Corporate Codes of Conduct: Is Common Environmental Content Feasible?

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Abstract

In a developing country context, a policy to promote adoption of common environmental content for corporate codes of conduct (COCs) aspires to meaningful results on two fronts. First, adherence to COC provisions should offer economic benefits that exceed the costs of compliance; i.e., companies must receive a price premium, market expansion, efficiency gains, subsidized technical assistance, or some combination of these benefits in return for meeting the requirements. Second, compliance should produce significant improvements in environmental outcomes; i.e., the code must impose real requirements, and monitoring and enforcement must offer sufficient incentives to prevent evasion. With those goals in mind, we explore options for establishing common environmental content in voluntary COCs. Because the benefits of a COC rest on its ability to signal information, we ground our analysis in a review of experiences with a broad range of voluntary (and involuntary) information-based programs: not only existing corporate COCs, but also the International Organization for Standardization (ISO) family of standards, ecolabels, and information disclosure programs. We find some important tradeoffs between harmonization, applicability, feasibility, and efficacy.

Key Words: corporate social responsibility, codes of conduct, environmental management

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1. Introduction

Consumers, shareholders, local communities, and other stakeholders increasingly demand assurances that the production of goods in developing countries conforms to minimum standards of social and environmental responsibility (O'Rourke 2004). Defining such standards is a difficult task, because *responsibility* is a term subject to interpretation. Indeed, it can reflect a range of goals, from prohibiting abuse to adhering to local laws to promoting initiatives that improve conditions for health, safety, and the environment. Because developing countries often lack the administrative capacity to enforce regulations effectively, multinational enterprises (MNEs) are mounting their own efforts to design and enforce corporate codes of conduct (COCs) along their supply chain. However, these individual efforts on the part of corporations can lead to duplicate costs, lack of transparency and uniformity, and thereby lack of credibility. Thus, standardized environmental content for corporate COCs can offer a simple, cost-effective, and credible way for MNEs to implement corporate social responsibility (CSR). For suppliers of multiple MNEs, it can offer a streamlined set of requirements. Host-country economic ministries and industry groups could use simplified standards of conduct as a means to promote export-oriented businesses to developed-country clients. Finally, standardization can allow third-party verifiers to apply their services to different companies and host countries. To be effective, the common environmental content must be rigorous enough to meet stakeholder needs, simple enough to be adopted, mindful of host countries' and industries' different needs, and in accordance with international norms and guidelines.

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Common content for COCs is being developed for labor according to International Labour Organization (ILO) standards, to which most countries adhere. However, environmental standards have no clearly articulated, internationally accepted consensus framework. This lack of convergence largely reflects a greater diversity in preferences for environmental standards and in circumstances. The actual impacts of emitted pollutants vary with geography, climate, and population exposure (greenhouse gases [GHGs] being the exception). Furthermore, in developing countries, the ecological and health risks that environmental regulations attempt to mitigate may be less of a national priority than poverty, basic health care, and education.

Nonetheless, many countries lack the capacity to implement the environmental regulation that they would prefer. Even in many developed countries, where environmental regulatory structures are well established, agencies do not have the resources to cope with the sheer numbers of potentially hazardous substances. But problems are more chronic in developing countries, where agencies have even fewer resources and even shorter histories but still face immense challenges in monitoring pollution sources (Tietenberg 1998). Standardized environmental practices in a voluntary COC have the potential to serve host-country governments. To the extent they encourage the private sector to exploit opportunities for improving environmental performance, the local environment benefits without additional government expenditures. Information disclosure can also improve regulatory performance, by providing indicators of the severity of environmental problems and helping agencies prioritize their environmental problems and enforcement strategies.

The demand for COCs by MNEs arises from concerns about environmental performance from consumers, investors, local communities, and the media. Different markets exhibit different preferences for environmentally benign behavior. The goal for some companies may be to avoid "environmental blacklisting" and the consumer outrage that might follow the discovery of egregious behavior by doing the bare minimum to meet compliance requirements. Other companies may actively court a niche market of "green" consumers with corporate standards above and beyond local compliance.

Common environmental content for voluntary COCs therefore has the potential to serve the interests of both host countries and MNEs. This report explores what content is typically included and the feasibility of standardizing such content, at least for a given industry.

To begin, we review the environmental sections of existing company COCs and evaluate whether and how convergence has emerged among companies. Section 2 documents the diversity in corporate practices and the frequent lack of specificity in environmental

requirements. In large part, this variety reflects a greater diversity in preferences for environmental performance, both from residents where production occurs and from consumers of the final products. Where common practices exist, they seem to arise in the form of process—as opposed to performance—guidelines, as in the implementation of environmental management systems (EMSs). Furthermore, few examples of monitoring and enforcement exist in these company-based efforts.

In considering the possible ways forward, we draw on lessons from other programs for environmental certification and information disclosure. Section 3 discusses the guidelines for environmental practices and performance developed by the International Organization for Standardization (ISO).[1] Section 4 explores various consumer-product ecolabeling schemes around the world to draw lessons about managing supply chains for sustainability goals—and premium prices. These labels are generally designed to reflect practices above and beyond regulatory standards in developed countries, which are not necessarily appropriate for widespread application in developing-country sectors, except for certain niche products. Some sectors, including chemicals and forest products, have their own certification programs that can offer lessons for standard setting and third-party enforcement. For example, in an RFF discussion paper (Fischer et al. 2005), we present a case study of the forestry sector to document the diversity of goals, the challenges of certification, and the relevance of demand-side issues. We identify common methods and requirements for compliance and certification, evaluate their costs and effectiveness, and determine which might be applicable for common environmental content in a meaningful COC.

Ensuring the credibility of standards requires reliable and regular verification. Admittedly, this kind of enforcement is lacking in most corporate COCs, but examples exist in voluntary programs sponsored by third parties or governments. A first step toward meaningful enforcement involves monitoring and information provision—a necessary foundation for verifying compliance with any standard, be it host-country regulations or corporate conduct codes. Some studies have shown that required reports alone can have significant impacts on reducing emissions, perhaps by galvanizing consumers' or shareholders' concerns about risks or by helping managers identify emissions-saving opportunities. In Section 5, we discuss existing

[1] ISO is an international nongovernmental network of the national standards institutes of 148 countries; its central secretariat is in Geneva, Switzerland. ISO was created in 1947 after a meeting in London, U.K., where delegates from 25 countries came together to facilitate the international coordination and unification of industrial standards.

reporting mechanisms like the Toxic Release Inventory (TRI) in the United States; Indonesia's Program for Pollution Control, Evaluation, and Rating; and other pollutant-release and -transfer registries being developed around the world.

Drawing on these lessons, we make present some guidelines and tradeoffs for developing common environmental content for COCs in Section 6. To be generally applicable, a set of feasible common provisions must focus on process and principles rather than performance. More specific environmental content—including performance measures—would need to be determined by industry, if not also by country. Consequently, before proceeding with designing common content, choices must be made regarding the appropriate scope of the environmental content, the target industry, the relative importance of economic and environmental goals, and the partners available to help implement the program. Section 7 offers brief conclusions.

2. Current State of Environmental Content in Corporate COCs

The World Bank Group commissioned the law firm Foley Hoag to survey company practices in seven sectors: apparel, footwear, light manufacturing, agribusiness, tourism, oil, and mining. We draw on the results from its survey, *Company Codes of Conduct and International Standards: An Analytical Comparison* (Smith and Feldman 2003), to gauge emerging trends among companies that adopt socially responsible practices. It is important to note that the Foley Hoag study surveyed only publicly available information (i.e., websites and annual reports) of the firms chosen to represent each given industry; the result is a compilation of company policies. A follow-up study (Smith and Feldman, forthcoming) was commissioned to consider the degree to which the stated policies are monitored or enforced by a third party.

Using the database that is a product of the Foley Hoag effort, we analyze the environmental portions of the COCs within the seven sectors to discern certain commonalities and divergences from which we can draw conclusions. Of the seven industries surveyed, apparel, footwear, and light manufacturing constitute one type of industry. Agribusiness is a classification in itself, oil and mining fall in the natural resources category, and tourism can be classified as a quasi-service industry. The survey uses several criteria to evaluate a company's environmental policy, including materials, emissions, pollution control and hazardous substances, waste management, packaging and transport, and biodiversity.

In the next three tables, we list the main points for each criterion in each of the seven industries. Looking at the industry–criteria matrix, we see that the environmental content varies considerably across the seven sectors, reflecting differences in production processes and factors

of production. Within sectors, environmental management initiatives can also range widely, particularly in the more diverse industries. However, some industry groups have developed their own standards for behavior, and several sectors require EMSs that incorporate standards and practices from the ISO 14000 series.

Apparel and footwear are labor-intensive industries, and the main inputs are not inherently toxic. For the most part, their environmental requirements are bundled into health and safety standards. For instance, the Clean Clothes Campaign states that "a safe and hygienic working environment shall be provided, and best occupational health and safety practice shall be promoted, bearing in mind the prevailing knowledge of the industry and of any specific hazards" (Smith and Feldman 2003). It does not define a specific environmental policy. Likewise, Nike's environmental goals are incorporated into its Management, Environment, Safety, and Health (MESH) program.

However, individual firms within the sample studied have taken some initiatives to address environmental concerns. Gap, another clothing manufacturer, requires its factories to have an EMS or environmental management plan in place and to comply with local environmental laws and regulations. Several factories are located in countries with lax environmental regulations, and in that case Gap factories are "encouraged" to meet the standards outlined in the Gap statement of environmental principles. Because the business model of the garment and footwear industry is based on outsourcing, several companies (e.g., H&M, Adidas–Salomon) make a mention of sourcing products from "green" suppliers, but the requirements tend to be vague.

In contrast, firms in the light-manufacturing sector are more likely to define an environmental management agenda. Most firms surveyed have comprehensive EMSs that address hazardous substances, nonrenewable resources, waste management, packaging, and transport; however, they do not tend to address biodiversity or carbon dioxide (CO_2) emissions. As seen in the Table 1 matrix, because light manufacturing is more likely to deal with materials that are inherently toxic and to have production processes that are polluting, most of the companies surveyed address these environmental concerns. Leading the way is IKEA, a Swedish furniture manufacturing company that has developed a comprehensive environmental policy that is articulated in a statement called "The IKEA Way": "We always strive to minimize any possible damaging effects to the environment, which may result as a consequence of our activities. Therefore, IKEA and its suppliers shall continuously reduce the environmental impacts of operations." IKEA subjects its suppliers to the same standards to which it subjects

Table 1: Summary of Environmental Code of Conduct Statements: Apparel, Footwear, and Light Manufacturing

Industry	*Apparel*	*Footwear*	*Light Manufacturing*
General policy statement	Although some companies (e.g., Marks & Spencer and Adidas) have specific EMSs, the apparel and footwear industries do not have a comprehensive environmental policy statement. Environmental policies fall under the rubric of health and safety standards for workers.		Plastics and light manufacturing sectors have comprehensive EMSs that address aspects of production that affect the environment (e.g., "The IKEA Way" and "The Lego Fundamental Principle" emphasize a cradle-to-grave life-cycle approach).
Materials	Some companies emphasize the use of renewable resources for raw materials (e.g., H&M and Marks & Spencer).	NA	Some companies have rules regarding use of hazardous substances and nonrenewable resources (e.g., IKEA discourages the use of wood from intact forests).
Emissions	NA	Policies to reduce CFCs, VOCs, and other toxic emissions during the production process have emerged (e.g., Nike, Timberland, and Adidas).	NA
Pollution control and hazardous substances	No policies specific to pollution control; however, some firms are phasing out hazardous chemicals (e.g., Marks & Spencer).	The industry is phasing out PVC and reducing exposure to chemicals (e.g., Nike and Reebok).	Many toxic chemicals used in this sector are regulated nationally and internationally (e.g., the Montreal Protocol). Some companies have additional policies attractive to their consumers (e.g., children's toy manufacturer Lego uses printing ink that is nontoxic and resistant to saliva and perspiration).
Waste management	No industry-specific policy; some support of recycling (e.g., Gap, as part of its employee policy, encourages the purchase of products with high postconsumer recycled matter).	No specific strategy, but some company-specific efforts (e.g., Timberland resells unused leather).	Some companies have a comprehensive waste management policy (e.g., Lego reuses and recycles plastics).
Packaging and transport	NA	A trend toward reducing or using recycled packaging is noticeable (e.g., Timberland uses 100% postconsumer recycled packaging).	Some companies use environmentally friendly packaging and emphasize minimum resource use (e.g., Lego).
Biodiversity	NA	NA	NA

Note: NA = criterion was not covered in the survey, or there are no trends to display.
Source: Smith and Feldman (2003).

Table 3 (found on page 10) summarizes the Foley Hoag findings for the natural resource-based sectors of agriculture and tourism. The agribusiness industry covers a broad range of businesses, including farms, food-processing industries, retailers, and restaurants. Each of these sub-industries has similar environmental COC principles. For instance, in the farming sector, Chiquita requires each business unit to have an EMS in place to properly identify priorities, Dole ensures that its EMS programs conform with developing international standards, and Del Monte monitors environmental performance and integrates environmental considerations into business decisions and planning activities.

Starbucks, Nestlé, and Procter & Gamble all seek to develop or have developed EMSs to be compatible with voluntary standards such as ISO 14001. Having franchises all across the world, McDonald's aims to develop an EMS that would work irrespective of the country in which the franchise is based. Although these major brands have an interest in protecting their goodwill, others are courting premium niche markets. Organic and fair trade certifications are becoming increasingly popular in the agribusiness industry, particularly in small and medium-sized enterprises.

The tourism industry depends on the natural environment, directly or indirectly. As a consequence, industry groups have developed comprehensive sets of standards that, though not mandatory, provide a framework for firms in the industry. These include the World Tourism Organization's (WTO's) Global Code of Ethics for Tourism, the International Ecotourism Standard, Green Globe 21 (which has the license for distribution and management of the International Ecotourism Standard), the Blue Flag Campaign, and the Coalition for Environmentally Responsible Economies (CERES) Principles. Most major companies have EMSs.

Table 2: Summary of Environmental Code of Conduct Statements: Agriculture, Tourism, and Resource-Based Sectors

Sector	*Agribusiness*	*Tourism*
General policy statement	More companies are adopting EMSs, ISO 14000 standards, or sector-specific programs (e.g., Flower Label Program, Better Banana Project, Fair Trade, certified organic labeling).	Most companies surveyed have EMSs. Industry-specific codes include Green Globe 21 and the International Ecotourism Standard.
Materials	Variable codes point to no discernable trend.	NA
Emissions	Industry largely ignores emissions, but Nestlé and Procter & Gamble optimize shipments to reduce emissions.	Airline industry has no comprehensive policy addressing emissions, but some individual efforts (e.g., British Airways). Hospitality industry promotes efficient hotels (e.g., Hilton's eco-room or "conservation for tomorrow") and and cruise ships (e.g., Royal Caribbean's first smokeless gas turbine engines).
Pollution control and hazardous substances	Rainforest Alliance requires that all pesticides be registered before use. Cut Flower Code and the Flower Label Program also address the issue. Starbucks promotes integrated pest management.	NA
Waste management	Banana industry is reducing plastics use. Some companies are returning unused chemicals. Starbucks is introducing consumer-level policies to reduce waste.	NA
Packaging and transport	NA	NA
Biodiversity	This concern arises sporadically in agribusiness. The U.K. banana industry's Code of Best Practice and the Flower Label Program dictate certain cropping patterns. Starbucks rewards farmers who conserve and improve soil structure.	Several tourism operators have established conservation funds (e.g., Green Globe 21).

Note: NA = criterion was not covered in the survey, or there are no trends to display.
Source: Smith and Feldman (2003).

Table 3 summarizes the survey's findings for the extractive resource sectors, oil and gas production and mining. Although several companies in the oil and gas sector have COCs that provide a general, overarching statements supporting "a safe and healthy working environment," environmental commitments are rarely stated in company policy; rather, environmental activities tend to be reported after the fact, in annual reports. Some companies, like Eni and Norsk Hydro use ISO 14001 standards for EMS requirements or as a guideline for their environmental policy. However, some companies have designed programs that specifically address environmental issues. For example, Exxon Mobil established its Operations Integrity Management System, which they assert meets "the intent and requirement of ISO 14001," to "ensure that environmental considerations are addressed in all operations."

The mining industry has a basic COC given by the Principles for the Conduct of Company Operations within the minerals industry, produced by the Mineral Policy Institute. Having said this, most companies prefer instead to have their EMS in line with ISO 14000 standards and have their environmental policies integrated with worker health and safety standards. In these respects, the environmental polices within the mining industry are very similar to those in the oil and gas industry. Transport is a major part of the postproduction activity of oil and mining companies; hence, both industries have policies that deal with accidental hazards during transportation. Oil and mining companies, responsible for significant emissions of GHGs, have policies to reduce emissions by eliminating gas flaring and to improve monitoring; however, we should note that the rise in natural gas prices is itself making flaring unattractive. Recognizing that mining and oil drilling can cause habitat destruction and biodiversity loss, companies are beginning to form policies that address these problems.

Table 3: Summary of Environmental Code of Conduct Statements: Agriculture, Tourism, and Resource-Based Sectors

Sector	*Oil*	*Mining*
General policy statement	Environmental reporting is included in annual reports and statements of emissions. Environmental concerns are included under the rubric of health and safety. Companies are starting to adopt EMSs, as per ISO 14000 standards.	Most companies support safe and healthy working environments and promise future ISO 14001 compliance. The Mineral Policy Institute has published principles of conduct that address environmental issues.
Materials	NA	Companies are beginning to emphasize water conservation and address pollution concerns.
Emissions	Industry seeks to increase energy efficiency and reduce or eliminate gas flaring.	Industry seeks to increase energy efficiency and reduce GHG emissions. A GHG "challenge program" requires companies to report progress in reducing CO_2 emissions and to implement air emissions management plans. National Mining Association supports voluntary measures to cut GHG emissions.
Pollution control and hazardous substances	Oil spills during transport is a pollution concern. Industry is partly regulated by the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.	Mineral Policy Institute recommends that companies mining high-sulfide ore prevent acid mine drainage, that no uranium should be involved, and that all environmental costs should be borne by the polluter or generator.
Waste management	Most oil companies are attempting to reduce waste discharges through reducing inputs, recycling, and treatment techniques.	Mineral Policy Institute encourages reports on recycling metal products.
Packaging and transport	Some companies have stringent rules on the age and condition of oil tankers, intended to reduce risk of spills.	Mineral Policy Institute urges companies to plan for accidents and environmental emergencies, including during off-site activities such as transport.
Biodiversity	Some companies are incorporating biodiversity issues into company policy (e.g., Shell's biodiversity standard; OECD guidelines state that the same policies apply to third-party suppliers).	Some companies are beginning to address biodiversity issues.

Note: NA = criterion was not covered in the survey, or there are no trends to display.
Source: Smith and Feldman (2003).

In addition to the diversity in enunciated standards, an important issue is whether any of the guidelines are followed and enforced. Hence, the World Bank Group commissioned Foley Hoag to examine and evaluate the structures that the firms have put in place to implement their CSR codes in a follow-up study (Smith and Feldman, Forthcoming). Although most of the information on company codes (used for the first study) was publicly available, most companies do not publicly disclose their implementation mechanisms. Foley Hoag thus conducted a series of in-depth interviews with experts on the five-targeted industries.

Like COCs, implementation mechanisms vary across and within industries. Most companies in the apparel, footwear, and light manufacturing industries use relatively vague language about providing "a safe and healthy work environment" for employees but do not specify the particular environmental standards that they intend to meet. Internal compliance audits tend to focus on labor aspects and rarely include a formal assessment of environmental factors. Even in companies that have more highly developed environmental standards, it remains unclear how these standards are applied to their dispersed suppliers.

Unlike many of the companies in the apparel, footwear, and light manufacturing industries, which wrap environmental standards into broader health and safety standards, those in the agribusiness sector typically have more comprehensive and specific environmental CSR standards. With regard to other internal mechanisms in place to gauge environmental implementation, many large MNEs have put in place environmental departments that are in charge of implementing standards. Most agribusiness companies have conducted at least internal environmental audits of their farms, and many have sought to obtain certification under ISO guidelines. Dole Food Company, Fresh Del Monte Produce, Inc., and Nestlé S.A. all refer in their publicly available materials to obtaining certification under ISO 14001 for EMSs in place at their farms or processing factories. Others partner with nongovernmental organizations (NGOs) to monitor local practices (Fair Trade and the Rainforest Alliance–certified shade-grown coffee, for example).

The tourism industry relies on environmental self-audits to monitor its compliance to stated COCs. With respect to implementation, the WTO's Global Code of Ethics for Tourism provides only that "the public and private stakeholders in tourism development should cooperate in the implementation of these principles and monitor their effective application."

The performance of Green Globe 21–certified companies is independently assessed through regular on-site assessments.[2]

Among leading MNEs in the extractive sector, some companies have comprehensive Health Safety Environment site inspections and audits that include annual self-assessments, annual management reviews of existing systems, and independent auditors at least once every three years. In addition, several external companies conduct audits to determine compliance with ISO 14001 and other international standards. Some of the independent companies used by extractive industry companies to certify environmental standards include PricewaterhouseCoopers and Arthur D. Little.

Despite the differences among the industries surveyed, we find some common features:

- Almost all the companies surveyed have taken voluntary measures to introduce environmental content in their COCs. However, because the study selected a major MNEs with CSR policies for the survey, it is unclear how indicative these observations are of the industries overall.
- Industry-wide bodies such as ecotourism organizations and the Mineral Policy Institute have played an important part in constructing frameworks for environmental performance. These organizations formulate industry-specific standards and COCs and act as information clearinghouses. Their standards are particularly useful to small companies that do not have the resources to create independent EMSs.
- Firms across all industries contract some production processes (components, packaging) outside the firm. Most request that their suppliers meet certain environmental standards (often referred to as "green procurement"). Such standards are part of most EMSs and the ISO 14001 standards. They may also be a requirement of consumer country laws and environmental labeling schemes.

[2] Green Globe was developed by the World Travel & Tourism Council (WTTC) in 1993 and was officially launched in 1994 as a membership- and commitment-based program. It was expanded in 1999 with the introduction of the Green Globe 21 Standard. The program was revised in 2001 and expanded to include actual measurement of environmental improvements through annual benchmarking. Green Globe 21 now has four standards that contain the environmental and social performance requirements of Green Globe 21 Program participants: Company, Community, International Ecotourism, and Design & Construct. Green Globe currently operates in 54 countries where on-site third-party assessment is carried out by AJA Registrars, Grupo Mendez Nava, or GTCertification Ltda, Holar Agricultural College (Green Globe 21 2004).

- International environmental treaties like the Basel Convention[3] and the Montreal Protocol[4] provide an impetus for consideration, even though they are not directly responsible for increasing EMSs within the production process. Under these treaties, international trade in toxic and ozone-depleting chemicals is strictly regulated. If and when the Kyoto Protocol for GHG reduction becomes binding for certain developed countries, it may foster demand for CSR practices that minimize those emissions.
- Almost all the industries surveyed encourage some form of the four Rs—reduce, reuse, recycle, and recover—in resource use and waste management.
- Although environmental statements affirm good practices, actual requirements are relatively vague, particularly compared with those for labor issues. Stipulations for enforcement are more rare.
- Where requirements are more substantial, they tend first and foremost to involve having an EMS in place. Where explicit external mechanisms exist for verifying environmental implementation, the ISO 14000 series usually sets the standards.

In summary, it is not surprising that different industries make different stipulations regarding environmental practices in their COCs, given that the key environmental concerns will

[3] A central goal of the Basel Convention is the application of environmentally sound management (ESM), which is intended to protect human health and the environment by minimizing hazardous waste production whenever possible. ESM addresses the issue of waste through an integrated life-cycle approach, which involves strong controls for hazardous waste, from generation to storage, transport, treatment, reuse, recycling, recovery, and final disposal. One of the guiding principles of the Basel Convention is that hazardous wastes should be dealt with as close to where they are produced as possible. Hazardous and other wastes can be moved across boundaries only with prior written notification by the exporting state to the competent authorities of the importing and transit states (if appropriate). Each shipment of waste must be accompanied by a document from the point at which a transboundary movement begins to the point of disposal. Hazardous waste shipments made without such movement documents are illegal. In addition, the export of such wastes to certain countries is banned outright. Transboundary movements can take place, however, if the exporting state does not have the ability to manage or dispose of the waste in an environmentally sound manner.

[4] The Montreal Protocol of 1987 required industrialized countries to reduce their consumption of chemicals that harm the ozone layer. As of September 2002, 183 countries had ratified the Montreal Protocol, which established the time schedule to "freeze" and reduce consumption of ozone-depleting substances (ODSs). The Montreal Protocol requires all parties to ban exports and imports of controlled ODSs to and from nonparties. The production and consumption of chlorofluorocarbons (CFCs) and other ODSs have been phased out in industrialized countries, and a schedule is in place to eliminate the use of methyl bromide, a pesticide and agricultural fumigant. Developing countries operate under different phaseout schedules, having been given a grace period before phaseout measures would apply to them because of their need for industrial development and their relatively low production rate and use of ODSs.

vary according to the materials and processes used, the supply chain structure, consumer awareness, and consumer ability to discriminate. Perhaps more surprising is the degree of reliance on EMSs—particularly the conformance to ISO 14001 standards—to the exclusion of actual performance criteria.

In several places in the Foley Hoag report (Smith and Feldman 2003) —and for several industries—they make the nearly identical notation:

> One clear trend apparent in all these codes is that many firms increasingly use and implement Environmental Management Systems. As the IFC [International Finance Corporation] states in its Handbook (IFC 2004), EMSs such as ISO 14001 are seen as mechanisms for achieving improvements in environmental performance and for supporting the trade prospects of "clean" firms. Additionally, manufacturers almost uniformly mandate compliance with any applicable environmental regulations and laws, and also almost uniformly provide a safe and healthy working environment. (Smith and Feldman 2003, pp. 13 and 24 in Part I, and pp. 14 and 42 in Part II)

Because of the increasing popularity of ISO 14001, we discuss its requirements and certification in detail in the next section. We note that it involves EMS implementation and adherence to self-designed performance guidelines, not an externally recognized performance standard. In a sense, the convergence that we observe in environmental practices is toward a management philosophy or process rather than a particular behavior or outcome. This kind of emphasis allows for the tailoring of environmental practices to individual sectors and, indeed, individual firms; however, while such flexibility is necessary for environmental standards of conduct to be relevant, it seems to come at the cost of an absence of clear, enforceable performance metrics.

In addition to existing corporate COCs, other templates for voluntary mechanisms can promote better environmental performance and improve access to markets that contain environmentally conscious consumers. These programs, increasingly prevalent in developed countries, are important as models for environmental conduct and for understanding the demand for better, credible conduct from supplier companies in developing countries. We next review EMS certification programs, since they form part of so many corporate COCs.

3. EMS Certification Programs

In considering the possible ways forward, we first look at current reporting and certification experiences. Because the ISO 14000 body of standards is rapidly becoming a

framework for environmental management, auditing, and labeling, we investigate its requirements and relevance for standardizing environmental content in corporate COCs. We also survey emerging evidence about the costs and benefits of ISO 14001 certification.

ISO 14000 Family of Standards

Following the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in 1992 (commonly referred to as the Earth Summit), ISO introduced its 14000 series for environmental management. The ISO 14000 body of standards allows organizations to focus environmental efforts according to internationally accepted criteria.

The standards are designed to be "generic," applying to all types and sizes of organizations, public or private, whatever the product or service. They are also designed to encompass diverse geographical, cultural, and social conditions. The ISO 14001 standard, which sets out principles for EMSs, does not establish absolute requirements for environmental performance, only a commitment to continual improvement and compliance with applicable legislation and regulations. Therefore, organizations engaged in similar activities may have different EMSs and performance, yet all may comply with ISO 14001. The ISO standards are thus flexible across firms, because firms determine the extent of coverage. The standards may include the organization's products, services, activities, operations, facilities, transportation, or any aspect of production but must be sufficiently consequential to justify certification.

To illustrate the scope of ISO standard-setting related to environmental conduct, Table 8 in the Appendix lists the current series of ISO 14000 family of standards. The 14020 series covers ecolabeling, and the 14040 series covers life-cycle assessment (LCA), which we discuss later.

ISO standards are voluntary, and conformity with ISO 14001 is the most common certification sought. The role of an EMS is to minimize harmful effects on the environment caused by the organization's activities. For an EMS to comply with ISO 14001, the organization must have an environmental policy that

- is fully supported by senior management and accessible to the staff and public,
- pledges compliance with environmental legislation that applies to the organization, and
- stresses a commitment to continuous improvement.

Note that these requirements are similar to the general statements of conduct with respect to the environment in some corporate COCs, including "the IKEA way."

Even though the ISO 14001 program requires documented proof of compliance with national environmental quality standards, several firms are being granted ISO 14001, bilateral certification, or both ahead of full compliance by demonstrating partial compliance or intent to comply (ISO 2004a).

ISO does not audit and certify management systems itself; instead, independent certification bodies handle verification. Although the certifiers do not operate on its behalf, ISO publishes guidelines on conformity assessment to promote convergence among national practices. Several certification bodies exist, and many operate across national boundaries.

Until recently, ISO certification had penetrated much further in developed countries than in developing ones, with Japan leading the pack by far. However, at the end of 2003, China was estimated to have the second-largest number of ISO 14001–certified companies. Many companies were also becoming certified in newly industrialized countries, Thailand, Brazil, India, and the new member countries of the European Union.[5]

Benefits of ISO 14001 Certification

Despite the rapid diffusion of ISO 14001, only a few studies have analyzed the standard's performance. Researchers at the University of North Carolina (UNC) conducted an empirical assessment of the impacts of EMSs in the United States using the National Database on EMS (UNC 2003). That pilot study collected longitudinal data on 83 facilities from 20 business sectors and included publicly traded, privately held, and government facilities, with organization sizes ranging from major manufacturers to small independent businesses. Roughly two-thirds of the facilities were registered or intended to seek ISO 14001 registration, whereas the rest were using the ISO 14001 framework to guide their efforts but did not intend to seek registration. UNC found that, on balance, EMS introduction was associated with overall improvements in reported environmental performance. However, impacts specific to ISO 14001certification were harder to discern.

[5] Data collected by Reinhard Peglau, Federal Environmental Agency, Germany, and ISO World (http://www.ecology.or.jp/isoworld/english/analy14k.htm); see also Khwaja et al. 2003.

Because EMSs designed using the ISO 14001 voluntary standard as a model must include specific objectives and targets for improvement, they tested whether environmental performance improvements were greater for those priority indicators. Although observations suggest this result, the difference was not statistically significant. Nor were the performance changes and the compliance of those facilities intending to seek ISO 14001 certification statistically different from the others. Although a notable share of the facilities that had violations during the baseline period did reduce or eliminate them after EMS implementation, on a statistical basis, EMS introduction or ISO certification did not have a significant effect on regulatory compliance (UNC 2003).

Although largely unquantified, the perceived benefits included increased management efficiency (the most widely reported benefit), increased operational efficiency, reduced liability, regulatory benefits, improved community relations, and improved relationships with customers and suppliers. Of the facilities that reported quantified benefits, the average benefits were $90,320, of which 57% was savings from reduced materials use.[6]

Another important question is how the market values ISO certification. Hibiki et al. (2003) used data on Japanese publicly held manufacturers to evaluate empirically the likelihood of and the potential benefits of acquiring an ISO 14001 certificate. They find that firms with a larger size, larger export ratio, higher profitability, and higher expenditures for research and development have greater incentives to get certified. Firms in certain industries—pharmaceutical, metals, transportation equipment, precision machinery, and other manufacturing industries—were less likely to seek certification. More importantly, the ISO 14001 certification system appears to contribute to a statistically significant increase (11–14%) in the market value of the firms in the manufacturing industry, suggesting that the stock market gives publicly held firms an incentive to acquire the ISO 14001 certificate.

Critics of ISO 14001 certification like Boiral and Sala (1998) note that environmental performance improvements are not guaranteed by EMS implementation. Furthermore, the ISO management strategy may not be compatible with all internal management cultures, and some

[6] These results are similar to case studies in Khwaja et al. 2003. For instance, the agricultural residue–based pulp and paper mill Raval Paper Mills (Rae Bareilly, Uttar Pradesh, India) was one of the demonstration units in the Demonstration in Small Industries for Reducing Emissions (DESIRE) cleaner production program sponsored by the United Nations Industrial Development Organization (UNIDO). Execution of the cleaner production techniques created numerous benefits for the firm; the investment of US$80,000 made in implementing the first 30 measures generated savings of US$88,000 per year.

empirical studies have validated the role of internal management philosophies. Examining the motivation of early ISO adopters, Nakamura et al. (2001) find that the environmental values, beliefs, and attitudes of managers are as important determinants as the costs and benefits of voluntary actions to enhance or protect the environment and the capacity to act. The critics also note that certification can be quite costly. Similarly, Bridgen and Helm (2000) caution that ISO 14001 certification is most relevant for companies that already incorporate environmental consciousness in their corporate culture and is not effective for companies that are poor environmental performers.

Costs of ISO 14001 Certification

The costs of ISO 14001 implementation and certification can vary greatly depending on the size of a facility and the nature of its operation. For a small to medium-sized manufacturing facility (i.e., 100–300 employees), the cost of developing and auditing an EMS will generally range from $20,000 to $50,000, according to Environmental International Ltd. (2003). Table 4 lists estimated costs of ISO 14001 implementation and certification for different manufacturing facilities in the United States.

Table 4: Summary of Estimated Costs of ISO Implementation and Certification for Various Industrial Facilities in the United States

Plant Size	*Costs of ISO Implementation and Certification*
Average manufacturing facility: 100–300 employees	$20,000–$50,000
Chemical manufacturer: 120 employees	$30,000 (2-year period)
Manufacturer of water quality measurement equipment: 300 employees	$20,000–$30,000 (2-year period)
Major plastics producer with facilities in various states (Delaware, Louisiana, and Texas)	>$100,000 per facility

Source: Environmental International Ltd. 2003.

UNC (2003) also estimate EMS design, implementation, and certification costs. They find that publicly traded facilities experienced lower total costs, whereas government facilities spent the most. Labor costs for government facilities were 2.6 times more than for privately owned companies and 4.1 times more than for publicly traded facilities; consulting costs formed yet higher proportions. They submit that the large cost differences arise from differences in access to internal capabilities and resources.

Table 5: Costs of EMS Design per Employee by Ownership Type

Cost Category	*Publicly Traded (n=20)*			*Privately Owned (n=16)*			*Government (n=6)*		
	Mean	*S.D.*	*Percent*	*Mean*	*S.D.*	*Percent*	*Mean*	*S.D.*	*Percent*
Labor	$206	219.5	77.2%	$317	371.6	59.7%	$822	1041.6	59.8%
Consultants	$ 12	19.9	4.5%	$ 37	60.6	7.0%	$499	775.6	36.3%
Travel/Training[1]	$ 14	32.2	5.2%	$ 34	99.8	6.4%	$ 50	111.8	3.6%
Equipment	$ 0	1.7	0.0%	$ 33	88.9	6.2%	$ 0	0.0	0.0%
Materials	$ 7	14.6	2.6%	$ 22	46.6	4.1%	$ 1	1.5	0.1%
Auditors, ISO 14001 Registration[2]	$ 28	51.0	10.5%	$ 88	125.6	16.6%	$ 0	0.0	0.0%
AVERAGE TOTAL COST/EMPLOYEE	$267*		100%	$531*		100%	$1441[3]*		100%

* Results of Wilcoxon-Mann-Whitney test show that costs are less for publicly traded facilities than for other facilities (p=0.04). For-profit (publicly traded and privately owned) costs are less than government costs (p= 0.03). In comparing all three facility types EMS design costs per employee also differ (p=0.08).

Source: UNC 2003

Of course, it is unclear to what extent U.S. figures are representative of the costs in a developing-country context. An analysis by de Bonafos (2001) presents a case study of a privately held Chilean forestry company that manages a total 82,564 hectares of pine plantations. The company started the ISO 14001 certification process in 1995 and obtained certification in 1997. Table 6 lists total direct costs (evaluation audit, certification audit, external audit control, fees for external and internal consultant work, and courses and seminars) incurred in the process of implementing and operating an EMS system according to the ISO 14001 standard. Notice that the costs involved in hiring external consultants accounted for more than 47% of total direct costs. This value is even higher than the 36.3% reported by UNC (2003) for government facilities, whereas internal costs are much lower.

Table 6: Direct Costs Incurred in the Adoption of Standard ISO 14001 by a Forestry Company in Chile

Item	*Compounded Total Direct Costs*[a] *(US$, December 2000)*	*Percentage (%)*
Evaluation audit	19,038.08	10.04
Certification audit	35,502.20	18.71
External audit control	25,567.50	13.48
External consultants	90,621.94	47.77
Internal consultants	9,847.35	5.18
Courses and seminars	9,137.36	4.82
Total	**189,714.43**	**100.00**

[a] Direct costs consist of the evaluation audit, certification audit, external audit control, fees for external and internal consultant work, and courses and seminars. Data were collected from 1996 to 2000 and compounded to December 2000.

Source: de Bonafos 2001.

De Bonafos (2001) estimated that the direct costs of ISO 14001 implementation per employee for this Chilean forestry company were US$220.70, less than half that of the privately held firms in UNC 2003 and even somewhat lower than the values reported for publicly traded facilities. However, in Chile, that per-employee figure represents roughly 5% of annual per capita income (data from Chile Data Profile, World Bank Group). They also estimate annual benefits of $823 per employee; about 5% was from reduced chemicals use, 20% from lower administration costs, and 75% from personnel savings (primarily contractors). Though intriguing, lack of detail in the de Bonafos (2001) study summary and its single firm sample make it difficult to draw hard conclusions.

Both of these studies reveal that large portions of the costs arise from external trainers, consultants, and auditors. The expansion of such capacity in developing countries to replace international consultants would bring down certification costs. Still, these costs will remain a greater barrier for developing country firms. Given that compliance and certification costs are fixed, up-front expenses, credit-constrained companies in developing countries may have difficulty obtaining the resources for certification, even if it may confer financial benefits later. Our case study of the forestry industry reveals that most organizations that have obtained ecocertification have done so with international financial assistance (Fischer et al. 2005).

Other EMS Certification Programs

Life-Cycle Analysis

Life-cycle analysis (LCA) is a cradle-to-grave approach for assessing industrial systems. A product's life cycle starts when raw materials are extracted from the earth; continues through manufacturing, transport, and use; and ends with waste management, which includes recycling and final disposal (UNEP 2003). By including all impacts throughout a life cycle, LCA provides a comprehensive view of the environmental aspects of a product or process and a more accurate picture of the total environmental trade-offs in product or process selection (USEPA and SAIC 2001). The commonly used life-cycle impact categories include potential contributions to global warming (e.g., carbon dioxide [CO_2] emissions); stratospheric ozone depletion (from chemicals like CFCs); acidification (e.g., sulfur dioxide [SO_2] and nitrogen oxides [NO_x]); eutrophication (as from phosphate and nitrates); photochemical smog (hydrocarbons); terrestrial and aquatic toxicity, as well as human health impacts (from toxic chemical releases); resource depletion (e.g., use of minerals and fossil fuels); and land use (e.g., solid waste).[7] ISO has standardized an LCA framework within the ISO 14040 series.

Eco-Management and Audit Scheme

Working in parallel with ISO, the European Union has developed the Eco-Management and Audit Scheme (EMAS), a management tool for companies and other organizations to evaluate, report, and improve their environmental performance. The scheme has been available for company participation since 1995 and was originally restricted to companies in industrial sectors.[8] Since 2001, EMAS has been open to all economic sectors, including public and private services.[9] Three measures have contributed to the effectiveness of EMAS: the integration of EN/ISO 14001 as the EMS required by EMAS, the adoption of a logo to signal EMAS registration to the outside world, and the mandate to consider indirect environmental effects such as those related to financial services or administrative and planning decisions. Participation is voluntary and extends to public or private organizations operating in the European Union and the European economic area (Iceland, Liechtenstein, and Norway). An increasing number of

[7] Source: U.S. EPA 1998b.

[8] Council Regulation (EEC) No. 1836/93 of 29 June 1993.

[9] Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001.

candidate countries are also implementing the scheme in preparation for joining the European Union. This broadening system indicates not only widespread convergence to the ISO body of standards but, along with recent European Parliament recommendations for promoting CSR (European Parliament 2003), increasing demand for compliant behavior among source companies outside the European Union.

Responsible Care

Responsible Care is an example of a sector-based voluntary program for environmental responsibility, although its success remains under debate. Canada's Chemical Producer Association (CCPA) developed Responsible Care in 1985. The American Chemistry Council established the American chapter of the Responsible Care program in 1988 as a voluntary effort to achieve "improvements in environmental, health, and safety performance beyond levels required by the U.S. government." (American Chemistry Council website). The program integrated ISO 14001 into Responsible Care, thus allowing participating organizations to gain both kinds of certification in a single audit of their EMS. The chemical industry cites that the program has been effective in reducing pollution because member companies are required to continually improve the management of chemicals. The American Chemistry Council has set up public advisory panels to allow for public input and involvement in shaping the initiative. Responsible Care has been implemented in more than 45 countries in North America, South America, Asia Pacific, Africa, and Europe (CCPA 2004).

Critics of Responsible Care label it as essentially a public relations effort undertaken by the chemical industry to address its negative image in the wake of the deadly 1984 Union Carbide gas leak in Bhopal, India.[10] To substantiate their claim, the critics argue that during the 1990s, the Chemical Manufacturers Association spent $1 million to $2 million a year on implementing Responsible Care at its member companies, but more than $10 million a year on advertisements about the program. Subsequent studies expose the limitations and the ineffectiveness of the program (U.S. PIRG 1998, Kleindorfer et al. 2000, Tellus 1996).

[10] See Footnote 17.

4. Ecolabeling as Certifying Environmental Conduct

Ecolabeling is a voluntary method of environmental performance certification that caters to certain consumers' preferences. The label signifies that a particular company's product or service has met certain predefined criteria, and as such, ecolabeling is functionally similar to a voluntary, standardized, industry-specific environmental COC with certification mechanisms. Studying ecolabel programs can offer lessons for considering more rigorous standards for environmental conduct in common content for certain industries. It can also offer insights into an important driver of the market for environmental content in a COC, because client companies seeking to preserve their ecolabel status may demand certain kinds of performance down their supply chain.

Ecolabeling is becoming increasingly popular as a policy because it offers both environmental and economic opportunities and highlights better environmental practices. The fundamental rationale for ecolabeling is to generate private incentives for improved environmental management or better long-term stewardship of natural resources by harnessing consumer choice, based on the assumption that credible information will affect consumers' purchases and increase market shares of the certified companies. Companies apply for an ecolabel to inform consumers that their products or services meet specific environmental standards, enabling them to charge higher prices in these premium markets. Companies may also undertake this voluntary to avert (or preempt) more stringent, confrontational, and more costly regulation.

In practice, ecolabeling has several levels, according to the entity or group that defines and verifies the compliance criteria:

- First-party labeling schemes, also referred to as self-declaration, are established by individual companies based on their own product standards. Company-based environmental standards in COCs fall in this category.
- Second-party labeling schemes are established by industry associations. Compliance is verified either through certification procedures within the industry or by external certifying companies.
- Third-party labeling schemes are usually established by an initiator (public or private) that is independent from the producers, distributors, and sellers of the labeled products.

All of those schemes can have third-party verification; the distinction lies in the responsibility for setting the standards. ISO standards combine aspects of first- and third-party programs: companies set their standards for performance, informed by minimum ISO requirements, and verification is performed independently. Most timber-certification programs started as a second-party industry-designed framework in the early 1990s. Currently, all forest ecolabel programs are developed and managed by independent organizations that represent various stakeholders (see Fischer et al. 2005).

Because standardized environmental provisions for COCs would fall primarily in the last category (like the ISO standards, at least in part), we focus on drawing lessons from the impacts and scope of third-party labeling schemes. Within the third-party category are two types of labels: the seal of approval and single-attribute certification programs. Seal-of-approval programs (e.g., Blue Angel, Green Seal) award or license the use of a logo to products that the program judges to be less environmentally harmful than comparable products, based on a specific set of criteria. Single-attribute certification programs (e.g. Biodegradable, Recycled) certify that claims made for a single attribute of a product meet a specified definition. Such programs define specific terms such as *recycled* and *biodegradable* and review applications from marketers for verification that their product attribute meets the program definition. Alternatively, programs can set requirements for manufacturers to meet (e.g., U.S. Energy Star).

Most of the existing broad-based ecolabeling schemes have evolved along a common path. In the early 1990s, ministries of the environment, environmental agencies, and equivalent governmental institutions established and promoted the adoption of national ecolabel schemes to increase public awareness of products that made less impact on the environment. Agenda 21, an outcome of the 1992 Earth Summit, endorsed these kinds of voluntary approaches.[11] Chapter 4 of that report, *Changing Consumption Patterns,* explicitly encourages the development of national policies and strategies for environmental labeling, product LCA, and information campaigns to increase consumer awareness:

> 4.20. The recent emergence in many countries of a more environmentally conscious consumer public, combined with increased interest on the part of some industries in providing environmentally sound consumer products, is a significant

[11] Agenda 21 is a comprehensive plan of action to be taken globally, nationally, and locally by organizations of the United Nations system, governments, and major groups in every area in which humans affect the environment (www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm).

> development that should be encouraged. Governments and international organizations, together with the private sector, should develop criteria and methodologies for the assessment of environmental impacts and resource requirements throughout the full life cycle of products and processes. Results of those assessments should be transformed into clear indicators in order to inform consumers and decision makers.
>
> 4.21. Governments, in cooperation with industry and other relevant groups, should encourage expansion of environmental labeling and other environmentally related product information programs designed to assist consumers to make informed choices.
>
> 4.22. They should also encourage the emergence of an informed consumer public and assist individuals and households to make environmentally informed choices by:
>
> (a) Providing information on the consequences of consumption choices and behavior so as to encourage demand for environmentally sound products and use of products;
>
> (b) Making consumers aware of the health and environmental impact of products, through such means as consumer legislation and environmental labeling;
>
> (c) Encouraging specific consumer-oriented programs, such as recycling and eposit/refund systems. (UNCED 1992)

Despite initial government involvement, today, the development of criteria and standards for ecolabeling is more often managed by independent third-party organizations (e.g., Canada's Environmental Choice, New Zealand's Environmental Choice, Taiwan's Green Mark, and Thailand's Green Label). The current approach moves from purely public management to a multiple-stakeholder scheme in an effort to increase private involvement and build credibility and transparency. Criteria for ecolabeling have also evolved from a product standard to a more complex evaluation of environmental performance.

With the aim to improve, promote, and develop the ecolabeling of products and services, the Global Ecolabelling Network (GEN) was created in 1994 as an association of third-party organizations that label environmental performance. Its 26 members share GEN's objectives and meet basic ecolabel criteria.[12] GEN has promoted cooperation and mutual recognition between different national ecolabeling schemes.

[12] For a list of GEN members, visit http://www.gen.gr.jp/members.html.

With the proliferation of labels came efforts to standardize aspects of ecolabeling. Responding to a need for greater transparency and credibility, given the large variety of and variation in certification programs. ISO began to address ecolabeling in the 14020 series. The ISO defines *environmental performance labeling* as a "a voluntary, multiple-criteria based, third-party program that awards a license that authorizes the use of environmental labels on products indicating overall environmental preferability of a product within a particular product category based on life cycle considerations" (Global Ecolabelling Network n.d.). ISO 14024 defines the principles for how responsible ecolabeling programs should operate while allowing for individual program flexibility, criteria, and national or regional environmental values and priorities. GEN has adopted this standard for verification, testing, and environmental criteria (GEN 1999).

National Ecolabels in Practice

Several countries have publicly sponsored the development of multiproduct ecolabels, often in partnership with industry or NGOs. Table 9 in the Appendix summarizes some of these ecolabeling schemes, organized by country or region. Most ecolabel programs target consumers in developed countries, with a few exceptions like India's Ecomark and Thailand's Green Label. Thus, the incentives in developing countries to adhere to ecolabel standards apply primarily to export sectors. However, the increasing emphasis on LCA means that not only producers of consumer goods but also suppliers of intermediate goods may face pressures to comply. As such, ecolabels in trade partner countries can create opportunities for exporters to tap premium markets—or they may create barriers to market access, if it is more difficult for developing country producers to meet and certify compliance with those standards.

The Organisation for Economic Co-operation and Development (OECD) studied the market, trade, and environmental impacts of selected national ecolabeling programs, including the E.U. Eco-label, Nordic Swan, Swedish Environmental Choice, Canadian Environmental Choice, Blue Angel, Green Seal, Japanese Eco Mark, and Norme Française Environnement (OECD 1997). Although the study cites anecdotal evidence supporting the various hypotheses on ecolabeling, the lack of empirical data does not allow statistical verification. The programs studied differ in many aspects, but all of their mission statements are consistent with ISO's draft general principles of ecolabels. Accordingly, the two objectives of environmental labels (and declarations) are to achieve market-driven, continuous environmental improvement (which will occur if labels can increase the demand for and supply of environmentally preferable products and services) and to communicate verifiable, accurate, nondeceptive information on the

environmental attributes of products and services. The main impacts on markets, trade, and environment are distilled in the following paragraphs.

Market Impacts

The OECD 1997 study found it difficult to ascertain the market impacts of ecolabeling, given the sparse data. However, scattered anecdotal evidence indicates that sales increase when a product has been certified with an ecolabel.[13] Additionally, producers continue to apply for and pay for ecolabeling, indicating that it has some market value. Any impacts on consumer choice due to ecolabels assume that consumers trust the certifying institution as an independent body with no conflict of interest with the product manufacturers. Countries that have more informed consumers experience greater market impacts. Ecolabeling is also demand driven, especially where it has been used to identify environmentally preferable products for government procurement and institutional purchasing. The OECD report emphasizes that no statistical data support the anecdotal information.

Trade Effects

The OECD study was unable to gather evidence regarding changes in trade flows arising from selected ecolabeling programs. However, labeling schemes that include production-related criteria are raising concern because such criteria can discriminate against imports when they reflect the environmental conditions and preferences of the importing country exclusively; the effects can be particularly acute for developing countries and countries heavily dependent on exports. If the product is highly traded and if the ecolabel contains production and process-related criteria, then the ecolabel may constitute a barrier to competition in the marketplace.

Environmental Effectiveness

The economic advantage of an ecolabel to a firm lies in its relative exclusivity. Accordingly, the environmental benefit sought through ecolabeling will be achieved when a balance is reached between the number of ecolabeled products and the stringency of the criteria. Because of the difficulty of distinguishing the environmental benefits of ecolabeled products

[13] Anecdotal evidence is also available for developing countries. For example, when Century Textiles of Bombay, the largest textile company in India, gained Öko-Tex certification for its products, it was able to raise prices by 8–10% and increase market access by 10% (Khan et al 2003). The costs of achieving certification were not reported.

from benefits achieved via other environmental measures, environmental effectiveness has instead been evaluated indirectly on the basis of consumers' awareness of and demand for ecolabeled products and of changes in producers' behavior. Public awareness and attitudes toward ecolabeled products vary significantly. In some countries, ecolabel development has affected the behavior of manufacturers, strongly encouraging them to modify their products so they can qualify for an ecolabel and maintain their products in retail chains.

Ecolabel criteria are generally set so that only a small percentage (5–30%) of products in a category can obtain the ecolabel. In practice, successful ecolabeled products often cover more than 30% of the market share in a product category. If too large a proportion of products is ecolabeled, however, the label is no longer an exclusive identifier of environmental compliance within that product category, resembling instead a de facto voluntary standard. In that case, price premiums are likely to be limited.

Some Other Studies of Ecolabeling

Since the OECD 1997 study, ecolabeling has gained increasing attention in economics research. Additional empirical analysis has attempted to quantify the strength of this "market" effect of ecolabeling. Bjørner et al. (2004) analyzed the effect of the Nordic Swan ecolabel on consumer choice and estimated models for consumer choices in Denmark among different brands of toilet paper, paper towels, and detergents. Their research indicated that the marginal willingness to pay for certified environmentally friendly brands ranges from 13% to 18% of the price. The effect was insignificant for paper towels, however, because "green" consumers were more likely to use reusable dishcloths instead. The researchers emphasize that Danish consumers respond to ecolabels because of their high degree of environmental awareness and their confidence in the certifying body (the government); Scandinavians have relatively aggressive environmental policies in general.

A large body of empirical evidence has documented a positive marginal willingness to pay extra for environmentally labeled products.[14] However, an important question is whether that premium is sufficient to generate positive effects on the market equilibrium. For example, in the timber sector, Upton and Bass (1996) and Mattoo and Singh (1994) cite evidence that 80% of

[14] For example, Henion 1972, Levin 1990, Cairncross 1992, Wasik 1996, Nimon and Beghin 1999, Kirchhoff 2000, Bennett et al. 2001, Cason and Gangadharan 2001, Roe et al. 2001, and Teisl et al. 2002.

consumers in U.K. and Canadian markets are willing to pay a premium for such products as sustainably harvested wood products. However, Sedjo and Swallow (2002) find that the market for certified sustainably harvested wood products may not generate a price differential between labeled and unlabeled wood to the extent indicated by surveys of consumer demand alone. A more recent study by Anderson and Hansen (2004) suggests that price premiums for ecolabeled wood products may be possible for special small market segments. We discuss additional empirical studies of ecolabeling in the forestry sector in an RFF discussion paper (Fischer et al. 2005).

The analytical economics literature cautions that, from a global perspective, implementing an ecolabeling program can lead to ambiguous results on welfare. Mason (2001) finds that when third-party certification is an imperfect test of "greenness," ecolabeling can reduce or expand the volume of green production, depending in part on the costs of certification and test accuracy. Greaker (2002) looks at the trade and welfare effects of ecolabeling compared with environmental standards. With international trade in industrial commodities whose processing or production pollutes the local environment, global welfare can in some circumstances be higher with an ecolabel scheme than with national regulation.

Both results have relevance for implementing environmental conduct standards in developing countries. On one hand, in a context of limited capacity for national regulation and enforcement, certification can improve welfare. On the other hand, developing countries are wary of external efforts to set environmental standards. The general perception is that high compliance costs make their exports less competitive in international markets and constitute a form of protectionism (Najam 2002). Greaker (2002) notes that ecolabels can improve the welfare of exporting countries in some circumstances, but not all.

The benefits of ecolabeling and its effect on trade and developing countries are under discussion at the World Trade Organization. Even though ecolabeling is voluntary, developing countries fear that the absence of a label could hurt their trade prospects, thus making it a de facto standard. For example, forest certification has gained widespread popularity in industrialized countries but has achieved relatively little penetration among developing country producers, due to the greater relative costs of certification and the lack of domestic consumer demand for it. Many developing country stakeholders harbor mistrust of certification, believing that rather than encourage improved forest management, it serves as a nontariff barrier to trade by discriminating against uncertified providers (see Fischer et al. 2005).

Another lesson from the literature is that the accuracy of compliance verification systems may be critical to achieving positive results, not only in accessing premium prices but also in ensuring that the companies that enjoy expanded market share are that much cleaner than those they displace. Furthermore, enthusiasm should be tempered by awareness that the price premiums that certification generates are not always sufficient to justify the costs or to generate significantly positive environmental outcomes.

Costs of Ecolabels

Even though application and annual fees represent only a small percentage of the total costs involved in ecolabel certification, it is interesting to highlight the common approach to setting those charges. Most programs (i.e., Blue Angel, India's Ecomark, E.U. Flower, Korean Eco Label, and Nordic Swan) set an annual license fee as a percentage of annual turnovers. Environmental Choice New Zealand sets its fee based on declared annual net sales rather than total turnover.

For example, E.U. Flower application fees are EUR 300–1,300. In addition, annual fees are assessed at 0.15% of annual sales volume of the product within the community, with a minimum of EUR 500 up to a maximum of EUR 25,000. For both fee types, a 25% discount is available for small and medium-sized enterprises and applicants from developing countries. The program also offers a 15% reduction in annual fees for companies already registered under EMAS or certified under ISO 14001, perhaps because it is easier for companies with an EMS in place to comply with requirements set by an ecolabel program. However, these fees do not cover testing and verification costs, which have to be met by the applicant.

In addition to participation fees and verification costs, firms also incur costs from changing their production processes to comply with the standard. To get a sense of the comprehensive costs of participating in an ecolabel program, the Korea Environmental Labelling Association (2004) issued a report based on an analysis prepared by Do et al (2003). Based on a survey of 43 companies in South Korea, Kwak estimates that total costs per product are on average 15.5% higher than for similar conventional products that are not certified. These values include costs associated with process and design renovation, facility maintenance, management of product quality and performance, replaced input materials, product testing for compliance verification, and license fees. Table 7 summarizes the findings, which reveal product cost increases ranging from 3.3% for printing paper to 51.4% for laundry detergent.

Table 7: Additional Costs per Product Awarded the Korean Ecolabel Compared with Conventional Products

Product	*Additional Cost of Ecolabel*
Printing paper	3.3%
Fluorescent lamps	4.3%
Laser printers	8.9%
Tap water faucets	9.0%
Toilet paper	15.3%
Household gas boilers	16.8%
Laundry detergent	51.4%

Source: Kwak 2003.

Lessons from Ecolabeling

According to the Consumers Union guide to environmental labels (Eco-labels 2002), a good ecolabel should indicate that an independent organization has verified that a product meets meaningful and consistent standards for environmental protection. The main challenge to policymakers and agencies is to address the concerns of both consumers and producers about standards verification and compliance while maximizing benefits. The benefits should include customer satisfaction and profits to producers as well as environmental protection. The important features of ecolabels learned to date are described in the following sections.

Meaningful and Verifiable

Ecolabels should reflect environmentally meaningful standards that can be verified by the certifier or another independent inspection organization. The labels should convey some tangible information that consumers can understand, rather that being an abstract declaration of environmental protection. To avoid potential conflicts of interest, the organization that grants the ecolabel should be an independent body.

Consistent and Clear

Ecolabels signal the environmental commitment or stringency of producers. Consumers can make sound decisions about labeled products only if the signals are clear and consistent. The labels should therefore state the environmental goals that the standards are trying to achieve. Generic ecolabels that reflect environmental commitments common to all industries, such as energy efficiency or recycling and reuse, should be consistent across products.

Stakeholders' Input

Labels that are developed with input from multiple stakeholders—including consumers, firms, and environmental organizations—are more likely to be adopted and accepted as credible standards. Including all stakeholders also promotes transparency in the process and understanding of what the label signifies.

Continuous Improvement

Ecolabels should be revised regularly to ensure that they meet their proposed objectives, increase transparency, promote credibility, and improve stakeholder involvement. For example, the E.U. ecolabel scheme was created in 1992, was revised in 2000, and will be reviewed again before the end of September 2005. The revision process should include stakeholder input from industry workers, community members, local firms, MNEs, and governments.

Information

As a market mechanism, an ecolabel provides additional environmental information about a product that consumers take into account when making purchasing decisions. Providing consumers and producers with access to information in clear formats is crucial for the success of a label (Teisl et al. 2002). Furthermore, the success of a program hinges on the environmental awareness of consumers (Bjørner et al. 2004). At a minimum, consumers must know what the label stands for and the environmental goals achieved by compliance. Consumers also must have confidence in the authenticity of the label. This can be facilitated if they have access to details of certifying authority. Independent not-for-profit organizations like the Consumer Policy Institute play a vital role in disseminating information to consumers about ecolabels, the standards met, and the authenticity of the certifying bodies.

Information is equally important to industry. Small firms especially may be unaware of existing ecolabels and the procedures for acquiring one. Often the only source of information regarding the various ecolabeling schemes is the body in charge of certification and implementation of the ecolabel. Although it is not a major issue with large producers and manufacturers, smaller firms with limited access to resources are disadvantaged. Industry groups and associations can fill this void by providing manufacturers with resources and acting as a clearinghouse for information about ecolabeling, procedures for acquiring certification, and market studies that would be useful to a potential ecolabeled company.

Cost of Compliance to Producers

Acquiring an ecolabel and complying with standards are resource-intensive undertakings for most manufacturers, especially small units that supply larger industries and do not interact directly with consumers. The costs of certification form a larger proportion of costs for small firms than for large companies. To help small firms, industry associations can provide resources and information on certification schemes and best practices to achieve environmental and efficiency targets. Improving access to credit and providing loans for certification could also make certification feasible for some firms.

After acquiring certification, firms must undergo periodic inspection, the cost of which is borne by the firm. Industry associations could also make group certification a feasible alternative for small-scale producers and manufacturers. A certificate could be issued to a group of producers managed by a common body that maintains records and supervises each holding; certification costs would be shared among several producers. To be successful, however, this option requires a functioning organization able to guarantee to the inspector that each individual holding complies with the law.

5. Monitoring and Reporting Programs

Since the mid-1980s, there has been a worldwide trend toward government-mandated disclosure of information about firms' environmental performance (e.g., Tietenberg 1998).[15] The emergence of these programs reflects a combination of increasing public concern about environmental degradation, technological innovations (such as the Internet) that have dramatically lowered the costs of information collection and dissemination, and the inability of traditional regulatory structures to cope with the sheer numbers of potentially harmful substances. The last factor is particularly germane to developing countries, where regulations are more likely to be weak and poorly enforced.

Unlike voluntary standards or ecolabels, reporting programs do not require specific achievements in environmental performance; rather, they mandate that participating firms in an industry disclose their emissions. Like public declarations of COCs and ecolabeling, reporting programs attempt to harness the influence of informed consumers and communities to promote

[15] These trends also apply to voluntary information disclosure and to other nonenvironmental indicators of firms' social performance, such as labor standards and human rights (e.g., O'Rourke 2004, Portney 2004).

behavioral change in companies. Although voluntary programs use information dissemination as a carrot (to attract higher-paying consumers), mandatory reporting programs can use information as a stick (to generate negative attention to galvanize stakeholders and encourage preemptive emissions reductions).

In this section, we assess the potential for public disclosure (through reporting programs) to play a role in the environmental content of COCs. The reasons for considering such a recommendation are threefold and of particular relevance for developing country needs. First, information provision is a relatively low-cost requirement, yet these programs seem to have had intriguing impacts on environmental performance. Second, information provision enhances the transparency, credibility, and verifiability of a COC, thus improving the likelihood of benefits in terms of access to premium markets. Third, information provision enhances the abilities of local regulators and community activists to ensure compliance with local laws and to better target their own monitoring and enforcement resources.

The discussion of mandatory environmental disclosure programs begins by focusing mainly on the poster child for these programs, TRI.[16] This U.S. program was the first major disclosure law, much has been written about it, and many of the lessons that can be drawn from it apply to other information disclosure programs. We also discuss the Indonesian Program for Pollution Control, Evaluation, and Rating (PROPER). Finally, we consider the incorporation of mandatory reporting into a voluntary COC.

Background

The tragic 1984 chemical accident in Bhopal, India, and several smaller-scale toxic leaks in the United States heightened concerns about emissions of hazardous materials.[17] The U.S.

[16] The information in this section is based on several sources, particularly Bouwes et al. 2001, Fung and O'Rourke 2000, Graham and Miller 2001, and U.S. EPA 2003.

[17] In 1984, methyl isocyanate gas leaked out of a storage tank at a Bhopal Union Carbide pesticide factory and drifted over nearby residential areas, killing 2,000 people and injuring another 300,000. Local health and other emergency service officials were unaware of the toxicity of chemicals at the factory and did not know how to treat victims. In 1985, the same chemical leaked from another Union Carbide plant in Institute, West Virginia, and injured more than 100 people.

Congress responded by passing the Emergency Planning and Community Right-to-Know Act (EPCRA) in 1986.[18]

The main purpose of EPCRA was to help emergency services in communities throughout the nation prepared to deal with heath problems in the event of chemical accidents. To this end, the act required that manufacturers in standard industrial classification (SIC) codes 20 through 39 report the amount and location of chemicals stored at their facilities so that local officials would have some idea of the potential consequences of leakages.

The act also required U.S. EPA and states to collect annual data on the releases of certain chemicals from each facility into air, water, and land; facilities had to report the quantity of chemicals that they recycled, treated, burned, or otherwise disposed of, both on and off site. The TRI created as a result of the act was based on the principle that local residents had a right to know about the potential hazards of nearby industrial facilities (U.S. EPA 1995). With this information, citizen groups can hold companies accountable for how they manage toxic chemicals. Businesses have an incentive to limit chemical releases to avoid being listed among the worst polluters, which could seriously damage their reputations and sales. The data also serve as a rough indicator of environmental progress over time.

TRI was innovative in taking a multimedia approach, the logic being that if firms must report releases into water but not into air, then they might have a perverse incentive to substitute air releases for water releases, thereby giving the false appearance that they are reducing pollution.[19]

The U.S. EPA administrator has the authority to decide which industries must report emissions, what chemicals must be reported, and threshold emissions levels below which facilities do not need to report. Since TRI's inception, the scope of the program has been substantially expanded. In 1998, seven sectors were added to the list of those required to disclose their emissions: metal and coal mining, coal- and oil-burning electric utilities, commercial

[18] Prior to EPCRA, very little regulatory attention had been paid to chemicals, even though it was well understood from the health literature that toxic pollution could seriously harm human health. As late as 1986, federal regulations had finalized rules for only 26 chemicals of a total of more than 75,000. Full text of the act is available at www.access.gpo.gov/uscode/title42/chapter116_.html.

[19] The Clean Water Act, whose regulations target releases into water but not air or land, is one example of a regulation that may create perverse incentives (Gottleib 1995).

hazardous waste-treatment and -disposal facilities, chemical distributors, petroleum terminals, solvent-recycling services, and federal facilities (e.g., military bases).

Moreover, U.S. EPA has issued new rules that have roughly doubled the number of chemicals that must be reported to approximately 650. Most of these substances are not themselves regulated, but there are many important exceptions, such as the six criteria air pollutants regulated under the Clean Air Act. Reporting thresholds have been lowered to bring smaller-scale facilities into the reporting system. By 2001, more than 20,000 industrial facilities reported for the TRI.

The annual TRI data collected by U.S. EPA are made available to the public through various websites; some organizations also post the data on their own websites.[20] Anyone can thereby find out about emissions from individual facilities anywhere in the country, examine a company's overall environmental record across its various facilities, and track specific chemicals of concern.

Users of TRI Data

Communities

Public interest and community groups use TRI data to pressure local facilities to reduce toxic releases and minimize the risks of chemical accidents.[21] The data also may be used to inform the general public about chemical releases and the risk of leakages, to show that new regulations are needed, or to suggest that enforcement of existing regulations should be tightened.

Governments

At the federal, state, and local level, government agencies use TRI data to help set priorities and allocate environmental protection resources where they are most needed.

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[20] See TRI Explorer (http://www.epa.gov/triexplorer); Envirofacts (http://www.epa.gov/enviro); Scorecard (http://www.scorecard.org), which was developed by Environmental Defense; and the Right-to-Know Network (http://www.rtknet.org), which was developed by Unison Institute. U.S. EPA also publishes summaries of the data each year in the *Toxics Release Inventory: Public Data Release* and the *Toxics Release Inventory: Public Data Release: State Fact Sheets*, and state governments publish their own reports.

[21] Such groups published more than 200 reports between 1989 and 1994 using TRI data (Orum 1994).

Regulators use TRI data to set emissions limits for facilities, check whether facilities are complying with allowable limits, and assess penalties for noncompliance. Disclosure laws in several states expand reporting requirements and, in some cases, mandate emissions reductions.[22] In most states, firms can receive technical assistance from state environmental protection agencies to help them reduce chemical releases.

U.S. EPA uses TRI data to assess health risks from toxic releases, to measure environmental progress over time, and to develop and implement new environmental legislation. TRI is also used to assess compliance with other environmental regulations (such as emissions reductions mandated by the 1990 Clean Air Act Amendments); to target areas where the enforcement of other regulations is needed; to gauge the need for additional regulatory efforts to clean up water, air, and solid waste problems; and to develop strategies for assessing pollution prevention problems.

Businesses and Financial Markets

Businesses use TRI data to help judge the need and opportunities for emissions reduction measures and to demonstrate improved environmental performance over time. Investment analysts use TRI data to identify companies that have good environmental records and thus could be socially responsible investment opportunities. Insurance companies use TRI data to help predict the risk of individual companies' being subject to lawsuits or regulatory penalties.

Labor Unions

Labor leaders have used TRI data to argue for improved working conditions, including lower exposure to chemicals and better safety equipment.

Academic Researchers

Researchers have used TRI data in studies of the effects of toxic chemicals (on human health and other areas) and in the development of technologies to lower the risk of toxic releases and to improve recycling.

[22] For example, in 1989, Louisiana passed a new law requiring a 50% cut in air emissions of certain toxics by 1994.

Effects of TRI on Pollution Reduction

At first, many environmental groups were skeptical about the significance of the new disclosure requirements of EPCRA, believing that simply requiring firms to provide information about environmental performance was no substitute for mandated improvements in performance. However, since EPCRA was enacted, releases of TRI-listed chemicals have fallen dramatically, even though the U.S. economy as a whole expanded rapidly during the 1990s. According to TRI reports, toxic releases fell by 46% from 1988 to 1999; the percentage reduction tended to be greater for the most toxic chemicals (Graham and Miller 2001). During the same period, the emissions of several pollutants subject to mandatory controls under the Clean Air Act Amendments—including carbon monoxide, nitrogen oxides, particulates, and volatile organic compounds, which are not on the TRI list—showed little if any downward trend (Fung and O'Rourke 2000). Because TRI data collection costs U.S. EPA only about $23 million per year, it is not surprising that policymakers and others have concluded that TRI is one of the most successful national environmental programs.[23]

The figures on the effectiveness of TRI in the preceding paragraph, however, may give an overly optimistic impression about the effectiveness of information disclosure programs in encouraging emissions reductions (e.g., Natan and Miller 1998). First, the rate of emissions decline diminished after the first several years of the program. From 1988 to 1993, total releases decreased 37%, with reductions averaging 7% a year; from 1993 to 1998, emissions dropped 20% (Graham and Miller 2001). This finding suggests that in the first few years, firms achieved low-cost emissions reductions by substituting other raw materials for toxic chemicals, enhancing recycling and waste treatment, and reformulating products. Additional emissions reductions are more costly; hence, we expect the pace of emissions reductions would slow over time.

Second, some of the reduction in TRI-listed chemicals might be due to their replacement with other chemicals—possibly also toxic but unlisted. Data are not readily available on the extent to which the use of unlisted chemicals may have increased as firms attempted to lower their TRI releases.

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[23] In 1996, then EPA Administrator Carol Browner declared that TRI "is quite simply one of the most effective means we have in this country for protecting the health of our people, the health of our environment." In 2001, EPA Administrator Christine Todd Whitman argued that "this inventory is a powerful tool for helping to protect public health and the environment. We're seeing constant decreases of emissions to air, land, and water." And Millard Etling, Dow Chemical's environment manager, has asserted that the TRI's "mandatory disclosure has done more than all other legislation put together in getting companies to voluntarily reduce emissions" (Seabrook 1991).

Third, many of the TRI-listed chemicals are subject to mandatory reductions through other regulatory programs. Therefore, to some extent, observed reductions in TRI chemicals may overstate the degree to which they fell because of information disclosure requirements. For example, toxic air releases have fallen more than toxic releases to other media since the TRI was introduced; however, the 1990 Clean Air Act Amendments required firms to impose controls on toxic air emissions. The underlying contribution of different environmental programs to the observed reduction in toxic releases over the past 18 years remains an open research question.

Fourth, from an environmental perspective, the preferred way to reduce emissions would be to reduce the amount of chemical inputs into the production process. If instead firms reduce emissions by recycling or end-of-pipe treatment (which includes incineration and landfill disposal), then the risks of exposure to workers, chemical accidents, and leakage during treatment remain. During the 1990s, less than one-quarter of manufacturing facilities reported reducing their waste emissions by reducing chemical inputs; most of the reductions occurred through recycling and waste treatment, which increased by 12% and 24%, respectively. In fact, only 10% of toxic waste is released; 43% of it is recycled and another 32% is treated (Graham and Miller 2001).

Finally, it is possible that firms have either intentionally or unintentionally underreported their emissions, given the incentives to avoid appearing on worst polluter lists and the wide range of allowable techniques for estimating emissions.

Nonetheless, it is still likely that the information disclosure required by TRI has contributed to a substantial reduction in toxic releases, and thus TRI has become the poster child for a new trend: the use of information disclosure instead of traditional pollution control mandates to spur environmental improvements. We now discuss the mechanisms by which emissions reductions may come about.

How Information Disclosure Achieves Toxics Reduction[24]

One effect of information disclosure rules is that as citizens become aware of toxic releases from facilities close to their neighborhoods, they become more active and organized and, perhaps in conjunction with environmental advocacy groups, pressure firms to cut back their pollution (e.g., MacLean and Orum 1992). Unlike traditional command-and-control

[24] Much of this section is based on Fung and O'Rourke 2000.

regulatory approaches, TRI brings local citizens' groups directly into the determination of the socially acceptable level of pollution. Plenty of anecdotal evidence indicates that information disclosure has galvanized citizens (e.g., Lynn et al. 1992, MacLean 1993, U.S. EPA 1998a). In a survey of about 200 corporate counsels, more than half indicated that "pressure from community activists has affected [their] company's conduct—sometimes forcing a reduction in pollution" (Lavelle 1993). Still, such campaigns do not explain everything; many firms that were not targeted by citizens' groups have cut back their emissions.

Another possibility is that the information a firm gathers may help it voluntarily cut back on emissions. Perhaps a comparison with the emissions of competitors reveals opportunities for improving efficiency and cutting waste that reduce both emissions and operating costs at the same time. A firm may wish to improve its environmental performance because it wants to be socially responsible. In fact, executives of some large companies promised huge voluntary cuts in toxic pollution.[25] TRI data may also facilitate efforts by large groups of firms, rather than individual firms, to voluntarily reduce pollution; for example, it enabled U.S. EPA to introduce the 33/50 Program, which invited companies to reduce emissions of 17 high-priority, TRI-listed chemicals 33% by 1992 and 50% by 1995.

However, there may not be many unexploited opportunities for win–win emissions reductions, given existing pressure in a competitive marketplace for firms to find cost-cutting measures. Another limitation to the mechanism is that firms put themselves at a competitive disadvantage if they engage in costly measures to control pollution but their rivals do not. And corporations' socially responsible behavior may be motivated more by a desire to avoid environmental blacklisting than by altruism. In fact, certain industries have tried to prevent the introduction and expansion of information disclosure, presumably because they feared it might lead to mandatory emissions controls.[26]

Perhaps the most important reason why firms have reduced emissions in response to information disclosure is fear of environmental blacklisting (Fung and O'Rourke 2000, Graham

[25] A notable example occurred just before the first TRI reporting deadline in 1988, when Richard J. Mahoney, then head of Monsanto, declared that he had been shocked that Monsanto was releasing 374 million pounds of toxic substances each year. He pledged to cut air emissions from his company's 35 plants by 90% over the next four years. Other well-known companies, such as 3M, AT&T, Dow Chemical, DuPont, and Merck, also pledged to voluntarily reduce toxic emissions (Cushman 1995).

[26] For example, in 1994, the Chemical Manufacturers' Association sued U.S. EPA when the agency expanded the number of chemicals listed in TRI (Fairley 1997).

2000). That is, they fear the harm to their reputations if environmental groups, journalists, or others list them among worst environmental offenders in the community, state, or nation on the basis of TRI data. The pressure to reduce emissions is ongoing because the rankings are relative: blacklists show which firms have the highest emissions relative to other companies that year, rather than a company's current emissions compared with its own past emissions.

If a firm gains a reputation as a notorious polluter, it can suffer financial harm. Consumers may boycott its products and buy from rival companies. The firm may have difficulty attracting workers without paying a premium for the health risks associated with working at a dirty plant or for the distaste that altruistic employees suffer from working for a blacklisted company. And investors with a preference for socially minded companies may be unwilling to buy stock in a blacklisted company unless they receive a higher return on their investments than for comparable (environmentally responsible) firms. The ability of investors to make these choices has been facilitated by the rise of mutual funds whose managers use environmental criteria to screen their holdings (e.g., Portney forthcoming). Recent research appears to confirm that bad publicity from environmental blacklisting has a negative effect on firms' stock prices and that those firms subsequently reduce their toxic emissions (e.g., Hamilton 1995, Konar and Cohen 1997, LaPlante and Lanoie 1994).[27]

Moreover, a company singled out for its poor environmental record might suffer greater likelihood of future regulation or enforcement of existing regulation (e.g., Maxwell and Decker 1998, Maxwell et al. 1998). Also, Decker (1999) finds that firms with lower rates of TRI releases are subject to less frequent inspections by regulatory agencies.

Limits of TRI Data

Although TRI is the most comprehensive national source of information on toxic chemical emissions, it is limited in important respects.

TRI does not cover all toxic chemicals. The approximately 650 chemicals that firms have to report represent less than 1% of the more than 75,000 chemicals manufactured in the

[27] A careful reading of the literature on corporate social responsibility more broadly from those in the corporate world makes it clear that they engage in beyond-compliance behavior because they feel that most or all of these actions pay off economically. Most of the 67 case studies in Holliday et al. 2002 on corporate engagement in socially responsible initiatives make reference to—or provide estimates of—the monetary payoff from those initiatives in terms of increased consumer demand or prices for labor and capital inputs.

United States. Approximately 6 trillion pounds of chemicals are produced each year in the United States, but only 7.3 billion pounds of toxic releases were reported in the 1999 TRI. The chemicals that are on the TRI list are those thought to have potentially harmful effects on human health or the environment, but how many of the unlisted chemicals are actually toxic is unknown because U.S. EPA has never systematically reviewed the environmental health data for the other 99% of chemicals, given that they are so numerous.

The failure to address all potential chemicals of concern leaves open the possibility that firms might reduce their TRI emissions while increasing other emissions, possibly toxic. In this regard, observed reductions in TRI emissions over time may overstate—to some unknown degree—actual reductions of all toxic emissions.

Many major sources of toxic emissions do not have to file reports. Even for chemicals that are listed, many sources are not subject to disclosure requirements, including motor vehicles, dry cleaners, auto repair shops, sewage treatment plants, hospitals, and airports. Also not covered are on-farm pesticide use and releases from contaminated sites like landfills or abandoned industrial facilities (e.g., Superfund or brownfield sites). According to U.S. EPA (1998b), 41% of toxic air emissions come from mobile sources (e.g., cars, trucks, and buses) and another 35% from other sources not subject to disclosure; manufacturers subject to disclosure laws account for only 24% of such emissions.

Moreover, the covered industries include significant numbers of small business that are exempt from reporting. Facilities that produce fewer than 25,000 pounds of TRI chemicals, use fewer than 10,000 pounds of TRI chemicals, or manufacture products that contain less than 1.0% concentrations of listed chemicals are exempt from reporting requirements.[28] Facilities with fewer than 10 full-time workers are also exempt.

Risk factors (number of people exposed and chemical toxicity) are not reported. TRI provides only the total pounds of chemicals released; what matters for health risks is the degree of chemical toxicity and the number of people potentially exposed to chemical releases. TRI chemicals vary enormously in toxicity. A single pound of a highly toxic chemical (e.g., acrolein or methyl isocyanate) is toxicologically equivalent to 100 million pounds of the least toxic of the reported substances (Bouwes et al. 2001).

[28] However, U.S. EPA has recently lowered reporting thresholds to 10 pounds for a dozen persistent bioaccumulative compounds and to 100 pounds for lead, lead compounds, and five other chemicals.

Potential exposure to toxic emissions depends on how many people live near chemical manufacturing plants or waste processing and disposal facilities, how many workers are employed by industries that manufacture and dispose of hazardous chemicals, and how many people buy products manufactured from toxic chemicals. The following example illustrates the importance of population exposure. In 1997, Utah was rated fifth among states for total pounds of TRI chemical releases, but its ranking fell to 37 when releases were weighted by population exposure (Bouwes et al. 2001).

Additional issues complicate the link between emissions and human health risks. The higher a facility's smokestack, the more dispersed its emissions in the atmosphere and the smaller the dose received by the local population; local wind patterns, stream flows, and the decay rate of chemicals also affect the dosage. Human health effects of certain TRI chemicals may also depend on the exposure pathway; for example, friable asbestos is a very potent carcinogen if inhaled but not if consumed through food. Because TRI does not consider risk factors, companies that want to avoid being blacklisted may undertake expensive investments for very little benefit to society; they may not necessarily reduce toxic emissions in areas with highest population exposure, focus on the most toxic chemicals, or otherwise measurably reduce risk to humans.

Most academic studies that have used TRI data have not attempted to weight emissions by toxicity or potential exposure (e.g., Brajer and Hall 1992, Perlin et al. 1995, Arora and Cason 1999). One exception is U.S. EPA's Risk-Screening Environmental Indicators (RSEI) model, which attempts to assess risk factors for emissions, accounting for the complications just described. The model has been used to estimate facility-specific cancer risks. Academic and advocacy groups have also used the model to assess exposure to emissions by race and income groups (e.g., Bouwes et al. 2001).[29] Nonetheless, existing TRI information can be very difficult to process for individuals who want to find out risks of living near a chemical factory or a coal-fired power plant.

Toxic chemicals used during manufacture or left in products are not reported. If reporting requirements were extended beyond releases to include the amount of chemicals

[29] The model divides the country into cells of 1 km^2, and each facility is assigned to a specific cell. Census data are used to assign a population figure to each cell. The model applies toxicity weights to emissions, where weights are assigned separately according to the emissions pathway and for cancer and noncancer risks. Wind patterns and stream flows are also considered in assessing dosage.

used during the production process and retained in finished products, then workers and consumers could better assess the risks to themselves.[30] This information might also aid firms in finding opportunities for emissions reductions before and during the production process; with information on end-of-pipe releases only, firms may concentrate only on postproduction cleanup.

Accuracy, verification, compliance, and timeliness are problems. Under existing laws, facilities are allowed to use a range of techniques for estimating emissions; they do not always install precise metering technology, even if it is available. U.S. EPA has very limited resources for checking the reliability of emissions reports and only inspects around 3% of facilities each year (O'Rourke 2004). These factors reduce the accuracy of the data reported and distort comparisons across facilities (because of different estimating techniques) and across time (if techniques change over time). In addition, a substantial portion of facilities fail to report emissions data (Wolf 1996). Finally, information about releases is posted more than a year after the releases actually occurred, a delay that limits the usefulness of reporting.

Other Environmental Disclosure Programs

TRI is the best-known example of what is referred to more generally as a pollutant release and transfer registry (PRTR).[31] A PRTR is any publicly available database of toxic chemical releases to air, water, and land, as well as wastes for off-site treatment and disposal, obtained from periodic reports collected from factories, power plants, and other stationary emissions sources. (Some PRTRs also include estimates of emissions from other sources, such as mobile sources and agriculture.) Several countries other than the United States have PRTRs: the United Kingdom has the Chemical Release Inventory, Canada created a National Pollutant Release Inventory in 1993, and Australia has the National Pollutant Inventory.[32] A recent directive for the European Union, the Integrated Pollution Prevention and Control Directive, requires firms in member states to report release data to the European Commission. The users, advantages, and limitations that we have described above for the U.S. TRI apply broadly to PRTRs in other countries.

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[30] Some states, such as Massachusetts and New Jersey, have mandated the reporting of chemical use.

[31] For more information, visit the World Bank Group website, http://www.worldbank.org/nipr/prtr.htm.

[32] For countries or regions without environmental data, an industrial pollution projection system has been developed, based on the TRI data; it estimates industrial toxic emissions based on the value of output.

The momentum for the spread of PRTRs outside the United States followed the 1992 Earth Summit in Rio de Janeiro. Chapter 19 of Agenda 21, the charter for sustainable development, called on governments to implement and improve national chemical release inventories, particularly for releases with risks to human health and the environment, that would be available to the general public and international bodies (UNCED 1992, 19.40). OECD has since developed guidelines for establishing PRTRs. Also, the parties to the Aarhus Convention signed the Kiev Protocol in 2003 that recommended that national PRTRs be mandatory, with annual reporting of air, water, and land emissions.

Indonesia's PROPER. Facing an expanding industrial sector and severe constraints on regulating its environmental impacts, in 1995 Indonesia introduced an information disclosure system known as PROPER to create "incentives for compliance through honor and shame" (Afsah and Ratunanda 1999). The program is administered by the Environmental Impact and Management Agency and initially applied only to water pollutants but is being expanded to cover air pollutants and hazardous wastes. Each firm is ranked by color: black for those that make no attempt to limit harmful releases, red for those that make some attempt at emissions control but less than required to satisfy local emissions standards, blue for those in compliance, green for those that overcomply, and gold for those that rank among the cleanest in the world. Participating firms file monthly emissions reports and are subject to occasional audits by environmental agencies, particularly if reporting looks suspicious. Results from the reporting system are made public at a press conference and posted on the Internet.

In the early years of the program, PROPER appeared to motivate significant environmental improvements at those facilities that were initially out of compliance, and some recent empirical evidence seems to support this notion (Garcia Lopez et al. 2004). Interestingly, based on a survey sent to plant managers in 1998, Afsah et al. (2000) find that the main stated motivation for reduced chemical releases was the potential opportunity for emissions savings; however, we note that because most of the improvements brought companies toward compliance with existing regulations, fear of enforcement is a more likely motivator.[33] This evidence contrasts somewhat with the U.S. studies discussed earlier, which suggest that the threat of environmental blacklisting is the most decisive factor in reducing emissions; however, the U.S. firms were largely in compliance with prevailing regulations.

[33] In June 1995, 115 facilities had red ratings and six had black ratings; by September 1996, 87 facilities had red ratings and only one a black rating.

Based on the Indonesian model, the Philippines has introduced a similar emissions disclosure and ranking program, called EcoWatch. Other programs have been or soon will be implemented in some other developing countries, including China, Mexico, India, Colombia, Bangladesh, Mexico, Czech Republic, and Thailand. The availability of emissions registries and public information programs in many developing countries creates an opportunity to more easily incorporate information disclosure into common environmental content and leverage the benefits of a COC to expand participation in these programs.

6. Toward Feasible, Common Environmental Content in COCs

When the goal is to improve economic and environmental well being in developing countries, any recommendations for common environmental content for corporate COCs should be expected to produce meaningful results on both fronts. First, adherence to the code provisions should offer economic benefits that exceed the costs of compliance to companies in developing countries; in other words, companies must receive a price premium, market expansion, efficiency gains, subsidized technical assistance, or some combination of these benefits in exchange for meeting the requirements. Second, adherence should produce significant improvements in environmental outcomes; that is, the code must impose real requirements, and monitoring and enforcement must offer sufficient incentives to prevent evasion.

With these goals in mind, we offer some guiding principles for establishing common environmental content in voluntary COCs. We also raise some key questions that must be answered before designing such content:

- What is the desired scope or application for the COC—a specific industry or subset in a particular country, or any company that wants to promote some degree of environmental performance? The scope has important effects on the set of feasible and desirable requirements.
- Are some goals more important than others? It may be difficult or impossible for a simple set of common environmental practices or standards to satisfy all economic, environmental, and institutional goals simultaneously.
- Which industries are most likely to benefit, and how should the response inform the proposed scope and content?
- What partners are available to implement such a program?

Choosing a Feasible Scope

The first question to be addressed is whether common environmental content is feasible and desirable, and to what extent. The larger the scope, the more oriented environmental content must be toward general process rather than performance outcomes; the smaller the scope and the more similar the target companies, the more specific the requirements could be.

With a broad scope, the lessons from the range of existing corporate COCs suggest two common requirements: compliance with prevailing laws and regulations and implementation of an EMS. Although these fundamental requirements are general, their implementation involves addressing the main environmental issues of concern to the firm within the context of its industry and host country. To these broad requirements, we add two more: third-party certification and information disclosure. These additional recommendations are offered to help further the stated goals by improving credibility and transparency, to enhance the market value of the COC, to create more meaningful incentives, and to provide useful information to local communities and regulators. Together, these four pillars are mutually reinforcing, because each fulfilled requirement eases the burden or increases the value of complying with the others.

In addition to the broad requirements, narrowing the scope by designing some environmental content that is specific to an industry or to a host country offers several advantages. For example, more precise performance measures can be incorporated that are more likely to ensure better environmental outcomes, and requirements can be tailored to key environmental concerns and demand for environmental performance, which vary by industry. Common environmental content for an industry COC offers the opportunity to both customize and advertise requirements in order to obtain the greatest possible market benefits. This lesson is apparent from the experiences of national ecolabels and industry-based certification schemes: clear and relevant content is essential for tapping consumers willing to pay a premium.

Most industries have an association that acts as a clearinghouse of information to its members, firms within the industry. These trade associations are a resource for disseminating good practices and for mobilizing an informational campaign to educate the users of the product and the public about the need for and benefits of the COC. For industries that already have advanced guidelines for environmental practices in developed countries, these associations offer a template for considering relevant content for COC in developing countries. However, where industry coordination is lacking, narrowing the scope and increasing the variety of environmental content can weaken consumer understanding of the COC. Consequently, the tradeoffs between

the benefits of streamlining environmental content for transparency and those of tailoring content to better target consumer and environmental needs can depend on industry conditions.

Common Content across Industries

Corporate COCs include a wide range of statements about encouraging environmentally friendly behavior. However, many such examples of environmental content are too idiosyncratic, too vague, too optional, or too unverifiable to contribute to meaningful common content. While supportive statements like "encourage recycling" would not likely detract from a COC, and many could be gleaned for inclusion in common content, we do not compile them here. We focus instead on the kinds of provisions that seem most promising for offering credible environmental improvements and tangible market benefits.

Compliance with Prevailing Laws and Regulations

Lawful behavior represents a minimum requirement for socially responsible conduct. It is also required for certifying an EMS under ISO 14001 guidelines. However, in many developing countries, lack of enforcement capacity means that compliance is not necessarily part of business as usual, so a meaningful COC has the opportunity to improve performance. Limited regulatory capacity also poses a challenge for COC credibility, because the presence of operating permits and lack of disciplinary action does not necessarily constitute evidence of compliance. Consequently, third-party verification and information disclosure are recommended, to improve both the incentives for compliance and the credibility—and thereby the value—of the COC.

Environmental Management System

EMS implementation is the most common component of existing corporate COCs. It is also a prerequisite for participating in more stringent ecolabel and environmental certification programs.

EMS is a flexible requirement, because it mandates the existence of a management process for dealing with environmental aspects of the particular business without requiring specific outcomes. The practices related to environmental management are also related to those that provide a safe and healthy working environment. For these reasons, an EMS is common practice in many diverse industries. The World Bank Group/International Finance Corporation (WBG/IFC) also brings to the table considerable experience with and capacity for promoting EMSs. The IFC handbook (IFC 2004) touts EMSs such as ISO 14001 as mechanisms for

achieving efficiency gains, improving environmental performance, and promoting trade prospects.

The evidence (though somewhat limited) indicates that, on balance, EMS introduction leads to significant reported improvements in environmental performance (UNC 2003). Many firms have also reported considerable savings in terms of reduced input use; however, these savings do not always outweigh the costs of EMS implementation, which can involve considerable training and outside consultants. As a consequence, reasonable additional benefits such as better market access may also need to be available, or cost sharing and low-interest loans may be needed to encourage adoption.

The expanding use of ISO standards makes them a natural platform for EMS and verification guidelines. ISO 14001 standards for an EMS offer widely known and accepted practices, which also include a mandate for complying with any applicable environmental regulations and laws, the first pillar for environmental content in a COC. The flexibility in ISO 14001 standards represents both a benefit and a flaw, as the performance goals are company-specific and relevant, but they need not be overly ambitious or burdensome—or meaningful. Still, these issues remain with any EMS program. ISO 14001 guidelines do require public disclosure of certain information and a commitment to continuous improvement. Perhaps the greatest advantage of the ISO 14001 standards is that they are accompanied by guidelines for enforcement and a network of well-respected independent certifying bodies.

Third-Party Verification

Some sort of monitoring mechanism is necessary to create real incentives for adherence and generate confidence in the COC. Although currently many MNEs rely on internal monitoring (if anything at all), demands for credibility seem to be increasing, and confidence in smaller companies and those located in developing countries is arguably lower. Third-party verification thus offers the greatest credibility. To this end, standard content is beneficial, because it allows for the emergence of a larger pool of independent verifiers, operating with common standards of their own.

ISO 14001 certification is a good example. With standardized guidelines, a large network of independent certifying bodies has emerged to register compliance. ISO 14001 certification is expanding rapidly in the developed world and also in the developing world, particularly in China. This indirect evidence of the value of ISO 14001 certification, particularly for exporting

firms, is beginning to be validated empirically. Early evidence in Japan indicates that ISO 14001 certification boosts stock values (Hibiki et al. 2003).

That said, ISO 14001 certification in itself does not seem to imply better environmental performance than ordinary EMS implementation. Certification also entails significant up-front costs to the firm, in addition to those related to EMS implementation; the value to the firm of increased credibility must outweigh these costs. The value to society of certification also lies in this credibility, which opens access to additional market benefits and encourages more firms to deploy meaningful EMSs. In other words, although ISO 14001 certification does not necessarily make a given EMS and its outcomes better, the fact that investors and consumers value the signal means that adopting and certifying an EMS can be more worthwhile than not having an EMS at all. In that sense, it reinforces the other environmental content and promotes better performance.

Taking an alternate path to EMS certification by ISO standards means either finding or creating an independent certification authority—or forgoing a good deal of credibility of the CSR program. If more particular environmental performance metrics are desired, that content could be designed with a specific industry or ecolabel group program in mind to take advantage of another existing third-party verification system. Creating a new certifying authority requires coordination and buy-in with local governments, NGOs, and industry groups, as appropriate. For a network of independent certifiers to evolve, a standard must be not only common but also sufficiently commonplace.

A final alternative might be to make the major multinational clients responsible for policing their own supply chain, but few currently find it in their own interest to do so. Furthermore, this alternative ignores the returns to scale for having common environmental conduct requirements for supply relationships that more resemble a web than a single chain. These scale returns represent another kind of trade-off between clarity and specificity, because less common environmental content makes it more challenging to organize third-party verification mechanisms.

Information Disclosure

Given the apparent success of mandatory reporting programs in improving environmental performance at relatively low cost, we highlight information disclosure as an option to form part of common environmental content in a COC. The benefits of reporting are manifold. First, publicly available environmental information is what drives the environmental benefits from harnessing community pressure and attracting the attention of corporate managers. Second,

information disclosure can help host country governments measure compliance and assess the performance of environmental regulations. Finally, reporting enhances the transparency and credibility of the COC and its certification system, improving the likelihood of benefits in terms of access to premium markets.

We recognize that the significance of the impact of TRI and other PRTR programs may also lie in the fact that participation is mandatory for the key players. Although COC adoption itself is voluntary, if disclosure were a standard component, then the benefits of the COC could be leveraged to improve the quality and quantity of environmental information that firms provide. For the firms that adopt the COC, local regulators and community activists also would have better access to information that could not only help them monitor compliance with local laws but also enable them to better target their own monitoring and enforcement resources. Reduced enforcement actions also offer a benefit to firms, lowering their costs of interacting with regulators and dealing with communities.

Because information needs may vary by country, common disclosure requirements may need to be tailored according to the country of operation, in consultation with local stakeholders. Reporting should be required for air, water, and land emissions—not only for chemicals listed in the TRI, but also for pollutants that are subject to regulation in the host country. In addition to toxic chemicals, several other pollutants contribute to environmental and human health damage. For example, nitrogen oxides (NO_x), sulfur dioxide (SO_2), and other fine-particulate air pollutants contribute to ozone, limited visibility, ecological harm from acid deposition, and serious respiratory and other health consequences. Many of these emissions are covered by mandatory regulations in developing countries as they are in the United States; however, better information could help control these pollutants as well.

For example, even well-enforced operating permits and regulatory standards in developing countries tend to be based on emissions rates or ambient concentrations, measured sporadically. For pollutants that linger and accumulate in the environment, mass emissions are more important than emissions concentrations. Information about mass emissions could provide better indicators and draw more attention to emissions behavior—such information is also a necessary precursor to implementing modern, market-based policies to reduce emissions.

As with the TRI, firms may need some flexibility in how they estimate their emissions. While sophisticated monitoring devices may be prohibitively costly,[34] emissions factor methodology based on input use and production technologies can offer reasonable estimates.[35] More importantly, credible environmental standards require that data-reporting requirements be explicit and standardized. For this information to have an impact, some institution must receive it and make it public. For countries without an existing PRTR, regulators—or third-party verifiers, environmental NGOs, or even the multinational companies that stand to benefit—would need to develop and implement an information registry. Credibility would be further enhanced by a more comprehensive emissions-tracking system that would collect, verify, and maintain data about firms' fuel and chemical purchases, production, and mass emissions. Overall, the development and effective operation of such a system could help improve the quality of information available to both multinational clients and local regulators.

As with any enforcement system, random and targeted audits would be needed to encourage compliance and to learn about firms' compliance costs, techniques, and evasive actions. The full costs of participating in an emissions registry are not likely to be trivial, because they include the costs of enforcement, training in methodology, maintaining and checking the database, and monitoring. Especially where the public benefits from information disclosure and its incentive effects outweigh the private benefits to adhering to a common COC, a large part of the costs may need to be borne by a third party—most likely the host government, perhaps with assistance from international donors and NGOs.

Industry-Specific Environmental Content

When the scope of environmental content is narrowed to a particular industry, the requirements can be more specific than the four general requirements presented earlier. They could incorporate more specific behaviors and focus to a greater extent on performance

[34] For example, when properly maintained, continuous emissions monitoring systems (CEMS) are the most accurate means of calculating the emissions of sulfur dioxide (SO2), NOx, and particulate matter, but the capital and annual operating costs of a CEMS can run from $20,000 to $100,000. Sample estimates are from pollution control officers at two power plants in metropolitan Manila, Phillippines (Krupnick et al. 2003).

[35] U.S. EPA has developed procedures for preparing emissions factor documents (http://www.epa.gov/ttn/chief/efdocs/procedur.pdf). Because these procedures may be overly complex for developing countries, opportunities for streamlining the guidelines—especially for smaller sources—should be assessed.

outcomes over process, using metrics that have particular relevance to that industry. As such, potential content would have to be evaluated by industry.

Experience with ecolabels, which are similar to a common voluntary COC, offers some important lessons. Common standards must be set and mechanisms for verification defined. With ecolabels, though, the standards tend to be quite high to represent a selective share of the particular product market.

In contemplating somewhat more specific and rigorous performance standards for common environmental content in an industry, it is important to assess whether the proposed COC could contribute to, piggyback on, or detract from well-established ecolabeling or other certification schemes. We discuss this issue in our case study for timber products (Fischer et al. 2005); several major certification programs exist, but little penetration has been made into developing countries. On one hand, a less costly certification format may be useful if it can credibly encourage sustainable practices, particularly if it can allow greater market access. On the other hand, an alternative format may not enjoy the same consumer acceptance and offer the same benefits as established certification schemes.

Like ecolabels, if COCs are to reap any market benefits, the code must be understood and credible to customers. Meeting these information and advertising requirements is likely to be more difficult for COCs—even common ones—because individual companies must market their own codes and adherence, typically without the aid of a nationally promoted label. Consequently, benefits may be more limited for a COC than for an ecolabel, and those benefits may be highly dependent on the level of customer awareness. One exception (and opportunity) may be when the customer is a highly engaged multinational corporation with its own brand to protect, or when a sufficiently large group of conforming companies (such as an export sector in a country) can jointly promote their COCs. On the other hand, Jenkins (2001) expresses concern that some of the gains to firms embracing the COC is likely to come off the backs of other developing country businesses, as corporate buyers narrow their supply chain to those that can certify their compliance with the code.

If the benefits are indeed limited, not much voluntary adherence can be expected unless the compliance costs are also quite low. It implies little behavioral change relative to business as usual—unless those changes involve sufficient efficiency gains as well as environmental improvements, which runs counter to more rigorous standards. Furthermore, the costs of verification must also be low so as not to exceed the benefits, which is challenged by the smaller scale over which certification bodies must meet their costs.

Life-Cycle Assessment

LCA represents an additional step (and likely the next wave) toward stronger content that retains common principles. ISO standards also govern the implementation and verification of LCA, just like EMSs, so many of those same advantages apply. LCA could be a means of elevating a company's products to be eligible for many national ecolabels. As such, it is likely to be a more costly process, and absent the benefits of an explicit ecolabel, the gains are likely to be smaller.[36] However, in some situations, LCA and its certification might form a useful component of environmental content, particularly as the practice becomes more widespread in the future. On a more limited scale, inexpensive LCA software is already available; a company with an EMS could use these tools to evaluate its potential for improvements and decide whether to pursue production process changes and a more rigorous certification process. Such evaluation might also identify low-cost changes might be worthwhile on their own.

Weighing the Benefits

With a multiplicity of goals—economic, environmental, and institutional—it is difficult for a simple set of common environmental practices or standards to satisfy all points. A second question for the design of environmental content for COCs regards the relative importance of the different goals, which may guide the choice of content.

Efficiency Gains

The IFC *Manual for Implementing EMS in SME* states, "the primary goal is to help businesses use environmental reviews to identify cost-saving measures. It is also intended to be a resource for companies to ensure positive environmental impacts while benefiting their own organization" (IFC 2004). Some authors argue that product and process standards should be considered more proactively as a driver for achieving efficiency gains, by way of improved technology, energy efficiency, and recycling inputs (e.g., Porter and van der Linde [1995], who theorize that imposing environmental standards can raise profits). Anecdotal evidence is offered to support the idea, some from developing countries (Khwaja et al. 2003). Most economists resist the notion that the "low-hanging fruits" of costless environmental improvements are widespread,

[36] ISO provisions for LCA are newer, and we have not evaluated any evidence regarding the costs and benefits of LCA outside of ecolabel conformity.

even though these theories are generally predicated on market institutions and incentives in developed countries.[37] Studies of EMSs have shown some significant savings in terms of materials use, but those savings must be properly weighed against the costs of implementation.

Market Gains

The argument that efficiency improvements improve environmental performance and increase profits remains distinct from the idea that environmentally benign producers can charge premium prices or access developed-country markets for their products. Demand for standardized content for COCs is likely to arise, directly or indirectly, from the minimum expectations of consumers in developed countries. With the increasing availability of and demand for information, standards may be perceived as inevitable. It means that the potential for charging premium prices in developed countries may well be limited; as standards become more common, price premium benefits tend to diminish in importance. Instead, voluntary code compliance is more likely to become a basic requirement for access to these markets.

Thus, the main reason that companies in developing countries would conform to environmental content in corporate COCs would be to avoid losing the export markets that require compliance. To cushion the costs of compliance, environmental performance demands should be coupled with technology and expertise transfer (Manoharan 2000).[38] To the extent that consumers and regulatory standards in developed countries demand compliance, MNEs could meet part of their CSR by providing assistance to improve the environmental performance of their subsidiaries and suppliers.

Judging by the existing COC of major MNEs, EMS certification seems sufficient to satisfy most industry CSR requirements and therefore should be sufficient for suppliers to access developed-country markets.

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[37] Palmer et al. (1995) explain why regulation costs are unlikely to be dominated by efficiency gains within the firm. Apparent cost savings can often be negated by proper accounting of management time and other human resource costs. Although some theories of the firm have been developed to explain how such situations might arise (see Sinclair-Desgagné 1999), it is still unclear how widespread these opportunities would be.

[38] Khwaja et al. (2003) offer an example of the role of support networks: working in cooperation with the local San Benito Leather Tanners' Association, the Colombian leather tannery Curtigran Ltd. reduced its operating costs by 11% and pollution by 50%.

Environmental Improvements

Whereas market benefits arise from perceived behavior, environmental improvements arise from real behavioral change. As noted earlier, EMS implementation does not necessarily confer environmental benefits, but empirical evidence supports the positive impact of EMSs on performance in general. ISO 14001 certification does not in itself promote better behavior except in conjunction with the benefits that accompany the credibility boost, which may encourage some firms to adopt an EMS in the first place. Information disclosure programs have also been shown to encourage better environmental performance, particularly for underperforming firms. Although the proposed common content provisions combine to improve incentives for performance, they do not guarantee particular outcomes, at least not in excess of lawful compliance to regulations. To achieve environmental outcomes with more certainty, performance metrics—in addition to process standards—could be incorporated. However, appropriate metrics must be developed by industry and by country, which dilutes some of the potential benefits of having widespread, streamlined content in a COC.

More Effective Use of Regulatory Capacity

Although society benefits from improved performance, host-country regulators benefit to the extent that the environmental content of the COC and its certification provides more, better, and more credible information than before. When enforcement capacity is limited, improved information provision can allow regulators to better allocate resources toward problem polluters. Companies that adopt the COC can then, in theory, benefit from reduced regulatory pressure. While many experts worry that in the long run voluntary codes may pre-empt more effective conventional regulation (Jenkins 2001; Maxwell et al. 1998), a focus on information, especially in this context, may pose less of those risks.

Better information about emissions can foster better designs of regulatory targets and mechanisms. For example, reporting mass emissions can facilitate the development of market-based mechanisms to reduce emissions more cost effectively. However, not all environmental content provisions offer the same type and quality of information. For example, EMS implementation may signal a higher likelihood of compliance, third-party certification improves this signal, and emissions disclosure provides harder data. Certification of more stringent performance standards also offers better compliance data.

Targeting Industries

The choice of scope and content is inherently intertwined with the question of which companies would be targeted for adopting common environmental content in their COCs. From our survey of existing company practices, we have gleaned several basic factors that indicate circumstances or industries in which standardized environmental content for COCs could have a real impact, both benefiting the environment and helping companies meet their corporate citizenship goals.

Demand Pull

Demand for sustainable practices can arise from consumers, regulations in host or consuming countries, or international law. Consumer pressure is likely to be strongest for products that will be marketed under major brand names or by major stores, for whom reputation is an important asset. It has been an impetus for apparel and footwear, timber, and coffee industries and could become important for brand-name manufactured and electronic products.

For a developing country, "Made in _____" also functions as a brand name, which exporting industries have an interest in protecting. These pressures largely apply to exports of final goods, like clothing, agricultural products, and some materials for which the origin is noted in the final product (like Turkish cotton or Brazilian rosewood).

Regulations and CSR codes in consuming countries may influence purchasing practices and product requirements. A consuming country's regulations are most likely to cover packaging and product characteristics, like safety and recyclability, but such rules do not necessarily translate into pressure for cleaner production practices. Ecolabels with life-cycle requirements may, however.

International law governing toxic chemicals (and chlorofluorocarbons [CFCs]) is of obvious importance to industries with chemical inputs but could also drive demand for verifiable environmental practices if the standards could ease compliance with international regulations. It is unclear what impact the Kyoto Protocol, if it comes into effect, will have on GHG emissions by companies in developing countries, which do not have binding emissions targets. Although developed-country clients might prefer climate-friendly behavior, offering GHG reductions in a COC could mean giving up potential benefits and transfers from a clean development mechanism project.

For companies in developing countries, a direct demand pull arises when environmental provisions in a CSR code can help them reduce their regulatory burden by signaling to regulators

(and to community activists) that enforcement action is less necessary. Local markets are unlikely to offer much premium to products from clean producers. Indirect demand pull from foreign markets may be strong for certain sectors, but it applies only to exporting firms. Certain companies in developed countries that have brand names to protect or their own CSR or ecolabel requirements may pass on these expectations to their suppliers. The key questions then become

- What environmental behavior is needed to satisfy these green purchasing requirements?
- How and to what degree is compliance enforced?

Lack (or Existence?) of Preexisting Industry Code

The benefits of standardizing environmental content are greater for industries in which demand for clean performance has translated into myriad variations in conduct requirements for supply chain producers. Should the standard then incorporate the set of the most stringent requirements among the client companies to be acceptable, even if it imposed an additional cost burden on suppliers catering to fewer clients? A bundle of criteria that reflect a compromise in the level of stringency might be acceptable if the greater transparency and verifiability of a common code enhances the credibility of the CSR program.

Industries whose production is so decentralized and dispersed that COCs are not developed could also benefit from the mutual adoption and promotion of common standards. It would require more organization, but the scale returns to reasonably widespread adoption could allow these industries to tap into the market benefits of a CSR program.

By contrast, other industries may have more centralized production or more transparent environmental risks, allowing for heightened consumer awareness and pressure. For example, widely publicized accidents turned the public eye on the major players in the highly concentrated chemical industry. Stories about rainforest destruction galvanized consumer and interest-group attention to the sourcing of wood products. In these sectors, strong demand has already prompted the individual industry groups to respond with their own sets of standards. Creating independent, standardized environmental provisions for a COC is less likely to be useful if it would substitute for or compete with an established industry environmental code. Rather, efforts to formalize environmental conduct standards in developing-country industries should be guided by established industry standards in developed countries, with an eye toward facilitating their adoption. If those standards are unrealistically stringent for developing-country producers, then there may be room for a middle tier of common standards—provided that those lesser standards

are accepted by consumers. For example, Indonesia and Malaysia are developing their own forest certification schemes.

Scope for Environmental Improvement

The potential impact of COCs could be strongest in industries that are energy intensive, use polluting inputs, or consume natural resources. Host-country governments could indicate which of their industries might present the greatest challenges to regulation and which could benefit the most from improved incentives for performance and information disclosure.

Ease of Monitoring

All of the factors described thus far can help identify industries with the greatest potential for benefiting from standardized environmental content for voluntary COCs. To this list, we add ease of monitoring, even evidence of serious monitoring activities is limited. Some form of reporting is essential to give standards credibility with consumers and other parties; monitoring is also essential for a code to have real incentives and meaningful effects on environmental outcomes.

Choosing Partners

In addition to choosing industries to target, there is a range of choices for partners to help develop and promote common environmental content in COCs. This choice will also likely impact the content strategy. Host-country governments, the typical client of IFC and the Foreign Investment Advisory Service, can be useful partners in targeting a particular export industry. They can guide the selection of specific performance and reporting criteria according to local needs. However, if a performance or perception problem arises primarily from the lack of capacity for credibly enforcing their own environmental regulations, they probably will not have the capacity to operate a verification system to monitor compliance with the conduct requirements. That role must be sought elsewhere.

NGOs have been active in information-disclosure as well as certification programs and may be able to serve a purpose, particularly as third-party monitors. Local industries may have sufficient collective resources to promote themselves as good environmental performers and to pay third parties to verify their claims, at least if the market benefits are there. However, significant assistance would undoubtedly be required to start up the program and cover (or at least cushion) many of the initial costs.

There may also be substantial opportunities to work with MNEs and industry groups. Outsourcing companies can help to streamline supply chain requirements and could themselves benefit from a broader base of suppliers that are credible practitioners of good environmental behavior. More standardized requirements could offer MNEs lower costs of enforcing their own supply chains, if a competitive network of third-party certifiers could evolve. However, it would require a rather large group of firms to adopt the common content; for some MNEs, the cost will be less specific requirements to address their particular concerns.

International industry groups can bring to the table their networks, experience, and common standards to guide CSR practices and their evaluation in developing countries. These associations are often in the best position to disseminate information among their members and to promote their collective compliance. However, industry groups dominated by particular subsectors may also bring along their own agendas.

Our case study on forest certification (Fischer et al. 2005) discusses some of the roles and challenges of these different partners. The forestry sector is particularly interesting because of its multiple certification schemes and its economic importance in several developing countries. The study highlights some important challenges to establishing credible and beneficial certification schemes in resource sectors in developing countries.

7. Concluding Remarks

In summary, to have a COC is essentially to signal information. To maximize the value of that information to stakeholders and the impact on the environment, the information must be meaningful, of good quality, and easily available. The experience of information-based programs such as emissions disclosure and ecolabeling reveal some common themes to add to those gleaned from the history of existing corporate COCs.

First, the benefits of information rely on the ability and readiness of consumers, environmental and community organizations, and regulators to understand and access the information and then use it to put pressure on corporate managers. The environmental requirements of the code should be transparent, and performance indicators and other data to verify compliance should be publicly accessible. Harnessing the power of important stakeholder groups to communicate findings can help promote social responsibility and deter evasion.

Second, the credibility of this information is essential, and it is best established by third-party verification. To this end, standard content is beneficial, because it allows for the emergence of a larger pool of independent verifiers that operate with common standards of their own.

Third, the perceived quality of the information is enhanced when independent bodies (as opposed to industry groups or individual companies) establish the requirements for voluntary schemes. This means that common environmental content has the potential to add value relative to sector or individual corporate codes. That said, even at their greatest, the market benefits cannot be guaranteed to outweigh the costs of implementation, compliance, and verification.

To be generally applicable, a set of feasible common provisions must focus on process and principles rather than performance. This content could include compliance with relevant laws and regulations, EMS implementation, third-party certification, and public reporting of environmental performance measures. The ISO 14001 system offers a respected template for EMSs as well as an established network of certifiers. Although reasonable evidence is emerging that these general steps can produce some meaningful results, they are not guaranteed. As such, provisions that are sufficiently broad as to be feasible for common application may not be fully satisfying.

More specific environmental content—including performance measures—would need to be determined by industry, or at least by country, or both. Consequently, before proceeding with designing common content, important choices must be made regarding the appropriate scope of the environmental content, the target industry, the relative priority of economic and environmental goals, and the partners available to help implement the program.

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Appendix

Acronyms

CCPA	Canada's Chemical Producers Asociation
CFC	chlorofluorocarbon
CO_2	carbon dioxide
COC	code of conduct
CSR	corporate social responsibility
EMAS	Eco-Management and Audit Scheme (European Union)
EMS	environmental management system
EPCRA	Emergency Planning and Community Right-to-Know Act (United States)
ESM	environmentally sound management
GEN	Global Ecolabelling Network
GHG	greenhouse gas
IFC	International Finance Corporation of the World Bank Group
ILO	International Labour Organization
ISO	International Organization for Standardization
LCA	life-cycle assessment
MNE	multinational enterprise
NGO	nongovernmental organization
NO_x	nitrogen oxides
ODS	ozone-depleting substance
OECD	Organisation for Economic Co-operation and Development
PROPER	Program for Pollution Control, Evaluation, and Rating (Indonesia)
PRTR	pollutant release and transfer registry
SO_2	sulfur dioxide
TRI	Toxic Release Inventory (United States)
UNCED	United Nations Conference on Environment and Development
U.S. EPA	Environmental Protection Agency (United States)
WTO	World Tourism Organization

Table 8: The ISO 14000 Family of Standards

Designation	*Publication Year*	*Title*
		EMS:
ISO 14001:1996	1996	Specification with Guidance for Use
ISO 14004:1996	1996	General Guidelines on Principles, Systems, and Supporting Techniques
		Guidelines for Environmental Auditing:
ISO 14010:1996	1996	General Principles
ISO 14011:1996	1996	Audit Procedures—Auditing of EMSs
ISO 14012:1996	1996	Qualification Criteria for Environmental Auditors
ISO 19011:2002[a]	2002	Guidelines for Quality and/or EMSs Auditing
		Environmental Labels and Declarations:
ISO 14020:2000	2000	General Principles
ISO 14021:1999	1999	Self-Declared Environmental Claims (Type II environmental labeling)
ISO 14024:1999	1999	Type I Environmental Labeling—Principles and Procedures
ISO/TR 14025:2000	2000	Type III Environmental Declarations
		Environmental Management:
ISO 14015:2001	2001	Environmental Assessment of Sites and Organizations (EASO)
ISO 14031:1999	1999	Environmental Performance Evaluation—Guidelines
ISO/TR 14032:1999	1999	Examples of Environmental Performance Evaluation (EPE)
ISO 14050:2002	2002	Vocabulary
ISO/TR 14062:2002	2002	Environmental Management: Integrating Environmental Aspects into Product Design and Development
		Environmental Management: LCA
ISO 14040:1997	1997	Principles and Framework
ISO 14041:1998	1998	Goal and Scope Definition and Inventory Analysis
ISO 14042:2000	2000	Life-Cycle Impact Assessment
ISO 14043:2000	2000	Life-Cycle Interpretation
ISO/TR 14047	2003	Examples of Application of ISO 14042
ISO/TS 14048:2002	2002	Data Documentation Format
ISO/TR 14049:2000	2000	Examples of Application of ISO 14041 to Goal and Scope Definition and Inventory Analysis
		(Other)
ISO/TR 14061:1998	1998	Information to Assist Forestry Organizations in the Use of the EMS Standards ISO14001 and ISO 14004
ISO Guide 64:1997	1997	Guide for the Inclusion of Environmental Aspects in Product Standards
ISO/International Electrotechnical Commission Guide 66	1999	General Requirements for Bodies Operating Assessment and Certification/Registration of EMS

[a] This standard replaces ISO 14010, 14011 and 14012.
Sources: ISO 2002, 2004b.

Table of Major Ecolabels

Table 9: Summary of Major Ecolabels

Country or Region and Standard Name	*Issuing Organization and Year*	*Description*
Australia: Good Environmental Choice Label	Australian Environmental Labelling Association Inc. (AELA), 2001	Launched to provide the community an environmental mark of recognition for a range of products. Program was developed for general compliance with ISO 14024 and is managed by the not-for-profit AELA. Certification scheme is based on ISO 14021. (http://www.aela.org.au)
Canada: Environmental Choice Program (ECP)	Terrachoice Environmental Services Inc., 1989	ECP was created as a voluntary ecolabeling program by Environment Canada. Its relationship with industry has evolved from confrontational to collaborative. TerraChoice has officially managed ECP since 1995. Apart from expanding guidelines and privatization, program scope has extended from consumer products to include services and events. (http://www.environmentalchoice.ca)
China: Environmental Labeling Scheme	National Environmental Protection Agency (NEPA), 1994	China State Bureau of Technical Supervision approved the establishment of the China Certification Committee for Environmental Labeling to administer the program; define the policy, principles, and rules of the program; propose product categories; approve certifications; and set fees for certification. (http://www.iisd.org/susprod/displaydetails.asp?id=42)
Croatia: Environmental Label Award	State Directorate for Environment, 1993	Scheme was launched under the management the Ministry of Environmental Protection and Physical Planning (http://www.mzopu.hr/default.aspx?id=5145). With participation of experts and public stakeholders, the program has developed ecolabel criteria for returnable packaging, waste collection, secondary raw material (recycled) products, products free from asbestos (and other toxic substances), and other products (e.g., cartridges, cassettes, and detergents).
European Union Eco-label (E.U. Flower)	European Union, 1993	The label was created to provide a consistent E.U. ecolabel scheme, with the same criteria applying for the same product, regardless of the member state in which it is produced or sold. Its logo is referred to as the E.U. Flower. (http://europa.eu.int/comm/environment/ecolabel/index_en.htm)
	2000	Scheme was comprehensively revised. Label can be issued to manufacturers, importers, service providers, traders, or retailers. Established product groups include cleaning products, appliances, paper products, home and garden items, clothing, tourism, and lubricants.

Country or Region and Standard Name	*Issuing Organization and Year*	*Description*
France: Norme Française Environnement	Association Française de Normalisation, 1992	Label development began in 1989, but because of initial industry opposition, program was not fully operational until 1992. This life-cycle–based ecolabel was developed through a consultation process that involved the government, environmental NGOs, and industry.
Germany: Blaue Engel (Blue Angel)	Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, 1977	Ecolabel set up by the Umweltbundesamt (the German environment agency) and guided by a jury that reviews proposals for product ecolabels. Jury consists of representatives from industry, environmental organizations, consumer associations, trade unions, churches, and public authorities to ensure that interests of various groups in society are considered. Other involved institutions are the German Institute for Quality Assurance and Certification (RAL) and the Federal Environmental Agency. Blue Angel was the first and is the oldest environment-related label for products and services. About 710 companies and 3,800 products now use it. (http://www.blauer-engel.de/englisch/navigation/body_blauer_engel.htm)
India: Ecomark Scheme	Ministry of Environment and Forests, 1991	Scheme was launched to identify environment-friendly products. Any product that is made, used, or disposed of in a way that significantly reduces the harm it would otherwise cause the environment can be considered an environment-friendly product. (http://envfor.nic.in/cpcb/ecomark/ecomark.html)
Japan: Eco Mark Program	Japan Environment Association, 1989	Initially a product standard for which criteria were set by the organization, the program now seeks to disseminate information about the environmental aspects of products and encourages consumers to choose them "for an ecological lifestyle and, ultimately, an environmentally sound society." (http://www.ecomark.jp/english/)
	1996	Program procedures were revised to conform to ISO 14024 standards. Currently, they include life-cycle analysis, consultation with related parties, and public review of draft criteria.
Korea : Eco Label Program	Korea Environmental Labelling Association (KELA) and Korea Ministry of Environment, 1992	Created in line with ISO 14024 for an environmental labeling, declaration, and certification system. It has developed criteria for seven product categories: office products, construction and housing products, living necessities, home appliances and furniture, transportation and leisure-related products, industrial equipment and supplies, and multipurpose and others. (http://www.kela.or.kr/english)

Country or Region and Standard Name	*Issuing Organization and Year*	*Description*
New Zealand: Environmental Choice	Environmental Choice Management Advisory Committee, 1990	Program was created following a government proposal to establish a voluntary ecolabeling scheme. It meets ISO 14020, ISO 14024 and GEN guidelines.
Netherlands: Stichting Milieukeur	Milieukeur Board, 1992	Ministry of Economic Affairs created the Stichting Milieukeur environmental labeling program (http://www.milieukeur.nl/english/), the Dutch competent body for the E.U. Eco-label.
Spain: Medio Ambiente	Asociación Española de Normalización y Certificación (AENOR), 1985	AENOR, a private independent body dedicated to developing standards and certification and enhancing social well-being and the environment, acts as the competent body for awarding the E.U. Eco-label in Spain. AENOR is a GEN member, participates in developing ISO ecolabeling standards, and has established criteria for the labeling of certain products and facilities in Spain. (http://www.aenor.es/desarrollo/certificacion/productos/tipo.asp?tipop=2, in Spanish)
Scandinavia (Denmark, Finland, Iceland, Norway, and Sweden): Nordic Swan	Nordic Council of Ministers, 1989	An independent multinational ecolabeling scheme. Only products that satisfy strict environmental requirements on the basis of objective assessments are approved. Assessment considers the product's life-cycle environmental impact. Program sets criteria for quality and performance and has developed criteria for 168 products. (http://www.svanen.nu/Eng/)
Sweden: Bra Miljöva (Good Environmental Choice)	Swedish Society for Nature Conservation and Eco-labelling and three large retail chains in Sweden, 1988	The Swedish Society for Nature Conservation and Eco-labelling formed in 1909 and the largest environmental NGO in Sweden, has a long history of environmental protection and has developed considerable influence and credibility. Strong demand for environmental information created incentive for a commercially independent, unbiased, environmental label (http://www.snf.se/bmv/english.cfm). The green peregrine falcon logo has been used since 1992.

Country or Region and Standard Name	*Issuing Organization and Year*	*Description*
Taiwan: Green Mark Program	Environmental Protection Administration (EPA), Government of the Republic of China, and Environment and Development Foundation (EDF), 1992	Program was launched by Taiwan's EPA but is currently administrated by EDF, an independent private organization. (http://greenmark.epa.gov.tw/english/index.asp#A) Green Mark had developed criteria for 41 product categories and certified 451 products by 1997. By 2003, the program had established 80 criteria that have resulted in 2,000 certified products according to the Taiwanese EPA's Bureau of Performance Evaluation and Dispute Settlement and has achieved label recognition by national ecolabel programs in the United States, Thailand, Korea, Australia, and New Zealand.
Thailand: Green Label Scheme	Thailand Environment Institute, 1994	Thailand Environment Institute, a local environmental NGO that cooperates closely with the Thai Ministry of Industry, developed the scheme (http://www.tei.or.th/greenlabel/). Criteria include life-cycle analysis, waste reduction, and energy and water conservation. Standards apply to energy-saving fluorescent lamps, products made from recycled plastics, environmentally sound refrigerators, low-pollutant emulsion paints, water-economizing flush toilets, mercury-free dry-cell batteries, recycled paper, low-energy air conditioners, and CFC-free sprays.
United States: Green Seal	Green Seal, 1989	Independent nonprofit organization (http://www.greenseal.org) sets environmental standards, certifies products that meet those standards, and educates consumers on how buying decisions can help the environment. Development involves environmental organizations, consumer groups, manufacturers, and government agencies. Certified products include newsprint, household cleaners, paints, fluorescent lightbulbs, and water-efficient fixtures. Green Seal meets the criteria for ISO 14020, ISO 14024, and U.S. EPA's third-party certifiers of environmentally preferable products.