

Environmental Innovation Activities of Fujitsu Laboratories

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Effective addressing of global environmental problems is considered to be one of the most important issues for ongoing corporate activities. In its fourth assessment report, the Intergovernmental Panel on Climate Change (IPCC) warns that emissions of greenhouse gases like CO₂, if left unchecked, could cause the average global temperature to rise by 2–6°C by the end of the 21st century, leaving the future of mankind at risk. Innovation by information technology (IT) is indispensable in reducing greenhouse gas emissions by 50% by 2050, and Fujitsu Laboratories initiated the development of diverse technologies for reducing the environmental load. Part of Fujitsu's development policy is to introduce its environmental perspectives into the R&D roadmap and to evaluate the development targets by life cycle assessment in order to predict the environmental load reductions beforehand. In addition, Fujitsu promotes total technology development from materials/devices to system/solutions, aiming at effective energy saving by integrating elemental technologies and building an ecological value chain. This paper outlines the latest activities of Fujitsu Laboratories toward environmental innovations.

1. Introduction

Effective addressing of global environmental problems is considered to be one of the most important issues of ongoing corporate activities. Fujitsu is involved in a variety of environment-related activities dealing with global warming, resource depletion, and contamination with toxic waste substances, and it also works to ensure compliance with relevant laws and regulations.

Global warming is said to be the biggest environmental challenge we have ever faced. The fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC) issued in 2007¹⁾ states that the emission of greenhouse gases like CO₂ is the main cause of global warming, and it warns that average global temperature could rise by 2–6°C by the end of the 21st century, leaving the future of mankind at risk if the current conditions are left

unchecked. To achieve a sustainable society that supports the continued existence of mankind, we must devote our efforts to reduce greenhouse-gas emissions by 50% by 2050. However, in the post-industrial-revolution society dominated by mass production and mass consumption, approaching the problem by simply enhancing energy-saving measures has its limits, and what the world really needs now is environmental innovations. This paper outlines Fujitsu research and development (R&D) activities toward environmentally friendly innovations.

2. Role of IT industry in combating global warming

The IT Governors conference at the Annual Meeting of the World Economic Forum held in January 2008 issued a message stating that the “The IT industry is responsible for approximately

2% of global CO₂ emissions. ICT solutions have the potential to be an enabler to reduce a significant part of the remaining 98% of total CO₂ emitted by non IT Industries and the public.” Far from being culprits, information technology (IT) and information and communications technology (ICT) simply consume power and are increasingly recognized as essential elements in achieving a thriving, low-carbon society. In other words, IT and ICT have a very important role to play in combating the global warming.

In a similar manner, the Fujitsu Way, which embodies the philosophy and guiding principles of the Fujitsu Group, advocates the preservation of the global environment and formulates a business policy that includes the provision of global-environment-protection solutions. In addition, the Fujitsu Group’s medium-term environmental vision “Green Policy 2020” (Figure 1) declares that the mission of Fujitsu is not only to combat global warming by making internal changes but also to help reduce the environmental load of society as a whole. Specifically, Fujitsu is to provide environmental innovations toward reducing nearly 30 million tons of CO₂ gas emitted annually in Japan.

3. R&D activities

As described above, much is expected from the IT industry toward the halving of CO₂ emissions by 2050. To that end, innovation through new R&D strategies is absolutely necessary. Some of the environmentally related development strategies of Fujitsu Laboratories are listed below.

- 1) Introduce an environmental axis into the R&D roadmap and review development policies from an environmental viewpoint
- 2) Predict beforehand the CO₂-reduction effect of newly developed technologies using life cycle assessment
- 3) Pursue total technology development from the materials/device level to facilities, systems, and solutions

Fujitsu is one of only a few IT companies known for total development and provision from products to solutions. These technology achievements can be a great force in reducing the environmental load. Our R&D themes related to environmental load reduction include many information technologies, and the combination of elemental ones and the resulting synergetic effect can lead to even more efficient environmental

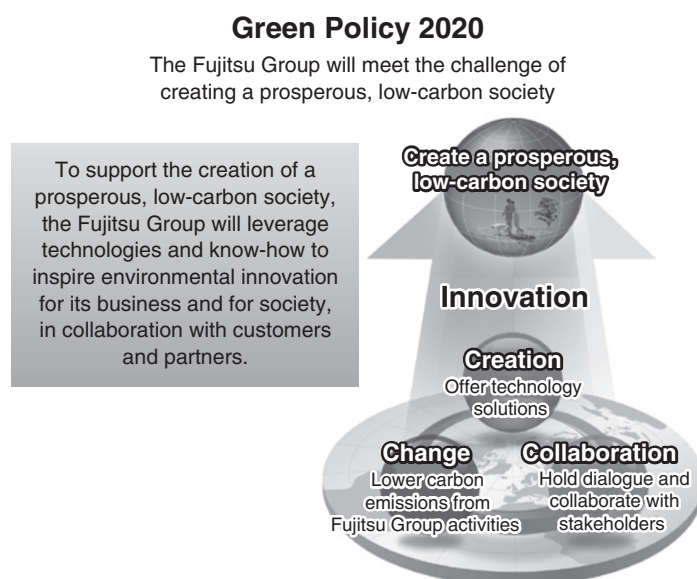


Figure 1
Green Policy 2020.

load reduction. Taking into consideration Internet data centers (IDCs) as an example, the following section describes the importance of the development of energy-saving technologies and gives some background about the actual development work.

4. Energy-saving measures for IT equipment: application to IDCs

The role of IT equipment is becoming increasingly important as the network society continues to progress, but at the same time, the increase in IT equipment power consumption is becoming a serious problem. Calculations performed by the Ministry of Economy, Trade and Industry (METI) found that the power consumed by IT equipment in Japan in 2006 reached 5% of the total power consumption in Japan, and this amount will increase by 12 times by 2050 if the conditions remain the same without any countermeasures being taken.²⁾ In this regard, IDCs, which are expected to play a major role in the next-generation Cloud computing, would be the sites that consolidate IT equipment to a greater degree, making them a prime target for the development of energy-saving technologies. The breakdown of power consumption at Fujitsu data centers is shown in **Figure 2**.

It is natural to think that the power consumption of IT equipment is very high, but as can be seen from the pie chart, the power consumed by air conditioning, power supplies, and other facilities is also very high and actually exceeds that of the IT equipment. Thus, to achieve an energy-saving IDC, it is clear that what is needed is total technology development that targets not only IT equipment but also air conditioning, power supplies, and other facilities.

With this in mind, Fujitsu Laboratories is undertaking the development of three types of technologies to achieve:

- 1) Highly efficient power conversion in power supplies of IT equipment

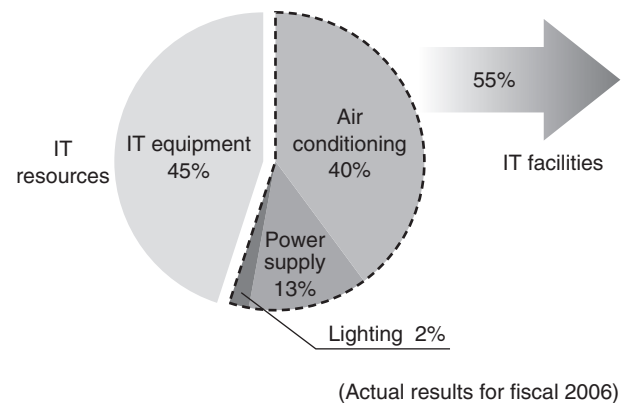


Figure 2
Power-consumption breakdown at Fujitsu data centers.

- 2) Low-power device technology toward energy-saving IT equipment
- 3) High-resolution visualization of temperature distributions toward energy-saving air conditioning equipment and other facilities

More detailed descriptions of these technologies are given in other papers in this special issue, which cover: GaN HEMT (high electron mobility transistor) technology for future applications, an on-die power supply noise monitor and its application to power gating technique, and multipoint temperature measurement technology.

Although each of these technologies can be expected to have a significant energy-savings effect on its own, their integrated use should achieve even greater energy savings. That is, by achieving greater conversion efficiencies in the power supplies of servers and by developing low-power devices, we can minimize the loss-induced heat and the power consumption, which will reduce the load on air conditioning facilities. Furthermore, by generating highly detailed visualizations of temperature distributions, we can obtain data that can be fed back to the air conditioning system to achieve the optimal air conditioning temperature and temperature distribution. This will cut down on waste caused by overcooling, which will lead to a great energy-

saving effect.

Through the above technologies, Fujitsu Laboratories aims to achieve an ecological value chain through total technology development and its synergetic effect. Such a chain is thought to be an important factor in achieving environmental innovation toward the Green Policy 2020.

5. Environmental load reduction by IT solutions

Although IT products are designed to achieve less environmental load, an even greater load reduction effect can be expected from IT solutions. As shown in **Figure 3**, the introduction of IT solutions can save energy in different ways. For example, intelligent transport systems can do a lot more than simply make vehicle driving safer—they also make transport more efficient and cut fuel use by reducing traffic congestion. Moreover, the inventory control system cuts storage space, thereby reducing the energy required to maintain the inventory. Furthermore, the electronic conferencing system saves the time

and energy needed for people movement. And the electronic billing and settlement system not only makes operations more efficient, but also reduces energy and paper use required for printing.

The energy-saving effects achieved by providing these solutions can be considered the most promising contribution that IT can make to combat global warming, and in this regard, there is great demand for Fujitsu’s technology contributions. The paper entitled “Application of Environmental Load Analysis to Branch Office Monitoring” in this special issue reports Fujitsu’s efforts to reduce the environmental load by applying environmental load analysis techniques and environmental load reduction solutions.

6. Conclusion

This paper outlined technology development toward reducing the environmental load, in particular, CO₂ emissions. The implementation of countermeasures to global warming is already a matter of great urgency, and we cannot help but acknowledge that the development of

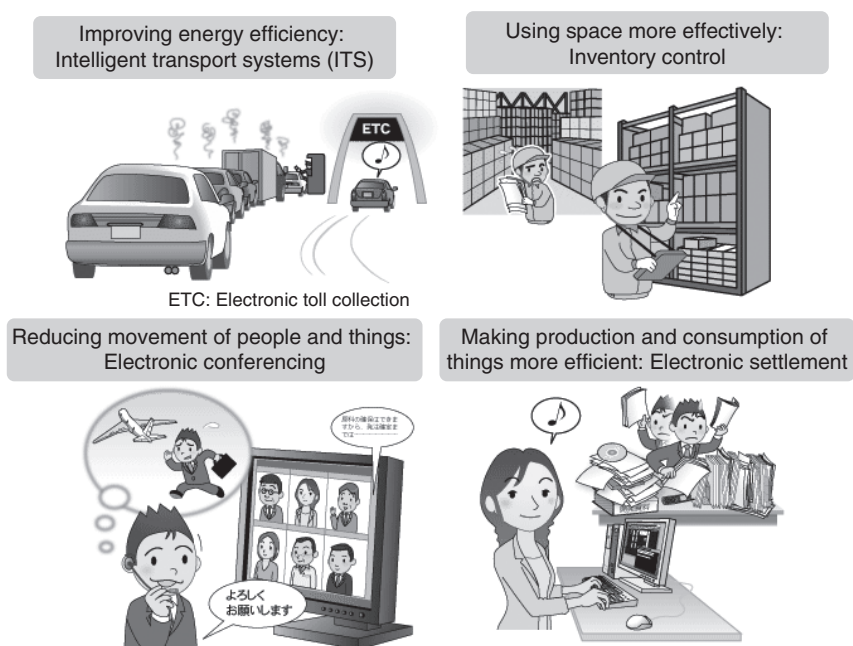


Figure 3 Environmental load reduction by IT solutions.

environmental load reduction technologies is becoming increasingly important day by day. The technologies described in the four papers in this special issue contain only part of the environment-related technology development now underway at Fujitsu Laboratories. Nevertheless, I would be very pleased if readers can acquire a good understanding of how each of these technologies

has great potential for contributing to a better environment.

References

- 1) IPCC: Climate Change 2007: Synthesis Report (AR4), 2007.
- 2) Ministry of Economy, Trade and Industry (METI): Expectation for innovative energy-saving technologies of IT equipment. Green IT Symposium 2007, 2007.



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