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Managing Executive Officer,
Chief Scientific Officer (CSO)

Message from the Chief Scientific Officer (CSO)

With the heritage of our DNA of taking on challenges, one of our core values, the research division focuses on new business creation, new product development, and expansion of the existing products in the fields of “ICT & Energy”, “Healthcare”, and “Sustainable Living”. To achieve the Mission 2030 targets, we are in charge of development of appropriate research themes based on the customer needs in the megatrend, accelerating research activities by using DX, and promotion of open innovation in collaboration between industry, academics, and government. The New Business Creation Department and the Denka Innovation Center in the New Business Development Division actively promote collaborations with startup companies through the corporate venture

capital established last year, and we have some potential investment projects. The R&D Management Department, with corporate functionality, as well as the Intellectual Property Department and Analysis Technology Research Department are engaged in achieving internal and external synergy for growth of business units and IPL* initiatives for business promotion. To achieve innovations that create new social values, we need to respect diversity and our differences. We would like to merge technologies, experiences, knowledge, and ideas from different people to develop as many products as possible to contribute to the society.

* intellectual property landscape

Research & development policy

The Denka Group is accelerating the creation of attractive new businesses and products that create new value by expanding our range of the “technologies that we do best” and promoting the development of products unique to Denka that can contribute to a sustainable society. To this end, we will promote research and development that leverages the Group’s collective strengths to integrate multiple disparate technologies and generate synergies across the entire Denka Group that transcend organizational boundaries and domains.

Roadmap

[FY2023 Results]

- Enhancement and promotion of R&D according to the megatrend
- Establishment of an R&D portal to share effective technological information across the company
- Introduction and development of new processes to reduce CO₂ emissions and to achieve a recycling-oriented society

[FY2024 Plan]

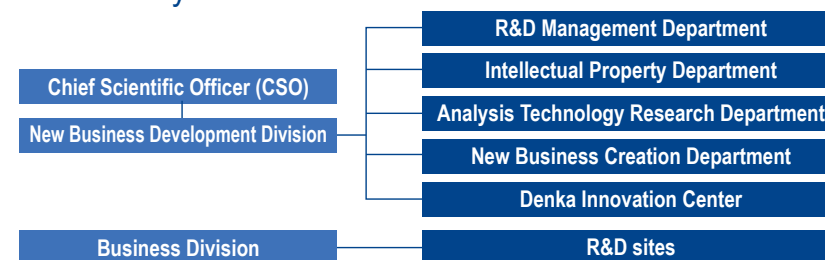
- Capture the future customer needs, develop research themes, and create new business at speed
- Optimize research resources and promote R&D through in-house synergy effects
- Promote MI* and IPL landscape usage initiative and establish an R&D platform

* Materials informatics

[FY2030 Target (ideal form)]

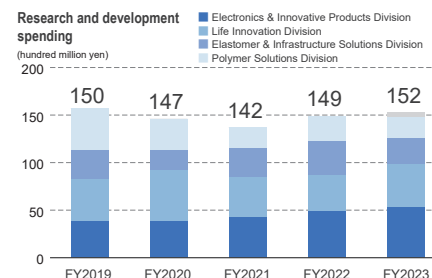
- Create new businesses by making the most of the research assets and contribute to society with new values
- Deepen seeds-needs matching and provide products and service offerings that suit the needs of society and markets
- Make the most of the R&D platform to promote efficient product development and technology development
- Provide opportunities for capable research human resources with insights and due diligence to build business models

Promotion system



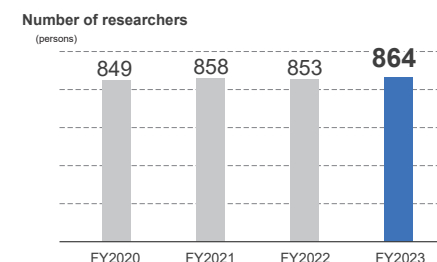
R&D spending (consolidated)

The annual average of the five-year R&D budget between FY2019 and FY2023 was 14.8 billion yen, and the budget in FY2023 was 15.2 billion yen.



Number of researchers (consolidated)

The number of researchers in FY2023 was 864, which increased by approx. 20 in 4 years.



Intellectual Property Initiatives

1 Intellectual Property Vision

MISSION

Provide high-value-added intangible assets to directly and indirectly increase the corporate value.

PURPOSE

To serve as a compass to guide to business value creation through merging IP and our specialties.

CORE VALUE

Specialty: Each employee is a human resource with unique values.

Diversity: Acknowledge and empathize with different backgrounds and viewpoints to grow together.

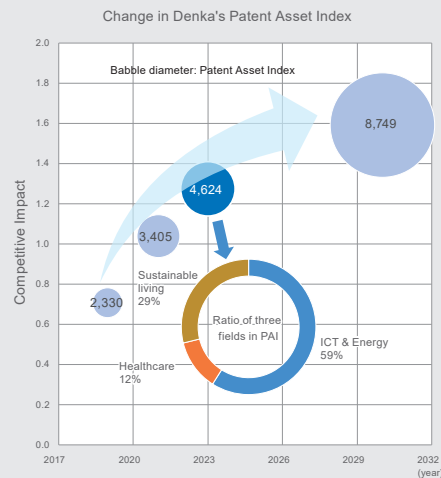
Co-creation: Respect each other and tackle work with integrity.

2 Toward achievement of the “Mission 2030” management plan targets

To achieve 100 billion yen of operating profit in FY2030 as listed as the “Mission 2030” management plan target, we verified the correlation of the R&D expenses and operating profit with the Patent Asset Index (PAI value)^{*1} and Competitive Impact (CI value)^{*2}. Based on that result, we set the PAI value and CI value for the achievement of “Mission 2030” operating profit to 8,749 and 1.6, respectively, against the current PAI value (4,624) and CI value (1.3). (Figure 1)

We will proceed with the following three initiatives to achieve these targets:

Figure 1. Patient Asset Index and “Mission 2030” target



1. Promote the business portfolio transformation, and provide appropriate patent information through IPL activities
2. Coordinate inside and outside the company to utilize open innovations to obtain high-value patent assets
3. Effectively utilize intangible assets to differentiate ourselves from other companies

*1. Patent Asset Index (PAI value) refers to a metric that represents competitive advantage and total value of the patent portfolio calculated using LexisNexis' PatentSight®

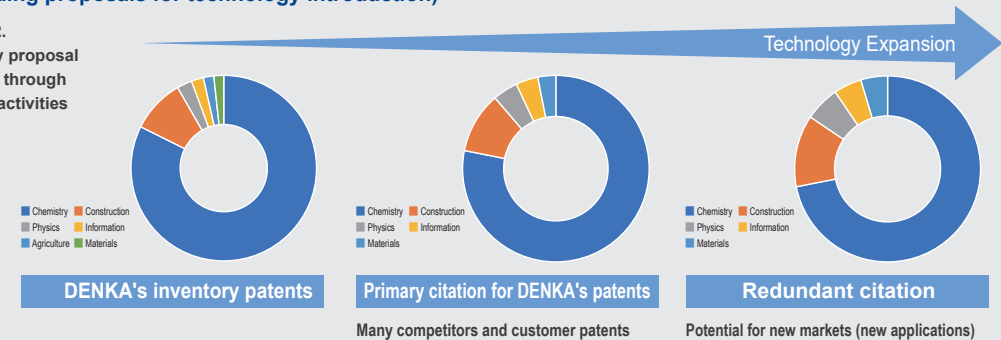
*2. Competitive Impact (CI value) refers to a metric that represents the competitive strength and quality of the patent family, calculated from the number of the references to the patent family and the size of the global market where the patent family members exist.

3 Contribution to Business through the IPL Activities

We have actively promoted our IPL activities since 2021 to achieve “Mission 2030” targets. In 2023, 16 IPL activities were reported. Through the IPL activities, Denka ascertains the current market value, seeks business areas with potential future market value, and proposes strategies featuring Denka's strengths. In addition, Denka pursues business value creation through provision of information valuable for new business creation and open & close strategy development, etc. Denka also creates an IP version of product portfolio management for existing businesses, organizing its patents and developing new markets (new applications). (Figure 2)

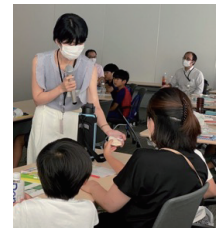
Business analysis and strategy proposals utilizing patent information (including proposals for technology introduction)

Figure 2. Strategy proposal scheme through the IPL activities



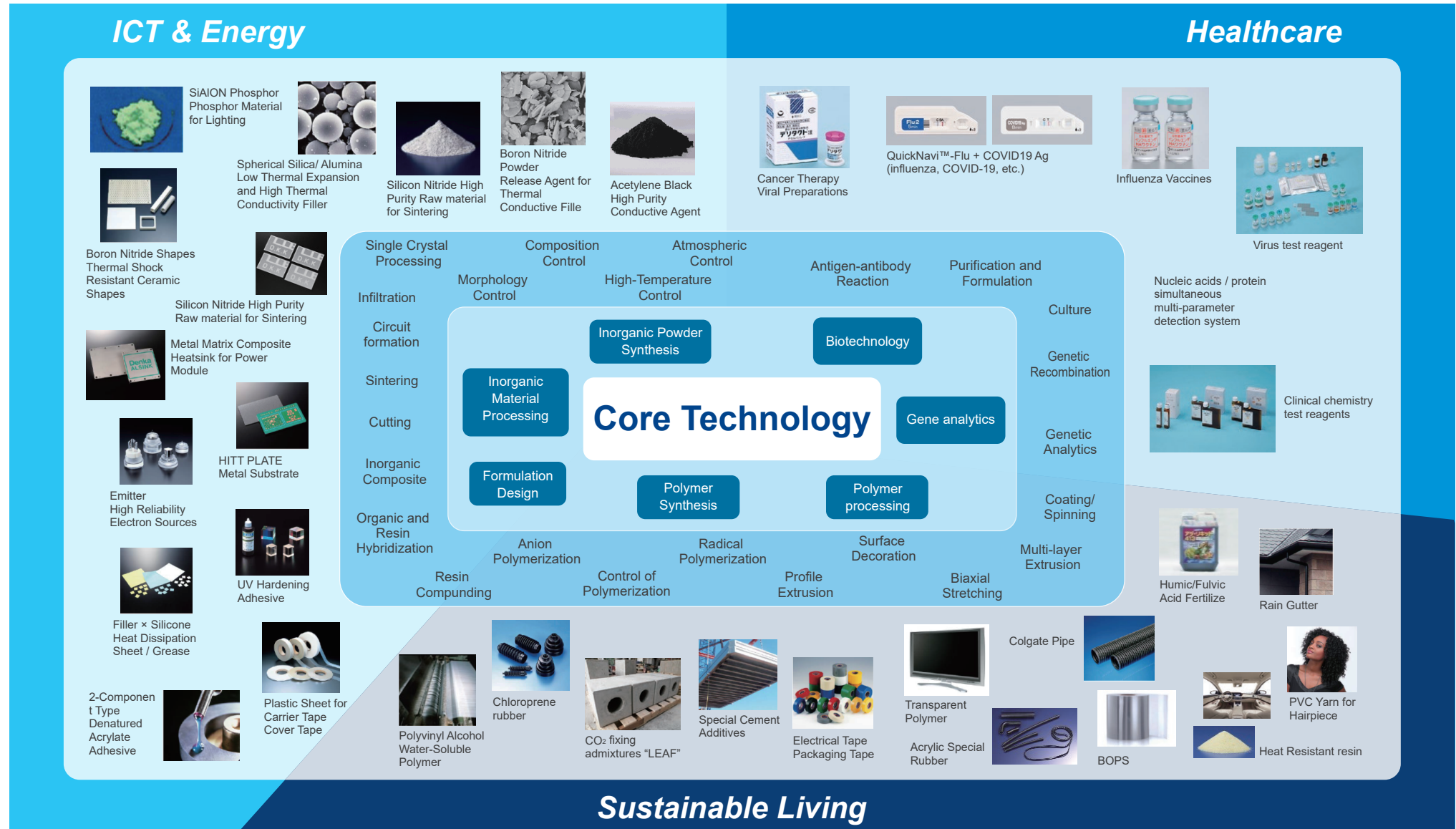
TOPIC | Kids' Innovation Workshop

To foster the next generation of innovators, we held a Kids' Innovation Workshop in August 2023. Elementary school children of Denka employees participated in this workshop and had a valuable experience that will help them foster their creative capabilities. Denka's patent attorney, who has the experience of taking part in a Kids' Innovation Workshop, took the role of the instructor and taught children about what they can do to bring their own ideas to life. Denka aims to contribute to finding and fostering future innovators by continuously holding Kids' Innovation Workshops to create a sustainable future.



Technology platform diagram

Denka is focusing R&D resources on three focus areas that capture megatrends. Here are some of the technologies we are currently developing.



Denka Technologies - Contributing to a Sustainable Society

Denka is vigorously pursuing various initiatives that contribute to sustainability in order to become a company with a superior competitive edge that is consistent with ESG initiatives.

Denka technology supporting renewable energy

Technologies that support the development of renewable energy include acetylene black, used as a raw material for ultra-high voltage cables that efficiently transport electricity generated by clean offshore wind power to various locations, and silicon nitride, which is used in bearing balls for wind power generation.

Silicon nitride assists in the transmission of **clean wind power**

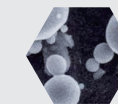


Acetylene black efficiently carries **clean energy**

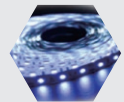
Denka technology supporting 5G

There are many technologies that support high-speed data communications required in an advanced information society, such as technology to protect semiconductors from heat, technology to reduce energy loss, and technologies to prevent static electricity and contamination of semiconductors by foreign matter during transport to ensure absolute quality.

Spherical silica reduces **energy loss**



Carrier tape sheets and top cover tapes protect against **static electricity and foreign matter contamination**



Spherical alumina protects against **heat**

Denka technology supporting carbon neutrality

In addition to promoting energy conservation and expanding renewable energy sources, namely hydroelectric power generation, we are also studying the introduction of innovative technologies such as CCUS, which separates, recovers, utilizes, and stores CO₂ from plants at the source, as well as the use of hydrogen. Moreover, we will push ahead with efforts to reduce the environmental burden attributable to our entire value chain by expanding the scope of our initiatives to address issues associated with the total life cycles of our products.



LEAF

PS chemical recycling



Hydroelectric power plants

* Photo courtesy of Agilyx

Denka technology improving QOL

There are many technologies that support the three areas of prevention, diagnosis, and treatment, including the development of manufacturing technology for G47Δ oncolytic virus, a new treatment to combat cancer; influenza vaccine production and stable supply to meet society's needs for immunization; and QuickNavi™-Flu + COVID19 Ag that enable rapid response to pandemics.

G47Δ oncolytic virus is meeting **unmet medical needs**



Influenza vaccines protect **your health** and wellbeing



QuickNavi™-Flu + COVID19 Ag help protect **society**

* Unmet medical needs refer to medical needs for which there is no effective treatment available

Denka technology supporting next generation xEVs

There are many technologies that support the electrification of automobiles, including the circuit boards for CPUs that control the power of xEVs that run on motors, heat resistance modifiers that make automotive components lighter and paint-free, and high-purity special carbon black used in lithium-ion batteries.

Heat resistance modifiers enhance heat resistance

Aluminum nitride and silicon nitride substrate **conduct heat to enhance vehicle safety**



Acetylene black increases the storage capacity of **lithium-ion batteries**

