Chapter I Contribution to Society

Continuing from Environmental Action Plan (Stage VII), Environmental Action Plan (Stage VIII) turns on two points, namely, "contributing to society" and reducing the environmental burden of "our business activities."

In our efforts to contribute to society, we aim to contribute to the sustainable development of our customers and society by providing ICT services, improving the energy efficiency of our products, making more efficient use of resources, promoting recycling, and otherwise increasing environmental value in light of the United Nations' adoption of the SDGs in 2015.

Key Achievements in FY 2016

- Examples of contribution to the sustainable development of society: **9** cases released
- Announcement of key green technologies: **58**
- New products with top-level energy efficiency: **71.1%**
- Resource efficiency of new products: **14.7%** improvement (Compared with FY 2014)

About Symbols Used ✓ Examined by third-party organization ○ FY 2016 target achieved

	Theme	Target items (targets through the end of FY 2018)	FY 2016 Target	FY 2016 Key Performance		Status	
Our Society	Contribute to sustainable development and preservation of biodiversity through provision of ICT services	Contribute to sustainable development of society through provision of ICT services.	Cases released	9		○	P. 21
		Develop innovative technologies that address environmental issues.	Announce 35*2 key green technologies*1	Announced 58 key green technologies		○	P. 24
	Improve environmental performance of products throughout their lifecycle	Achieve top-level energy efficiency*3 for 50% or more of the new products.	New products with top-level energy efficiency in 40% or more of our new products	71.1%	✓	○	P. 26
		Promote eco design for resource saving and circulation and increase resource efficiency*4 of newly developed products by 15% or more. (Compared to FY2014)	5% or more improvement of the resource efficiency of new products	14.7% improvement	✓	○	P. 28
		Maintain over 90% resources reuse rate of business ICT equipment.	90% or more	92.0%	✓	○	P. 30

*1 **Key green technologies:** Technologies for reducing power/energy, improving man-hour efficiency, conserving resources, and resolving social issues.
*2 **Outside presentations:** Press announcements, academic society presentations, exhibitions, etc.
*3 **Top-level energy efficiency:** Establish a standard recognized as the top-level energy efficiency for each product category, as compared to the market and conventional products. See "Reference Information" on page 26 for details.
*4 **Resource efficiency:** Calculated by dividing "product value" by "environmental burden of use and disposal" of the individual elements (resources) of which the product consists. See "Reference Information" on page 28 for details.

Contribute to Sustainable Development of Society through Provision of ICT Services

Our Approach

The effort to "Contribute to sustainable development of society through provision of ICT services" is one of the goals in the Fujitsu Group's Environmental Action Plan (Stage VIII). With the United Nations having adopted a set of Sustainable Development Goals (SDGs) in 2015, thereby laying out clear international targets, the Fujitsu Group is now aiming to contribute even more to the sustainability of customers and society.

Bringing that vision of a sustainable society to fruition will require initiatives to tackle a wide variety of social and environmental issues, ranging from combating global warming through reductions in GHG emissions to saving natural resources, preserving biodiversity, stabilizing food supplies, responding to urbanization, and protecting against disasters. Information and communication technology (ICT), which helps optimize, streamline, and automate processes in a diverse mix of fields, has the power to drive solutions to the problems that society and the natural environment are facing. By leveraging its ICT services and working with customers, the Fujitsu Group is determined to play an important role in achieving SDGs on a global scale.

Summary of FY 2016 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VIII) (toward FY 2018)	Contribute to sustainable development of society through provision of ICT services.
FY 2016 Targets	Release case studies.
FY 2016 Key Performance	Released **9** case studies.

FY 2016 Performance and Results

Publishing Case Studies of ICT-Driven Approaches to SDGs

Fujitsu published nine case studies of efforts to contribute to SDGs, including educational solutions featuring content that underscores the importance of conserving natural resources, basic intelligence infrastructures for protecting biodiversity, disaster-prevention solutions for reducing damage from sewer flooding resulting from torrential rain, and next-generation bus location services.

Publicizing Efforts via outside Channels and Holding Seminars and Workshops for Employees

In working to create ICT services that help achieve SDGs, Fujitsu presented case studies of various ICT services at the UN-sponsored UNFCCC NAP Expo and other international conferences. The Company also used its intranet to distribute information and held internal seminars and workshops for employees. (See Page 48.)

Distributing information via the intrasite (ex.)

Case Studies of Contributions to SDGs

Next-Generation Bus Location Services

Target 11.2: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

FUJITSU Mobility Solution SPATIOWL uses real-time location information to tailor information and services to users' current locations. With that functionality, SPATIOWL helps optimize urban transportation, prevent and mitigate traffic congestion, and provide users with the ideal modes of transportation—all of which bring society closer to achieving SDGs.

The technology is already benefiting the DESUCA Company, which has issued over 100,000 DESUCA IC commuter cards for public transport in Kochi Prefecture. In the process of updating its DESUCA IC system, the company worked with Tosa Electric Railway (a core group company) to launch "buskocchi"—a service that lets users track bus locations. Fujitsu established a data link with the DESUCA IC system, which features an intuitive map display and search function. Fujitsu's contributions laid the foundation for high-accuracy, real-time visualizations of bus and user movement, thereby facilitating the optimization of bus schedules.

"With this system, we get a clear idea of differences in delays by route—and the locations where delays begin," a customer representative said. "When it comes to delay prevention and scheduling, we need the right environment to make the necessary changes. We hope Fujitsu continues to work with us in establishing that environment and developing the public transportation system in Kochi."

Contribute to Sustainable Development of Society through Provision of ICT Services

Case Studies of Contributions to SDGs

Detecting Signs of Sewer Overflow to Limit Damage from Torrential Rain

Target 11.b (excerpt): Substantially increase the number of cities adopting and implementing integrated policies and plans towards resilience to disasters

Target 13.1 (excerpt): Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters

The Fujitsu Group's disaster-prevention solutions help prevent disasters before they occur and make it easier to collect, analyze, and publicize information during a crisis—benefits that make communities more resilient to disasters and enhance their adaptive capacities to climate-related hazards.

In a field trial of a sensing system for detecting signs of sewer overflow, the partners succeeded in real-time detection of early signs of inland flooding during localized downpours and gathered data for effective analyses. The trial also included validation of energy harvesting technology, which converts small amounts of energy from the natural environment into electricity. The partners confirmed that it could generate enough electricity for stable system operation and eliminate the need for battery replacement for five years or more.

"Monitoring the water levels in the sewer system helps us speed up the process of sending staff to sites, implementing emergency measures, and delivering evaluation information to residents," the customer said. "By quantifying changes in water levels, as well, the technology makes it possible to validate drainage plans, and thereby mitigate flood damage."

Laying the Groundwork for Science Museum Net (S-Net)

Goal 4 (overview): Provide quality education

Goal 17 (overview): Revitalize global partnership

Goals 14 and 15 (excerpt): Conserve and sustainably use water/land ecosystems

Musetheque is Fujitsu's educational solution to help museums, galleries, public records offices, and libraries manage their collections and materials. It contributes to education and research for biodiversity conservation.

The National Museum of Nature and Science aims to preserve collections of over 4.5 million specimens as the common heritage of mankind, and nurture scientific literacy through exhibits and learning support. Using Musetheque, the Museum built "Science Museum Net" to collect and share specimen data on collections at natural history museums throughout Japan. As Japan's Global Biodiversity Information Facility site, the Museum also uses Science Museum Net to publicize natural history specimen information.

"With our system, we've been able to gather data from over 80 institutions nationwide and amass a collection of information that exceeds what a single museum could offer," a Museum representative told us. "Science Museum Net is a popular resource for many researchers around the world, too. We want to keep offering users a valuable source of primary information on biodiversity."

Offering On-Site Environmental Classes

Goal 4 (excerpt): Ensure higher-quality, equitable learning and research throughout the primary and secondary education processes

Goals 6, 11, and 15 (excerpt): Protect and preserve endangered species in the natural world and preserve biodiversity

Fujitsu's "Manavication," an educational solution for collaborative learning in K-12 school environments, enables educators to help students engage in fundamental learning, acquire knowledge, hone their critical thinking, reasoning, and expressive abilities.

In a practical application of the technology, Fujitsu teamed up with WWF Japan to develop environmental study materials to help reconfirm the relationship between resources and lifestyles, think about what humans need to do to achieve a one planet lifestyle, and provide a catalyst for action. By posting and sharing students' opinions via an electronic whiteboard and other resources, Manavication encourages learners to think about the views of their peers and fosters a collaborative-learning environment. Fujitsu has been conducting visiting lectures on environmental education at domestic elementary and junior high schools. Approximately 130 groups and 7,200 students participated.

"Electronic study materials now provide a new means to make environmental education more attractive," a WWF Japan representative said. "The SDGs underscore the importance of education. WWF Japan will continue to pursue possibilities for new education."

Contribute to Sustainable Development of Society through Provision of ICT Services

Main Activities in FY 2016

GHG Emission Reduction through the Provision of ICT

Through the provision of ICT, the Fujitsu Group is working to create innovations in wide-ranging areas of society, including improvement of efficiency in energy usage, greater efficiency in production activities, and reduction in the movements of people and goods. By doing so, we aim to contribute to the reduction of GHG emissions. We believe that the use of ICT by large numbers of customers will reduce GHGs in society overall, while leading to ongoing business growth for the Fujitsu Group as well.

The Fujitsu Group is working to quantitatively visualize—and also expand—the contribution to GHG reductions from the ICT used by our customers. The Fujitsu Group recognized 38 new cases of environmentally conscious solutions in FY 2016, bringing the cumulative total to 489 and helping reduce total CO_2 emissions by 7.37 million tons. Estimates indicate that middleware products that support ICT platform operations and management are effective in minimizing environmental impact by limiting the amounts of electricity that ICT devices consume. With FUJITSU Software Systemwalker Operation Manager, for example, users can schedule their servers to turn on and off according to usage status—and that functionality reduces server electricity consumption.

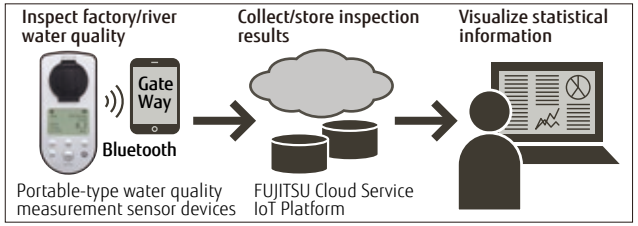
In FY 2016, we also expanded our "environmentally conscious solutions" into our cloud services. Using PaaS (Platform as a Service) technology allows users to accelerate application development and operations, thereby creating a lighter environmental impact.

Utilizing the IoT Platform to Lighten the Environmental Load of the Development Phase

OPTEX Co., Ltd. began offering "WATER it," a quick water-quality analysis service for users, to users in Asia in April 2016. WATER it forwards data from OPTEX's portable water quality measurement sensors to the cloud via smartphones, enabling users to analyze and visualize data on their devices. Using Fujitsu's IoT Platform, OPTEX successfully developed the service in a quick, cost-efficient manner. For the demonstration tests, which began in the fall of 2015, the team in charge of developing the equipment completed the water quality control application in just three months. According to Fujitsu estimates, the technology reduces the environmental burden of the development phase by approximately 50%.

WATER it will also help address environmental issues by improving water quality in Asia, where industrialization continues to charge forward. WATER it gives users the ability to make frequent measurements of water quality, which they can use to gather accurate analysis results and draw on their findings to develop plans for water-quality improvements. "By driving this kind of virtuous cycle, we put ourselves in position to sustain our business-development efforts and make contributions to society," an OPTEX representative explained. "That's the kind of business model we need."

WATER it, OPTEX's quick water-quality analysis system



Reference Information Calculation Method for Amount of GHG Reduction Effect

Fujitsu uses assessment methods from Fujitsu Laboratories to evaluate environmental burden-reduction of its ICT offerings (in CO_2 emissions) and measures annual GHG reductions from solution user count, client count, or annual sales.

Overview of Environmental Impact Assessment Methodology

Conversion of 7 factors to CO_2 emissions

Resource consumption	Consumption of paper, CDs, documents
Movement of people	Movements by airplanes, trains, buses and automobiles
Transport of goods	Transport by trucks and rail freight
Office space	Associated work-hours, documents/equipment space
Warehouse space	Storage in regular/ refrigerated warehouses
Power Consumption of ICT/Network equipment	Power consumed by ICT equipment (servers, PCs, etc.)
Data communication traffic volume	Data communication traffic volume by Internet/FAX

Environmental-load basic unit database

Sum of CO_2 emissions

Before/After comparison

CO_2 reduction effect

Before After

ICT solutions with expected reduction effect of 15% or more are certified as **environmentally conscious solutions**

Comment from Third-Party Verification Body

Continuing from last year, we reviewed the data on the amount of contribution to GHG emission reduction through provision of ICT. For FY 2016, we changed the methods for determining reduction units and took other steps to improve the accuracy and reliability of calculation results.

Masatoshi Sakaguchi
System Certification Division, Bureau Veritas Japan

Developing Innovative Technologies for Solving Environmental Issues

Our Approach

Fujitsu Laboratories, the core research and development (R&D) organization in the Fujitsu Group, works on a diverse mix of emerging ICT-related technologies—ranging from advanced materials, next-generation devices, networks, and cloud systems to the creation of next-generation solutions and services—with the environment always in mind.

Drawing on these efforts to develop innovative technologies and embracing its mission to create technologies that can help solve social and environmental problems, Fujitsu Laboratories promotes environmental activities ranging from CO_2 emission reductions through energy-conserving practices and work task-efficiency improvements to resource-saving initiatives, countermeasures for natural disasters, the preservation of biodiversity, and efforts to combat global warming.

Summary of FY 2016 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VII) (toward FY 2018)	**Develop innovative technologies** that address environmental issues.
FY 2016 Targets	Announce **35** key green technologies* (event)
FY 2016 Key Performance	Announced **58** key green technologies (Press announcements: 25; Academic society presentations + exhibitions: 33)

* **Key green technologies:** Technologies for reducing power/energy consumption, improving work-hour efficiency, conserving resources, and tackling social issues

FY 2016 Performance and Results

Showcasing Developed Technologies to the World

Fujitsu's Environmental Action Plan (Stage VIII) includes the objective of enhancing the company's ability to showcase the green-oriented technologies in its development portfolio to the public. In FY 2016, we expanded on our normal mass-media initiatives by giving presentations at a new selection of events (academic society meetings and exhibitions).

In terms of the SDGs, the technologies that Fujitsu announced in FY 2016 contribute primarily to two goals: "Make cities and human settlements inclusive, safe, resilient and sustainable" (Goal 11) and "Take urgent action to combat climate change and its impact" (Goal 13).

FY 2016 Development Performance (items appearing in the media)

(1) Technology for quickly tracking changes in open-source software
(2) High-accuracy fuel-efficiency estimates using ship operation data
(3) Mathematical AI technology for quickly solving urban security positioning problems
(4) High-speed forensic technology for grasping the entirety of a cyber-attack at a glance
(5) Technology for capturing human movements at high-speed, high-precision levels via 3D sensing and determining the corresponding techniques in real time
(6) Technology for building optimal networks for media-based services
(7) Semiconductor packaging substrate that enables thin film capacitor embedding
(8) Field engineering technology for providing IoT services rapidly
(9) Technology for automatically generating image recognition algorithms on an AI-enabled platform
(10) Energy-saving technology for cooling data centers
(11) Technology for automatically assessing personal data privacy risks
(12) System for detecting sewer flooding, aimed at reducing damage from torrential rain and flash floods
(13) Technology that allows 5G mobile wireless base stations and access points to achieve high-speed transmissions (over 10 Gbps) at low power-consumption levels on par with Wi-Fi
(14) LED-watermarking technology for automating and optimizing manual-labor tasks
(15) Technology for automatically extracting business specifications in programs
(16) Millimeter-wave CMOS circuitry for automotive radar, enabling the world's fastest frequency modulation
(17) Technology for using conversational speech to automatically identify customer satisfaction/dissatisfaction
(18) Analysis technology for improving the communications performance of virtual networks
(19) In-memory deduplication technology for accelerating the response times of large-scale storage
(20) Flexible, battery-less beacon that uses analog power circuit control to create a compact, slim configuration
(21) Technology for measuring magnetic properties under stress with a piezoelectric device
(22) Mobile-app control technology for revolutionizing home healthcare
(23) Technology for the centralized management of data distributed in the cloud and on edge servers
(24) Technology for enabling the secure use of cloud services via IoT devices using smartphone-based biometric authentication
(25) One of the world's smallest DC-DC power modules

Developing Innovative Technologies for Solving Environmental Issues

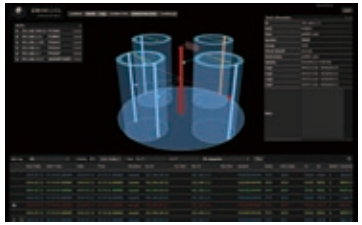
Main Development Initiatives in FY 2016

High-Speed Forensic Technology for Grasping the Entirety of a Cyber-Attack at a Glance

Assessing the damaging effects of malware, which infect organizations to trigger problems, used to involve bringing experts in for time-consuming analyses of network and device logs.

By compressing, storing, and automatically analyzing massive volumes of network communications data, Fujitsu Laboratories has now developed technology that lets users analyze the status of a targeted cyber-attack in a short period of time and shows the whole picture at a glance. The technology collects communications data flowing through the network and then, using the data to infer the commands executed on the PC, connects command operations with specific user information to identify who executed what type of remote control and collect trace information about command operations. Upon detecting a targeted cyber-attack in its home system, the technology extracts affected PCs one after the other and automatically draws the attack status from a comprehensive perspective.

As a result, users can conduct analyses quickly without needing to be an expert, and can implement prompt, far-reaching countermeasures before the damage of an attack can spread.



Screenshot of the analysis system for the status of targeted attacks

The Industry's First Technology for Automatically Assessing Personal Data Privacy Risks

Japan's Amended Act on the Protection of Personal Information, which goes into effect in 2017, will make it possible to provide third parties with de-identified personal data—even without the individual's consent. Before providing de-identified data, providers must first ensure it complies with guidelines and evaluate the risk of specific individuals being recognized.

Based on data distribution, Fujitsu Laboratories developed the industry's first technology to automatically search for combinations of attributes that make it easiest to identify individuals—as well as quantifying that ease of identification—in a realistic timeframe. This makes it possible to quickly see which attributes to prioritize for de-identification. Fujitsu Laboratories also developed a technology for calculating potential damage from data leaks and determining compliance with various de-identification guidelines. Users can evaluate risks and implement appropriate de-identification processes quickly and easily.

Technology for quantifying the ease of personal data identification

Age	Occupation	Permanent address
50	Artist	Downtown
50	Public servant	Downtown
60	Artist	Downtown
60	Public servant	Downtown
60	Public servant	Suburbs

5 records can be identified

Before the new technology: Difficult to establish countermeasures

Age	Occupation	Permanent address	
50	Artist	Downtown	
50	Public servant	Downtown	
60	Artist	Downtown	
60	Public servant	Downtown	Difficulty level: 0.5
60	Public servant	Suburbs	Difficulty level: 0.6

Possible to identify based on age and occupation
Difficulty level: 1.8

5 records can be identified

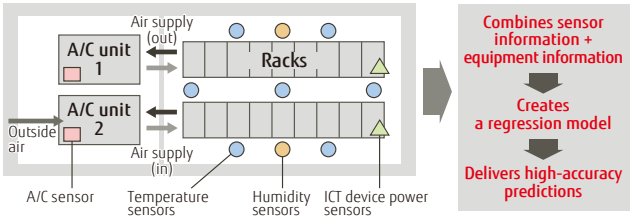
With the developed technology: Easy to see items to de-identify

Energy-Saving Technology for Cooling Data Centers

Currently, reports indicate that data center energy consumption constitutes 1–2% of all electricity use, so better energy conservation is needed, particularly in air-conditioning.

To respond to the dynamic status changes unique to data centers, such as moving information equipment in and out and modifying rack arrangements, Fujitsu Laboratories has developed a highly accurate prediction technology. The innovation sequentially predicts air-conditioning effects, making it possible to reduce the amount of energy that air conditioning consumes. The technology creates a database that incorporates the status of air-conditioning equipment and operates under conditions requiring the system to gather information from two sources: not only choosing measurement data for addressing prediction targets but also automatically selecting at least one variable from the air-conditioning equipment status. By creating a predictive model using the selected variables, the technology successfully improves predictive accuracy.

High-precision temperature-prediction technology



Development of Top-Level Energy Efficient Products

Our Approach

As ICT spreads, an increase in energy demand is expected in proportion to the higher performance and higher-density integration of servers and other ICT products. Accompanying this, energy-related regulations for ICT products are increasing in various countries and regions, such that energy efficiency is taking on importance within society in the form of energy label conformance and green procurement requirements.

The Fujitsu Group believes that we also must aim to improve the energy performance of products during their use, in order to reduce GHG emissions. In that context, we will actively implement energy-saving technologies and continue working to improve the energy efficiency of products. Through these and other product-development efforts, we will strive to reduce the power consumption of our offerings in customer usage settings.

Summary of FY 2016 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VIII) (toward FY 2018)	Achieve top-level energy efficiency for **50**% or more of the new products.
FY 2016 Targets	Make **40**% or more of new products top-level energy efficient.
FY 2016 Key Performance	Made **71.1**% of new products top-level energy efficient.

FY 2016 Performance and Results

Actively Applied Energy-Saving Technology

We have set targets for the achievement of top-level energy efficiency based on the number of product series that are expected to be developed during FY 2016–18.

Applications of energy-saving technologies include new, high-efficiency microprocessors and power supplies, energy-saving displays, optimized energy-saving controls, and the strengthening of power management features. In addition to these, we are actively undertaking the aggregation of LSIs and the reduction of components.

Achieved Top-Level Energy Efficiency for 71.1% of New Products

As a result of applying and expanding energy-saving technologies across our divisions in products including servers, PCs, network devices, and imaging devices, we were able to exceed by over 31.1% our 40% target (vs. FY 2016) for new product top-level energy efficiency.

Working toward Our Targets

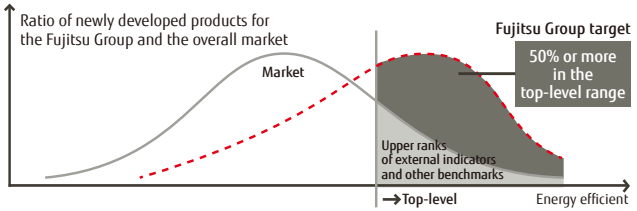
To help "achieve top-level energy efficiency for 50% or more of the new products," one of the objectives in our Environmental Action Plan, we will continue to make even stronger development efforts to give our products—from leading items in each division to the rest of the lineup—top-level energy efficiency.

In addition, we will deploy outstanding energy-saving technology and expand its application to products. Looking toward the future, we aim to push the development of advanced technology, which will contribute to revolutionary improvements in energy efficiency.

Reference Information

Top-Level Energy Efficient Products

Products, beginning with top-runner products (first in the world or industry, top of the world or industry), that meet criteria equivalent to the upper ranks of external indicators and other benchmarks of energy efficiency



Reference Information

Top-Level Energy Efficient Product Target Standards

Fujitsu sets targets that recognize top-level energy efficiency standards in each product area compared with the market overall or with conventional products.

Example of Target Standards*1

Reference Level	Product Categories
ENERGY STAR criteria compliant	PCs, displays, imaging equipment, etc.
Top-level Top Runner achievement rate under the Energy Conservation Law	Servers, storage systems, etc.
Industry-leading energy efficiency	LSI, products for specified fields, etc.
Industry's highest-level battery life	Smartphones
Power consumption reductions over prior products/prior performance	Network products*2, electronic components, etc.

*1 Depending on product specifications, standard values differ even for products within the same category.
*2 A larger number of stars designate the top-level, concerning the products which are assessed by Ecology Guideline For the ICT Industry.

Development of Top-Level Energy Efficient Products

Main Development Initiatives in FY 2016

The Industry's First High-Efficiency Cooling Technology (VLLC) Unix Server

SPARC M12 Series

Fujitsu developed the industry's first Vapor and Liquid Loop Cooling (VLLC) technology using vaporization heat. Fujitsu has implemented the technology on the SPARC64 XII processors in the SPARC M12 Series, which debuted in April 2017. This enables the products to achieve cooling efficiency levels roughly double those of conventional cooling methods. Most existing servers use air-cooling systems, cooling the processor's surface heat sink with a fan. However, heat sinks—which release heat—continue to get bigger as higher-performance processors generate more heat. Fujitsu's new VLLC technology for vacuum-evaporative cooling delivers outstanding cooling performance by using water—which boasts excellent heat-transport capabilities—as its cooling medium and incorporating evaporation, a phenomenon that efficiently removes heat by decompressing the interior. This helps reduce fan power consumption.

The M12-2, part of the M12 Series, features a 80 PLUS® Platinum certified power-supply unit capable of converting power at an incredible 94% efficiency rate.

A Wireless Module with Higher Receiver Sensitivity and Less Power Consumption

FWM7BLZ20 Series

Fujitsu's FWM7BLZ20 Series of compact wireless modules compatible with Bluetooth version 4.2* features a wireless communication LSI with a built-in processor boasting excellent processing capabilities and low power consumption. By optimizing energy-management functions but maintaining the same size as existing products, the modules almost double the transmission distance of existing products at a receiving sensitivity of -94 dBm (measurement value), at half the power (around 5.4 mA; measurement value). Further, sensor data analysis traditionally done by servers is now possible within the module, so the module reduces network load, making systems less energy-intensive. A lighter internal layout reduces resource usage by 18%.

It is the ideal solution for customers considering remote maintenance, reduction of the power-consumption levels of Bluetooth devices, and boosting the speed of IoT devices.

* **Bluetooth version 4.2:** Bluetooth is the global wireless standard for exchanging data over short distances; version 4.2 introduces more features for IoT-related devices.

A Palm Vein Authentication Device that Cuts Power Consumption during Authentication by 80%

(L)
PalmSecure-F Pro Mouse
(C)
PalmSecure-F Pro Standard
(R)
PalmSecure-F Pro
(for embedding)

The PalmSecure-F Pro lineup uses a CMOS sensor with a higher frame rate* than the previous device, features a new current driving circuit, and shortens output of LED current (quickens shutter speed). By also capturing fewer frames during the imaging process, it cuts power consumption by 80% per authentication.

The device is also more compact. The product's smaller optical size, which enables smaller lenses, and the denser LED package configuration make it just one-third the total volume of the previous device. The device also expands the operating temperature range from the conventional 0–60°C to a much wider -40–85°C. As a viable solution for embedded devices and applications in automobiles, which normally present considerable challenges, it broadens the scope of palm vein authentication systems. Finally, the device improves the authentication rate from a 1,000-person scale to a 10,000-person scale, enabling implementation in larger infrastructures.

* **Frame rate:** A value indicating the number of still images (frames) in one second of content; higher frame rates make the subjects in a video appear to move more smoothly.

Improving the Resource Efficiency and Resource Circulation of Products

Our Approach

There is a growing view worldwide of the importance of resource efficiency. An example can be seen in the EU's designation of resource efficiency as a growth strategy and its establishment of the Resource Efficiency Flagship Initiative.

Efficient use of resources in the ICT products that we provide to customers is important. We have engaged in 3R design that draws on the principles of reduce, reuse, and recycle, and have developed our products with technology that is effective in reducing the use of resources. We are making efforts to improve resource efficiency, which is made possible by designing products to be lighter and smaller, using recycled plastics, reducing the number of parts, enhancing ease of disassembly, and improving recyclability. Our goal is to offer products that provide customers with benefits including compactness, light weight, and space savings.

Summary of FY 2016 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VIII) (toward FY 2018)	Promote eco design for resource saving and circulation and increase resource efficiency of newly developed products by **15%** or more (Compared to FY 2014)
FY 2016 Targets	Increase resource efficiency of new products by **5%** or more (Compared to FY 2014)
FY 2016 Key Performance	Increase resource efficiency of new products by **14.7%** improvement (Compared to FY 2014)

FY 2016 Performance and Results

Improving the Resource Efficiency of New Products

In FY 2012, the Fujitsu Group created its own definition of resource efficiency. In FY 2016, as well, we continued to use our indicators to evaluate products newly developed by Fujitsu*, while also reducing product part quantities and reducing product size through smaller, thinner, and lighter parts and higher-density mountings.

* **Products newly developed by Fujitsu:** Excludes products for which resource efficiency is determined by customer specifications or standards.

Achieving 14.7% Improvement in Resource Efficiency

Fujitsu has achieved a 14.7% improvement in FY 2016, against a target of 5%, through reduced size and weight, in PCs, smartphones, palm authentication devices, and image scanners.

Fujitsu Receives the LCA Japan Forum Chairman's Award (See Page 48)

The Fujitsu Group received its first Chairman's Award at the 13th LCA Japan Forum Awards*. The award recognized Fujitsu's efforts to improve product resource efficiency, implement Group-wide improvement activities, and continue applying its environment-related activities across its product lineups.

* **LCA Japan Forum Awards:** Given to companies that work to alleviate products' environmental burdens by applying, expanding, establishing, and energizing life-cycle assessments.

Award recipients

Working toward Our Targets

To improve new product resource efficiency by at least 15%, Fujitsu will continue current initiatives, while expanding development of new lightweight, rigid materials and the use of recycled materials. We will also widely publicize product environmental performance to grow sales.

Reference Information

Definition and Calculation of Resource Efficiency

Resource efficiency is evaluated by dividing the value of a product by the environmental burden from use and disposal of the elements (resources) comprising the product.

$$\text{Resource efficiency} = \frac{\text{Product value}}{\text{Environmental burden from resource usage} + \text{Environmental burden from resource disposal}}$$

Environmental burden from resource usage = Σ (Resource burden coefficient x Resource usage volume)

Environmental burden from resource disposal = Σ (Resource burden coefficient x Resource disposal volume)

Definition of Each Item

Product value	To place emphasis on the valuation of reduction in environmental burden due to resource usage and disposal, product value is limited to those that are related to resource usage and is set on a per-product basis. (Example of factor not considered: CPU performance improvements)
Resource burden coefficient	Environmental burden weighting coefficient that is specific to a particular resource and considers factors like exhaustibility, scarcity, and environmental impact from mining and disposal. Activities will begin with this figure set to a value of "1" for all resources.
Resource usage volume	Mass of each resource used in the product (excluding the mass of recycled plastic used).
Resource disposal volume	Mass of each resource disposed of (not reused) in connection with a post-use product (design value). Activities will begin with this figure set to a value of "0."

Improving the Resource Efficiency and Resource Circulation of Products

Main Activities in FY 2016

A Smartphone 12% Thinner and 5% Lighter Than Its Predecessor

arrows SV **F-03H**

34% resource efficiency improvement (over conventional models)

Fujitsu released the arrows SV F-03H smartphone in July 2016. Featuring a variety of unique design elements, the product achieves both a lightweight, resource-saving structure and a remarkable degree of toughness.

In addition to incorporating a high-density component layout that cuts the board area by 60% relative to the previous model, the device design uses an embedded touch panel with an integrated display to make the device 5% lighter and 12% thinner. The design team also focused on balancing toughness with aesthetic appeal, allowing the device to pass drop tests and other durability assessments as well. The number of repaired units dropped 70% from the last model.

The device's battery life* increased to more than three days. The plants manufacturing the smartphones switched to automated lines for the back panel-installing process, thereby contributing to CO_2 reductions in the production stage.

* **Battery life:** The average amount of time that a battery lasts under average smartphone usage conditions (calculated based on data from a June 2015 study by Intage Inc.)
(NTT DOCOMO research/manufacturer research)

The World's Lightest 13.3-Inch Mobile PC

LIFEBOOK UH75/B1

97% resource efficiency improvement (over conventional models)

The LIFEBOOK UH75/B1, which hit the market in February 2017, features new device casing parts and new printed-circuit boards, LCDs, batteries, and keyboards. By using the new components and working closely with plants and suppliers, Fujitsu created the world's lightest 13.3-inch mobile computer, weighing 761 grams.

Use of a magnesium-lithium alloy cover (LCD back cover) for the casing and thin-wall magnesium alloy casting for the top and bottom cover of the unit realized a thin and robust design in addition to lighter weight. Fujitsu also worked with its LCD manufacturer to develop thin glass and thin backlight features. Not only did the collaboration enable a lightweight design, but both collaborators also inspected each other's production lines to ensure maximum quality.

For the device components, too, Fujitsu focused on eliminating unnecessary elements, meticulously crafting a streamlined design and painstakingly minimizing the overall weight down to the last tenth of a gram.

Advancing 3R Design

Through our proprietary product environmental assessments and green product evaluations, the Fujitsu Group is working toward the application of reduced resource usage, improved recyclability, and other technologies that take into account the 3Rs. Examples of the effective resource-saving technologies that we are deploying in our products include reductions in the number of components and cables, performance enhancements, space savings through higher-density integration, and digital product manuals. Furthermore, we are using Fujitsu's own 3-D Virtual Product Simulator (VPS), which is popular with many of our customers during their product design processes, to test the steps involved and the convenience of product assembly and disassembly before creating prototypes.

From 2010, we have also conducted regular study tours for designers at the Fujitsu Group recycling centers. In addition to hands-on experience with dismantling used products, designers gain feedback from staff in charge of recycling through idea exchanges and explanations of the obstacles to ease of dismantling. From FY 2015, the Fujitsu Group has been summarizing examples of the obstacles to ease of dismantling that we have learned from some 90 case studies at 5 recycling centers. Results are distributed in a systematic collection complete with pictures.

Gaining experience in dismantling at recycling center study tour

Product Recycling

Our Approach

The Fujitsu Group's product recycling programs are based on Extended Producer Responsibility (EPR) and Individual Producer Responsibility (IPR). EPR holds that producers bear responsibility for products from design and manufacturing to disposal and recycling. IPR holds that producers bear responsibility for their own products. IPR is a major challenge for the Fujitsu Group in expanding our business globally, but we believe that responding to this challenge, and that of EPR, in collaboration with industry associations and governments will enable us to help create a recycling-minded society in which the requirements and demands of all stakeholders are met.

The Fujitsu Group carries out recycling programs that comply with the laws and regulations of the various countries in which it operates. Fujitsu accepts industrial waste for appropriate processing at Fujitsu recycling centers across Japan. We also try to do as much collection, reuse and recycling as we can, even in countries where recycling is not obligatory.

Summary of FY 2016 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VIII) (toward FY 2018)	Maintain over 90% resource reuse rate for business ICT equipment at Fujitsu recycling centers.
FY 2016 Targets	Achieve a 90% resource reuse rate.
FY 2016 Key Performance	Achieved a 92.0% resource reuse rate.

FY 2016 Performance and Results

Promoted Recycling of ICT Products

In Japan, the Fujitsu Group has built a recycling system that covers the entire country. While ensuring thorough traceability and security, we are steadfastly implementing Extended Producer Responsibility by providing safe and secure services that achieve high resource reuse rates in order to promote the recycling of ICT products.

Achieved a 90% or Higher Reuse Rate

We processed 4,185 tons of recycled ICT products (used ICT products for business applications) from corporate customers and achieved a resource reuse rate of 92.0%. Also, we have now collected a total of 61,435 end-of-life PCs from individual customers.

Trends in Resource Reuse Rates of End-of-Life Business ICT Products

FY	2013	2014	2015	2016
Resource reuse rate* (%)	91.3	90.9	92.0	92.0
Amount processed (tons)	5,035	5,016	5,203	4,185

* Weight percent ratio of recycled parts and materials to end-of-life products

Trends in Numbers of End-of-Life PCs Collected from Individual Customers

FY	2013	2014	2015	2016
End-of-life PCs collected (units)	98,549	103,276	69,801	61,435

TOPICS

Hong Kong Recycling Association visits Fujitsu Recycling Center

In February 2017, with support from the EMS Committee at Fujitsu Hong Kong, representatives from the Hong Kong WEEE Recycling Association toured the Fujitsu East Japan Fukushima Recycling Center's technologies. The tour showcased the operations at the facility, including systems for keeping waste to near-zero levels and methods for processing materials.

Hong Kong produces roughly 70,000 tons of waste electrical and electronic equipment (WEEE) a year. Most of the waste is exported abroad, while valuable materials are reused or collected. With international trade regulations on WEEE growing increasingly strict in recent years, and used product markets outside Hong Kong are shrinking. It is increasingly necessary to promote WEEE-recycling.

Under the Hong Kong government's policy, the Association gathers information on electronic waste-recycling practices around the world and encourages efforts to implement viable solutions in Hong Kong. Association Vice President Eddie Chan was enthusiastic about his experience. "It was helpful to see the technologies," he said. "We learned so much about how to generate more revenues from recycled products."

Representatives from the Hong Kong WEEE Recycling Association pose for a picture

Participants gather information