

# Coming Clean: The Impact of Environmental Performance and Visibility on Corporate Climate Change Disclosure

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**ABSTRACT.** Previous research provides mixed results on the relationship between corporate environmental performance and the level of voluntary environmental disclosure. We revisit this relation by testing competing predictions from defensive and accommodative approaches to voluntary disclosure with regard to climate change. In particular, we add to the prior literature by determining the extent to which environmental performance and company media visibility interact to prompt voluntary climate change disclosure. Using ordinal regression and Ceres, KLD, and Trucost ratings of S&P 500 companies, we find a positive relationship between environmental performance and voluntary climate change disclosure. We extend the literature on environmental strategies and disclosure by establishing that company visibility and issue (climate change) visibility interact with environmental performance to influence the level of voluntary climate change disclosure.

**KEY WORDS:** voluntary environmental disclosure, transparency in organizations, environmental sustainability, environmental strategy, social responsibility of business, media coverage of business

## Introduction

Stakeholders have long argued that environmental regulation is required to prompt better environmental practices and most large companies now devote considerable time and resources to climate change issues and voluntary environmental disclosure (Kolk, 2008). Voluntary disclosure denotes information that is not required by law or regulatory code, such as annual reports and proxy statements, or exceeds those requirements (e.g., UN Global Compact, Global Reporting Initiative) (Dye, 2001).

The Business Roundtable (2007) states that the consequences of climate change are potentially serious and far-reaching, and 50% of executives rank environmental sustainability issues among the foremost threats to shareholder value (Bonini et al., 2008), but only 24% of the Standard and Poor's (S&P) 500 companies mention climate change in their SEC filings for 2008 (Doran et al., 2009). This inconsistency typifies the disparate ways in which companies address voluntary environmental disclosure.

Buysse and Verbeke (2003) note that the environmental sustainability literature generally distinguishes between companies that are defensive and compliance driven, and those that adopt proactive strategies to accommodate stakeholders. The defensive approach to disclosure (e.g., Patten, 1992; Skinner, 1994) is derived from the view that, because they are basically reacting to institutional pressure, companies with unfavorable environmental records will use disclosure to explain or justify their shortcomings. Alternatively, the accommodative approach to disclosure (Dye, 2001; Verrecchia, 1983) is predicated on an expected positive relationship between environmental performance and voluntary environmental disclosure. Companies with poor environmental records will withhold disclosure in an attempt to avoid negative exposure, while companies with favorable environmental performance will attempt to distinguish themselves by voluntarily disclosing information about their performance.

One factor that is often overlooked, or addressed tangentially, with regard to voluntary disclosure is the impact of media visibility. Stakeholder pressure for action on environmental issues depends on

public attitudes that are, in turn, affected by media coverage (Kioussis et al., 2007). Through its priming and framing effects media coverage directly influences audience attention (Entman, 2006), public attitudes toward companies, (Rindova et al., 2007) and how the public perceives corporate behavior (Wang, 2007). As such, the stakeholder–media coverage dynamic has important implications for voluntary environmental disclosure. For example, a number of major publications now devote substantial portions of their web site coverage to news and information on climate change (e.g., New York Times, BBC Online, The Guardian<sup>1</sup>). Carpenter (2001) argues that the increased media coverage of climate science and environmental policy heightens the role of NGOs and signals a shift in public opinion. Consequently, it is conceivable that the pattern of media coverage simultaneously reflects and shapes corporate disclosure strategies.

In this study, we examine the impact of visibility on voluntary climate change disclosure, a company's decision to voluntarily disclose its carbon emissions and activities regarding climate change. A number of studies have examined environmental reporting motives and strategies (e.g., Buysse and Verbeke, 2003; Clarkson et al., 2008), but less is known about how internal factors (environmental performance) combine with external factors (visibility) to prompt that disclosure. Although the environmental sustainability literature has investigated voluntary environmental disclosure, it has not focused on company visibility as a core construct of interest. By identifying the extent to which voluntary disclosure of climate change practices is associated with visibility, we increase the understanding of how informal social pressures encourage corporate compliance with voluntary initiatives. Specifically, we propose that visibility has a direct association with the level of voluntary climate change disclosure and interacts with environmental performance to influence the relationship between environmental performance and voluntary climate change disclosure.

To test the validity of this proposal, we analyze S&P 500 companies' levels of disclosure to the Carbon Disclosure Project (CDP) – an initiative sponsored by the Coalition for Environmentally Responsible Economies (Ceres), a London-based NGO with more than 475 institutional investors and \$55 trillion in assets under management (Ceres,

2007).<sup>2</sup> Each year, the CDP asks the CEOs of the world's largest public companies to report their carbon emissions, the risks and opportunities posed to their companies by climate change, and their climate change strategies. Because compliance is voluntary, the CDP data provide an opportunity to compare the levels of climate change disclosure and draw conclusions about the reasons for differences. In what follows we will: (a) briefly review business approaches to voluntary environmental disclosure, (b) test hypotheses regarding the role of corporate visibility in moderating the relationship between environmental performance and voluntary climate change disclosure, and (c) discuss the theoretical and practical implications.

### Conceptual background and hypotheses

Wartick and Cochrane (1985) offer four primary strategies for responding to stakeholders' expectations: reactive, defensive, accommodative, and proactive. These strategies are generally placed on a continuum from doing less than required to doing more than required and differ in the extent to which the companies are willing to address stakeholder expectations (Clarkson, 1995). Companies that exhibit a reactive posture deny responsibility, defensive companies admit responsibility but comply minimally, accommodative companies accept responsibility, and proactive companies anticipate responsibility for problems and search for ways to be response leaders. The defensive and accommodative strategies are the most prevalent in studies of voluntary environmental disclosure.

The defensive disclosure strategy is predicated on a negative relationship between environmental performance and voluntary environmental disclosure, whereby companies with poor environmental performance records use disclosure to explain their performance (Brown and Deegan, 1998). Despite the obvious intuitive appeal of companies with good environmental performance providing more disclosure than those with poor environmental records, the behavioral accounting literature provides considerable evidence to the contrary. Empirical studies by Cho et al. (2006), de Villiers and van Staden (2006), Hughes et al. (2001), and Patten (2002) have all found that environmental performance is *negatively* related to environmental voluntary disclosure.

The defensive strategy entails minimal compliance and may include subtle avoidance tactics or symbolic legitimacy, whereby companies attempt to burnish stakeholder relations with superficial policy adjustments (Ashforth and Gibbs, 1990; Suchman, 1995), and provides a number of benefits.

Among its benefits, defensive disclosure protects against problems resulting from losing control of sensitive company information and revelations about seemingly irrelevant missteps that might otherwise go undetected (Solomon and Lewis, 2002). Similarly, the defensive approach to disclosure reduces the likelihood of adverse market reactions to information, including declines in stock prices and shareholder lawsuits (Field et al., 2005, Mercer, 2005). According to O'Dwyer (2002), merely responding to environmental concerns with disclosures can legitimize those concerns, but without disclosure the concerns may disappear. Providing disclosure also reduces the effort required by stakeholders to obtain information, thereby encouraging additional oversight. For example, the Calvert Group, which emphasizes sustainable investing, noticed a trend in Tyco's annual toxic emission disclosures that led them to believe the company was poorly managed and subsequently divest<sup>3</sup> (Jeffords and Gorte, 2006). Finally, when disclosures are challenged, companies often spend time and resources responding and making operational adjustments (e.g., Endelman, 1992). Thus, while voluntarily disclosing environmental information has the promise of enhanced legitimacy (Elsbach, 2003; Skinner, 1994), it entails risk as well.

Conversely, the accommodative disclosure approach (Dye, 2001; Verrecchia, 1983) posits that companies with favorable environmental records have reason to inform stakeholders of their policies and activities. According to the resource-based view of the firm, corporate strategy can lead to sustainable competitive advantage if it is supported by firm-level competencies that are rare, non-substitutable, difficult to imitate, and value-producing (Barney, 1991). On this basis, a positive relationship between environmental performance and voluntary environmental disclosure would improve the competitive posture of the company (Hart, 1995; Rugman and Verbeke, 2002). An accommodating strategy implies that companies will recognize outside stakeholders and actively integrate nonmarket issues, such as

voluntary disclosure, into their strategic choices (Oliver, 1997). This type of disclosure enables companies to call attention to their environmental programs and subsequently earn the support of key stakeholders. Thus, an accommodative strategy of disclosure entails more than responding to demands and regulations.

There is empirical evidence of a positive relationship between environmental performance and voluntary environmental disclosure as well (e.g., Al-Tuwaijri et al., 2004; Clarkson et al., 2008). More broadly, corporate disclosure is related to key financial metrics such as lower cost of debt capital, and improved liquidity and price-to-book ratios (Botosan, 1997; Patel et al., 2002) because it enables investors and other stakeholders to align their interests with corporate governance and oversight (Frankforter et al., 2007). Finally, companies that are characterized by increased disclosure signal to their stakeholders that they are trustworthy and are less likely to be encumbered by actions such as stakeholder resolutions (Reid and Toffel, 2009). Thus, by adopting an accommodative strategy toward voluntary disclosure, managers of better performing companies can secure advantages for their companies.

In addition, shareholders and financial institutions perceive companies with poor environmental records as higher risks, and may demand a risk premium (Bansal and Clelland, 2004). Consequently, companies are unlikely to forego an opportunity to reassure shareholders and institutional investors about their environmental records. If voluntary approaches to environmental policy become more prevalent in the world's largest economies (OECD, 2003), companies with reactive environmental strategies will be at a competitive disadvantage against their proactive rivals (Garrod, 1997; Henriques and Sadorsky, 1999; Reinhardt, 1999). Finally, accommodative disclosure affords managers more control over when and how information is released. Skinner (1994) has established that managers' perceive an asymmetric loss function with respect to their disclosure practices. That is, the negative repercussions for stakeholders receiving unexpected bad news about a company exceed the possible benefits of stakeholders receiving unexpected good news.

It is clear from the preceding review of research that there remains a lack of clarity regarding the

relationship between environmental performance and voluntary disclosure. The two competing approaches provide opposite predictions on how environmental performance may affect discretionary climate change disclosure. Our hypotheses now follow (stated in the alternate form):

*Hypothesis 1a:* Environmental performance will be positively associated with voluntary climate change disclosure, as implied by the accommodative approach.

*Hypothesis 1b:* Environmental performance will be negatively associated with voluntary climate change disclosure, as implied by the defensive approach.

#### *Visibility and voluntary disclosure*

Deegan et al. (2002, p. 335) have stated, “where there is limited concern, there will be limited disclosures.” We concur and add a precursor, where there is limited visibility, there will be limited concern. Media visibility is the attention a company receives from media outlets and the prominence of that coverage relative to other stories (Kiousis, 2004). Media coverage is a critical means of identifying social issues and scrutinizing corporate behavior (Chen and Meindl, 1991; Fombrun and Shanley, 1990), and the 24-h news cycle and the Internet greatly enhance its breadth (Illia, 2003; Taylor and van Dyke, 2004). The disclosure strategies of companies are likely to be shaped by the institutional environment, which is in turn affected by media coverage.

Media coverage raises the visibility of an issue or organization through its agenda setting, salience transfer, and framing functions. According to agenda-setting theory (McCombs and Shaw, 1972) media outlets influence what the public thinks about through the amount and type of coverage afforded various events. Media exposure also results in salience transfer (Wanta and Miller, 1996), by influencing the relative importance attached to issues. For example, Kiousis et al. (2006) examined media content and public opinion during the 2002 Florida gubernatorial election and found that public opinion regarding the importance of issues reflected media

coverage. Finally, issue framing is a process whereby communicators, consciously or unconsciously, present a point of view that encourages the facts of a given situation to be interpreted by others in a particular manner. Media frames serve to define problems, diagnose causes, make moral judgments, and suggest remedies (Kuypers, 2002).

We use the term *general visibility* to describe visibility that is derived from media coverage of a company on a range of issues including its marketing efforts and product releases. According to Pfeffer and Salancik (1978) and Miles (1987), general visibility affects the level of outside pressure a company experiences because stakeholders take greater interest in companies that are visible. For example, highly visible, prominent companies have yielded to outside pressure to adopt formal grievance procedures and balanced shareholder value policies (Edelman, 1992; Fiss and Zajac, 2006). In the same way, we expect highly visible companies to experience more pressure to provide voluntary climate change disclosure.

*Hypothesis 2:* General visibility will be positively associated with voluntary climate change disclosure.

A company acquires *issue visibility* because of its proximity to a particular issue (Jones and Keiser, 1987; Neustadl, 1990). Stakeholder groups selectively target companies that are highly visible and whose practices raise specific issues of interest to society (Rehbein et al., 2004), and prompt change by publicly challenging the legitimacy of those companies with regard to the focal issue (Den Hond and de Bakker, 2007). For example, Royal Dutch Shell, an oil industry leader, garnered increased attention for the environmental impact of its manufacturing practices. Consequently, stakeholder interest in their level of disclosure was very high and even the marked increase in disclosure provided under (then) chairman, Sir Philip Watts, was met with skepticism (Becker, 2003). Obviously Shell had high general visibility because of its size and worldwide presence, but that was combined with high issue visibility related to its environmental impact.

Bansal and Roth (2000) describe issue salience as the extent to which a specific ecological issue has meaning for stakeholders, and note that stakeholders

have relatively little knowledge of low salience issues. Because stakeholders can readily observe activities with environmental impact, those activities have high salience and can threaten a company's legitimacy. By linking a company with a particular topic, issue visibility increases issue salience. For example, Deegan et al. (2000) determined that corporate environmental disclosure was positively associated with environmental groups' concerns about environmental performance and, following environmental catastrophes, companies operating in the affected industries increased environmental disclosure on their annual reports. Share value can also decrease if a company is found liable for environmental damage or if its poor environmental record makes the news (Hamilton, 1995). Consequently, companies that are connected to highly visible issues must be more cognizant of stakeholder desires (Neustadl, 1990; Sharma and Nguan, 1999). We expect the following:

*Hypothesis 3:* Issue visibility will be positively associated with voluntary climate change disclosure.

*Hypothesis 4:* The positive relationship between issue visibility and voluntary climate change disclosure will be stronger than the positive relationship between its general visibility and voluntary climate change disclosure.

#### *Visibility, performance, and disclosure*

Media organizations tend to be concerned with maintaining the interest of their audiences, such that outlets favor sensational stories centered on conflict, controversy, and prominent actors (Thompson, 2000). Stories about leading and lagging environmental companies are more likely to conform to those criteria, but there is also a third group of companies with average levels of environmental performance that may be less visible. Baker et al. (1999) describe how low visibility companies get less attention from news agencies, financial analysts, and institutional investors than their peers. Information about companies that do not fit the prevailing media narratives of novelty and drama is less prevalent (Boswell, 2009). According to Salancik (1979) all else being equal, inconspicuous companies have less

immediate need to adapt their behavior because they face less public scrutiny. When an issue affects a large group of companies or an entire industry, the task of resolving the issue may be taken up by a single company or a smaller group of companies, allowing others to be free riders who benefit from issue resolution without the expense of developing the solution (Meznar et al., 2006).

As stakeholders take interest in an issue like environmental performance, it is likely that leading companies will seek competitive advantage by acclaiming their performance through increased disclosure. Dawkins (2005) contends that when a company takes the lead in redressing a stakeholder issue – labeled a *pacesetter* – there is increased visibility surrounding the issue, and the pacesetter is applauded for exemplary business conduct and used to assail the legitimacy of its industry peers. Highly visible companies facing external social pressure for poor performance will also increase disclosure to influence social perceptions and excuse their performance (Bansal and Clelland, 2004; Lindblom, 1994). Perhaps capitalizing on this phenomenon, Greenpeace attempts to influence consumer perceptions and corporate behavior by contrasting sound environmental companies with poor environmental companies (Financial Times, 2001).

Delmas and Terlaak (2001) observe that many of the benefits of voluntary agreements, most importantly the preemption of regulatory measures, are of a collective nature. Consequently, a collective call for action such as that posed by the CDP provides the incentive for nondescript companies to be more recalcitrant regarding their levels of environmental performance and disclosure and benefit from their relative anonymity. In this way, less visible companies can enjoy anonymity as long as their performance is neither so favorable nor unfavorable as to warrant media attention. Thus, the level of visibility afforded companies is likely to influence the relationship between environmental performance and voluntary climate change disclosure, but not necessarily in a linear fashion.

*Hypothesis 5:* General visibility will moderate the relationship between environmental performance and voluntary climate change disclosure such that companies will be less likely to provide disclosure when general visibility is lower.



*Hypothesis 6:* Issue visibility will moderate the relationship between environmental performance and voluntary climate change disclosure such that companies will be less likely to provide disclosure when issue visibility is lower.

## Method

### Sample

The companies in this study were (a) in the S&P 500, (b) evaluated by Kinder, Lydenberg, and Domini (KLD) and Trucost Plc for environmental performance in 2006, and (c) received a request from Ceres to participate in the CDP survey detailing carbon emissions and related activity in 2008. We staggered the years of data collection in order to permit inferences regarding causality. KLD specializes in corporate social performance analysis and their ratings: utilize an objective set of evaluative criteria, are developed by a specialized, independent staff, are based upon a wide variety of company, government, NGO, and media outlets, and have been widely used in management research (e.g., Berrone and Gomez-Mejia, 2009; Reid and Toffel, 2009). The KLD ratings have also been described as “the defacto standard” and “the best available” ratings tool (Waddock, 2003, pp. 369, 371). Trucost Plc is an UK-based environmental research company that provides data and analysis to thousands of companies and investment indices worldwide and helps them to understand the environmental impacts of business activities in financial terms (Trucost, 2010).

Using a conservative approach, each company included in the analysis was a member of the S&P 500 all 3 years of the study, rated by KLD, Trucost, and the CDP, and not a signatory of the CDP. The S&P 500 has an annual turnover of between 1 and 9% (Standard & Poor’s, 2010). Because of lack of access to data and changes in the S&P 500, a number of companies were excluded from the KLD (118) and Trucost (30) ratings. It is reasonable to expect signatories to the CDP (six in all) to respond, and thus we follow Reid and Toffel (2009) in excluding them from the analysis. Finally, news outlets such as the CBS and Google provide numerous articles on

climate change that are not related to the companies themselves, which confounds the visibility variables, and were eliminated for that reason. After these adjustments, the final sample consisted of 344 companies.

### Measures

#### *Voluntary climate change disclosure*

We derived the dependent variable, *voluntary climate change disclosure*, from the companies’ responses to the climate change mitigation questionnaire sent by Ceres that categorized company responses into four areas: (a) no response, (b) refused the request, (c) provided alternative information, or (d) answered questionnaire. Reasoning that failure to respond was, for our purposes, the same as a refusal, we pared the responses to three: (a) no disclosure, companies that ignored or refused the request; (b) different or incomplete disclosure, companies referred Ceres to other sources (e.g., annual report or sustainability report), or did not complete the questionnaire in full; or (c) full disclosure, complied by providing complete information.

Ceres is the largest repository of corporate greenhouse gas emissions data in the world and issues press releases detailing industries and companies that do not participate. It is, consequently, reasonable to infer that most companies desiring to provide climate change disclosure comply with the Ceres request. Making a corporate sustainability report available, for example, is less credible because of possible self-serving bias, and because it is more difficult to compare with other results. Nevertheless, it is possible that companies did not respond to the CDP questionnaire, but made the information publicly available elsewhere (e.g., corporate Web site). To assure the validity of the climate change disclosure measure, we drew a random group of 20 non-compliant companies from our S&P 500 sample and searched their company Web sites. We did not find among the sample any company that disclosed direct, and indirect carbon emissions data, and performance relative to stated goals as required by the CDP questionnaire during the years of our analysis (2006 or 2008). This outcome supports the validity of the voluntary climate change disclosure measure.

### *Environmental performance*

In order for the independent variable, *environmental performance*, to include positive input metrics as well as negative outcome metrics, we combined the *z*-scores of environmental performance ratings from KLD Analytics (50%) and environmental impact ratings from Trucost (50%). KLD examines a number of activities that are indicative of environmental strengths and weaknesses (called concerns) to evaluate environmental performance. The environmental strength assessment considers proactive measures of performance such as use of recycled materials in manufacturing, maintenance of equipment, and ISO certifications.

Conversely, the environmental weakness assessment accounts for negative outcomes such as fines for waste management violations and high toxic emissions. KLD indicates a strength or weakness on an assessment item with a numerical rating of "1." If a company does not exhibit the strength or weakness item in question, it receives a rating of "0" (KLD Analytics, 2007). We developed environmental performance as a continuous variable by subtracting the pro-rata (number/total) concern score from the pro-rata strength score for each company. The number of questionnaire items used to rate strengths and weaknesses differed, which precluded simply subtracting total weakness scores from total strength scores to obtain comparable composite score. The full battery of KLD environmental performance questions is provided in the Appendix.

Trucost analyses include all direct and supply chain emissions by companies and their supply chains and apply external prices to their environmental resources. The score, however, is normalized against a company's annual revenues to enable comparisons across companies of different size (Trucost.com, 2009). Trucost ranks companies by quintile based on total carbon emissions with one as the lowest emission level and five as the highest. To employ the Trucost rankings, we reverse scored the companies such that those in the first quintile received a score of one and had the highest carbon emissions compared with companies in the fifth quintile, which received a score of five and had the lowest carbon emissions.

### *General visibility*

Media visibility reflects the level of media awareness and is generally gaged by the volume of stories or the

space dedicated to a given topic (Golan and Wanta, 2001). Following previous research (Meznar and Nigh, 1995; Meznar et al., 2006), we operationalized the moderating variable, *general visibility*, as the number of times a company was mentioned in mainstream media such as newspapers. Drawing on Kiouisis' (2004) and Zygliopoulos and Georgiadis (2006), we made two assessments to determine visibility: relevance and prominence. We selected the Washington Post, the New York Times, the Wall Street Journal, and USA Today in 2007 and 2008, because they are leading political, business, and social news outlets that cover the full spectrum of issues and events. After conducting a Lexis-Nexis news search for each company, we allocated one point for each time the name of the company was mentioned within the headline of an article (relevance), and an additional point if the story appeared on the front page (prominence). In this way, a front-page story containing a company's name in the title would receive a score of "2" for visibility. We totaled the scores for each company and averaged the stories over a 2-year period in order to mitigate the impact of events in 1 year dramatically affecting the scores.

Meznar et al. (2006) have noted that with the 24-h news cycle, Internet blogs, *e-zines*, and other electronic information sources, print media coverage alone is a deficient indicator of media visibility. The Google News Archive differs from the general Google search engine in that it  *crawls*  stories from web sites including newspaper publishers and aggregators to cover a vast number of issues and perspectives. Although the credibility of some Internet news sights can be questioned, the impact of the Internet as a vehicle for dispersing information is unparalleled (Carty, 2002; Illia, 2003). Moreover, media exposure is a stronger determinant of issue awareness than media credibility (Wanta and Ghanem, 2006). Consequently, we conducted a Google News Archive search and determined the number of times each company was mentioned in an article title during 2007 and 2008. The Google News Archive does not, however, provide the location and placement of articles.

To reduce the potential for outliers to confound our results, we top coded to the visibility variables values above the 95th percentile of the distribution. We then employed principal component factor analysis and confirmed that the Lexis-Nexis score and the Google News Archive score loaded highly on a

single factor that accounted for 78% of the total variance. This outcome suggested that we could reliably combine the items into a single index. We standardized the two measures of company visibility by transforming them into  $z$ -scores, and combined them into a single index with a Cronbach  $\alpha$  of 0.71. This measure of general visibility is theoretically consistent with our arguments and empirically parsimonious.

#### *Issue visibility*

To construct the *issue visibility* variable, we repeated the Lexis-Nexis and Google News Archive searches, except that in addition to the name of the company we included the phrase “climate change.” We have comprised “issue visibility” narrowly in our search by employing the phrase “climate change” as a proxy for a few reasons. First, we considered that articles containing “climate change” and the name of a company were very likely to focus directly upon the climate change issue as defined by the CDP; direct and indirect carbon emissions, and climate change performance relative to stated goals. Second, climate change disclosure is the dependent variable in this study and most directly the “issue” with which we are concerned. Third, operationalizing issue visibility more broadly (e.g., environmental effects of companies) increases the possibility for contamination. Environmental effects, such as pollution, are likely to be regulated and thus disclosure regarding those effects is involuntary and not addressed in the CDP questionnaire. Environmental effects are also likely to bias the issue visibility variable toward so called “dirty industries” such as auto and transport, oil, and utilities, whereas all companies in all industrial sectors conduct activities with potential implications for climate change.

As with the general visibility variable, we conducted principal component factor analysis to confirm that the Lexis-Nexis and Google News Archive items loaded highly and positively on a single factor. The items accounted for 85% of the variance with a Cronbach  $\alpha$  of 0.78, and thus we averaged the standardized ratings to form a single variable.

#### *Control variables*

We gathered data on a number of factors that might influence companies’ decisions to publicly disclose climate change information. First, the size of a company may affect its visibility (Mezner and Nigh, 1995;

Pfeffer and Salancik, 1978), and several studies have found a significant relationship between company size and environmental disclosure (e.g., Deegan and Gordon, 1996; Patten, 1992). Thus, we used the log of revenues and log of company-wide employment to control for size (e.g., Buysse and Verbeke, 2003).

Second, the level of environmental performance and disclosure may be affected by financial performance. We controlled for financial performance by using an accounting-based variable and a market-based variable, return on assets (ROA) and return on equity (ROE), respectively (Bansal and Clelland, 2004). Third, prior research has revealed significant industry differences in the amount of environmental and social information companies disclose (Cho and Patten, 2007; Doran et al., 2009) and in how companies respond to climate change (Jeswani et al., 2008). To control for these differences, we developed a series of nine dummy variables for industrial sectors based on previous research (e.g., Reid and Toffel, 2009) and the Ceres CDP report. The composition of industries in our sample is reported in Table I. The highest concentrations of companies were in the consumer discretionary (62) and information technology (47) industrial sectors.

## Results

#### *Model specification*

The dependent variable, voluntary climate change disclosure, consisted of three categories: no disclosure,

TABLE I  
Sample industry composition

Industrial sectors	Companies	Percent
Consumer discretionary	62	18.0
Consumer staples	35	10.1
Energy	26	7.6
Financials	43	12.5
Health care	39	11.3
Industrials	46	13.4
Information technology/ telecommunications	47	13.7
Materials	22	6.4
Utilities	24	7.0
Total	344	100.0



partial disclosure, and full disclosure. In our analyses, we treated these three categories of the dependent variable as ordinal under the assumption that the categories have a natural ordering (none, partial, and full), but the distances between adjacent levels are unknown. Due to this assumption, we subjected the data to ordinal regression analyses in order to statistically test the hypotheses.

An ordinal regression model requires that the parameters of the independent and control variables are the same (parallel) across the three dependent variable categories. A test of parallelism is conducted by estimating a model that assumes parallelism (i.e., the parameters of the independent and control variables are the same across the three dependent variable categories) and a model that does not assume parallelism. We can assume parallelism if the General Model (i.e., the model that does not assume parallelism) does not significantly improve the Null Model (i.e., the model that requires the parameter estimates to be the same). Thus, we will assume parallelism if the difference between the two  $-2$  log-likelihood values of the models is not statistically significant, as determined by a  $\chi^2$  test. We conducted a test for parallelism for each ordinal regression model used in this study.

Descriptive statistics and correlations are provided in Table II. The dependent variable, voluntary environmental disclosure was developed as an ordinal variable with three levels: (a) no disclosure ( $n = 72$ ; 20.9%), (b) partial disclosure ( $n = 56$ ; 16.3%), and (c) full disclosure ( $n = 216$ ; 62.8%). Each of the ordinal regression models used to test the hypotheses included the following control variables: (a) eight of the nine dummy variables that represented the nine industrial sectors, (b) the log of company revenues, (c) the log of company-wide employment, (d) ROA, and (e) ROE. Although ROA and ROE are highly correlated, and log of employees and log of revenues are highly correlated, neither set of variables is highly correlated with the independent and dependent variables tested in this study. To ensure that the highly correlated control variables did not confound hypothesis testing, we calculated the Variance Inflation Factor (VIF) for the independent variables in each of the four ordinal regression models and found none to exceed 3.50. Based on Stevens (1996) assessment that multicollinearity (i.e., a high degree of relationship between two or more independent variables) does not pose a concern unless one or more

VIF values exceed the value of 10, we found the analyses to be robust. The companies had a mean revenue level of \$11.233 billion (i.e., a log value of 10.05), and the mean number of employees was 24,049 (i.e., a log value of 4.38). The mean ROA and ROE for the companies were 4.75 and 14.92, respectively.

The model used to test Hypotheses 1a and 1b, Model 1, is shown in Table III. Because Hypothesis 1a posed a positive relationship between environmental performance and voluntary climate change disclosure, Hypothesis 1a would be supported if the coefficient for the environmental performance variable was positive and statistically significant at the one-tailed  $\alpha$  level of 0.05. At the same time, Hypothesis 1b would be disconfirmed. The parallelism test for the parameter estimates for the ordinal regression model used to test Hypothesis 1, Model 1, was not significant ( $\chi^2(13) = 20.66$ ,  $p = 0.08$ ) at the 0.05  $\alpha$  level. Thus, Model 1 was used to test Hypothesis 1a. The estimated coefficient for the voluntary climate change variable was positive and significant as predicted by Hypothesis 1a ( $B = 0.22$ ,  $p < 0.05$ ). Necessarily, Hypothesis 1b was disconfirmed. This result is consistent with the accommodative disclosure approach, but inconsistent with the negative association predicted by the defensive approach.

The model used to test Hypotheses 2 and 3; Model 2 is presented in Table IV. Because Hypotheses 2 and 3 posed positive relationships between general visibility and issue visibility and voluntary climate change disclosure, the coefficient for the general and issue visibility variables must be positive and statistically significant at the one-tailed  $\alpha$  level of 0.05 for Hypotheses 2 and 3 to be supported. The parallelism test for the parameter estimates for the ordinal regression model used to test Hypotheses 2 and 3, Model 2, was not significant ( $\chi^2(14) = 20.08$ ,  $p = 0.13$ ) at the 0.05  $\alpha$  level, and thus Model 2 was used to test Hypotheses 2 and 3. Hypothesis 2, which predicted a positive relationship between general visibility and voluntary climate change disclosure, was not supported ( $B = 0.15$ ,  $p > 0.05$ ). Conversely, Hypothesis 3, which predicted a positive relationship between issue visibility and voluntary climate change disclosure, was supported ( $B = 0.69$ ,  $p < 0.05$ ).

Hypothesis 4 predicted that the positive relationship between issue visibility and voluntary

TABLE II  
Descriptive statistics and correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1 Log of employees	4.38	0.54												
2 Log of revenues	10.05	0.47	0.72**											
3 Return on assets	4.75	9.38	0.02	0.02										
4 Return on equity	14.92	34.45	0.03	0.01	0.64**									
5 Environmental performance	0.01	1.20	0.06	-0.01	0.10	0.08								
6 General visibility	-0.24	0.79	-0.09	-0.05	-0.06	-0.10	-0.09							
7 Issue visibility	0.01	1.01	0.31**	0.37**	0.03	0.04	0.01	-0.14*						
8 General visibility × environmental performance	-0.09	1.05	0.00	0.03	-0.03	-0.01	-0.16**	-0.18**	0.01					
9 Issue visibility × environmental performance	0.01	1.30	-0.06	-0.08	0.06	0.04	0.10	0.01	-0.17**	-0.11				
10 Visibility	-0.28	1.26	0.19**	0.27**	-0.01	-0.03	-0.05	0.60**	0.78**	-0.11	-0.13			
11 Industrial sectors <sup>a</sup>	-	-	-0.41**	0.32**	0.23*	0.18	0.50**	0.09	0.17	0.16	0.16	0.14		
12 Disclosure <sup>b</sup>	-	-	0.22	0.30	0.00	0.04	0.15	0.00	0.30	0.13	0.07	0.22	0.25	

\*Correlation is significant at the 0.05 level (two-tailed).

\*\*Correlation is significant at the 0.01 level (two-tailed).

<sup>a</sup>As the industrial sectors are represented by nine dichotomous variables, the correlation values listed for industrial sectors are multiple *R* values. These multiple *R* values were generated with multiple linear regression models in which eight of the nine industrial sector dichotomous variables served as the independent variables (the utilities sector variable was the reference category) and the each of the other variables listed in this table (except for the disclosure variable) served, in turn, as the dependent variable.

<sup>b</sup>Each of the values listed for the disclosure variable is equal to the square root of the Nagelkerke pseudo *R*<sup>2</sup> value generated through an ordinal regression model with the disclosure variable serving as the dependent variable. These values were not statistically tested.

TABLE III  
Regression results for model<sup>a</sup>

Variables	Coefficient	SE	Wald test	<i>p</i>	VIF
Threshold					
Disclose = 1	9.244	3.309	7.803	0.005	–
Disclose = 2	10.162	3.317	9.385	0.002	–
Industry categories					
Consumer discretionary	–2.151	0.695	9.569	0.002	3.385
Consumer staples	–1.438	0.753	3.647	0.056	2.385
Energy	–1.687	0.751	5.046	0.025	2.024
Financials	–1.666	0.720	5.352	0.021	2.830
Health care	–1.538	0.713	4.648	0.031	2.412
Industrials	–2.043	0.712	8.236	0.004	2.828
Information/telecom	–1.055	0.719	2.152	0.142	2.732
Materials	–1.305	0.792	2.713	0.100	1.871
Log of employees	0.466	0.353	1.738	0.187	2.987
Log of revenue	1.024	0.417	6.040	0.014	2.804
ROA	0.006	0.016	0.147	0.702	1.763
ROE	–0.005	0.004	1.205	0.272	1.719
Environmental performance	0.215	0.119	3.279	0.035 <sup>b</sup>	1.354

<sup>a</sup>The dependent variable is voluntary climate change disclosure. The  $-2$  log-likelihood value for the intercept only Model is 629.562. The  $-2$  log-likelihood value for Model 1 is 577.815. The difference between the  $-2$  log-likelihood values of the intercept only Model and the Model 1 is 51.747 ( $\chi^2(13) = 51.747, p < 0.001$ ). The parallelism test is  $\chi^2(13) = 20.671, p = 0.080$ .

<sup>b</sup>One-tailed probability.

climate change disclosure would be stronger than the positive relationship between general visibility and voluntary climate change disclosure. Thus, the coefficient for issue visibility must be significantly greater than the coefficient for the general visibility in order to support Hypothesis. To test Hypothesis 4, it was necessary to generate a new variable, the *visibility* variable, which is the sum of the general visibility and issue visibility variables. The inclusion of this variable in Model 3, rather than the two separate variables, enabled us to statistically test whether one of the coefficients was greater than the other (see Table V). Model 2 allowed the coefficients to differ, while Model 3 required the coefficients to be equal. Thus, the statistical test of the difference between the  $-2$  log-likelihood value of Model 2 (the Full Model) and the  $-2$  log-likelihood value of Model 3 (the Restricted Model) tested whether the issue visibility coefficient was greater than the general visibility coefficient.

Recall that the parallelism test for Model 2 was not statistically significant. The parallelism test for Model 3, the Restricted Model, was also not significant ( $\chi^2(13) = 21.38, p = 0.07$ ), and thus Models 2 and 3 were used to test Hypothesis 4. The  $-2$  log-likelihood values of Model 2 and Model 3 were 571.64 and 574.72, respectively. The difference between these two values was statistically significant ( $\chi^2(1) = 3.08, p = 0.04$ ) at the one-tailed  $\alpha$  level of 0.05. Thus, Hypothesis 4, which stated that the positive relationship between issue visibility and voluntary climate change disclosure is stronger than the positive relationship between general visibility and voluntary climate change disclosure, was supported. Moreover, Hypothesis 4 was supported because the relationship between issue visibility and voluntary climate change disclosure was significant, whereas the corresponding relationship between general visibility and voluntary climate change disclosure was not.

TABLE IV  
Regression results for Model 2<sup>a</sup>

Variables	Coefficient	SE	Wald test	<i>p</i>	VIF
Threshold					
Disclose = 1	5.151	3.494	2.173	0.140	–
Disclose = 2	6.071	3.499	3.011	0.083	–
Industry category					
Consumer discretionary	–2.139	0.701	9.326	0.002	3.367
Consumer staples	–1.103	0.756	2.130	0.144	2.385
Energy	–1.574	0.756	4.338	0.037	2.031
Financials	–1.888	0.703	7.212	0.007	2.527
Health care	–1.357	0.721	3.543	0.060	2.436
Industrials	–1.956	0.722	7.340	0.007	2.834
Information/telecom	–1.955	0.719	2.762	0.097	2.715
Materials	–1.119	0.795	1.981	0.159	1.860
Log of employees	0.517	0.356	2.106	0.147	2.997
Log of revenue	0.602	0.429	1.969	0.161	2.946
ROA	0.008	0.016	0.224	0.636	1.760
ROE	–0.004	0.004	1.069	0.301	1.728
General visibility	0.148	0.149	0.990	0.160 <sup>b</sup>	1.025
Issue visibility	0.689	0.320	4.632	0.016 <sup>b</sup>	1.244

<sup>a</sup>The dependent variable is voluntary climate change disclosure. The  $-2$  log-likelihood value for the intercept only Model is 629.562. The  $-2$  log-likelihood value for Model 2 is 571.641. The difference between the  $-2$  log-likelihood values of the intercept only Model and Model 2 is 57.921 ( $\chi^2(14) = 57.921$ ,  $p < 0.001$ ). The parallelism test is  $\chi^2(14) = 20.075$ ,  $p = 0.128$ .

<sup>b</sup>One-tailed probability value.

As shown in Table VI, Model 4 that was used to test Hypotheses 5 and 6 included two interaction variables in addition to the general visibility, issue visibility, and environmental performance variables. We formed the first interaction variable, which is labeled *general visibility*  $\times$  *performance*, by multiplying the centered general visibility and environmental performance variables. We formed the second interaction variable, which is labeled *issue visibility*  $\times$  *performance*, by multiplying the centered issue visibility and environmental performance variables. Hypothesis 5 would be supported if the coefficient for the general visibility  $\times$  performance variable was statistically significant at the two-tailed  $\alpha$  level of 0.05, while Hypothesis 6 would be supported if the coefficient for the issue visibility  $\times$  performance variable was statistically significant at the two-tailed  $\alpha$  level of 0.05. The parallelism test for the parameter estimates for Model 4 was not significant ( $\chi^2(17) = 21.32$ ,  $p = 0.21$ ) at the 0.05  $\alpha$  level, and thus it was

used to Test Hypotheses 5 and 6. Hypothesis 5, which stated that general visibility interacted with environmental performance, was supported ( $B = -0.20$ ,  $p = 0.50$ ). Hypothesis 6, which stated that issue visibility interacted with environmental performance, was not significant at the 0.05 level ( $B = -0.32$ ,  $p = 0.10$ ), but is significant at the 0.10 level indicating marginal support.

In sum, we found support for Hypotheses 1a and 3 in that companies were more likely to provide voluntary climate change disclosure if they have favorable environmental performance and higher levels of issue related visibility. Hypothesis 4, which stated that the positive relationship between issue visibility and voluntary climate change disclosure was stronger than the positive relationship between general visibility and voluntary climate change disclosure, was also supported by our analysis. Finally, we established support for Hypothesis 5 and marginal support for Hypothesis 6 in that general and

TABLE V  
Regression results for Model 3<sup>a,b</sup>

Variables	Coefficient	SE	Wald test	<i>p</i>	VIF
Threshold					
Disclose = 1	6.583	3.377	3.801	0.051	–
Disclose = 2	7.503	3.382	4.921	0.027	–
Industry category					
Consumer discretionary	–2.246	0.697	10.377	0.001	3.353
Consumer staples	–1.227	0.752	2.658	0.103	2.376
Energy	–1.712	0.753	5.170	0.023	2.019
Financials	–2.024	0.699	8.390	0.004	2.520
Health care	–1.523	0.714	4.546	0.033	2.414
Industrials	–2.100	0.716	8.602	0.003	2.825
Information/telecom	–1.234	0.716	2.970	0.085	2.713
Materials	–1.190	0.791	2.260	0.133	1.860
Log of employees	0.580	0.354	2.682	0.101	2.975
Log of revenue	0.724	0.421	2.954	0.086	2.891
ROA	0.008	0.016	0.272	0.602	1.760
ROE	–0.004	0.004	1.047	0.306	1.722
Visibility	0.294	0.124	5.582	0.018	1.122

<sup>a</sup>The dependent variable is voluntary climate change disclosure. The  $-2$  log-likelihood value for the intercept only Model is 629.562. The  $-2$  log-likelihood value for Model 3 is 574.721. The difference between the  $-2$  log-likelihood values of the intercept only Model and the Model 2 is 54.841 ( $\chi^2(13) = 54.841, p < 0.001$ ). The parallelism test is  $\chi^2(13) = 21.382, p = 0.066$ .

<sup>b</sup>The difference between the  $-2$  log-likelihood values of Model 3 (574.721) and Model 2 (571.641) is 3.080 ( $\chi^2(1) = 3.080, \text{one-tailed } p = 0.040$ ).

issue-related visibility interact with environmental performance to influence the level of voluntary climate change disclosure.

## Discussion

### *Overview and contributions*

Given the difficulties of governments, businesses, and stakeholders in determining concrete ways to address climate change, exploring voluntary compliance with requests for disclosure of companies' carbon risks, strategies, and emission levels is a useful endeavor. We make both empirical and theoretical contributions to the growing literature on voluntary disclosure and there are a number of implications for research. First, this research contradicts prior studies in the behavioral accounting literature indicating a negative relationship between environ-

mental performance and environmental disclosure. It may be that the lack of clarity in prior studies on that relationship is partly due to methodological shortcomings in some studies. We employ improved measures such as the KLD, Trucost, and Ceres ratings that enable us to employ a very broad and representative sample. To our knowledge, the measure of environmental performance is the first to include both, proactive types of planning and reporting, and the more generally employed outcome measures.

Second, the study identifies an important role for media visibility in the types of disclosure strategies likely to be employed by companies. Fombrun et al. (2000) characterize different approaches to CSR in terms of opportunity platforms and safety nets. Companies with favorable environmental performance appear to use climate change disclosure as an opportunity platform, while those with less favorable environmental records use disclosure as a safety net



TABLE VI  
Regression results for Model 4<sup>a</sup>

Variables	Coefficient	SE	Wald test	<i>p</i>	VIF
Threshold					
Disclose = 1	6.493	3.573	3.303	0.069	–
Disclose = 2	7.435	3.579	4.315	0.038	–
Industry category					
Consumer discretionary	–2.005	0.704	8.117	0.004	3.416
Consumer staples	–1.297	0.759	2.920	0.087	2.407
Energy	–1.558	0.758	4.230	0.040	2.045
Financials	–1.448	0.734	3.891	0.049	2.857
Health care	–1.192	0.724	2.708	0.100	2.468
Industrials	–1.884	0.724	6.781	0.009	2.847
Information/telecom	–1.031	0.731	1.988	0.159	2.767
Materials	–1.229	0.800	2.362	0.124	1.873
Log of employees	0.437	0.360	1.470	0.225	3.019
Log of revenue	0.761	0.437	3.025	0.082	3.004
ROA	0.006	0.016	0.148	0.700	1.776
ROE	–0.004	0.004	0.908	0.341	1.730
Environmental performance	0.192	0.134	2.039	0.153	1.412
General visibility	0.105	0.152	0.477	0.490	1.079
General visibility × environmental performance	0.197	0.121	2.617	0.050 <sup>b</sup>	1.095
Issue visibility	0.720	0.358	4.052	0.044	1.294
Issue visibility × environmental performance	–0.316	0.246	1.650	0.100 <sup>b</sup>	1.107

<sup>a</sup>The dependent variable is voluntary climate change disclosure. The  $-2$  log-likelihood value for the intercept only Model is 629.562. The  $-2$  log-likelihood value for Model 4 is 563.808. The difference between the  $-2$  log-likelihood values of the intercept only Model and Model 4 is 65.754 ( $\chi^2(17) = 65.754, p < 0.001$ ). The parallelism test is  $\chi^2(17) = 21.660, p = 0.198$ .

<sup>b</sup>One-tailed probability value.

against threats to legitimacy. It may be that, broadly speaking, disclosure patterns can be viewed from a punctuated equilibrium perspective whereby disclosure is relatively static, but during certain periods of time companies move from a strategy of maintaining their legitimacy with relatively less disclosure to a strategy of (re)gaining legitimacy with more disclosure, and media visibility prompts the variations. For example, in the issue management life cycle, issue visibility can provide evidence that a company's performance does not comport with societal expectations. Conversely, organizations that are pacesetters and wish to derive a benefit from their activity increase disclosure in order to make their achievements known and then recoil to a more standard, *safe* level of disclosure. Thus, viewing a broad swath of companies with respect to disclosure may indicate an undulating relationship between

performance and disclosure that is agitated by media visibility.

Third, this study recognizes the potential for other factors to interact with environmental performance to influence corporate responses. Bansal and Clelland (2004) suggested testing for nonlinear relationships between corporate environmental legitimacy, impression management, and unsystematic risk. They found that environmental legitimacy demonstrated a nonlinear relationship with disclosure because companies employed impression management strategies to influence external perceptions. Fourth, the visibility results in this study differ from those found by Meznar and Nigh (1995) and Meznar et al. (2006), who did not find significant relationships between visibility and company behavior. Our visibility variables, however, were more extensive in that different types of visibility (general/issue related)

and Internet news sources were also incorporated into the visibility measure. It would be beneficial for research to further examine our proposed distinction between general and issue-related visibility with respect to company disclosure. Visibility may also have impact on the type of information that is disclosed. For example, it may be that issue visibility makes it more likely that stakeholders will demand specific information, while general visibility has no impact on disclosure or produces a general or symbolic level of transparency.

For stakeholder groups, the primary implication is that managerial concerns about the impact of media exposure on corporate image also extend to the climate change issue. In the MIT Annual Business of Sustainability Survey, 38% of the 1560 business leaders surveyed cited an improved image as the principal benefit of addressing sustainability, versus approximately 10% for competitive advantage, cost savings, or employee attachment (Berns et al., 2009). According to signaling theory (Spence, 1973), corporations with superior information transparency signal better corporate governance. Hence, even the companies that adopt a defensive strategy toward disclosure are, by default, giving an indication of their corporate governance. It may be that after having identified disclosure pacesetters, it is important to pressure the less visible companies to follow the leaders sooner rather than later. Thus, the attention of regulators and stakeholders might well be directed toward average companies within a given industry as well as the leaders.

Powell and DiMaggio (1991) state that companies aim to meet, rather than exceed, the expectations of institutional stakeholders and social actors. The risk of information leaking to competitors as companies are developing environmental innovations cannot be eliminated, but it can be mitigated through voluntary disclosure regimes such as the CDP that do not reveal proprietary information. Finally, managers of highly visible companies that have more pressure to adopt an accommodative strategy may be surprised by what they find when they examine their practices. Coca-Cola expected most of its carbon emissions to originate from its trucks and manufacturing operations, but instead discovered that the vast majority of emissions emanated from the refrigerants and insulation in the coolers, vending machines, and fountain dispensers used to serve their drinks. Bryan

Jacob, Director of Energy Management and Climate Protection at Coca-Cola stated, “[i]f we had never put pencil to paper and done the calculations, we might not have understood it ourselves – or believed it” (King, 2009).

#### *Study limitations and conclusion*

The limitations of this study provide avenues for further research. First, the study results are limited to the U.S. context. Second, results might be enriched by an even finer grained analysis of visibility. While this study sheds light on the association of general and related issue visibility with climate change disclosure, a content analysis that details the tenor of visibility and press coverage, though a daunting and time-consuming task, might shed additional light. Third, because we have no absolute measure of environmental performance, it is possible that we have an anomalous sample or a sample year in which most companies performed well or poorly. In the same way, it is possible that the economic downturn in the U.S. economy that began in the later months of 2008 affected media priorities for reporting and company disclosure practices. We did, however, control for financial performance and average media coverage over 2 years to reduce to impact of sensational events. By illuminating the nature of the interface between environmental performance, visibility, and climate change disclosure we hope to assist the efforts of companies to provide disclosure in a responsible manner, and the efforts of stakeholders’ to obtain the information they need to protect their interests.

#### **Notes**

<sup>1</sup> New York Times, Environment. <http://www.nytimes.com/pages/science/earth/index.html>. BBC Online, In-depth: climate change. <http://www.google.com/search?q=bbc+online+in+depth+climate+change&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a>. The Guardian Unlimited, Special report: Global warming. <http://www.guardian.co.uk/environment/climate-change>.

<sup>2</sup> As of February 2009.

<sup>3</sup> This was prior to the Tyco fraud scandal that resulted in prison terms for the CFO and CEO.

## Appendix

### *KLD environment items*

#### *Strengths*

1. *Beneficial products and services.* The company derives substantial revenues from innovative remediation products, environmental services, or products that promote the efficient use of energy, or it has developed innovative products with environmental benefits.
2. *Pollution prevention.* The company has notably strong pollution prevention programs including both emissions reductions and toxic-use reduction programs.
3. *Recycling.* The company either is a substantial user of recycled materials as raw materials in its manufacturing processes, or a major factor in the recycling industry.
4. *Clean energy.* The company has taken significant measures to reduce its impact on climate change and air pollution through use of renewable energy and clean fuels or through energy efficiency, and promoted climate-friendly policies and practices outside its own operations.
5. *Management systems.* The company has demonstrated a superior commitment to management systems through ISO 14001 certification and other voluntary programs.
6. *Other strength.* The company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities.

#### *Concerns*

1. *Hazardous waste.* The company's liabilities for hazardous waste sites exceed \$50 million, or it has recently paid substantial fines or civil penalties for waste management violations.
2. *Regulatory problems.* The company has recently paid substantial fines or civil penalties for environmental regulations, or the company has a pattern of regulatory controversies.

3. *Ozone depleting chemicals.* The company is among the top manufacturers of ozone depleting chemicals such as HCFCs, methyl chloroform, methylene chloride, or bromines.
4. *Substantial emissions.* The company's legal emissions of toxic chemicals from individual plants into the air and water are among the highest of the companies followed by KLD.
5. *Agricultural chemicals.* The company is a substantial producer of agricultural chemicals.
6. *Climate change.* The company derives substantial revenues from the sale of coal or oil and its derivative fuel products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products.
7. *Other concern.* The company has been involved in an environmental controversy that is not covered by other KLD ratings.

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