

Our Challenges

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Innovations Starting from Networking

Coming together across the Group as “One Kuraray,” we continue to take on the challenge of creating innovation by connecting people with people, and technologies with technologies, both within and outside the Company.



Basic Strategy for R&D

The Research and Development Division works closely with in-house companies, business divisions, and Group companies to promote projects that contribute to Group-wide business expansion and profit growth under the respective missions of “creating new business,” “strengthening and expanding existing businesses,” and “establishing and deepening core technologies.” Our Supporting Project has contributed to the sustained enhancement and expansion of existing businesses, while our New Business Creation Activities are broadening the scope of the business foundation by discovering new business opportunities. The Research and Development Division works closely with our Innovation Networking Center, an organization that pursues innovation by integrating internal and external resources. Through the collaboration, we undertake joint projects both within and outside the Company in areas such as global marketing activities for items under development, the generation of new business ideas through the sharing of information on R&D seeds and unmet needs*, and joint activities to accelerate development. The division is also working with the Portfolio Strategy Department, newly established in January 2024 within the Corporate Management Planning Office, to more closely coordinate R&D activities and the portfolio strategy. These measures are designed to promote the creation of new businesses for the future, including the development of materials and new processes relevant to sustainability.

* Unsatisfied or unidentified potential demand or needs.

R&D Framework

Aiming to become a Specialty Chemical Company achieving sustained growth, the Research and Development Division plays a core role in implementing R&D and new business activities as a corporate organization. The Research and Development Division manages the Kurashiki Research Center, Tsukuba Research Center, Intellectual Property Department, and Planning and Administration Department.

Our research centers pursue the development of new businesses, products, and technologies using their core technologies, which include organic synthesis and synthetic polymer technologies, catalytic chemistry, polymer materials technology, environment- and energy-related technologies, precision polymerization and polymer modification, compound materials, polymer processing, and computational science. Drawing on their sophisticated analytical capabilities and safety assessment techniques, the research centers also function as analysis hubs for Kuraray Group companies, and work to address technical problems across the Group. They also engage in the planning, proposal, and execution of projects in research themes that fall outside the scope of our research laboratories. Meanwhile, to accelerate R&D, our activities are targeting the deployment of digital R&D technologies.

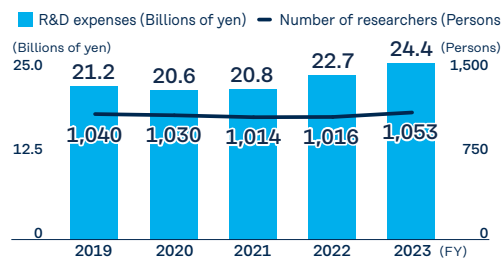
The Intellectual Property Department also collaborates with the IP Management Center to evaluate and analyze IP data to support business strategies.

The Research and Development Division promotes R&D while working closely with the development and production bases of each division, including overseas bases.

The Technology Division, responsible for corporate production technology development, manages the Technology Development Center and the Technology and Maintenance Management Department. It promotes progress in production technology by partnering with the Production and Technology Management Division of each Group company and the Production and Technology Development Department of each plant. It has also begun collaborating with the Research and Development Division in the early stages of development to accelerate the evolution of new businesses and products. This division is also taking the lead in implementing digital strategies for Group-wide production technology R&D.

Priority Issues of “PASSION 2026”	
Development based on the customer perspective	(P.38)
Development that contributes to sustainability	(P.39)
Planning and promotion of an IP strategy	(P.40)

R&D Expenses and Number of Researchers






Innovation Networking Center

The most important objective of the Innovation Networking Center (INC) is to generate innovation by integrating internal and external resources. To empower the Research and Development Division, other individual divisions, Group companies, and customers to take the initiative in generating ongoing innovation, the Center is playing the role of accelerator in the Kuraray Group's innovation efforts, promoting activities involving the participation of all corporate divisions and employees. We have adopted an ambassador system for the Center, whereby more than 30 core members from diverse backgrounds are collaborating globally with over 50 ambassadors representing various Group organizations.

With a vision to "generate future-oriented innovative processes and an innovative culture across the Group," the Marketing Department is responsible for activities to generate innovative themes from a customer perspective, while the Incubation Department takes on the development of the themes. The Strategy & Management Department maintains a platform allowing staff to search information on the Kuraray proprietary technologies that support these innovation activities as well as on relevant testing and experimental facilities and the staff members assigned to each project. It also operates a framework for appropriate and transparent resource allocation to projects and portfolio management (innovation pipeline).

In 2023, we held Group-wide discussions on the priority fields where Kuraray is targeting innovation (innovation strategy) to designate strategic fields (see figure at right). These priority fields are the object of strategic resource allocation based on the above-mentioned pipeline. We are also working on open innovation, which includes exploring opportunities to work with startups. In January 2024, the newly established Gemstone Project Group entered into collaboration with a U.S. startup for the commercialization of a promising new technology.

Priority fields and examples of key strategies

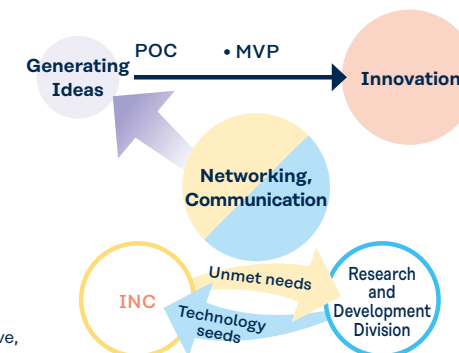
Priority field		Aim
	Sustainable Feedstock	Substitute conventional feedstocks with more sustainable ones to contribute to the improvement of the global environment
	Lightweight Solutions to Replace Metal	Provide solutions that contribute to weight reduction in mobility, where demand for energy conservation is increasing
	Polymer materials recycling	Secure access to recycled feedstocks and build new value chains to utilize industrial waste or end-of-life products to contribute to the improvement of the global environment

Development Based on the Customer Perspective

Collaboration between Innovation Networking Center and Research and Development Division (Global Marketing)

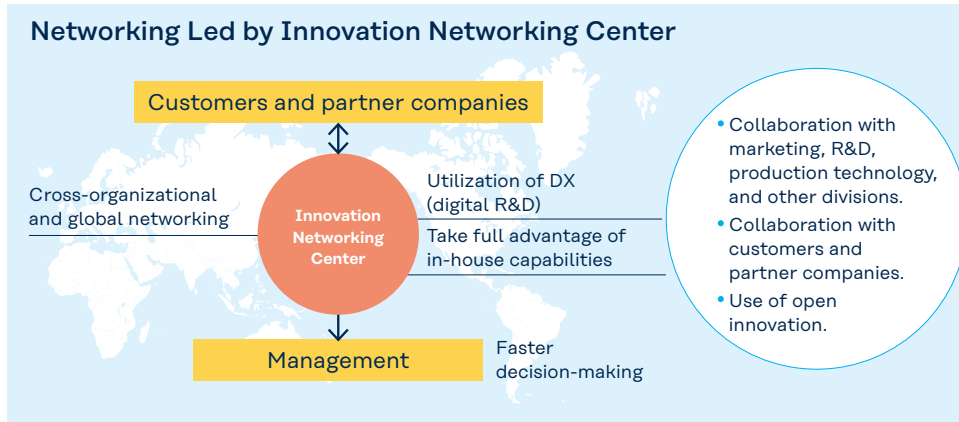
In achieving ongoing innovation, it is essential at the early stage of development to learn from markets and customers about where they see the value of materials made using the proprietary technologies of the Research and Development Division, and then implement proof-of-concept (POC) demonstrations. This requires being closely connected to the markets. For this reason, staff in charge of each of our R&D themes collaborate with the segment teams*1 formed by INC to promote marketing and develop products based on a deep familiarity with the market. In addition, as members of the segment teams, such staff seek to discover the unmet needs of customers at an early stage and encounter ideas that lead to new R&D themes.

We started holding regular Innovation Hours in 2022. These are global communication events that bring together members of the Research and Development Division and INC. The goal of the events is to construct a Group-wide innovation process, cultivate a culture of innovation, and achieve more active networking and communication. Through this venue, which combines the collective strengths of both organizations, we are accelerating the generation of ideas, development of minimum viable products (MVP)*2, and POC to create innovation.



*1 Segment teams targeting six strategic areas: Automotive, Paper & Packaging, Agriculture, Sports & Outdoors, Architecture & Construction, Life & Personal Care.

*2 Products that provide the minimum viable value to users.

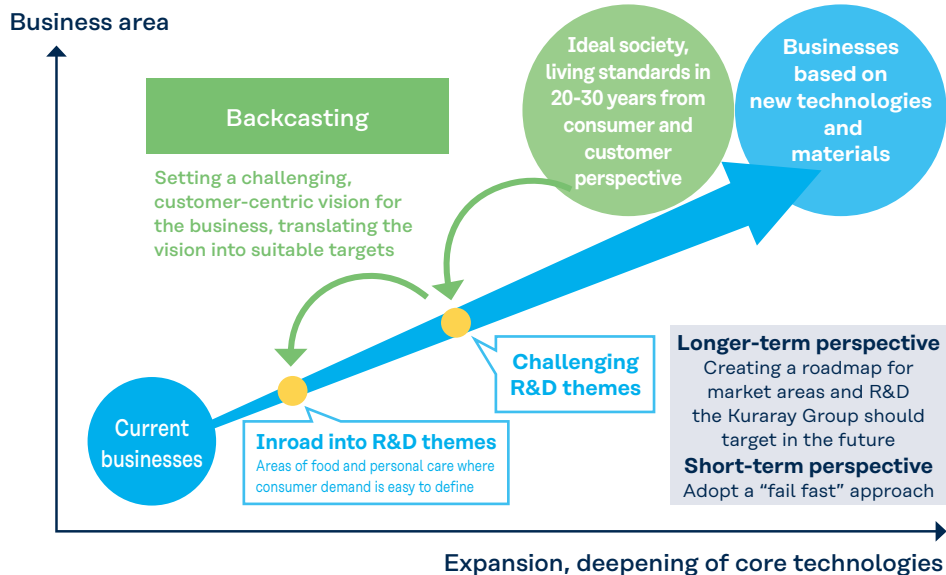


Backcasting in R&D

The Research and Development Division generates R&D themes that lead to new value proposals addressing issues and trends in society and markets and customer issues. Under "PASSION 2026," we looked ahead to the society and living standards we hope to see 20 to 30 years down the road from the perspective of consumers and customers. Backcasting from there, we have set more challenging R&D themes that will enable us to achieve this. We drew up a longer-term roadmap for market areas and R&D activities the Kuraray Group should pursue outside the sphere of our existing businesses. In the short term, our goal is to adopt a "fail fast*" approach. We have introduced this concept starting with the areas of food and personal care, where customer needs are relatively easy to define, and have selected candidate research themes in each of these fields. Currently, we are engaged in concept testing to investigate the commercial viability of these candidate themes. Additionally, we will explore themes in new fields as a means of generating challenging R&D themes, including in areas outside the scope of previous research.

* The concept of making mistakes quickly and learning from them to get closer to success.

Backcasting diagram



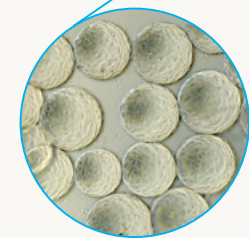
Development that Contributes to Sustainability

The Research and Development Division is focused on further refining Kuraray's proprietary technologies to create new businesses in areas that contribute to sustainability and improved quality of life, issues of pressing importance to society. Given the particular importance of the themes of a circular economy and carbon neutrality, we are seeking to develop biodegradable materials that contribute to improving the natural environment. In addition to developing a vinyl acetate polymer that combines biodegradability with high functionality, we are working to shed light on the mechanism that controls biodegradability, to apply the findings to the development of materials. We are also engaged in the development of low environmental impact materials, including the use of biomass as a raw material in areas peripheral to our businesses and investigation of low environmental impact processes. In this field, we have worked with customers on a series of projects aimed at confirming the value of the materials and enhancing their performance, including exploring technologies for scaling-up development. We are also focusing on areas such as process development to significantly reduce greenhouse gas (GHG) emissions and the development of technologies and materials that contribute to recycling. We will continue pursuing new business creation that contributes to the natural and living environments and ties into the creation of customer value.

TOPICS

Initiatives in the Life Science Field

To create business opportunities in the field of cell culture, and specifically in regenerative medicine, which promises high growth, we have developed a bridgehead technology in the form of a PVA micro-carrier for use in cell culture. The adoption of PVA as the material has demonstrated a range of advantages, including resistance to damage when stirred in cell culture and to infiltration of foreign bodies, high cell culture efficiency, and easy detachment of cells for recovery. A manufacturing system for samples is already in place and sales launched in Japan in March 2024. We are currently laying the groundwork for launches in the United States and elsewhere.



Microscopic image of cells cultured on PVA microcarriers

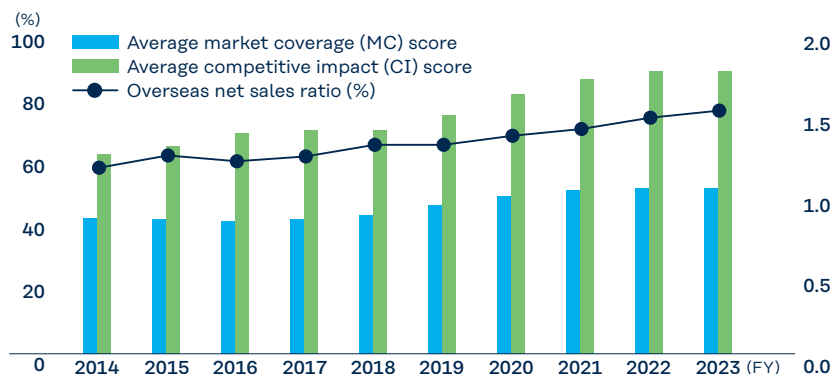
Planning and Promotion of an IP Strategy

The Kuraray Group's intellectual property management is founded on respect both for our own intellectual assets and those of other companies, and is aimed at generating contributions to business from intellectual property activities aligned with our management and business strategies. Kuraray has consistently worked to enrich its intellectual property portfolio in line with global business development, but to support the enhancement of the business portfolio from the intellectual property side, we will now additionally place greater emphasis on intellectual property management from a longer-term perspective and subject it to continuous review.

Building the Patent Portfolio (1): Supporting Global Business Expansion

Aiming to achieve business results in line with the Kuraray Group's management strategy, we have been working to upgrade our patent portfolio*1 as we grow the business on a global scale. Specifically, our average score on the market coverage (MC)*2 index, which reflects the number of patents held in overseas markets, has risen in line with the rising overseas net sales ratio and the accompanying expansion in patents held overseas. Simultaneously, our average score on the index of patent competitive impact (CI)*3 for each patent family*4 has also improved, while our Patent Asset Index (PAI)*5 score has also increased across the Group.

Overseas net sales ratio and average patent value index scores



*1 Created by the Kuraray Group using patent analytics from the LexisNexis® PatentSight+, sourced from the U.S.-based LexisNexis.

*2 The index is calculated based on the size of markets covered by patents and the number of countries where patents are valid.

*3 An index of the competitiveness of a patent family calculated by multiplying the market coverage (MC) index by the index of total portfolio technological value (Technology Relevance), which is based on citations in junior patent applications.

*4 The unit of a single patent invention applied for and granted in multiple countries.

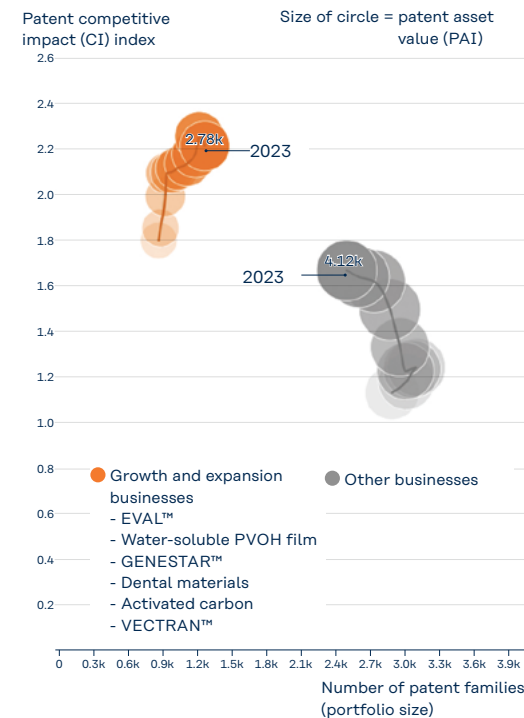
*5 An index indicating the total value of a patent portfolio, the sum of the competitive impact of all patents held.

Building the Patent Portfolio (2): Helping to Build a More Sophisticated Business Portfolio

To sustainably fulfill its mission of improving the environment and enhancing the quality of life, the Kuraray Group is working to enhance its business portfolio. To implement intellectual property activities in support of this aim, we are making headway in upgrading the patent portfolio centering on growth and expansion businesses (P.24). We have consistently worked to efficiently support the role of each business by boosting the competitive impact (CI) score per patent in growth and expansion businesses and by reviewing the portfolio structure in other businesses to achieve a balance between patent quantity and quality.

We will continue to enhance the business portfolio in line with the particular characteristics of each business through the strategic use of intellectual property, not limited to the area of patents.

Change in patent index scores of growth and expansion businesses (2014–2023)



Value Creation through More Optimal Intellectual Property Management

The Kuraray Group sees one of the aims of its use of intellectual property as being "value creation through differentiation." To this end, we engage in the ongoing review of our intellectual property management. The evolving demands of society in areas such as climate change and limiting the consumption of resources, alongside mounting competition in global markets, are bringing about great changes in the business environment. For businesses to maintain competitiveness and continue to create value in the new environment requires the appropriate use of intellectual property. We are thus using IP landscapes (analyses of patent and market information), along with additional market information gathered through management activities, to construct and implement an intellectual property strategy that is more closely integrated with our business strategy, aiming to explore and exploit new business opportunities.

Dialogue

Ichiro Nakano

General Manager
Innovation
Networking Center



Nozomu Sugo

General Manager
Research and
Development Division



Sharing strategies throughout the Group and endeavoring to create new businesses by combining technologies and market feedback

Systematically connecting with markets in new areas

Sugo The strength of the Kuraray Group's R&D lies in our ability to draw on the array of technologies and processes we possess, from low to high molecular-weight polymers and their processing, to consistently develop products ranging from resins and polymers to films and other compound products. Moreover, in the Research and Development Division, we have put in place a Supporting Project to help the various divisions with their problem-solving and technological development. We invite customers to participate in this collaboration as well, and are getting results by working together to address the challenges of enhancing quality and improving yields. Furthermore, we have formed a Cross Technology Research Group, a team that is tasked with bridging R&D and knowledge gaps across the various laboratories. While further strengthening

such collaboration, we are working to create new businesses, strengthen and expand existing businesses, and establish and deepen core technologies.

Nakano The Innovation Networking Center (INC) is a fairly new organization, formed in 2022. Our chief mission is to bring together internal and external resources to accelerate innovation. As a cross-organizational unit, which did not exist in our previous business division system, INC currently operates globally with around 30 core members and some 50 ambassadors representing various Group organizations.

Until now, drawing on its strengths in technological development and its product appeal, the Kuraray Group tended mainly to adopt a product-centered business model. To generate innovation and expand into new businesses in this so-called age of VUCA, with an operating environment that is changing dynamically, it is critical, in addition to that business model, that we systematically tap into markets

in new business areas. As an accelerator, we have engaged in repeated discussions with the Research and Development Division and the various business divisions, focusing on developing a framework for drawing up strategic scenarios and driving projects forward. We will leverage our accumulated achievements to foster the creation of new businesses.

Sugo Although the Research and Development Division also pursues fixed-point studies, collaboration with the customer-centric INC and the business divisions has allowed us to draw on one another's capabilities in various initiatives. This will lead to more efficient R&D and give us a better chance of creating new businesses.

Moreover, such collaboration will enable us to more swiftly and more reliably offer products that are in demand in society and, ultimately, make significant contributions to society as a whole.

Nakano The Kuraray Group boasts wide-ranging capabilities, including talented personnel, technological development, a global network, and knowledge and insight gained from past mistakes. To reinforce our trust with customers, I believe it is essential to foster collaboration between organizations, aiming to harness these capabilities effectively.



Appropriate management of our portfolio under the various thematic groups will also surely be a key element in making our R&D more efficient. Given the fact our resources are limited, it will be crucial to embrace a "fail fast" approach, moving closer to success by making mistakes quickly and learning from them.

Linking technologies and markets through a bidirectional approach

Sugo On the topic of collaboration between the INC and the Research and Development Division, we continue to work together closely from different angles: INC is spearheading marketing through our internal and external networks, including customer networks, while the Research and Development Division mainly verifies technologies.

Nakano We are putting priority on linking the technological capabilities of the Kuraray Group with customer needs.

One aspect of this is "seeding out"—in other words, pursuing a strategy of commercializing themes proposed by the Research and Development Division. Our aim is to generate business hypotheses that capitalize on the capabilities of the Kuraray Group and, depending on the nature of the project, even coordinate the project in collaboration with customers.

Our other strategy involves responding to market demand, as we work to commercialize themes emerging out of the activities of the INC. For these themes, we explore the integration of existing technologies based on information about unmet needs collected from internal and external networks, including the networks of customers. If a new technology is involved, we consult with the

Research and Development Division, bring in applied technologies, and incorporate them into concrete business scenarios.

The key is to speed up and take greater advantage of this bidirectional approach of both proposing research seeds and responding to market demand. This approach gives rise to compelling business ideas and scenarios and allows us to efficiently implement and verify these ideas while forming hypotheses.

Sugo To be sure, we've come up with some of our themes through dialogue with customers after a



proposal made by the INC. It's fairly difficult to arrive at an idea that will gain traction with customers solely through fixed-point studies. So, in this sense, our collaboration has been highly constructive.

Also, for a new theme to be successful, it is essential to be able to get a read on the market from the R&D stage—in other words, to have a marketing perspective. No matter how sophisticated and unique we make our products, they cannot take off as a business if they fail to gain acceptance by customers. I think collaboration with the INC has been highly worthwhile in terms of gaining a market perspective as well.

Nakano In fact, members of the Research and

Development Division are now taking part in the various activities of the INC.

Our current activities are grouped into six strategic areas—Automotive, Paper & Packaging, Agriculture, Sports & Outdoors, Architecture & Construction, Life & Personal Care. Based on this grouping, we have formed a matrix involving multiple strategic arenas in which segment teams carry out their activities. For example, in two strategic arenas—"Lightweight solutions to replace metal," and "Polymer materials recycling"—we are seeking to generate innovation by pursuing marketing that draws on the networking abilities of the Automotive segment. We will also use this matrix to guide our portfolio strategy targeting new business creation across the Kuraray Group.

Meanwhile, as part of our efforts to further reinforce collaboration and encourage innovation, we regularly hold global meetings called Innovation Hours. In odd-numbered months, the meetings share R&D themes from the "seeding out" side. In even-numbered months, they share information about unmet needs from the market side and explore themes. We have also established a Core Technology Platform (CTP) to gather information on core technologies from across the Kuraray Group for employees to browse, as well as a Technical Equipment Platform (TEP) to visualize and share data on our various R&D and technical equipment. Both platforms are accessible in a virtual environment. Such sharing of information across the Group has also begun to give rise to synergies, mainly in the form of collaboration and cooperation between employees.

Sugo As the strategic arena examples indicate, the recent trend in research themes, particularly in environmental fields, has been toward rapidly

mounting demand for products that help support carbon neutrality and a circular economy, particularly in Europe.

Nakano I agree. About six years ago, only a handful of eager customers expressed an interest in our biofuel feedstock, but that has changed significantly in the past three years. In fact, to keep the channel of communication open with our customers, it is imperative that we constantly update our sustainability knowledge and proposals.

Boosting collaboration on a global scale to create new businesses

Sugo We see global collaboration as being key to the creation of new businesses. One example of an ongoing project is cell culturing in the life sciences field (▶ P.39). The use of PVA microcarriers for cell cultures holds future business potential in regenerative medicine and other fields. However, because the market for this material has yet to really take off, we plan to work together with the INC as we closely track future trends and roll out the project on a global scale.

Nakano The Research and Development Division and the INC are collaborating on marketing for the cell culturing project in North America. In fact, staff from the INC's marketing division there are working to step up the pace of local sales. Other global projects are ongoing as well, including collaboration with business divisions on multiple themes, such as a new PFAS-free water-repellant material technology.

Sugo The Kuraray Group derives roughly 80% of sales from overseas markets. In addition to building networks in the new businesses we talked about

earlier, I believe it will be vital to strengthen collaboration on a global scale in several respects, including diversity and talent management.

Nakano We are taking a broad-based approach in our efforts to address issues. We are pursuing organic collaboration across the organization and gaining buy-in among all employees for the strategies of the Kuraray Group as a whole, including the various business divisions and subsidiaries in Japan and overseas. At the same time, we are moving forward in creating a framework for collaborative innovation and putting a support system in place. It will also be critical to foster a corporate culture of embracing challenges without fear of failure to bring greater vitality to our efforts to propose technologies in new areas and cultivate new markets. Needless to say, strengthening our branding capabilities will also be important; we need to better communicate to customers around the world who we are and what our objectives are.

Sugo The primary mission of our R&D is the creation of new businesses. As it involves the development

of technology, R&D is ultimately a longer-term endeavor. As such, the long-term market outlook and the future direction of our business portfolio are factors that come into play. We intend to fulfill our mission by collaborating in terms of marketing and the development of business scenarios with the INC and with the Portfolio Strategy Department that was formed within the Corporate Management Planning Office in January 2024.

Nakano We bolstered the overseas marketing capabilities of the INC in January 2024 and plan to increase our momentum. Our goal is to tap into Group-wide innovation activities to launch new startups that grow into businesses capable of generating ¥10 billion in sales and, in doing so, foster a corporate culture of embracing challenges. We will continue to work passionately to be able to deliver results by 2026, the final year of the Medium-Term Management Plan "PASSION 2026." We are confident the Kuraray Group can boldly take on this challenge and achieve growth in the future.

