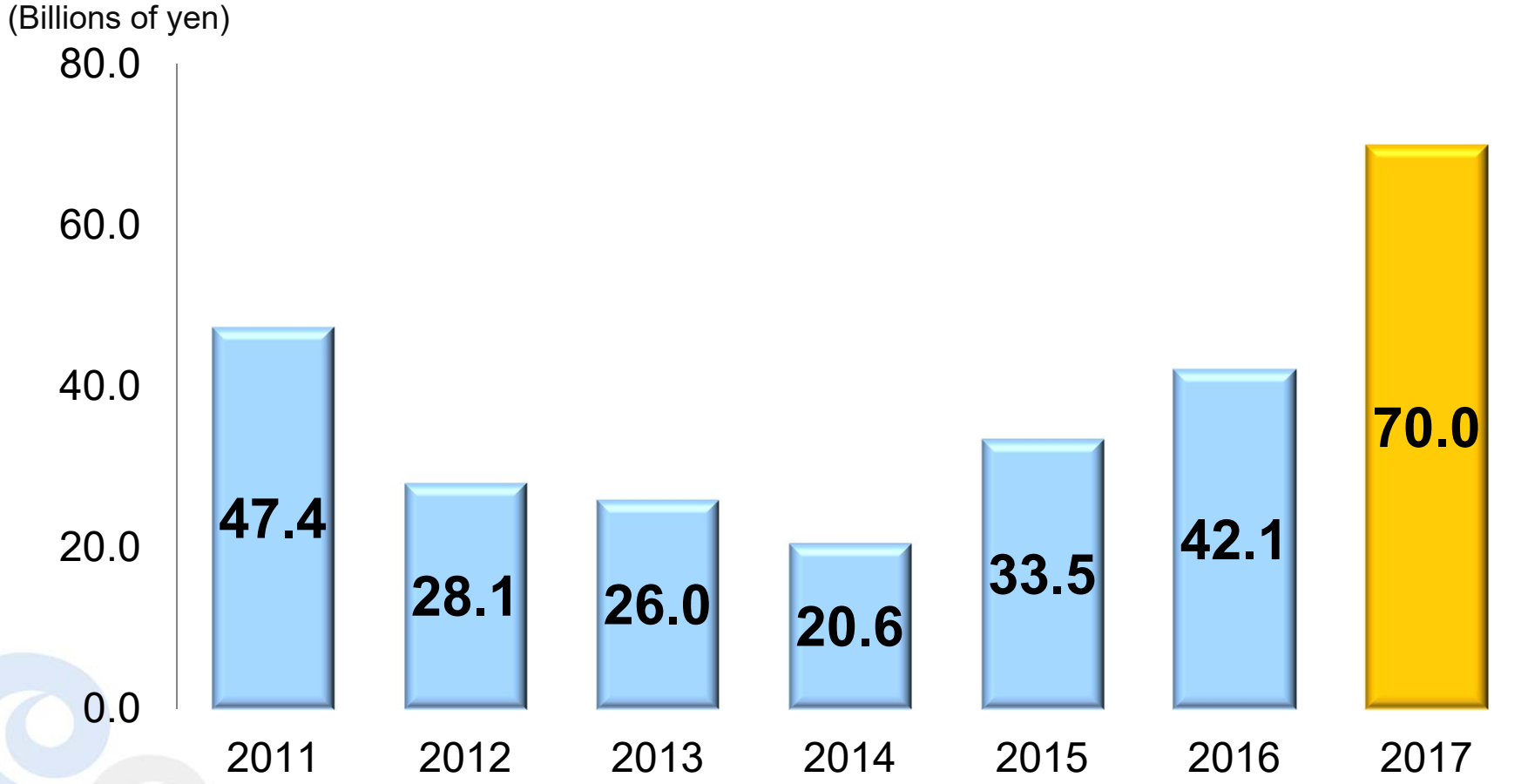
Operating income (2011-2017)

Bottomed out in 2014 ⇒ It will exceed ‘17 earlier forecast of ¥60 billion



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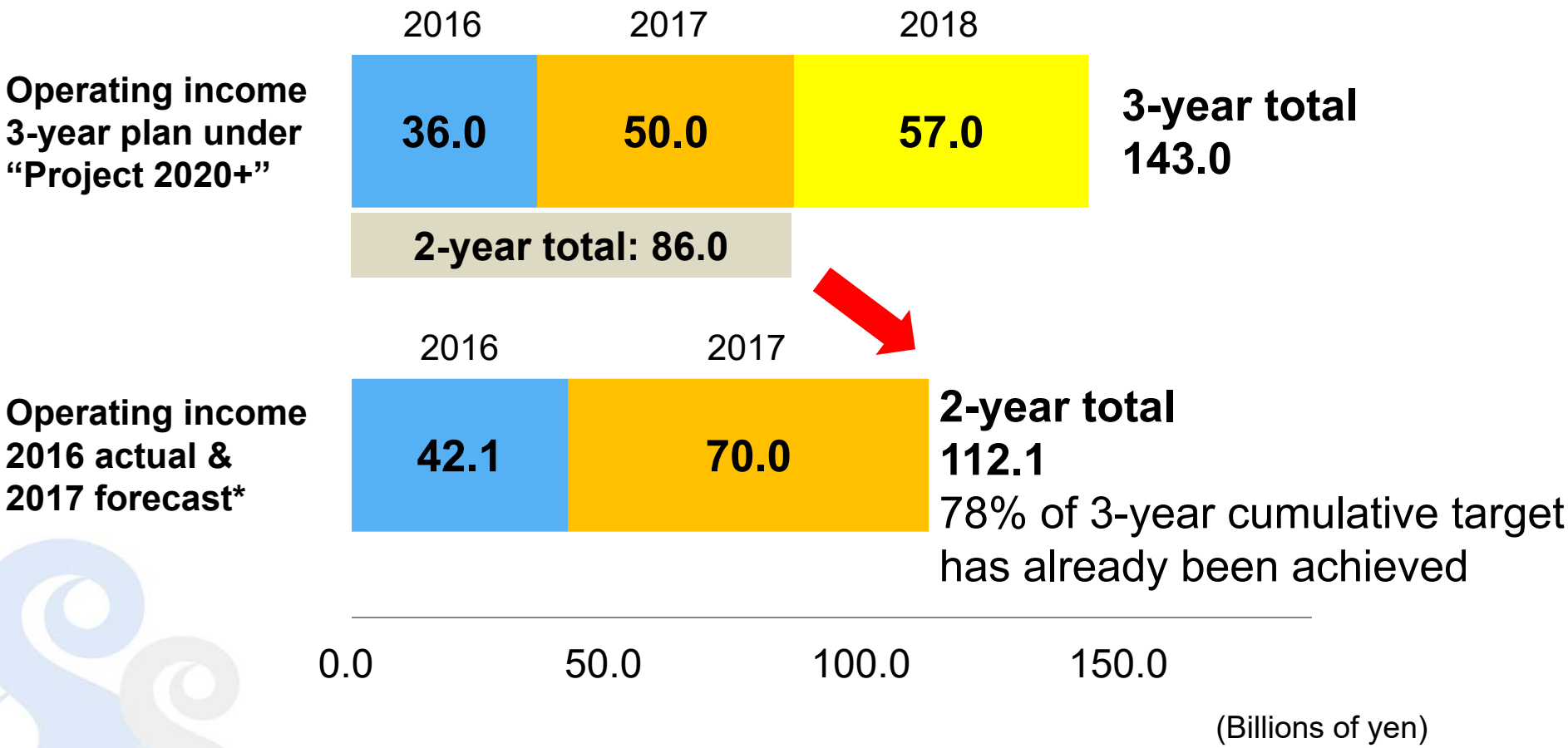
Actual operating income vs. 3-year plan

Measures successfully improved profitability ⇒
3-year cumulative target will be achieved earlier than we planned



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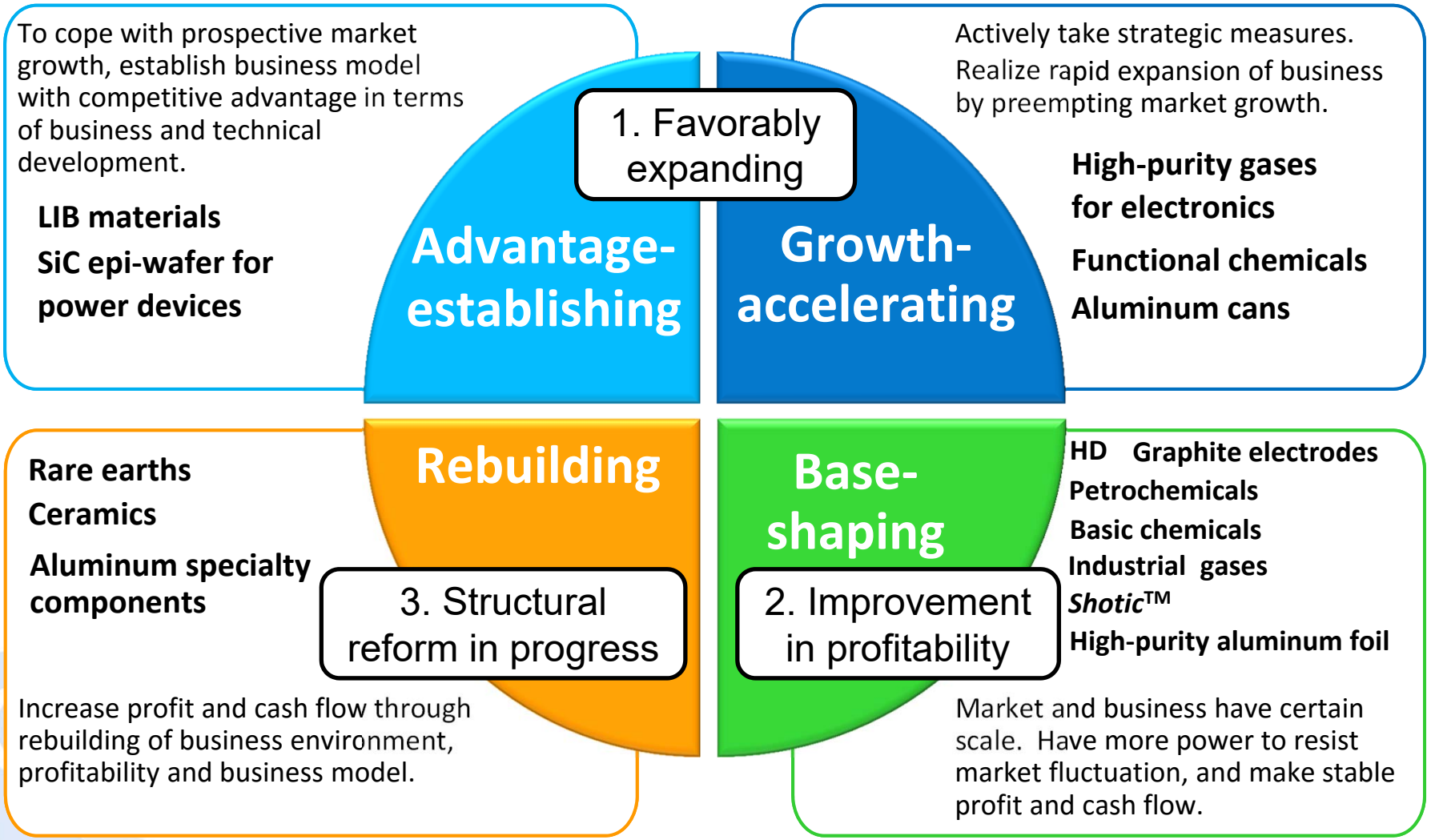
Improvement in business portfolio



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1. Business expansion: Growth-accelerating & Advantage-establishing businesses (’16-’17)

Growth-accelerating businesses

☐ High-purity gases for electronics

- ✓ Responded to the spread of 3D-NAND
- ✓ Expanded production capacity and overseas bases

☐ Aluminum cans

- ✓ Decided to establish 2nd base in Vietnam and new base in Thailand

☐ Functional chemicals

- ✓ 2nd BMC plant in China (Zhuhai) started operation



High-purity gases for electronics

Advantage-establishing businesses

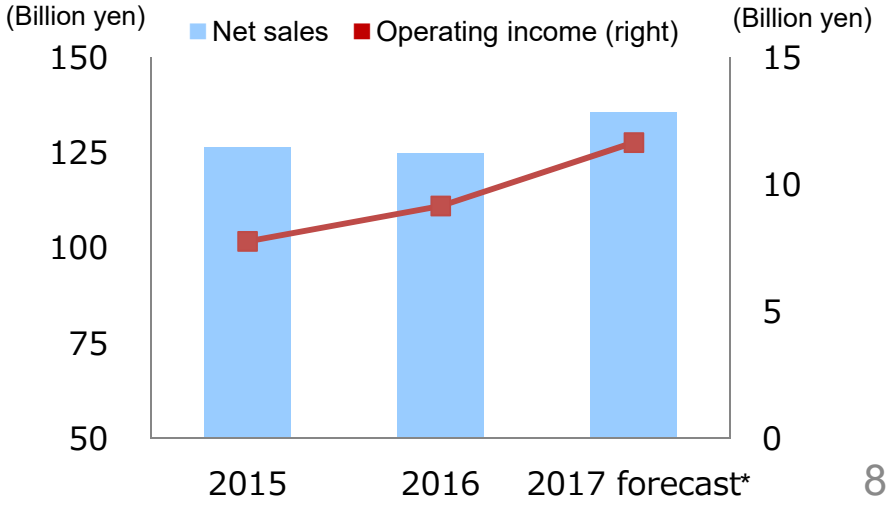
☐ LIB materials

- ✓ Expanded capacity to produce *VGCF*™ and *SCMG*™

☐ SiC epi-wafer for power devices

- ✓ Expanded High-Grade Epi production capacity
- ✓ Acquired technical assets from Nippon Steel & Sumitomo Metal Group

【Sales and operating income of Growth-accelerating and Advantage-establishing businesses】



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2. Improved profitability: Base-shaping businesses (’16- ’17)

☐ HD

- ✓ Streamlined production capacity
- ✓ Cost reduction

☐ Graphite electrodes

- ✓ Acquired SGL GE Holding GmbH
- ✓ Streamlined production capacity
- ✓ Cost reduction (Renewal of hydro power plants)

☐ Petrochemicals

- ✓ Consolidated SunAllomer

☐ Basic chemicals and industrial gases

- ✓ Improved profitability
- ✓ Revised prices

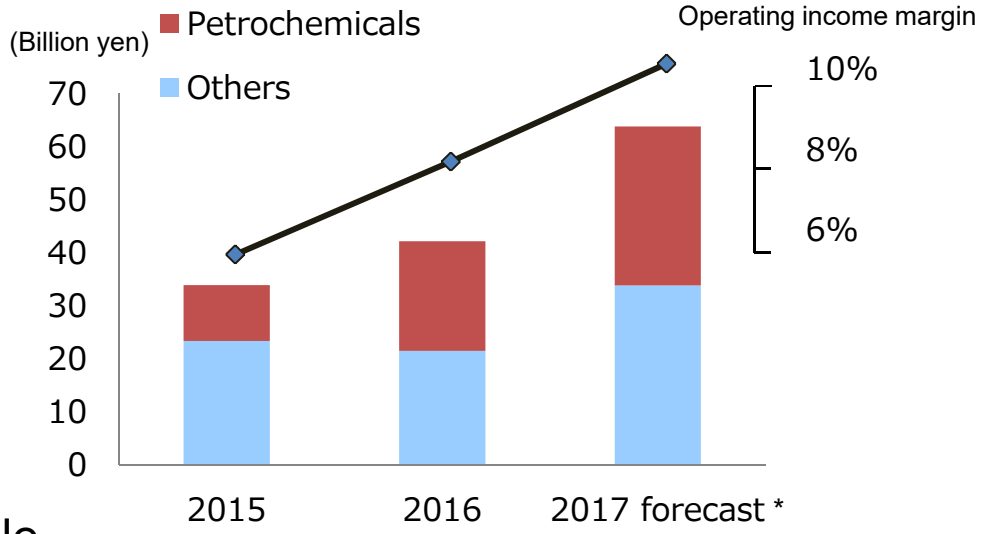
☐ High-purity aluminum foil

- ✓ Increased sales of new grade products
- ✓ Made Chinese subsidiary profitable



[Oita Plant, SunAllomer Ltd.]

【Operating income of Base-shaping businesses】



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3. Structural reform in progress: Rebuilding businesses (’16-’17)

☐ Ceramics

✓ Withdrawal from ICA and general-purpose alumina
⇒ Focus on high-value-added products

☐ Aluminum specialty components

✓ Integrated production bases of *SHOTIC*™ (Malaysia)

✓ Reduced fixed costs in domestic bases

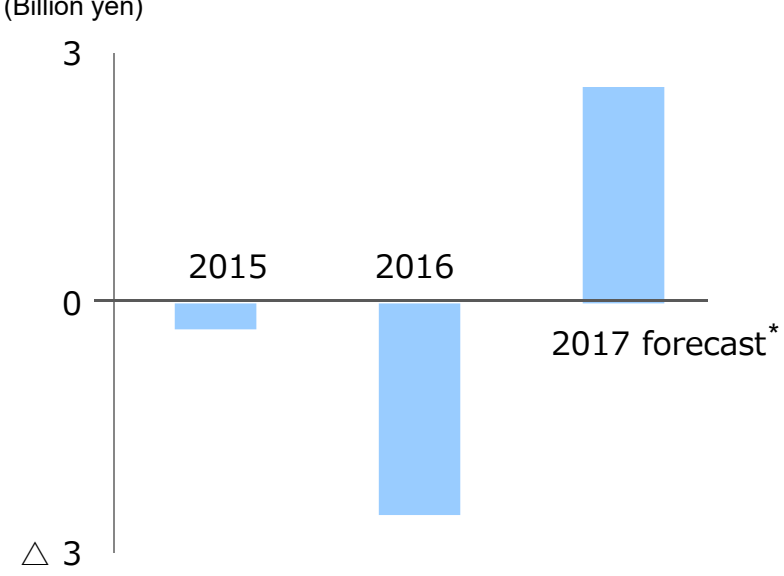
☐ Rare earths

✓ Reduced fixed costs and inventories in all bases



[Titanium oxide for MLCC]

【Operating income of Rebuilding businesses】



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Ⅰ. “Project 2020+” Progress in the first half

Ⅱ. Business strategies for 2018

SDK Group’s target market domains

SDK Group’s target image

1. Expansion of individualized businesses
2. Improvement in business portfolio
3. Increase the ratio of overseas sales

Strategies for each business

R&D strategy

Toward 2018

Ⅲ. Tasks under a long term vision

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SDK Group's target market domains

Recovery in all market domains; Focus on promising markets

Automobiles: Spread of EVs; weight saving; automatic driving
Railways: Replacement demand for railcars

Spread of IoT and big data
⇒Expansion of semiconductor related market and storage market





Mobility



Electronics



Energy

Expansion of battery market
Takeoff of SiC-based power devices
Spread of solar power generation



Infra-structure

Normalization of steel market
Increase in demand for infrastructure

Living environment

Spread of IoT (Smart house)
Lowering environmental burden

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SDK Group's target market domain: EVs

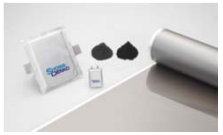


Electrification

- **SiC epitaxial wafer for power devices**



- **Lithium ion battery materials**



- **High-purity aluminum foil for aluminum electrolytic capacitors**



- **Filler for heat radiation**



Weight saving Down sizing

- **Aluminum specialty components**



- **Polypropylene**



- **Thermosetting bulk molding compound**



- **Rare earths**



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SDK Group's target market domain: Spread of IoT & big data

Expansion of semiconductor related market and storage market

SiC epitaxial wafer for power devices





Filler for heat radiation

Reduction of power loss in electronic devices





HD media

High-purity gases for electronics







Infrared LEDs

Sensors (Iris recognition, security camera)





Titanium oxide for ceramic capacitors

High-purity aluminum foil for electrolytic capacitors



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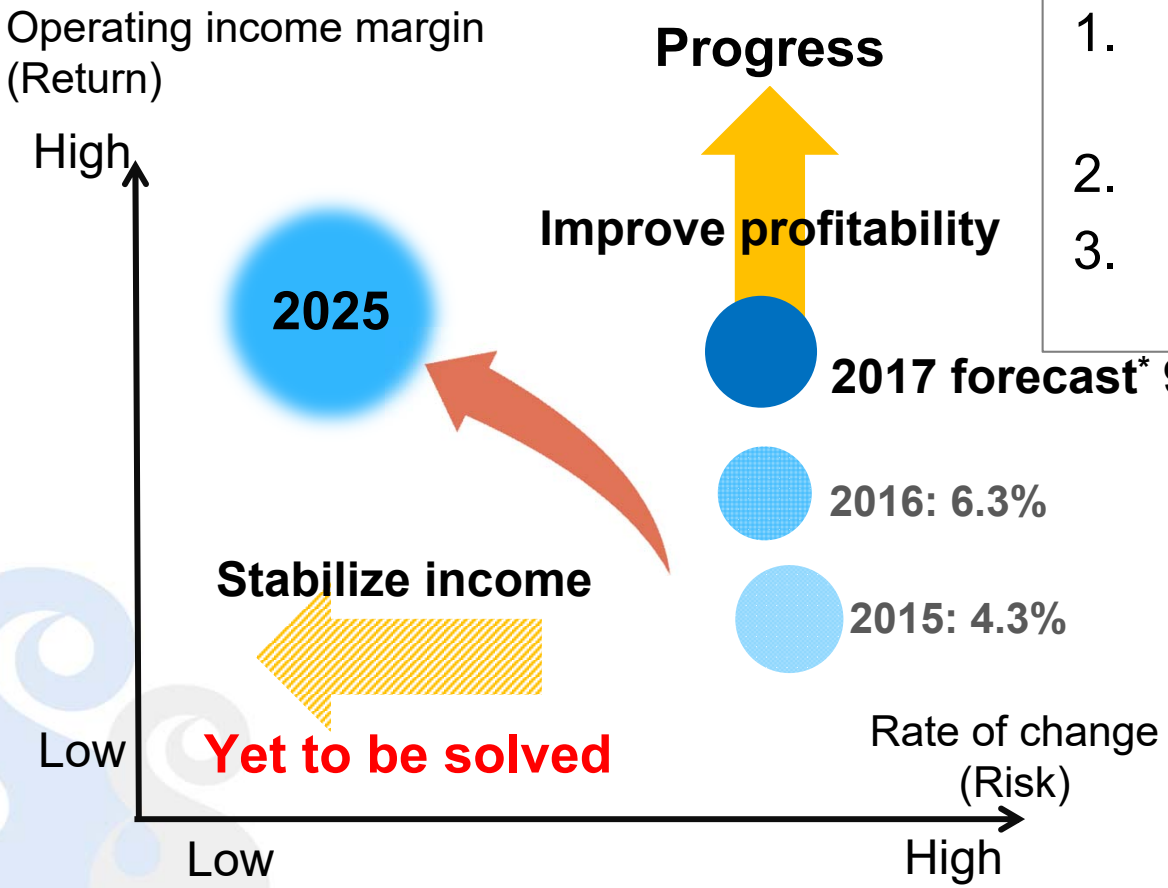
SDK Group's target image

Took measures in promising markets, profitability improved
We will take measures to stabilize income further ⇒
Expand individualized businesses



Measures to stabilize income

1. Expand individualized businesses
2. Improve business portfolio
3. Increase the share of overseas sales

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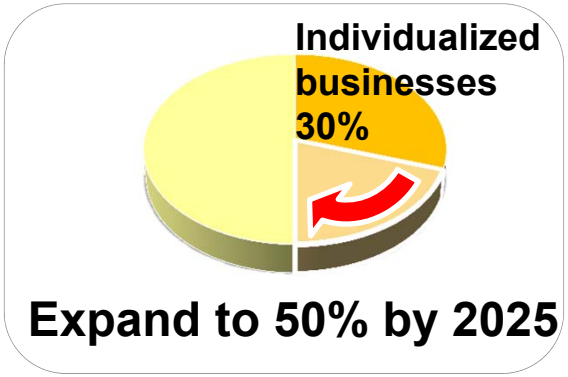
1. Expansion of individualized businesses

Put a process in motion to expand business toward 2020

☐ Requirement for “individualized businesses”

Businesses with sustainable high-profitability and stability

- ✓ Operating income margin: 10% or more
- ✓ Operating income: several billions of yen or more
- ✓ Tolerance to income fluctuation and environmental changes



☐ Basic strategies to develop “individualized businesses”

- ✓ Secure top share in market of a scale of tens or hundreds of billions of yen
- ✓ Focus on the markets with appropriate scales for the strength of the Group

⇒ Establish “firm presence” with original technologies

Businesses with global top shares	HD media	High purity gases for electronics	Graphite electrodes
Market scale	¥400 billion	¥150 billion	¥300~500 billion
SDK’s market share	25%	25%	More than 30%

*In the global HD media market, SDK holds top market share as independent manufacturer.
Market scales and shares are SDK’s estimate.

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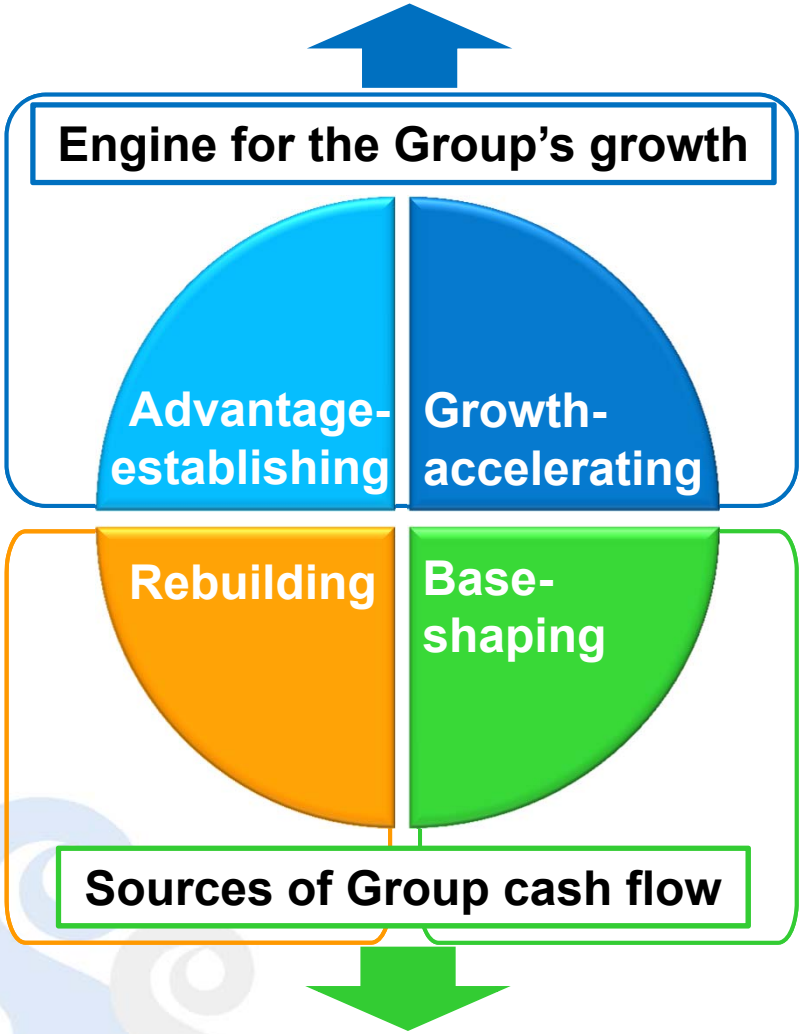
2. Business portfolio: Tasks for the future

Accelerate growth through efficient use of cash



Support growth with stable income

Growth-accelerating/ Advantage-establishing

Overseas business expansion

2017 net sales: Up 7% from 2015

Develop new growth businesses of the Showa Denko Group

Organized growth

Alliance

M&A

Base-shaping

Cost reduction

Strengthen business base

2017 operating income margin:

10% or more (up 7 points from 2015)

Current revenue base of the SDK Group

Cost reduction

Strengthen base

Rebuilding

Optimize business domains

2017 operating income margin:

4% (turned into black in 2017)

Focus on profitable business fields and withdraw from unprofitable businesses

Optimize business domains

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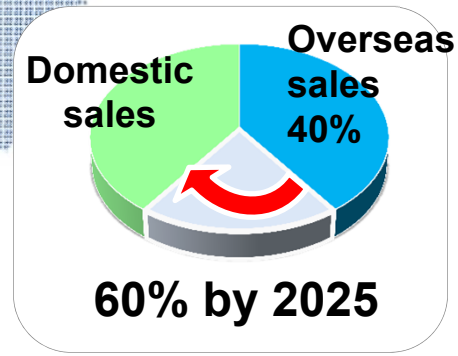
3. Increase the ratio of overseas sales

Overseas expansion of business bases in Growth-accelerating and Base-shaping businesses

New/expanded business bases under "Project 2020+"

【Ratio of overseas sales】
Goes up to a little less than 50% by 2018



Globalization of operation progresses in graphite electrode, high-purity gases for electronics, and aluminum can businesses

- High-purity gases for electronics
- Functional chemicals
- Aluminum cans
- Graphite electrodes
- Petro-chemicals
- High-purity aluminum foil
- SHOTIC™

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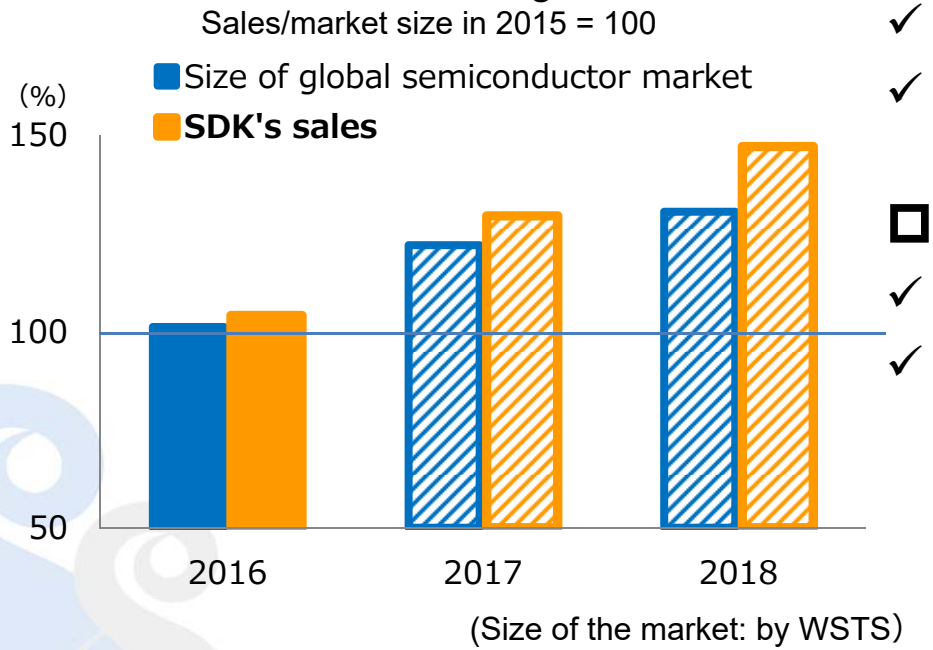
High-purity gases for electronics

Realize sales growth faster than market growth through overwhelming supply power

- ✓ Boom in the semiconductor & display industries continues
- ✓ Forwarded capital investment by electronics manufacturers, centering on 3D-NAND production

【SDK's sales and size of global market】



(Size of the market: by WSTS)

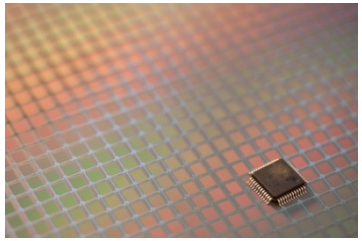
【SDK's strategy】

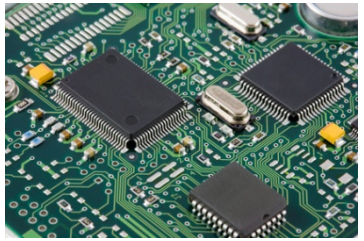
☐ Expand production capacities

- ✓ Accelerate capacity expansion for etching gases, etc.
- ✓ Promote overseas production
- ✓ Launch new products
- ✓ Start operation of new JV plant in South Korea (CH_3F)

☐ Expand overseas sales bases

- ✓ Start commercial operation of US base
- ✓ Establish 3rd base in China (Wuhan)





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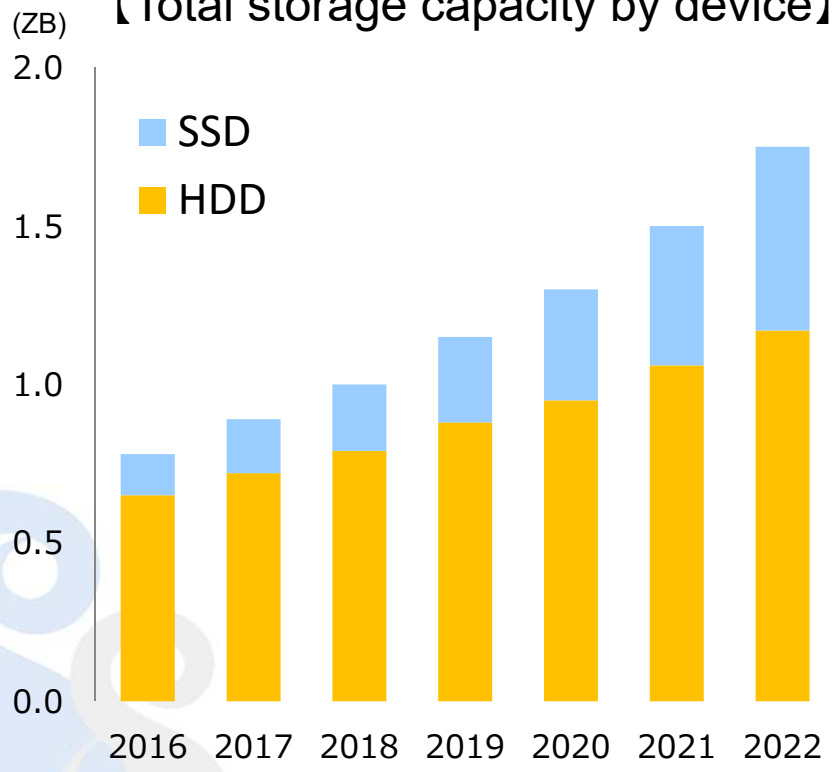
HD media

Demonstrate leadership in technology, Pursue “Best-in-Class”

✓ Progress in IoT increases demand for storage devices for dada centers

⇒Coexistence of HDD & SSD continues

【Total storage capacity by device】



(The total storage capacity od shipped devices, SDK’s estimate)

【SDK’s strategy】

☐ Develop leading-edge media

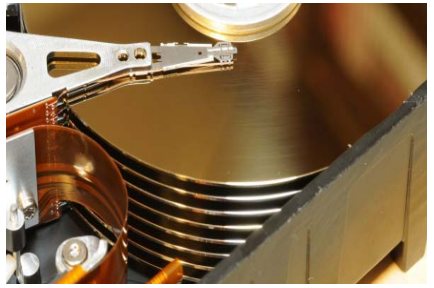
✓ Launch large-capacity media for data centers (3.5-inch, 1.5~1.8TB/platter)

✓ Accelerate development of next-generation media (HAMR/MAMR)

☐ Cost reduction

✓ Improve productivity

✓ Integration of operation of substrate section and media section completed in all bases



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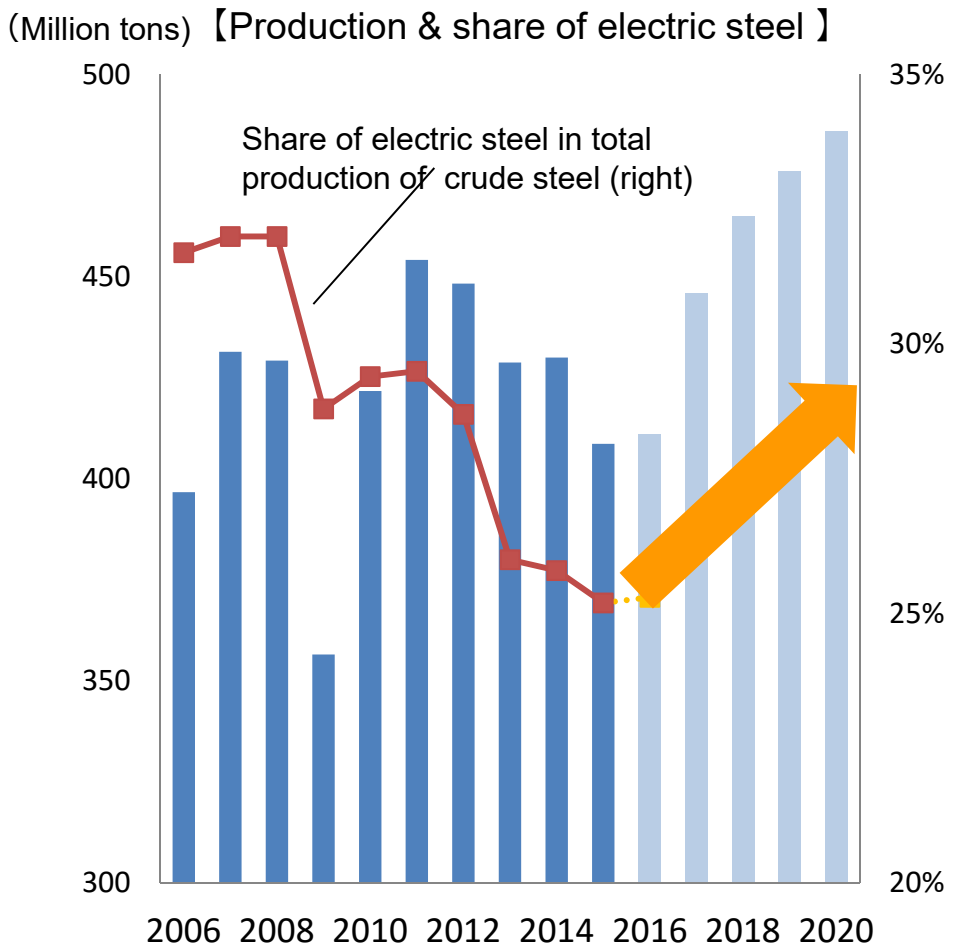
Graphite electrodes (1) Market environment

Supply-demand balance of GE becomes tight

- ✓ Condition of steel market
  - North America: strong demand
  - China: Surplus of production capacity is scaling down
  - ⇒ Production of electric steel increases
    (Environmental regulation, Disuse of ground steel)
  - ASEAN: Operating rate of electric furnaces recovers
  - ⇒ Increased demand for GE
- ✓ Graphite electrode industry
  - Reduced UHP production capacity:
    ′13 950,000t/y ⇒ ′18 780,000t/y
  - Needle cork (raw material):
    Supply-demand balance becomes tight



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Graphite electrodes (2) Post-acquisition strategy

Acquisition of SGL GE Holding GmbH*

【Acquisition of SGL GE Summary】

Estimated total enterprise value**	Total: €350 M (about ¥40 billion***) US subsidiary sold: $150 M (¥16.4 billion***)
Sale price of shares	Total: ¥15.6 billion (including advisory fee) US subsidiary sold: $117 M (¥12.9 billion**)
Schedule	Resolution by the boards: Sept. 28, 2017 Acquisition of shares in SGL GE: Oct. 2, 2017 Transfer contract signed on Oct. 2, 2017 US subsidiary transferred on Nov. 7, 2017
Impact on business results	B/S,P/L,CF will be consolidated from 4Q 2017 Impact of acquisition of SGL GE and transfer of its business in the US on SDK's 2017 financial results will be announced as soon as evaluation of SGL GE's assets is completed. The amount of "Goodwill" will be announced as soon as it is fixed.

【SDK's strategy】

☐ **Change graphite electrode business into individualized business**

✓ SDK Group's GE plants in Japan, US and Europe run at full capacity

✓ Newly added plant in US (30,000t/y) will start mass production soon

☐ **Implementation of post-acquisition measures**

✓ Final cost reduction effect will be ¥4 billion/y
It will be gradually realized, starting from 2018

- Enhance cost competitiveness trough sharing of best practices
- Reduce administrative cost though integration
- Establish optimized global supply chain
- Establish advantage in product quality and brand power through fusion of technologies

*Currently SHOWA DENKO CARBON Holding GmbH
**Total enterprise value was announced on Oct. 20, 2016. Value of US business was announced on Sept. 28,2017.
***Based on exchange rates of ¥115 to the euro and ¥110 to the dollar.

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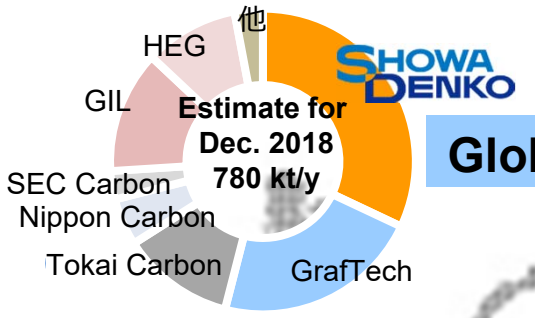
Graphite electrodes (3) Post-acquisition global system



Global market share 32%

Europe, CIS, Middle East, Africa

Wiesbaden
Meitingen
Steeg
La Coruna

Capacity in EU
90 kt/y

Japan, China, Asia Pacific

Omachi
Tokyo
Sichuan
Banting

Capacity in Asia
85 kt/y

North, Central, and South America

Ridgeville

Capacity in US
75 kt/y

SDK will establish well balanced production systems in major markets: 250 kt/y

Office Plant

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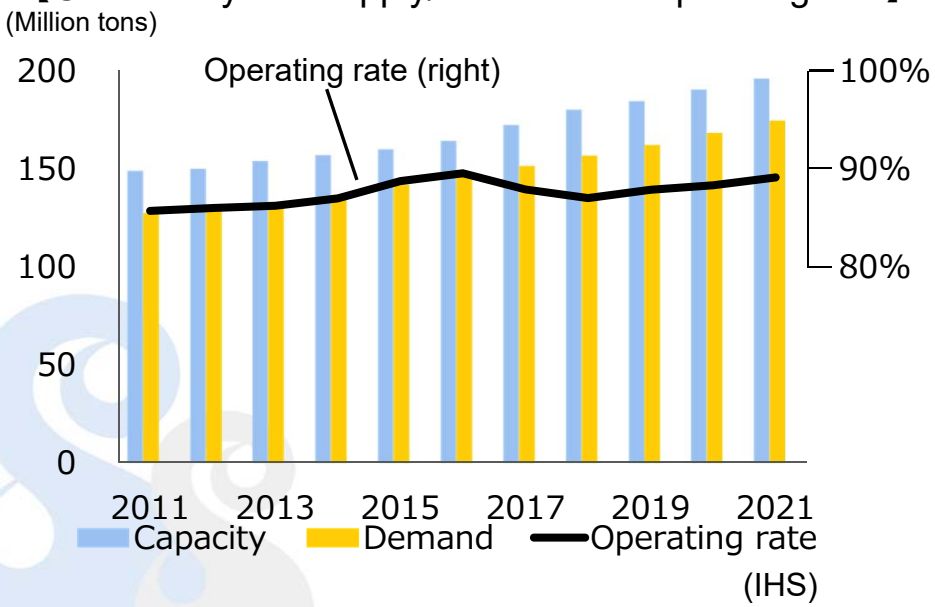
Petrochemicals

Operate Oita Complex at full capacity after 2018 regular maintenance

- ✓ Strong demand in Asia
- ✓ Additional ethylene plants in North America (150 Mt × 2 plants)
- ✓ In 2018, many plants in East Asia will have regular maintenances (SDK: Mar.-Apr.)

  ⇒Tight supply-demand balance in 2018

【Global ethylene supply/demand and operating rate】



【SDK's strategy】

- ☐ **Maintain safe and stable operation and improve efficiency under high operating rate**
- ☐ **Strengthen lineup of derivatives**
- ✓ Strengthen lineup of environment friendly solvents

  Ethyl acetate: Improve catalyst, Increase production

  NPAC: Expand production capacity
- ✓ Develop new derivatives

  (Aim to start mass production in 2020)

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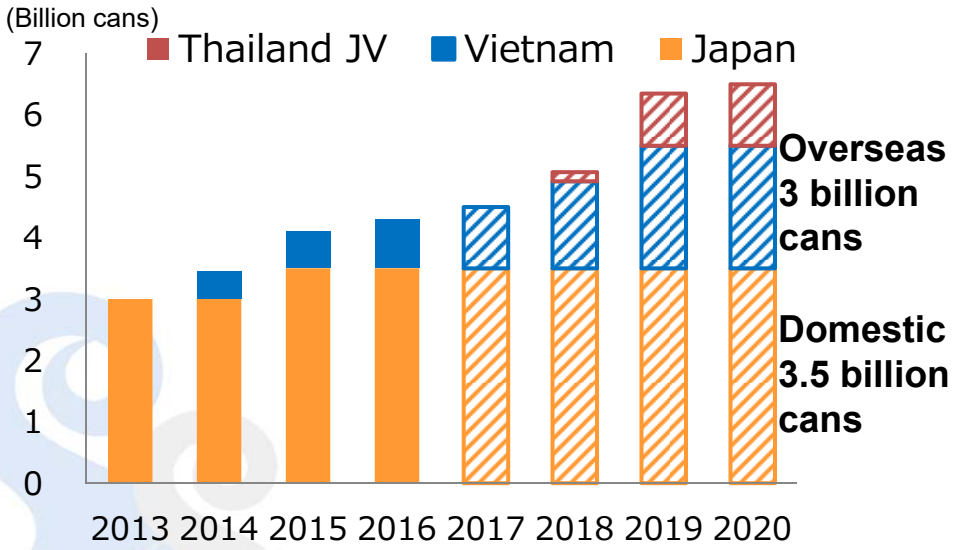
Aluminum cans

Aggressive investment in the growing ASEAN market

- ✓ Overseas: Southeast Asian market grows 9% a year
- ✓ Domestic: Stable market scale
  Wide variety of tastes

【Aluminum can production by SDK Group】



【SDK's strategy】

- ☐ **Overseas: Expand market share with advantages in quality**
- ✓ New/additional lines will start operation
- ✓ Consider further expansion of production facilities
- ☐ **Domestic: Create new market with original technologies**
- ✓ Develop superfine printing technology and grasp needs for small-lot production of multiple products



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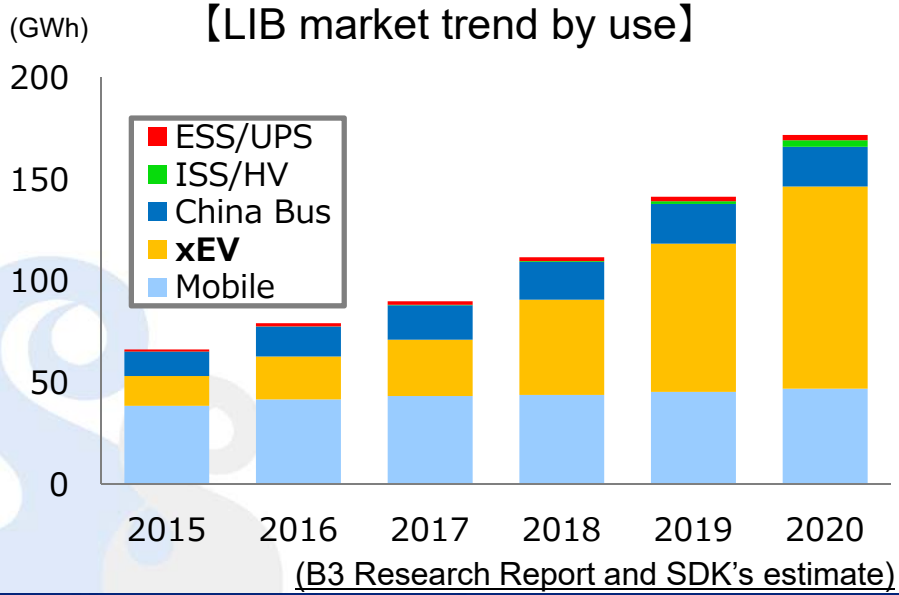
Lithium ion battery (LIB) materials

Pursue properties of “large capacity, low resistance and long life” Cultivate xEV markets

- ✓ Stricter exhaust gas control in many countries stimulates xEV (EV, HV, PHV, FCV) markets
- ✓ Demand for LIBs with quick-charge capability, longer cruising distance and enhanced safety expands
- ✓ Uncertainty about subsidy policies

【LIB market trend by use】

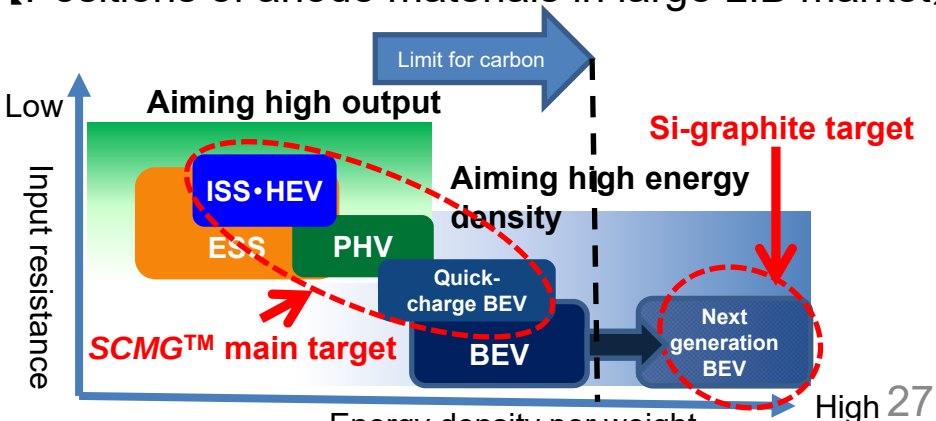


(B3 Research Report and SDK’s estimate)

【SDK’s strategy】

- ☐ **Develop new products**
- ✓ *SCMG*™ (anode material)
- ✓ Start test production & sale of Si-graphite composite anode material
- ✓ *SPALF*™ (packaging material): Develop products for large LIBs
- ☐ **Strengthen production system**
- ✓ *VGCF*™ (electrical conductivity enhancer): Consider to re-expand production capacity

【Positions of anode materials in large LIB market】



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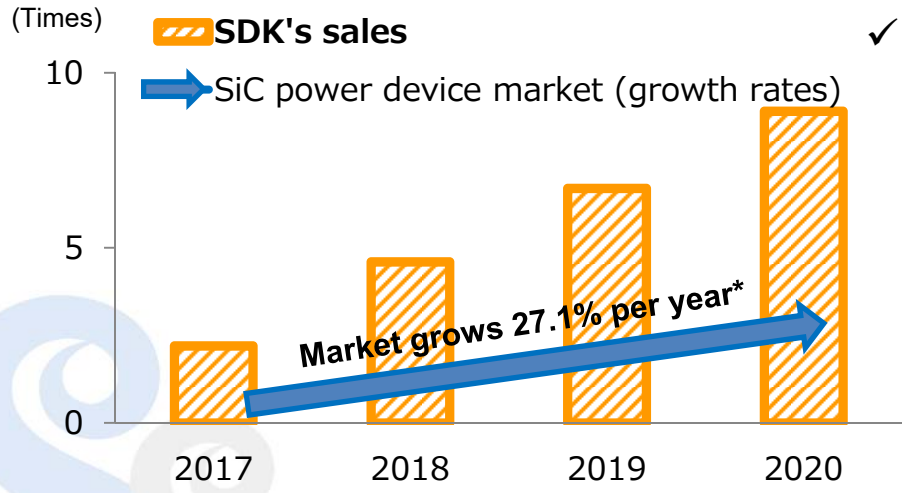
SiC epitaxial wafer for power devices

SDK leads market evolution with high-grade epi-wafer

- ✓ Acceleration in investment for mass production of SiC-based devices
  - ⇒ Shift to large-diameter wafer
- ✓ On board use will take off in 2021
  - ⇒ Increasing need for reliability

【SDK's SiC epi-wafer business】

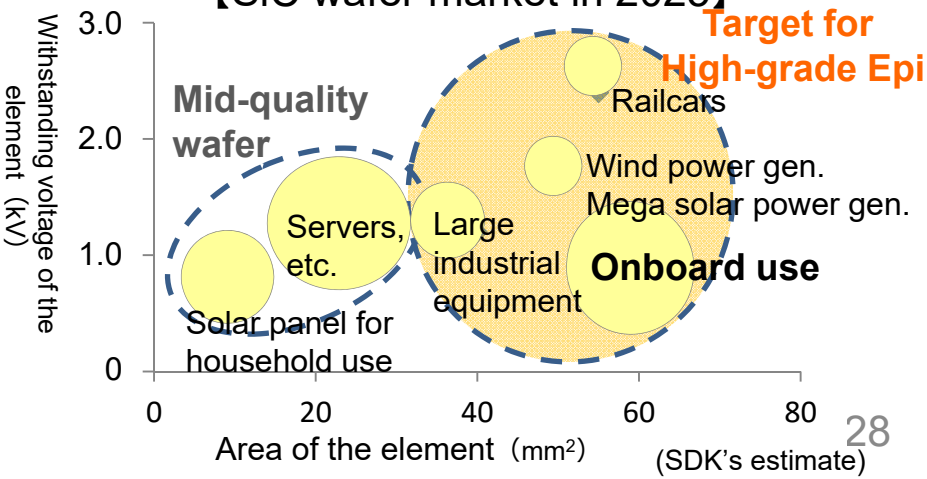


(Fuji Keizai "Outlook for the market of next generation power devices, power electronics and related products, 2017")
*Average of market growth from 2016 to 2020.

【SDK's strategy】

- □ **Strengthen production system**
- ✓ Will establish 5,000 wafers/month production system in April 2018
- ✓ Continue to expand production capacity
- □ **Accelerate R&D**
- ✓ Lower defect rate further to contribute to the reduction in device production cost
- ✓ Realize effect of acquisition of technical assets from Nippon Steel & Sumitomo Metal Group

【SiC wafer market in 2025】



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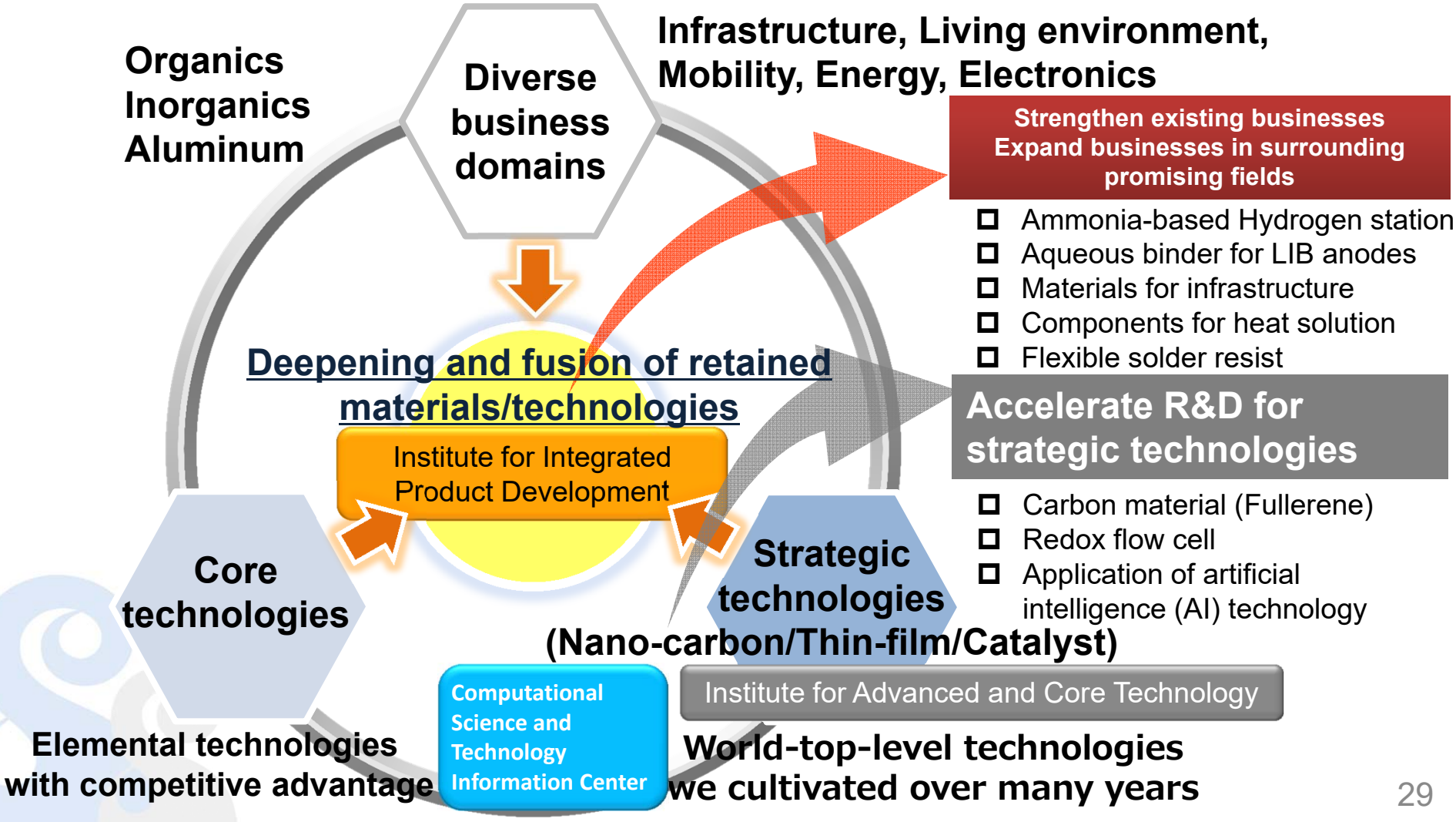
R&D strategy (1) Overall strategy

Fuse various needs into cross-divisional themes, deepen them, and offer new value



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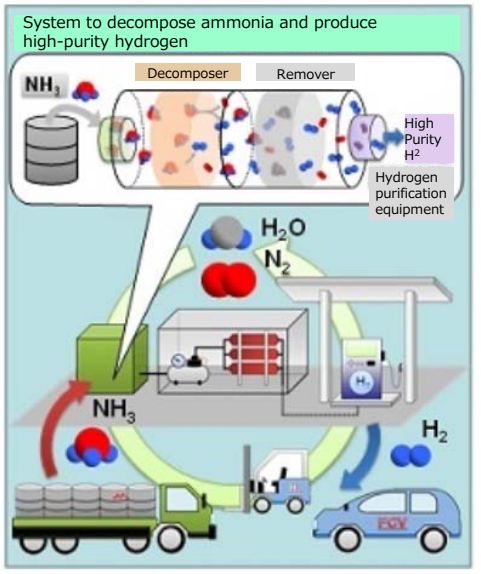
R&D strategy (2) Strengthen existing businesses Expand individualized businesses

Demonstrate high-value-added products and realize profit in 2018

☐ Ammonia-based hydrogen station

Mobility | Energy

- ✓ Successfully developed practical system first in the world*
- ✓ Demonstration of system starts

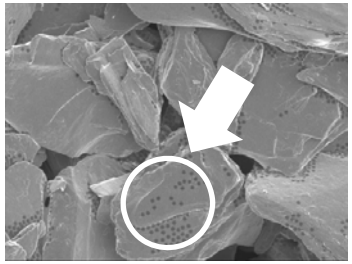


[Ammonia-based hydrogen station]

☐ Aqueous binder for LIB anodes

Electronics | Energy

- ✓ Original polymer structure realizes low resistance and long life
- ✓ Accelerate R&D to realize high output and high withstanding voltage binder to be used in LIBs for EVs



[Aqueous binder on the surface of graphite]



[Aqueous binder (emulsion)]

☐ Repairing materials to be used in cold weather

Infrastructure

- ✓ NETIS** registration completed
- ✓ Implemented trial applications
- ✓ Increase number of application examples, and start full-scale marketing



[Trial application of material to repair wet surfaces]
Higashi-nagahara (Asahi dam waterway)
Repair work to stop water leakage through concrete wall

* Strategic Innovation Creation Program hosted by the Cabinet Office
** New Technology Information System operated by the Ministry of Land, Infrastructure, Transport and Tourism

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R&D strategy (3) Surrounding promising field/heat solution

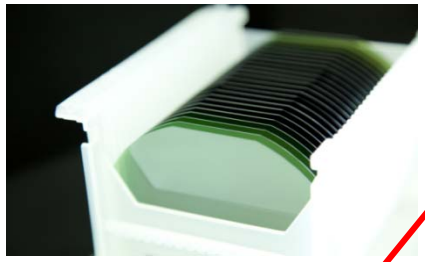
Beyond fusion and deepening of technologies, go to the next stage

- Give high-performance properties to materials, and propose heat solutions
- Propose hybrid materials developed thorough combination of our aluminum, resin and ceramics products

→Trial use for evaluation by customers starts

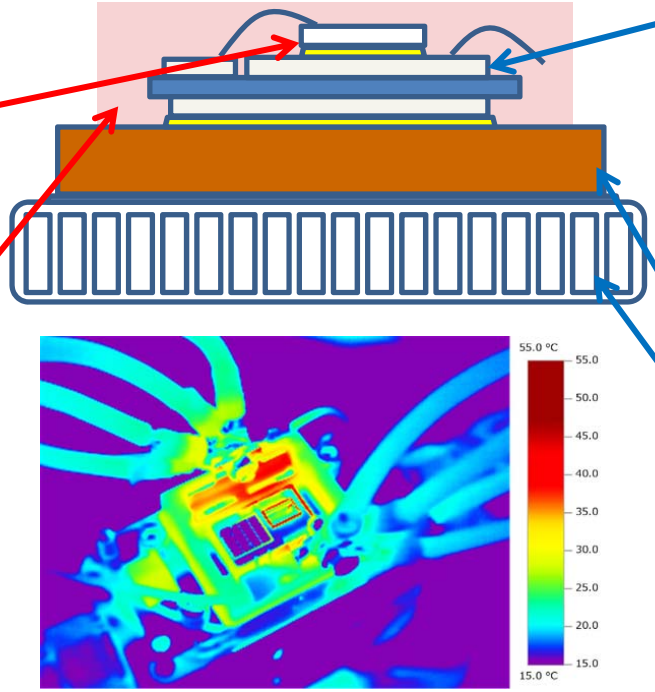
Enhanced heat resistance

Power element: SiC epi-wafer



Sealing resin with enhanced heat-resistance

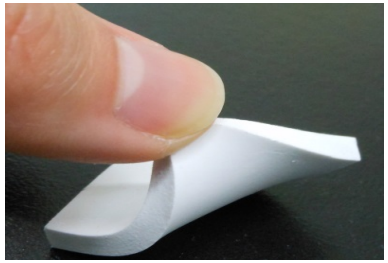




Heat generation analysis of a module

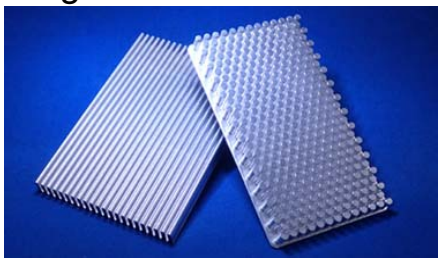
Enhanced heat radiation

Insulating sheet: Inorganic filler



Application example: Silicon sheet for heat radiation

Heat-radiating panel:
Cooling device:



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R&D strategy (4) Strategic technology/Carbon material “Fullerene”

- **Expand the range of use of fullerene by enhancing special features and strengthening technologies**
- **Establish top-level production system in the world, and aim to realize stable supply of high-quality fullerene**
- **Control its behavior, and challenge to reveal new features and create new products**

☐ **Understanding and effective use of fullerene**

✓ Establish technique to control dispersion and analyze

☐ **Mass production of “fullerene”**

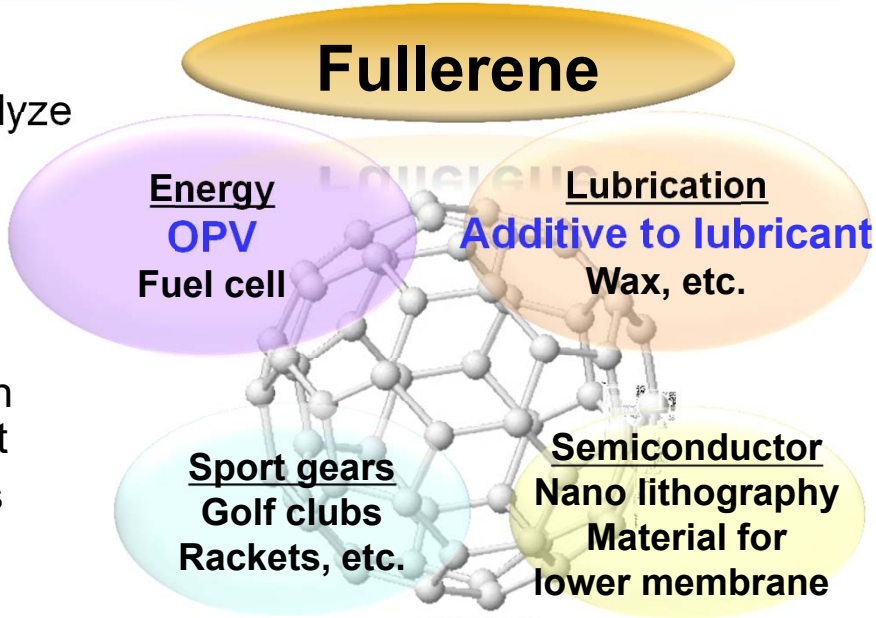
✓ Already verified high-yield production method

✓ Start to establish mass production system

☐ **Uses**

✓ Progress in application as composite material with high withstanding voltage and additive to lubricant

✓ Application to organic photovoltaic panel (OPV) is accelerated





[Fullerene products]

Widely used for energy saving purposes

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Toward 2018

☐ Performance forecast for 2018

✓ We will announce it simultaneously with 2017 financial results, which is scheduled to be in February 2018.

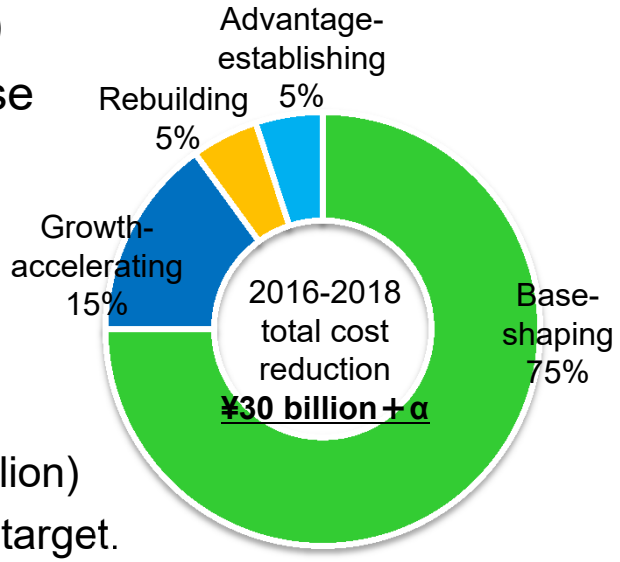
⇒ Because our negotiation with customers for sales prices of graphite electrodes for 2018 is going on, and the “Goodwill” to be posted concerning the acquisition of SGL GE and calculation of the new tax rate has not been finished yet.

☐ Special factors in 2018

✓ Petrochemicals: Periodic shutdown maintenance of Oita Complex once in every 4 years (Mid March to the end of April)

✓ Chemicals: Sales of electronic chemicals will increase

✓ Inorganics: The effect of business integration with SGL GE* will realize. Graphite electrode market will be stronger.



☐ Cost reduction

✓ 3 year total: Original target = ¥20 billion (Revised to ¥30 billion)

⇒ We will achieve cost reduction in excess of the revised target.

*Currently SHOWA DENKO CARBON Holding GmbH

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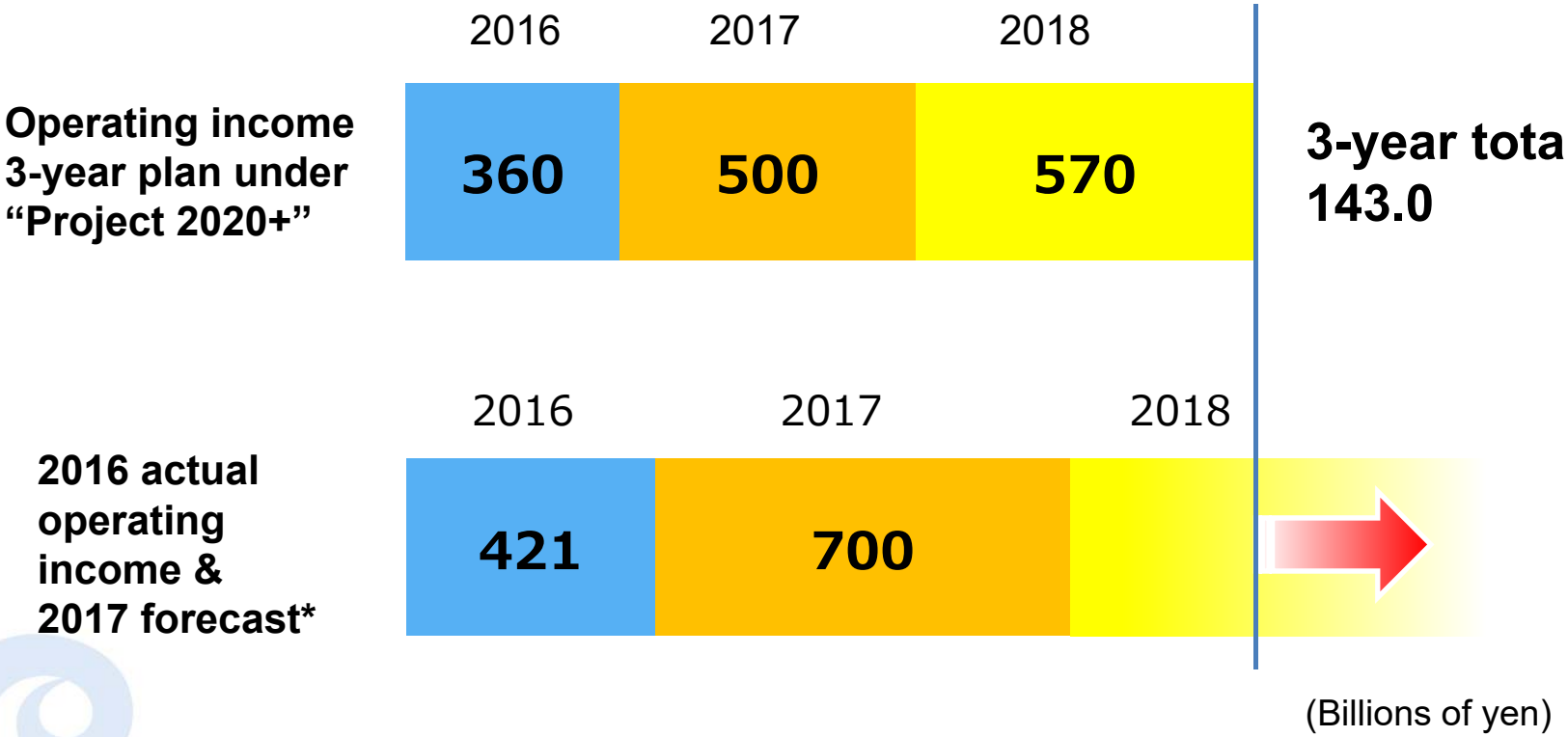
Cumulative operating income

We will achieve target operating income under “Project 2020+” in excess of it



*2017 forecast was announced on December 12, 2017

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Capital investment plan

We will execute strategic investment in "Growth-accelerating" and "Advantage-establishing" businesses

Growth-accelerating

- **Aluminum cans:** Expand production lines in Vietnam and Thailand
- **High-purity gases for electronics:** Expand capacities of bases at home and abroad
- **Functional chemicals:** Increase sales in Asia

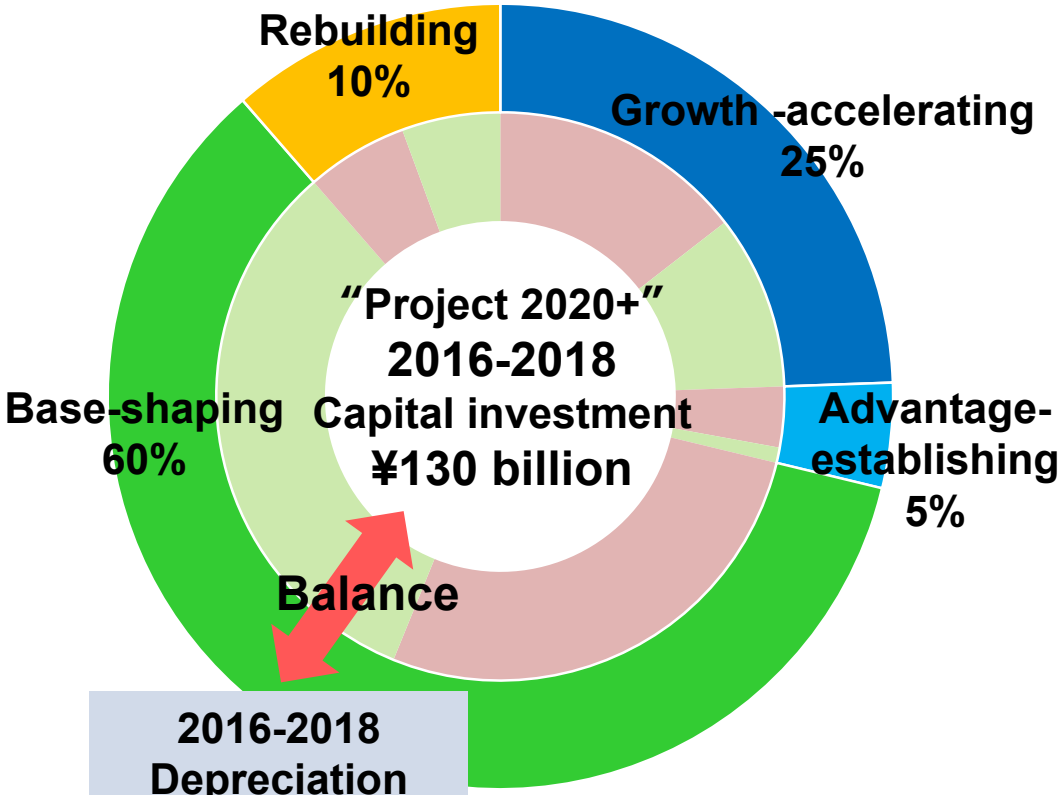
Advantage-establishing

- **LIB material:** Expand capacities
- **SiC epi-wafer for power devices:** Increase production of large-diameter epi-wafers

Base -shaping

- **HD:** Keep ahead of others in next-generation technologies
- **Graphite electrodes:** Increase production in US
- **Petrochemicals:** Strengthen cooperation with surrounding complexes

2018 forecast
Capital investment: ¥42 billion
Depreciation: ¥40.5 billion



2016-2018
Depreciation
¥130 billion

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Major financial targets and financial strategy

☐ “Project 2020＋” financial targets

Item	2018 target
D/E ratio (gross)	1.0 times
Free cash flow	¥68 billion （2016-2018 total）
ROA （Operating income/Total assets）	6.0%
ROE	9.0%

⇒ We will aim to achieve 2018 targets in excess of them

☐ Return to shareholders

We will aim to achieve payout ratio of 30% in 2018

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Ⅰ. “Project 2020+” Progress in the first half
Ⅱ. Business strategies for 2018
SDK Group’s target market domains
SDK Group’s target image
1. Expansion of individualized businesses
2. Improvement in business portfolio
3. Increase the ratio of overseas sales
Strategies for each business
R&D strategy
Toward 2018

Ⅲ. Tasks under a long term vision

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Our ESG efforts through business activities & products

We aim to contribute to the creation of society where prosperity and sustainability are harmonized, through our business activities and products

【SDK Group's environment friendly products (examples)】

Resource recycling	Ammonia, Hydrogen (Chemical recycling of used plastics) Aluminum cans (We produce aluminum cans from used ones) Graphite electrodes (Parts used to recycle scrap iron)
Energy	SiC epi-wafer for power devices（Reduces power loss in power devices） LIB materials (Reduce need for recharging through realization of LIBs with high-capacity, low resistance and long life) Hydrogen (To be used in fuel cells)
Safety & Security	Sodium hypochlorite (Sterilizes drinking water) N-propyl acetate (NPAC: It substitutes volatile organic compounds (VOC) as solvent for ink)



【ESG indexes for investment into which SDK is incorporated】

MS-SRI
As of Dec 2017

FTSE4Good

FTSE Blossom Japan

Member of SNAM Sustainability Index 2017

MSCI 2017 Constituent MSCI Japan ESG Select Leaders Index

MSCI 2017 Constituent MSCI Japan Empowering Women Index (WIN)

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Formulation of next medium-term business plan

Showa Denko Group for all stakeholders' satisfaction

"Post Project 2020+" (Tentative name; To be announced in Dec. 2018)

☐ Pursue value for customers (Expand individualized businesses)

We create value for customers, making the most of our business portfolio

☐ Pursue value for society

We contribute to realization of sustainable society and solution of social issues through execution of our original efforts

- Pay close attention to the viewpoints of ESG, SDGs, etc.
- Promote diversity management further

☐ Change the period of medium-term business plan

We will change the period of our medium-term management plan to three years in order to speed up the management in the Group.

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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 2018 when we disclose 2017 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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