

## **6. ECO-EFFICIENCY AND AN OVERVIEW OF GREEN PURCHASING**

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### **ABSTRACT**

Eco-efficiency –a management concept designed to encourage businesses to become more competitive, more innovative, and more environmentally responsible– was first coined by the World Business Council for Sustainable Development (WBCSD) and then endorsed by the 1992 ‘Earth Summit’ as the means for companies, individually and collectively, to contribute to the far-reaching Agenda 21 action program developed by the milestone conference. Today, the validity of eco-efficiency is being clearly demonstrated by its success in the growing number of companies which have adopted it as their business norm and translated it into action. Eco-efficiency is a key component on the road to sustainability –a powerful driver for widespread, root-and-branch change, if properly implemented on a large scale. It impacts the entire product chain– by addressing the whole life cycle, promoting a shift from products to services, encouraging green purchasing, and enabling the development of sustainable consumption patterns.

This paper presents the development of the eco-efficiency concept, including the application, measurement, and reporting of eco-efficiency as well as the case studies which show the benefits of eco-efficiency. An overview on green purchasing is also provided to demonstrate a powerful drive for companies to achieve eco-efficiency in the next century.

### **THE ECO-EFFICIENCY CONCEPT**

Eco-efficiency has certainly come a long way since the phrase was first coined in 1991 in the book “Changing Course” produced by the WBCSD as an input to the Earth Summit in Rio. Stephan Schmidheiny was looking for a term that could express the combination of environmental and financial performance, so he organized a competition to find the right term. The winner was a colleague of his who suggested the word “eco-efficiency.” Today, 8 years later, the ever-growing number of discussions and applications of the concept is a sign of its power.

The brief definition of eco-efficiency is the combination of economic and ecological efficiency to add more value with less environmental impact. The more formal definition is as follows:

*“Eco-Efficiency is reached by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing the ecological impact and resource intensity throughout the life cycle to a level at least in line with the Earth’s carrying capacity”.*

A company wanting to become eco-efficient should strive to improve in the following 7 aspects of eco-efficiency as defined by the WBCSD:

1. Reduce the material intensity of its goods and services;
2. Reduce the energy intensity of its goods and services;
3. Reduce the dispersion of any toxic materials;
4. Enhance the recyclability of its materials;
5. Maximize the sustainable use of renewable resources;
6. Extend the durability of its products; and
7. Increase the service intensity of its goods and services.

Eco-efficiency combines environmental and economic performance. It enhances the efficiency of production processes and creates new and better products and services using fewer resources and generating less pollution along with the entire value chain. Eco-efficiency complements many other environmental management approaches by drawing a positive link between environmental improvement and bottom line benefits. Yet, eco-efficiency includes a feature that sets it apart from other concepts. It focuses as much on value creation as on resource use or pollution reduction. Eco-efficiency can help to create value for a company and society as a whole by explicitly promoting change toward sustainable growth. This emphasis on creating and adding value is clearly to society’s benefit.

### **How Has the WBCSD Developed the Concept of Eco-Efficiency?**

Since the emergence of the Eco-Efficiency concept, the WBCSD has developed it further through a number of reports and books. For example, *Eco-Efficient Leadership for Improved Economic and Environmental Performance* (1996) outlined the concept in broad terms and defined it as a management philosophy for business.

*Eco-Efficiency: The Business Link to Sustainable Development* (1997), was co-authored by Livio DeSimone, Chairman and CEO, 3M, and Frank Popoff, Chairman, Dow Chemical. The book presented numerous studies of the application of eco-efficiency within leading international companies. It explained how businesses were encouraging eco-efficient practices in their operations, but argued that further development required enabling frameworks from governments.

In the study *Environmental Performance and Shareholder Value* (1997), DuPont, Storebrand, and the Swiss Bank Corporation together with some 40 WBCSD members drew attention to the positive link between environmental and financial performance. However, unless financial markets can evaluate and reward eco-efficiency in business, they concluded that companies will still not advance quickly enough toward more sustainability. The lack of an agreed eco-efficiency metrics and reporting format was also apparent.

In cooperation with the United Nations Environment Program (UNEP), the WBCSD launched *Cleaner Production and Eco-Efficiency - Complementary Approaches*

to *Sustainable Development* (1998), in which we pointed out the mutual strength of both concepts in driving progress toward sustainable development.

Two “*Eco-Efficiency Bulletins*” were also produced in 1999 to give status reports on the further development of the concept.

## **MAKING THE CHALLENGE OF SUSTAINABILITY A BUSINESS OPPORTUNITY**

Eco-efficiency benefits both the environment and the corporate bottom line. By integrating environmental aspects throughout the life cycle of their products and services, companies reduce consumption of resources, lessen environmental burdens, and limit risks and liabilities. Applying eco-efficiency in product design and procurement processes also leads to economic benefits by cutting a company’s total cost of ownership and shortening pay-back periods on necessary capital investments.

Companies that implement eco-efficient practices are better equipped to: meet new demands from stakeholders; respond more aggressively to competitive pressures; anticipate customer needs more successfully; ensure employees’ health and safety; and protect the environment more effectively.

The eco-efficiency concept is driven by the vision of “creating value by making the challenge of sustainability a business opportunity”. Business is implementing this vision as a holistic approach on four levels:

### **Innovation**

Companies are manufacturing products with new and enhanced functionalities –and selling services to enhance the products’ functional value. This “eco-innovative” approach, supported by Dow Chemical, generates business opportunities and economic growth as well as environmental improvements.

### **Eco-efficient Processes**

Worldwide and across all sectors, large and small companies have benefited from 3M’s concept, “Pollution Prevention Pays,” and other approaches, as companies are moving from costly end-of-pipe solutions to managing environmental issues on an integrated basis. Eco-efficiency indeed offers benefits at every stage of a product’s supply chain and can help improve overall supply-chain management, including the elimination of harmful substances and the formulation of an end-of-life strategy for products.

### **By-Product Synergy**

Another value-creating aspect of eco-efficiency is by-product synergy, which entails using the by-products and wastes of one industry as the raw materials and resources for another –thus creating zero waste. In the Gulf of Mexico, for example, the TXI corporation is leading a by-product synergy project and found that companies which adopt this strategy increase their profitability, reduce pollution and natural resource use, and alleviate the adverse environmental impact of industrial development.

## Shifting Market Mechanisms

Companies, such as Interface, have started leasing equipment as well as selling it, and now provide functional offerings for to meet their customers' needs. The introduction of these new services underlines a shift to improved product durability, designing to facilitate upgrading, and enforced recycling –changes that ultimately mean closing material loops and increasing service intensity of products.

There are a number of management tools to help identify and select opportunities to make these changes, including:

- Formal risk and environmental assessments;
- LCA;
- EMAS and ISO 14000;
- Environmental accounts/audits;
- Financial accounting methods that reflect “hidden” costs and potential benefits;
- Formal eco-efficiency assessments; and
- Environmental reporting and benchmarking to provide feedback to management.

We believe that the potential for eco-efficiency is huge and the examples of the benefits are many. The following few examples illustrate some of the results that can be achieved:

- *3M*  
3P: Pollution Prevention Pays program has yielded:
  - Economic benefits: savings of US\$750 million since 1975; and
  - Ecological benefits: releases to air, water and land reduced by 1.4 billion pounds since 1975.
- *Procter & Gamble*  
Eco-efficiency through LCA.  
P&G uses life cycle inventory to make eco-efficient detergents: the Ultra formulation (1989).  
Results:
  - 50 percent less volume than traditional detergents;
  - 30 percent less raw materials;
  - 30 percent less packaging (cartons); and
  - 40 percent less transportation needs.
- *Xerox*  
Savings of 100 MUSD/year.  
Xerox is now embarking on a program to become a truly Eco-Efficient corporation.
- *Dow Chemical*  
Annual savings from reduction of wastes and emissions are almost twice the investment.
- *Gerling, Germany*  
Gerling applies “risk-adjusted pricing” to the companies it insures. It has shown that the more eco-efficient a customer, the lower the risk factor which is then translated into lower premiums.

- *UBS/Swiss Bank*  
UBS/Swiss Bank Corporation takes environmental risks into account in parallel with traditional types of risks. The bank will lend at a better rate to “environmentally-safe” clients.

There are also examples from developing countries:

- *Acegrasas, Colombia*  
A food producer of oil and butter. Investment to reduce water use was paid back in less than half a year.
- *SME's (small and medium sized enterprises) in Brazil*  
Adoption of eco-efficient practices enhanced environmental and social performances, and increased profits. Investments were paid back on average in less than 6 months.

There are many internal barriers to eco-efficiency in a company so if you want to reap the benefits of this concept you need a dedicated approach. The single most important requirement is senior management commitment. If that is lacking and if the company lacks a vision of how to become more sustainable, the likelihood of success is limited.

On the other hand, for companies that have tried eco-efficiency, the benefits in the form of financial performance, stronger employee commitment, and reduced environmental impact have turned out to be substantial.

## THE FINANCIAL MARKETS

Business also needs recognition from the financial markets for its achievements. One recent development that is worthy of notice is the release of the Dow Jones Sustainability Index, listing 200 companies judged to be leaders in sustainability. Through a so-called “back-test” of how the Sustainability Index would have performed over the last five years, Dow Jones concluded that the Sustainability would have outperformed the General Index with four percentage points, i.e. 17 percent versus 13 percent. This has raised the level of interest from fund managers in environmentally related matters.

Eco-funds are also becoming popular in Japan with total sales of 133.2 billion yen (as of November 1999). So far, four investment trust companies have launched Eco-funds.

### Net assets of the Eco-funds in Japan

Nikko Securities Asset Management Co., Ltd.	71.8 billion yen
Yasuda Kasai Global Asset Management Co., Ltd. (YKAM)	22.0 billion yen
DLIBJ Asset Management Co., Ltd.	35.0 billion yen
UBS Fund Management Co., Ltd.	9.1 billion yen
<b>Total</b>	<b>137.9 billion yen</b>

In order to screen portfolios, the analyst team in the eco-funds carefully reviews the environmental management practices and performance of selected companies, based on information available to general public, the results of its questionnaire, and interviews. For example, the following three aspects are taken under consideration in the eco-fund jointly developed by Yasuda Kasai Global Asset Management Co., Ltd. (YKAM) and Yasuda Fire and Marine Insurance Co., Ltd.:

- Development of environmental management;
- Publication of environment-related information; and
- Reduction of environmental impact and promotion of eco-efficiency.

In USA, a total of US\$2 trillion is now invested in a socially responsible manner, including the investment in proactive environmental companies, representing about 13 percent of the US\$16 trillion total of funds under professional management. The fastest growing component of socially responsible investing is the growth of portfolios that employ both screening and shareholder advocacy, in which shareholders use their ownership positions to influence corporate actions.

## **TURNING BUSINESS CONCEPTS INTO POLICY CONCEPTS**

“Achieving more value with less impact” –today’s definition of eco-efficiency– is not just a corporate aim, but also very much a goal for all parts of society. Extended to the economy at large, eco-efficiency can create value on an additional level, i.e. eco-efficiency in economies. At the macro level, eco-efficiency has been defined as “de-linking growth of welfare from use of nature”, (i.e. more value with less impact for the entire economy.)

Since its inception, the business concept of eco-efficiency has gained credibility among governments and inter-governmental organizations. The OECD has developed its own program on eco-efficiency and published a report on the topic in 1998. Several UN organizations, including the UNEP and UN Commission on Sustainable Development, are also exploring policies and measures necessary to implement eco-efficiency.

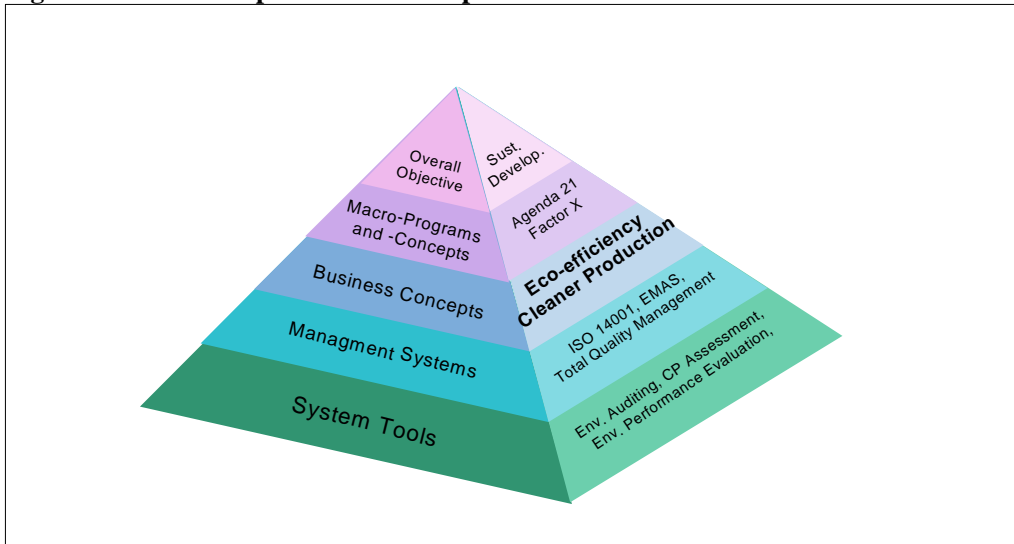
In addition, the European Union heads of states and governments have started pushing to integrate sustainable development, including eco-efficiency, into their policies to stimulate progress toward sustainable industrial development. As evidence of this, the WBCSD is engaged in the first Europe-wide initiative on eco-efficiency, the European Eco-Efficiency Initiative, aimed at establishing eco-efficiency as a leading business concept throughout Europe.

In the process of turning eco-efficiency, a business concept, into a policy concept, it shares similarities with complementary management tools such as Cleaner Production toward the common objective of sustainable development. Figure 1 shows how eco-efficiency concept relates to others for sustainable development.

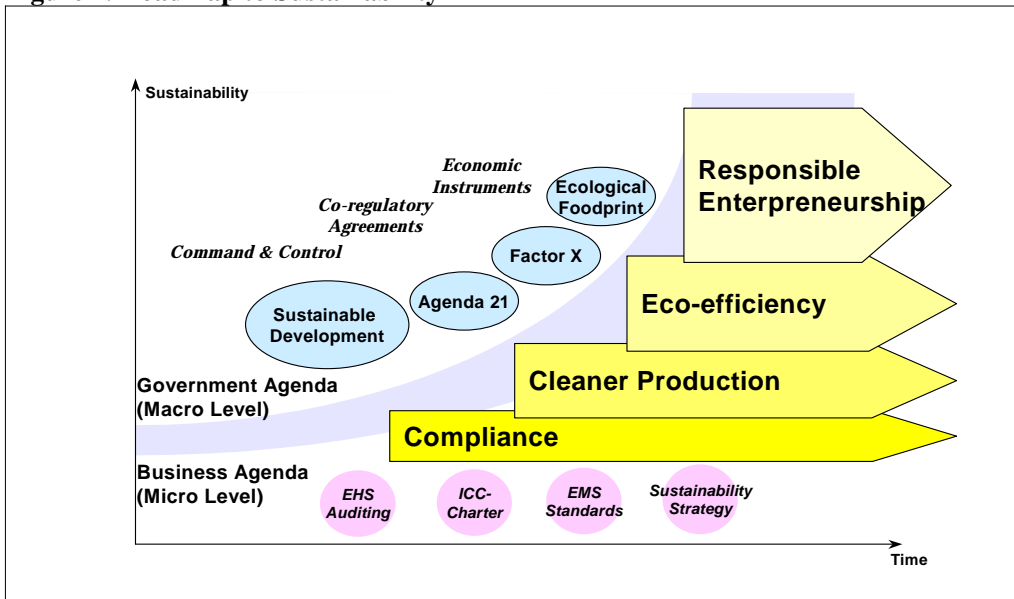
As well as business, governments should also integrate these management concepts into their economic and industrial policies and action plans to move the sustainable development agenda forward. This will help business progress faster toward responsible entrepreneurship, or striking the right balance between profitable operation, environmental

protection and social progress. Figure 2 shows the roadmap and agenda for both public and private sector to sustainability.

**Figure 1. Relationship Between Concepts**



**Figure 2. Roadmap to Sustainability**



## **ECO-EFFICIENCY INDICATORS: A TOOL FOR BETTER DECISION-MAKING**

The WBCSD has developed a set of eco-efficiency indicators to help measure progress toward economic and environmental sustainability in business. Eco-efficiency indicators primarily serve as a decision-making tool for internal management to evaluate performance, set targets, and initiate improvement measures. They also are important tools for communicating with internal and external stakeholders.

The basic objective of eco-efficiency is to maximize value while minimizing resource use and adverse environmental impacts. In order to calculate eco-efficiency, the WBCSD has developed the following equation, which merges value and ecological aspects into an efficiency ratio:

$$\text{Eco-efficiency} = \frac{\text{Product or service value}}{\text{Environmental influence}}$$

This basic equation can be used to calculate several different eco-efficiency ratios. Specific calculations will depend upon the needs of individual business managers and on the values and impacts specific to their business sector. It is necessary to maintain “numerator” and “denominator” data separately in order to clearly identify the origin of the data and the basis for the calculations.

Eco-efficiency does not address all three pillars of sustainable development. While it strives to improve economic and environmental efficiency, the concept does not pertain to social issues. Yet, eco-efficiency is a key development driver for business and governments.

There are many reasons why companies should measure and report their eco-efficiency performance:

- To improve efficiency by tracking and documenting progress as well as limitations;
- To identify cost savings in operations;
- To generate a positive response from investors and rating agencies as environmental performance and eco-efficient operations emerge as important criteria for investors; and
- To communicate the corporate message positively and clearly.

Monitoring and reporting are key elements of a management system. Accurate measurements can help managers make sound decisions and assess whether their objectives can be met or not. Reporting to all those who can influence decisions the status of ongoing efforts and discussing with them ways to further improve can make a management process more effective and ensure solid progress. The information provided with the concept should be especially useful for managers as they devise ways to improve the eco-efficiency of their businesses. Also, stakeholders such as employees, neighbors,

and business partners such as investors and insurers may want to use dedicated information relevant for their own decision-making.

The eco-efficiency indicators and efforts by other initiatives on corporate reporting, such as the Global Reporting Initiative (GRI), share the goal of identifying common elements for measurement and communication, and harmonizing indicators to the extent that is practical and scientifically possible. The objective of the WBCSD's work is not to develop one single approach to measuring and reporting eco-efficiency. Rather, it seeks to establish a general, voluntary framework that is flexible enough to be widely used, broadly accepted, and easily interpreted by a large spectrum of sectors. The specifics of defining, measuring, and communicating eco-efficiency will necessarily vary from one business to another, and comparisons between different businesses must be approached with great caution.

To keep the framework flexible and applicable to diverse sectors, but still allow harmonization of indicators, the concept recommends a two-level approach of:

1. Generally applicable indicators; and
2. Business specific indicators.

While “generally applicable” indicators should be internationally agreed upon and valid for virtually all businesses, they may not be of equal value or importance for a given company; nor are the necessarily comparable between different businesses. All other indicators have been called “business-specific indicators” as their relevance and pertinence vary from one business to another.

### **Generally Applicable Eco-Efficiency Indicators**

#### **Product/Service Value**

- Mass or number of products or services produced or sold; and
- Net sales.

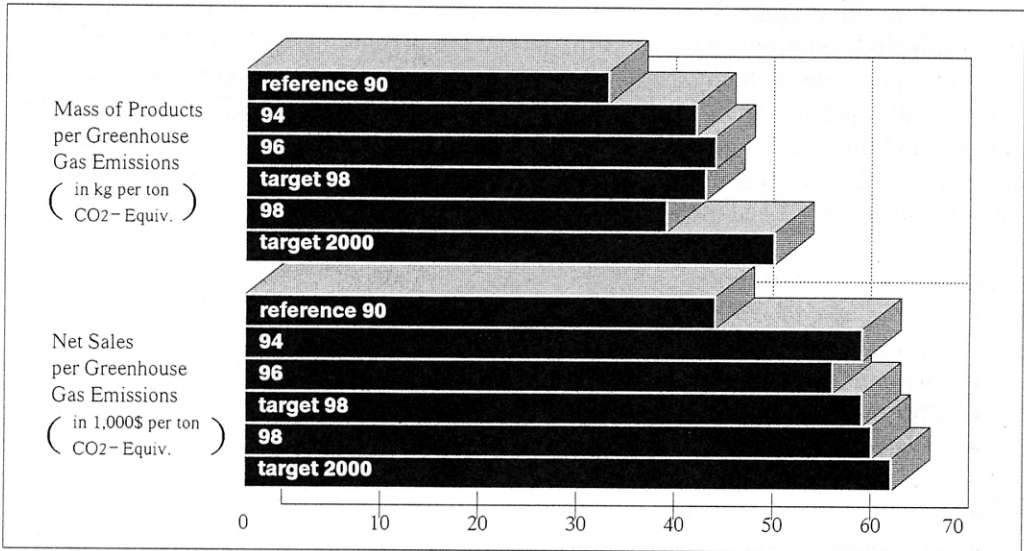
#### **Product/Service Creation Environment Influence**

- Energy consumption;
- Material consumption;
- Net water consumption;
- Greenhouse gas emissions; and
- Ozone depleting substance emissions.

The WBCSD has recently launched a pilot program (including one of the BCSD-Taiwan's member companies within the pilot group) to test the validity of its eco-efficiency indicators concept. The BCSD-Taiwan has also launched a pilot test for three industry sectors in Taiwan, including: pulp and paper, cement, and semiconductor industries. The aim is to gain practical experience and to adapt the framework as necessary. The framework does not recommend that companies issue a separate or stand-alone eco-efficiency report –but rather that companies integrate eco-efficiency information into their overall decision-making and communication processes. Eco-efficiency information can be communicated on the basis of a facility, a region, a

division or an entire corporation, although there is a risk in aggregating data across different products and/or operations.

**Figure 3. Presenting Improvements Over Time Compared to a Reference Point and to Targets**



To enable transparency and facilitate understanding, it is necessary to maintain “value” and “impact” data separately when calculating the eco-efficiency ratios, as well as when reporting organizational information. Companies may further choose to report eco-efficiency as trends over time or as a comparison to a reference point or target, as shown in the Figure 3. Performance can also be benchmarked relative to an industry average.

## GREEN PURCHASING

Incorporating environmental considerations into procurement and purchasing policies can force suppliers to apply sustainable development practices to their products and services. Green purchasing policies from public and private sectors are probably going to have the greatest impact on business in the 21 century. It has been recognized as a very powerful measure to combine eco-efficiency with supply chain management.

### Public Sector

The federal government of the USA purchases more than US\$ 200 billion worth of goods and services each year. Recognizing that purchasing decisions can have environmental consequences, the federal government is incorporating environmental considerations into its purchasing practices. In early 1993, President Clinton began issuing a series of Executive Orders mandating that executive agencies take actions to improve their environmental performance. The Executive Orders promote energy efficiency, water conservation, reduced toxic emissions, waste prevention and recycling, and environmentally preferable purchasing. On September 14, 1998, President Clinton

issued Executive Order 13101, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition. Accordingly, environmentally preferable purchasing means selecting “products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose.”

In Executive Order 13101, the US-EPA finalized draft guidance to help federal agencies include environmental concerns in making purchasing decisions. The guidance establishes principles to help identify products and services that have a reduced impact on human health and the environment. The US-EPA encourages agencies to evaluate the multiple environmental impacts of every product throughout the product’s life cycle –raw material acquisition, manufacture, packaging and distribution, use, and disposal. Environmental aspects can include:

- Energy-efficiency;
- Recycled content;
- Water-efficiency;
- Resource conservation;
- Waste prevention;
- Renewable material percentages;
- Adverse effects to workers, animals, plants, air, water, and soil;
- Toxic material content;
- Packaging; and
- Transportation.

The era of green purchasing in the Republic of China formally began in 1999. The ROC’s Government Procurement Act (hereinafter referred to as the “Act”) came into effect on May 25, 1999. In accordance with Article 96 of the Act, the EPA and the Public Construction Commission (PCC) promulgated regulations concerning priority purchasing for environmentally-friendly products. Environmentally friendly products can enjoy a 10 percent price advantage when participating in government bids.

### **Private Sector**

The growing interest in environmentally preferable purchasing, however, is not limited to the public sector. Private-sector companies are also investigating and purchasing environmentally preferable products and services. Through a variety of environmental and cost-saving initiatives –design for the environment, greening the supply chain, full-cost accounting, zero-waste initiatives, ISO 14000 certification, environmental accounting, and others– private sector companies are identifying, manufacturing, and purchasing green or eco-efficient products and services.

The business reasons for which companies adopt environmentally preferable purchasing practices to help improve the environment include:

- Responding to customer interest in “environmentally friendly” products and practices
  - Public Service Electric and Gas Company’s “buy recycled” program in 1997.

- Distinguishing a company and its products from competitors
  - Sony’s “Greenplus” program in Netherlands; and
  - Volvo provided information on the environmental impacts of products in Japan, Europe, Australia, and the United States.
- Pursuing cost savings
  - Purchasing lighter weight or reduced packaging to contain their products by Anheuser-Busch, The Body Shop, Herman Miller, IBM, and McDonald’s.

Many companies have incorporated environmentally preferable purchasing principles into their routine operations. Some companies have issued official principles to their suppliers, such as Toyota’s Environmental Purchasing Guidelines, and Nokia’s Supplier Requirements. Some are developing and refining critical components of what could become formal environmentally preferable purchasing programs. The components include the following:

- Developing lists of chemicals to avoid;
- Creating lists of approved products;
- Establishing single environmental attribute purchasing programs;
- Considering multiple environmental attributes when making purchasing decisions; and
- Working closely with suppliers to enhance environmental performance.

In the United Kingdom, the business association, Business in the Environment, as published guidelines on best practices and has a task force of leading companies who are introducing it. The guidelines were influenced by two pioneers in the field, the telecommunications company BT, and B&Q, Europe’s biggest do-it-yourself supplier. BT has an environment section in its procurement department and screens all major purchases. It also confers an Environmental Suppliers Award to recognize good practice among suppliers. B&Q conducts an annual questionnaire survey of its suppliers, which it uses to grade their production methods and source of material. B&Q prefers to work with its suppliers to achieve improvement but at the end of the day will stop buying if poor performers do not mend their ways.

Procurement policies are probably having the greatest impact on the forest product industry. Tracking whether products are produced using sustainable forestry practices has become much easier with the evolution of independent certification. Certification is provided by the Forest Stewardship Council, a body created by the Worldwide Fund for Nature (WWF) and proactive timber users such as B&Q.

More and more companies agree that supplying environmentally preferable products will be an important industry objective in the next century. Supplying “environmentally friendly” products requires companies to purchase and use environmentally preferable components in manufactured products and to identify vendors to stock environmentally preferable products. In an attempt to identify such products, more than 1,800 Japanese companies and other organizations have joined the Japanese government’s Green Purchasing Network (GPN) to learn more about environmentally preferable purchasing and to share product information. More information about GPN can be found at <http://www.wnn.or.jp/wnn-eco/phne>.

## CONCLUSIONS

By 2002, when Earth Summit III reviews general progress toward sustainability, more and more developed countries and multinational companies plan to present and discuss specific concrete results –demonstrating that product innovation and eco-efficiently operating companies have had an effect on the performance of the economy on the macro level. To confirm this, the issues monitored and reported on the micro- and macro- levels must fit together, and such information must be available from major parts of the economy, both the private sector and communities. The eco-efficiency indicators, as proposed by the WBCSD, are the best tool for meeting the requirement.

Governments have a role to play in helping to spread the application of eco-efficiency globally. They have the means to promote and accelerate the process of change by and within business. The responsibility is on them to provide free and open markets which enhance the willingness of companies to increase their eco-efficiency. Restrictions and barriers, however well-intentioned, will be counter-productive from both environmental and economic points of view.

Companies have found out that the more they work on resource productivity, the greater the potential and the bigger the gains that can be achieved. As is often the case, the limitations are very much in our own minds, and whether or not we make a real dedicated effort to reach the potential that the eco-efficiency concept promises. Long-term objectives like factor 4 and factor 10 that have been proposed by some have, so far, limited analytical underpinnings and should be seen more as expressions of ambitions. The future prospects of eco-efficiency are substantial, but it is difficult to judge its ultimate potential. However, eco-efficiency firmly places us on the journey toward sustainability.

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