Summary of briefing on the Material Sector Business

Date: Thursday, November 14, 2019

Asahi Kasei Corp.

Notes about Predictions and Forecasts

The predictions and forecasts in this document are based on various prerequisites, and by no means do they promise or guarantee the achievement of future plan goals and measures.

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Reference materials

I. Overview of the Material sector (Yoshida)
II. Business units of the Material sector (Kudo, Yamagishi, Ono, Honda)

Presentation

Overview of the Material sector (Yoshida)

I. p.5 Overview of the Asahi Kasei Group

Yoshida: The Asahi Kasei Group operates business in three sectors of Material, Homes, and Health Care, and the Material sector is the largest, accounting for 54% of the total sales and about 60% of the operating income in FY 2018.

I. p.6 Priority fields for provision of value

Five priority fields for provision of value are defined in our medium-term management initiative to contribute to a sustainable society. In Material, we focus our efforts on the three fields of the Environment & Energy, Mobility, and Life Material.

I. p.8 Management policy

There are three growth strategies in Material. The first is activity toward sustainable society. We aim at achieving both sustainable growth of corporate value and contribution to a sustainable society. The second is to expand our business in the priority fields for provision of value and to promote portfolio transformation and to provide new value and solutions to society. The third is to heighten our business platform. We are strengthening our platform with digital transformation and by addressing human resource development backed by a culture of continuously taking on challenges.

I. p.10 Basic concept for contributing to sustainable society

For sustainable society, we will work on further developing our existing businesses and creating new businesses through three different approaches. The first approach is material innovation. We innovate materials and provide them to both existing and new markets, and thereby contribute to society. The second is manufacturing process innovation. We pursue process innovation that would increase cost effectiveness and contribute to energy saving and reduction of CO_2 emissions. The third is enhancement of product performance. We endeavor to enhance our product performance in both existing and new businesses.

I. p.11 Contributing to sustainable society through expansion of businesses that support environmental

protection

We will also focus our efforts on the expansion of businesses that contribute to environmental protection. For example, in Mobility, one of the priority fields for provision of value, we plan to more than double our total sales from FY 2018 to FY 2025. At the same time, we will increase our contribution to the environment. In relation to products that contribute to reducing CO_2 emissions, including S-SBR for fuel-efficient tires, Xyron modified-PPE that enables lightweight automobiles, and LIB separator that is indispensable for electric vehicles, we have been calculating the reduction by life cycle assessment for about 2 years with the advice of outside experts. In FY 2018, these three products made a 3.63 million tons-CO_2 equivalent contribution to emissions reduction. We will further enhance the environment-friendly performance of these products in addition to increasing their sales, in order to achieve both business growth and the expansion of environmental contributions.

I. p.13 Basic strategy and financial objectives

Operating profit in Material was about ¥130 billion in FY 2018. We plan to achieve ¥150 billion in FY 2021, and ¥180 billion in FY 2025. In the priority fields for provision of value, we are promoting expansion of high value-added businesses. In this presentation, we will provide you with explanations about our strategies mainly in the Environment & Energy and Mobility.

I. p.14 Priority fields for provision of value

Aiming for the growth in the Environment & Energy and Mobility, we will further develop existing businesses and create new businesses. Growth engines of the existing businesses are Sage Automotive Interiors Inc, or Sage, and battery separators. We have made a large amount of investment on these products through M&A and capital expenditure, which are expected to firmly produce results.

In addition, we will create new businesses by promoting innovation, both innovative materials and innovative production processes. Our innovative materials include foamed engineering plastics, cellulose nanofiber, and CO_2 sensor, and innovative production methods include CO_2 chemistry, green hydrogen, and CO_2 separation/recovery technologies.

I. p.15 Development of new technology contributing to sustainable society

In the Environment & Energy, we are addressing the establishment of a cycle of CO_2 separation, capture, and utilization. The first example is CO_2 chemistry. Some of our technologies have already been commercialized, and others are validated or under development. The second example is hydrogen production by alkaline water electrolysis. Wind power generation is widely used in Europe, especially in Germany, and attention is currently focused on how to efficiently utilize surplus power produced by renewable energy. Our alkaline water electrolysis technology can use the surplus power to produce green hydrogen. We are currently conducting the verification tests in collaboration with the German government and universities. Green hydrogen can be utilized in our CO_2 chemistry to produce various chemical products using CO_2. We will endeavor to establish such cycles that contribute to the environment.

I. p.16 Contribution in Mobility

We set the objectives in Mobility as reduction of environmental burden in mobility and achieving comfortable vehicle interiors. In relation to these objectives, we introduced our AKXY concept car three years ago. The concept car equipped with about 30 of our company’s products and technologies, including those that enable lighter weight and lower environmental burden, has been exhibited in many trade shows around the world. In April 2019, we introduced our AKXY POD vehicle interior concept mockup. It is helpful in discussions with customers to introduce our concepts, since there are increasing needs for comfortable vehicle interiors against the major trend of CASE in the automobile industry.

I. p.17 Steps to achieve contribution

With the aim of achieving our growth strategy, our efforts focus on globalization and strengthening the value chain, in addition to material innovation as described earlier.

With regard to the progress of globalization in Material, we have sales offices and manufacturing and research facilities in about 80 locations overseas, and about 45% of the employees are foreign nationals. It is important to globally promote enhanced marketing, to establish a system of manufacturing in optimum locations, and to reinforce our brand. We will continue these efforts particularly in Europe, the US, and China.

For strengthening the value chain, we will leverage Sage, which we acquired in FY 2018. With their advantages in design and the access to automobile manufacturers, the sales opportunities of our company's products are expanding. In addition, as we announced today, we are entering the airbag fabric sewing business. We offer Leona nylon 66 filament as material for airbag yarn, and we are expanding downstream industries to strengthen the value chain.

I. p.19 Reorganization

In April 2019, we reorganized the Material sector configuration from 6 strategic business units and 1 core operating company to 3 strategic business units and 1 core operating company. The aim of this reorganization was to pursue growth by leveraging the collective strength of the organization, through greater flexibility of management resources and more active connections among different business units. Additionally, we expect the reorganization to accelerate our business portfolio transformation.

After about a half year from the reorganization, for example, in the Performance Products SBU where the former Fibers & Textiles, Performance Polymers, and Consumables SBUs were combined, a variety of linkages, portfolio strategies, and new organizations have already begun. We are reviewing the structure and functions of this SBU with an eye toward the spring of 2020. Operating as a larger unit gave us a broad perspective across businesses, which has promoted active discussions about what our ideal portfolio should be. Together with other leaders of the Material sector, I will be responsible for giving shape to these ideas.

I. p.20 Maximization of earnings from previous investments (FY 2016–2018)

During three years from FY 2016 to FY 2018, we adopted decisions on about ¥500 billion of investments in the Material sector. About ¥330 billion out of the investment was for projects of at least ¥1 billion each, mainly related to Automotive, the Environment & Energy, and Sustainability. In Automotive, we decided on investments of about ¥150 billion. This included increased production capacity for Lamous artificial suede, S-SBR for fuel-efficient tires produced in Singapore, and Leona nylon 66 filament, as well as the acquisitions of Sage and Senseair AB, a gas sensor module manufacturer in Sweden. In the Environment & Energy, we decided on investments of about ¥85 billion, mainly for increased production capacity for LIB separator. As for sustainability, we decided on investments of about ¥25 billion for the renovation of our hydroelectric power plants in the Nobeoka region and other projects. Some of these plants have been used for over 50 years. As part of our effort for environment-friendly energy use, we plan to renovate these hydroelectric power plants over the next 6 to 7 years through an investment of tens of billions of yen, ensuring their efficient operation over the long term.

I. p.21 Investment strategy for FY 2019–2021

The Asahi Kasei Group plans to adopt decisions on approx. ¥800 billion of investments over the three years from FY 2019. The Material sector plays a central role, and our investments will mainly be in the priority fields for provision of value to drive the overall growth of the Asahi Kasei Group by further reinforcing our strong businesses and creating new businesses. In addition to growth, we place emphasis also on the contribution to sustainability.

I. p.22 R&D policy

Core technologies in Material are polymerization and spinning, polymers and processing, catalysts and processes,

compound semiconductors and LSIs, membranes and separation, and others. We strive to create new businesses based on these core technologies.

I. p.24 Heightening business platform

To enhance the business infrastructure, we are working on the utilization of digital transformation. Specific activities include establishing effective and efficient strategies to leverage digital marketing, increasing development speed with materials informatics, or MI, innovation of productivity using IoT, and establishing intellectual property strategy by IP landscaping.

I. p.25 Example of IP landscaping for business strategy in polymers

Here is an example of IP landscaping in the polymer field. The graph illustrates the change over time of the patent strength of customers (Companies A, B, and C) based on IP landscaping analysis. The vertical axis of the graph shows total patent strength of each company, and the horizontal axis shows average patent strength, which indicates whether a company has outstanding patents or not.

Company A, which is the largest in the industry, used to be our main customer. From the perspective of patent strength, however, Company B has outstanding patents even though its total number of patents is not large. Being in contact with Company B, having patents with outstanding characteristics, would help us understand future market trends and the outlook of technology. Based on this analysis, we decided to regard Company B as an important customer, in addition to Company A. We have already started doing business with Company B. This is a good example of how IP landscaping can be used effectively in business strategy.

I. p.26 Application of materials informatics (MI) to catalyst development

Here is an example of catalyst development using MI. We were able to reduce both the number of experiments and the development period to one-third of what would have been required using conventional methods. For the development of catalysts, even experts have to depend on their intuition, and it requires repeated trial and error. However, taking too much time means a competitive disadvantage. In this case example, we created a database of a wide variety of knowledge and data that we had in various fields and applied MI to successfully improve the efficiency and effectiveness of the development process. In addition to catalysts, we have also achieved favorable results of using MI in the development of polymers and compounds.

I. p.28 Plastic waste problem

The issue of microplastics is a serious concern these days. While plastics offer convenience, their improper disposal has become a big problem. In response to such issues, we have begun work on two different aspects. The first one is the recycling of polyethylene, or PE, which is the most produced plastic in the world. The second one is to elucidate the mechanism of microplastic formation.

I. p.29 Polyethylene recycling

For the recycling of PE, we are participating in a research project led by NEDO together with several other companies, universities, and research institutions. We started the development of technology for recycling and activity to establish a value chain. The project covers the whole recycling flow from collecting used plastic containers, reproducing pellets, molding them into bottles, and filling the bottles for sale. Asahi Kasei is working on the process of reproducing collected plastic into pellets.

I. p.30 Project to elucidate mechanism of microplastic formation

We started a joint research and development project with Isobe Laboratory of Kyushu University to elucidate the

mechanism of microplastic formation. Our research involves observing the state of microplastic formation and performing chemical evaluation through an experimental test simulating the natural environment. Isobe Laboratory of Kyushu University is conducting research on numerical models of microplastics spreading in the ocean. Together, we aim to contribute to society by establishing a model of global microplastic flow.

Performance Products SBU (Kudo)

II. p.4 Mission of Performance Products SBU

Kudo: Former businesses of fibers, performance polymers, and consumables have been integrated into one as the Performance Products SBU. We are advancing a portfolio transformation through flexible allocation of management resources. Among the priority fields for provision of value including the Environment & Energy, Mobility, and Life Material, we focus particularly on Mobility. Within the Material sector, the Performance Products SBU is taking the lead in Mobility. Among our various strengths, our materials are our greatest advantage. However, it is difficult to best the competition based solely on the strength of materials. Where and how the materials are processed is important, and the key to the value chain.

II. p.5 Main products and overview of basic strategy

The Performance Products SBU offers many materials for Mobility. Based on our advantages in materials, we will reinforce the value chain by gaining midstream businesses and by strengthening our relationships with customers. In the compounding of engineering plastics, for example, it is essential to think, based on the advantage in materials, where and how to compound, what applications to target, and which customers to partner with in selling our products.

In the fibers business, we have announced our entry into the airbag fabric sewing business. With regard to Leona nylon 66 filament, the material for airbag yarn that we produce, we will establish an integrated supply chain from yarn to fabric and sewing. It is important to raise earnings by providing value to customers through the entire value chain. Taking into consideration that we are competing with some of our customers in some cases, we continue to carefully review which part of the value chain we should reinforce.

II. p.6 Changing needs in Mobility

In the automobile-related business, we are required to take measures in response to CASE and meet the increasing environmental needs. We expect that in 2025, vehicles powered only by an internal combustion engine (ICE) will account for just over a half of the total number of automobiles produced in the world, and electric-drive vehicles will account for nearly half. So we focus on meeting various requirements for environmental contribution by using our technologies not only for ICE vehicles but also in the growing market of electric-drive vehicles. The key aspects are light weight, electric drive, fuel efficiency, and organic solvent-free.

II. p.7 Growth strategy in Mobility

To respond to a changing mobility society and to achieve continuous growth, we are addressing three subjects: Growth of existing products including synthetic rubber and engineering plastics, generating synergy from our acquisition of Sage, and new business development. The main aspects here are light weight and electric drive.

II. p.9 Goals to achieve with foamed engineering plastic

Now on new businesses. The first example is foamed engineering plastic. We expect to launch products such as foamed modified-PPE and foamed polyamide in the automobile field. Asahi Kasei has been working on foaming technology for about 30 years at the Suzuka plant where we manufacture Saran Wrap cling film. Our foaming technology is also used for the Neoma Foam phenolic foam insulation panels in the Construction Materials business. This foaming technology enables us to create distinctive products.

II. p.10 SunForce m-PPE foamed beads

SunForce is foamed modified-PPE that has excellent insulation, flame retardance, and heat resistance properties. It is used for peripheral components of the LIB units of electric vehicles. As it has superior insulation properties than aluminum or steel, SunForce enables lighter weight LIB units.

II. p.11 Applications and future development of foamed polyamide

Phase 3 of Japan's restrictions on accelerated running noise will come into force in 2024. This will be much stricter than the current Phase 2, so reducing the noise from automobile engines will be important. Since the components around the engine must have high heat resistance as well as sound absorption, we focused on developing foamed polyamide.

II. p.12 Characteristics of foamed polyamide

As shown in the graph, frequencies that are easily absorbed by foamed polyamide depend on the thickness of the material. The ones shown in the graph with good absorption performance are actually too thick to commercialize. We are doing research to achieve good performance in a thinner form of 10 mm or less by affixing a nonwoven fabric.

Foamed polyamide is very light with excellent sound absorption and heat resistance. As far as we know, our company is the first in the world to develop foam products of modified-PPE and polyamide. There was a newspaper report of another company's development of foamed polyamide, but based on what we hear from our customers it does not seem to have been commercialized yet. We are offering sample products mainly in Europe and receiving a lot of inquiries. With regard to modified-PPE foamed beads, we have begun commercial supply to major automobile manufacturers.

II. p.13 Cellulose nanofiber composite material

We are working on the development of composite material of cellulose nanofiber, or CNF, and polyamide. CNF composite has the potential to be used in various fields and there are many competitors in this area. Our company has deep knowledge of cellulose because we have long been operating the business of Bemberg cupro fiber that uses cotton linter as raw material and we used to operate a viscose rayon business that used pulp as raw material.

We believe that our company is the only one that has the whole range of technologies in relation to the composite material, from cellulose to engineering plastics. Heat resistance, light weight, and shape retention are important. We have achieved shape retention equivalent to aluminum with a lighter weight than aluminum. We look forward to commercializing the product soon with surface treatment and dispersion technologies.

II. p.15 Basic strategy through acquisition of Sage

In FY 2018 we acquired Sage, an automotive interior material manufacturer, for $1.06 billion. In the business of automotive interior materials, the material manufacturers often have direct contact with automobile manufactures, not only with Tier-1 and Tier-2 suppliers. Sage has strong ties with automobile manufacturers, which will help us further strengthen the relationships we have with automobile manufacturers, including in Europe. Additionally, we plan to enhance our material variations, create new value, and pursue synergy.

II. p.16 Progress of synergy between Asahi Kasei and Sage

In this diagram, the vertical axis shows the material variation and the horizontal axis shows geographic regions. After dyeing Lamous artificial suede from Asahi Kasei, Sage supplies the products globally. We are currently looking to obtain synthetic leather in China as a new material for Sage. While Sage is based in the US, we are aiming to grow their fabric business in Europe and Japan. As part of the synergy with our company, Sage aims to build relationships with Japanese automobile manufacturers.

II. p.17 Accelerating further growth

We are targeting sales growth in Mobility of about ¥300 billion between FY 2018 and FY 2025. In Performance Products, we are taking various measures for growth, and the acquisition of Sage is one of them. Sage has through M&A, and we expect that sales of Sage will exceed ¥100 billion through activities including M&A by FY 2025, making a contribution to achieving our overall target.

Specialty Solutions SBU (Yamagishi)

II. p.22 Mission and strategy outline of Specialty Solutions SBU

Yamagishi: The mission of the Specialty Solutions SBU is to contribute to earnings of the Asahi Kasei Group by strengthening the effort to provide new value to the market, through enhancement of high performance materials and promotion of solution businesses. Our company has been good at enhancing high performance materials. We are also pursuing solution business closer to the market in order to create new value together with our customers.

The first point of the strategy outline is to advance focus and differentiation. We will further evolve high-earnings businesses through continuous transformation of the business portfolio and concentration of resources on main products in order to further reinforce our strong businesses. The second point is to create unique solution-oriented businesses focused on customer value.

II. p.23 Main products

Here are our main products. I will explain later about the battery separators. Ion-exchange membranes and electrolyzers are used for the process of electrolyzing saline solution to produce caustic soda and chlorine. Asahi Kasei is the only company in the world that provides all three elements of electrolyzer cells, membranes, and electrodes. We have the world's leading share in membranes and the No. 2 share in electrolyzers. The alkaline water electrolysis system described earlier by Yoshida is based on this technology.

Highly functional glass fabric is an electrical insulator used for printed circuit boards in mobile devices such as smartphones and in equipment for communications infrastructure. We are one of the world's top suppliers of super thin fabric used for smartphones and low-dielectric products used for 5G and sub-6 GHz applications. Our materials related to 5G include glass fiber, low-dielectric resin, and elastomers. This is a field where we can leverage our technology to contribute to society. Our other strong businesses that make contributions in the world include Sunfort dry film photoresist, Ceolus microcrystalline cellulose, Duranate HDI-based polyisocyanate which is a hardener for non-yellowing polyurethane, and photopolymers.

II. p.25 LIB separator

The three main applications of LIB separator are automotive, consumer electronics, and energy storage systems, or ESS. All are important to support the infrastructure of the world.

In the automotive application, there are three different types of vehicles: battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV) and hybrid electric vehicles (HEV). The performance required of the separator is different depending on the type of vehicle.

In the consumer electronics application, LIB separators are used for ICT (information and communication technology), power tools, gardening tools, and more. Demand for separators for the use with smartphones tops out in these days, but there is an increasing demand in the fields of power tools and gardening tools.

In the ESS application, we believe that LIB separators can contribute to distributed storage, integration of renewable energy, load leveling, etc., and so we work to meet those needs.

II. p.26 Outlook of Asahi Kasei's LIB separator business

As the top supplier of LIB separators, we contribute to maximized value based on firm relationships with our customers. There are various requirements for different batteries, so we provide products that match the needs.

According to data from Nikkei Inc., total world shipments of LIB separators in FY 2018 were about 3.28 billion m^2, an increase of about 20% from the previous year. Our global market share in FY 2018 was 17%, followed by SEMCORP, Toray, SKI, and Senior. The share of the top five companies together accounts for over 50%.

II. p.27 LIB separator market trend

According to data from Fuji Keizai Co., Ltd., the LIB separator market is expected to grow at an average annual rate of over 20% from 2019 to 2025. We focus on automotive in developed countries, consumer electronics, and ESS markets where our technologies and products are valued. By automotive in developed countries, we mean OEMs that are headquartered in developed countries, though they may manufacturer all over the world.

II. p.28 Future outlook of automotive market

Looking at the automotive market, BEV, PHEV, and HEV shipments are all expected to expand. We estimate average annual growth of about 60% from 2017 to 2020 by vehicle units. Performance required of the separator differs depending on the type of vehicle. High capacity is needed for BEV, while high output for HEV.

II. p.29 Advantage and strength of Asahi Kasei's LIB separator

We have two product lines: Hipore wet-process separator and Celgard dry-process separator. Hipore has characteristics suited to batteries featuring high capacity and safety, and is mainly used for consumer electronics, BEV, and PHEV. Celgard has characteristics suited to batteries featuring high output and long life, and is mainly used for HEV and ESS. Hipore uses PE we produce in-house as its raw material, and is characterized by high strength and thin film. We supply Hipore of consistent high quality and high grade by using our cutting-edge production engineering and strict quality control. Additionally, with our accumulated material technology and manufacturing know-how, we are able to offer customized membrane designs in accordance with customer requirements, with stable production at high volume.

Celgard has rectilinear pores in the thickness direction enabling high Li-ion permeability. It has zero heat shrinkage in the transverse direction and is therefore usable without coating. In addition, it exhibits excellent oxidation resistance as it has a trilayer structure of PP (polypropylene), PE, and PP. These characteristics make it suitable for batteries featuring high output and long life.

Both manufacturing processes are environmentally friendly. Our company has accumulated experience in the LIB separator business over a long time, and our comprehensive patent network is a big advantage.

II. p.30 Capacity expansions for Asahi Kasei's LIB separator

We are increasing our LIB separator production capacity to meet forecasted market growth. Our capacity at the end of FY 2018 was 730 million m^2/year, and we plan to increase that to 1.55 billion m^2/year by the end of FY 2021.

Basic Material SBU (Ono)

II. p.33 Mission of Basic Materials SBU

Ono: One of three missions of the Basic Materials SBU is to establish and reinforce a stable earnings foundation. In the Asahi Kasei Group, the Basic Materials SBU is positioned as a fundamental business rather than a high value-added business. The issue is how to steadily strengthen the business. The second mission is to provide a stable supply of raw materials and utilities to other businesses within the Asahi Kasei Group, and implement an energy policy with due consideration for ESG. We are responsible for the supply of raw materials needed for various derivative products and the stable procurement of raw materials as necessary. At the same time, we advance measures for energy saving and reduction of CO_2 emissions through conversion of fuel and increased use of renewable energy. The third mission is the development and promotion of chemical technologies that contribute to sustainability. Focusing on CO_2 chemistry, we are developing various to enable reduced greenhouse gas emissions.

II. p.34 Main products

We unified our naphtha cracker with that of Mitsubishi Chemical Corporation and in 2016, and implemented a structural reform of our petrochemicals business. We reduced capacity for styrene monomer, epoxy resin, SB latex, ABS resin, and others, to make a firmer business structure.

We have production facilities of acrylonitrile, or AN, in Japan, Korea, and Thailand, with a total production capacity of 981 kt/year at present. Our company is in the position of No. 2 in the world and No. 1 in Asia in AN, which is a major business of the Basic Materials SBU.

Main products include many that are used as raw materials for other products of Asahi Kasei. For example, AN is a raw material of adiponitrile produced within the company. Similarly, styrene, methyl methacrylate, cyclohexanol, and polyethylene have internal applications as raw materials. It is our very important mission to maintain a steady supply of cost-competitive raw materials to derivative products business in Asahi Kasei.

II. p.35 Asahi Kasei's CO_2 chemistry

Since the 1980s, Asahi Kasei has been engaged in the development of CO_2 chemistry that utilizes CO_2 as chemical feedstock with the aim of contributing to a low-carbon society.

In the EC (ethylene carbonate) process for polycarbonate, or PC, production, CO_2 is combined with ethylene oxide to produce EC, which is converted to DMC (dimethyl carbonate) and then DPC (diphenyl carbonate). This process has been licensed to several PC manufacturers, and we continue licensing activity. The DRC (dialkyl carbonate) process for DPC is another PC production process. In this case, PC is produced from CO_2 and alcohol through DRC and DPC. Its validation has been completed, and we are reviewing the next steps including licensing for special PC. In addition, we are currently developing a CO_2-based isocyanate production process. This process doesn't use phosgene, a toxic substance that is required in the conventional process. Isocyanate is produced by reacting a CO_2 derivative with amine, and the isocyanate is used to make polyurethane. The EC process and DRC process I described earlier also both eliminate the need for phosgene, which was required in the conventional process. We will continue to focus on the development of technology for CO_2 chemistry that will contribute to sustainability.

II. p.36 Basic policy of acrylonitrile (AN) business

Our basic policy for the AN business has three parts. The first one is to make a continuing contribution to our customers' business. We have the second-largest capacity in the world and the largest in Asia. We also have the world's top-class stable operation and stable supply. The high yield of our process and the low level of impurity in our product AN also contribute to stable operation. We endeavor to maintain our position as the No. 1 supplier in the world in terms of reliabilty.

The second part is the further evolution of our top-level catalyst technology and manufacturing processes. Our catalyst has the world's No.1 yield in the propylene process. We also have the world's only propane process, which is used at PTT Asahi Chemical Ltd. in Thailand. We continue catalyst development to further raise the yield of both processes. Our propylene process uses a smaller amount of raw materials and emits 20% less CO_2 than conventional processes. Our technological strength enables us to contribute to sustainability.

The third part is stabilization of business earnings. AN market prices are volatile, so we are promoting the introduction of a cost-based formula for sales prices to stabilize earnings. At the same time, we are developing the by-products and derivative products businesses to generate stable profits for the entire AN-related operation even when profits from AN itself are variable. Through such efforts, our AN business can play a firmer role as a stable source of earnings for the Asahi Kasei Group.

II. p.37 Implementation of energy policy with due consideration for ESG

Since the company's founding, we have had hydroelectric power plants in the northern area of Miyazaki Prefecture to supply electric power to the plants in the Nobeoka region. Around 30% of our power demand in the Nobeoka region is met by the hydroelectric power plants. To expand the supply of clean energy, we plan to renovate the hydroelectric power plants with total investment of tens of billions yen by FY 2026. We strive to enhance the power generation capacity of these plants to reduce the use of power from coal, lowering CO_2 emissions. In addition, we are currently studying the issuance of Asahi Kasei's first "green bond."

We will make an environmental contribution through reduced CO_2 emissions, including the conversion of coal fired power plants into natural gas fired power plants.

Asahi Kasei Microdevices Corp. (Honda)

II. p.42 Core technologies and main products

Honda: Our company's greatest advantage is having both LSI technology for analog/digital signal conversion and sensing technology using compound semiconductors enabling high sensitivity and fast response. We therefore have strong businesses in consumer electronics such as smartphones and in automotive.

The products we offer for consumer electronics include the electronic compass to identify direction, the high-precision position control IC for camera modules with autofocus and image stabilization functions, and the signal processing IC for audio equipment. For automotive, we offer products such as the signal processing IC for noise and echo cancellation and the motor control sensor used power window and windshield wiper control.

II. p.43 Business domain expansion

In this diagram, the horizontal row shows markets and the vertical column shows solutions. The current core business targets the consumer electronics and automotive markets. We currently have solutions in the areas of high frequency, magnetic field, and sound. In the future, we plan to develop products that can provide value to society in the area of invisible light, including infrared and ultraviolet.

II. p.44 Role of Asahi Kasei Microdevices (contribution to the Asahi Kasei Group)

The electronic devices business is positioned relatively downstream, which means we are close to the customers. The role of Asahi Kasei Microdevices in the Asahi Kasei Group is to function as a sort-of "antenna" to efficiently collect the latest information in leading markets, and convert this information into value for the Asahi Kasei Group. We work toward the provision of total solutions.

II. p.45 Examples of product development contributing to environment and energy (i)

I will give two examples of product development. The first one is a sensor to detect CO_2. The efficiency of use air conditioning systems in buildings decreases due to ventilation. Keeping ventilation to the minimum by monitoring the concentration of CO_2 enables significant energy saving.

Our sensor can detect CO_2 in a simple but highly accurate way based on the characteristic of CO_2 to absorb infrared light. The sensor is comprised of an infrared light emitter, a photodetector, and a control IC. We developed this small sensor by using the optical path design technology and module technology of Senseair, a Swedish company that we acquired in 2017.

II. p.46 Examples of product development contributing to environment and energy (ii)

The second example is a power LSI for energy harvesting. Energy harvesting means to convert minute amounts of energy from the environment into electric power for use. It is a power generating system without depending on an unstable source such as solar. One example of the system is microbiological electric generation which collects a small amount of electricity generated by microorganisms in the soil. The system is made possible with a booster circuit and a control circuit

that operate on very low voltage and consume very little power. Usually, about 1 volt is required to drive a booster circuit, but we have an IC that can operate at 0.2 volts. Various customers have expressed interest in this system.