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## Information disclosure strategies for green industries

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## **ADB Working Paper Series**

### **Information Disclosure Strategies for Green Industries**

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No. 305  
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**Abstract**

Environmental information disclosure strategies, which involve corporate attempts to increase the availability of information on pollution and emissions, can become a basis for a new wave of environmental protection policy that follows and has the potential to complement traditional command and control and market-based approaches. Although a growing body of literature and operational programs suggest that publicly disclosing the information can motivate improved corporate environmental performance, this phenomenon remains poorly understood. This paper reviews the economic and legitimacy theory behind information disclosure and analyzes the current practice and programs adopted in industrialized and industrializing countries. Admittedly few in number, the cases studied reveal the advantages of such voluntary approaches, when the countries of developing Asia must deal with weak institutions, growing markets, and strong communities. Factors that contributed to widespread success of selected programs in the People's Republic of China, India, Indonesia, the Philippines, and the United States are information quality, the dissemination mechanisms, provision of incentives for good performers, and public and private pressure.

**JEL Classification: Q52, Q53, Q57, Q58**

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## 1. INTRODUCTION

In Asia and elsewhere, maintaining environmental balance with rapid industrial growth is the subject of any safe policy. In the last few decades, several environmental laws have been enacted and numerous institutions set up to implement the objectives of these laws. But this traditional form of environmental protection—establishment of environmental legislation, standards, and punitive action in the case of failure to meet these regulatory requirements—has been ineffective in controlling the environmental impacts caused by corporate activities. In developing and industrialized countries, these mandatory command and control approaches are costly and fail to achieve the expected goals when (i) emission sources are widely scattered across administrative boundaries; (ii) the gap is wide for the abatement cost caused by the use of obsolete machinery in industrial production process; and (iii) regulating agencies lack capacity and will to implement the standards.

As a reaction to such shortcomings, a second wave of policy tools beginning from the 1970s witnessed the emergence of market-based approaches, mainly in industrialized economies as in the United States (US) and Europe. These include tradable permits, emission charges, and deposit refunds. In some cases, these market-based instruments have substituted regulatory approaches, but in most cases complemented them by enhancing flexibility, therefore improving the efficiency for pollution control policies (Tietenberg 1998). Noteworthy examples in Asia include emission charging systems being implemented in the People's Republic of China (PRC), Malaysia, and Thailand, with varying degrees of success. Nevertheless, even in industrialized economies like the US, Germany, and Japan, this second wave of environmental policy tools have not been able to fully solve the environmental problems. In the industrialized countries, the system is overburdened by the sheer number of substances to be controlled (Kathuria and Sterner 2006). The reason for the limited use of market-based approaches in developing countries is due to difficulties associated with the capacity of environmental agencies to design, implement, monitor, and enforce such approaches in conjunction with other instruments (Jose 2008).

The ineffectiveness of regulative and market-based approaches to protect the environment highlight the significance of informal policy tools, such as public disclosure of corporate environmental information and rating schemes for improving environmental performance. Since the emergence of public disclosure programs in the 1990s, companies publicly provide information about emissions and pollutions. A rating system involves categorizing different firms on the basis of their environmental profile. In recent years, the reliance on information disclosure and rating has been made effective with the information revolution. According to Kolk (2004), this formed the beginning of the third wave of voluntary approaches that aim to improve corporate environmental performance. The expanding roles of disclosure strategies stem from (i) an increasing perceived need for more effective tools rather than simply relying on traditional command and control approaches, (ii) a rising demand for environmental information from communities and markets, and (iii) decreasing cost of information collection and dissemination.

## 2. TYPES AND SETTINGS OF ENVIRONMENTAL INFORMATION DISCLOSURE

Although environmental information disclosure approaches like ecolabeling are extensively used in natural resource and consumer acceptance settings, as in forest certification programs or organic food retailing, their use in industrial environment settings—pollution and emission control—has started picking up only very recently. Labeling of products and public disclosure of environmental information of manufacturing processes provide signals to investors, consumers, regulators, and the general public about the relative and absolute levels of environmental impacts of polluters (Grafton et al. 2004). The most widely used

signaling devices are those indicating that an appliance or a product has achieved some level of environmentally benign requirements, e.g., energy efficiency ratings for electrical appliances and ecofriendly consumer products like recycled paper. While ecolabels and awards convey a signal of how environment-friendly a product or company is, process-based information disclosure is gaining increasing attention in company board rooms, where environmental risk liability is an issue.

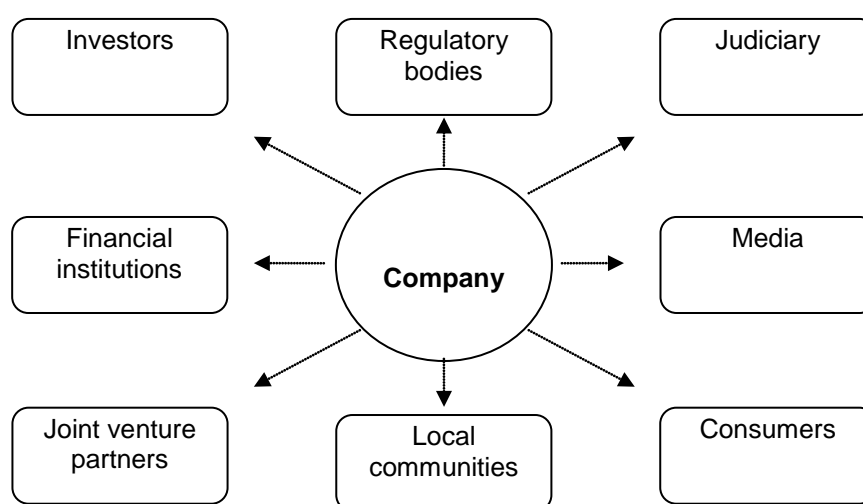
Depending on the way information is conveyed, environmental information disclosure can be of three types. Type 1 is the certification of products, firms, processes, or management procedures by third parties, e.g., ecolabel certification, ISO certification. Type 2 is self-certification without any fixed criteria or any externally independent review, e.g., corporate social responsibility reports published by companies. Provision of raw data, with some interpretation or judgment, form type 3, into which rating and award schemes could be classified (Lopez et al. 2004).

The use of environmental information disclosure also depends upon the setting in which it has arisen (Coglianese and Nash 2001). Disclosure can be used in a household setting, such as buying lead-free gasoline, or an occupational setting, such as when workers are exposed to suspended particulate matters in manufacturing plants, or a product setting, such as when consumers buy products with pesticide residue, or a community setting, such as when residents are subjected to toxic emissions or effluent discharge from a nearby factory.

### 3. WORKING CHANNELS OF ENVIRONMENTAL INFORMATION DISCLOSURE

Environmental information disclosure works through different channels. Since the effectiveness of environmental information disclosure lies in aligning the behavior of a corporate body with the interest of society, this can be done through the product market, capital market, insurance market, or legislation and the judiciary (Figure 1).

**Figure 1: Working Channels of Environmental Information Disclosure**



Source: Authors.

In the product market, environment-conscious consumers express their support for responsible companies by boycotting environment-damaging products, if information is provided for different options. Even if consumers are not directly harmed by the pollution or emission, they may select a green product, such as paying more for recycled paper. In this case, product market effects are enhanced when environmental considerations form part of

the purchase decisions of large buyers like government offices or chain stores. In the capital market, investors may decide to invest in companies with a more green record, either for moral reasons because of their belief that environmentally responsible corporate bodies will incur fewer risks and hence will be more competitive in the long run. In the same way, financial institutions may be more cautious in providing credit to environment-damaging firms as they can combine pollution or emission-related liability into their lending decisions. International investors are also keen to know more about the potential liability they could be involved in by forging direct investment (Janakiraman and Jose 2007). Foreign investors associate poor environmental performance with financial risks and liabilities. Evidence also suggests that green firms may have higher rates of return (Khanna et al. 1997). In industrialized countries like Japan and the US, and in the European region, the ability of green investors to make these choices has been facilitated by the rise of several green mutual funds where investment advisors carefully screen the firms using well-defined criteria (Tietenberg 1998). Hamilton (1995), and Konar and Cohen (1997), using US 1989 toxic release inventory (TRI) data, found that polluters that reported emissions lost on average US\$4.1 million in the value of the traded stock of the day when the news was released. Evidence also suggests that polluting companies have responded to negative signals and total releases declined by nearly half during 1988–1998, although a part of this fall may be due to firms substituting chemicals not listed on TRI (Grafton et al. 2004).

In the labor market of developed countries like Japan, environmentally conscientious employers may find it easier to hire and to retain employee loyalty. This may not be very relevant in many developing countries in Asia, where often large polluting and emitting companies are also significant employment providers. In the legislature, if existing legislation seems inadequate, the information provision may result in community support for additional legislation. Lastly, in the judicial system, parties directly harmed by the polluting industries can retrieve compensatory damages by suing polluters or through public interest litigation. In countries such as India, the right to a clean and safe environment is fundamental for each individual and this can be enforced through judicial action when other systems fail to respond (Jose 2008).

Environmental information disclosure and ratings have multidimensional benefits for different stakeholders. Communities are in a much stronger position to negotiate environmental agreements with neighboring companies. This is essential because lack of information can distort a community's perception of industrial activities (Dasgupta and Wheeler 1999). The stock market can more accurately value corporate environmental performance and banks can factor environmental pollution-related liability into their lending decisions (Khanna and Damon 1997). For consumers, availability of information through outlets such as the internet may greatly influence their decisions.

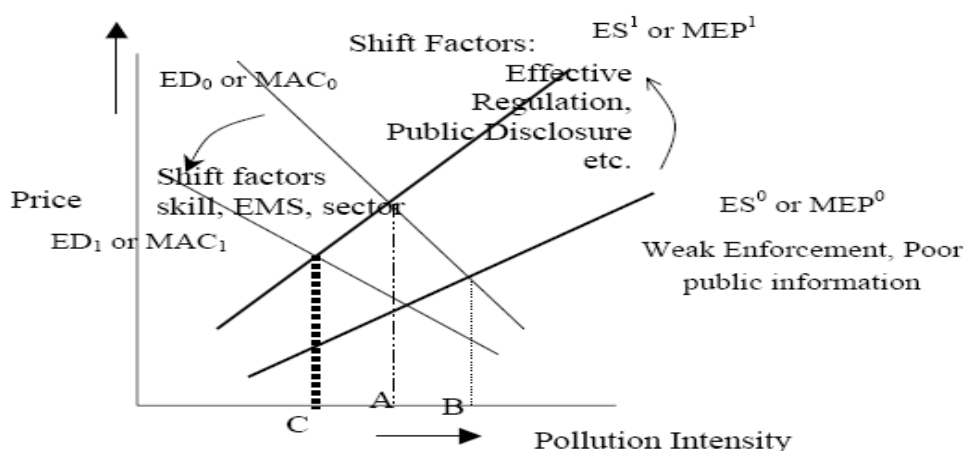
The regulator may itself benefit from public disclosure. More compliance with environmental standards can boost its credibility with industry, nongovernment organizations, and the public (Wheeler et al. 2000). Further, the ratings and public disclosure of environmental information by companies allow communities to check regulators' claims against their own daily experience, thereby indirectly affecting the credibility of the agency. The disclosure promotes useful learning across firms (Afsah and Laplante 2007). A good rating for a firm among its competitors establishes the feasibility of cleaner production and encourages other firms to invest more in pollution-reducing and -mitigating equipment. Disclosure also promotes managers' awareness of their own firms' pollution (Lopez et al. 2004). This discussion highlights the special role of environmental information disclosure as an instrument in its own right, as well as a prerequisite for other regulatory and market-based instruments.



## 4. ECONOMIC EXPLANATION OF ENVIRONMENTAL INFORMATION DISCLOSURE

The economics of environmental information disclosure can be observed from how the equilibrium for environmental protection in a region is determined. The environment of a region is usually characterized by its carrying capacity. Any firm operating in the community essentially uses this absorptive capacity, reflecting a demand for environmental services. Plants can either use this service completely or reduce emissions by adopting some mitigation measures. Thus, for a cost-minimizing manufacturer, the environment demand schedule reflects its marginal abatement cost. This can be thought of as the firm's marginal willingness-to-pay for pollution abatement. The more the plant abates, the less will be its demand for environmental services. Moreover, it becomes progressively more expensive for the plant to abate at low pollution levels. The regional marginal abatement cost or environment demand schedule could be crudely approximated as a sum over all the plant-level schedules, which slopes downward to the right as illustrated in Figure 2. As the price of environmental services rises, the industry would prefer to reduce pollution along this schedule (Hartman et al. 1997). The environmental demand schedule is generally affected by three major factors: (i) external pressure through the markets or investors, which in turn is influenced by public disclosure and ratings; (ii) economic considerations; and (iii) plant characteristics. Important plant characteristics like ownership, size, market orientation, human and technical capital, and availability of abatement technologies, which have relatively less relevance for small and medium-scale industries, have a direct influence on the environmental demand schedule of large plants.

**Figure 2: Impact of Environmental Information Disclosure  
on Equilibrium Pollution in a Region**



Source: Adapted from Wheeler, B., and S. Afsah Lalpante. 2000. *Greening Industry: New Roles for Communities, Markets and Governments*, World Bank Policy Research Report, New York: Oxford University Press.

Note: ED: Environmental Demand; MAC: Marginal Abatement Cost; ES: Environmental Supply; MEP: Marginal Environmental Protection.

With effective formal regulation, environment services always carry a price for a plant. But for most developing countries of Asia, the price is too little to impact regional pollution. This is due to ineffective formal regulation and concentration-based standards. The price could easily be augmented through public disclosure or the people affected could act in their own self-interest provided they have information about the pollution and emission discharges. Hartman et al. (1997) argue that in regions devoid of formal regulation, communities confront local polluting plants with their own demands for environmental services. This community demand curve reflects three basic factors: the community's ability to (i) monitor emissions, (ii) assess damages (both indicate information costs), and (iii) bargain to enforce environmental protection norms—reflecting transaction costs. These three aspects reflect

the community assessment of marginal social damage and are summarized in a locally enforceable environmental supply schedule. Thus, the environmental supply curve reflects the price communities require industries to pay for different levels of pollution. With increases in damage, communities impose progressively higher costs on polluting plants. This implies that the environmental supply schedule slopes upward to the right in Figure 2. The equilibrium pollution level in a region or community is determined at the point where the environmental demand and environmental supply schedules intersect. Environmental information disclosure programs take care of the information aspect of the pollution discharge and influence both the environmental supply and environmental demand schedules (Kathuria and Sterner 2006). Public disclosure and rating facilitate shifting the environmental supply schedule to the left (i.e., from  $ES_0$  to  $ES_1$ ), thereby increasing the price of pollution for a unit as shown in Figure 1. Any increase in external pressure or price of environmental services induces the plant to reduce pollution, thereby shifting the environmental demand schedule to the left. This ultimately leads to a fall in pollution from B to A even to C (Figure 2).

## 5. LEGITIMACY THEORY OF ENVIRONMENTAL INFORMATION DISCLOSURE

The theory of legitimacy can also explain the reasons behind the disclosure of environmental information. In developing countries, information about environmental risks associated with industrial activities is asymmetrically distributed. In a typical case, the best knowledge about emissions or a pollution profile is held by the corporate bodies and/or regulators, not the community in the absence of outside pressure to do so. In addition, in most developing countries, bureaucratic inertia and/or legal constraints frequently constrain or even prevent information sharing. Legitimacy theory, developed by Prabhu (1998) and Neu et al. (1998), posits that business organizations must consider the rights of the community at large, not merely those of investors. If the corporations do not appear to operate within the bounds of the behavior considered appropriate by the community, then the community will act to remove the organization's right to continue its operations. When an actual and potential disparity exist between the business and social value systems, this will lead to threats to organizational legitimacy in the form of legal, economic, and other sanctions. Neu et al. (1998) also argue that the legitimacy of an organization is constructed and maintained through symbolic action, which forms part of the organization's public image. They argue that it is often easier to manage an organization's image through environmental information disclosure. The three well-known strategies of information disclosure for image creation are (i) attempting to educate and inform the relevant public about recent corporate actions that remedy previously perceived deficiencies, (ii) attempting to change the perceptions of other external stakeholders, and (iii) attempting to deflect attention from the perceived problem areas by changing the focus of the external public.

Contemporary community is increasingly organized by the internet, newspapers, magazines, and annual reports. While the symbolic aspects of corporate actions have been central to legitimacy, these textually mediated discourses have more recently been seen to fulfill similar functions. Given the inaccessibility of most corporate activities, the public have come to rely on words and numbers available in annual reports and environment statements as proxies for these activities. Therefore, business uses information provided in sustainability reports as a communication mode to establish legitimacy and a mode of managing public impressions. Adams (2002) had a similar observation and argued that the reason for the increase in the number of companies producing environment reports is not regulation or public pressure but the desire to improve the corporate image with customers, regulators, investors, and the community. However environmental information disclosures are regarded as the pivotal instruments of corporate communication. Within industry subsectors like pharmaceutical, chemicals, mining, transport, electronics, and automobiles, whose activities

either result directly in high environmental impacts or are at least suspected of causing them, empirical evidence exists (Fichter 1998, Larsen 2000, Kolk 2004) that environmental information disclosure has become a competitive relevance.

## **6. GOOD CASES OF ENVIRONMENTAL INFORMATION DISCLOSURE IN INDUSTRIALIZED COUNTRIES**

Ecolabeling and ratings that fall into type 1 disclosure strategy have increasingly been used as effective instruments to make production and consumption patterns more sustainable in industrialized economies, like Japan and the US and those in Western Europe. The European countries, for example, have used ecolabeling since 1989 for their industrial products. Australia adopted an energy efficiency star rating system in the late 1980s. The results of these ecolabeling and EMS programs are encouraging, but limited to select sectors.

Type 2 information disclosure includes environmental reporting and is entering into the business mainstream as part of corporate affairs in select sectors. This is true not only for environmental pioneers and sector leaders but also for global companies and multinationals whose activities result directly in high environmental impacts. But companies also realize that the honeymoon period, in which environmental reports received media and public attention just for themselves rather than for what they disclosed, is over (Deloitte Touche Tohmatsu International et al. 1993). Today, substantive information is required and corporate reporting is successful only if the underlying environmental system is appropriate, and the associated process is effective and operational (UNEP and SustainAbility 1994). This needs setting of environmental goals, assigning responsibilities to reach these goals, and assessing the outcomes.

Type 3 disclosure strategies, which involve making raw data available, are effective in some countries. In the public disclosure programs of developed countries, good examples include the TRI of the US, started in 1987; Canada's national release inventory started in 1993; and the United Kingdom's pollutant inventory and Australia's national pollutant inventory, both started in 1998 (Lopez et al. 2004). Although the structures of these programs are different, they share the common principles of environmental information disclosure.

The TRI has become a successful model for disclosure programs in terms of effectiveness in reducing toxic release. It was enacted by the US Congress in January 1986 as a part of the Environmental Protection and Community Right to Know Act to provide information to the public on releases of toxic substances into the environment. Incidentally most of the substances involved are not subject to any standards or regulations. Starting with nearly 300 substances, the US Environmental Protection Agency modified the list and added 286 chemicals in 1994, leading to a total of more than 640 chemicals. The TRI states that firms using 25 tons or more of a listed chemical in a given calendar year, or firms importing, processing, or manufacturing 25,000 pounds or more of a listed chemical must provide a report on each of the chemicals in existence within the plant, provided the firm employs 10 or more full-time workers. The reports should include information such as the name of the company, name of the parent company if it exists, toxic release and frequency of release, as well as the medium in which the chemical is released (Tietenberg 1998).

To complement and reinforce the TRI program, the Environmental Protection Agency initiated the 33/50 program, which set national goals for 17 prioritized toxic chemicals to reduce them by 33% by 1992 and 50% by 1995 from the 1988 level. These reductions were to be achieved voluntarily and compliance was to be measured by the TRI reports. The emphasis of TRI and 33/50 programs are environmental protection or pollution prevention rather than end-of-pipe treatment. Initially 555 companies with significant chemical release were included, but later on the program was expanded to 5,000 companies. Nearly 26% of companies agreed to participate in the program. By 1994, a year before the deadline, they

collectively reduced emissions by more than 50%, a total of 757 million pounds of pollutants. However, the total release of all the TRI firms was reduced significantly by 45% in 1998. Table 1 gives the data of TRI firms in the selected years.

**Table 1: Toxic Release Inventory Data for Selected Years**

Item	1988	1995	1998	% decline from 1988 to 1998
Total number of facilities	20,470	20,783	19,610	4.2
Air emission	2,183	1,201	921	58.0
Water pollution	165	37	45	73.0
Underground injection	162	143	115	29.0
Total on-site releases	2,968	1,688	1,427	52.0
Total releases	3,396	1,977	1,857	45.0

Source: United States Environmental Protection Agency. 2000. *Toxic Release Inventory Program, 1998 Public Data Release Report*. [www.epa.gov/triinter/tridata/tri98/pdr/index.htm](http://www.epa.gov/triinter/tridata/tri98/pdr/index.htm) (Accessed on 14 April 2008).

## 7. ENVIRONMENTAL INFORMATION DISCLOSURE PROGRAMS IN DEVELOPING ASIAN COUNTRIES

Since the Rio conference in 1992, public disclosure of environmental schemes have found acceptance in several countries of developing Asia. These include PROPER of Indonesia, EcoWatch of the Philippines, and Green Watch of the PRC. Table 2 gives a summary of how implementation of the environmental information disclosure schemes led to increased compliance in these countries.

**Table 2: Impact of Environmental Information Disclosure Programs in Asian Countries**

Program	No. of Factories		Share of Factories (%)		Increase in Compliance (%)
	Noncompliance	Compliance	Noncompliance	Compliance	
PROPER, Indonesia					
1995	92	54	63	37	24
1997	57	89	39	61	
EcoWatch, The Philippines					
1997	48	4	92	8	50
1998	19	26	42	58	
Green Watch, People's Republic of China					
1999	23	68	25	75	10
2000	14	77	15	85	

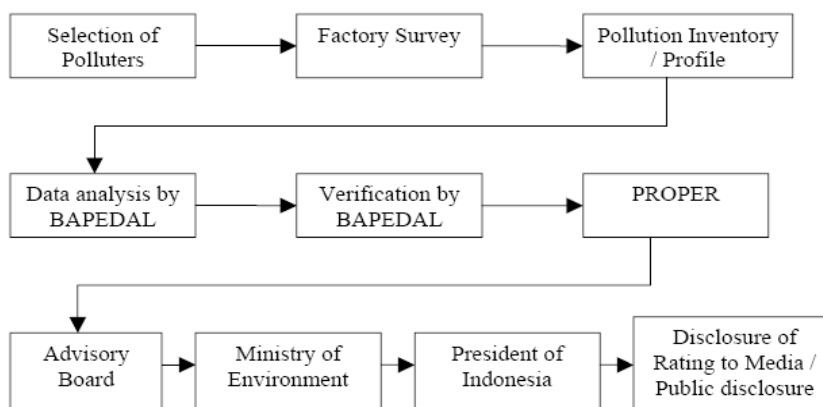
Source: World Bank. 2006. *Public Disclosure: A Tool for Controlling Pollution. Research Digest 8-23*, Washington, DC.

### 7.1 PROPER in Indonesia

Indonesia's local environmental agency, BAPEDAL has made effective use of the environmental information disclosure performance ratings. BAPEDAL had earlier tried regulations by enforcing penalties, closures, and fines, but was not very successful given the political environment in which it was operating. It was also wary of market-based instruments like environmental charges, because of concerns that charges might tempt individual officers of the agency into corruption (Blackmen et al. 2004). Hence, they chose a rating or labeling

scheme, the Programme for Pollution Control Evaluation and Rating (PROPER), where firms are rated in five different colors depending upon their environmental performance. In the first 18 months, effluents from the firms that were labeled were reduced by 40% as they strove to avoid the shame of being rated as “black” or “red” firms rather than “blue” (compliant) or even “green.” Figure 3 gives the steps undertaken by BAPEDAL in implementing PROPER.

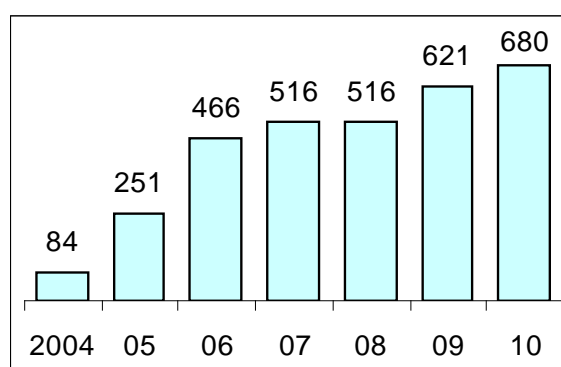
**Figure 3: Steps Involved in Developing PROPER**



Source: Japan International Cooperation Agency. *The PROPER: Indonesian Success Story*.

Since BAPEDAL was working in a difficult political milieu and previous efforts to improve corporate environmental performance through command and control approaches were not successful, credibility to the scheme was essential. To enhance the credibility with all stakeholders in implementing PROPER, BAPEDAL developed a careful process for scrutinizing the ratings through three checkpoints: (i) an advisory board with representatives from academia, industry, other government agencies, and community-based institutions; (ii) the environment minister; and (iii) the President. The mood and effect on the corporate community was upbeat with the knowledge that the President of Indonesia had approved the ratings. The participant base is increasing rapidly (Figure 4).

**Figure 4: Number of Participants of PROPER**



Source: Japan International Cooperation Agency. *The PROPER: Indonesian Success Story*.

## 7.2 EcoWatch in the Philippines

The Philippines introduced EcoWatch in 1996 with a basis similar to PROPER. In December 1996, the President, in the presence of the Department of Environment and Natural Resources and the Laguna Lake Development Authority, signed a memorandum of agreement with 23 business associations, representing some 2,000 corporations, and formally launched the industrial EcoWatch Program. The project was designed to provide a strong incentive to industries to comply with environmental regulations and to reward those whose environmental performance exceeds standard requirements. The project allows the

government to set up an environmental grading system to categorize the environmental performance of these firms using a five-color (gold, blue, green, brown, and black) labeling system, similar to the one used for PROPER. A black label is used for firms with no pollution control or causing serious damage to the environment; blue for firms that meet all environmental standards and required procedures, such as self-reporting of pollution data; and gold for firms that meet environmental standards for 3 years continuously and conduct at least two environmental programs such as waste reduction and recycling projects.

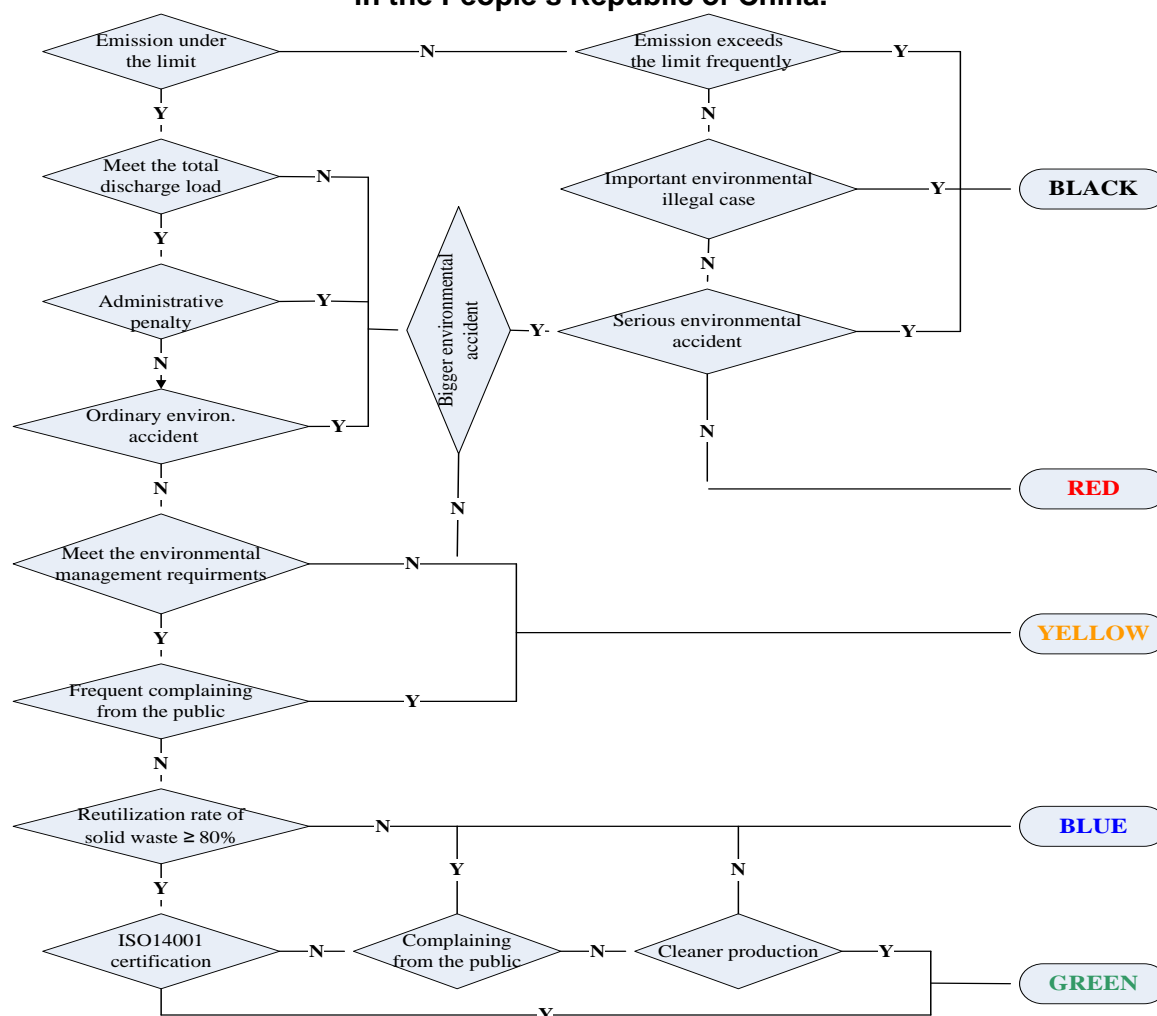
The EcoWatch rating scheme was introduced as conventional regulations failed to reduce pollution. Under EcoWatch, in the initial evaluation of 52 plants, more than 92% were found to be noncompliant, i.e., with red or black ratings. However, rating led to increased environmental performance, with the number of plants with blue rating increasing from 8% to 58% in 1998. The developers of the EcoWatch disclosure program pursued a similar political strategy as the one used in PROPER. The President formally announced EcoWatch along with leaders of the Philippines Business Association, who encouraged association members to participate in the program. The program allowed poorly rated factories a grace period before public disclosure. A critical step in the design of the project was to include the corporate representatives in the elaboration of the program from the beginning, with the result that the private sector, through the signing of the EcoWatch project agreement, committed to support project implementation.

### **7.3 Green Watch in the People's Republic of China**

A rating system, defined by the Green Watch Program, initiated in the PRC in 1999, divides corporate environmental performance into five categories, with black and red denoting inferior performance, yellow denoting compliance with national regulations but failure to comply with stricter local requirements, and blue and green denoting superior performance. In Technical Guideline for Corporate Environmental Performance Evaluation and Rating, issued by the State Environmental Protection Administration (SEPA), three types of indicators are used: pollutant emissions, environmental management, and social impacts. For pollutant emissions, 13 pollutants were selected to assess whether the company could meet the standards for concentration and total emission load. For environmental management, basic requirements on environmental management were selected, such as paying the pollution charge on time; reporting environmental statistics data on schedule and exactly; properly managing pollutant outlets; conducting environmental impact assessment (EIA); managing environmental capacity, obtaining environmental management system (EMS) certification, and conducting cleaner production auditing. Social impact indicators include public complaints, emergent environment cases, large illegal cases, and administrative penalties (SEPA 2005). The program's color-coded ratings are the results generated by auditing environmental performance using the indicators described. The criteria and rating procedure are illustrated in Figure 5.

The ratings system draws on four principal sources of information: reports from firms; inspection reports on environmental management; records of public complaints, regulatory action, and penalty records; and surveys that record characteristics of the firms that are relevant for rating environmental performance. SEPA wishes to build up an incentive mechanism for industrial pollution prevention and control, based on the measures addressed by the rating systems in the pilot project in Jiangsu province. These measures are likely to become increasingly popular at local levels. This environmental performance rating system provides incentives for continuous improvement because it recognizes three differentiated levels for firms to comply with national standards. Even for noncompliant companies, the system rewards improvement efforts by recognizing two levels of differentiated performance.

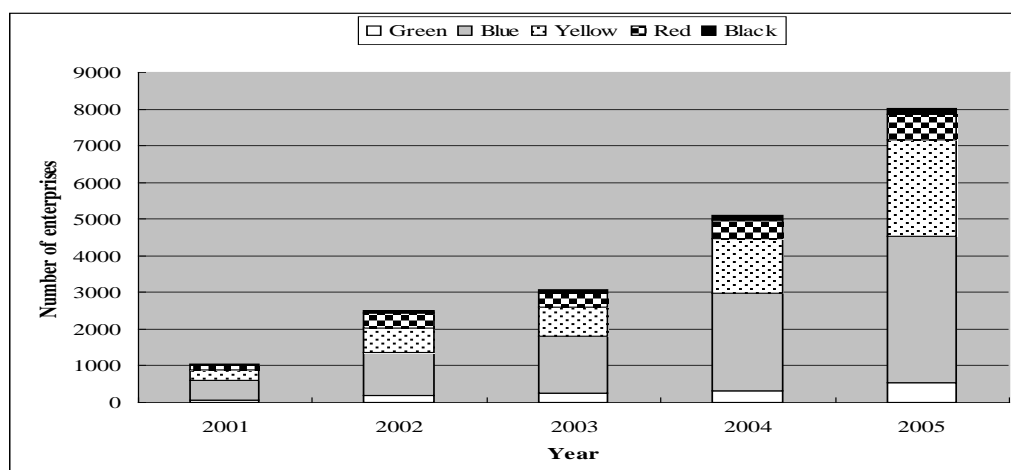
**Figure 5: Environmental Performance Rating Framework in the People’s Republic of China.**



Source: Bi 2007.

Figure 6 indicates the results of the environmental performance rating program being conducted in Jiangsu Province (Bi 2007): 1,069 enterprises were evaluated in 2001 based on the previously described criteria. By 2005, the program covered more than 8,000 enterprises. Encouragingly, the ratio of enterprises colored red and black decreased from 17.18% in 2001 to 10.56% in 2005. It shows that PRC enterprises are concerned about being put on the environmental black list and try to abide by the basic requirements for pollution control.

**Figure 6: Effects of the Environmental Performance Rating Program in Jiangsu Province, People's Republic of China (2001-2005)**



Source: Bi 2007.

## 7.4 Green Rating Project in India

In the late 1990s, the Centre for Science and Environment initiated the Green Rating Project (GRP) in India. The project aimed to monitor the environmental performance of Indian companies and rank them based on performance. In the first phase, the pulp and paper industry, comprising 31 large firms, was selected. The first rating was released in 1999 with none of the plants having good scores. The rating disclosure however anticipated the improvement of the plants' environmental management performance over time. The conjecture arises from the fact that before the GRP started only one company had an environment policy as part of its operations, but when the companies got associated with the GRP, eight more companies adopted an environment policy. This reflects the potent force of reputation through disclosure.

Evidence indicates the significance of such disclosures. When the largest paper-producing company did not respond to the requisite information, the default option of rating it last was considered and this option was communicated to the head of the company. Within a week, the rating agency received a response from the head assuring full cooperation. In the end, the company secured the third place. To give credibility to the project, a project advisory panel was constituted comprising industry leaders, judges, research and development experts, academicians, environmentalists, journalists, and other eminent members of society. To evaluate the ecological effect of the technology used by the plants, a three-member technical panel from the pulp and paper subsector was formed to help the rating process. After the rating of pulp and paper, the Centre for Science and Environment got involved in the rating of a few other polluting sectors, including chlor-alkali, automobiles, and the cement industry. The rating program in India is found to have a significant impact on improving corporate environmental performance. Table 3 summarizes the major impact of the rating process in three industries.



**Table 3: Major Impact of the Rating Process in Three of Industries in India**

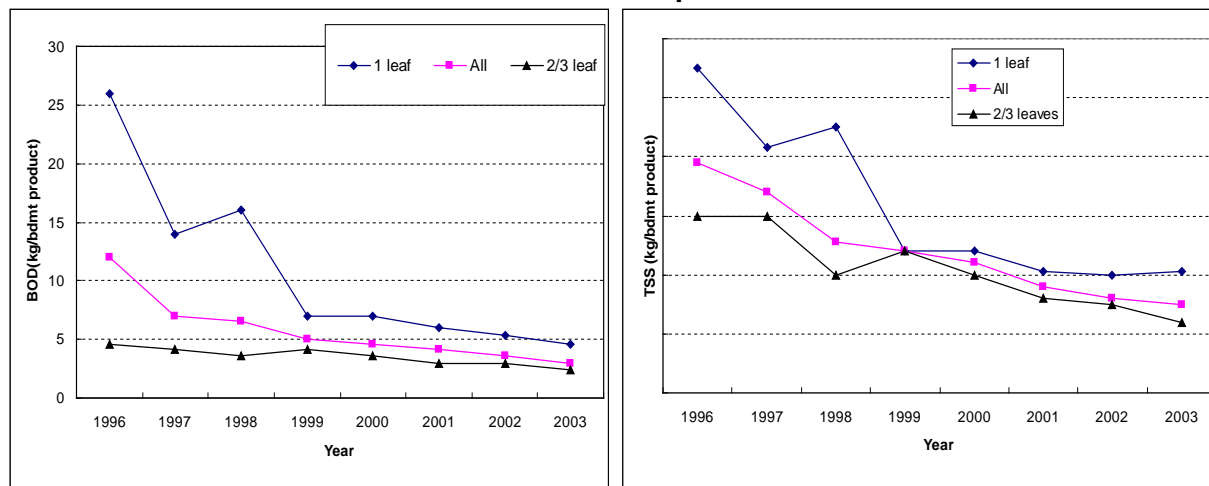
Industry Sector	Before the GRP	After the GRP
Pulp and Paper	Less than 10% of companies substituted chlorine dioxide (an environment-friendly substitute) for chlorine	Around 90% of companies substituted chlorine dioxide for chlorine
	Elemental chlorine (Cl) consumption is about 75 kilograms (kg)/ton paper	Elemental Cl consumption $\approx$ 48 kg/ton-paper First elemental chlorine-free plant in India
	No standard for absorbable organic halides (AOX, a group of potent carcinogens) depends on consumption of elemental chlorine	Standard for AOX introduced and monitored for the paper industry; led to a shift from elemental chlorine for bleaching and reduced AOX load
	No standards for color of the treated effluent from paper manufacturing units	The Indian states of Andhra Pradesh and Tamil Nadu set PCB standards for color of the treated effluent from paper manufacturing units
	No water consumption guidelines for the sector	Water consumption guidelines in paper manufacturing introduced
Chemical	> 50% of mercury consumed in the sector is lost and unaccounted for, as monitoring EOP emissions in case for mercury is not feasible; the solution was to regulate mercury input	Government of India put in place guidelines to regulate input mercury
	Use of mercury cell technology—high emission of mercury	Switchover to membrane technology facilitated through (i) subsidies for the import of membrane technology, and (ii) reduction of customs duty on components of membrane cell technology used in the caustic soda industry from 15% to 5%
Automobile Industry	Supply-chain environmental management: Companies sourcing raw materials and components from small and medium-scale sector, which had neither resources nor intent to control pollution	Companies like Ford, Mercedes, General Motors, Hero, and Honda set clear policy on outsourcing, keeping environmental performance of the supplier in mind; Ford and General Motors asked suppliers to get ISO 14001
	Companies transferring old technology to their Indian subsidiaries	Hyundai Motors publicly committed to supply similar technology to India as it does to Europe or America
	Rainwater harvesting: less or no efforts on rainwater harvesting	Companies like Hero Motors, General Motors, and Eicher Motors started rainwater harvesting within their plants to reduce external water demand

Source: CSE 2006 and interviews.

The objective of the GRP was not only to disclose the current environmental performance of companies, but also to suggest ways to improve their activities. The impact of the project on the improved environment can be seen in Figure 7. Both high rated—2 or 3 leaves—and low rated—I leaf—firms reported progressive improvement in environmental conditions as measured items of biological oxygen demand and total suspended solids emitted from the plants. Even though these figures indicate that poorly performing companies declined after 1999, there is no clear proof that GRP ratings drove these reductions. Other control factors like regulatory, market, and community pressures, as well as sectorwide technological change might have caused this. However, the results strongly suggest that GRP drove emission reductions for plants that received a one-leaf rating in 1999. These findings support

previous analyses of environmental information disclosure programs in other developing countries that show that disclosure has the greatest impact on poorly performing industrial units.

**Figure 7: Impact of the Green Rating Program on the Environmental Performance of 21 Rated Companies**



Source: Centre for Science and Environment. 2006. *Profile Plus Process*. Green Rating Project Report. Centre for Environmental Studies, New Delhi.

## 7.5 Carbon Reduction Labeling and Carbon Footprint Program in Thailand

The Carbon Reduction Labeling Program is a voluntary certification program for commercial products and services started in 2008 in Thailand, and organized by Thailand Greenhouse Gas Management Organization and Thailand Environmental Institute. The carbon reduction label is a certification for products or services that achieve greenhouse gas emission reductions over its lifecycle, measured against certain criteria. The product or service has to meet one of the following three criteria to qualify for the label: (i) achieve at least 10% greenhouse gas emission reduction over the last 12 months compared with the base year (2012), (ii) meet criteria for power consumption and waste management, or (iii) be manufactured from less carbon intensive technology compared with the industry average, which will be closely reviewed by the Carbon Label Promotion Committee on case-by-case basis. Criteria (ii) includes three conditions: (i) electricity supplied is generated on-site from biomass or waste, and power purchased from an external supplier is no more than 5% of total electricity requirement; (ii) no fossil fuel is consumed in the manufacturing process except for boiler or gas engine start-up and transport within the manufacturing facility; and (iii) waste generated from the process does not emit greenhouse gases. The approval process includes submission of an application, a field visit, and a review by a carbon reduction label technician team and carbon reduction label committee; this takes approximately 2 months. After passing these processes, the product or service will be certified and given the carbon reduction label (Figure 8), which will be valid for 3 years.

**Figure 8: Carbon Reduction Label in Thailand**



Source: Thailand Greenhouse Gas Management Organization. <http://www.tgo.or.th/>

As of March 2010, 69 products from 15 producers had been certified for the label. They include food, personal products, construction materials, packaging, and other personal and industrial goods. The carbon reduction label has two benefits: (i) customers can participate in the climate change mitigation initiative more easily by having more informed choices for purchases; and (ii) companies can demonstrate their commitment to greenhouse gas emission reduction, enhance business competitiveness for the environment-conscious customer segment, and potentially reduce manufacturing costs through more energy-efficient processes and waste minimization. As products and services with the carbon reduction label are more competitive or first choices for customers, companies will start to make continuous efforts to reduce greenhouse gas emissions. This positive spiral has a potential to drive society to become more environmentally conscious.

The carbon reduction label only considers the scope of carbon reduction. Currently only the production phase is considered in measuring carbon reduction. In an extreme case, a product that reduced greenhouse gas emissions from the manufacturing process in return for an emission increase from other processes could be qualified. Thus, measurement methodologies for greenhouse gas emission from supply, usage, and disposal need to be developed and considered as a criterion.

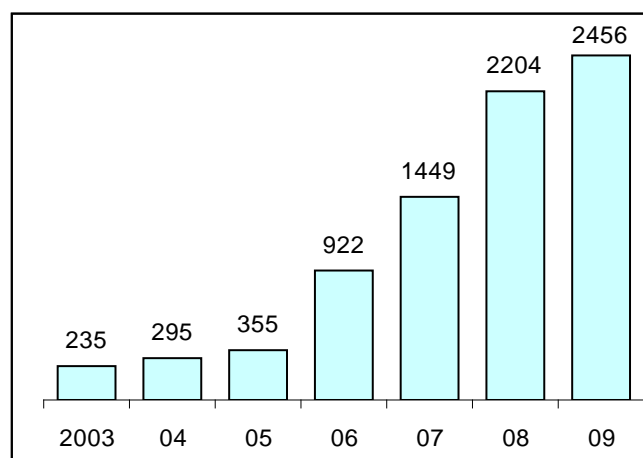
A barrier observed in the implementation is readiness of both the business sector and consumers. The business sector, especially small and medium-sized enterprises, are showing limited interest in participating in the program, and greenhouse gas emission data including historical data is limited. The other side of equation is limited understanding by consumers. Currently the value and meaning of the carbon reduction label is not well understood and appreciated, so manufacturers are not adequately sensitized and are not motivated to be involved in the program.

## 7.6 Carbon Disclosure Project: Global

The Carbon Disclosure Project (CDP) is a not-for-profit organization based in London. It has a global climate change reporting system, and has the largest database of primary corporate climate change information in the world.

In 2009, approximately 2,500 companies measured and disclosed carbon information through the CDP platform. The track record in terms of the number of participants (Figure 9) shows high and growing interest in climate change information disclosure from corporations.

**Figure 9: Number of Participants in the Carbon Disclosure Project**



Source: Carbon Disclosure Project. <https://www.cdproject.net>

Corporations can disclose climate change information by either responding to information request from the CDP or registering at the CDP. The CDP sends information requests to

corporations worldwide. In 2009, it reported the highest response rate from companies in the history of the CDP—82%, with growing response from Brazil, Russia, India, and the People's Republic of China (BRIC) countries.

The information from individual companies and the consolidated report can be obtained from the CDP; more than 500 investors and 60 purchasing organizations are said to leverage information from this site. Users can compare and benchmark companies to apply in making business decisions.

This globally standardized initiative with a large number of participants not only provides transparency to shareholders and the general public, but also enhances corporate efforts to reduce the carbon footprint.

## **8. ENVIRONMENTAL INFORMATION DISCLOSURE: A PROACTIVE POLICY TO IMPROVE CORPORATE ENVIRONMENTAL PERFORMANCE?**

Whether information disclosure can be used as a policy instrument in its own right or complement regulatory and market-based instruments, it entails a different role for the government, offering the possibility of fulfilling the large and growing need for environmental protection despite limited budgets and staff (Tietenberg 1998). The five examples in section 7 indicate that environmental disclosure strategies have sometimes substituted for traditional approaches and even complemented them.

A typical voluntary information disclosure strategy by a company involves two factors: information quality—measured by the usefulness of content and the adequacy of information; and system quality—measured by the overall satisfaction of stakeholders. Information disclosure involves four separate steps: (i) establishing mechanisms for discovering environmental risks at the company level, (ii) assuring the reliability of information, (iii) publicizing or sharing the information, and (iv) acting on the information. Moreover, two important issues pertain to voluntary information disclosure: (i) self-selection, only those firms with easy abatement possibilities participate in such programs, and (ii) policy works for low-cost abatement as the decline in emissions tapers off after the first few years.

The important and indirect effect of the mandated public disclosure program is the access to and use of the information by the relevant stakeholders. Local environment groups and media can use the information to apply pressure on local industries. Investors and citizens can use the information to plan the location of investments. Environmental information disclosure has led to public pressure for accountability of the worst polluters. Even the mere anticipation of public pressure can make companies alter their behavior. Actually, information disclosure and ratings provide a reputation incentive to a corporation. All companies want a good rating and a green public image in the globalized economy—more so when concern about environmental issues among investors and regulatory authorities is on the rise. There is a clear incentive for companies to improve environmental performance and to share the information, which can be the most powerful factor. Disclosing information is particularly effective in the case of hot-spot areas and high-impact sectors. By giving information, the decision would primarily lie in the hands of prospective investors or the community. The benefits and some limits to the environmental information disclosure schemes are illustrated in Table 4.

**Table 4: Benefits and Limits of Environmental Information Disclosure Rating Schemes**

Benefits	Limits
<p>Key advantages of successful environmental information disclosure are</p> <ul style="list-style-type: none"> <li>(i) improved dialogue and trust between corporations and government, and corporations and the community; and corporation to corporation leads to more cooperative relationships and greater certainty in improved environmental performance</li> <li>(ii) greater flexibility than command and control, particularly in complex or rapidly changing contexts, offering more ambitious goals, and lowering administrative and enforcement costs</li> <li>(iii) long-term changes in corporate management behavior, i.e., a shift from reactionary, end-of-pipe and financial cost attitudes to proactive, cleaner production, economic savings behavior</li> </ul>	<p>Environmental information disclosure can not be on its own:</p> <ul style="list-style-type: none"> <li>(i) deal with free riders—voluntary disclosure schemes may not incite all companies to participate and can not on their own deal with poor performers who fail to acknowledge market and community signals</li> <li>(ii) it is limited to areas where there is less public recognition for environmental protection and avoidance of strict standards is a customary norm by business</li> <li>(iii) ensure global application—information disclosure schemes are being developed and applied differently in different national and socioeconomic contexts</li> </ul>

Source: Authors.

Furthermore, to enhance the credibility of any information disclosure schemes with all stakeholders, a careful process for scrutinizing the ratings at different checkpoints is required. Since information disclosure is often a strategic activity for a corporation, it needs to be thought through beforehand before releasing the results. In many cases, large polluters and emitters may also be large employment providers. It may be in the interest of the economy to give them a grace period before full public disclosure of environmental information. In the PRC, Indonesia, and the Philippines, the programs allowed poorly rated factories a grace period before formal public disclosure. Environmental information disclosure also promotes flexible responses because companies that choose to improve their public image are able to reduce their emissions in the cheapest way available to them (Grafton et al. 2004).

Environmental information disclosure combines conventional environmental monitoring, self-regulation, and public pressure using environmental ratings to promote better corporate environmental management, thus forming an effective tool to protect the environment in developing Asia. Environmental information disclosure schemes not only bring transparency into the environmental performance of companies and put public pressure on them to constantly upgrade their work in this area, but it will also go a long way to lifting environmental concerns within the companies themselves, right to the top (Coglianese and Nash 2001). Disclosure and rating programs make corporate leaders realize that environmental compliance should not be restricted to meeting standard norms but can actually become a proactive exercise in which regulatory norms constitute only the minimum effort. The business perspectives to this approach, drivers, and barriers to participating in this program need further analyses.

## 9. REMAINING ISSUES AND POINTS FOR DISCUSSION

The potential for environmental information disclosure schemes to improve corporate environmental performance and fill the gaps in existing systems are promising. They could herald a new wave in environment policy, but such a conclusion will require additional research beyond that provided in this paper. The evidence that we have at this point is too sketchy to allow us to make convincing policy recommendations. It is possible however, to generate some questions in choosing policies that are consistent with available evidence. If

and when these hypotheses are supported by further evidence, they could form the basis for an enhanced policy-making process. Important questions for further research include the following:

- Do investments in the provision of environmental information yield rates of return that compare favorably with other measures? Evidence indicates such approaches have significantly reduced pollution in a variety of settings. In the case of TRI, PROPER, and Green Watch, abatement was induced at low regulatory cost. However, evidence on the cost-effectiveness of these programs remains sparse. Rigorous cost-effectiveness analysis is needed. Public disclosure of environmental performance can facilitate a diversity of local solutions to environmental problems that no command and control system or otherwise market-based mechanisms could encompass.
- What drives companies to disclose environmental information? Current evidence suggests that large firms with great environmental impacts are most likely to participate, but no examples suggest that factories get a free ride on emission or pollution reduction prior to program initiation. This also does not suggest that they participate only to divert attention from poor compliance and regulatory capture or to face strong regulation or get favorable recognition from markets and communities. In other words, various drivers and barriers existing for companies to voluntarily participate in the programs should be studied further.
- Which type of information provision yields the highest rate of return for business? The information quality, i.e., adequacy of information and system quality—perceptions of community and markets—can have a large impact on the effectiveness of the program. Too much information can bring adverse impacts as well. Under what circumstances would highly aggregated and structured information be preferred to the provision of more data?
- What are the critical external and internal means by which disclosure of environmental information spur improved environmental performance? Providing factory managers and owners information about their firms' net emissions with abatement opportunities, which is principally an environmental audit, may be a key internal means to improve environmental performance.

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