

DO VOLUNTARY CORPORATE EFFORTS IMPROVE ENVIRONMENTAL PERFORMANCE?: THE EMPIRICAL LITERATURE

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Abstract: Many companies are adopting environmental performance programs that aim to go beyond regulatory compliance and provide greater environmental protection. How effective are they in doing so? This Article collects and surveys the empirical studies of environmental performance of these programs and presents a picture of mixed results. When companies adopt environmental management systems, their regulatory performance and nonregulated environmental impacts often improve. There is little empirical support, however, for the proposition that these systems are associated with design and implementation of greener products or processes. When companies adopt voluntary environmental performance standards, the evidence is mixed; it seems to suggest that these standards are not associated with improved performance. Yet a qualification is needed here: both the company programs and the empirical studies are relatively new and these results may well change as the programs become more institutionalized within the companies, and the studies have access to better data.

INTRODUCTION

Corporations are increasingly making voluntary efforts to protect the environment. These efforts are sometimes undertaken as part of a governmental initiative, sometimes as part of a trade association program, and sometimes they are undertaken by an individual company. Whatever the structure, they all share the feature of voluntariness, at least in the sense that they are not required as part of an environmental

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regulation. Do these voluntary efforts actually result in improved environmental performance by the companies that make them? A number of scholars have done empirical studies of this question, and this Article will review them.

I. VARIETIES OF VOLUNTARY PROGRAMS

For the purposes of this Article, voluntary programs will be grouped into two principle types. The first type is comprised of environmental management systems (EMSs), which have become increasingly popular and more familiar over the last several years.¹ EMSs are management systems designed to structure a corporation's environmental protection efforts and, hopefully, to move the company into regulatory compliance and beyond. As management systems, however, they do not in and of themselves entail a commitment to any specified level of environmental performance, although one hopes that better performance will follow the management effort.²

These EMSs typically incorporate a statement of company policy about environmental protection, and they generally are set up with a degree of involvement by top management of the firm. EMSs also usually establish a system for evaluating a company's environmental impacts and for managing these impacts throughout the entire company hierarchy, based on the familiar management idea "plan, do, check." A core justification for establishing an EMS is that conscious attention to environmental management throughout the organization will generate better environmental performance. Companies can obtain certification of their EMSs through the International Organization for Standardization (ISO) by applying the standards set forth in ISO 14001.³ This certification involves monitoring the company to

¹ See Cary Coglianese & Jennifer Nash, *Management-Based Strategies: An Emerging Approach to Environmental Protection*, in LEVERAGING THE PRIVATE SECTOR: MANAGEMENT-BASED STRATEGIES FOR IMPROVING ENVIRONMENTAL PERFORMANCE 3 (Cary Coglianese & Jennifer Nash eds., 2006). Professors Florida and Davison estimate that "roughly a quarter (24%) of manufacturing plants with more than 50 employees have adopted an EMS." Richard Florida & Derek Davison, *Why Do Firms Adopt Advanced Environmental Practices (And Do They Make a Difference)?*, in REGULATING FROM THE INSIDE: CAN ENVIRONMENTAL MANAGEMENT SYSTEMS ACHIEVE POLICY GOALS? 82, 86 (Cary Coglianese & Jennifer Nash eds., 2001).

² See Coglianese & Nash, *supra* note 1, at 3–8 (providing a good, short introduction); Jennifer Nash & John R. Ehrenfeld, *Factors That Shape EMS Outcomes in Firms*, in REGULATING FROM THE INSIDE: CAN ENVIRONMENTAL MANAGEMENT SYSTEMS ACHIEVE POLICY GOALS?, *supra* note 1, at 61, 62–68.

³ See generally Susan Summers Raines & Christian Haumesser, *ISO 14001 in the United States: Good News on the Question of Hype Versus Hope*, 4 ENVTL. PRAC. 163 (2002), available at http://journals.cambridge.org/download.php?file=%2FENP%2FENP4_03%2F514660466

ensure that there really is a management system and that it is being implemented. This check is typically done by third-party auditors, although a company may use its own employees if they have been trained and certified as auditors. Finally, EMSs often incorporate public reporting of the company's environmental efforts.

The second type of corporate environmental program considered in this Article is a voluntary commitment to achieve a specified level of performance. For example, a company or industry trade association might commit to reducing its toxic waste discharges, or its energy use, by twenty percent over the next five years. These voluntary commitments can be made through one of three different categories of programs. The first category consists of government-sponsored programs, such as Performance Track or WasteWise.⁴ Under the terms of these programs, companies that join commit to a specified level of environmental action or reporting, or both; in exchange they receive public recognition, technical advice and networking opportunities, and sometimes fewer regular inspections or other regulatory concessions. The goal is to encourage companies to take their environmental performance beyond regulatory compliance. A second category of voluntary performance program includes those programs that are sponsored by trade associations or other industry groups. The Responsible Care program of the International Council of Chemical Associations is one of the most familiar of these types of programs.⁵ Companies that commit to these programs typically promise specific environmental activities and performance, receiving industry recognition as well as technical assistance and advice. A third category is made up of company efforts undertaken by an individual company simply committing itself to a specific environmental performance target, such as a twenty-five percent reduction in carbon dioxide (CO₂) emissions.⁶ Whatever their organizational structure, a key question is whether these voluntary performance standards are actually associated with improved environmental performance by the companies. This Article will survey the empirical litera-

02021257a.pdf&code=6b7b66eee565fe4a9a01ec5fab104dcd (providing an introduction to the ISO system).

⁴ National Environmental Performance Track, US EPA, <http://www.epa.gov/perfrac> (last visited May 6, 2008); WasteWise, US EPA, <http://www.epa.gov/wastewise> (last visited May 6, 2008).

⁵ International Council of Chemical Associations, Responsible Care, <http://www.responsiblecare.org> (last visited May 6, 2008).

⁶ See BSDglobal.com, Business and Sustainable Development: A Global Guide, Voluntary Schemes, http://www.bsdglobal.com/issues/climate_voluntary_schemes.asp (last visited May 6, 2008) (providing examples of individual company programs).

ture; unfortunately, it concludes that for the most part this association has not been shown.

II. WHAT IS ENVIRONMENTAL PERFORMANCE?

This Article will consider studies that measure any of the three major aspects of performance. First, it will consider studies that measure how well companies succeed in minimizing their regulated discharges into the environment, typically discharges into air or water, or toxic releases.⁷ As part of this analysis, the Article will consider the extent to which voluntary efforts are associated with improved company compliance with environmental regulation. The second aspect of environmental performance that this Article will consider is how well a company performs with nonregulated uses of resources, such as minimizing energy use, water use, and raw materials inputs. Third, this Article will examine what the empirical literature conveys about the impact of voluntary programs on company attempts to adopt cleaner production processes and to design cleaner products.

In measuring the impact of company adoption of voluntary programs, it is necessary to have a point of comparison for environmental performance, and the studies considered here have used different ones. The preferred measure is a comparison of company performance to an external standard, such as the performance of a control group of similar companies that did not adopt the program or, as an alternative, comparison to the average performance for the industry. Several of the studies use this measure and are, therefore, the most illuminating. On occasion, however, studies compare a company's current performance to its own earlier performance, measuring it before and after adoption of the voluntary program. This Article will consider these studies as well. While these studies are useful, their utility is limited because they do not allow for other factors influencing the company's performance, such as the well-known tendency for reported Toxic Release Inventory (TRI) releases to decline industry-wide—and indeed economy-wide—over time.⁸ To understand the impact of voluntary programs on any TRI reduction, one would like to

⁷ This analysis will emphasize studies of measured environmental performance. While there is substantial literature that uses opinion surveys to determine performance, it will be used only sparingly here.

⁸ See Press Release, EPA, EPA Releases Most Recent Community Right-to-Know Data on Toxic Releases (June 18, 1998), <http://www.epa.gov/newsroom/index.htm> (search "Right-to-Know Data on Toxic Releases").

allow for consideration of the industry-wide changes that take place simultaneously and presumably result from other causes.

Do voluntary programs improve environmental performance? This Article will start by considering the extent to which adoption of an EMS is associated with improved performance.

III. DO EMSs IMPROVE PERFORMANCE?

A. Regulated Discharges: Air, Water, and Toxic Releases

Most of the empirical studies find that implementation of an EMS is associated with better performance on regulated discharges, namely air, water, and toxic releases.⁹ A leading study by the National Database on Environmental Management Systems (NDEMS) found this result to be the case for firms whose performance was measured on indicators chosen in advance by the companies: “[T]he introduction of an EMS can be expected to be at least somewhat beneficial to the environmental performance of most facilities, as well as to their operating and management efficiencies, and in some cases to their regulatory compliance patterns.”¹⁰ This conclusion resulted from an in-depth study of

⁹ Richard N.L. Andrews et al., *Environmental Management Under Pressure: How Do Mandates Affect Performance?*, in LEVERAGING THE PRIVATE SECTOR: MANAGEMENT-BASED STRATEGIES FOR IMPROVING ENVIRONMENTAL PERFORMANCE, *supra* note 1, at 111, 117–19 (“Empirical studies to date report modest but predominantly positive impacts of EMS’s on environmental performance.”). Similar conclusions are reported by European studies. See Julia Hertin et al., *Are “Soft” Policy Instruments Effective? The Link Between Environmental Management Systems and the Environmental Performance of Companies* 14–15 (SEWPS–SPRU Electronic Working Paper Series, Paper No. 124, 2004), available at <http://www.sussex.ac.uk/spru/documents/sewp124.pdf>.

Professors Florida and Davison evaluated survey data and concluded, “The results are clear: EMS plants are nearly twice as likely to report P2 [pollution prevention] as a source of plant level improvement (93.5% versus 69.7%) and three times more likely to view EMS as the source of significant in plant improvements (79% versus 28.3%).” Florida & Davison, *supra* note 1, at 90. Other sources of improvement found in the study included recycling (93.5% versus 69.0%), air emissions reduction (88.7% versus 53.5%), solid waste reduction (75.8% versus 54.5%), and decreased electrical use (67.7% versus 43.4%). *Id.* at 90–91.

The Performance Track program of the U.S. Environmental Protection Agency (EPA) is difficult to categorize, as it requires adoption of an EMS, but has additional requirements. OFFICE OF INSPECTOR GEN., EPA, EVALUATION REPORT: PERFORMANCE TRACK COULD IMPROVE PROGRAM DESIGN AND MANAGEMENT TO ENSURE VALUE 4–5 (2007), available at <http://www.epa.gov/oig/reports/2007/20070329-2007-P-00013.pdf> (evaluating the program); see discussion *infra* note 40 and accompanying text.

¹⁰ NAT’L DATABASE ON ENVTL. MGMT. SYS., DEPT. OF PUB. POLICY, UNIV. OF N.C. AT CHAPEL HILL, ENVIRONMENTAL MANAGEMENT SYSTEMS: DO THEY IMPROVE PERFORMANCE?, PROJECT FINAL REPORT, EXECUTIVE SUMMARY, at ES-25 (2003) (emphasis omitted),

data reported by participating firms. The extensive data covered a two-year baseline period prior to adoption of the EMS, as well as a three-year period of operating under it. Eighty-one firms originally began the study, although only thirty-one reported throughout the entire period. The data collected was quite comprehensive, and the analysis found EMS adoption to be generally associated with better performance.¹¹ This study considered firms that had adopted EMSs and volunteered to participate in NDEMS; many of the volunteers had been recruited by state and federal regulators.¹² The study's depth of information makes it useful, but to obtain this much information, the NDEMS used a non-random sample and ultimately had a small sample size. These limitations must be noted in evaluating the study's conclusions.

Similar conclusions emerged from several studies that evaluated reported TRI data. One substantial study used regression analysis to evaluate TRI data on 500 firms for the years 1994 and 1995.¹³ It found that EMS adoption was associated with lower toxic emissions and, further, that this result was stronger for firms that had more comprehensive EMSs, supporting the inference that the EMSs had substantial effects.¹⁴ In this study, "comprehensiveness" of an EMS was determined by considering a large number of different variables covered by the EMS, including inspections, number of Superfund sites, public disclosures, and toxic releases.¹⁵ Firms with more comprehensive EMSs tended to have greater improvement in overall environmental performance. The result is particularly persuasive because the study controlled for changes in the firms' production levels by calculating the

available at <http://www.c2e2.org/documents/completeexecutivesummary.pdf> [hereinafter NDEMS].

¹¹ More than two-thirds of the tracked Environmental Performance Indicators (EPIs) showed improvement, and approximately 56% of the reporting facilities experienced improvement. *Id.* at ES-4. However, 18% of the EPIs produced worse outcomes than before the EMS was adopted, although in only one facility did more than half of the EPIs decline. *Id.* In contrast, over 60% of facilities reported improvements in at least half the indicators associated with their EMS objectives and targets, and less than one-third experienced deterioration of the same indicators. *Id.* at ES-4 to -5.

¹² *Id.* at ES-24.

¹³ Wilma Rose Q. Anton et al., *Incentives for Environmental Self-Regulation and Implications for Environmental Performance*, 48 J. ENVTL. ECON. & MGMT. 632, 634 (2004).

¹⁴ *Id.* The study examined firms that were included in the Corporate Environmental Profile Directories, which was compiled from firm surveys by the Investor Responsibility Research Center for 1994 and 1995. *Id.* at 632-34. The results were strongest for the firms that discharged the most pollution prior to adopting EMSs and subsequently adopted the most comprehensive EMSs. *Id.* at 652. The study compared a firm's performance before and after adopting an EMS. *Id.* at 634-40.

¹⁵ *Id.* at 635-36.

ratio of toxic emissions to sales. Several other studies have reached similar results, looking at TRI data to compare an individual company's releases before and after adoption of an EMS.¹⁶ These general results are reflected in outcomes reported in survey-based studies of Austrian¹⁷ and Mexican companies¹⁸ as well. An earlier study found that firms with more environmental management activities had better performance on environmental spills.¹⁹

After a company adopts an EMS, is further improvement associated with taking the next step and having it certified for ISO compliance? Most of these studies do not purport to answer this question. The two studies that did consider it both found that EMS adoption was the important factor for environmental performance, and that certification in and of itself was not associated with further improvements.²⁰ The most persuasive explanation, offered by both studies, is that certifica-

¹⁶ Andrew A. King et al., *The Strategic Use of Decentralized Institutions: Exploring Certification with the ISO 14001 Management Standard* 30 (Corporate Soc. Responsibility Initiative, John F. Kennedy Sch. of Gov't, Harvard Univ., Working Paper No. 15, 2004), http://www.hks.harvard.edu/mrcbg/papers/seminars/Lenox_october_05.pdf (comparing actual toxic releases with predicted releases for the firms); see Matthew Potoski & Assem Prakash, *Covenants with Weak Swords: ISO 14001 and Facilities' Environmental Performance*, 24 J. POL'Y ANALYSIS & MGMT. 745, 763, (2005) ("These analyses provide some evidence that, compared to non-certified facilities, ISO 14001-certified facilities experienced significantly larger reductions in pollution emissions, controlling for other factors and the endogeneity between facilities' decisions to join ISO 14001 and their environmental performance."); Michal Szymanski & Piyush Tiwari, *ISO 14001 and the Reduction of Toxic Emissions*, 7 J. ECON. POL'Y REFORM 31, 41–42 (2004) (examining TRI data linked with 264 ISO-certified manufacturing facilities in the United States from 1996 to 2001).

¹⁷ Elisabeth Schylander & André Martinuzzi, *ISO 14001—Experiences, Effects and Future Challenges: A National Study in Austria*, 16 BUS. STRATEGY & ENV'T 133, 139 (2007) (surveying companies for their evaluations of EMS effectiveness and summarizing the results). Waste and recycling were reported to have shown the greatest improvements, with air and water discharges somewhat lower, although the absolute level of improvement was not shown. *Id.*

¹⁸ Susmita Dasgupta et al., *What Improves Environmental Compliance? Evidence from Mexican Industry*, 39 J. ENVTL. ECON. & MGMT. 39, 61–62 (2000) (using regression to analyze data from a World Bank sponsored survey of 236 facilities chosen to represent Mexican factories by sector, size, class, and location).

¹⁹ Jonathan Naimon et al., *Do Environmental Management Programs Improve Environmental Performance Trends? A Study of Standard & Poors 500 Companies*, ENVTL. QUALITY MGMT., Autumn 1997, at 81, 81 (using regression analysis to compare data on environmental management features collected in a 1992 survey of S&P 500 firms by the Investor Responsibility Research Center with environmental trend data for S&P 500 firms from 1994).

²⁰ NDEMS, *supra* note 10, at ES-25; King, *supra* note 16, at 30. Another study that compared the effects of four different U.S. voluntary programs found, however, that ISO 14001 certification was the most effective tool in improving performance. S.A. Melnyk et al., *Assessing the Effectiveness of US Voluntary Environmental Programmes: An Empirical Study*, 40 INT'L J. PRODUCTION RES. 1853, 1875 (2002).

tion is done primarily as a representation to outside stakeholders, while it is adoption of the EMS that actually impacts performance.

Yet, as is so often the case with empirical work, this consensus is not complete. One important recent study reached conclusions that are inconsistent with the results reported above.²¹ This study found no statistically significant difference between the environmental performance of firms with ISO-certified EMSs and a control group of similar firms that had not implemented EMSs.²² This study used a more nuanced measure of performance than most. Rather than looking solely to the volume of TRI materials released, as the studies reported above had done, this study used a toxicity ranking system to allow for risk of harm created by the relative toxicity of all materials released, as well as their volumes. Thus, it measured the total relative toxicity of releases rather than just the aggregate number of pounds of toxic materials released. This control allowed for a change in the composition of a company's toxic waste stream discharge to be reflected. The study also normalized releases for production volume. It considered toxicity measured over five- and ten-year periods. The care with which the study was constructed—allowing for relative toxicity and production volume, and using a control group of firms for comparison—should be noted. Its results are an important qualification to the general consensus presented above, and the study certainly deserves to be counted in the overall survey of the literature.

Finally, one must consider what these studies say about whether companies that implement EMSs also show better regulatory compliance. Unfortunately, straightforward conclusions are not possible because the work done on this question, while quite substantial, reports conflicting results. One of the most careful efforts used regression analysis to look at the compliance performance of 3700 firms, four percent of which had ISO-certified EMSs.²³ It found that the firms with

²¹ Ryan A. Harding et al., *The Role of ISO 14001 in Environmental Management at U.S. Manufacturing Facilities* 51 (Apr. 7, 2003) (unpublished Group Project in Master's Program, Bren School, U.C. Santa Barbara), *available at* http://www.bren.ucsb.edu/research/2003Group_Projects/iso/Final/iso_final.pdf. The study sought to examine 484 facilities, although only 198 responded with data. *Id.* at 25. The toxicity ranking system was based on Occupational Safety and Health Administration (OSHA) permissible exposure limits and likely pathways of exposure. *Id.* at 21–22.

²² *Id.* at 51.

²³ Matthew Potoski & Aseem Prakash, *Green Clubs and Voluntary Governance: ISO 14001 and Firms' Regulatory Compliance*, 49 AM. J. POL. SCI. 235, 240 (2005). The facilities studied were some of the 3700 firms that had their air pollution regulated and performance reported in EPA's Integrated Data for Enforcement Analysis database. *Id.*

EMSs spent less time out of compliance with air toxic regulations—about twenty-five days per year on average—and concluded that “joining ISO 14001 does improve regulatory compliance beyond what likely would have occurred had the facilities not joined the program.”²⁴ One problem in studying this question is determining whether the EMS improves performance, whether better performance influences the decision to implement an EMS, or whether both changes are determined by other company factors and management strategies. This study allowed for such a consideration by using sophisticated statistical methods to “isolate the impact of facilities’ ISO 14001 membership on regulatory compliance from other factors that induce facilities to join ISO 14001 and comply with regulations in the first place.”²⁵ Thus, the result is more reliable because the study controlled for this endogenous problem. Other studies have reached consistent conclusions.²⁶

Yet several substantial studies reach the opposite conclusion, finding that implementing an EMS is not associated with improved regulatory compliance. For example, the NDEMS study discussed above, admittedly an in-depth look at a small sample, found no statistically significant reduction in regulatory violations after implementing an EMS, although it did note that the number of facilities reporting violations declined from fifteen to six.²⁷ One European study looked at the measured environmental compliance of a group of small- and medium-sized companies and similarly concluded that implementing an EMS was not associated with better regulatory compliance.²⁸ While these studies are substantial, variations in sample size and composition, measurements of regulatory compliance, and the inevitable imperfections of social science empirical research surely contribute to the difference in results. From a policy perspective, this difference means that, while cur-

²⁴ *Id.* at 246.

²⁵ *Id.* at 240.

²⁶ Dasgupta et al., *supra* note 18, at 61 (reviewing Mexican companies, and finding that “[p]lants which institute ISO 14001-type internal management procedures exhibit superior environmental compliance”); Melnyk et al., *supra* note 20, at 1875–76 (comparing various voluntary programs); see Hertin et al., *supra* note 9, at 7 (citing two German studies).

²⁷ NDEMS, *supra* note 10, at ES-15 to -16. (finding improvement “in some cases,” but not overall); Andrews et al., *supra* note 9, at 116–20 (reaching a similar, negative conclusion in their study of 617 responding facilities that were all TRI reporters). Professors Darnall and Carmin report that only twenty-five percent of the voluntary programs in their study use regulatory compliance as a screening device for participation. Nicole Darnall & Joann Carmin, *Greener and Cleaner? The Signaling Accuracy of the U.S. Voluntary Environmental Program*, 38 POL’Y SCIENCES 71, 78 (2005).

²⁸ Kristina Dahlström et al., *Environmental Management Systems and Company Performance: Assessing the Case for Risk-Based Regulation*, 13 EUR. ENV’T 187, 199 (2003).

rently there is a significant amount of intriguing data, a workable empirical answer to whether implementing an EMS is associated with improved regulatory compliance is not yet available. When the inquiry shifts to the effect of nonregulated environmental impacts, the answer becomes clearer.

B. *Nonregulated Resource Use*

In addition to the regulated discharges discussed above, company facilities have many other impacts on the environment, ones that are not directly regulated for environmental effect. For example, facilities discharge ordinary wastes and use energy, water, storage, and transportation. All of the studies to date that have considered these kinds of environmental impacts have found that firms that implement EMSs have better performance in these areas. While the specific environmental impacts considered have varied somewhat among the studies, energy and water use reductions were most consistently found, followed by improved waste management practices and better materials use.²⁹ One Swedish study of joint EMS programs among twenty-six mostly small- and medium-sized enterprises also found a forty-four percent decrease in energy use and a thirty-two percent reduction in materials use. This study looked further, however, and also found broader benefits, including improved waste handling and recycling procedures, the spread of district heating schemes, improved storage, decreased transportation needs, and some substitution of goods.³⁰

Although these studies did not purport to measure empirically why these kinds of improvements appear so consistently, they do offer some reasonable interpretations of the data. Better performance on non-regulated resource uses are likely to result in immediate, direct cost savings and, thus, will clearly be visible and attractive targets for the facility's managers. In addition, because these environmental impacts have not been subject to direct environmental regulation before, they

²⁹ NDEMS, *supra* note 10, at ES-13 (finding improvements in energy, water, and materials use); Andrews et al., *supra* note 9, at 117–19 (reporting improved energy use); Hertin et al., *supra* note 9, at 6 (finding improvements in energy, water, and waste management); see also Jonas Ammenberg & Olaf Hjelm, *Tracing Business and Environmental Effects of Environmental Management Systems—A study of Networking Small and Medium-Sized Enterprises Using a Joint Environmental Management System*, 12 BUS. STRATEGY & ENV'T 163, 164–65 (2003). The Ammenberg study used self-reported performance data gathered in interviews with company environmental coordinators and is limited by its admittedly small sample of twenty-six participating enterprises. *Id.* It reported the results of the interviews without statistical analysis. *Id.* at 166–70.

³⁰ Ammenberg & Hjelm, *supra* note 29, at 170.

may have received less management attention in the past, and so, there may be more room for improvement in the initial effort. Of course, to the extent that this second interpretation is correct, it would imply that these consistently positive results have been influenced by first-time efforts, making the results harder to duplicate over time. Certainly, future empirical studies should be sensitive to the possibility that performance improvements may be a one-time result of directed management attention, rather than an indicator of future improvements. That said, these results do offer a convincing policy rationale for supporting EMSs: they may be a way to reach important environmental impacts that have not been controlled by traditional regulatory tools.

In addition to resource use, it is important to determine if implementing an EMS is associated with environmentally superior operating changes, such as designing and adopting environmentally superior products and processes. Here the empirical results to date have been consistent; unfortunately, they have not been positive.

C. *Nonregulated Operating Changes: Greener Products and Processes*

Finding ways to motivate companies to develop greener products and processes is particularly important to environmental policy. Yet the task is challenging; developing greener products and processes requires innovative, creative efforts by companies, as well as consistent, sustained financial and other support throughout the decisionmaking levels of the organizations. Our traditional regulatory system has made real progress over the last forty years in controlling emissions and other environmental impacts by regulating harmful behavior and thereby providing cleaner air, water, and land. This regulatory system, however, has been less successful at inspiring innovative change that improves environmental performance beyond the improvement required for regulatory compliance. Such change is needed. In environmental policy circles, there is widespread concern that the traditional regulatory system will have increasing trouble attaining further environmental improvement, and that the traditional system may be inadequate to effectively require the next generation of improvements that are necessary to pursue real sustainability.³¹ Current environmental regulation works reasonably well to control harmful behavior, but it is a blunt and imperfect tool when used to inspire and motivate creative responses that lead to greener products and processes—and eventually to a more sustainable

³¹ See, e.g., DANIEL J. FIORINO, *THE NEW ENVIRONMENTAL REGULATION* 59–120 (2006) (chapters three and four).

society. Additional policy tools are needed to achieve this larger goal, and many have hoped that EMSs would be such tools.

Unfortunately, the empirical studies to date have not found that EMSs can achieve the desired result. Each of the studies that have evaluated this question have found that EMSs are not associated with the development of cleaner, greener products or processes.³² A Swedish study focused specifically on the process of product design. This small but interesting study concluded that implementing EMSs did not influence product design decisions because EMSs were too rigid and specific for this turbulent process.³³ Considering the extensive individual and institutional thinking required for far-reaching product design innovation, the result is not surprising.

More generally, these studies argue that company decisions to fundamentally change products and processes are not made at the level where an EMS has its greatest impact. The focus of attention in implementing an EMS is on the particular facility, because it is within a particular facility that most of the real work for an EMS takes place. Yet, the argument runs, fundamental redesign of products or processes requires sustained creative effort, sustained financial commitment, and a willingness to confront the substantial business risks that are presented by the processes. These requirements must have support within the facility, but they also require top management support at the national level. While this explanation is certainly plausible and persuasive, it goes beyond the empirical results. Whatever the merits of the rationale, the empirical findings to date are illuminating, though not conclusive given the difficulty of measuring the motivations for innovation. That said, the current group of EMSs have not been shown to be effective in requiring or inspiring the necessary fundamental product and process innovations.

A most interesting case study by Professors Gunningham, Kagan, and Thornton offers useful insight on this problem.³⁴ This study was

³² See NDEMS, *supra* note 10, at ES-25; Andrews et al., *supra* note 9, at 117–20. It must be acknowledged that innovation is a difficult question to study empirically, and even more so when one is trying to determine what motivates it. The evidence available, while illuminating, cannot be taken as definitive at this time.

³³ Petrus Kautto, *New Instruments—Old Practices? The Implications of Environmental Management Systems and Extended Producer Responsibility for Design for the Environment*, 15 BUS. STRATEGY & ENV'T 377, 383 (2006). This study looked in-depth at three firms as case studies and evaluated survey responses from 101 firms, which represented fifty-three percent of the group originally solicited. *Id.* at 382.

³⁴ See NEIL GUNNINGHAM ET AL., *SHADES OF GREEN: BUSINESS, REGULATION, AND ENVIRONMENT* 135–56 (2003).

an in-depth examination of fourteen pulp and paper mills located worldwide.³⁵ In general, all the mills in question had good records of compliance with environmental regulation, and such regulation had in fact driven significant positive technological change and performance improvement.³⁶ This study went further and specifically considered why some mills made the investment to go beyond regulatory compliance, while others did not.

The study found that the style of environmental management was the most important factor, more important than the national regulatory regime, the mill's corporate size, or its earnings. Yet there was a great deal of variation in the extent to which mills went beyond compliance and the reasons they did so. The study found that management style was the best explanatory variable. "By management style we refer to a combination of managerial attitudes and actions that mark the intensity and character of each management's commitment to environmental compliance and improvement."³⁷ Style was measured by structured interviews with individual members of management, which were scored and compared.³⁸ This approach was important, as it enabled the study to separate the evaluation of management style from the evaluation of facility environmental performance.

This intensive study offers a much deeper look into the specific mills and management styles studied, although the in-depth look was obtained at the cost of a larger sample size. This careful look inside the facilities does offer substantial conceptual support for the idea that green products and green processes grow out of deeply imbedded characteristics of a particular managerial culture and that adopting an EMS, while useful, is by itself not likely to lead to such changes. Of course, one must also consider that most EMSs in place today are still relatively new, as are the studies measuring their impact, and that over time implementing EMSs may lead to deeper changes in the environmentally responsive management culture. Thus, EMS studies completed five or ten years from now may find some contribution to cleaner operations and products that we cannot establish today.³⁹

³⁵ *Id.* at 5–6.

³⁶ *Id.* at 6.

³⁷ *Id.* at 96.

³⁸ *Id.*

³⁹ Beyond EMSs, there is a broader question of what other policy tools might inspire or provoke such changes, but this question is beyond the scope of this Article.

D. EMSs—Conclusion

The empirical evidence to date supports the conclusion that EMSs are generally associated with better environmental performance on regulated discharges and on nonregulated resource use. In view of the fact that most EMSs are relatively new, as are the studies that have evaluated them, there is reason to hope that their environmental performance impacts will increase over time, leading to more good news. The news today is, however, less positive when one asks whether facilities that implement EMSs have improved records of compliance with environmental regulation. On this point the evidence is simply in conflict and more research is necessary. What of greener products and processes for industry? Here the evidence, while limited to date, is consistent and negative: EMSs are not associated with greener products or processes. While industries are still in the early stage of EMS implementation, and more work is needed, at this point one must face the prospect that EMSs will not be the means to achieve greener products and processes objectives and that other policy tools will be necessary.

In addition to EMSs, many companies are taking part in voluntary performance standards, and the Article next considers the empirical studies of these standards.

IV. DO VOLUNTARY PERFORMANCE STANDARDS ACTUALLY IMPROVE ENVIRONMENTAL PERFORMANCE?

A. *Varieties of Voluntary Standards*

Because the number of empirical studies of voluntary performance standards is limited, this Article will discuss the empirical measures of their environmental performance together. There is substantial variation, however, in the different types of voluntary performance standards programs and a brief summary of these various types will enhance the empirical literature discussion below. The most visible and familiar type of performance standards program consists of government-sponsored programs, such as the well-known Performance Track program.⁴⁰ Performance Track seeks to identify and recognize corpo-

⁴⁰ See National Environmental Performance Track, US EPA, <http://www.epa.gov/perfrac> (last visited May 6, 2008). WasteWise and Climate Challenge are other programs of this type which are evaluated in the empirical studies discussed below. Climate Challenge, DOE's Energy Partnerships for a Strong Economy, Notice, http://www.climatevision.gov/climate_challenge/climatechallenge.html (last visited May 6, 2008); WasteWise, US EPA, <http://www.epa.gov/wastewise> (last visited May 6, 2008). Professors Darnall and Carmin

rate and other environmental leaders.⁴¹ Companies must apply to join the program, but most are accepted, as is often the case for programs of this type. Participants make a commitment to environmental performance improvement as measured by one or more specific metrics. Typically these metrics require quantified improvement in some aspect of performance. Participants receive public recognition, technical advice and assistance, and in some cases, they may be rewarded with fewer regulatory inspections.⁴² Other government-sponsored programs sometimes offer additional regulatory benefits. Public reporting of results is typical, although many programs allow firms to simply leave the program, for either poor performance or failure to report, without sanction.

A second group of voluntary performance standards programs include those programs that are established by an industry trade association or other trade group. The chemical industry's Responsible Care program and the Sustainable Forestry Initiative of the forest products industry are two well-known examples.⁴³ In these programs, companies commit to environmental performance standards, usually stated qualitatively rather than quantitatively, as a condition of membership in the sponsoring organization. Technical advice and assistance from the organization and other members of the group are often included in the program, as are public recognition and an improved public image for the company and the industry.

In the third type of program, an individual company adopts performance standards on its own initiative. A company might commit to a specific level of environmental performance beyond regulatory requirements, such as a twenty-five percent reduction in toxic waste discharge. These individual company commitments appear to be increasing, but to date, no systematic empirical evaluation of their environmental performance effects exists.

Taken together, these programs may have the potential to substantially improve environmental performance, particularly as their numbers and participation levels increases. They have received little

survey the different types and structures of voluntary environmental programs. Darnall & Carmin, *supra* note 27, at 72.

⁴¹ National Environmental Performance Track, US EPA, <http://www.epa.gov/perfrac> (last visited May 6, 2008).

⁴² *Id.*

⁴³ See International Council of Chemical Associations, Responsible Care, <http://www.responsiblecare.org> (last visited May 6, 2008); SFI: Sustainable Forestry Initiative, <http://www.sfiprogram.org> (last visited May 6, 2008).

systematic empirical study, however, and the limited evidence of their performance impact is mixed.

B. *The Weight of the Evidence: Voluntary Performance Standards Have Not Been Shown to Improve Environmental Performance Generally*

Most of the studies in this area find that voluntary performance standards are not associated with better environmental performance. The number of studies is small, however, and this conclusion tentative. Thus, the point cannot be taken as conclusively established today. Many of these programs are relatively young, and the studies of them are relatively recent, so this result may change over time. Subject to these qualifications, the conclusions of studies completed to date are reasonably consistent. For example, a study of the Climate Challenge program found that "Climate Challenge voluntarism seems to either have no effect (in the case of program adoption) or to contribute negatively to emission reductions (in the case of specified levels)."⁴⁴ The Climate Challenge program was a voluntary effort established to encourage the largest electric utilities to reduce their CO₂ emissions; in the program, participating firms set their own reduction targets.⁴⁵ This study looked at the emissions of the fifty largest electric utilities east of the Rocky Mountains from 1995 to 1997, thirty-five of which participated in the program, and it found that membership in the program was not associated with emissions improvements.⁴⁶ The authors hypothesized that the weak regulatory program for CO₂ emissions was the culprit, making emissions reduction an environmental performance criterion that did not receive serious attention by the companies.⁴⁷ Of course, to the extent that this hypothesis is correct, it substantially undercuts the idea that voluntary programs can improve environmental performance beyond regulatory requirements.

Similar results were published in a 2000 study of the chemical industry's Responsible Care program in which the authors concluded that improved environmental performance, measured by other reports outside of the program, was not associated with program member-

⁴⁴ Eric W. Welch et al., *Voluntary Behavior by Electric Utilities: Levels of Adoption and Contribution of the Climate Challenge Program to the Reduction of Carbon Dioxide*, 19 J. POL'Y ANALYSIS & MGMT. 407, 421 (2000). Emissions data was reported by the Natural Resources Defense Council. *Id.* at 416.

⁴⁵ *Id.* at 416.

⁴⁶ *Id.* at 422.

⁴⁷ *Id.*

ship.⁴⁸ Responsible Care membership required specified performance efforts, as well as management activities. Yet, the program called for neither monitoring nor enforcement, and the study's authors hypothesized that the absence of these two elements was the reason for its poor performance showing.⁴⁹ Since the date of the study, the Responsible Care program has been restructured to incorporate both monitoring and program sanctions, and future studies may find improved performance.

The absence of improved overall performance was also the conclusion of a study of the Sustainable Slopes Program (SSP) of the U.S. Environmental Protection Agency (EPA), a voluntary effort to encourage ski areas to improve their environmental performance.⁵⁰ The study concluded:

Additionally our five-year study found no statistical evidence to conclude that compared to nonparticipants, SSP ski areas have higher overall environmental performance or higher scores in the following individual dimensions of environmental protection: expansion management, pollution management, and wildlife and habitat management. SSP participants only appear to show a statistically significant correlation with higher natural resource conservation performance rates.⁵¹

Interestingly, the study found that ski areas wholly or partially on public land had poorer performance records. The authors hypothesized that the program's poor results flowed from its lack of either third-party monitoring or sanctions for violations.⁵²

⁴⁸ Andrew A. King & Michael J. Lenox, *Industry Self-Regulation Without Sacrifice: The Chemical Industry's Responsible Care Program*, 43 ACAD. MGMT. J. 678, 713 (2000).

⁴⁹ *Id.*

⁵⁰ Jorge Rivera et al., *Is Greener Whiter Yet? The Sustainable Slopes Program After Five Years*, 34 POL'Y STUD. J. 195, 215 (2006).

⁵¹ *Id.* The study covered a five-year period and used regression analysis to evaluate the data on 110 of the 178 ski areas in the western United States. *Id.* at 201. Performance data was reported by the Ski Area Citizens Association, a partnership of nonprofit environmental organizations that evaluated the ski areas. *Id.* at 196. This work built on the authors' earlier study. See Jorge Rivera & Peter de Leon, *Is Greener Whiter? Voluntary Environmental Performance of Western Ski Areas*, 32 POL'Y STUD. J. 417 (2004). Both of these studies were limited by small sample size.

⁵² Jorge Rivera et al., *supra* note 50, at 213.

These results are broadly consistent with the EPA Inspector General's study of some of the firms in the Performance Track program.⁵³ As noted above, the Performance Track program consciously sought to identify and include environmental leaders. This 2007 study was a broad review of the whole program; the portion of interest here looked carefully at the environmental performance of forty randomly selected program participants.⁵⁴ The study has both good and bad news: while many member-firms had better toxic release performance than their respective industries as a whole, a substantial minority of member-firms performed worse than their industries.⁵⁵ The same was true for regulatory compliance: while twenty-two of thirty-five facilities had no compliance problems, "Thirteen of the 35 facilities which had inspections had more compliance problems than their sector average for one or more compliance measures."⁵⁶ These examples of poor performance are particularly discouraging for a program that has consciously targeted environmental leaders.

The broad conclusion of these studies is that voluntary performance programs generally have not been shown to be associated with better environmental performance. There are, however, some rays of light shining through this generally cloudy picture.

*C. Some Limited Evidence of Improved Environmental Performance from
Voluntary Performance Standards*

In the mix of largely negative evidence reported above, there are some reported bright spots in which voluntary performance standards are associated with better environmental performance. Two studies found that firms that joined a voluntary program at its early stages tended to show better environmental performance than the industry as a whole, even though this result was not the case for firms that joined later or for the program overall. One study examined firms that participated in EPA's Climate Challenge program.⁵⁷ As noted above, this

⁵³ OFFICE OF INSPECTOR GEN., *supra* note 9, at 15–22. This study considered many additional aspects of program design and implementation beyond environmental performance. *Id.*

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ *Id.* at 24.

⁵⁷ Magali Delmas & Maria J. Montes, *Voluntary Agreements to Improve Environmental Quality: Are Late Joiners Free Riders?* 7 (Inst. for Social, Behavioral and Econ. Research (ISBER), U.C. Santa Barbara, Working Paper No. 7, 2007). The study used regression analysis to control for other variables, including proxies for political pressure, regulatory pressure, legislative pressure, relative state commitment to environmental protection, and relative

voluntary program sought to encourage reductions in CO₂ emissions by the largest electric utilities. The early joiners were good prospects for improvement; as a group, they had undertaken more emission reduction efforts prior to joining, and they were subject to greater political pressure regarding their emissions.⁵⁸ An earlier study of EPA's Waste-Wise program by one of the same authors reached broadly consistent conclusions.⁵⁹ The WasteWise program sought to encourage voluntary reductions in waste generation. While it required annual reporting on results, there was no sanction for not reporting. This study found that the firms that first joined the program were more likely to report their results than late joiners. Interestingly, it also found that other factors, such as having an EMS, overall firm size, or the firm's industry segment, were not related to reporting rate.⁶⁰

Taken together, these studies offer some support for the idea that voluntary performance programs may make a difference for the firms that first join them, but that these positive initial results may be swamped by a larger group of free riders who subsequently join. The studies were not able to evaluate the counterfactual situation—what would have been the environmental performance of the early joiners if they had not joined? Thus, it may be that joining the program was an effect of actual or prospective improvement in environmental performance, rather than a cause. Even so, the result supports the idea that the voluntary program was associated with improved performance, though it resulted from, rather than caused, the improvement.

One early study found that firms were more likely to join EPA's 33/50 voluntary program when confronted with the prospect of regulatory controls as an alternative.⁶¹ This program encouraged companies joining the program to reduce their discharge of seventeen specified chemicals by thirty-three percent, and subsequently by fifty

environmental contamination of the state, as well as company-specific factors including environmental effort, productive efficiency, and size. *Id.* at 4–9. It looked at all 124 companies that signed agreements to participate in the program. *Id.*

⁵⁸ *Id.*

⁵⁹ See Magali Delmas & Arturo Keller, *Free Riding in Voluntary Environmental Programs: The Case of the U.S. EPA WasteWise Program*, 38 POL'Y SCI. 91, 104–05 (2005). This study used a regression analysis to evaluate survey data from the 106 companies that responded, which represented 11.2% of the 947 companies in the program. *Id.*

⁶⁰ *Id.* at 101–02. While useful, this study is limited because it only measured whether firms reported, not whether they reported positive results. *Id.* at 96–97. As noted in the previous footnote, it was based on a survey of 947 firms, but had only an 11.2% response rate (106 firms), further qualifying its results. *Id.*

⁶¹ Madhu Khanna & Lisa A. Damon, *EPA's Voluntary 33/50 Program: Impact on Toxic Releases and Economic Performance of Firms*, 37 J. ENVTL. ECON. & MGMT. 1, 23 (1999).

percent over the term of the program.⁶² In a study of the chemical industry firms that joined, the authors concluded:

Expected gains due to public recognition and technical assistance offered by the program and the potential to avoid liabilities and high costs of compliance in the future under mandatory environmental regulations provided incentives for participation in the program. This suggests that participation in voluntary programs depends to a considerable extent on the existence of a regulatory framework that would impose penalties on firms that do not undertake proactive measures for self-regulation. Voluntary programs are likely to be less effective without the backstop of mandatory regulation.⁶³

There was also good performance news. The study compared the member companies' environmental performance on releases of the seventeen toxic chemicals to their predicted releases prior to joining the program. Even after controlling for sample selection bias, the impact of regulations, and firm specific factors, the study found:

While the amount of pollution reductions that can be attributed to the program is less than the total observed reduction by participants, the program is estimated to have led to a reduction of 28% in expected 33/50 releases relative to the preprogram level over the period 1991–93.⁶⁴

Thus, the voluntary program was associated with some of the positive performance results.

One review of EPA's Strategic Goals program also found some qualified good news.⁶⁵ The Strategic Goals program was a voluntary program aimed at improving the environmental performance of firms in the metal finishing industry. EPA's mid-term report showed reductions by participating firms, with a 58.7% reduction in air and water emissions, a 3% reduction in sludge production, and a 15% reduction

⁶² *Id.*

⁶³ *Id.* This study used regression analysis to evaluate TRI data on 123 firms that were in the chemical industry and eligible to participate in the program during its first three years, 1991 to 1993, the time period of the study. *Id.* at 4–7.

⁶⁴ *Id.* at 23.

⁶⁵ Jason Scott Johnston, *The Promise and Limits of Voluntary Management-Based Regulatory Reform: An Analysis of EPA's Strategic Goals Program*, in *LEVERAGING THE PRIVATE SECTOR: MANAGEMENT-BASED STRATEGIES FOR IMPROVING ENVIRONMENTAL PERFORMANCE*, *supra* note 1, at 167, 180–84.

in land disposal of toxic wastes.⁶⁶ Yet this good news was qualified by the study's overall conclusion that the program's low participation rate and failure to meet its goals provided good reasons for discontinuing it.⁶⁷ Whatever the reason, the Strategic Goals program was neither renewed nor extended when it reached the end of its initial term in 2003.

As discussed above, some positive results were reported in the EPA Inspector General's study of the Performance Track program.⁶⁸ Of the forty entities that were randomly selected for study, most members in the program had better performance on toxic waste emissions and on regulatory compliance than their respective industries. Overall, this study was critical of the program and its results, but this positive data should be noted.

Despite these individual bright spots, the composite picture is gray. Why are these voluntary performance programs not associated with better environmental performance? The programs and these studies are all relatively recent, so perhaps better performance is coming and will be revealed in future performance improvements, which the next generation of studies will find. In the current group of studies, the consensus explanation is that the programs are not very successful because, in general, they do not have effective monitoring and sanctions for poor program performance. Indeed, most do not have any monitoring or sanction. Thus, the argument runs, firms can join them without either a demonstrated history of real environmental effort or a real contemporary commitment to sustained environmental improvement in the future. When real effort is required to improve environmental performance, there is insufficient company commitment for the program to succeed.

One interesting study offers results that are generally consistent and supportive. It was not a study of environmental performance, but rather a study of what firms join what kinds of voluntary programs. Specifically, this study of 400 firms compared the environmental performance of firms that join different kinds of voluntary programs. It found that firms that pollute less join programs that have monitoring

⁶⁶ *Id.* One Minnesota study of its participating firms was reported to have concluded that they performed better than nonparticipating firms. *Id.* at 182–83.

⁶⁷ *Id.* at 180–83. Professor Johnston also notes that the standards set were not very demanding, as they were below the standards set by an industry best practices group, and that the program back dated its baseline performance period to 1992, in effect counting as improvements many gains that were achieved before the Strategic Goals Program began. *Id.*

⁶⁸ OFFICE OF INSPECTOR GEN., *supra* note 9, at 23–26.

and that actually sanction violators by expulsion, such as the Sustainable Forestry Initiative. In contrast, the firms that join programs that do not monitor or issue sanctions, such as the former Responsible Care program, have worse pollution records than their industry averages.⁶⁹ These findings suggest that firms choose programs, and thus, program design may be quite important to observed environmental performance results.

CONCLUSION

Do voluntary environmental programs improve environmental performance? The studies do not definitively answer the question. To be sure, there is substantial support for the point that implementation of an EMS is associated with better environmental performance, both on regulated emissions and on the use of resources that are not directly regulated. Unfortunately, the studies to date do not offer support for the hope that EMSs will be associated with adopting greener products and processes. For this important environmental policy objective, the evidence to date argues that other policy tools will be needed. Taken together, the studies are still too few, qualified, and diffuse to consider either of these conclusions to be well enough established that they can serve as an acceptable basis for making new policy that either promotes or discourages EMSs.

With voluntary performance standards, the data is both more limited and less conclusive. While some bright spots can be found, the overall picture is a gloomy one. There is limited support for the position that the participants in these programs can be reasonably expected to have better environmental performance. When considering both EMSs and performance standards, one must remember that the programs are relatively new, and the limited number of studies are recent. Further work is needed.

One final methodological note is necessary. Many of these studies have had to work with less than ideal data sets, presumably because the needed information is difficult to collect. While data on regulated emissions and discharges is reasonably available, data on other kinds of environmental impacts is not, and must typically be gathered by third parties or directly from the companies that are willing to disclose such information. This observation is also true for information

⁶⁹ Michael J. Lenox & Jennifer Nash, *Industry Self-Regulation and Adverse Selection: A Comparison Across Four Trade Association Programs*, 12 BUS. STRATEGY & ENV'T 343, 348-355 (2003).

regarding the existence and content of EMSs, and for voluntary programs, unless they have a government sponsor that requires data collection and disclosure. Thus, studies must often use survey evidence, and they frequently have smaller sample sizes than is preferable. Many have been successful in addressing these problems, but these are limitations that must also be considered in conducting the necessary work in this area in the future.

For the present, a policy of benign neglect by the traditional regulatory system seems to be appropriate. Voluntary efforts offer a tantalizing prospect of real improvement in environmental performance, and they should continue. There is only limited and conflicting empirical support for the possibility of improvement, however. Better program design, with real monitoring and performance sanctions, and new and better studies, may provide empirical support for incorporating voluntary efforts into the public regulatory system for containing environmental risks. The empirical support is not yet there.

