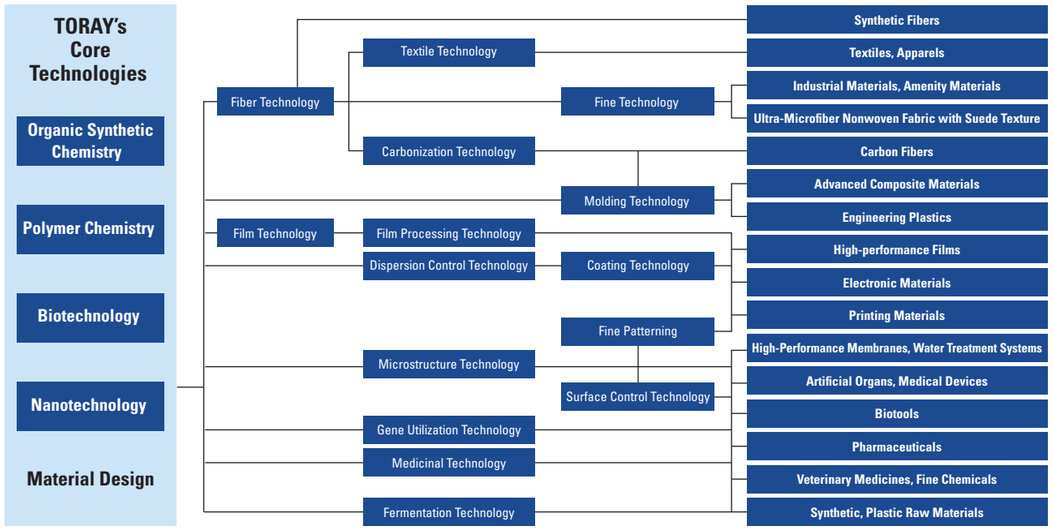
R&D

Toray's corporate slogan, "Innovation by Chemistry," represents our pursuit of technological innovation in the core area of chemistry and our aim of being a global leading corporation in advanced materials. Going forward, we will bolster further the Group's combined strengths and creating innovative advanced materials.

Toray's Technical Fields: Continued Creation and Commercialization of Advanced Materials

The Toray Group's core technologies are "organic synthetic chemistry," "polymer chemistry," "biotechnology" and "nanotechnology." Based on these, we are working toward greater depth and fusion of fundamental technologies such as polymerization, fiber spinning, textile processing, film processing, and organic synthesis, while expanding our operations from fibers and textiles to films, chemicals, and resins. We are also creating advanced materials and developing businesses in the fields of electronics & information materials, carbon fiber composite materials, pharmaceuticals, medical devices, and water treatment.



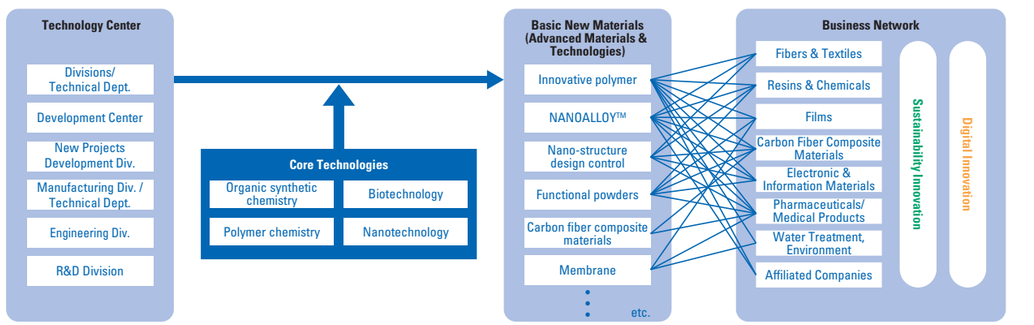
R&D Basic Policy and Organization

Toray's Technology Center serves as the headquarters for driving research and technological development into advanced materials based on the firm conviction that research and technological development provide the key to building the Toray of tomorrow.

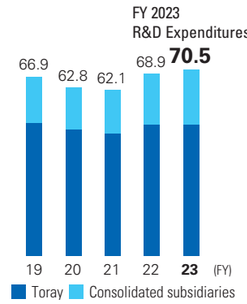
Our strength lies in our commitment to distant long-term continuity. We continue our efforts from a long-term perspective. Toray's R&D teams inherit the idea of "The Deeper, the Newer"—a concept that digging deep into something will result in new discoveries and inventions—the DNA of "pursuit of the ultimate limits." Based on a grand vision of the times and the needs of society, Toray aims to drive innovation that possesses social and economic value.

One remarkable feature at Toray is that all research and technological development functions are centralized in the Technology Center. This undivided R&D organization makes it easier to create new innovations by integrating technologies and allows advanced materials originally developed for other businesses to be rapidly deployed across multiple businesses. This also enables the Group to fully utilize its combined strength by actively exploiting techniques and knowledge from many fields to solve problems in a single field of business.

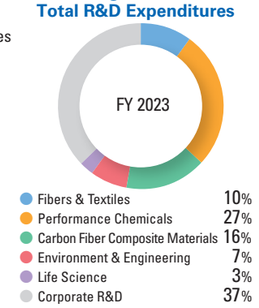
Over the duration of Project AP-G 2025 (FY 2023-FY 2025), we are planning to invest over 80% of the cumulative R&D expenses of ¥220 billion in the Sustainability Innovation (SI) and Digital Innovation (DI) businesses, which we have designated as growth business fields, over the three-year period. To achieve our company-wide revenue targets, we are promoting research and technological development aimed at "ultimate value creation," "product and operational excellence," and " sustainable growth."



R&D Expenditures (Billion yen)



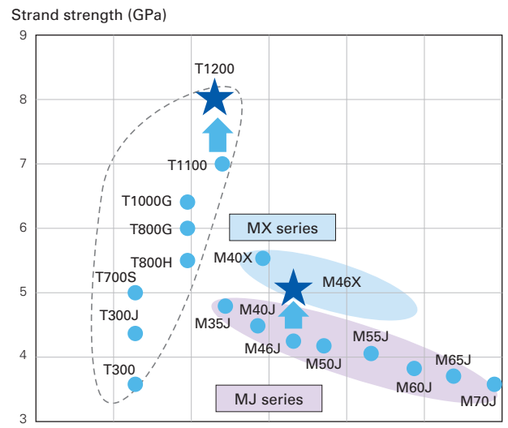
Percentage Breakdown of Total R&D Expenditures



Development of World's Highest Strength Carbon Fiber TORAYCA™ T1200

Since Toray began selling carbon fibers in 1971, we have been supplying high-performance TORAYCA™ carbon fiber for applications such as pressure vessels (CNG and CHG tanks), automobiles, aircrafts, and sporting equipment. In 1986, we developed TORAYCA™ T1000, which was then the world's highest strength carbon fiber, and have since remained a global leader in that respect.

In November 2023, we announced the development of TORAYCA™ T1200, which has a tensile strength of 8.0 GPa, setting a new mark for the highest strength. By further refining our proprietary nanoscale structural control technology, we have designed and achieved an internal structure with high toughness. In January 2024, we also announced the development TORAYCA™ M46X, the latest offering in the TORAYCA™ MX series which features a high tensile modulus. TORAYCA™ M46X maintains the same high tensile modulus as conventional products and has an increased strength by approximately 20%. In this way, we will increase our contribution to the realization of a carbon-neutral society, and expand into higher-end fields, such as the aerospace, industrial, and sports applications.



Leveraging Separation Membrane Technologies for Diverse Applications

Toray continues its efforts in the research and technological development of separation membranes and has been applying them in many fields, including water treatment and artificial kidneys. Toray possesses a lineup of membranes which have a variety of pore diameters for the different sizes of the substances to be separated, offering total solutions to meet our customers' needs.

As for developments and promotion of applications other than water treatment and artificial kidneys, we are expanding into the food and biotechnology fields; the environmental field such as the collection of valuable materials and gas separation; the new energy field such as membrane bioprocesses that combine membrane technology with biotechnology as well as electrolyte membranes for hydrogen production; and semiconductor applications that require clean water and air. In the food and biotechnology fields, we are working on the development of highly durable hollow fiber membrane modules that can be used in purification and concentration processes, as well as the advancement of the non-fouling membrane technology aimed at improving the productivity of biopharmaceuticals. In the environmental field, we are developing and demonstrating all-carbon CO_2 separation membranes to reduce CO_2 emissions and developing new nanofiltration (NF) membranes to recover lithium, for which demand is expected to grow.