Special Feature

Human Centric Intelligent Society

P.11 Deploying a Hydrogen Station Information Management Service

P.13 Building an Energy Monitoring System in Indonesia

Leveraging the Power of ICT to Build a Safe, Prosperous, and Sustainable Society

The Fujitsu Group has made a "Human Centric Intelligent Society" its Group vision.
Along with aiming for an abundant future and greater possibilities for innovation through ICT, we are supporting the individuals bringing about these benefits.

P.15 Leveraging ICT to Generate Innovation and Reduce Environmental Impacts

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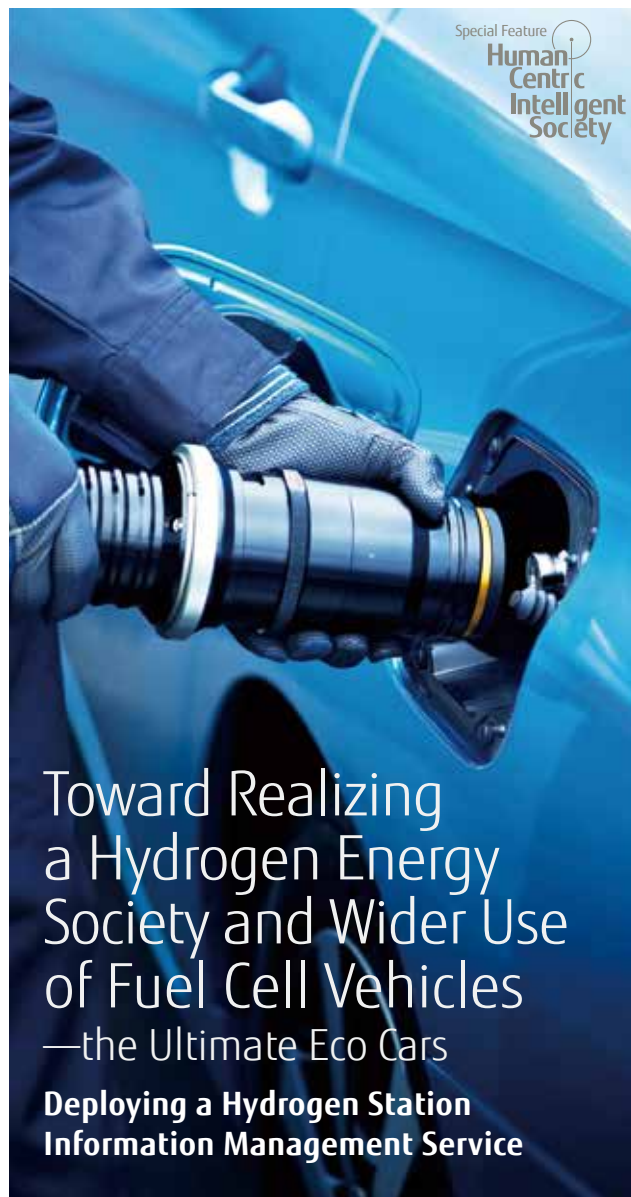
Special Feature
Human Centric Intelligent Society

Toward Realizing a Hydrogen Energy Society and Wider Use of Fuel Cell Vehicles
—the Ultimate Eco Cars

Deploying a Hydrogen Station Information Management Service

Theme

Greater availability of hydrogen fuelling stations is the key infrastructure element needed to achieve a hydrogen energy society
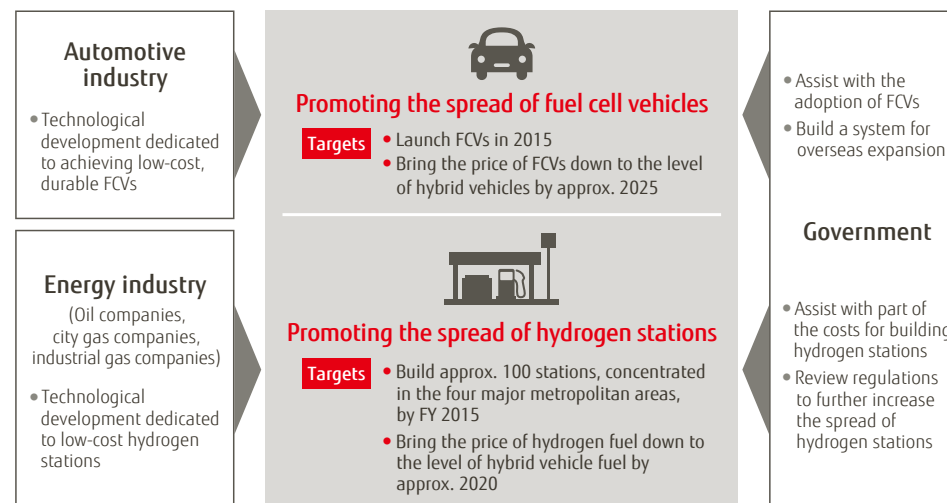
Amidst the growing severity of environmental issues, such as the risk of fossil fuel depletion, global warming, etc., hydrogen is attracting attention as a next-generation source of clean energy that does not emit CO_2. The government in Japan, where energy resources are in short supply, is aggressively pushing forward the use and application of hydrogen as a major energy strategy issue.

In 2014, fuel cell vehicles (FCV), which use fuel cells that generate electricity via the chemical reaction between hydrogen and oxygen, came onto the market and expectations are for them to lead the way toward realizing a hydrogen energy society. At the same time, over-arching collaboration between the government, municipalities, and companies in various industries is indispensible for building the infrastructure that holds the key to hydrogen availability. There are various hurdles to building hydrogen fuelling stations for FCVs. Among these are the high cost of construction and the need to comply with domestic regulations on high-pressure gas.

As of the end of FY 2014, there are only 17 hydrogen stations nationwide that are in fixed locations similar to conventional gas stations. In recent years, mobile hydrogen stations offering the benefits of low-cost construction and easier acquisition of operating space are becoming more prevalent—a trend which is expected to continue in the future.

Diagram of public-private collaboration for increasing fuel cell vehicles (FCV)

Automotive industry
- Technological development dedicated to achieving low-cost, durable FCVs

Promoting the spread of fuel cell vehicles

Targets
- Launch FCVs in 2015
- Bring the price of FCVs down to the level of hybrid vehicles by approx. 2025

Energy industry
(Oil companies, city gas companies, industrial gas companies)
- Technological development dedicated to low-cost hydrogen stations

Promoting the spread of hydrogen stations

Targets
- Build approx. 100 stations, concentrated in the four major metropolitan areas, by FY 2015
- Bring the price of hydrogen fuel down to the level of hybrid vehicle fuel by approx. 2020

Government
- Assist with the adoption of FCVs
- Build a system for overseas expansion
- Assist with part of the costs for building hydrogen stations
- Review regulations to further increase the spread of hydrogen stations

Takakura Hydrogen Station in Hachioji, Tokyo

Created by Fujitsu based on a Nihon Keizai Shimbun article from July 16, 2014 (morning edition)

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Building an Energy Monitoring System in Indonesia

Leveraging ICT to Generate Innovation and Reduce Environmental Impacts

Solution

Provide a system giving real-time information on the locations and operational status of hydrogen fuelling stations

As infrastructure develops, the next hurdle for the spread of FCVs is the question of when and where drivers can replenish hydrogen levels. A service is needed that provides FCV drivers with accurate information in real time on the operational status of hydrogen fuelling stations. To create such an environment, the Fujitsu Group has developed, then launched in December 2014, the Hydrogen Station Information Management Service, which gathers and delivers hydrogen station information.

Since the service uses the cloud-based platform SPATIOWL, information on hydrogen station location and operational status input by hydrogen fuel suppliers is unified on the cloud. This information is sent to the automobile manufacturer's

datacenter, then is transmitted as hydrogen station information to FCV drivers in real time.

Toyota Motor Corporation uses Fujitsu's service to support drivers of its MIRAI fuel cell vehicles. Toyota provides Hydrogen Station List, a car navigation system application, and Pocket MIRAI, a smartphone application, to help its customers enjoy an enriching experience with their FCV.

The government of Japan is continuing to strategically build programs and infrastructure, including setting a target of approximately 100 hydrogen stations by the end of FY 2015,* aimed toward achieving a hydrogen energy society. In this context, the Hydrogen Station Information Management Service not only contributes to the spread of FCVs, but also makes collaboration possible with companies engaging in new business using hydrogen energy, and arguably accelerates innovation in the use of sustainable energy.

The Fujitsu Group will continue to contribute to better transportation for society and the more complete achievement of a hydrogen energy society by providing ICT solutions.

* NEDO's (New Energy and Industrial Technology Development Organization) "NEDO Hydrogen Energy White Paper"
http://www.nedo.go.jp/content/100567362.pdf

Diagram of the Hydrogen Station Information Management Service
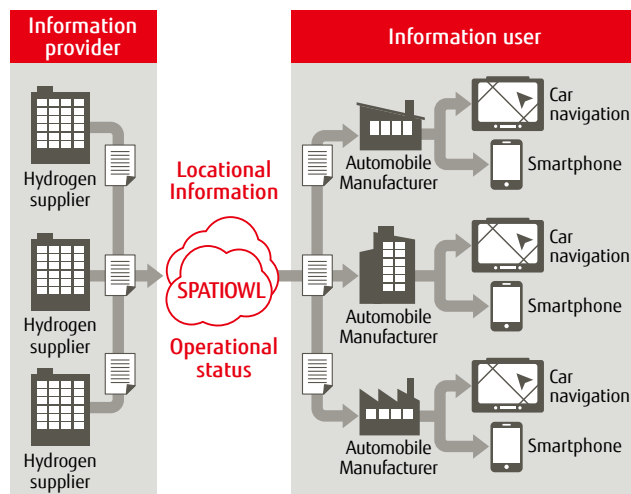
Hydrogen Station List, a navigation application

Pocket MIRAI, a smartphone application

Stakeholder's Message

A Service Contributing to a Hydrogen Energy Society

Takako Yamada

Telematics Business Department, e-Toyota Division, Toyota Motor Corporation

I believe the Fujitsu Hydrogen Station Information Management Service plays an important role in the development of a hydrogen society. The easy-to-use development environment was a great help, allowing us to create services in a short period of time. We will continue to carefully enhance these services by listening to feedback from customers and related suppliers, ensuring we provide them with a high level of satisfaction.

The Spread of Hydrogen Energy through Corporate Tie-Ups

Takashi Kanada

Telematics Service Division Manager, Innovation Business Headquarters

SPATIOWL, the Fujitsu solution behind the Hydrogen Station Information Management Service, is an open cloud platform. Therefore, it enables collaboration with a wide range of companies. I believe that the use of hydrogen energy will be promoted through innovations created by different companies working together, each providing technologies in its specialized area.

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Building an Energy Monitoring System in Indonesia

Leveraging ICT to Generate Innovation and Reduce Environmental Impacts

Special Feature
Human Centric Intelligent Society

Building an Energy Monitoring System

towards a Low Carbon Society in Indonesia

Embarking on Social Implementation Projects in Bogor City, Indonesia

Indonesia

Bogor

Theme

Growing needs for innovative energy saving measures in Indonesia under rapid economic growth.

The Republic of Indonesia (hereafter abbreviated to "Indonesia") is home to 249 million people (as of 2013), making it the fourth most populous country in the world. Steady and rapid economic growth continues, marking an annual rate of approximately 6% recently.
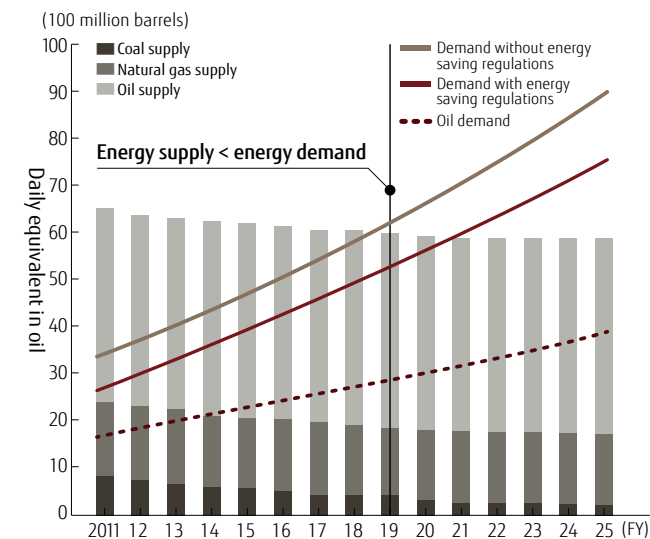
Indonesia is also extremely rich in natural resources such as oil, natural gas, and coal, making it one of the top energy export states in Asia. However, the supply and demand balance has changed in recent years due to increasing domestic energy consumption accompanying economic growth. As domestic energy demand is forecast to exceed supply by 2020, a more efficient energy supply and utilization system is expected from the standpoints of both energy security and maintaining international competitiveness.

Energy saving measures are important from an environmental perspective as well. Indonesia, in particular, faces the challenge of vulnerability to the impacts of climate change due to its geographic features as the largest archipelago nation in the world. The government, therefore, set a low carbon target in 2009, ahead of other ASEAN nations, to "reduce GHG emissions by 26% by 2020," as it promotes a transition to lower carbon emissions.

In order to examine and implement effective energy-saving measures in an Indonesian way, a data and information platform is urgently required that provides quantitative and continuous information to characterize energy consumption in Indonesian cities. This entails not only major sources to supply energy, such as thermal power plants, but also precise measuring and verification of direct and indirect emission volumes accompanying energy consumption over a wide area, from cities to industrial parks.

The National Institute for Environmental Studies of Japan (hereafter, NIES), which has been engaged in local measurements and verification research in collaboration with the Indonesian government and universities, selected Fujitsu as a strategic partner in December 2014 and commenced a project monitoring Indonesia's electric power consumption. Fujitsu has had worldwide experience building environmental management systems in Saudi Arabia, Thailand, and other countries. It has been also implementing energy monitoring systems at in-house facilities. With abundant experience and knowledge, Fujitsu has seized a precious opportunity to build an innovative monitoring system with NIES.

Changes in domestic energy supply and demand in Indonesia

(100 million barrels)

- Coal supply
- Natural gas supply
- Oil supply
- Demand without energy saving regulations
- Demand with energy saving regulations
- Oil demand

Energy supply < energy demand

Daily equivalent in oil

2011 12 13 14 15 16 17 18 19 20 21 22 23 24 25 (FY)

Source: Intellectual Asset Creation, October 2014, the Nomura Research Institute

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Deploying a Hydrogen Station Information Management Service | Building an Energy Monitoring System in Indonesia | Leveraging ICT to Generate Innovation and Reduce Environmental Impacts

Solution

Building an energy monitoring system and promoting an energy saving society

This project sets up approximately 100 monitoring points in locations including a university administration building, a research laboratory, a hotel, a café, and private residences, in order to monitor different sectors' actual electric consumption. Through the social implementation project, monitoring data are assembled and processed to identify the operating status and trends of activities with electronic devices. Various statistical information is sent to the system developed by utilizing the Environmental Management Dashboard of Fujitsu.
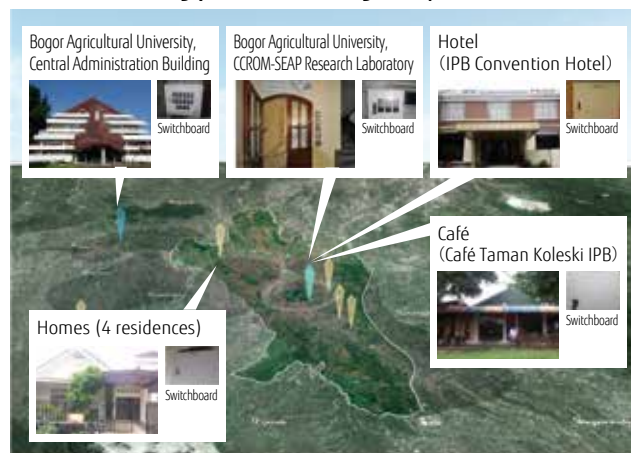
Results to date have revealed variations in peak consumption hours from facility to facility and have given a visual representation in some facilities of the electricity consumed by air conditioning, lighting, data servers, etc. By specifying the sources drawing electricity, it is possible to

review and implement more effective power usage practices. In addition, the recorded data can be checked at any time by the researchers, facility administrators, and other parties involved.
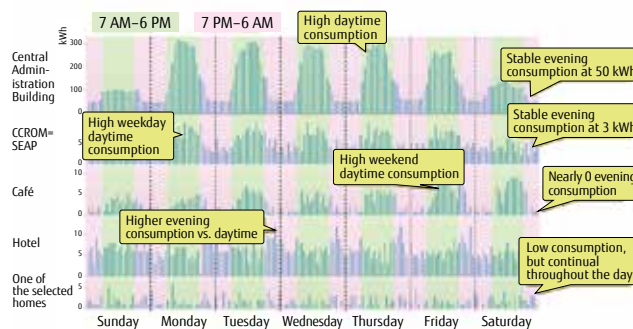
The plan is scheduled to continue for six years and is projected to gradually grow in scale. If the accumulated expertise and the positive energy-saving measures suggested through the process are utilized, and the project's scale is expanded to other Indonesia cities and districts, more effective policies for climate change mitigation and adaptation can be expected as a result.

Through the future provision of energy saving technologies, Fujitsu will continue to contribute to economic growth, disaster risk management, and environmental conservation promotion in newly developing countries.

List of monitoring points inside Bogor City

Bogor Agricultural University, Central Administration Building — Switchboard

Bogor Agricultural University, CCROM-SEAP Research Laboratory — Switchboard

Hotel (IPB Convention Hotel) — Switchboard

Café (Café Taman Koleski IPB) — Switchboard

Homes (4 residences) — Switchboard

Comparison of electric power consumption trends for each facility

7 AM–6 PM   7 PM–6 AM   High daytime consumption

Central Administration Building — Stable evening consumption at 50 kWh

CCROM-SEAP — High weekday daytime consumption — Stable evening consumption at 3 kWh

Café — High weekend daytime consumption — Nearly 0 evening consumption

Hotel — Higher evening consumption vs. daytime

One of the selected homes — Low consumption, but continual throughout the day

Sunday Monday Tuesday Wednesday Thursday Friday Saturday

Stakeholder's Message

Toward "Green Growth" for Cities through ICT

Prof. Tsuyoshi Fujita
Director
Center for Social and Environmental Systems Research
National Institute for Environmental Studies, Japan

In most Asian cities where rapid economic growth is underway, a transition strategy framework is undergoing an urgent quest to minimize environmental deterioration and to keep it under acceptable levels of global environmental constraints, such as a way towards a low carbon society. The research project is to design a socio-technical system to monitor the environmental emissions and social behaviors in real time, and to apply them into the production consumption system as a social knowledge platform. The project is also to develop a series of systems for saving quantitative data after implementation. Our research project aims to leverage ICT to develop scientific systems for methods for planning international emission right mechanisms, measurements for confirming effects of CO_2 emission reductions, and MRV (measurement, reporting, verification), and then communicate these as international standards from Japan and Asia. NIES has been developing comprehensive evaluation models of future socio-economics, optimal location models, and lifecycle assessments that quantify invisible environmental value. Combining Fujitsu's technologies for high-speed information processing, activity measurement visualization, and the processing and display of information, I believe, will lead to social innovation that brings corporations and researchers into collaboration with governments and citizens.

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Building an Energy Monitoring System in Indonesia

Leveraging ICT to Generate Innovation and Reduce Environmental Impacts

Special Feature — Human Centric Intelligent Society

Leverage ICT to generate innovation and reduce environmental impacts

Providing environmentally conscious solutions that promote reductions in GHG emissions

Solution 1

Reducing environmental impacts by transforming the work styles of 160,000 Fujitsu Group employees
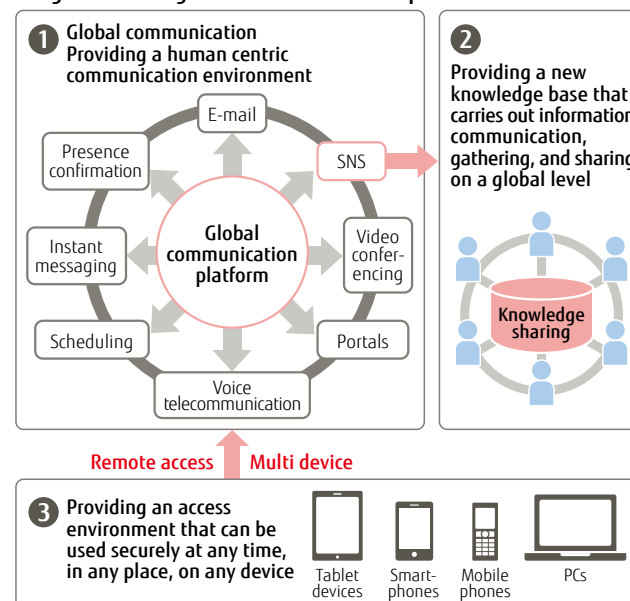
The Fujitsu Group provides a communication platform, based on in-house experience and know-how, for supporting a work style transformation for some 1 million employees of 150 major Japanese companies doing business worldwide.

In January 2012, the Fujitsu Group began building a global communication platform to effectively share and utilize the knowledge of employees across the globe, and to maximize our performance as a corporation. In February 2014, platform integration was completed for approximately 200 domestic companies and 110,000 employees. Plans are in place to expand integration by the end of FY 2015 to encompass approximately 500 companies and 160,000 employees worldwide as the project progresses overseas in Europe, North America, China, and Asia & Pacific regions.

Since September 2013, we have also been actively utilizing a large-scale social networking system that is unrivaled in the world. With the new communication platform, seamless information sharing becomes possible, and the system stimulates communication while improving the speed of our business.

Cost reduction benefits (based on Fujitsu's implementation)

- By integrating the Group's communication platforms, system development and operation/maintenance costs are reduced, with an approximate 50% year-on-year savings in operation costs Group-wide.

- With regular internal meetings, Unit-wide meetings, etc. switched to a Web-based format, we have an average of 3,000 online meetings every day. The result is reduced business travel expenses, including the time it takes to travel, by as much as 20% year-on-year in Units fully implementing the changes.

Environmental impact reduction benefits (based on Fujitsu's estimates)

- Work style transformation reduces costs while also bringing a significant reduction in environmental burdens. Supposing a customer with employees on the scale of 10,000 people, estimates evaluated from five standpoints—meeting announcements, video conferencings, knowledge sharing, telephone communication with counterparts frequently away from their desk, and ICT infrastructure—demonstrated reductions in CO_2 emissions volume of approximately 80% compared to pre-platform integration levels.

Diagram of the global communication platform

1. **Global communication** Providing a human centric communication environment

Global communication platform: E-mail, SNS, Video conferencing, Portals, Voice telecommunication, Scheduling, Instant messaging, Presence confirmation

2. Providing a new knowledge base that carries out information communication, gathering, and sharing on a global level — Knowledge sharing

3. Providing an access environment that can be used securely at any time, in any place, on any device — Remote access / Multi device — Tablet devices, Smart-phones, Mobile phones, PCs

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Building an Energy Monitoring System in Indonesia

Leveraging ICT to Generate Innovation and Reduce Environmental Impacts

Solution 2 — Leveraging IoT for more efficient maintenance work

By leveraging the Internet of Things (IoT), unexpected downtime can be prevented when carrying out maintenance work that has conventionally followed the approach of "fixing what has broken." Fujitsu's SupportDesk Service, a maintenance service that makes use of the practical expertise we have cultivated inside Fujitsu, detects signs of hardware malfunction using sensing technology with automatic-alert functionality. Specialized staff members can make an appropriate response and can preempt problems.

Furthermore, a solution encompassing a further evolution of our automatic-alert and malfunction detection features is the Glovia Enterprise MM, a system that makes maintenance work in manufacturing industries more advanced. The system collects operating information in real time from sensors attached to equipment currently in use. Sensor data is analyzed using big-data statistical analysis technology to predict the timing of malfunctions for each specific piece of equipment. We can now periodically replace the right components and realize benefits from a cost and environmental impact perspective. Maintenance work carried out on site is also being done more efficiently with the help of smart devices. These efforts are decreasing the time it takes until we can report that work is complete, and are also contributing to improved customer satisfaction.

🌱 Environmental impact reduction benefits (based on Fujitsu's estimates)

● Maintenance work that maximally leverages the IoT decreases environmental impacts accompanying component shipping and the dispatch of maintenance staff, which has shown reductions in CO_2 emissions volume of approximately 80%.

Solution 3 — Reducing the environmental burden of ICT infrastructure with the cloud

The ability to use cloud services in this day and age has become a matter of course. Cloud services involve the shared use of high-performance servers installed in datacenters to allow customers to use whatever functions they need via the Internet. This reduces the cost of systems adoption by as much as 20% and makes it easier for customers to adopt IT systems. Additionally, since customers are relieved of the need to have their own servers and storage equipment, the electric power that would have run such ICT equipment is saved, which contributes to reducing environmental impacts. Fujitsu is building datacenters with full disaster prevention and security features, through which we provide a variety of services to our customers. One of the services we are providing to healthcare institutions is a digital medical record system called HOPE Cloud Chart.

Case Study — Aiseikai Hospital

At Aiseikai Hospital, patient information that had been individually managed is now unified on a cloud-based medical fee and medical record system. This system brings efficiency to a wide range of cumbersome healthcare clerical tasks. By using a cloud environment for ICT infrastructure, the hospital gains security and cost benefits, delivers peace of mind to its patients, and also contributes to reduced environmental impacts. "Adopting the cloud service has helped us reduce our environmental impact, has increased the amount of time we can spend with patients, improved the quality of our healthcare, and reduced the amount of time patients spend waiting at the payment counter. In the future, we will use ICT to further improve the quality of regional healthcare."

Shinya Mitsui
Managing Director, Aiseikai Hospital

Solution 4 — Development using 3-D simulators

Fujitsu is providing manufacturing industries with a Virtual Product Simulator (VPS) that incorporates the expertise from our own monozukuri (craftsmanship) experience so that those industries can launch competitive products in a timely fashion. Conventional approaches entailed multiple prototypes made to test the best ways to assemble, operate, and repair products. With the VPS, however, 3-D CAD data can be used to virtually test products, reduce the number of prototypes needed, and realize development cost savings. Also, since tests can optimize production steps, this approach helps save space in production plants and use personnel and equipment more efficiently.

An even more significant feature is that multiple operators can view the same image simultaneously in real time, allowing them to remotely verify designs while working in different locations. Building a development framework that unifies the company units involved means that design can be carried out with a more effective emphasis on product lifecycle, which facilitates product maintenance and leads to improvements in product recycling.
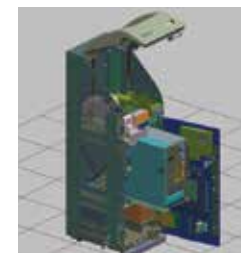
3-D CAD data from the VPS

🌱 Environmental impact reduction benefits (based on Fujitsu's estimates)

● Being able to remotely test designs simultaneously from different locations allows for reductions in travel time and business trips needed for meetings, which has shown reductions in CO_2 emissions volume of approximately 30%.