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Chapter I | Contribution to Society

Under the Environmental Action Plan (Stage VII), the Fujitsu Group is aiming to expand our contributions to society overall and is globally expanding the scope of our targets, including reduction of GHG emissions through the provision of ICT and social contribution activities by employees. Moreover, Fujitsu has set goals for expanding the provision of solutions that will contribute to global sustainability, as well as for promoting research and development. The company will make efforts to improve the environmental performance of ICT products.

Key Achievements in FY 2014

Contribution to reducing GHG emissions through ICT
24.83 million tons

New products with top-level energy efficiency
46.0%

Resource efficiency of new products
33.6% improvement (compared with FY 2011)

Hours of social contribution activities by employees
145,000 hours

About Symbols Used ✔ Examined by third-party organization ◯ FY 2014 target achieved

	Theme	Target items (targets through the end of FY 2015)	FY 2013 Key Performance	FY 2014 Key Performance		Status	
Our Society	Contribution to Society by ICT: Reduce Greenhouse Gas Esions	Reduce greenhouse gas emissions for our customer and society over 38 million tons.[1]	10.86 million tons (domestic: 6.68 million tons; overseas: 4.18 million tons)	Contributed 24.83 million tons (Japan: 15.43 million tons; overseas: 9.40 million tons)	✔	◯	P. 19
	Contribution to Society by ICT: Increase Solutions	Increase the deployment of sustainability solutions.	Prepared an action framework Set definitions and criteria, and identified solutions	Identified 12 solutions that contribute to sustainability to strengthen our solutions portfolio in the field of climate change, and gathered case studies		◯	P. 21
	Design and Deliver Eco-efficient Products: Energy Efficiency	Achieve top-level energy efficiency[2] of more than 50% of the newly developed products.	39.0%	46.0%	✔	◯	P. 22
	Design and Deliver Eco-efficient Products: Resource Efficiency	Increase resource efficiency of newly developed products by 35%[3] compared to 2011.	Increased by 21.3%	Increased by 33.6%	✔	◯	P. 24
	Leading Edge R&D	Develop innovative technologies that enable solutions and products to reduce the environmental load.	Announced 18 key green technologies	Announced 25 key green technologies		◯	P. 26
	Corporate Citizenship: Social Challenges	Support initiatives that address the complex social and environmental challenges, e.g. biodiversity conservation.	Provided funding, technology, and human resource support	Provided funding, technology, and human resource support		◯	P. 28
	Corporate Citizenship: Social Activities	With society, support our employees to volunteer social activities.	Dedicated 129,000 hours to social contribution activities by employees	Dedicated 145,000 hours to social contribution activities by employees		◯	P. 28

[1] **38 million tons:** Calculate the numeric target by multiplying annual sales of each solution category by a conversion factor of CO2e savings per sales, which is based on around 300 case studies of Environmentally Conscious Solutions in Japan. There was an upward revision of the target at the end of FY 2014.
[2] **Achieve top-level energy efficiency:** Achieve more than 25% of market benchmark in energy efficiency such as top-runner products (first in the world or industry, top of the world or industry)
[3] **35%:** An upward revision of the target at the end of FY 2014

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GHG Emission Reduction through the Provision of ICT

Our Approach

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. Between FY 2009 and FY 2012, this ICT usage has contributed to a cumulative reduction of 12.23 million tons of CO_2 emissions. From FY 2013, we will extend the scope of our targets overseas, and aim to contribute to a global cumulative reduction in emissions of 38 million* tons or more over the three years through FY 2015.

*Revised upward from 26 million tons.
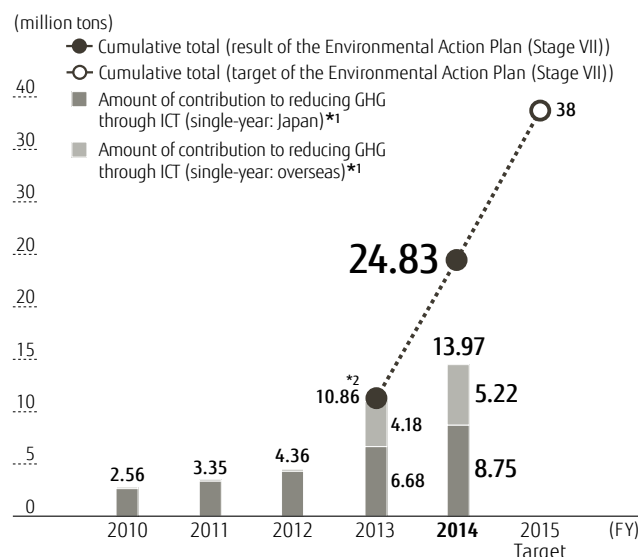
Summary of FY 2014 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VII) (toward FY 2015)	Reduce greenhouse gas emissions for our customers and society	over 38 million tons
FY 2014 Targets	Contribute to reducing customers' and society's greenhouse gas emissions by	over 16.99 million tons
FY 2014 Key performance	24.83 million tons	Japan: 15.43 million tons / Overseas: 9.4 million tons

Performance and Results for FY 2014

Expanding Environmentally Conscious Solutions

To advance the quantitative visualization of GHG reduction effects through ICT, we recognize solutions with an expected reduction effect of 15% or more as "environmentally conscious solutions." In FY 2014 we moved ahead with recognizing these cases, centered on solutions that we provide to large numbers of customers. Moreover, we leveraged opportunities to propose environmental contribution effects to customers and worked to convey the environmental value of our solutions.

Amount of Contribution to Reducing Emissions of Greenhouse Gases (GHG) through the Provision of ICT

(million tons)

- ● Cumulative total (result of the Environmental Action Plan (Stage VII))
- ○ Cumulative total (target of the Environmental Action Plan (Stage VII))
- ■ Amount of contribution to reducing GHG through ICT (single-year: Japan)*1
- ■ Amount of contribution to reducing GHG through ICT (single-year: overseas)*1

(FY)	2010	2011	2012	2013	2014	2015 Target
Single-year	2.56	3.35	4.36	6.68 (overseas 4.18), *2 10.86	8.75 (overseas 5.22), 13.97	
Cumulative					24.83	38

*1 Values for FY 2010 to FY 2012 represent performance under the Environmental Action Plan (Stage VI). From FY 2013, we are expanding the scope globally.
*2 FY2013 results were revised accompanying reassessment of categories for compiling data from overseas.

Recognizing 51 New Cases that Contribute to 24.83 million tons of GHG Reduction

The Fujitsu Group recognized 51 new cases of environmentally conscious solutions in Japan, bringing the cumulative total to 400. These new cases include the Fujitsu Enterprise Application GLOVIA ENTERPRISE MM, a maintenance solution to support the transformation of maintenance practices for manufacturers, and a cloud-based digital medical record system called Fujitsu Healthcare Solutions HOPE Cloud Chart.

The result has been a reduction effect of 24.83 million tons of GHG worldwide, meeting our target.

FY 2015 Targets and Plans

Setting Priority Solutions and Advancing Recognition

We revised our target of a 26-million-tons cumulative amount of contribution to GHG reduction from FY 2013–2015 to a 38-million-ton target. Toward achieving this target, we are placing priority on solutions which we provide to large numbers of customers and solutions for which we foresee expanded use by customers, such as cloud computing and mobile, as we engage in recognition of environmentally conscious solutions.

Examples of Priority Solutions (FY 2014)

1. Next-generation integrated Web CMS "Sitecore CMS"
2. FENICS II business Wi-Fi service
3. Manufacturing-targeted production management ERP "GLOVIA G2"
4. On-site Inspection Meister
5. AZCLOUD SaaS FoodCORE
6. Resident information system "MICJET Tax Information"

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GHG Emission Reduction through the Provision of ICT

Main Activities in FY 2014

Encouraging Environmental Performance to be Part of New Proposal Materials

Fujitsu is promoting new ideas inside and outside Japan to help convey to customers our favorable environmental performance. This includes, for example, the contribution of our solutions to CO_2 reduction. At Fujitsu Systems East Limited, we have started an initiative to evaluate the size of contributions to CO_2 reduction when commercializing package software in order to incorporate the proposal of these ideas into our business process. In addition, at Fujitsu Social Science Laboratory Limited (Fujitsu SSL), we are using an internal awards program and best practices presentations in order to facilitate the awareness of employees, while also creating pamphlets, etc. for customers.

In Europe, we are utilizing EcoCALC, web-based tools for calculating environmental contributions, and we are communicating to customers the environmental performance of our solutions. In FY 2014, we evaluated and proposed ideas that included business talks in Finland for government-targeted work systems, and business talks in Spain for server virtualization projects at major automobile manufacturers.

Pamphlet introducing Fujitsu SSL's Environmental Contribution Solutions

Reference Information: Calculation Method for Amount of GHG Reduction Effect

At the Fujitsu Group, we have assessed the quantitative reduction in environmental burdens (in terms of reduced CO_2 emissions) from ICT adoption using an environmental impact assessment method developed in 2004 by Fujitsu Laboratories Ltd. We have assessed the CO_2 emission-lowering impacts in 400 prior cases and have calculated the CO_2 reduction effect per unit of sales from the accumulated data.
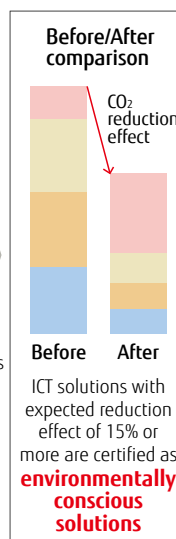
In calculating the amount of contribution to GHG reduction, we calculate the annual amount of reduction effect from the CO_2 reduction effect per unit of sales and from the annual sales of each solution category.

Overview of Environmental Impact Assessment Methodology

Conversion of 7 factors to CO_2 emissions

Factor	Description
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 consumped by ICT equipement (servers, PCs, etc.)
Data communication traffic volume	Data communication traffic volume by Internet/FAX

Sum of CO_2 emissions

Environmental-load basic unit database

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

In continuation with last year, we reviewed, from a third party perspective, the FY 2014 data on the amount of contribution to GHG emission reduction through the provision of ICT.

Last year, we gave a high evaluation to the facts that all of the basic data used for calculations had systematically undergone checks by the internal Environmentally Conscious Solutions Review Meeting and that the documents used in calculations had been properly prepared. We confirmed in this review that these practices were functioning effectively. In addition, more detailed calculation methods were put forward in newly added provisions, increasing further transparency in the calculation process and in its foundation.

At the same time, we believe that the calculation method itself holds room for improvement because it uses GHG reduction effects per unit of sales (GHG reduction intensities), applying conventional category classifications. However, constructive initiatives are being made to conduct a study to confirm the appropriateness of the current calculation method and to disclose the results, which, we hope, will lead to more future improvements.

Masatoshi Sakaguchi
System Certification Division, Bureau Veritas Japan

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Deploying Sustainability Solutions

Our Approach

Achieving a sustainable society requires that we address a variety of environmental and social issues including: measures against global warming by reducing GHG emissions, adaptation to the effects of climate change, resource efficiency, conservation of biodiversity, food supply security, and urbanization.

In response, the Fujitsu Group is increasing deployment of sustainability solutions as we continue to respond to global environmental and social issues through ICT solutions. We are studying and implementing these solutions through the global members of our Environmental Solutions Committee and its constituent working group (WG).

Summary of FY 2014 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VII) (toward FY 2015)	Increase the deployment of sustainability solutions.
FY 2014 Targets	Uncover case studies to demonstrate how solutions contribute to sustainability. Strengthen our solutions portfolio.
FY 2014 Key Performance	Identified 12 solutions that contribute to sustainability to strengthen our solutions portfolio in the field of climate change, and gathered case studies.

FY 2014 Performance and Results

Identified 12 Solutions that Contribute to Sustainability

The working group (WG) established to achieve the targets of the Environmental Action Plan (Stage VII), verified the criteria set in the previous fiscal year for solutions that contribute to sustainability, and identified 12 solutions in particular that contribute to mitigating and adapting to climate change. Furthermore, the WG formulated a plan for communicating our stories globally in order to further expand our provision of these solutions.

TOPICS

Starting Operation in Jakarta, Indonesia of a Participatory System for Sharing Disaster Information between Citizens with Smartphones

In recent years, abnormal climate conditions and massive floods occurring in multiple locations across the globe are impacting many citizens and regional economies. As a means of boosting countermeasures against these types of disasters, Fujitsu and PT. Fujitsu Indonesia, with help from the Japan International Cooperation Agency's (JICA) Indonesia Office, introduced a system in Jakarta, Indonesia that allows citizens to participate in sharing disaster-related information.

This system, which utilizes the high concentration of smartphones in Indonesia, provided approximately 10 million citizens with a special app. The citizens installed the app so that they could send pictures and text describing the water levels of streams and rivers, as well as rainfall information, which they observe. Using the GPS information from each smartphone, these multiple reports are compiled and displayed within a map. Citizens can then use the same app to view this information. In addition, the system is connected to the existing disaster information management system of Jakarta's Regional Disaster Management Agency. During disasters, alerts from the Agency are sent to smartphones (that have installed the app) in real time. For Jakarta, which faced capital procurement hurdles to establishing an advanced observation network for gathering disaster data, the system is arguably the best solution due to its low cost and ease of adoption.

Furthermore, since the same app can be used to collect more water level and rainfall information as greater numbers of citizens contribute observations, it is expected to help improve citizens' awareness of self-initiated and independent disaster preparedness and disaster mitigation.

Overview screen   Report screen
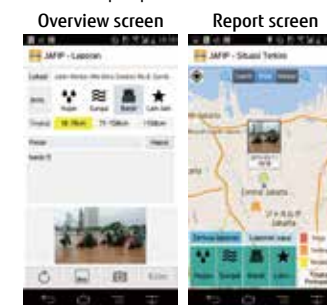
High floods in Jakarta

FY 2015 Targets and Plans

Deliver Messages to Customers on Solutions Contributing to Sustainability

With the aim of increasing the deployment of solutions to customers, during FY 2015 we will broadly disseminate messages on solutions contributing to sustainability through our website and other channels.

We will also work to provide case studies and to expand our lineup of solutions.

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Development of Top-Level Energy Efficient Products

Our Approach

As energy-related regulations for ICT products increase in number and in the breadth of the products they target, energy efficiency is taking on importance within society in the form of environmental label conformance and green procurement requirements.

Amid this background, the Fujitsu Group believes that we must accelerate improvement of the energy performance of products during their use, in order to reduce GHG emissions. For that reason, we are engaged in the development of products featuring top-level energy efficiency. Up to now, we have worked to improve the energy efficiency of products through development of "Super Green" products. As we now seek to further increase energy efficiency, in our Environmental Action Plan (Stage VII) we have set a target of making over 50% of all new products top-level energy efficient.

Summary of FY 2014 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VII) (toward FY 2015)	Achieve top-level energy efficiency of more than **50%** of newly developed products.
FY 2014 Targets	Make **45%** or more of new products top-level energy efficient.
FY 2014 Key Performance	Made **46.0%** of new products top-level energy efficient.

FY 2014 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 2013–14.

Applications of energy-saving technologies include the adoption of high-efficiency 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.
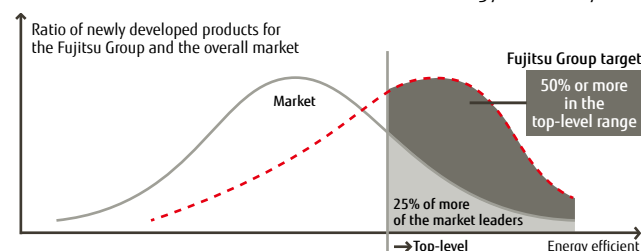
Achieved Top-Level Energy Efficiency for 46.0% of New Products

As a result of applying and expanding energy-saving technologies across our divisions in products including servers, PC servers, PCs, network devices, and scanners, we were able to meet our target for new product top-level 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 achieve 25% or more of the market benchmark in energy efficiency.

Ratio of newly developed products for the Fujitsu Group and the overall market

Market

Fujitsu Group target

50% or more in the top-level range

25% of more of the market leaders

→Top-level   Energy efficient

Reference Information — Top-Level Energy Efficient Product Target Standards

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

Example of Target Standards[1]

Reference Level	Product Categories
ENERGY STAR criteria (in effect) compliant	PCs, imaging equipment, etc.
Top-level achievement rate of the Top Runner Program (FY 2011) under the Energy Conservation Law	Servers[2], 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[3], electronic components, etc.

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

FY 2015 Targets and Plans

Deploying Outstanding Energy-Saving Technology and Expanding Its Application

To achieve our fiscal year target, we will review plans to pursue actions such as the addition of top-level product development in all divisions. In addition, we will deploy outstanding energy-saving technology across the company and expand its application to products. Looking toward the future, we aim to advance the development of advanced technology for energy saving devices, which will contribute to revolutionary improvements in energy efficiency.

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Development of Top-Level Energy Efficient Products

Main Activities in FY 2014

Tablets with Energy-Saving Designs for Long Battery Life for Corporate Users

ARROWS Tab **Q775/K**

The tablet can be custom equipped with the palm vein authentication sensor.

ARROWS Tab Q775/K is a large-screen 13.3-inch tablet running Windows and targeted at corporate users as a tablet that can function as their main PC. Using the latest Intel® CoreTM i processor and an IGZO energy-saving display, the tablet achieves approximately 9.1 hours[1] of battery life. Furthermore, the tablet is Energy Star compliant and achieves an energy efficiency rate of 500%[2] or more (FY 2011 standards) based on the Law Concerning the Rational Use of Energy.

In addition, with weight in the range of 900+ grams, the ARROWS Tab Q775/K is the lightest in its class for tablets with 13.3-inch and larger screens. In order to create the tablet's compact and lightweight frame, magnesium alloy, with its superior strength and weight advantages, was used for the internal cover, combined with hybrid molded components such as glass-hardened resin for a new level of strength and lightness.

[1] CoreTM i5 model. Measured based on the JEITA battery operating time measuring method (Ver. 2.0).
[2] Tablet model with the CoreTM i7-5600U processor.

ScanSnap iX100, the World's Lightest and Most Energy Efficient Scanner

ScanSnap iX100

The compact ScanSnap iX100 is a battery and Wi-Fi equipped portable scanner, and yet still achieves a world-beating weight of only 400 grams*. Features of the product include a 10% reduction in printed circuit board size compared to using conventional technology, while 3-D modeling of all components, to optimize installation down to units of 0.1 mm, has minimized dead space in the structural design and the scanner's primary parts have been made as light as possible.

In addition, the ScanSnap iX100's control IC functions were limited to essential operations only, and the efficiency of neighboring power supply circuits was boosted, in order to ensure long battery life. Total power consumption was minimized by thoroughly eliminating excess power consumption for each and every component and by optimizing the timing of the scanner's transition to operation, sleep, or power-saving mode. The result is a 50% reduction, over ENERGY STAR criteria, in power consumption during sleep mode.

* For the A4 scanner with battery and Wi-Fi. Source: PFU Limited (as of June 1, 2015).

Development of EcoBoard, an Environmentally Conscious Score Board that Can Operate on Solar Power Alone
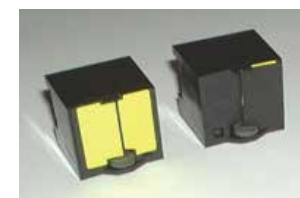
Environmentally conscious score board for baseball stadiums

Fujitsu Frontech Limited has developed a product called EcoBoard, which operates solely on power generated by its solar panels and can update its live display for game scores and informational messages.

The magnetic reversal elements used by EcoBoard operate on magnetic force from electromagnets. The board boasts an energy saving design, since operational power is only necessary when switching displays, after which magnetism keeps the images in place. Operation is possible at night or under cloud cover* and, in contrast to standard score boards, no external power supply is needed.

* Even without sunlight, operation (on full battery power) for approximately six games is possible, assuming 9-inning games.

Magnetic reversal elements

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Improving the Resource Efficiency of Products

Our Approach

Amid the depletion of national resources, rising international resource prices, uncertain supply of rare metals, and other growing threats to the sustainability of companies and society, there is also 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.

The Fujitsu Group, too, believes in the importance of efficiently using resources in the ICT products that we provide to customers. Toward that end, 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 reduce environmental burdens through improved 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 outstanding products that provide customers with benefits including compactness, light weight, and space savings.

Summary of FY 2014 Achievements

Targets under the Fujitsu Group Environmental Action Plan (Stage VII) (toward FY 2015)	Increase resource efficiency of newly developed products by	**35**% or more (compared to FY 2011)
FY 2014 Targets	Increase resource efficiency of new products by	**15**% or more (compared to FY 2011)
FY 2014 Key Performance	Increased resource efficiency of new products by	**33.6**% (compared to FY2011)

FY 2014 Performance and Results

Improving the Resource Efficiency of New Products

In FY 2012, the Fujitsu Group created its own definition of "resource efficiency" since no official indicator existed.

In FY 2014, following the previous fiscal year, we continued to use our indicators in the evaluation of products newly developed by Fujitsu*, while also undertaking initiatives aimed at reducing the number of parts in products and reducing the size of products through smaller, thinner, and lighter parts and higher-density mountings.

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

Achieving 33.6% Improvement in Resource Efficiency

Fujitsu has achieved a 33.6% improvement in FY 2014 resource efficiency, against a target of 15%. This is the result of smaller size and lighter weight, primarily in tablets, PC servers, mobile phone base stations, and mainframes.

FY 2015 Targets and Plans

Target Revised Upwards and Further Improvements in Resource Efficiency in Our Sights

Since the Fujitsu Group achieved its FY 2015 target ahead of schedule, we revised the target upward and have set our sights on improving resource efficiency of new products by 35% or more compared to FY 2011.

Toward achieving this goal for the fiscal year, we are not only continuing current initiatives, but are also working to expand development of new lightweight, rigid materials and the use of recycled materials. We also seek to widely publicize our products' environmental performance to increase recognition of this factor, which we will link to sales growth.

Reference Information — Definition and Calculation of Resource Efficiency

Resource efficiency is evaluated by dividing the value of a production, by the environmental burden (in terms of use and disposal) of the elements (resources) comprising the products.

$$\text{Resource efficiency} = \frac{\text{Product value}}{\begin{array}{c}\text{Environmental burden from resource usage} \\ = \\ \Sigma \text{ (Resource burden coefficient} \times \text{Resource usage volume)}\end{array} + \begin{array}{c}\text{Environmental burden from resource disposal} \\ = \\ \Sigma \text{ (Resource burden coefficient} \times \text{Resource disposal volume)}\end{array}}$$

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 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."

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Improving the Resource Efficiency of Products

Main Activities in FY 2014

FUJITSU Server GS21 2600, an Environmentally Conscious Mainframe with Superior Performance

FUJITSU Server GS21 2600

138.6% resource efficiency improvement (over conventional models)

The FUJITSU Server GS21 2600 uses system-on-chip[*1] technology to aggregate 14 LSI chips into 1. An approximate boost in processing performance by as much as 40% is achieved, along with an approximate reduction in power consumption by as much as 50%. With 80 PLUS®[*2] Gold certification, the server meets the highest standards in the industry.

The server also utilizes significantly reduced component numbers, more compact sizes for each component, plus aggregation and integration, to create a footprint (including maintenance space) that is as much as 70% smaller than conventional models, in a design as much as 58% lighter.

Solventless powder paint for the housing, complete elimination of volatile organic chemicals (VOCs), and completely lead-free soldering of electronic components to printed circuit boards are among some of the server's other achievements.

[*1] **System-on-chip:** Technology that aggregates multiple functions onto a single IC chip.
[*2] **80 PLUS®:** A certification program for the energy efficiency of computer power supplies.

ARROWS Tab F-03G, the World's Lightest Tablet with Extended, Worry-Free Battery Life

ARROWS Tab **F-03G**

37.9% resource efficiency improvement (over conventional models)

The ARROWS Tab F-03G tablet, launched in the winter of 2014, is 86 grams lighter than the model from winter 2013. With a weight of just 433 grams, the F-03G is the lightest in the world among tablets with screens 10 inches or larger.

The tablet's structure was improved using optimal materials in order to satisfy the dual objectives of lightness and durability. The frame was made thinner thanks to both stronger materials with low-density glass and the addition of stress-resistant, high-strength aluminum used for some of the internal components.

In addition, energy saving performance was emphasized so that the device can be conveniently carried without its battery charger. Other energy saving technologies were developed to new levels with features including a "human-centric engine" with fewer CPU cores and fewer clocks—for less battery usage when the screen is off—as well as optimized CPU performance for each app used on the device. These advances made it possible to maintain conventional battery life and to employ a compact and lightweight 7840-mAh battery.

Advancing 3R Design

Through our proprietary product environmental assessments and green product evaluations, the Fujitsu Group is working toward the application of 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, and we are testing 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 here on out, the Fujitsu Group will summarize examples of the obstacles to ease of dismantling that we have learned from the recycling centers, and from the product development stage will incorporate these lessons into design for easier dismantling of post-use products.

Gaining experience in dismantling at recycling center study tour

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Research and Development of Advanced Green ICT

Our Approach

The Fujitsu Group pursues its business activities with an aim to solving social and environmental problems by driving forward research and development (R&D) in a multitude of domains. Working from the standpoints of environmentalism and sustainability, we use leading-edge technologies as our foundation and expand outward into materials and devices used in products, as well as facilities and system solutions.

At Fujitsu Laboratories Ltd., the core company shouldering R&D in the Fujitsu Group, two key approaches are being undertaken: "Green of ICT," which seeks to reduce energy and resources consumed by ICT equipment and infrastructure, and "Green by ICT," which seeks to reduce environmental burdens through the use of ICT. Within these approaches, Green by ICT has a significant ripple effect in society and we are aiming to drive green ICT in the domain of Social Innovation, the core of the Fujitsu Group's growth strategy.

Summary of FY 2014 Achievements

| Targets under the Fujitsu Group Environmental Action Plan (Stage VII) (toward FY 2015) | **Develop innovative technologies** that enable solutions and products to reduce the environmental loads |
| FY 2014 Key Performance | Announced **25** key green technologies |

FY 2014 Performance and Results

Positioning and Highlighting Fujitsu Laboratories' Key Green Technologies

To disseminate the Fujitsu Group's advanced green ICT throughout society, and to support its early deployment in businesses, we positioned as our key green technologies "best-in-class" and "world-first" technologies, as well as technologies with notably high environmental contribution. We are also highlighting our technological capabilities by advancing our R&D for these key green technologies and assertively promoting them through press announcements.

In addition, in the domain of creating social innovation, which connects and leverages heterogeneous information such as that generated by corporations, governments, individuals, and sensors, we strengthened our generation of green ICT and communicated its contributions to the environment.

Development Achievements

- Data optimization technology
- Communications data collection and high-speed search technology
- Information service technology among terminals and devices
- Transportation pattern analysis technology
- On demand traffic operation technology
- Patient condition recognition technology
- Wide area SDN management and control technology
- Access re-creation verification technology
- Vehicle lane deviation detection technology
- Cyber attack detection technology
- 56-Gbps receiver circuits for servers
- Cluster supercomputer NW switch reduction technology
- Automatic generation technology for image recognition programs
- WAN speed improvement technology
- CMOS transmission/reception chips for vehicle on-board radars
- New management methods for natural forests
- Sensing middleware for wearable devices
- Bio-derived, water-based paint
- Tools for finding the characteristics of areas in which Linked Open Data technologies are applied
- Ring-type wearable devices
- Technology for detecting early signs of drainage system flooding
- Optical transceiver circuits using silicon photonics
- Technology for recognizing crowd movements
- Flood forecast simulation technology
- Technology for early detection of dyskinesia (irregularities in motor functions)

Announcement of 25 Key Green Technologies

In FY 2014, the Fujitsu Group announced 25 technology development achievements centered on the domains of Green by ICT and the domain of Social Innovation: 18 technological developments (including 13 developments in the domain of Social Innovation), while 7 developments were in Green of ICT.

Social innovation research domains in the laboratory
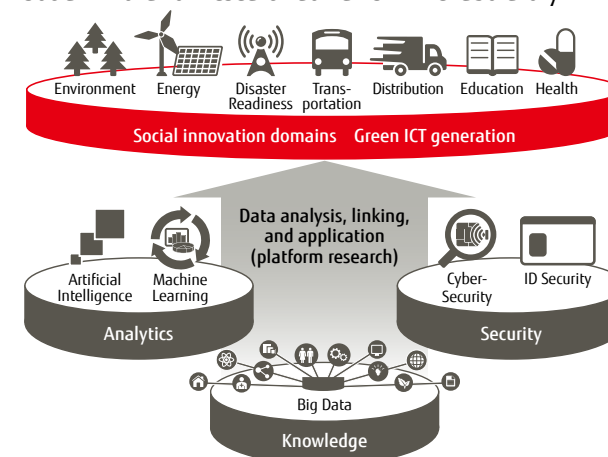
FY 2015 Targets and Plans

Accelerating the creation of green ICT solutions

While further enhancing the environmental contribution of our advanced technologies, the Fujitsu Group will accelerate the creation of not only individual technologies, but also the creation of related green ICT that connects such technologies. In particular, we will keep strengthening green ICT, as well as the data analysis, linking, and platform research that support it, in the domain of Social Innovation, as we continue to promote and publicize to society our technological achievements.

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# Research and Development of Advanced Green ICT

Main Activities in FY 2014

Developing Manhole Sensors as a Low-Cost Technology for Detecting Signs of Drainage System Overflow

Building water measuring sensors into manholes is effective for detecting and controlling urban drainage overflow and damage. Battery replacement, however, means a high cost of operation per manhole.

Fujitsu Laboratories Ltd. addressed this issue by determining the number and location of the manholes that should include sensors. The company used analysis of the time it takes water to flow from upstream to downstream, given variations in topography and the shape and the length of the drainage routes. The overall flow of drainage can be understood and forecast with just one-fifth the previous number of sensors. Furthermore, the company has taken into account fluctuations in water levels and developed control technology that optimizes measurement parameters. The amount of electric power consumed has been cut approximately 70% while still maintaining measurement accuracy. This efficiency makes it possible to run the manholes solely on natural energy, bringing per-unit operating costs down approximately 90%.

#### Drainage water level monitoring system
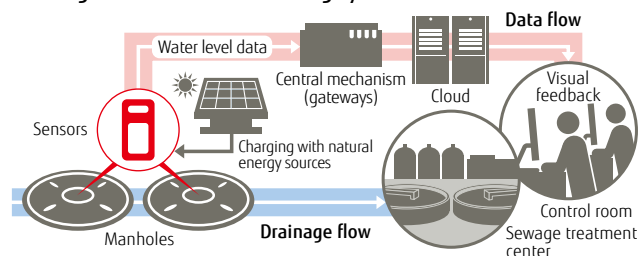
Achieving the World's Most Efficient Inter-Processor Data Transmissions at 5 mW per 1 Gbps[1]

Fujitsu, Fujitsu Laboratories Ltd., Fujitsu Laboratories of America, Inc. (FLA), the Photonics Electronics Technology Research Association (PETRA), and the New Energy and Industrial Technology Development Organization (NEDO) announced in February 2015 results of their joint development of an optical transceiver circuit using silicon photonics technology.[2]

With this new approach, optical devices are moved at low voltages while adjusting the current amplification at a speed that can track the data fluctuations. This halves normal power consumption but gives high-speed transmission of 25 Gbps. The new technology holds down power consumption and achieves fast transmission in the range of terabits per second, which is expected to lead to great new performance gains for servers and supercomputers.

[1] **1 Gbps:** a rate of transmission where one gigabit of data is transmitted in one second.
[2] **Silicon photonics technology:** technology that patterns optical devices on a silicon substrate.

Illustration of the newly-developed optical transceiver circuit and its key features

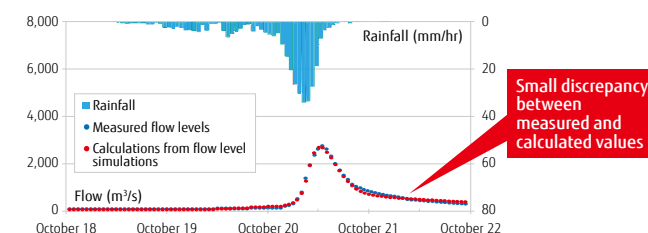| Process	Transmission speed	Voltage power supply	Power/speed
28nm CMOS	25Gbps	0.9V&1.8V	5mW/Gbps
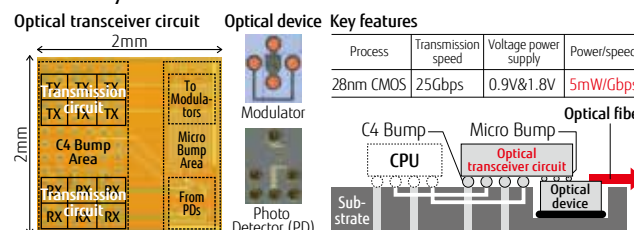
Developing Technology for Automatically Determining Parameters for a Flood Forecasting Simulator to Mitigate Water Damage

Currently, flood forecasting simulators are being applied as part of these waterway management efforts. With simulators, it is preferable to use "distributed runoff models" that show land use distribution, including topography, forests, and urban areas. It is difficult, however, to determine optimal parameters for these models.

To address this challenge, the Public Works Research Institute (PWRI) and Fujitsu Laboratories Ltd. developed technology for automatically determining parameters to use in a flood forecasting simulator based on distributed runoff models. A very high degree of reproducibility was achieved after comparing values from 15 previous flood flow measurements with values calculated using flood forecasting simulations.

This approach allows for continually adjusting optimal settings for the flood forecasting simulator in order to allow river managers to determine suitable actions for disaster preparedness and mitigation.

Values from waterway flow level measurements and values calculated from simulations

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Collaborating with Communities and Taking Action as a Good Corporate Citizen

Our Approach

Fujitsu Group deploys its funds, technology (ICT), and people (expertise) to support the activities of NPOs, NGOs, educational institutions, local governments, citizens' groups, and other diverse bodies that seek to resolve social issues. Specific examples include technological support for citizen enlightenment and studies for biodiversity strategies by local governments; funding support for rare species protection by NPOs and global warming countermeasure projects; technological support for monitoring and other systems; and support for human resources participating in the social contribution programs of international institutions. We determine the targets and content of support based on the needs and issues of local communities.

In addition, we support the social contribution activities undertaken by employees, encouraging each and every employee to maintain high awareness of social and environmental issues and to take an active involvement in resolving these.

Summary of FY 2014 Achievements

	Corporate Citizenship: Social Challenges	Corporate Citizenship: Social Activities
Targets under the Fujitsu Group Environmental Action Plan (Stage VII) (toward FY 2015)	Support initiatives that address the complex social and environmental challenges, e.g. biodiversity conservation	With society, support our employees to volunteer social activities
FY 2014 Key Performance	**Funding:** Donated to a children's advocacy center and provided support to disaster areas through the Red Cross **Technology:** Provided our palm vein recognition system **Human resources:** Carried out professional training and other activities	Dedicated **145,000 hours** to social contribution activities by employees

FY 2014 Performance and Results

Expanding the Number and Scale of Regions Carrying Out Social Contribution Activities

In FY 2014, we started social contribution activities at overseas sales companies and support centers, mainly in Asia, and started a large number of new initiatives in collaboration with regional communities. In addition, in areas such as Japan, England, and northern European countries, where social contribution initiatives have been quite active, we worked to increase the number of employees and stakeholders participating, in addition to the number of activities themselves. We actively used our technologies, including applying ICT to our on-site environmental classes taking place in Japan, in order to provide support.

Dedicating 145,000 Hours Worldwide

Through the provision of funding, technology, and human resources, Fujitsu has worked to address many needs, including conservation of biodiversity and education for the next generation in Europe, Middle East, India, Africa, and Asia (EMEIA), as well as local community service in the U.S.A.

Social contribution activities undertaken by our employees overseas showed particular growth, approximately three fold. In Japan and overseas, employees spent 145,000 hours in social contribution activities.

- Donating palm vein recognition systems to kindergarten: Jiangsu Fujitsu Telecommunications Technology Co., Limited (China)
  We donated our PalmPass™ kindergarten management system to commemorate our 20th anniversary. Contributing to building an environment of safety and peace of mind at kindergartens.
- Carrying out professional training for 800 students: Fujitsu UK & Ireland (United Kingdom)
  Seven employees gave presentation, writing, and other training to students attending Bishop Vaughan School.
- Sending Christmas presents (toys and cash) to a children's advocacy center: Fujitsu Network Communications (U.S.A.)
  Over 780 employees collected $2,500 in cash and seven boxes of toys to send to a children's advocacy center. (left photo)
- Starting 3-year green belt preservation activities: Fujitsu Systems Business (Thailand)
  After concluding a joint 3-year project agreement with the Thai Royal Forest Department, 400 tree saplings were planted at Bang Khla Chao Park in Samut Prakan province. (right photo)
- Contributing to preserving biodiversity by building beehives: Fujitsu Technology Solutions EE (Belgium/Luxemburg)
  In collaboration with specialist organizations, 8,000 euros were invested in placing beehives on the roof of the Fujitsu office.

FY 2015 Targets and Plans

Increasing Activity Hours and the Use of ICT

Along with continuing the new activities carried out in FY 2014, we plan to provide employees with opportunities to engage in contribution activities, while increasing the number of those hours.

In addition, we aim to evolve these activities into greater vehicles for support and contribution. We will do this by leveraging our sensing, monitoring, data analysis and other technologies to solve regional issues in the fields of these social contribution activities, and to promote the application of ICT.

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Main Activities in FY 2014

Tropical Rainforest Regeneration Activities to Bring Back the Rich Forests of Borneo (Malaysia)

Since 2002, the Fujitsu Group, with support from the Sabah Forestry Development Authority, has been engaging in a rainforest regeneration project in the Fujitsu Group Malaysia Eco-Forest Park in Sabah province, Malaysia. 37,500 trees of the indigenous species dipterocarp have been planted on 150 ha of land where non-native lumber trees are growing. Currently, we are mainly working on maintenance in order to tend to the saplings.

Fujitsu Group employees from across the world also gather on site every year to observe the progress of the forest and to take part in eco-tours involving forest preservation work. In FY 2014, 66 employees and family members, from eight countries participated. They cooperated with local stakeholders including local university students and Japanese school students (over 100 people total), to work on preservation activities such as the additional planting of approximately 1,400 trees. Continual efforts like these have helped some trees to reach approximately 10 meters as the forest makes steady progress toward recovering its rich tropical rainforest ecosystem.

Employees helping with tropical rainforest regeneration

Giving On-Site Environmental Classes to 7,300 Students and Providing Opportunities to Think About the Environment (Japan)

In order to have the young generation of the future understand the importance of the environment, the Fujitsu Group is sending employees to schools as lecturers to conduct on-site environmental classes. In FY 2014, lecturers visited 144 elementary and junior high schools, teaching classes to approximately 7,300 students.

Currently, the adoption of ICT at schools is moving forward and future classes will be taught with each and every student using a tablet PC. Fujitsu's on-site classes provide an opportunity to experience the new manner of education in advance. In FY2014, the two classes, called "Living With Just One Earth" and "Our Future Jobs and Ecology," were developed and carried out in collaboration with an NPO. Classes could be taught with students exchanging opinions and seeing tallies of how each person answered, which made for an interactive experience as only ICT can offer. In addition, the "Our Future Jobs and Ecology" class incorporated elements of career counseling.

Participating in classes where each student has a tablet PC

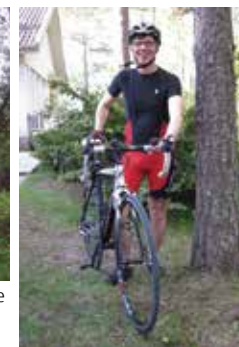### 114 Employees Take Part in a Bicycle "Race" (Finland)

Fujitsu Finland has participated every year since 2009 in the Kilometer Race, an event in which teams of cyclists race to cover the greatest distance. The race aims to spur the switch from automobiles to bicycles as a means of commuting and private travel, thereby reducing the impact of everyday transportation on the environment.

The race was held from May to September in 2014, with participation by 114 employees of Fujitsu Finland. The employees' total distance traveled was 134,819 kilometers, which contributed to reducing CO_2 emissions by about 23.6 tons. For the race overall, distance travelled exceeded 27 million kilometers, reducing carbon emissions by 4,765 tons.

Fujitsu also took part in a concurrent charity event held by the Finnish Red Cross. Fujitsu Finland contributed a total of 10,000 euros to disaster aid, the greatest amount contributed by any of the more than 2,400 teams participating.

Left: Matti Koskimies, who participated in the race with his family
Right: Kimmo Vaikkola, Fujitsu team captain