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

Ⅱ. Business strategies for 2018

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  1. Expansion of individualized businesses
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Strategies for each business
R&D strategy
Toward 2018

Ⅲ. Tasks under a long term vision
Operating income will exceed the forecast announced in July and mid-term plan

<table>
<thead>
<tr>
<th></th>
<th>2016 actual results</th>
<th>2017 forecast (July)</th>
<th>2017 revised forecast</th>
<th>Increase from July forecast</th>
<th>2017 Project 2020+</th>
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<tbody>
<tr>
<td>Net sales</td>
<td>671.2</td>
<td>762.0</td>
<td>773.0</td>
<td>+11.0</td>
<td>850.0</td>
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<tr>
<td>Operating income</td>
<td>42.1</td>
<td>60.0</td>
<td>70.0</td>
<td>+10.0</td>
<td>50.0</td>
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<tr>
<td>Ordinary income</td>
<td>38.7</td>
<td>43.5</td>
<td>55.0</td>
<td>+11.5</td>
<td>-</td>
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<tr>
<td>Net income attributable to owners of the parent</td>
<td>12.3</td>
<td>21.0</td>
<td>21.0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

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

Operating income (2011-2017)

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

(Billions of yen)

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual results</th>
<th>Forecast*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>47.4</td>
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<tr>
<td>2012</td>
<td>28.1</td>
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<tr>
<td>2013</td>
<td>26.0</td>
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<td>2014</td>
<td>20.6</td>
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<td>2015</td>
<td>33.5</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>42.1</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>70.0</td>
<td></td>
</tr>
</tbody>
</table>

*Announced on December 12, 2017
Measures successfully improved profitability ⇒
3-year cumulative target will be achieved earlier than we planned

Operating income
3-year plan under “Project 2020+”

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>3-year total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>36.0</td>
<td>50.0</td>
<td>57.0</td>
<td>143.0</td>
</tr>
</tbody>
</table>

2-year total: 86.0

Operating income
2016 actual & 2017 forecast*

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2-year total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>42.1</td>
<td>70.0</td>
<td>112.1</td>
</tr>
</tbody>
</table>

78% of 3-year cumulative target has already been achieved

*Announced on December 12, 2017
I. “Project 2020+” Progress in the first half

**Improvement in business portfolio**

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

**Advantage-establishing**

1. Favorably expanding

   - 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

**Growth-accelerating**

2. Improvement in profitability

   - 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.

3. Structural reform in progress

   - Rare earths
   - Ceramics
   - Aluminum specialty components

   Increase profit and cash flow through rebuilding of business environment, profitability and business model.
I. “Project 2020+” Progress in the first half


**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

**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】

(Billion yen)

<table>
<thead>
<tr>
<th>Year</th>
<th>Net sales</th>
<th>Operating income (right)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>2016</td>
<td>125</td>
<td>15</td>
</tr>
<tr>
<td>2017 forecast*</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

*Announced on Dec. 12, 2017
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

---

**[Operating income of Base-shaping businesses]**

(Billion yen)

- Petrochemicals
- Others

- Operating income margin
  - 10%
  - 8%
  - 6%

- 2015: 20
- 2016: 30
- 2017 forecast: 40

*Announced on Dec. 12, 2017*
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

---

**Graph: Operating income of Rebuilding businesses**

- 2015: 0 billion yen
- 2016: 0 billion yen
- 2017 forecast*: 3 billion yen

*Announced on Dec. 12, 2017

[Titanium oxide for MLCC]
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
Recovery in all market domains; Focus on promising markets

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

**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

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

**Living environment**
- Spread of IoT (Smart house)
- Lowering environmental burden

Ⅱ . Business strategies for 2018

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
II. Business strategies for 2018

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

- Aluminum specialty components
- Polypropylene
- Thermosetting bulk molding compound
- Rare earths
II. Business strategies for 2018

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

Expansion of semiconductor related market and storage market

- Infrared LEDs: Sensors (Iris recognition, security camera)
- SiC epitaxial wafer for power devices
- Filler for heat radiation: Reduction of power loss in electronic devices
- HD media
  - High-purity gases for electronics
- Titanium oxide for ceramic capacitors
- High-purity aluminum foil for electrolytic capacitors

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II. Business strategies for 2018

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

*Announced on Dec. 12, 2017
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

<table>
<thead>
<tr>
<th>Businesses with global top shares</th>
<th>HD media</th>
<th>High purity gases for electronics</th>
<th>Graphite electrodes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market scale</strong></td>
<td>¥400 billion</td>
<td>¥150 billion</td>
<td>¥300~500 billion</td>
</tr>
<tr>
<td><strong>SDK’s market share</strong></td>
<td>25%</td>
<td>25%</td>
<td>More than 30%</td>
</tr>
</tbody>
</table>

*In the global HD media market, SDK holds top market share as independent manufacturer. Market scales and shares are SDK’s estimate.*
2. Business portfolio: Tasks for the future

Accelerate growth through efficient use of cash

Engine for the Group’s growth

Growth-accelerating

Advantage-establishing

Overseas business expansion
2017 net sales: Up 7% from 2015
Develop new growth businesses of the Showa Denko Group

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

Rebuilding

Optimize business domains
2017 operating income margin: 4% (turned into black in 2017)
Focus on profitable business fields and withdraw from unprofitable businesses

Growth-accelerating/Advantage-establishing

Organization growth
Alliance
M&A

Sources of Group cash flow

Support growth with stable income
II. Business strategies for 2018

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+”

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

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

【Expanded bases in East Asia and ASEAN】

- HD Taiwan
- HD Malaysia
- HD Singapore

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

Domestic sales 40%
Overseas sales 60% by 2025
Ⅱ . Business strategies for 2018

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
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Strategies for each business

R&D strategy
Toward 2018

Ⅲ . Tasks under a long term vision
II. Business strategies for 2018

High-purity gases for electronics

Realize sales growth faster than market growth through overwhelming supply power

- Boom in the semiconductor & display industries continues
- Electronics manufacturers accelerate capital investment, centering on 3D-NAND production

【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 (CH₃F)

- Expand overseas sales bases
  - Start commercial operation of US base
  - Establish 3rd base in China (Wuhan)

【SDK’s sales and size of global market】

Sales/market size in 2015 = 100

- Size of global semiconductor market
- SDK’s sales

(Size of the market: by WSTS)
**HD media**

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

- **Progress in IoT increases demand for storage devices for data centers**
  - ⇒ Coexistence of HDD & SSD continues

  **【Total storage capacity by device】**

  ![Graph showing total storage capacity by device](image)

  - SSD
  - HDD

  **【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

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

  ![Image of HDD and SSD](image)
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
### II. Business strategies for 2018

**Graphite electrodes (2) Post-acquisition strategy**

#### Acquisition of SGL GE Holding GmbH*

| 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

*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.
II. Business strategies for 2018

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
II . Business strategies for 2018

Petrochemicals

Operate Oita Complex at full capacity after 2018 regular maintenance

- Strong demand in Asia
- Additional ethylene plants in North America (1.5 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)
Aggressive investment in the growing ASEAN market

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

[Graph showing aluminum can production by SDK Group]

- **Overseas**:
  - Expand market share with advantages in quality
  - New/additional lines in Thailand and Vietnam 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

【SDK’s strategy】

- **Overseas**: Expand market share with advantages in quality
- **Domestic**: Create new market with original technologies

- Developing superfine printing technology and grasping the needs for small-lot production of multiple products
II. Business strategies for 2018

Lithium ion battery (LIB) materials

Pursue “large capacity, low resistance and long life” properties
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

[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]

[LIB market trend by use]

(B3 Research Report and SDK’s estimate)

(Limit for carbon)

Aiming high energy density
Aiming high output
Quick-charge BEV

Next generation BEV

Input resistance

Energy density per weight

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II. Business strategies for 2018

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 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
  - Acceleration in investment for mass production of SiC-based devices
    - Shift to large-diameter wafer

SDK's SiC epi-wafer business

Sales in 2016 = 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales (Times)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>0.5</td>
</tr>
<tr>
<td>2018</td>
<td>1.0</td>
</tr>
<tr>
<td>2019</td>
<td>1.5</td>
</tr>
<tr>
<td>2020</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Market grows 27.1% per year

(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.

SiC wafer market in 2025

- **Target for High-grade Epi**
- Railcars
- Wind power gen.
- Mega solar power gen.
- Servers, etc.
- Large industrial equipment
- Solar panel for household use

Area of the element (mm²)

Withstanding voltage of the element (kV)
II. Business strategies for 2018

R&D strategy (1) Overall strategy

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

Organics
Inorganics
Aluminum

Diverse business domains

Infrastructure, Living environment, Mobility, Energy, Electronics

Strengthen existing businesses
Expand businesses in surrounding promising fields

- Ammonia-based Hydrogen station
- Aqueous binder for LIB anodes
- Materials for infrastructure
- Components for heat solution
- Flexible solder resist

Accelerate R&D for strategic technologies

- Carbon material (Fullerene)
- Redox flow cell
- Application of artificial intelligence (AI) technology

Deepening and fusion of retained materials/technologies

Institute for Integrated Product Development

Core technologies

Elemental technologies with competitive advantage

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

World-top-level technologies we cultivated over many years
Demonstrate high-value-added products and realize profit in 2018

- **Ammonia-based hydrogen station**
  - Successfully developed practical system first in the world*
  - Demonstration of system starts

- **Aqueous binder for LIB anodes**
  - 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

- **Repairing materials to be used in cold weather**
  - NETIS** registration completed
  - Implemented trial applications
  - Increase number of application examples, and start full-scale marketing

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* 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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- **Mobility**
- **Energy**
- **Electronics**
- **Infrastructure**

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[Aqueous binder (emulsion)]
[Aqueous binder on the surface of graphite]
[Ammonia-based hydrogen station]
[Trial application of material to repair wet surfaces]
Higashi-nagahara (Asahi dam waterway)
Repair work to stop water leakage through concrete wall
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

- **Enhanced heat radiation**
  - Insulating sheet: Inorganic filler
  - Application example: Silicon sheet for heat radiation
  - Heat-radiating panel: Hybrid material
  - Cooling device: Aluminum parts, Frames

Heat generation analysis of a module
II. Business strategies for 2018

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

- Expand the range of use of fullerene by enhancing special features and strengthening/deepening 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

Fullerene

Energy
OPV
Fuel cell

Lubrication
Additive to lubricant
Wax, etc.

Sport gears
Golf clubs
Rackets, etc.

Semiconductor
Nano lithography
Material for lower membrane

Other industrial use
Additive to polymer, rubber, metal, etc.
Hard carbon membrane
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 calculation of the amount of “Goodwill” to be posted concerning the acquisition of SGL GE and 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
We will achieve target operating income under “Project 2020+” in excess of it

Operating income 3-year plan under “Project 2020+”

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>36.0</td>
<td>50.0</td>
<td>57.0</td>
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</tbody>
</table>

3-year total 143.0

2016 actual operating income & 2017 forecast*

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
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<tbody>
<tr>
<td>Value</td>
<td>42.1</td>
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</table>

(Billions of yen)

*2017 forecast was announced on December 12, 2017
We will execute strategic investment in “Growth-accelerating” and “Advantage-establishing” businesses in a positive manner

**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 materials**: 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

**Growth-accelerating**
- 2018 forecast
  - Capital investment: ¥42 billion
  - Depreciation: ¥40.5 billion

**Advantage-establishing**
- Project 2020+
  - 2016-2018
  - Capital investment: ¥130 billion

**Base-shaping**
- Rebuilding: 10%
- Growth-accelerating: 25%
- Advantage-establishing: 5%
- Balance

**2016-2018**
- Depreciation: ¥130 billion

We will execute strategic investment in “Growth-accelerating” and “Advantage-establishing” businesses in a positive manner.
II. Business strategies for 2018

Major financial targets and financial strategy

- “Project 2020+” financial targets

<table>
<thead>
<tr>
<th>Item</th>
<th>2018 target</th>
</tr>
</thead>
<tbody>
<tr>
<td>D/E ratio (gross)</td>
<td>1.0 times</td>
</tr>
<tr>
<td>Free cash flow</td>
<td>¥68 billion (2016-2018 total)</td>
</tr>
<tr>
<td>ROA (Operating income/Total assets)</td>
<td>6.0%</td>
</tr>
<tr>
<td>ROE</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

⇒ 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
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
Our ESG efforts through business activities & products

We aim to contribute toward creating a society where affluence 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】
Formulation of the 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 business plan to three years in order to speed up the management in the Group.
Toward 2020 and beyond, Let each of us add new value.
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.