Environmental Impact Assessment System

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Abstract

We describe an environmental impact assessment system that was developed by the NTT Energy and Environment Systems Laboratories in response to a call for contributions to suggest ways of reducing the environmental load of information and communications technology (ICT) services provided by the NTT Group. We explain an approach to evaluating the effects of ICT services on the environment, the NTT Group Solution Environmental Label System, and the positioning of the system in attaining the objectives of THE GREEN VISION 2020.

1. Introduction

The NTT Group has drawn up THE GREEN VISION 2020 as a new vision to guide its environmental efforts in information and communications technology (ICT) through the year 2020 [1]. This vision involves three targets: Green of ICT, Green by ICT, and Green with Team NTT. The goal of Green by ICT is to reduce CO_2 emissions by at least 20 million tons by the year 2020 through the use of ICT solutions as a step toward becoming a low-carbon society.

To achieve this target, it is necessary to quantitatively evaluate the effectiveness of individual ICT solutions in reducing CO_2 emissions. The NTT Energy and Environment Systems Laboratories have developed an environmental impact assessment system as a tool for evaluation.

2. Evaluation of environmental effects of ICT solutions

The energy efficiency of new devices such as home electronics products, light-emitting diode (LED) light bulbs, etc. has been increasing, and the energy-saving effects can be measured quantitatively by comparing the power consumption of new products with that of earlier products.

ICT solutions generally lead to greater work efficiency and a reduction in the use of paper through digital storage of information. Although it is assumed that these benefits also reduce the environmental load, it is difficult to quantitatively measure the amount of energy saved, as can be done with home electronic equipment, LED light bulbs, etc.

To overcome this difficulty, we categorized the features of ICT solutions into eight activities (**Fig. 1**), and for each of the activities, we converted the amount of energy and goods used into a quantitative value for CO_2 emissions. The individual values were totaled to obtain the amount of CO_2 emitted when the ICT solutions were applied. We also calculated the CO_2 emissions for a reference product system (conventional) services that have the same functions as the ICT solutions in order to compare the CO_2 emission reduction effects of ICT and conventional services.

By preparing the factors for the conversion of CO_2 emissions (basic units of emission sources) for the respective activities, we can obtain the amount of CO_2 emitted from the quantities of the eight activities. The emission quantities are calculated based on a life-cycle assessment (LCA). LCA is a method of quantitatively assessing the effects of a product or service on the environment at each stage of the product's or service's life cycle, from obtaining the raw materials to manufacture, use, and disposal (**Fig. 2**).

This kind of assessment makes it possible to quan-

	Items (eight activities)	Description
(1)	ICT hardware	CO_2 emissions produced in life cycle of IT equipment
(2)	ICT software	CO_2 emissions produced in the stages of software design, development, and use
(3)	Consumable goods and other support products	CO_2 emissions from production of CDs, books, etc.
(4)	Site infrastructure	CO_2 emissions produced in life cycle of facilities that constitute the network infrastructure
(5)	Transport (movement of goods)	CO_2 emissions produced in the movement of freight by truck, train, etc.
(6)	Travel (movement of people)	CO_2 emissions produced in the movement of people on aircraft, electric trains, and other vehicles
(7)	Storage of goods	CO_2 emissions produced by warehouses, etc.
(8)	Human work environments	CO_2 emissions produced by workplaces such as offices

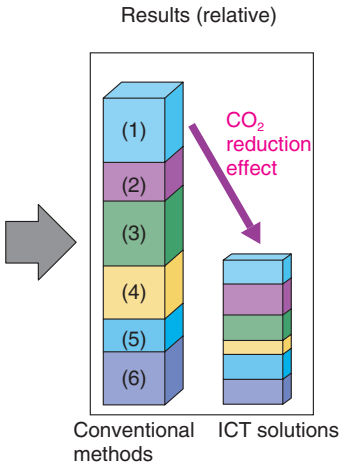

Fig. 1. Descriptions of items evaluated for their environmental load (left) and relative results of applying ICT solutions (right).

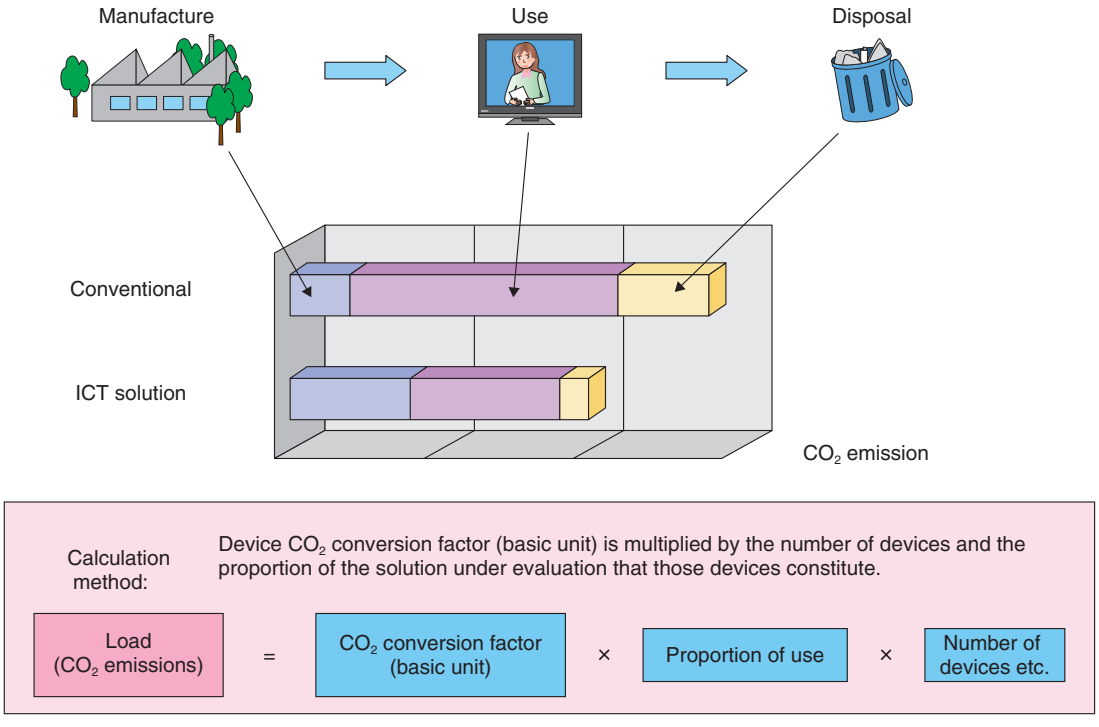

Fig. 2. Calculation of environmental load.

titatively calculate the CO_2 emissions associated with diverse ICT solutions.

This evaluation method is described in the Environmental Efficiency Evaluation Guidelines of the Japan Environmental Efficiency Forum [2]. NTT has been conducting advanced research on evaluating the

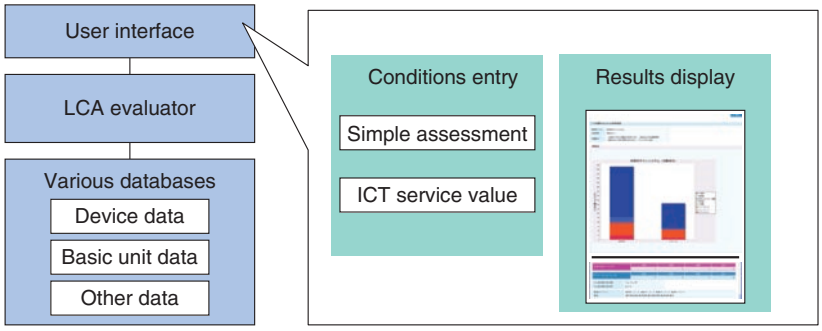

Fig. 3. Configuration of common assessment system.

effects of ICT solutions on the environment and has played a leading role in the development of these guidelines.

The environmental impact assessment system consists of a database of evaluation techniques and the basic units required for evaluation. The user selects the ICT equipment that constitutes the ICT solution to be evaluated and selects how the equipment is used. Then, the user enters the respective quantities (e.g., the number of ICT devices and the duration of use) to evaluate the environmental load.

3. Overview of environmental impact assessment system

The configuration of the environmental impact assessment system is shown in **Fig. 3**. The system comprises an LCA evaluation unit for calculating the environmental load as well as various databases. An algorithm is implemented in the evaluation unit to calculate the environmental load. The information required for the calculations is stored in the databases. This information includes the models of terminal devices, communication cables, and other components of the communication facilities, as well as the environmental load at the stage of disposal and the power consumption during use. The user enters the evaluation conditions on the screen and the evaluation is performed.

This assessment system has two evaluation functions. One is a simple evaluation function that presents the evaluation items on a single screen; the other is an ICT service evaluation function that allows the evaluation items to be customized according to the purpose of the evaluation. The simple evaluation function is provided for broad general use (described in more detail below), whereas the ICT service evaluation function defines models that are specialized for the solution being evaluated to enable a stricter evaluation. The screen for entering the evaluation conditions for the simple evaluation function (**Fig. 4**) has forms for entering data for the eight activities described in Fig. 1. To allow comparison, the conventional means are presented on the left half of the screen and the ICT solutions are shown on the right. The user enters the values, and the evaluation is then performed.

4. Evaluation examples

Example applications of the environmental impact assessment system are shown in **Fig. 5**. The use of a videoconferencing system to hold meetings is compared to the conventional means of traveling by train to attend meetings. The videoconferencing system connects distant locations via a network and makes it possible to conduct meetings with far less movement of people.

Evaluation results are presented for cases involving meetings held between participants from Tokyo and Yokohama and from Tokyo and Nagoya under the same conditions (48 meetings per year, 2 hours per meeting, two people).The videoconferencing option places a load on the environment from the use of the ICT equipment, but it is substantially lower than the load resulting from the conventional means of traveling by train to attend meetings in person. We can therefore easily see which option will have the greater effect on reducing the environmental load.

In these examples, the travel distance was greater for the Tokyo and Nagoya meeting participants than it was for the Tokyo and Yokohama participants (conventional means), so the environmental load was larger, and the reduction effect of using videoconfer-

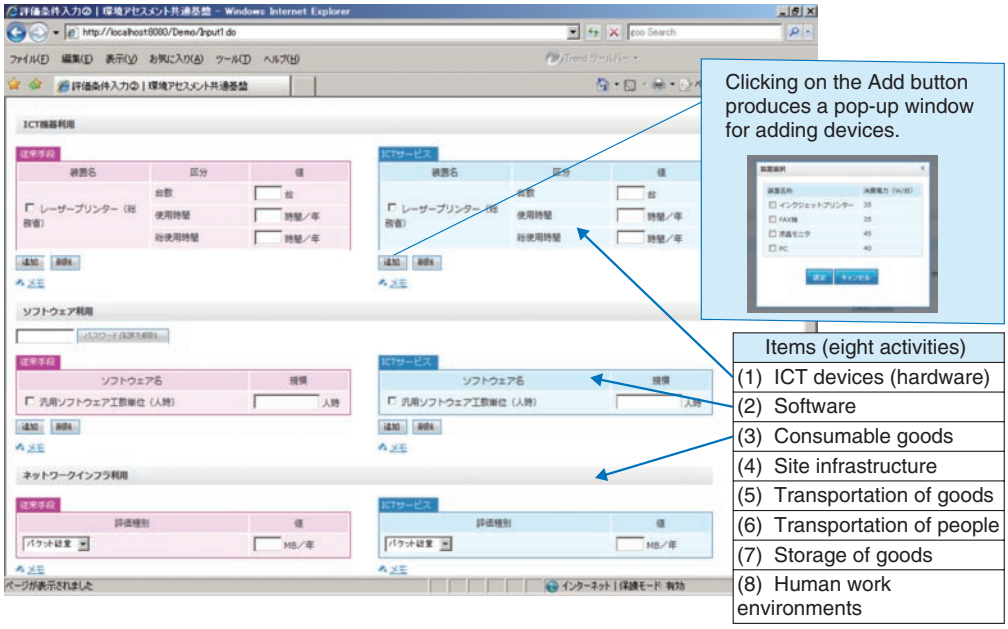

Fig. 4. Screen to enter evaluation conditions.

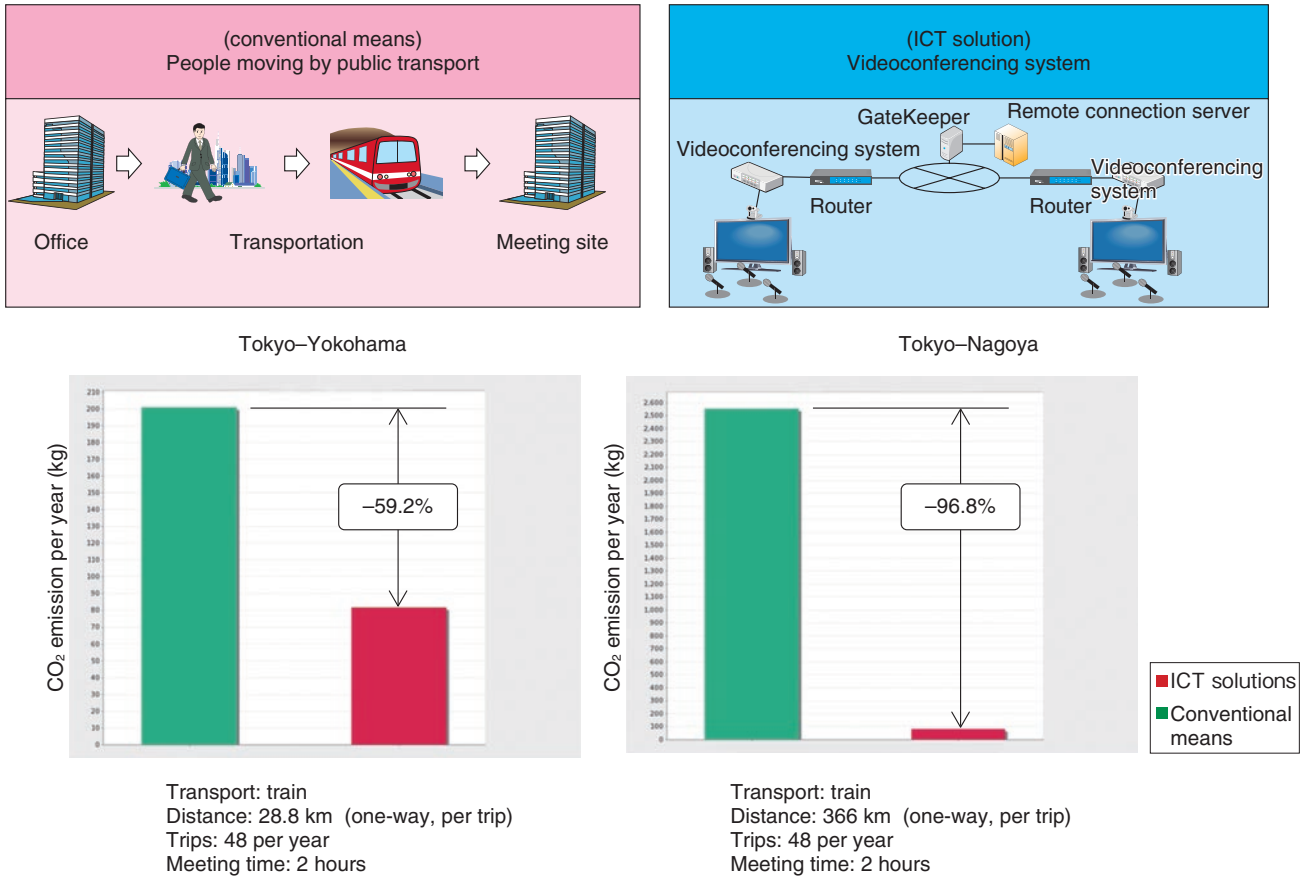

Fig. 5. Evaluation of videoconferencing system.

Fig. 6. NTT Group environmental label.

encing was also larger. The environmental load varies with the meeting duration and the number of meetings as well as with the travel distance. The amount of environmental-load reduction through the use of ICT services varies with the evaluation method used. This assessment system can also be used effectively to check the variation in reduction effects due to differences in the evaluation method by changing the evaluation parameters.

This assessment system allows results to be saved in a Microsoft Excel file for wide use.

5. NTT Group Environmental Labeling System for Solutions

Results from this assessment system can also be used to certify use of the NTT Group environmental labeling system for ICT solutions.

In this labeling system, solutions that reduce the environmental load by at least 15% are certified as being environmentally friendly with a symbol that we call the environmental label (**Fig. 6**). The label can be displayed in pamphlets or on websites to inform customers at a glance that a solution is environmentally friendly. Certified solutions and the environmental impact evaluations in which the certifications are grounded are also displayed on the NTT Group websites to further promote this idea to customers [3]. From 2009, when this system was initiated, to 2011, 19 solutions were certified. The environmental labeling system itself was standardized in the ISO 14020 series, so this labeling system is also administered according to that standard.

6. Future development

To measure the attainability of THE GREEN VISION 2020, we need a total value for the load reduction effects of solutions applied at the enterprise level. However, it is difficult to obtain an overall evaluation of all of the solutions offered by the NTT Group and to measure their total value. To solve that problem, we will work on developing technology that can be estimated to a total value for the load reduction effects of all solutions.

We also plan to promote examples of how this assessment system can be used for evaluations and to devise other means of facilitating the use of the system. By doing so, we hope to encourage widespread use of the system in evalua-tion solutions and to contribute to the environmental efforts of the NTT Group.

References

[1] NTT CSR Promotion Office, “NTT Group 2010 CSR Report,” 2010.
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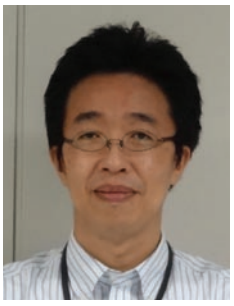
[3] NTT Group Solution Environmental Label System (in Japanese). http://www.ntt.co.jp/kankyo/protect/label/index.html



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