Explaining Corporate Environmental Performance: How Does Regulation Matter?

Neil Gunningham (in collaboration with R Kagan and D Thornton)

Abstract

It is widely assumed that national and subnational differences in regulation and regulatory enforcement account for differences in environmental performance by regulated businesses. Against this "regulatory regime" assumption, however, one can pose a counter-hypothesis: by the beginning of the 21st Century, particularly in economically advanced democracies, differences among regulatory regimes have narrowed sharply, and local social pressures, market incentives, and corporate environmental management are the chief determinants of variations in firm-level environmental performance. This paper tests the "regulatory regime" and the counter-hypothesis, drawing on a study of 14 pulp and paper manufacturing mills in Australia, New Zealand, British Columbia, and the states of Washington and Georgia in the U.S. Over the last three decades, we find, tightening regulatory requirements and intensifying political pressures have brought about large improvements and considerable convergence in environmental performance by pulp manufacturers, most of which have gone "beyond compliance" in several ways. But significant firm-level differences in pollution control still exist. Relying on 1998-99 effluent data, we find that regulatory jurisdiction does not account for differences in environmental performance across facilities. Just as salient in explaining those differences are variables such as corporate profitability, pressures by local communities and environmental activists, and especially corporate environmental management style – although no single set of variables is determinative. A broader historical perspective on our data, however, indicates that regulation still matters, since *large* improvements in corporate environmental controls have been associated with tightening regulatory requirements and intensifying political pressures.

Explaining Corporate Environmental Performance: How Does Regulation Matter?

Neil Gunningham (in collaboration with R Kagan and D Thornton)

Over the last decade a considerable literature has developed on the 'greening of industry'. At the heart of the field lies the question, "What are the determinants of greening?" For without an empirically-grounded understanding of when and why profit-oriented businesses are willing to go "beyond compliance" with environmental law, or how far they are willing to do so and with what limits, it is impossible to disentangle wishful thinking and ideological exhortation from the kind of realistic expectations on which governmental and social policy can sensibly be based. Notwithstanding some valuable case studies (generally confined to environmental leaders) and some less illuminating survey evidence, adequate empirical answers have not been forthcoming[1]. We still know little about why individual corporations behave the way they do in the environmental context, about why some companies but not others, choose to move beyond compliance, or what motivates them to do so, about what are the most important influences on environmental outcomes or what social policy tools are likely to prove most effective in achieving improved corporate environmental performance.

In this paper, we have sought to advance the empirical understanding of these questions, by studying 14 pulp and paper manufacturing mills in British Columbia, Canada; Australia; New Zealand; the states of Washington and Georgia in the United States. We have used a combination of qualitative and quantitative data gathered in 1998-1999, to examine a number of alternative explanations for variation in "environmental performance" over time and across business corporations. We have particularly focused on the role of regulatory regimes, economic variables (such as firm-level economic incentives and resources), political and social pressures, and corporate environmental management and attitudes.

---

[1] On the empirical limitations of the existing literature see DA Fuchs and DA Mazmanian "The Greening of Industry: Needs of the Field" Business Strategy and the Environment, 7, 193-203 (1998).

Our data and analyses have shown that the relationships between these variables and environmental outcomes are complex. This very complexity makes it desirable to both summarize and integrate our main findings, which we do in the first part of this chapter. In the second part, we explore their broader implications and lessons for social policy and regulatory design.

Understanding Corporate Environmental Performance

To explain corporate environmental performance, we argue, is it useful for analysts (and corporate managers themselves) to view business enterprises as simultaneously motivated and constrained by a multi-sided "license to operate." We found that corporate managers, at least in closely-watched industries like pulp and paper manufacturing, viewed each facility's license to operate as including not only its regulatory permits and legal obligations but also an often-demanding "social license" and a constraining "economic license." The regulatory, economic and social licenses are monitored and enforced by a variety of stakeholders, who commonly seek leverage by exploiting a variety of license terms. Environmental groups not only enforce the terms of the social license directly (e.g., through shaming and adverse publicity) but also seek to influence the terms of the economic license (e.g., generating consumer boycotts of environmentally damaging products) and of the regulatory license (e.g., through citizen suits or political pressure for regulatory initiatives). Thus the *interaction* of the different types of license often exceeds the effect of each acting alone. The terms of some legal license provisions extend the reach and impact of the social license by directly empowering social activists or by giving them access to information which they can use to pressure target enterprises. Conversely, a company which fails to respond appropriately to social license obligations risks a tightening of its the regulatory license, as frustrated community activists turn for help to politicians and regulators.

The terms of each strand of the 'license to operate', however, often are far from clear. Moreover, proactive corporate officials sometimes can reshape some license terms – by providing information to and negotiating with regulators or environmental activists, by engaging in community outreach and education, by scanning for technologies and procedures that simultaneously cut costs and improve the firm's environmental performance. Yet this very complexity, interactive nature, and malleability of the various license terms frustrate

efforts to find objective measures of the relative stringency of one facility's license to operate as compared with another's.

Nevertheless, we attempted to examine the *direct relationship* between each strand of the license to operate and mill-level environmental performance. Of necessity, we could employ only rough proxies for the inherently complicated regulatory, economic, and social licenses. And we measured facilities' environmental performance – also a variegated phenomenon, consisting of action against many kinds of environmental risks – primarily by using quantitative data concerning serious kinds of water pollution and spills, which was available for most mills only for the latter part of the 1990s. This analysis, while necessarily simplistic, did produce some interesting insights into why some mills went further beyond compliance than others.

A. Understanding Convergence

Over the last few decades, evaluations by government bodies and industry associations, along with our own measures, all confirm the same general conclusion: over the last thirty years, there has been a dramatic reduction in the polluting emissions of pulp mills in all jurisdictions studied – on the order of 80 or 90 percent for several leading measures of water pollution in wastewater. Moreover, there has also been a considerable narrowing of differences between environmental "leaders and laggards" in levels of pollution control. All of the mills in our sample generally were in compliance with their regulatory permits; this too confirms findings of other recent studies of the pulp and paper industry. None of the mills we studied were regulatory laggards in the sense of being ignorant of or systematic evaders of their "regulatory licenses." All of the mills for which we could obtain quantifiable regulatory permit limits had gone beyond compliance, reducing the discharge of key water pollutants to levels well below those specified by their permits.[2]

---

[2] Also the OECD study p. 16 "It appears that many mills are well ahead of the perpmit or regulatoroy limits that are set. This inference is drawn from information on the range of discharges of the principle pollutants from teh process, per tonne of production ... Many mills have discharges that are low compared to the levels that are set in regulations or targets. However, information on permit limits were only supplied for a few mills in each country. Nevertheless, few mills are expected to have low permit discharge limits. This suggests that other factors than permit limits are driving the pollution control programs at mills."

Changes in all strands of the pulp industry's license to operate, at least in economically advanced democracies, help explain both the overall decline in pollution and the general convergence of environmental performance across individual mills. Most striking, perhaps, was the convergence across the countries and the firms we studied in the *terms* of each of the individual types of license. When interviewed in 1998-99, firms with operations in more than one jurisdiction did not regard their regulatory license as being materially different in different jurisdictions. They referred to differences of enforcement style and philosophy in the different regulatory regimes, but they also observed that when the regulatory license ratcheted more tightly in one jurisdiction, other jurisdictions commonly followed that lead.[3] Similarly, while many mills reported that they had experienced far less social pressure in an earlier era, all now experienced some such pressure. Communities and environmental advocacy groups tended to act as de facto regulators, thereby further diluting the importance of different enforcement styles. As one mill manager put it: "the implications of failing to meet the regulations are too great from a public or market point of view, so we are more demanding on ourselves than the regulators are". Finally, the advent of globalization, and an extremely competitive world pulp market has diminished variability in the economic licenses of pulp mills. Institutional investors and financial analysts today are likely to judge all firms by common criteria.

Just as importantly, there has been a convergence *among* the different types of license. Just as the regulatory and social licenses have demanded tighter controls on emissions, the economic license in an ever-more-competitive world market has become more demanding, pushing all firms to concentrate on cutting costs and improving profits. The tougher regulatory and social licenses have substantially improved the environmental performance

[3] Regulatory regimes do not evolve in isolation. On the contrary, jurisdictions commonly model their legislation on that of other jurisdictions. Indeed, Braithwaite and Drahos, in their study of global business regulation, found that "in all the countries we visited for this research, substantial parts of national environment protection laws were modelled from other nation's laws." See J Braithwaite and P Drahos *Global Business Regulation* CUP, 2000, p291. Certainly there is often a time lag between when one jurisdiction adopts a particular regulatory solution and it is taken up elsewhere, but in a industry with as high an environmental profile as pulp and paper, in which the processes of production are relatively standard, and the range of technologies for addressing them, it is hardly surprising that substantial modeling took place.

and attitudes of all firms; in our sample we did not find a single true laggard, and only one true reluctant complier.

But the economic license has simultaneously constrained how far firms can go in a "green" direction. Due to economic constraints – especially over-capacity in the world market for pulp and the weakness of customer demand for unbleached paper or totally chlorine free paper – none of the mills in our sample had leapt far ahead of the others by abandoning pulp bleaching or running a totally chlorine free (TCF) operation; one mill (SH) which had tried TCF had lost too much money and retreated. Economic license constraints helped explain why none of the firms in our sample had done the innovative engineering or made the very costly investments that would be necessary to operate a completely 'closed loop' mill, with no discharges to surrounding waterways, and why none had abandoned bleaching of paper at all as a way of reducing use of potentially polluting bleaching chemicals.[4]

At the same time, financial markets today are more likely to react adversely to firms that get adverse publicity for regulatory noncompliance or avoiding environmental liabilities. Because both regulators and financial analysts take heed of demonstrations and protests against pulp mills, firms can justify paying heed to the social license in terms of economic risk management. The net result of accommodating to the demands of the three different types of license is that a firm can neither afford to drop too low, nor aim too high: hence the considerable convergence in performance revealed by the statistics.

That convergence, however, has drifted more or less steadily toward better control of effluent in the pulp industry. The primary engine of that movement, we believe, has been periodic "tightenings" of governmental regulatory licenses. The law on the books (and in each mill's permit) is a benchmark for enforcers of both the social and economic license. Exposure of substantial legal noncompliance is taken by both community activists and professional investors as a justification for skepticism about the environmental good faith or the

[4] On occasion, the economic license can push in a green direction when customers or suppliers demand better performance due to health or environmental concerns.

competence of mill managers. And that, of course, strengthens the capacity of regulatory license requirements to overcome economic license restraints.

The *largest* reductions in pulp mill discharge to water of harmful pollutants have stemmed from investments in expensive technologies, particularly secondary waste-water treatment facilities, oxygen delignification systems, and the substitution of chlorine dioxide for elemental chlorine as a bleaching agent (which often required construction of a chlorine dioxide plant). Economic license constraints often affected the *timing* of those installations, as firms often successfully argued that they should coincide with periodic rebuilding or updating of primary production equipment. But sooner or later, the regulatory license has trumped economic demands, partially through the implicit promise that all competitors would be obliged to make the same investment. And indeed, one of the most striking findings in our research has been the extent to which major investments in prevention and control technology have been made in response to pending or anticipated regulatory rules.[5]

B. Understanding Variation

Convergence in environmental performance in the pulp and paper industry, while impressive, has not been complete. At the end of the 20th Century, we found significant differences among the mills we studied. The difference between best and worst performers was substantial: on some measures, such as BOD, TSS, and AOX, “laggards” emitted between three and four times more pollution than leaders. While some pulp mills in our sample were emitting less than 20 percent of the BOD and TSS allowed by their regulatory permits specified, others were in the 60-85 percent range. Thus we were left with an important puzzle. Why have some pulp mills done a better job in reducing pollution than others?

[5] Not only did regulation account for significant technological change, but it was regarded as an inevitably "tightening noose. " A number of managers viewed regulation as paramount in bringing about long term environmental improvements. Some cited the personal responsibilities of senior officers or managers, who in most jurisdictions are also liable to penalties as individuals. Others were influenced by their vulnerability to either individual or class actions from citizens injured as a result of the mill’s activities. Many were concerned with the informal punishments which might accompany breach of regulations, not least, negative publicity and shaming. And of course some were influenced by all of these factors.

No simple answer emerges from our data, which point toward a complex, multi-variate explanation. Corporate environmental behavior and motivation are extremely complex. They involve the interaction of numerous variables, each difficult to measure, and more resistant still to quantification, modeling, and regression analysis. Nevertheless, our interview and statistical data do generate a considerable number of insights for theories of regulation and corporate environmental behavior -- relevant not just to the particular industry sector we studied, but also for other highly regulated, heavily scrutinized and mature industry sectors, and perhaps for others as well.

Variation in Firms' Licenses to Operate. Notwithstanding substantial convergence in the terms of the various license requirements, significant variation between the licenses of different mills helped explain some of the differences in their environmental performance. With respect to the *regulatory license*, for example, we found that British Columbia's lag behind the United States in requiring secondary wastewater treatment in mills at the edge of coastal waters resulted in *better* BOD control by those BC mills in 1998-99, on average, because their treatment facilities were newer and closer to "state of the art." Similarly, BC's more imminent and more stringent regulatory deadline for elimination of AOX discharges helps explain why BC mills, on average, had lower AOX emissions in 1998-99 than the American mills in our sample.[6] Other inter-firm differences in environmental performance could be attributed at least in part to the terms of their particular *economic license.* For example, a mill whose products and customers were environmentally sensitive (RF, selling paper diapers in Western Europe) had low AOX discharges. Some firms operating under serious economic license limits, such as those who were 'cash-strapped', told us this constrained their capacity to put in place appropriate environmental technology. Conversely, mills whose corporate parents had larger sales and higher profit margins in the first half of the 1990s, a period of intense social and regulatory pressures regarding chlorine, had better technologies and better environmental performance at the end of that decade.

Different *social license* demands often appeared to be particularly powerful in influencing differences in environmental outcomes. For example, the gap between the

[6] The BC-US differences in discharges, it should be noted, did not pass a test of statistical significance, reflecting the relatively small number of mill in the calculation and the intra-jurisdictional variability in discharges.

emissions of JF and TS, described earlier, was very much what one would have anticipated, given JF's more remote, small-town location and TS's location near the heart of a changing, more economically diversified city with lively environmental activists.[7] In a number of cases, our interview data suggested that a painful well-publicized encounter with a major environmental group produced a sea-change in the corporate approach to the environment. More diffuse community pressure also prodded some firms to "beyond compliance' measures, such as substantial expenditures on odor reduction measures. In several cases, *customers*' concerns, in the wake of Greenpeace's campaign in Western Europe complaining about dioxin in pulp mill effluent, wedded environmental concerns with economic pressure -- helping to explain lower AOX emissions on the part of some of the mills in our sample.

On the other hand, more global measures of the relationship between the different strands of the mills' license to operate did not correlate closely with contemporary variation in mill-level environmental performance. With respect to the regulatory license, for example, pulp mills' environmental performance did not consistently reflect the regulatory jurisdiction in which they operated, or the type of regulatory regime they faced. On none of our measures did facilities cluster tightly by regulatory jurisdiction; even the mills in British Columbia, where regulations call for radical reductions in AOX by the end of 2002, were not uniformly below the sample average. Notwithstanding the greater fearsomeness of legal sanctions in the U.S. and the allegedly more legalistic American approach to regulation, in 1998-99 the mills in the United States were as likely to be below as above average. Similarly, we failed to detect any significant statistical relationship between regulatory jurisdiction and the extent to which pulp mills had invested in state-of-the-art pollution control or reduction technology. One reason, we conclude, is that by and large, convergence in regulatory licenses has come to outweigh regulatory divergence. Just as significantly, there is considerable flexibility in regulatory requirements *within* all the jurisdictions in this study, for regulators have tailored facility-level permits and informal orders to individual mills' inputs, technologies, surrounding environmental exigencies, and investment cycles.

[7] Almost all our respondents acknowledged that a "mill in the boondocks" with an economically dependent local community could be anticipated to have a very relaxed social license compared to one located near (or visible to) a middle class and environmentally conscious community that no longer depended upon it for its economic well-being.

With respect to economic variables, too, the relationships between corporate economic license and mill-level environmental performance, while suggestive in some cases, as noted above, often were inconclusive. One mill that sold pulp to be made into food containers, which one might expect to trigger especially strong market-related concerns for reducing use of elemental chlorine as a bleaching agent, operated at only 60% substitution, below average, and had not installed an oxygen delignification system, a leading edge technology in reducing chlorinated organics. We discovered no significant statistical relationship, for example, between general economic conditions in the pulp industry, as measured by highs and lows in pulp prices, and various mill-level measures of pollution reduction and control of chemical spills. Similarly, we found *no* statistically significant correlation between average 1998-99 emissions and corporate economic resources, as measured by total sales or profit margin of the mill's corporate parent in 1998-99. Although mills owned by corporations with larger profit margins (ratio of income to sales) and larger annual sales income in the *early 1990s* generally had lower BOD, TSS, and AOX emissions late in the decade, and also had better pollution control technology, some of those correlations did not reach the level of statistical significance. Corporate profitability in the first half of the 1990s was correlated (.62) with more ambitious environmental management style in 1998-99, but that association did not persist when we used 1995-99 measures of profitability. Some of the best-performing mills in terms of the environment were "true believers" in terms of environmental management style, despite struggling financially through much of the 1990s.

Finally, although a demanding "social license" was said by many managers to have been a trigger for certain "beyond compliance" environmental measures, it is important to note that managers at different mills responded to social pressures in different ways. Some reacted to community or NGO demands with resistance rather than responsiveness. And this suggests that environmental management style – the attitudes and modes of thought than guided corporate and mill-level policy, not social pressure alone, is a key variable in determining the capacity of social pressures to shape corporate environmental performance.

Variations in Firms' Environmental Management Style. The different responses of firms to apparently similar social and regulatory pressures, plus our findings about the effects of corporate economic resources, suggest that the influence of the regulatory, economic, and social licenses on environmental performance depends on an "intervening variable" –

managerial attitudes, or the combination of attitudes and executive action we call *environmental management style.* When we classified each mill's environmental management style on a scale extending from Environmental Laggard through Reluctant Complier , Committed Complier , Environmental Strategist to True Believer, and then correlated environmental management style with environmental performance, the results were striking.[8] Average emissions for True Believers were substantially lower than those for Environmental Strategists, whose scores were substantially lower than the average for Committed Compliers, whose scores were substantially lower than the average for Reluctant Compliers.

True Believers and Environmental Strategists, we found, also tend to invest in better pollution control technology. They also achieve larger incremental gains in environmental performance by virtue of a more dedicated approach to day-to-day environmental management (what we have called "implementation"). Thus True Believers, we found, have fewer costly and environmentally harmful accidental spills of pulping chemicals. Moreover, they appear to "scan" more actively for "win-win" measures (which improve environmental performance *and* cut costs.) Environmental Strategists and especially True Believers also do a better job of building "reputational capital" with regulators and with environmental activists (in local communities and nationally), which appears to pay off in attaining more flexibility in regulatory permits. In addition, True Believers and Environmental Strategists show a pattern of continued improvement in environmental performance over time, whereas Committed and Reluctant Compliers do not.

Yet firms still are constrained by the terms of their licenses. Thus environmental management style is far from omnipotent in shaping environmental performance, and it may well be shaped in part by the firm's economic situation. A firm that pushes the boundaries of its licenses too far will be punished: by regulators (if there is serious breach of the terms of a permit), by markets (if behavior goes beyond what is perceived by investors and analysts as economically rational) and by communities or NGOs (if their behavior goes far beyond what is perceived as socially acceptable). As noted earlier, no mill in our sample, including True Believers, could ignore the capital constraints imposed by their economic licenses. And where the economic license was tight even they were not very far ahead of the Committed

[8] The correlation between Environmental Management Style and environmental performance was .76 for BOD,

Compliers, for example, in adopting costly new environmental protection measures. Our data suggested that the attitudes of True Believers and Environmental Strategists resulted in incremental gains in the reliability and imaginativeness of day-to-day implementation of relatively standard corporate environmental policies, as well as a broader definition of what constituted economic gain from the installation of environmental equipment.

Moreover, although we are convinced both by our statistical and fieldwork data, that "management matters," our methodology did not enable us to explain precisely why firms approximated one ideal type or another. As a working model, we assume this will be the outcome of interaction between external factors (e.g. the license requirements) and internal factors (e.g., corporate culture). There was much to suggest that firms with different cultures behaved very differently. We were struck for example, by the behavior of one 'corporate raider' which operated two mills in our sample. In each case, its attitude to the local community was confrontational in circumstances in which many other mills had gone to very substantial lengths to appease and establish trust with community groups. But to more fully tease out why different environmental management cultures arise, it would take a far more detailed and intensive study of a number of firms, including not just leaders (as a few studies have done[9]) but also laggards (who are apt to refuse access to social scientists).

II. *Understanding Corporate Greening*

Our findings shed some empirical light on the literature on regulation and compliance and on the greening of industry. For example, a number of environmentalists and legal scholars presume that variation in environmental performance can be substantially explained by differences in regulatory regimes, particularly the stringency of their environmental rules and facility-level permits and the aggressiveness with which they are enforced. Yet we found that no regulatory jurisdiction is doing noticeably better or worse than the others in improving environmental performance among the pulp mills it seeks to control.[10]

.66 for TSS, and .57 for AOX

[9] Prakash, 2000; Hoffman, 1997

[10] The same result was found by a ten-country study of the pulp and paper industry by the OECD.

Most strikingly, the purported greater prescriptiveness and deterrence orientation of US environmental regulation did not produce better environmental outcomes on the part of US mills.[11] At least in this closely-watched industry, debates about coercion versus persuasive, compliance-oriented enforcement strategies are not of the essence, for once the terms of the regulatory license are established, firms have a variety of reasons to comply, over and beyond the efforts of enforcement agencies. Community and NGO vigilance in particular often has been the key to the salience and the threat, in managers' eyes, of their regulatory license, regardless of regime regulatory style.

In this industry, too, we find little empirical support for the more romantic versions of the "greengold thesis", which asserts that there is a happy coincidence between what is good for the environment and what is good for business. On the contrary, particularly with respect to investments in costly new pollution control or reduction technologies, "win-win" solutions do not abound. The best example we encountered was the introduction of oxygen delignification, adopted by some mills partly because it promised operating cost reductions as well as pollution reduction. But many other mills calculated that oxygen delignification, in their operations, would not pay off on either dimension. Most major environmental improvements in the last few decades, such as those resulting from the installation of secondary treatment systems for wastewater and 100% substitution of chlorine dioxide for elemental chlorine in pulp bleaching, were driven by regulation (or anticipated regulation),[12] since they entailed large capital investments and increases, not decreases, in operating costs, and did not result in a clear competitive advantage on the sales front. Most other new

---

[11] Indeed (eliminating RF, whose low AOX score reflected special market incentives) and the United States mills' average AOX emissions were slightly worse than the average.

[12] An OECD study of the pulp and paper industry in 1999 found that "With respect to bleaching, pollution prevention measures have been taken to reduce the quantities of chlorine gas used. In some cases it has been totally replaced by chlorine dioxide. In other cases, even chlorine dioxide has been eliminated, and no chlorine compounds are involved in the production of pulp. In this area, mills have gone far beyon the AOX levels set in their permits. *These developments appear to be more market driven than environmental permit/regulation induced*" (p. 17, emphasis added). We note that it is difficult to distinquish between anticipated regulation and reponses to market or social pressures, which at the very least, affect estimates of the nature and likelihood of regulation. However, at least in the U.S., the *total* substitution of chlorine dioxide for elemental chlorine has probably been induced by anticipated regulation. Mills in the U.S. have long argued that lower levels of substitution are adequate to protect health and the environment, and it is unlikely that they would entirely eliminate elemental chlorine if not required to do so.

environmental technologies are extremely expensive with no short-term pay-off or demonstrable strategic advantage.[13] Significantly, none of the companies in our sample had moved 'outside the box' in terms of new bleach technologies or closed loop production and none saw any natural market advantage in doing so.

Thus to the extent that substantial improvements of the environnmental performance of the sector depend on the introduction of costly new technologies, they are not likely to be generated by economic pressure that elicits corporate scanning for win-win opportunities. That, instead, appears to be the comparative advantage of government regulation, which can (as it has in the pulp and paper industry) serve as a coordinating mechanism, encouraging investment in new environmental technologies by implicitly promising firms most willing to go along that that their competitors will be required to make the same investments.

On the other hand, our research indicated that firms in the pulp and paper industry enjoyed much greater opportunities to achieve win-win outcomes in terms of process and operational changes, such as diligent supervision and training that resulted in better maintenance and tighter process controls -- which in turn reduced chemical spills, thereby minimizing downtime, waste, and trouble with regulators and the community. Put another way, the "greengold" thesis had greater resonance when it came to the benefits of good housekeeping and a systematic approach to environmental management. But even in this realm, we found that *perception* was all-important.-Some firms adopted vigorous environmental management and training systems and did a great deal more than was required by law, in the belief that it made good economic sense to do so, and/or because they believed it would protect the other terms of their license to operate. But other mills seemed singularly unimpressed with the idea of "win-win" outcomes, and remained reactively driven by regulation and other social forces. It appears that 'management matters' far more than the rhetoric of 'win-win'.

---

[13] See V Norberg-Bohm and M Rossi "The Power of Incrementalism: Environmental Regulation and Technological Change in Pulp and Paper Bleaching in the US" Technology Analysis and Strategic Management, Vol 10, No 2, 1988, 225-245, at 225. This is not to deny that pulp mills will invest in major technologies which also have environmental benefits, such as oxygen delignification in some circumstances, but the general picture is one of incremental change with too limited incentives for firms to take risks to adopt major technological change.

Our research does not provide support for the various 'stage models' of corporate greening, which assert or assume that firms will go through a progression (and in the view of some, a natural evolution) from laggard, to compliance, to compliance plus, to environmental excellence.[14] On the contrary, the constraints of the economic license (not least, the pressures to cut costs, the judgments of financial markets, and the unwillingness of consumers to pay a price premium for environmental excellence) are likely to keep them far short of the last of these stages. As we have seen, any company that strays too far from the terms of the economic license is likely to be brought back into line. For example, since consumers thus far have been unwilling to pay a price premium for totally chlorine free paper, even companies which have the technology to go down this path do not use it because it is uneconomic to do so. Neither is it the case that firms will all, sooner or later, progress to at least a "higher" (albeit not the highest) stage of environmental performance.[15] For notwithstanding increasing convergence in environmental performance, our study has also demonstrated substantial continuing variation, and no evidence of any natural trend to higher stages of corporate greening.

On the other hand, our findings resonate with the various theories which emphasize the importance of a firm's social standing and in particular the firm's economic stake in maintaining its reputation for good environmental citizenship. Firms in our sample, particularly larger firms with a high public profile, or even smaller ones highly dependent on the goodwill of the local community, tended to be highly sensitive to negative publicity, and vulnerable to informal sanctions and shaming. And their behavior was shaped by a far broader range of stakeholders within the 'organizational field' than regulators alone. Local community concern and pressure were particularly important in this respect.

Finally, our findings also lend considerable support to those who attribute importance to managerial attitude. However, whether the sources of a "greener" environmental management style derive from sources mentioned in the literature – such as "charismatic green leadership", internal corporate culture, the nature of the firm's market niche, or other

---

[14] See ch 2.

[15] This finding is consistent with A Ghobadian, H Viney, J Lui and P James "Extending Linear Approaches to Mapping Corporate Environmental Behaviour" *Business Strategy and the Environment,* Vol 7, 13-23 (1998).

variables – was not apparent from our research, which would have had to have taken a very different form if we had sought to address such issues.

F Policy Implications

Our findings have a number of implications for regulatory design and social policy, and suggest a number of instruments and strategies by which governments and others can most effectively change corporate environmental behavior. In analyzing the type of intervention which might be necessary, it is useful to begin by asking, "To what extent are firms likely to undertake environmental improvements voluntarily?"

Although there were a range of situations in which most of the firms we studied were willing go beyond compliance, they did so for the most part because of their perceptions of their license conditions and as a matter of risk management. Their beyond compliance investments were mostly of the kind that we have termed "margin of safety" and "anticipatory compliance" measures, although some (in response to intense social license pressures) fell into the "good citizenship" category. It was government regulation, social pressures, and occasionally consumer actions that drove environmental behavior, coupled with management's varying perceptions of the scope of win-win outcomes.

For these reasons, it would be unwise to assume that a purely voluntary approach will achieve further improvements, particularly in the case of reluctant and committed compliers, which account for almost half our sample of firms. Even in the case of environmental strategists or true believers, their more ambitious "good citizenship" and "win-win" investments did not emerge across the board and were relatively limited. The evidence suggests that absent some substantial tightening of their license terms, or some external 'shock' precipitating a shift in management style, or both, many mills may simply remain at the 'stage' of environmental progress that they have currently achieved.

In terms of regulatory design, the separate regulatory, economic and social strands of the business enterprises' license provides a useful analytical framework for identifying the points of greatest leverage over corporate environmental performance.

Using the The Regulatory License. It is mportant to reemphasize our finding that the *largest* improvements in corporate environmental controls of water discharges were associated with tightening regulatory requirements and intensifying political pressures. The big jumps in waste water environmental performance in pulp manufacturing were the products of *regulation-driven technological change*. That is, technology changes occurred in order to meet more stringent performance standards.[16]

As noted earlier, further technological change is also likely to be driven by regulation[17]. Yet governments are understandably reluctant to base performance standards on new technology that is unproven, for should the unproven technology fail, other jurisdictions will not adopt the requirement, and local industry may be put at a competitive disadvantage.

---

[16] The academic literature on regulation draws a distinction between regulations that specify "performance standards" (e.g., maximum emissions for particular substances) and regulations that mandate the use of specific control technologies ("technology standards"). Michael Porter and Claus van der Linde have argued that performance standards can foster innovation because they free up an enterprise to respond to a regulator's requirement in the way it best thinks fit. In evidence they cite the relative success of the Scandinavian and USA governments in achieving emissions reductions in the pulp and paper industry. The Scandinavian companies, under a performance based regime, "developed innovative pulping and bleaching technologies that not only met emission requirements but also lowered operating costs". USA companies, in contrast, did not respond to regulation by innovating because USA specification or technology based regulations did not permit companies to "discover how to solve their own problems" (Porter and van der Linde 1995: 129).

However, in the State of Washington permits we reviewed, we found that mills were not generally required to install particular technologies, but that they were required to meet performance standards, although these in turn were based on certain model control technologies. This most often led to the installation of the model technology. In addition, where permits did require the installation of a specific technology, this requirement had usually been arrived at after negotiations between the regulator and regulatee, or only applied if certain conditions were met. Similarly in all the jurisdictions in our study, pulp mills' environmental developments generally were driven by *performance* standards rather than by governmental mandates to use specific technologies. These findings are in keeping with a ten-country OECD study of the pulp and paper industry, which states:

> "The permitting processes followed impose release conditions, including limits. These are developed on the basis of existing technology capable of meeting the limits. Mills are permitted to choose what equipment to install to meet the limits. Flexibility is granted in enabling them to do this in the most cost effective manner. Specific technologies are not mandated.
>
> In some cases, permit conditions include the installation of specified equipment. It is noted that this is attained through prior discussions between the permitter and permittee. The specification therefore reflects an agreement between the parties, and not the mandating of equipment." (p.15)

[17] For a discussion of the relationship of regulation and technology in a somewhat similar context see N Ashford and G Heaton "Regulation and Technological Innovation in the Chemical Industry" *Law and Contemporary Problems* 46 (3) (summer 1983), 157.

Thus determining the appropriate technology on which to base a regulation is a costly and risky process for a government agency, making it reluctant to mandate substantial leaps forward in technology-based environmental performance in the absence of either major public pressure (as occurred with respect to dioxins) or the demonstrated economic viability of new technology.

Nevertheless, even without specifying more stringent performance standards, regulatory agencies are able to influence the development of new technologies by specifying their long term goals and engaging industry officials in a dialogue about pathways and timetables for achieving them. For example, the U.S. EPA notes in the preamble to its cluster rule that it "believes that the mill of the future will approach closed loop operations."[18] and suggests an avenue by which this objective might be achieved.

The implied government capacity to make such technologies, once developed by leaders, mandatory for all firms provides some incentive for leaders to experiment and innovate, thereby obtaining first-mover advantages.[19] It also provides some incentive for laggards not to fall too far behind current industry practice, to avoid costly retrofits if new technology becomes required. That is, regulation can stimulate greener technological innovation and adoption of innovative technology by creating a dynamic, increasingly stringent regulatory environment, and by decreasing uncertainty. Thus regulation in general, rather than any particular regulation, is able to herd industry towards excellence by imposing a regulatory trajectory that forces facilities to anticipate a future of more stringent demands, and a future in which new environmental and health impacts must be addressed.[20] This effect is intensified because regulations, health and environmental concerns, and technological innovations in any

---

[18] 63 *Federal Register* 18535

[19] Note Porter and van der Linde's characterization of US pulp and paper regulations in the 1970s which they argue, prevented US companies from realizing first mover advantages because it "ignored a critical principle of good environmental regulation: Create maximum opportunity for innovation by letting industries discover how to solve their own problems". See M Porter and C van der Linde "Green and Competitive: Ending the Stalemate" Harvard Business Review Sept/Oct 1995 120-133 at 129.

[20] Finnish pulp mills have found that this "dynamic incentive [to reduce averages below limits in order to avoid accidental short-term exceedences] has, however, been reduced by the fear expressed by many interviewees that discharges far below the permit limits are likely to result in tighter permit" (p. 13 Mickwitz and Hilden, 2001)

jurisdiction commonly ripple through to other jurisdictions by virtue of the process of "regulatory modeling"[21].

The "herding process' can be facilitated by the provision of good information about the relative environmental performance of regulatory leaders and laggards. For the most part, regulatory systems' performance in this regard has been disappointing. In conducting this research, for example, we faced tremendous difficulties in obtaining accurate and accessible data that could usefully be compared over time and between facilities.[22] Good evaluations of government or corporate policy require accurate, *comparable,* outcome data. Monitoring requirements can provide such data if they take into account more than the compliance of a particular facility at a particular point in time. Monitoring requirements could allow for evaluative research and policy analysis if care is taken to ensure that the data collection they require allows for comparison over time and between facilities, and if the manner in which the data is reported assures data quality and facilitates accessability.

More broadly, some regulatory agencies have sought to nurture innovative, cost-effective solutions and to build in continuous improvement by developing a "performance track": an alternative to traditional regulation which is offered to environmental leaders who

---

[21] In an industry with as high an environmental profile as the pulp and paper industry, in which the processes of production are relatively standardized, substantial modeling apparently takes place. For example, a number of our respondents pointed to the close relationship between United States and Canadian environmental regulations particularly, but similar technology-related regulatory solutions could also be found in New Zealand and Australia. On the process of regulatory modeling generally, and its importance, see further J Braithwaite and P Drahos Global Business Regulation, 2000, Ch 25.

[22] For example, some facilities would report pollutant discharges in efficiency units (pounds per unit of production), others in concentration units (pounds of pollutant per litre of water), and others in impact units (pounds per day). However, the data required to make the conversions (production per day, discharge volume per day) between these units was often not provided. Even when production figures were given, frequent changes were made as to how production levels were reported, so that consistency over time and between facilities was difficult to maintain. Sometimes, although the same parameter was being monitored, the laboratory analytic techniques differed. Or different parameters were used to try and measure a similar environmental problem (chlorine discharges v. adsorbable organic halides v. dioxin).

While most jurisdictions required that data be collected relatively frequently, there was no consistency as to how often it was reported. Facilities were sometimes to required to take daily measurements but only report annual averages.

Data was also difficult to obtain, sometimes requiring a visit to the local regulatory agency and copying down the numbers on the company's report. Electronic data was available in some jurisdictions, but the data quality was not always as good as one would wish. For example, the US EPA's Permit Compliance System contains discharge monitoring report data for all permitted facilities in the U.S. However, a value of 4.3 1000lbs/day is often entered into the database as 4.3 lbs/day instead of 4300 lbs/day. Automated data quality routines ought to be able to identify such problems.

agree to implement an environmental management system, to consult with and provide information to local communities, and to achieve "beyond compliance" environmental outcomes negotiated with the regulator[23]. Underlying such approaches is the belief that such flexibility will "harness the power of competition to stimulate profitable clean technology and other environmentally beneficial innovations."[24] For example, mill RF signed an agreement with the US EPA under which it committed itself to maintain superior environmental performance and to serve as a benchmark for EPA in setting effluent guidelines under the Cluster Rules. In return it was given significant regulatory flexibility as well as operational and capital cost savings, including flexible control of hazardous air pollutants, flexible air permitting for new product trials and development, and fewer reporting monitoring and record keeping requirements. It was also offered greater predictability of regulatory requirements over a 15 year period.

On the other hand, negotiating flexible permits is costly and risky both for agencies and regulated firms.[25] Thus far, at least in the United States, they have proved feasible only in the limited number of cases where environmental and economic paybacks are sufficient to overcome their considerable cost to develop, administer, monitor and assess, and where both agencies and facilities have sufficient reputation capital to overcome social actor opposition.[26] TS, for example, was able to obtain a "bubble permit"[27] for its operations because of its heavy

---

[23] Examples of this approach include various Clinton-Gore Reinventing Environmental Regulation initiatives, most notably Project XL and the Environmental Leadership Program, the Wisconsin Green Tier Proposal (Wisconsin Department of Natural Resources 2000) and the USA EPA's Performance Track (USA EPA 2000).

[24] M SmithThe US Pulp and Paper Industry and Sustainable Development (1997) p9.

[25] Because companies clearly have more information about their facilities' environmental performance problems and potentials than do regulators and social actors, unique, flexible permits require a high degree of expertise on the part of regulators and social actors who wish to assess (a) the appropriateness of permit conditions, and (b) the *comparative* performance of facilities with different permit requirements. Moreover, obtaining such permits require more thought and work (and hence expense) *for facilities*, and are therefore only worth their while if they result in substantial savings on compliance.

[26] Such regulatory flexibility systems are common in some jurisdictions, such as Sweden and New Zealand, OECD p. 36/37, small jurisdictions that do not need to regulate thousands of facilities. In addition, these jurisdictions still have national technology-based guidelines or regulations on which specific permits were based. In the U.S., regulatory flexibility programs have met with only very limited success. Too high transactions costs, a failure to overcome mutual mistrust, the lack of a statutory base, and a vague definition of "better" results, have been identified as particular weaknesses. See for example, Weber, 1998)Steinzor (1996); and Susskind *et al* (1998). For a broader critique of environmental flexibility initiatives see Davies and Mazurek (1997).

investments in its reputation with both regulators and social actors, while RF, already a superior environmental performer, was eager to obtain the much broader benefits described above.

Leveraging the Social Licence. Another central finding of our study was that business firms' social licenses provide a particularly powerful point of leverage. Community and environmental advocacy groups in particular tend to act as effective watchdogs and de facto regulators, shaming and otherwise pressurizing companies into beyond compliance environmental performance. While they can sometimes play this role in the absence of any form or state intervention, their effectiveness, we have observed, is enhanced by various forms of facilitative government regulation. For example information and monitoring requirements can empower social actors if environmental information about facilities is easily accessible and sufficient to allow for meaningful interpretation of the data. Rules that require facilities to inform the public of environmentally significant actions and monitoring redress some of the inherent information assymetries that occur between regulators, regulatees and the public, and allow social actors to most appropriately target their actions[28].

For example, in Indonesia, under the PROPER PROKASIH program, regulators rank the performance of individual facilities using surveys, a pollution database of team reports, and independent audits. A enterprise's pollution ranking is readily understood by the public, being based on a colour coding (gold and green for the best performers, black blue and red for those not in compliance). The program has reportedly been very successful in improving the environmental performance of participating firms.[29] In our study, we found that in British

---

[27] Bubble permits are of particular use in air pollution because while wastewater is relatively easy to collect into a common stream for treatment (or a separate stream for recirculation back into the process), air emissions are difficult and expensive to collect and transport without leaks, thus each piece of equipment is often treated as a separate source.

[28] See for example, Environment.Gov: Transforming Environmental Protection for the 21st Century, National Academy of Public Adminstration Washington DC (2001) which calls for an information-rich, flexible, and performance driven strategy. See also DP Clarke "EPA in the Information Age" Environmental Forum, Vol 18 No 3, May-June 2001, pp22-34.

[29] A recent study which examines the program over time, suggests that community pressure and negative media attention, and increased likelihood of obtaining ISO 14000 certification, are the major stimuli for improved environmental performance. However, the provision of increased environmental information to plant managers is also a significant factor and the authors cite factory managers learning more about their own plant's pollution emissions and abatement opportunities as a key impetus for abatement (Afsah *et al*).

Columbia, mills were particularly mindful of avoiding breaches which might result in poor standing in a periodic government-published report that functioned much as a mill-by-mill environmental scorecard. In the United States, the Toxic Release Inventory, which simply obligates firms to publish their total estimated emissions of potentially hazardous chemicals, has created strong incentives to reduce the use of such chemicals.

Moreover, our research indicates that government actions that *procedurally* empower local communities can have significant effects. In New Zealand, mills reported having become much more responsive to community environmental concerns after communities were given the legal right to challenge the terms of each facility's "consent" (permit), and thereby gained the power to delay the introduction of new processes or technology. In an Australian jurisdiction, similar effects flowed from a new law that obligated firms to prepare and comply with an environmental improvement plan, including a commitment to consultation with local communities[30]. In Canada and the US, the permitting process has long been open to the public and allowed for public comment on permitting decisions. Such public access has been extended in the US through programs such as Project XL and the Environmental Leadership Program, which make it a condition for providing greater regulatory flexibility, that participating companies provide information to, and consult with, local communities.

The Economic License and Environmental Performance. Turning to the economic license, we described earlier how its terms operate as a constraint on environmental leadership. Our interviews with financial institutions, industry analysts, corporate lawyers and company officials in the pulp and paper industry suggested that the willingness of investment analysts and the financial community to take account of environmental issues is changing only very slowly. However, not all aspects of the economic license militate against improved environmental performance. Scholars and environmental activists have suggested that governments and NGOs can act to mitigate some of the harsher impacts of the economic license by facilitating provision of information to the market, enabling it to make more accurate evaluations as to the environmental credentials and liabilities of different firms. There is some evidence that markets do punish environmentally 'bad' firms and reward

[30] See further Gunningham and Sinclair (2002) Chapter 8.

'good' ones in terms of their stock price,[31] perhaps because good environmental management may be regarded as a useful indicator of good management generally. However, other studies find no such effect.[32] We found little evidence of this effect in our study, discovering instead that several doses of adverse publicity about one firm's environmental record had no significant effect on its stock price.[33]

Nevertheless, governments may be able to add greater legitimacy and potency to the dissemination of relevant information to the market**.** For example, the U.S. Securities and Exchange Commission requires all publicly traded companies to report their environmental liabilities both for hazardous waste cleanup and environmental legal actions. However, there has been an extremely low disclosure rate.[34] Information standards can obviously only be effective to the extent that the information they require is in fact provided.

Similarly, the launch of private efforts to improve the provision of data to the market may also have a positive impact on corporate environmental performance. For example, environmentally-based index funds such as the Dow Jones Sustainability Group Index may, over the long term, lead to small companies improving their environmental performance so as to be listed on the index. In addition, if the fund provides a reasonable return on investment

---

[31] Kleindorfer P and Orts E "Informational Regulation of Informational Risks" Wharton School, University of Pennsylvania Working Paper, 1996, p1; S Afsah, A Blackman and D Ratunanda "How do Public Disclosure Pollution Control Programs Work? Evidence from Indonesia" Resources for the Future, http://rff.org/CFDOCS/disc_papers/pdf_files/0044.pdf; J T Hamilton, "Pollution as News: Media and stock market reactions to the TRI data" (1993) 27(1) *Journal of Environmental Economics and Management* 38-48.

[32] Day et al, 1997 found no significant abnormal returns for the forest products industry in the stock market for two envints of environmental importance that they studied (the 1993 executive order stipulating that paper purchased by the government meet minimum stands of recycled content, and the 1987 announcement that pulp mills were a major souce of dioxin in waterways and that trace amounts of dioxin could be found in most paper products).

[33] See analysis of PG in Chapter .

[34] "A 1992 survey of SEC registrants with the SEC found that 62 percent of respondents had not accrued known environment-related exposures on their financial statements. A 1996 study of enivronmental disclosure by comopanies involved in initial public offerings who were known CERCLA potentially responsible parties [i.e. might be responsible for hazardous waste cleanup] at one or more sites found a non-reporting rate of 54 percent, as compared to a non-reporting rate of 61 percent for currently registered companies. Additionally, a 1998 study conducted by the Office of Enforcement and Compliance Assurance (OECA) on the disclosure of environmental legal proceedings, ... for the years 1996 and 1997, found a non-reporting rate of 74 percent" (January 19, 2001 memo from the Mary Kay Lunch, Director of the Office of Planning and Policy Analysis, U.S. EPA) *http://es.epa/gov/oeca/oppa/secguide.html*

(as seems to be the case[35]), such indices might lead to a less reactive approach on the part of financial analysts and others, and incentives for corporate environmental leadership.

The economic license can also be influenced by consumer preferences. Were consumers to cease demanding bright white paper, pulp mills would abandon environmentally damaging bleaching technologies.[36] In theory, that process could be accelerated through independent certification and labelling schemes which call consumers' attention to products made in environmentally preferable ways, such as unbleached paper. Realistically, however, while such labeling schemes may have value in some areas, such as the sale of up-market wines, they face a much harder task in the realm of basic commodities such as pulp or copy paper. A more promising first step, therefore, would be for governments, as major purchasers of paper products, to lead the market toward dramatic reductions in the use of bleaching chemicals by insisting on buying only (or mostly) bleach free paper products. Similarly, in circumstances where unbleached paper is unsuitable, government could provide leadership by purchasing pulp with high recycled paper content. However, the fickleness of government in obeying its own rules may make companies reluctant to invest heavily in such initiatives. Despite an executive order in 1993 for the U.S. federal government to purchase recycled paper, actual purchasing behavior did not change until 1998, and only after tremendous pressure to do so was applied by various environmental groups.[37]

Policy can most directly influence the economic constraints faced by industry (and activists) by making it cheaper for industry to comply or go beyond environmental compliance (and cheaper for activists to participate in the regulatory process and obtain information). This could be done through direct subsidies, grants, tax incentives and other transfers of money, to both industry and community and environmental organizations. For

---

[35] See P Cerin and P Dobers "What does the performance of the Dow Jones Sustainability Index tell us?" http://home.swipnet.se/peter_dobers/publikationer-eng.html

[36] For a brief period at the turn of the 1990s, companies exporting to environmentally sensitive European markets did pay considerable attention to these sensitivities but as the premium price for TCF pulp dissipated, so too, did the incentive for those companies to change their own technologies.

[37] Greenwire Oct 18, 1996, ENVIROS, COUNTIES URGE FEDS TO BUY GREEN. It was not until February 1998 that the GSA announced that it would only sell recycled paper (Greenwire, February 27, 1998, RECYCLING: FED AGENCY WILL PROVIDE RECYCLED PAPER ONLY)

example, governments can fund research consortia to find new and innovative technologies. They can also provide tax incentives for companies that install more environmentally-friendly technology. They can provide grants to activist organizations that allow them to pay staff to develop expertise, or attend public hearing.

The points of leverage provided by the different strands of firms' license to operate, of course, are not mutually exclusive. Since the causes of inadequate environmental performance are complex, multi-faceted and contingent upon a range of external factors, they are unlikely to be amenable to a simple or single policy fix. Policy makers need to employ a substantial toolkit and to leverage change at a number of different pressure points. Combinations of instruments, harnessing a broader range of social actors, are likely to provide the most promising approach. What combinations are likely to work best in what circumstances, is itself a complex issue which one on us has explored at length elsewhere.[38]

One of our strongest findings is that 'management style matters.' By corporate environmental management style, we should reiterate, we mean something more than the adoption of formal environmental management systems, such as ISO 14000. Environmental management style includes a set of managerial attitudes toward environmental issues and actions that go beyond the formulation and systematic implemention and evaluation of environmental policies. It includes such variables as how open and responsive managers are in dealing with regulators and environmental groups, how imaginatively and energetically they scan for "win-win" opportunities, and what kind of calculus they employ in evaluating the business benefits of investments in environmental improvements. What distinguished high performing True Believers and Environmental Strategists from, say, Committed Compliers, was not whether or how often they conducted systematic self-audits or how they developed environmental management systems, but how they conceived the purpose and function of such audits or systems.

If management style is important in explaining environmental outcomes, an important policy question whether management style is amenable to influence by the levers of public policy, and if so how? Unfortunately, government intervention on this front is risky without

[38] N Gunningham and P Grabosky *Smart Regulation; Designing Environmental Policy*, OUP, UK, 1998.

knowing a great deal more about *why* management attitudes in different firms approximate different ideal types. And in this regard our research, limited to cross-sectional comparisons at one point in time, as opposed to detailed firm-by-firm histories, produced no definitive knowledge. The managers we interviewed identified a number of influences on their behavior, largely in terms of the various license conditions described earlier. But why they reacted so differently to these different pressures, we cannot say. How government policy makers might be able to change corporate environmental management style remains an elusive, but undoubtedly important, empirical and policy issue.

Finally, our research suggests that environmental management style alone cannot guarantee superior environmental performance. Indeed the data suggests that external license factors – regulatory and social pressures, and economic constraints and resources – that both interact with (and often shape) management attitudes are crucial in determining environmental performance. If those license conditions are not congenial, measures focussed on management style alone are unlikely to make a large difference. To paraphrase Marx, companies make their own history but not in circumstances of their own choosing.

References:

Aoki, Kazumasu & John Cioffi (2000) “Poles Apart: Industrial Waste Management Regulation and Enforcement in the United States and Japan” in Robert A. Kagan & Lee Axelrad, eds., *Regulatory Encounters: Multinational Corporations and American Adversarial Legalism*. Berkeley: University of California Press

Aoki, Kazumasu, Robert A. Kagan & Lee Axelrad (2000) "Industrial Effluent Control in the United States and Japan" in Kagan & Axelrad, eds., *Regulatory Encounters: Multinational Corporations and American Adversarial Legalism*. Berkeley: University of California Press

Ayres, Ian & John Braithwaite (1992) *Responsive Regulation*. New York: Oxford University Press

Bardach, Eugene & Robert A. Kagan (1982) *Going By The Book: The Problem of Regulatory Unreasonableness. A Twentieth Century Fund Study*. Philadelphia: Temple University Press

Becker, Gary (1968) “Crime and Punishment:An Economic Approach” 76 *Journal of Political Economy* p 169;

Braithwaite, John (1993) “The Nursing Home Industry," in Michael Tonry & Albert J. Reiss, Jr., ed., *Beyond the Law: Crime in Complex Organizations.* University of Chicago Press

-------- (1985) *To Punish or Persuade: Enforcement of Coal Mine Safety*. Albany, N.Y.: SUNY Press

Braithwaite, John and Peter Drahos (2000) *Global Business Regulation,* Cambridge University Press

Cashore, Benjamin & Ilan Vertinsky (2000) “Policy Networks and Firm Behaviours:Governance Systems and Firm Responses to External Demands for Sustainable Forest Management.” *Policy Sciences:*33:1-20

Coglianese, Cary and Jennifer Nash (2001) in C. Coglianese & J. Nash, “environmental Management systems and the New Policy Agenda,” in Coglianese & Nash, eds., Regulating from the Inside: Can Environmental Management Systems Achieve Policy Goals? Washington, D.C.: Resources for the Future.

Dwyer, John Richard Brooks, & Alan Marco (2000) "The Air Pollution Permit Process for U.S. and German Automobile Assembly Plants" in Kagan & Axelrad, eds., *Regulatory Encounters: Multinational Corporations and American Adversarial Legalism.* Berkeley: University of California Press

Ecology of Industry, 1998

Fuchs. D.A. and D.A. Mazmanian (1998) “The Greening of Industry: Needs of the Field” Business Strategy and the Environment,” 7: 193-203.

Fung A and D O'Rourke "Reinventing Environmental Regulation from the Grassroots Up: Explaining and Expanding the Success of the Toxics Release Inventory" *Environmental Management* Feb 2000, Vol 25, No 2, 115-127

Grabosky, Peter & John Braithwaite (1986) *Of Manners Gentle: Enforcement Strategies of Australian Business Regulatory Agencies.* Melbourne: Oxford University Press

Gunningham, Neil (1987) "Negotiated Non-Compliance: A Case Study of Regulatory Failure" *Law & Policy* 9: 69-87

Gunningham, Neil and Peter Grabowsky (1998) Smart Regulation: Designing Environmental Policy, Oxford: Clarendon Press

Harrison, Kathryn (1995) "Is Cooperation the Answer? Canadian Environmental Enforcement in Comparative Context." J. Pol. Anal. & Mgmt 14:221-224

------ ( )

--------(1996) "The Regulator's Dilemma: Regulation of Pulp Mill Effluents in a Federal State," Canadian Journal of Political Science 29:469-496

Hobbs, J. (2000) 'Promoting cleaner production in small and medium-sized enterprises' in R. Hillary (ed.) (2000) *Small and Medium-Sized Enterprises and the Environment* (Sheffield, UK: Greenleaf Publishing): 150.

Hillary, R (2000a) 'The Eco-Management and Audit Scheme, ISO 14001 and the smaller firm', in R. Hillary (ed.) (2000) *Small and Medium-Sized Enterprises and the Environment* (Sheffield, UK: Greenleaf Publishing)

Hoberg, George (1993) "Environmental Policy: Alternative Styles" in *Governing Canada: State Institutions and Public Policy*. Toronto: HBJ-Holt

Hoffman, Andrew (1997) *From Heresy to Dogma: An Institutional History of Corporate* Environmentalism. San Francisco: New Lexington Press

Kagan, Robert A. & Lee Axelrad (2000) *Regulatory Encounters: Multinational Corporations and Adversarial Legalism.* University of California Press

Kagan, Robert & Scholz, John (1984) "The Criminology of the Corporation and Regulatory Enforcement Styles," in Keith Hawkins and John Thomas, eds., *Enforcing Regulation* (Boston: Kluwer-Nijhoff)

Kelman, Steven (1981) *Regulating America, Regulating Sweden: A Comparative Study of Occupational Safety and Health Policy*. Cambridge, Mass: MIT Press

Magat, Wesley & W. Kip Viscusi (1990) "Effectiveness of the EPA's Regulatory Enforcement: The Case of Industrial Effluent Standards." J. Law & Economics 33: 331-360

Miller J L and A B Anderson "updating the Deterrence Doctrine: (1986) 77 *The Journal of Criminal Law and Criminology* 418.

Morag Levine, Noga (1994) "Between Choice and Sacrifice: Constructions of Community Consent in Reactive Air Pollution Regulation," *Law & Society Review* 28: 1035-1077

Norbert-Bohm, Vicki & Mark Rossi (1998) "The Power of Incrementalism: Environmental Regulation and Technological Change in Pulp and Paper Bleaching in the US," *Technology Anal. & Strategic Mgment* 10: 225-241

OECD (2000) *Reducing the Risk of Policy Failure: Challenges for Regulatory Compliance.* OECD Working Paper Vol III, No 77, 2000.

Prakash, Asseem (2000) *Greening the Firm: The Politics of Corporate Environmentalism*. Cambridge, UK: Cambridge University Press

Raizada, R. (1998) *Corporate Responses to Government and Environmental Group Actions Designed to Protect the Environment.* Ph.D. Dissertation, University of British Columbia

Sabatier, Paul and Mazmanian, Daniel (1983), *Can Regulation Work? The Implementation of the 1972 California Coastline Initiative*, New York: Plenum

Scholz, John T. (1984) "Cooperation, Deterrence and the Ecology of Regulatory Enforcement," *Law & Society Review* 18: 601.

Scruggs, Lyle A. (1999) "Institutions and Environmental Performance in Seventeen Western Democracies," *British J. Political Science*, 29

Smart B ed*, Beyond Compliance: A New Industry View of the Environment* Washington DC, World Resources Institute, 1992.

Smith, M. (1997) *The US Paper Industry and Sustainable Production.* MIT Press, Cambridge.

Sonnenfeld, David A. 2000. "Social Movements and Ecological Modernization: the Transformation of Pulp and Paper Manufacturing" (Working Paper # 00-6). Berkeley, CA: University of California, Berkeley Workshop on Environmental Politics.

Stanley, Elaine (1999) "Available Environmental Data for Deterrence Research" Presentation by EPA Office of Compliance at Forum on Deterrence of Environmental Violations and Environmental Crimes, National Institute of Justice, Washington .D.C. July 12, 1999.

Stigler George "The Optimum Enforcement of Laws" (1970) *Journal of Political Economy* 78:526

Thornton, Dorothy, Robert A. Kagan & Neil Gunningham (2000) "In Search of Environmental Leadership: Law, Community, Market and Management in the Pulp and Paper Industry" paper presented at Annual Meeting of the Law and Society Association, Miami Beach, FL , May 26-29

Verweij, Marco (2000) "Why is the River Rhine Cleaner than the Great Lakes (Despite Looser Regulation)," *Law & Society Review* 34: 1007

Vogel, David (1986) *National Styles of Regulation: Environmental Policy in Great Britain and the United States*. Ithaca, N.Y.: Cornell University Press

Walsh, Mary Williams (1992) "Canadian Mill's Quandary: Can it Make Money on Pollution-Free Paper?" Los Angeles Times, March 8, p. D-3.

Wilson, Graham (1985) *The Politics of Safety and Health*. Oxford: Clarendon Press

Wokutch, Richard E. (1992) *Worker Protection, Japanese Style: Occupational Safety and Health in the Auto Industry*. Ithaca, NY: ILR Press

Wokutch, Richard E. & Craig V. Vansandt (2000) "National Styles of Worker Protection in the United States and Japan: The Case of the Automotive Industry." *Law & Policy* 22: 369-384

Arthur D. Little, Inc. (1995) "Hitting the Green Wall," Perspectives

Baylis, Robert, Lianne Cornell & Andrew Flynn (1998) …… *Business Strategy and the Environment* 7: 150-161

Bhat, Vasanthakuram (1996) The Green Corporation: The Next Competitive Advantage. Westport, CT: Quorum Books

Cebon, Peter (1993) "The Myth of Best Practices: The Context Dependence of Two High-performing Waste Reduction Programs," in K. Fischer & J. Schot, eds. Environmental Strategies for Industry. Washington, DC: Island Press

Cashore, Benjamin & Ilan Vertinsky (2000) "Policy Networks and Firm Behaviours: Governnance Systems and Firm Responses to External Demands for Sustainable Forest Management." Policy Sciences 33: 1-30

Coglianese, Cary & Jennifer Nash (200?) "Management-Based Environmental Policy: An Introduction," in

Daft, Richard (1992) Organization Theory and Design. St Paul, MN: West Publishing.

Fischer, Kurt and Johan Schot (eds.), (1993) Environmental Strategies for Industry. Washington, D.C.: Island Press

Ghobadian A, Viney H, Lui J, and James P (1998) "Extending Linear Approaches to Mapping Corporate Environmental Behaviour" *Business Strategy and the Environment* 7: 13-23.

Gladwin, Thomas (19930 "The Meaning of Greening: A Plea for Organizational Theory," in Fischer, Kurt and Johan Schot (eds.), Environmental Strategies for Industry. Washington, D.C.: Island Press

Haines, Fiona (1997) Corporate Regulation: Beyond "Punish or Persuade." Oxford: Clarendon Press

Hartman, Raymond, Maimil Hug & David Wheeler (1997) Why Paper Mills Clean up: Determinants of Pollution Abatement in Four Asian Countries. World Bank Policy Research Paper #1710. Washington, TheWorld Bank.

Himmelberger, James & Halina Brown (1995) "Global Corporate Environmentalism: Theoretical Expectations and Empirical Experience," *Business Strategy & The Environment* 4: 192-199

Hirshhorn, Joel & Kirsten Oldenburg (1991) Prosperity Without Pollution: The Prevention Strategy for Industry and Consumers. New York: Van Nostrand Reinhold

Hoffman, Andrew (1997) From Heresy to Dogma: An Institutional History of Corporate Environmentalism. San Francisco: New Lexington Press

Mehta. Alex & Keith Hawkins (1998) , "Integrated Pollution Control and Its Impact: Perspectives From Industry," *Journal of Environmental Law* 10: 61.

Porter, Michael and Claas van der Linde (1995a) "Green and Competitive: Ending the Stalemate," Harvard Business Review 73: 120-134

--------(1995b) "Toward a New Conception of the Environmen-Competitiveness Relationship," Journal of Economic Perspectives 9:97-118

Prakash, Asseem (2000) Greening the Firm: The Politics of Corporate Environmentalism. Cambridge, UK: Cambridge University Press

Reinhardt, Forest L. (2000) Down to Earth: Applying Business Principles to Environmental Management. Boston: Harvard Business School Press

Roome N (1992) "Developing Environmental Management Strategies" Business Strategy and the Environment" Vol 1, Part 1, pp 11-23.

Steger, U (1993) "How German Companies are Dealing with Environmental Issues" in Fischer K and Schot J, *Environmental Strategies for Industry: International Perspectives on Research Needs and Policy Implications* Island Press, Washington DC (1993) Ch 5.

References:

Arthur D. Little, Inc. (1995) "Hitting the Green Wall," *Perspectives*

Baylis, Robert, Lianne Cornell & Andrew Flynn (1998) …… *Business Strategy and the Environment* 7: 150-161

Bhat, Vasanthakuram (1996) The Green Corporation: The Next Competitive Advantage. Westport, CT: Quorum Books

Cebon, Peter (1993) "The Myth of Best Practices: The Context Dependence of Two High-performing Waste Reduction Programs," in K. Fischer & J. Schot, eds. Environmental Strategies for Industry. Washington, DC: Island Press

Cashore, Benjamin & Ilan Vertinsky (2000) "Policy Networks and Firm Behaviours: Governnance Systems and Firm Responses to External Demands for Sustainable Forest Management." Policy Sciences 33: 1-30

Coglianese, Cary & Jennifer Nash (200?) "Management-Based Environmental Policy: An Introduction," in

Daft, Richard (1992) Organization Theory and Design. St Paul, MN: West Publishing.
Fischer, Kurt and Johan Schot (eds.), (1993) Environmental Strategies for Industry. Washington, D.C.: Island Press

Ghobadian A, Viney H, Lui J, and James P (1998) "Extending Linear Approaches to Mapping Corporate Environmental Behaviour" *Business Strategy and the Environment* 7: 13-23.

Gladwin, Thomas (19930 "The Meaning of Greening: A Plea for Organizational Theory," in Fischer, Kurt and Johan Schot (eds.), Environmental Strategies for Industry. Washington, D.C.: Island Press

Haines, Fiona (1997) Corporate Regulation: Beyond "Punish or Persuade." Oxford: Clarendon Press

Hartman, Raymond, Maimil Hug & David Wheeler (1997) Why Paper Mills Clean up: Determinants of Pollution Abatement in Four Asian Countries. World Bank Policy Research Paper #1710. Washington, TheWorld Bank.

Himmelberger, James & Halina Brown (1995) "Global Corporate Environmentalism: Theoretical Expectations and Empirical Experience," *Business Strategy & The Environment* 4: 192-199

Hirshhorn, Joel & Kirsten Oldenburg (1991) Prosperity Without Pollution: The Prevention Strategy for Industry and Consumers. New York: Van Nostrand Reinhold

Hoffman, Andrew (1997) From Heresy to Dogma: An Institutional History of Corporate Environmentalism. San Francisco: New Lexington Press

Mehta. Alex & Keith Hawkins (1998) , "Integrated Pollution Control and Its Impact: Perspectives From Industry," *Journal of Environmental Law* 10: 61.

Porter, Michael and Claas van der Linde (1995a) "Green and Competitive: Ending the Stalemate," Harvard Business Review 73: 120-134

--------(1995b) “Toward a New Conception of the Environmen-Competitiveness Relationship,” Journal of Economic Perspectives 9:97-118

Prakash, Asseem (2000) Greening the Firm: The Politics of Corporate Environmentalism. Cambridge, UK: Cambridge University Press

Reinhardt, Forest L. (2000) Down to Earth: Applying Business Principles to Environmental Management. Boston: Harvard Business School Press

Roome N (1992) “Developing Environmental Management Strategies” Business Strategy and the Environment” Vol 1, Part 1, pp 11-23.

Steger, U (1993) “How German Companies are Dealing with Environmental Issues” in Fischer K and Schot J, *Environmental Strategies for Industry: International Perspectives on Research Needs and Policy Implications* Island Press, Washington DC (1993) Ch 5.