

Research and Development / Intellectual Property



We will challenge ourselves to create new products and acquire new technologies that will drive Fuji Electric’s growth strategies.

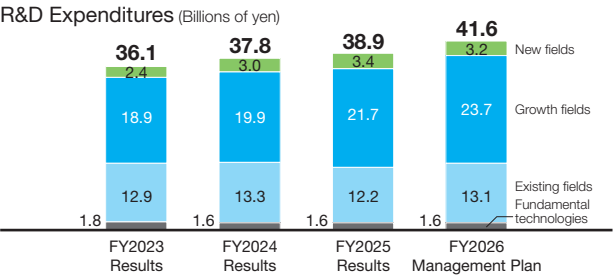
Kazuya Nakayama
Senior Executive Officer
Corporate General Manager, Corporate R&D Headquarters

Even as the business environment becomes more uncertain, we believe that trends such as the transition to a decarbonized society, the shift to a circular economy, and growing energy demand driven by expanded use of digital technologies will continue. To solve the new challenges our customers face as a result of these trends, we are refining our core technologies and strengthening development of global products, and new products that contribute to green transformation (GX) and digital transformation (DX). Furthermore, we are challenging ourselves to

acquire innovative new technologies through collaboration and co-creation with partner companies and academia, aiming to create new products that meet new needs by anticipating how social issues will change. We are also working to build an intellectual property portfolio to ensure competitive advantages for our new products and technologies, and we are engaged in international standardization activities, which are essential to expanding our business globally.

Progress of Medium- to Long-Term R&D

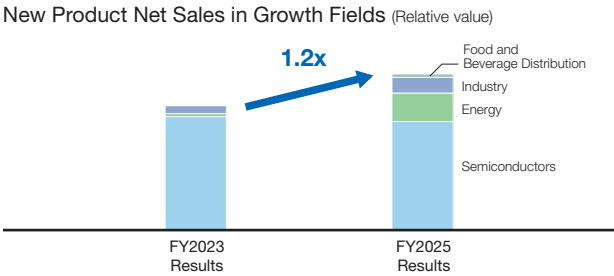
As our R&D strategy in the FY2026 Medium-Term Management Plan, we are promoting the development of new products in our existing fields (1) and growth fields (2), as shown in the R&D portfolio (on the next page), while engaging in R&D in new fields (3) that will contribute to growth from 2030 onward. To realize this R&D strategy, we increased R&D



Main Development Progress in FY2025

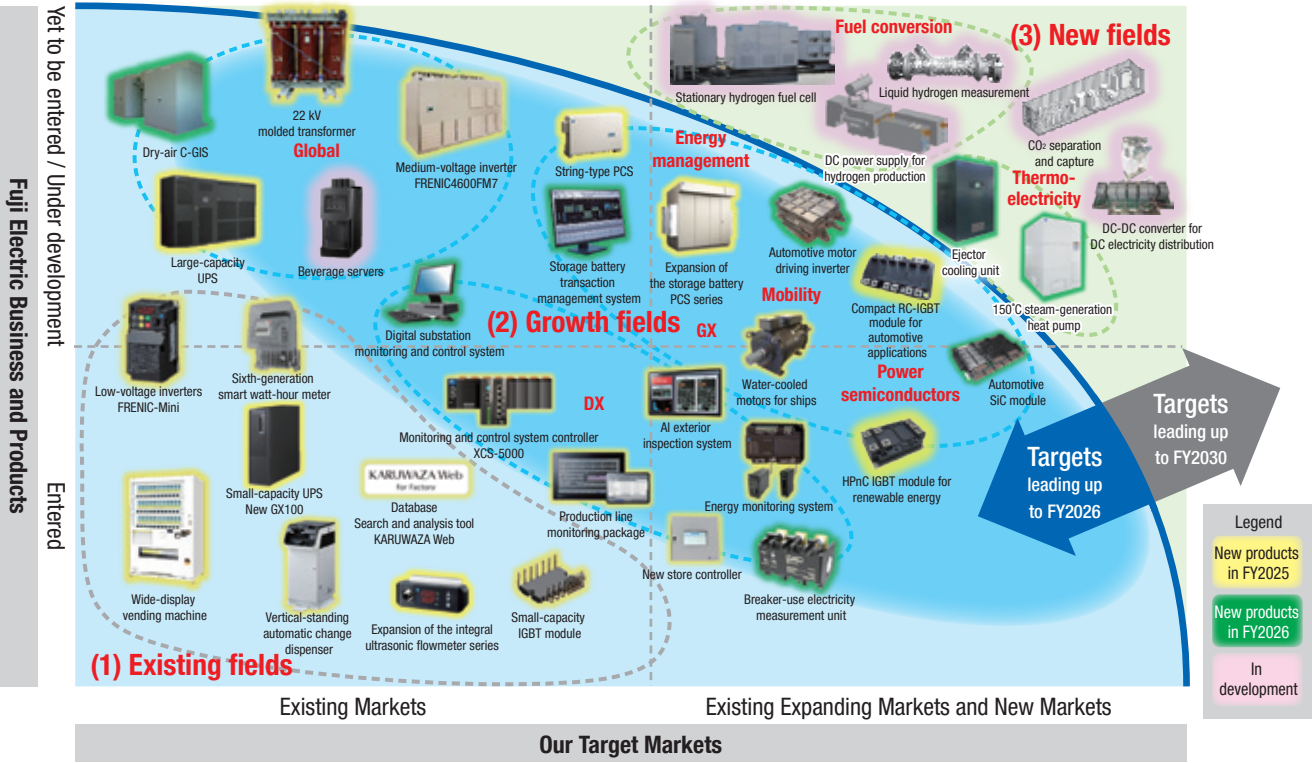
As a result of our development efforts in fiscal 2025, we launched numerous world-first and world-leading new products, while also making significant progress in acquiring new technologies with an eye to the future. In the growth fields (2), we launched products including large-capacity UPSs for data centers that achieve best-in-class power conversion efficiency, and we are also developing a grid storage trading and operation system that is expected to double electricity-market trading revenue. We also began mass production of thin-profile RC-IGBT modules for light and compact vehicles and are developing motor-drive inverters using

expenditures year on year in both fiscal 2025 and fiscal 2026, and we will focus investment on R&D in growth and new fields that support our growth strategies. As a result of our ongoing focused investment to date, new product net sales in growth fields (within five years of launch) in fiscal 2025 grew to 1.2 times the fiscal 2023 level.



these modules. In addition, we are developing large-capacity automotive modules equipped with industry-leading low-loss SiC-MOSFETs. In the new fields (3), we developed a 150°C steam-generation heat pump that makes effective use of waste hot water from factory equipment to significantly reduce energy costs. We will also launch an industry-first ejector cooling unit in fiscal 2026 that can reduce cooling costs for water-cooled servers at data centers by 85%. Using these heat products as a starting point, we will enter markets that are new to Fuji Electric.

- R&D Portfolio and Main Progress Items**
- (1) Existing fields "Develop next-generation models, strengthen competitiveness, and expand platform development" to maintain and expand our existing businesses
 - (2) Growth fields "Launch GX, DX, and global new products by 2026" to drive our growth strategies
 - (3) New fields "Challenge ourselves to acquire new GX technologies and create new products" in anticipation of market expansion from 2030 onward



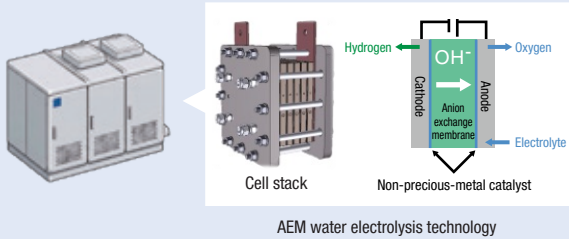
Strengthening Acquisition of New GX Technologies

In fields that are new to Fuji Electric and for which the market is expected to expand from fiscal 2030 onward, such as fuel conversion, DC electricity distribution, CO₂ separation and capture, and next-generation power semiconductor devices, we

are strengthening our acquisition of new GX technologies through joint research with research institutions that possess the world's most advanced technologies.

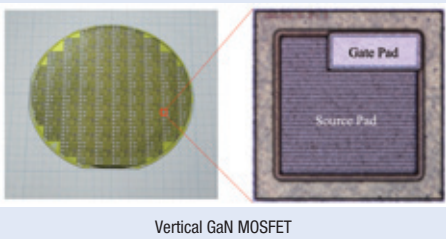
Anion Exchange Membrane (AEM) Water Electrolysis Technology for Hydrogen Production

Aiming to acquire hydrogen production technologies for fuel conversion to hydrogen, we are participating in NEDO's "Project to Develop Common Platforms Supporting the Widespread Use of Hydrogen" and working on the "Development of High-Performance, Highly Durable Anion-Exchange-Membrane Water Electrolysis Cells and Stack Technology." Led by the University of Yamanashi, which possesses the world's most advanced technologies in the field of hydrogen utilization, this research aims to achieve both higher efficiency and lower costs in hydrogen production. In the area for which we are responsible, "Development of Water Electrolysis Cells and Study of Stack Formation," we have achieved industry-leading electrolysis efficiency for an AEM system using a stack comprising 10 layers of small cells.



Vertical Gallium Nitride (GaN) MOSFET

In our research on GaN, which is expected to serve as a next-generation switching device, we are collaborating with Nagoya University, which possesses world-leading technologies in this field and is leading a Ministry of Education, Culture, Sports, Science and Technology project, to research fundamental technologies for vertical GaN power devices. We have devised a proprietary MOS gate structure that incorporates an AlGaN layer and have increased electron mobility approximately threefold, marking a major advance toward the commercialization of vertical GaN MOSFETs. Furthermore, through joint research with the Tsukuba Power Electronics Constellations, we have achieved the world's first large-area vertical GAN device with 1200 V-class breakdown voltage and a current of 10 A, with its structure formed by ion implantation.



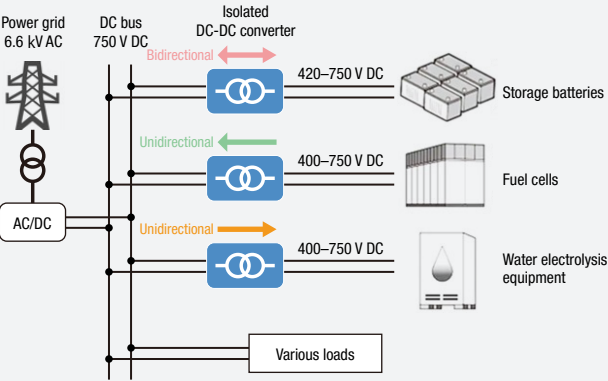
R&D TOPICS

Achieving Industry-Leading Conversion Efficiency with an Isolated DC-DC Converter, a Key Component of Next-Generation Power Supply Systems

Many of the devices that will play key roles in decarbonization operate on DC power, including solar cells, which are becoming increasingly widespread as a source of renewable energy; storage batteries that compensate for fluctuations in solar cell output; water electrolysis equipment that produces hydrogen; and fuel cells that generate electricity using hydrogen and other fuels. As a result, there are high hopes for practical application of DC bus systems that can operate these devices efficiently.

We are developing an isolated DC-DC converter, which is a key component of DC bus systems. We have adopted a dual active bridge circuit that performs the bidirectional power conversion required for connecting to storage batteries, and in a 200-kW prototype that incorporates our own SiC modules and proprietary control technologies, we achieved an industry-leading conversion efficiency of 98.0% or higher under rated conditions. Its wide allowable voltage range of 400 to 800 V DC also enables many power sources and loads to be connected without restriction. We have also developed control technology that maintains a constant DC bus voltage while preventing

connected storage batteries from being overcharged or overdischarged. By further refining these technologies, we aim to realize high-efficiency next-generation power supply systems for data centers and other applications.



Example of a DC Bus System Using an Isolated DC-DC Converter

Intellectual Property Initiatives

We position intellectual property as a key management resource and, under our intellectual property policy, we secure competitive advantages for our products by strategically acquiring and utilizing intellectual property rights, while promoting compliance with the international standards required in the global market.

Over the medium to long term, in addition to strengthening our intellectual property and international standardization activities for businesses and products in growth fields, we are utilizing

intellectual property analysis to improve our market analysis capabilities in order to create new products.

Intellectual Property Policy

- Develop and implement intellectual property strategies by analyzing intellectual property
- Strengthen each business's intellectual property portfolio and reduce risks
- Strengthen strategic international standardization activities

Strengthening Intellectual Property in Coordination with the R&D Strategy

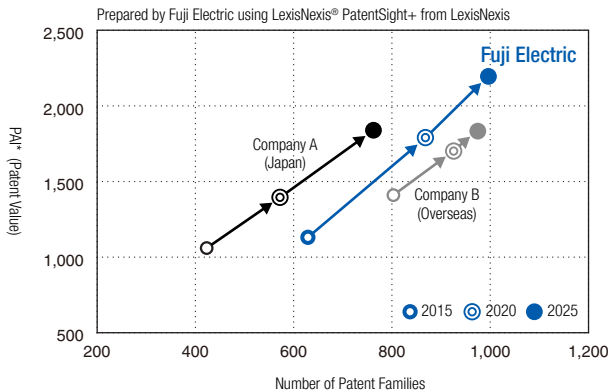
We build and manage the intellectual property rights we hold as business-by-business intellectual property portfolios, with intellectual property organized by factors such as technology and the number of years such rights have been held, and we continuously maintain our portfolios by strengthening, retaining, and abandoning rights in accordance with the business environment. To strengthen our intellectual property, we conduct activities in coordination with our R&D strategy, strategically reinforcing intellectual property while rapidly building patent portfolios in our growth and new fields.

Strategic Strengthening in Growth Fields

Our growth fields include products related to GX (energy management, mobility, and power semiconductors), DX, and global products, and we are strengthening intellectual property in each of these areas. In power semiconductors, for example, we have strengthened our intellectual property over many years in light of the competitive environment. As a result, as shown in Figure 1, by 2025 we had established a leading position among the global competition in both patent value (PAI*), which represents patent “quality,” and the number of patent families, which represents patent “quantity.”

* PAI (Patent Asset Index): Patent value calculated using LexisNexis® PatentSight+

[Figure 1] Strengthening Intellectual Property for Power Semiconductors in Growth Fields



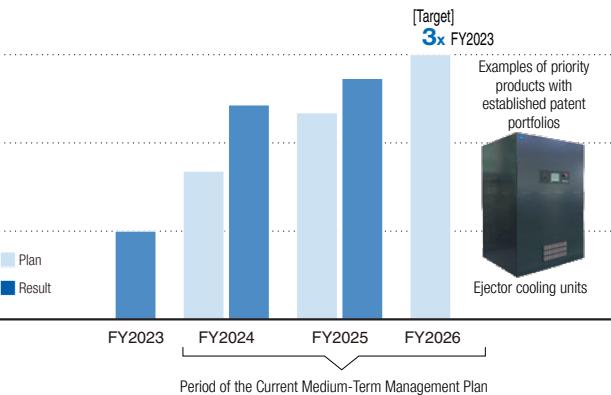
Rapid Development of Patent Portfolios in New Fields

New fields include new products related to fuel conversion and thermoelectricity, which are areas where market expansion is expected from fiscal 2030 onward. It is important to reliably secure intellectual property rights to such new technologies.

To this end, we formulated a plan to triple the overall target number of invention proposals in new fields by fiscal 2026 compared to fiscal 2023. By the end of fiscal 2025, actual performance had already reached 2.7 times the fiscal 2023 level, indicating progress has been faster than planned (Figure 2).

We are also working to rapidly build patent portfolios for priority products. For example, for our ejector cooling units, we carried out activities closely aligned with our business strategy by completing the process from filing to grant within a short period for the many invention proposals identified through fiscal 2024, in preparation for the start of sales in June 2026. In these activities, we strategically utilize the “Collective Examination for IP Portfolio Supporting Business Strategy” system, which supports comprehensive acquisition of intellectual property rights.

[Figure 2] Number of Invention Proposals in New Fields



Strategic International Standardization Activities (Example: Obtaining Security Certifications)

We have established the International Standardization Committee as a governance structure to oversee and lead international standardization activities across the company. By anticipating trends in standards and regulations, we promote rulemaking and certification acquisition to enhance our business competitiveness.

Security Certification Initiatives

Certification at Individual Bases

In recent years, amid a sharp increase in cyberattacks on control systems, increasingly stringent laws and regulations in global markets, and mandating of supply chain security requirements by customers, obtaining security certifications has become an essential business requirement. Under the International Standardization Committee, we began strategic initiatives to obtain certification on a per-factory basis in 2022, and as of fiscal 2026, many bases, including those of our affiliate companies, have completed certification under the international standard IEC 62443-4-1 (Table 1).

[Table 1] IEC 62443-4-1 Certifications at Individual Bases

Base	Fiscal Year Certified
Tokyo Factory	FY2023, renewed in FY2026
Suzuka Factory	FY2023
Kobe Factory	FY2024
Fuji Electric FA Components & Systems Co., Ltd. (Fukiage Factory, Otawara Factory, and others)	FY2024
Hakko Electronics Co., Ltd.,	FY2024
Tsukuba Factory	FY2026

Use of a Japanese Certification Body and the CB Scheme

For the certification renewal at the Tokyo Factory and the new certification at the Tsukuba Factory in April 2026, we newly utilized a Japanese certification body, the Japan Quality Assurance Organization (JQA), and obtained certification under the CB Scheme,* an international mutual recognition system.

Using JQA enabled faster certification, lower costs, and the retention of sensitive information within Japan. Furthermore, obtaining certification under the CB Scheme means that local testing of actual equipment when expanding overseas can be waived or significantly simplified, giving us a major advantage in accelerating our global expansion.

* A system under the IEC's international framework whereby product test results are mutually recognized among member bodies in more than 50 countries worldwide.



CB Certificate Presentation Ceremony
JQA President & CEO Ishii and President & COO Kondo
(on the right in the photo)