Solutions to Help Create Sustainable Society

● Seiya Yamazaki ● Kenichi Iida ● Yu Seimiya ● Hiroko Ioka

The global environment is presenting serious challenges in the form of climate change and biodiversity reduction while population growth is resulting in shortages of energy, food, and water and urbanization is increasing social problems. The Fujitsu Group has focused on addressing these challenges and problems through such means as using information and communications technology (ICT) solutions for reducing greenhouse gas (GHG) emissions and for creating a sustainable society. This paper outlines these challenges and describes the efforts being made by the Fujitsu Group. It describes two specific cases related to reducing GHG emissions, "Global Communications Platform" and "sales tablets for life insurance company," in which the deployment of Fujitsu's ICT services led to a reduction in CO_2 emissions. It also discusses the contributions of the Fujitsu Group toward global standardization of environmental impact assessment methods. A case is also described in the area of agriculture, which has recently been attracting greater interest, in which ICT solutions are used to help create a sustainable society.

1. Introduction

The world is now faced with a variety of problems, from increasingly severe environmental problems such as climate change and loss of biodiversity, to security of energy, food, and other resources. It also faces an upsurge in social changes accompanying urbanization.

As expressed in the FUJITSU Way, a summary of Fujitsu's corporate philosophy, "We protect the environment and contribute to society" is one of our corporate values. The Fujitsu Group recognizes that it has a social responsibility to contribute to global sustainability and sees this as a cornerstone of its existence.[1] At the same time, the information and communications technology (ICT) services offered by the Fujitsu Group are applicable to diverse areas of society and can contribute to global environmental solutions.[2),3] The Fujitsu Group is therefore focusing on versatile ICT solutions that can help reduce greenhouse gas (GHG) emissions while also contributing to environmental solutions in a variety of fields and industries. To this end, the following objectives were set in the Fujitsu Group Environmental Action Plan (Stage VII) launched in April 2013 and running from FY2013 to FY2015.

- Reduce GHG emissions through the deployment of ICT (Reduce GHG emissions for our customers and society by over 26 million tons)
- Provide sustainability solutions (Increase the deployment of sustainability solutions that can contribute to creating a sustainable society)

This paper introduces Fujitsu's approach to achieving reductions in GHG emissions through the deployment of ICT solutions and describes two related cases. It also discusses the contributions of the Fujitsu Group toward global standardization of environmental impact assessment methods. A specific example is presented of shaping a sustainable society in the field of agriculture, which has been attracting increasing attention as an ICT target.

2. Reduction in GHG emissions through ICT

Many organizations and companies are quantifying and reporting on their environmental impact (negative impact) and those of specific products, and the techniques and tools they use continue to be developed and improved. On the other hand, there are only a few globally harmonized methodologies or concepts for quantifying environmental-impact reduction effects

(positive impact).

Since the development of a "methodology for assessing the environmental impact of ICT solutions"[4] by Fujitsu Laboratories in 2004, Fujitsu has been quantitatively assessing environmental-impact (CO_2-emission) reduction effects of ICT, as shown in **Figure 1**. By 2009, assessment data for more than 100 cases of ICT solutions had been accumulated in this way, and the Fujitsu Group used these data as a basis for making its first announcement of quantitative targets for environmental contributions through ICT (specifically, a total reduction of 12 million tons in GHG emissions for FY2009–FY2012). Then, after accumulating assessment data for more than 300 cases of ICT solutions by the end of FY2012, the Fujitsu Group established new globally expanded targets in April 2013 (a total reduction of 26 million tons for FY2013–FY2015).

The Fujitsu Group calculates the effectiveness of its GHG reduction efforts by multiplying the sales volume of the target solution by the amount of contribution made per sales volume. The conversion factor used (ton CO_2/yen) was determined from the data for more than 300 cases of solution assessment. The following presents two examples of actual solutions.

2.1 Global Communications Platform

Fujitsu's Global Communications Platform is a system integration (SI) solution that aims to improve the efficiency and reduce the cost of a customer's administrative tasks (phone calls, mail, schedule management, videoconferencing, document management, etc.).

1) Effect of introduction

Holding a meeting involves a variety of tasks such as contacting participants and reserving a meeting room by using the telephone and other tools like an on-line calendar, e-mail software, and a conference room reservation system. Introducing the Global Communications Platform has enabled such tasks to be performed using a unified system, thereby greatly reducing the amount of time spent on them. At the same time, videoconferencing has helped to make business trips unnecessary, enabling the time that would have been spent traveling to be used more productively. This Global Communications Platform solution is also effective in improving the efficiency of preparing and obtaining the materials required for a meeting, of obtaining necessary contact information, etc.

2) Assessment of CO_2-emissions reduction effect

Here, we describe the CO_2-emissions reduction effect of this solution by taking the introduction of the Global Communications Platform inside Fujitsu as an example. The assessment procedure begins by deciding which tasks (unit processes) are to be assessed and collecting data related to each of them (amount of paper used, time spent, movement of people and Transport of goods, etc.). However, the functions targeted by this

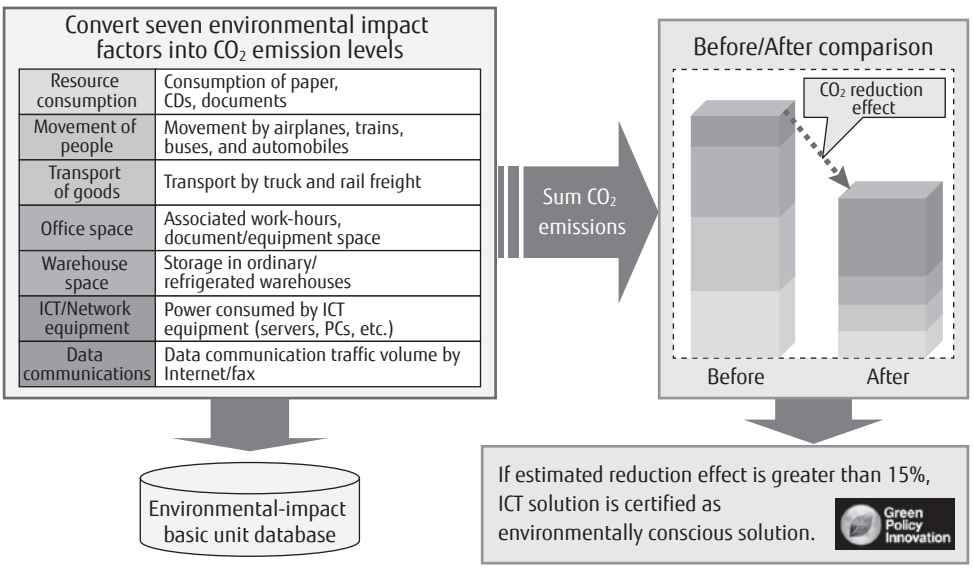

Figure 1
Methodology for assessing environmental impact of ICT solutions.

solution are many and varied, and, since it would be difficult to include all of them, we performed this assessment for five representative functions: meeting coordination, videoconferencing, knowledge sharing, telephoning busy people (who are frequently away from their desks), and ICT infrastructure.

- Meeting coordination

For this function, we assumed the number of people involved in its performance and identified each element involved in holding one meeting. We then came up with figures for the amount of time spent on the various types of work involved, the extent to which that work can be made more efficient, the number of times such a meeting is held every year, etc. on the basis of past examples within the company.

- Videoconferencing

For this function, we assumed the distance traveled, the preparations made, etc. for people traveling to attend a meeting. We also assessed the amount of data communications performed after the introduction of the Global Communications Platform solution as a load-increasing factor.

- Knowledge sharing, telephoning busy people

For these two functions, we quantified on an item-by-item basis the amount by which work changed after the introduction of the solution.

- ICT infrastructure

For this function, we quantitatively assessed the energy-saving effect obtained by reducing the number of servers used.

This assessment of the effect of the Global Communications Platform inside Fujitsu showed that it reduced CO_2 emissions related to meeting coordination by 85.8%. It also showed that the introduction of this solution not only reduces the environmental impact but also reduces labor costs, an effect that was not previously noticed. A saving of about 8000 hours related to meeting coordination is expected.

2.2 Sales tablets for a life insurance company

This solution linked tablet computers for insurance sales personnel with a life-insurance policy management system.

1) Effect of introduction

The work of insurance sales personnel has traditionally been based on paper documentation, which makes office work paper-intensive. In addition, such paperwork and other tasks are typically performed at a sales office, so there are costs (both money and time) involved in travelling to the customer's site and to the relevant office. The amount of such paperwork can be reduced by having sales personnel use tablets to explain insurance products to customers and to prepare contracts. Moreover, linking those tablets to the company's business system would enable the sales personnel to work more efficiently when at the customer's site and while traveling, resulting in less need to stop by the office between customer visits. This solution would thus reduce labor costs and travel expenses.

2) Assessment of CO_2-emissions reduction effect

We assessed the CO_2-emissions reduction effect of the sales tablets solution in six areas, which are listed in **Figure 2**. The overall reduction effect was 43.1%. The effect was particularly noticeable in the movement of people (reduction in travel expenses) and in office space (energy-saving effect from reduced lighting, air conditioning, etc.). Additionally, in the area of resource (paper) consumption, the introduction of this solution contributed significantly to saving more than ten million sheets of paper.

3. Standardization of environmental impact assessment methodology

The Ministry of Internal Affairs and Communications (MIC) in Japan has taken the lead in promoting the international standardization of an environmental impact assessment methodology with

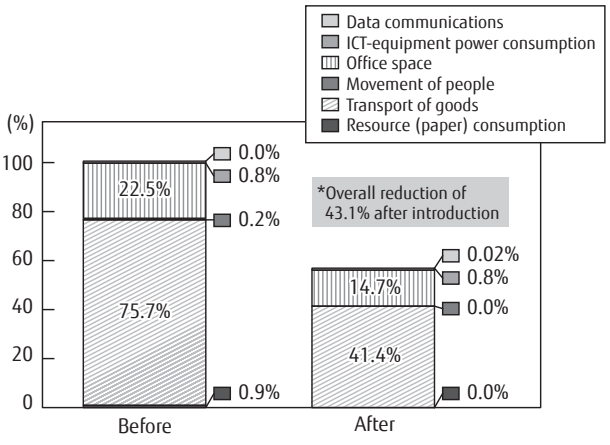

Figure 2
CO_2-emissions reduction effect of sales tablets solution.

the aim of propagating the concept of environmental contributions by ICT throughout the world. In this endeavor, MIC has been working with eight ICT companies including Fujitsu and has included Fujitsu's methodology for assessing the environmental impact of ICT solutions described above as part of Japan's input to this standardization process.

As a result of these efforts, Study Group (SG) 5 of the ITU-T established "L.1410: Methodology for the assessment of the environmental impact of information and communication technology goods, networks and services" as an ITU-T Recommendation in March 2013.[5] After this, the ICT and Climate Change Working Group of the Telecommunication Technology Committee (TTC) in Japan created a Japanese-language version of L.1410 and established it as TTC Standard JT-L1410.[6]

The L.1410 methodology aims to assess the environmental impact of ICT goods, networks, and services (particularly in regard to energy consumption and GHG emissions) on a life-cycle basis, and it was therefore developed as a complement to ISO14040 (Environmental management—Life cycle assessment—Principles and framework) and ISO14044 (Environmental management—Life cycle assessment—Requirements and guidelines). There are three key aspects to L.1410: "first and second order effects," "life cycle assessment," and "eight items." The first two aspects are addressed here.

3.1 First- and second-order effects

While the introduction of ICT can contribute to a reduction in environmental impact, the energy consumed by ICT itself increases as the functions and services provided by ICT expand. The environmental impact (negative impact) of ICT due to the consumption of energy and natural resources and the generation of waste, as well as other factors, is considered a first-order effect while the environmental impact reduction (positive impact) is considered a second-order effect. This second-order effect contributes to a sustainable society as in the creation of a paperless environment (digitization of information), a reduction in the movement and transport of people and goods, and revolutionary changes in industry and lifestyle. To maximize the environmental impact reduction effect, the second-order effects must be maximized while the first-order effects must be minimized.

3.2 Life cycle assessment (LCA)

In principle, the assessment should be performed over an entire life cycle, from the acquisition of raw materials through production, use, and end of life treatment, but it is acceptable to target only part of the life cycle if cut-off rules or section A.1.2 of ISO14040 applies. With this in mind, a checklist is provided in the form of a life cycle and category matrix consisting of the four life cycle stages of raw material acquisition, production, use, and end of life treatment versus the eight items of ICT hardware, ICT software, consumables and other supportive products, site infrastructure, transport (movement of goods), travel (movement of people), storage of goods, and working environment. This framework has been widely accepted after being studied and advocated by Japan toward international standardization.

4. Provision of a solution contributing to a sustainable society—agricultural support through ICT

The widespread acceptance of corporate social responsibility (CSR) and environmental management in society has prompted many companies and organizations to pursue solutions to address social and environmental challenges. The Fujitsu Group, as well, continues to respond to these social and environmental challenges and has set "Increase the deployment of sustainability solutions" as a target of the Fujitsu Group Environmental Action Plan (Stage VII). In the plan, the Fujitsu Group aims to contribute to solutions including one that can help mitigate flood damage by conducting weather forecasting simulations using supercomputers and one that can support sustainable urban development using big data. Here we present an example of a solution that aims for the sustainable use of biological resources in the agriculture sector.

In Japan, the agricultural sector is faced with a variety of issues including the aging of experienced farmers, a shortage of new farmers, an increase in abandoned cultivated land, and the expected inflow of overseas farm products due to the pending Trans-Pacific Partnership (TPP) trade pact. Against this background, Fujitsu aims to contribute to the sustainable use of biological resources with a focus on agricultural products and to support Japan's primary industries using ICT.

Fujitsu has been participating in the "Yamanashi

Cooperative Farming System" launched by Yamanashi Prefecture in 2012, and has collaborated with the JA Nishi Yatsushiro Agricultural Cooperative and Shunka Ichiba Co., Ltd. in conducting a field trial on the visualization of optimal temperature management in the cultivation of sweet corn. In Yamanashi Prefecture, the numbers of new farmers and new corporate entrants in agriculture are growing annually, and many of them are undertaking the cultivation of sweet corn, which is relatively easy to grow. In the early growth period, however, managing temperature and humidity by opening and closing vinyl row covers is difficult for inexperienced farmers. To help them, Fujitsu constructed a simple sensor network using a special low-power radio system, and, using this network, it collected data on the timing of ventilation for vinyl-covered rows and on temperature and humidity to identify any correlations between these variables (**Figure 3**).

Two key features of this sensor network are that it requires no license or communication fees to operate and that it can operate with only a solar panel, i.e., without an AC power supply, thanks to low power consumption. In addition, equipping the system with cameras enables conditions at diverse points in the field to be efficiently determined without manual intervention. This sensor network therefore has the added advantage of reducing the labor, time, and traveling costs associated with making the rounds in a field.

A comparison of temperature management between new and experienced farmers showed that

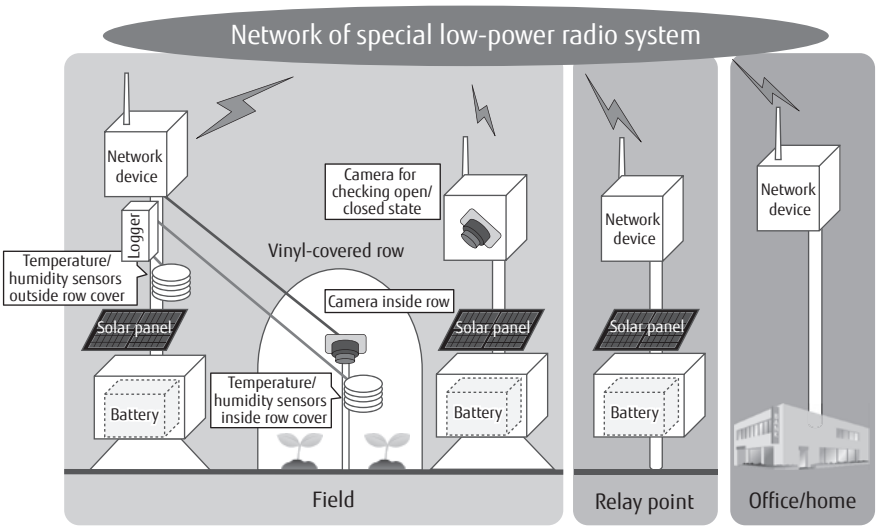

Figure 3
Schematic diagram network for vinyl-covered rows.

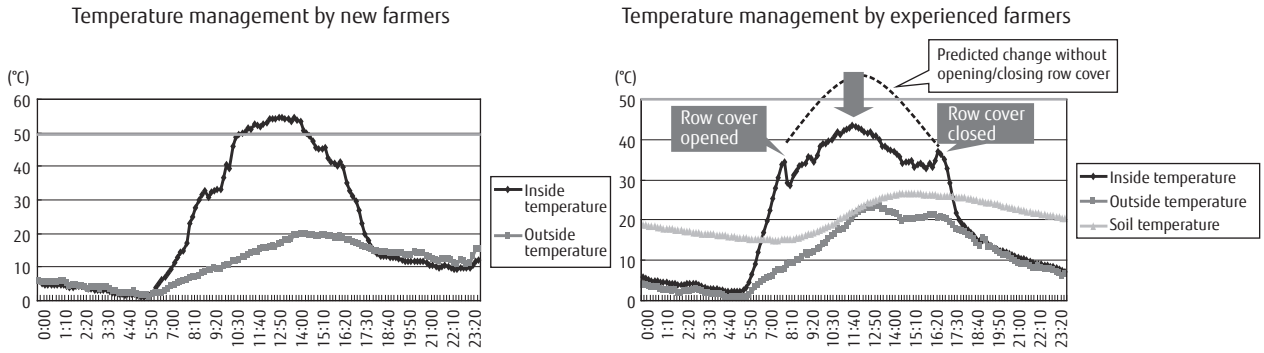

Figure 4
Comparison of temperature management between new and experienced farmers.

vinyl-covered rows managed by new farmers suffered from poor air flow and inadequate ventilation and reached temperatures in excess of 50°C as a result. In contrast, experienced farmers varied the opening and closing times of the vinyl covers in accordance with weather conditions, thereby keeping the rise in temperature under 45°C (**Figure 4**).

Fujitsu plans to provide cultivation support for new farmers in various ways, such as by enabling experienced farmers to share their knowledge of ventilation timing with new farmers by e-mail or text messaging and to reflect the knowledge gained in this field trial in a cultivation manual.

5. Conclusion

As technology advances, the use of ICT is being expanded to include diverse social applications. This expanding use of ICT is not only making work more efficient but is creating new value by making possible what was previously inconceivable.

Fujitsu aims to leverage the power of ICT by assessing this new value in terms of environmental and social sustainability. Additionally, by expanding the application of ICT even further, Fujitsu intends to take a proactive approach to reducing GHG emissions in society and customer operations, to responding to diverse social and environmental challenges, and to creating a sustainable society.

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Seiya Yamazaki
Fujitsu Ltd.
Mr. Yamazaki is engaged in the planning and promotion of green solutions business.

Yu Seimiya
Fujitsu Ltd.
Mr. Seimiya is engaged in the promotion of green solutions business using sensor networks.

Kenichi Iida
Fujitsu Ltd.
Mr. Iida is engaged in the promotion of environmentally conscious solutions.

Hiroko Ioka
Fujitsu Ltd.
Ms. Ioka is engaged in the promotion of sustainability solutions.