Environment Management Solutions to Reduce GHG and Other Environmental Load

Kazuyoshi Teramoto
Hiroyasu Kato

OVERVIEW: The adverse manifestations of global warming are becoming undeniably apparent in many ways and places around the globe, so curtailing greenhouse gas emissions has become an urgent concern. As a signatory of the Kyoto Protocol, Japan is making wide-ranging efforts to reduce the country's emissions since the beginning of the first emission reduction commitment period in 2008 under the terms of the protocol. Many companies are now grappling with carbon-reduction activities, and the Hitachi Group has made a significant contribution to these efforts with the development and deployment of a powerful "environment information gathering and managing solution." Certainly the actual meaning of reducing our environmental load involves more than just rolling back greenhouse gas emissions. We must implement more comprehensive and effective environmental management practices in the years ahead.

INTRODUCTION

THE first commitment period under the Kyoto Protocol began in 2008, and global responsibilities of the various regions and countries concerned have become clearly recognized. However, Japan's commitment under the protocol to curb its emissions by an average of 6% from 1990 levels between 2008 and 2012 is proving very difficult to achieve [indeed, preliminary figures show that Japan's GHG (greenhouse gas) emissions in 2006 were up 6.4% more than in 1990], so developing more energy-efficient technologies and products has become a critically important concern of corporate environmental management policies. More aggressive efforts are also required to better manage and reduce waste materials and chemical substances to mitigate their environmental impact, and preparations are moving ahead to adopt the EU's EuP (Energy-using Products) Directive as a comprehensive environmental load management framework beginning in 2009. This entails diverse yet consistent and systematic mitigation strategies that of course deal with the impacts of individual products and activities, but also address the impacts of diverse sectors such as business enterprises, local communities, and households.

Here we discuss mitigation initiatives, focusing on a powerful new "environment information gathering and managing solution" that supports companies in their efforts to reduce GHG emissions (see Fig. 1).

CHALLENGES TO BE ADDRESSED

One strategy for bringing down the level of overall GHG emissions is to consistently collect and manage consistent environmental data over a broad range in line with standard environmental criteria. By reducing emissions one "point" at a time, this will have a cumulative effect until vast "areas" of GHG emissions are reduced. With a bottom-up approach, we can put in place an infrastructure that achieves energy efficiencies close to Top Runner levels and GHG reductions across an extensive area. And by boosting the action response level of numerous companies and organizations that are working to mitigate GHG emissions, the effects of even a small number of Top Runner product category targets will lead to sustained and large-scale effects.

Fig. 2 shows a management policy model for reducing GHG emissions by the manufacturing sector. Implementing and extending this kind of management system would serve to organically link different policies, extend the beneficial effects of policies and efforts across the entire emissions reduction program, and build up the critical mass of the program as a whole. The chief challenges in implementing such a system are (1) the collection of homogenous and unified data regarding rational energy conservation and

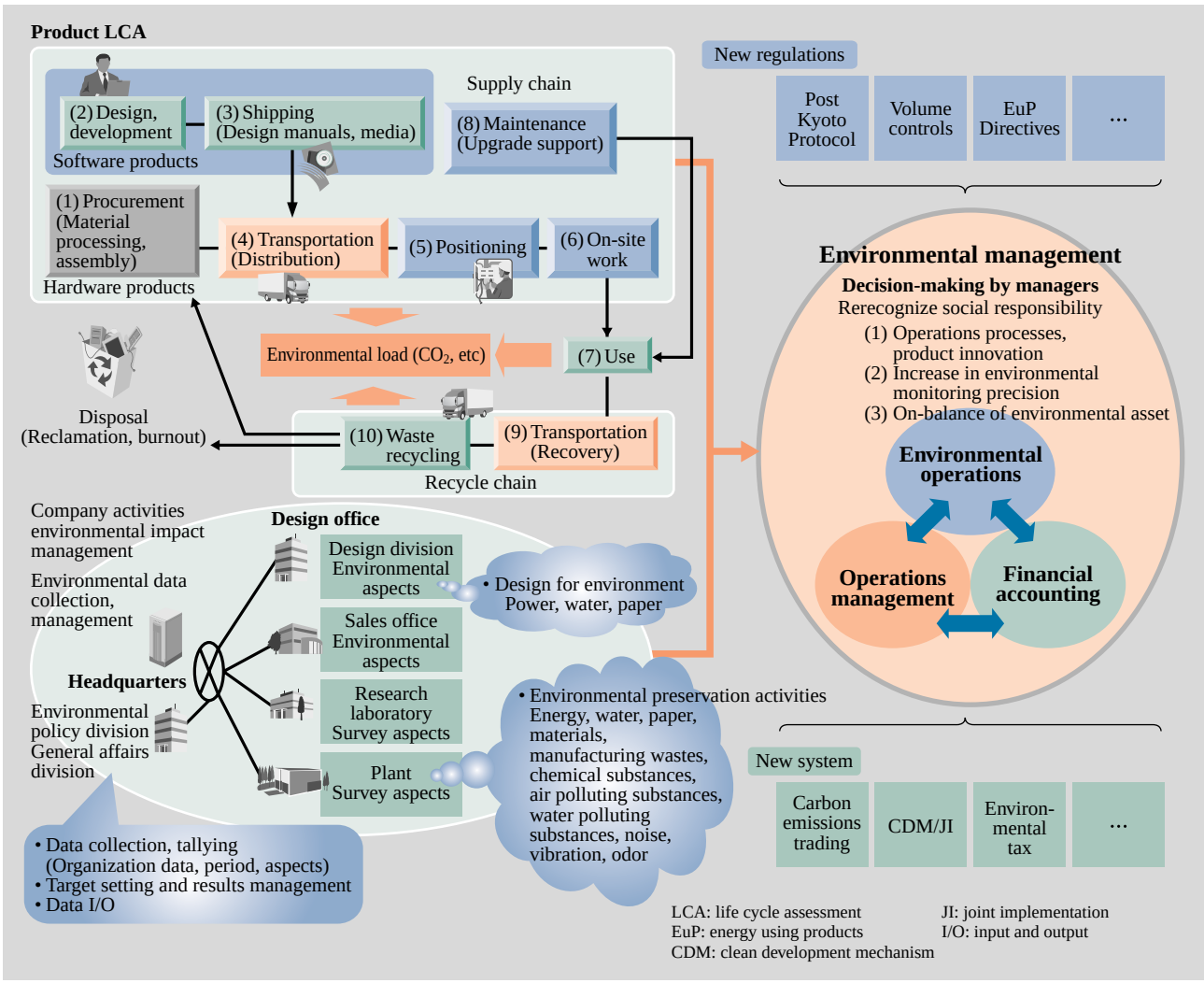

Fig. 1—Transition from Environmental Monitoring to Environmental Management.
Today we deal with environmental load regionally by tallying and managing various loads caused by company activities and temporally through LCA of the environmental load of products or services over their entire lifetime. One key capability in these efforts is collection of environmental data over an extensive area with the goal of reducing GHG (greenhouse gas) emissions. The future will require that this capability is integrated with other management functions, and a comprehensive management system that is fully integrated with company activities.

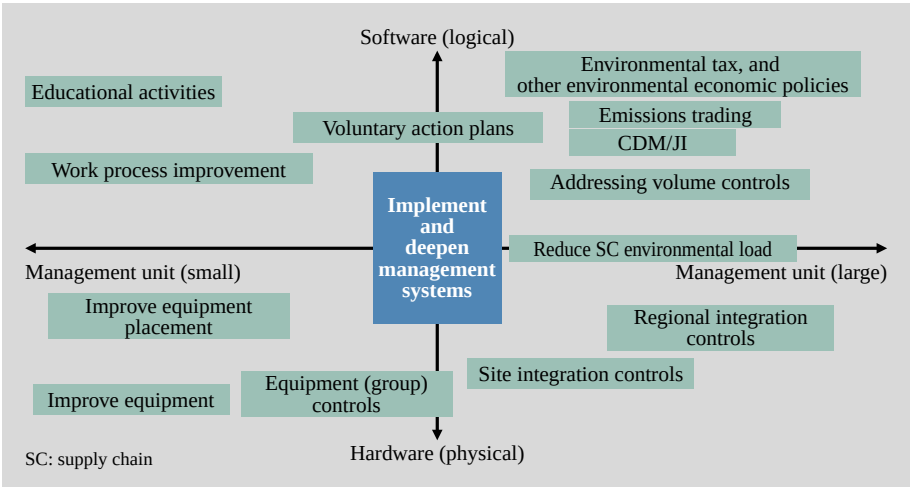

Fig. 2—Management Structure for Reducing GHG Emissions from the Manufacturing Sector.
Not only improving the efficiency of equipment piece, but a holistic bottom-up approach encompassing the entire system and its operation is critically important for reducing GHG emissions.

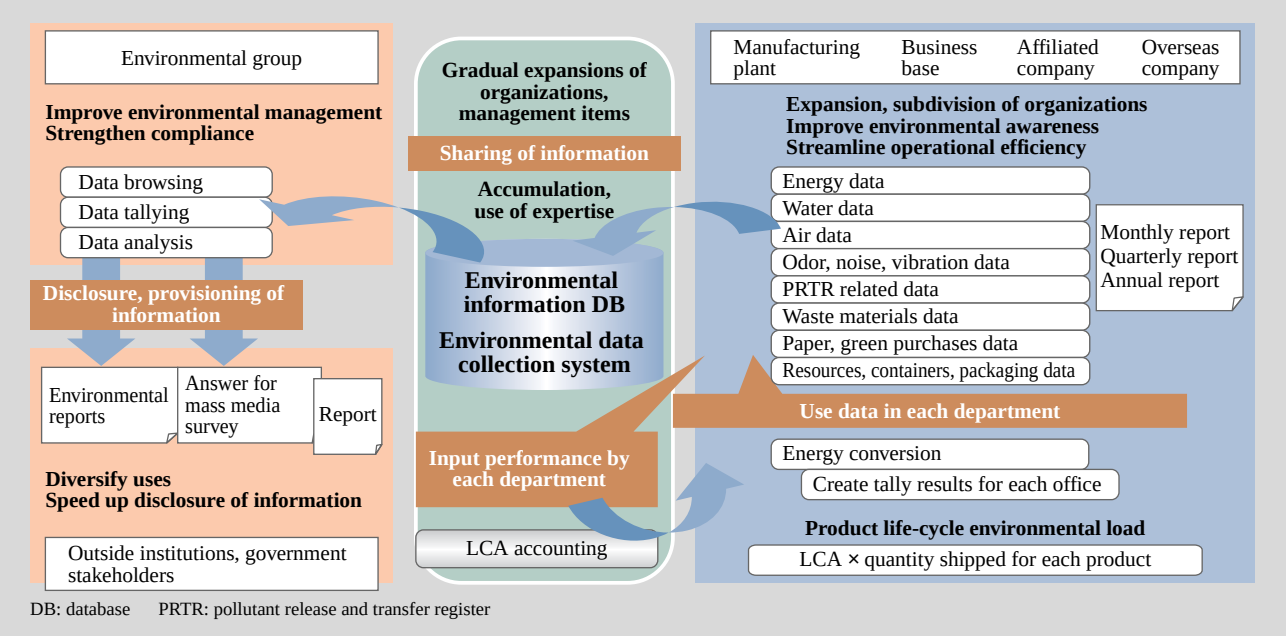

Fig. 3—Configuration and Main Functions of the Environment Information Gathering and Managing Solution. Multifaceted data pertaining to environmental load is uniformly collected and managed in such a way that relevant facilities can access the information over the Web.

GHG reduction measures, (2) more accurate record-keeping and management of environmental load associated with company activities, (3) realistic assessment and recognition of real internal costs to companies, and (4) implementation of effective environmental management policies.

ENVIRONMENTAL MANAGEMENT SOLUTIONS

Importance of Environmental Data

There is a crucial need for a robust system capable of stably and reliably collecting, managing, and utilizing homogenous and detailed environmental load data associated with a company's organization, business processes, products, and services. The criteria of environmental information to be managed continue to increase as regulations and standards proliferate and become more diversified. Particularly now that this information is starting to be regarded as critically important management data, just how well (or how poorly) a company handles its environmental data will have a major impact on its internal costs.

Environmental Information Gathering and Managing Solution

The organizations from which data is collected and the data itself are constantly changing as business activities evolve and change. Consequently, a robust and useful environmental data management system must be capable of uniformly and continuously capturing homogenous and highly accurate environmental data. Supporting these capabilities, we developed the powerful "environment information gathering and managing solution" shown schematically in Fig. 3. Although the core functions of the system are to tally and manage environmental load data, it does much more. The solution also makes it far easier to manipulate and manage data, and keeps track of GHG emissions, energy consumption, waste products, chemical substances, and a wide range of other environment-related data. The system also tracks organization changes, has a range of options for tallying or aggregating data, and is capable of verifying and checking the collected data. Data is input to the system through a Web browser, an Excel* spreadsheet, or even through measurement tools and systems.

Product Life-cycle Solution

Keeping track of GHGs emitted by companies and organizations involves acquisition of regional data (i.e. emissions from plants and facilities), but tracking the environmental load of a company's products involves acquisition of temporal data (i.e. data representing the

* Excel is a registered trademark of Microsoft Corporation in the U.S. and/or other countries.

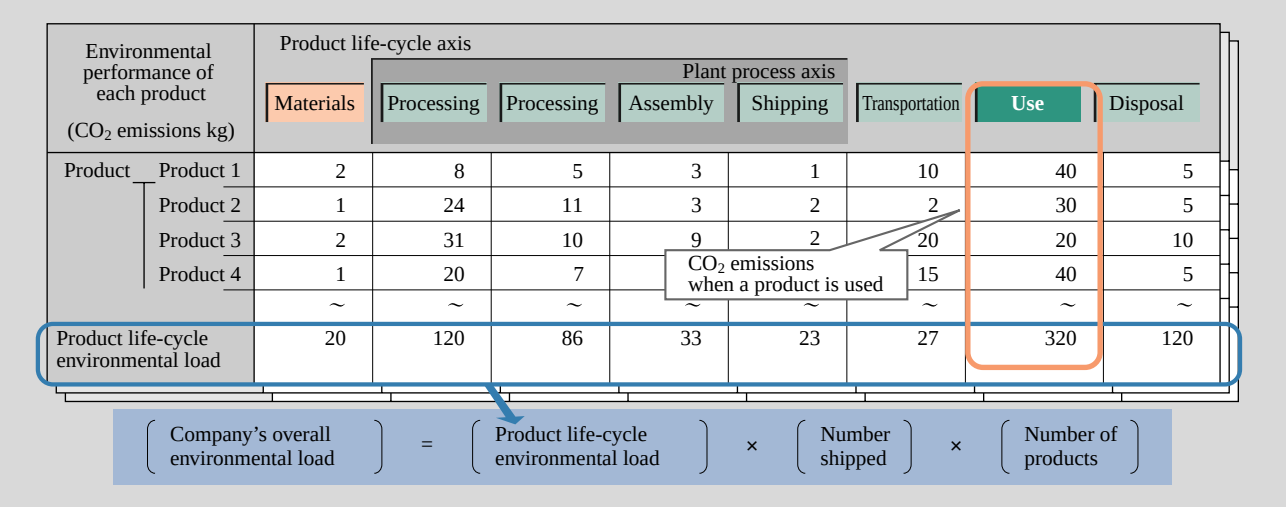

Fig. 4—LCA Solution Functions.
Encompasses all environmental load for a product (not only the manufacturing plant impact) from procurement of the materials to transportation, use, and eventual disassembly and disposal.

entire life cycle of the product). For this we developed an LCA (life cycle assessment) solution, an additional solution that estimates a product's environmental load over its lifetime based on LCA and predefined scenarios. The "environment information gathering and managing solution" is ideal for capturing environmental data that directly relates to a company's activities, but the LCA solution provides a way of tracking environmental data about products after the products have been shipped. This data allows us to assess the environmental load and performance of products and services over their lifetimes. Also, we can estimate the societal environmental load as a measure of company activity simply by multiplying the number of products shipped times their environmental load as illustrated in Fig. 4, and we are now considering making this information available to the public.

DEPLOYMENT CASE STUDY: FOUR ELECTRICAL/ELECTRONIC GROUPS

Voluntary Action Plan for Global Environment Preservation

To assess the effectiveness of the solutions described in the previous sections, we will discuss an electrical/electronic sector environmental survey and automatic tally system deployed in four electrical/electronic groups in 2005. This system monitors progress implementing the voluntary action plans by the manufacturing divisions of the groups under study as an index of enhanced efficiency.

Before the Kyoto Protocol was adopted, the Japan Business Federation set a target of "rolling back CO_2 emissions from the manufacturing and energy conversion sectors to the 1990 level or less by the year 2010," and adopted voluntary action plans in these same industries and sectors. Note that these voluntary action plans also play a critically important role in Japanese industries' efforts to meet its Kyoto Protocol targets, and progress is closely monitored and considered in annual government council meetings.

System Overview and Results

In implementing the voluntary action plans, it is necessary to determine the amounts of energy consumed and CO_2 emitted into the atmosphere each year for the four electrical/electronic groups, and every June surveys are distributed and the responses tallied for all of the member companies (about 550 companies). This work was becoming problematic, because it involved tallying an enormous amount of data and thus required a great deal of labor. By exploiting the Internet, the "environment information gathering and managing solution" had proven itself as very effective for aggregating environmental data, so the system was adopted beginning in 2005 in the four electrical/electronic groups to streamline the work and boost reliability, and the system is fully in service today. As illustrated in Fig. 5, the participating companies download a data recording tool (an Excel spreadsheet), enter their data, then upload the data to the system over the Internet. The data compiled by

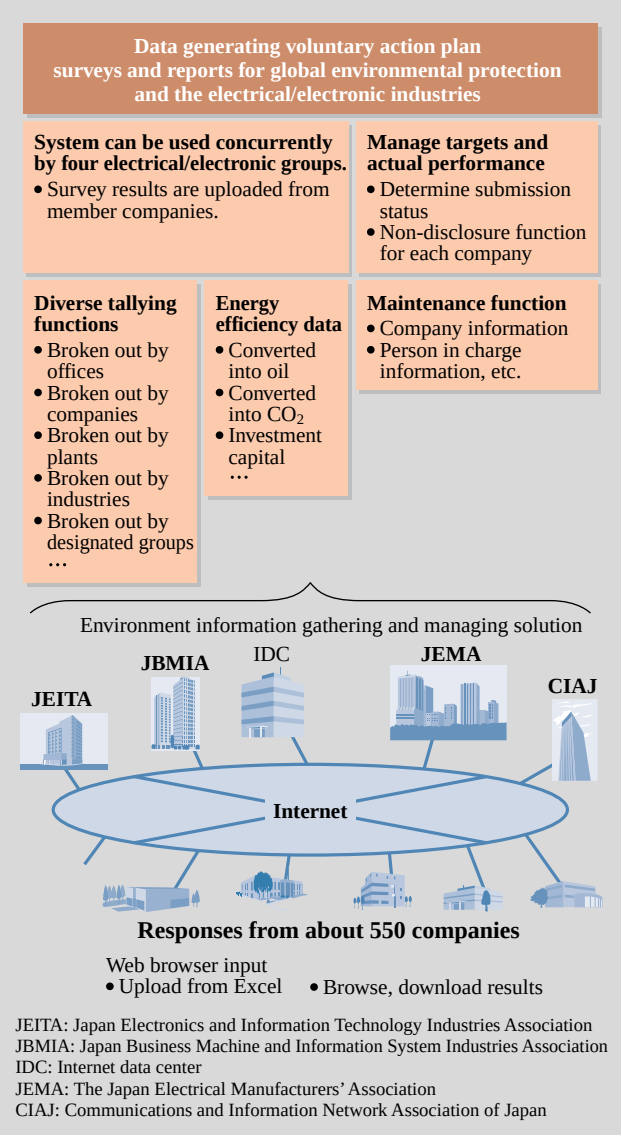

Fig. 5—Electrical/Electronic Sector Environmental Survey and Automatic Tally System.
The system serves to collect, manage environmental data for about 550 participating companies, and generate reports.

the four groups is then used to assess progress, set policies, and draft results reports. The survey data is wide ranging and encompasses both numeric and text information: amounts of energy consumed and CO_2 emitted, key energy conservation measures and policies, current status of each company in achieving its targets, and so on.

Although the system was developed to track and tally data within a company, it has also proven to work extremely well for compiling data on whole industry groups, different geographic regions, and public facilities. The four electrical/electronic groups are also deeply involved in the IT (information technology) sector, so they have brought cutting-edge IT to bear in their mitigation efforts. This has been especially beneficial for ensuring the reliability and continuity of data by checking consistency of past, present, and future target figures, by preventing input errors, and by summarizing data.

Implementation Results

Putting in place a system for dealing with environmental data and environmental activities using the same procedures and forms for collecting, managing, and using the data across an entire industry has tremendous appeal. This permits more accurate and sophisticated analysis of voluntary action plan's progress management, and also helps the industry pull together as a whole in addressing these environmental issues. The system also clearly reveals a company's relative position among member companies in implementing mitigation efforts, and thus serves to motivate companies to step up their environmental protection efforts. We might also mention that the four electrical/electronic groups actually moved up their targets in 2007 after using the system in 2006, and are challenging themselves to achieve even greater efficiency. CO_2 emissions of the four electrical/electronic groups account for nearly 5.1% of those of the total manufacturing sector, so these efforts to achieve greater efficiency are highly significant.

Future Direction

Here we have described implementing the system for an entire industry group, but we would note that certain companies and company groups have achieved substantially better performance and results than described for the industry. Indeed, we could cite cases where more than 10,000 items of environmental data are routinely collected and managed, and environmental CSR (corporate social responsibility) reports are issued annually.

Certainly, with the establishment of the post Kyoto framework committed to halving GHG emissions by 2050 and full-scale adoption of carbon emissions trading, mitigation of environmental load will place a greater burden on companies and have major implications in terms of internal costs. EuP Directives that comprehensively regulate the environmental load of products will also soon take effect. In most cases at this point, data regarding the environmental load of company activities or products is regarded as off-balance-sheet, much like the brand value of a company. This will change dramatically if more rigorous

matching with economic rationality begins to emerge. When that happens, the ability to precisely collect and manage environmental data and precise life-cycle management of products and services will become an absolute necessity for the very survival of companies. An enormous amount of effort will be required in the years ahead to adapt and tailor organizations and management structures, business processes, and product specifications to better accommodate environmental management.

CONCLUSIONS

This paper reviewed some of the company's recent efforts toward mitigating the environmental load, highlighting a powerful "environment information gathering and managing solution" that supports efforts to reduce GHG emissions. The Hitachi Group is committed to develop and deploy even more effective environmental management solutions and tools in the years ahead.

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ABOUT THE AUTHORS

Kazuyoshi Teramoto

Joined Hitachi, Ltd. in 1973, and now works at the Information & Control System Division, the Information & Telecommunication Systems. He is currently engaged in the development of manufacturing execution systems and environment management solutions. Mr. Teramoto is a member of the Information Processing Society of Japan.

Hiroyasu Kato

Joined Hitachi, Ltd. in 1982, and now works at the MES and Environment System Department, the Information & Control System Division, the Information & Telecommunication Systems. He is currently engaged in the construction of environmental management systems.