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Contexts and Corporate Voluntary Environmental Behaviors: Examining the EPA's Green Lights Voluntary Program

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CONTEXTS AND CORPORATE VOLUNTARY ENVIRONMENTAL BEHAVIORS

Examining the EPA's Green Lights Voluntary Program

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Why do an increasingly large number of firms choose to spend their own money and resources to protect the environment beyond the extant regulatory requirements? This article addresses this question by examining the EPA's Green Lights (GL) voluntary program in which a firm's policy makers made an early commitment to limiting greenhouse gases through the installation of energy-efficient lighting technology in its facilities. Two theoretical perspectives—resource-based theory and neo-institutional theory—are adopted to investigate the contexts by which a firm is encouraged to undertake voluntary environmental actions and evaluate environmental strategies associated with them. Accordingly, the authors focus on two major contexts: market contexts in which a firm adopts voluntary actions as a strategic response to market pressures and to advance competitiveness; and institutional contexts in which a firm takes voluntary postures as a strategic response to institutional pressures, to obtain institutional legitimacy and weaken regulatory scrutiny. The research results partially support both contexts and their associated strategic behaviors.

Keywords: *Green Lights voluntary program; greenhouse gas prevention; neo-institutional theory; resource-based theory; institutional contexts; market contexts; strategic behavior*

A major change in environmental policy has occurred in terms of governmental and private sector involvement. Governments have adopted a series of largely competitive measures to reinvent environmental policy, escaping from earlier regulatory methods that mandated requirements to the affected industries. They have experimented with various pollution control methods that include market-based mechanisms (e.g., emission trading), information-based mechanisms (e.g., Toxic Release Inventory), and voluntary programs (e.g., Green Lights). These incentive-based and voluntaristic approaches focus on environmental performance rather than regulatory compliance (Norberg-Bohm, 1999; Rosenbaum, 2000). They are designed to complement and even replace traditional (command-and-control) pollution mechanisms that are often considered to

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be basically ineffective (i.e., too complex, costly, and inflexible) to reach their proposed goals.

Firms have likewise dramatically transformed their own environmental strategies. Moving away from a passive and even defensive response to environmental regulations, an increasing number of firms such as 3M, Dupont, Baxter International, and BP-Amoco have adopted a more cooperative and proactive stance on environmental protection. They view environmental protection, formerly seen as a mandated responsibility with which to comply, as an opportunity to improve their environmental and economic performances (Porter & van der Linde, 1995). Many firms have voluntarily chosen to allocate financial and other resources to undertake environmental initiatives that go beyond strict regulatory requirements (Fischer & Schot, 1993; Smart, 1992).

These firms have often undertaken a proactive environmental initiative through voluntary environmental programs (VEPs), either government sponsored (e.g., 33/50, Green Lights, Climate Challenge), industry association sponsored (e.g., Chemical Manufacturing Association's Responsible Care), or third party sponsored (e.g., International Standards Organization's 9000 and 14000 series) (Darnall & Carmin, 2005). Since the 1990s, in the United States alone, there have been more than 150 VEPs implemented, among which more than 42 programs are sponsored by the federal government (Carmin, Darnall, & Mi-Homens, 2003; Mazurek, 2002). As voluntary programs have proliferated tremendously, the number of participants in VEPs has also grown accordingly. In the year 2000, there were more than 13,000 participants in the U.S. Environmental Protection Agency's (EPA) voluntary programs alone.[1]

These converging trends of government reform movements and changing corporate attitudes toward environmental protection overshadow the prevailing argument that environmental protection is a "public good," in which self-interested individuals and firms are believed to lack the necessary incentives to allocate and consume the goods in a socially efficient manner (Hardin, 1968; Ostrom, 1990) and consequently require government intervention to encourage or enforce environmental standards (Baumol & Oates, 1988; Weimer & Vining, 1998). This trend, seemingly contradictory with the belief that firms would not responsibly "consume" environmental goods without legal pressure, led scholars to important questions: Why does a firm voluntarily undertake environmental protection? What are factors that drive voluntary actions? And can public goods be voluntarily derived?

Current research provides two major views of why a firm may undertake voluntary environmental actions. On one hand, researchers view voluntary actions as a market response strategy. A firm shows voluntarism to respond to environmentally conscious consumers and investors (Arora & Cason, 1996; Reinhardt, 2000; Rivera, 2002; Welch, Mazur, & Bretschneider, 2000), while proactively dealing with environmental problems. By adopting a VEP, it can develop a "green" reputation and therefore take a competitive position in markets. On the other hand, other researchers view voluntary actions as a strategic means to deal with institutional and regulatory pressures. A firm decides to take voluntary actions to convince regulatory agents and the public of its environmental receptivity and thus obtain institutional legitimacy, which could result in relieving the intensity of regulatory oversight and mitigating the incentive for political mobilization of interest groups for setting higher environmental pollution standards (e.g., King & Lenox, 2000; Lyon & Maxwell, 1999; Welch et al., 2000).

Although many researchers examine a firm's voluntary environmental action, most research chooses not to investigate both market and institutional contexts in which a firm determines its environmental strategy. It is important to examine both because of the contexts and environmental strategies associated with them. We adopt two theoretical perspectives—resource-based theory and neo-institutional theory—and investigate both market and institutional contexts in which a firm is encouraged to participate in the EPA-sponsored Green Lights (GL) voluntary program (1991; later incorporated into the Energy Star Buildings [ESB] program). In the GL program, a firm voluntarily opts to limit or prevent greenhouse gas emissions through the installation of energy-efficient lighting technology in its facilities. A particular focus is on the early GL participants because they stand to enjoy the most benefits from the strategies. That is, the early environmental commitment can attract the most attention from media and the public, which the firms can use to either attract environmentally conscious consumers or disguise their environmental performances.

To anticipate this research, the first section briefly describes the EPA's GL voluntary program. The second section adopts the perspectives—a resource-based theory and a neo-institutional theory—to examine contributing factors and conditions that drive a firm to program participation and relate them to particular environmental strategies. The third section presents the research methodology that addresses the data, variable measurements, and statistical model used to test the hypotheses. Finally, we present the results of the analysis and conclusions and suggest a number of policy implications.

GREEN LIGHTS VOLUNTARY PROGRAM

The GL program was initiated by the EPA in 1991 as the flagship of its Energy Star programs.[2] It was designed to reduce electricity demands[3] and prevent utility emissions, particularly of greenhouse gases (e.g., carbon dioxide, methane, and nitrous oxide), through the installation of energy-efficient lighting technology (e.g., electronic fluorescent lighting ballasts, occupancy sensors, energy-efficient fluorescent bulbs) in corporate facilities. The potential roles of the program were pronounced in the U.S. policy of global climate change, particularly when there was no political consensus on the means to reduce aggregate greenhouse gases (Brunner & Klein, 1999).

Firms who wanted to join the program were asked to sign a Memorandum of Understanding (MOU) with the EPA. As part of this agreement, the firms must survey all of their facilities and install new lighting systems that can realize energy efficiency without compromising lighting quality within 5 years (EPA, 1993). The specific choice of lighting technologies was not prescribed but left to the participants. In return, the EPA provided a wide range of support to the participants throughout the lighting-upgrade process, including technical assistance and information, possible financing sources, and public marketing of the participants' green initiatives. For example, the EPA helped the participants identify where lighting upgrades were needed and what their options were by using its state-of-the-art computer software package. In addition, participants would obtain technical assistance through monthly national-level lighting workshops and by publishing product-information reports on the performance of lighting technology (EPA, 1993).

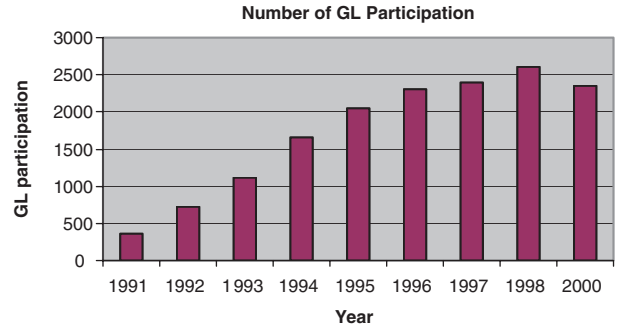

FIGURE 1: Number of Green Lights (GL) Participants
Source: EPA Energy Star Buildings & Green Lights participant list, 1991–1998 & 2000.

There are three categories of GL program participants: partners, allies, and endorsers (EPA, 1996). *Partners* include both the private and public organizations (e.g., hospital, university, state and local governments) that upgrade lighting fixtures in their own facilities. *Allies* are energy and lighting-industry affiliates (both utilities and purveyors of lighting equipment). They were expected to commit not only to the same lighting upgrade as partners but also to the promotion of the program and energy-efficient lights. *Endorsers* are professional and trade organizations that encouraged their members to adopt the program.

The number of participants consistently grew and the annual average participant growth was more than 50% between 1991 and 1995, although the number slowed down after the year 1995 (see Figure 1). As of July 2000, there were 1,589 partners, 486 allies, and 299 endorsers.

THEORIES AND HYPOTHESES

Resource-Based Theory

Resource-based theory (RBT) focuses on a firm's internal resources to explain variation in its competitiveness in markets (Barney, 1991). It argues that firm resources with distinctive attributes lead to sustainable competitiveness (Barney, 1991; Wernerfelt, 1984). The resources include both tangible resources (e.g., physical technology or geographical location) and intangible resources (experience and reputation). RBT proponents posit four central attributes (Barney, 1991). First, the resources must generate positive value and opportunities to a firm. But valuable resources do not produce competitiveness potentials by themselves when many firms share them. This relates to the second attribute, namely, uniqueness or rareness (Reed & DeFillippi, 1990). In addition, a firm with rare resources may not enjoy its competitiveness for long periods of time when the resources can be imitable and substitutable, which leads to the third and fourth resource attributes, imperfect imitability and nonsubstitutability with strategically equivalent resources (Barney, 1991; Dierickx & Cool, 1989).

RBT provides valuable insights into how a firm perceives environmental protection as a strategic means to promote its competitiveness. Environmental protection, once regarded as an internal cost of business operation, has become

considered a strategic tool by which firms can respond to environmentally conscious consumers and investors and deal with pollution, conceived as a byproduct of inefficient use of production materials. As a result, a firm can build a green reputation and reduce production costs, which can help it take a competitive position in markets. Underlying the importance of a firm's environmental competence, Hart (1995) argues that "strategy and competitive advantage in the coming years will be rooted in capabilities that facilitate environmentally sustainable economic activity" (p. 991).

RBT and GL Participation as a Strategic Response to Market Pressures

The GL program, in which a firm commits to installing proven energy-efficient lighting systems in its facilities and prevent greenhouse gases, can make a firm responsive to markets and competitive for two major reasons. First, the program participation can help a firm either maintain or acquire a green reputation. The reputation makes a firm seem responsive to green consumers with a preference for environmentally friendly products and tap into such green markets (Darnall, Gallagher, Andrews, & Amaral, 2000). In the United States, the green market segment is seemingly ascendant; more than 15 years ago, more than 75% of U.S. consumers listed a corporate environmentally friendly image as an important criterion for their purchasing decision (Kleiner, 1991), and nearly a third of consumers have purchased a product known for being environmentally benign (Roper Organization, 1990). Contemporary evidence is similarly compelling (e.g., see Adler, 2006), as well as the growing popularity of hybrid automobiles.

The green image is particularly crucial to firms with proximate contact with final consumers (such as consumer good producers) that are more visible to consumers and susceptible to green publicity because their product sales are largely associated with the publicity (Arora & Cason, 1996; Khanna & Damon, 1999). In addition, a green reputation can generate a comparative differential advantage by which firms can enjoy price premiums in selling their products (Rivera, 2002; Russo & Fouts, 1997). Such a reputation, once established, is not easily imitated over short time periods (Hart, 1995). This leads to the following hypothesis:

Hypothesis 1: A firm with closer contact with final consumers is more likely to participate in the Green Lights program.

In addition to the reputational benefits, the GL program participants can achieve significant energy cost savings and subsequent reductions in operation and production costs. Energy savings would be more than $1.2 billion a year if energy-efficient lighting upgrades are made to all U.S. facilities (EPA, 1996).

Despite the potential benefits that the GL program can deliver to firms, the program participation may not be an option for every firm. As is usually the case for pollution prevention strategy, the GL pollution prevention strategy is labor intensive rather than technology intensive (Darnall, 2003; Hart, 1995); it typically involves a number of employees who work in teams and share their expertise. The required employees range from lighting designers to project managers to waste management professionals to financial specialists to public relations officers (EPA, 1993). In this regard, a firm that has emphasized capital equipment development is

relatively at a great disadvantage. Higher capital investment makes it difficult to adjust its strategy. This leads to the second research hypothesis:

Hypothesis 2: A firm with lower capital investment intensity is more likely to participate in the Green Lights program.

Finally, intensive up-front capital investment required to implement GL projects, even with a potential internal rate of return on the investment and the EPA's assistance of identifying financing options (e.g., self-financing, third-party financing, municipal bonds), could discourage firms with low financial performance. Those firms are more likely to perceive the GL strategy as a risk rather than an opportunity for sustained competitiveness. Conversely, the opposite could be true for firms with better financial performance (Arora & Cason, 1995) and thus could encourage them to participate in the GL program. This leads to the following research hypothesis:

Hypothesis 3: A firm with better financial performance is more likely to participate in the Green Lights program.

Neo-Institutional Theory

Neo-institutional theory (NIT) holds that organizations are susceptible to institutionalized values and expectations; moreover, their stability and survival are dependent on the extent of that conformity. Organizational choices are not just based on economic interests but also on social justification and legitimacy (Oliver, 1997; Zukin & DiMaggio, 1990). Institutional theorists have elaborated institutional processes that give rise to organizational conformity to what is socially taken for granted. DiMaggio and Powell (1991) identify three pressures that lead organizations to act and look homogeneous: coercive pressures, normative pressures, and mimetic pressures. *Coercive isomorphic pressures* arise from either legal mandates (e.g., regulatory standards and requirements) or informal rules and sanctions with forms such as force, persuasion, and invitations (DiMaggio & Powell, 1991; Meyer & Rowan, 1977). Examples for the latter can be standardized corporate practices and procedures (e.g., reporting mechanisms, accounting practices, environmental management systems) that firms require their subsidiaries and suppliers to adopt (DiMaggio & Powell, 1991; Meyer & Rowan, 1977). *Normative pressures* primarily stem from educational processes (e.g., academic and professional training) and professional networks (industrial trade associations) (DiMaggio & Powell, 1991). Universities and other professional academic institutions train organizational managers and staff to follow professional values and norms by influencing their cognitive bases. Professional networks, such as industrial associations, are the other source of pressure. They diffuse institutionalized rules and practices to their member organizations and thus shape their behaviors and activities. Finally, *mimetic pressure* grows out of organizational ambiguity. When organizations have unclear goals and lack of understanding about possible outcomes of actions and future environmental state, they are forced to imitate or mimic actions that other organizations have successfully taken in previous periods (March & Olsen, 1989).

NIT and GL Participation as a Strategic Response to Institutional Pressures

From the NIT perspective, a firm's GL participation can be viewed as a strategic means to release institutional pressures and meet environmental expectations of what is considered most appropriate in terms of dealing with environmental problems. Among institutional pressure sources, government agencies are the most prominent and powerful actors. They use regulatory mechanisms (e.g., legal threats and liabilities) to discourage and occasionally sanction noncompliance and violations; potential penalties and liabilities can be very expensive under environmental regulations such as the Superfund Act of 1986 and the Clean Air Act Amendment of 1990 (Khanna & Damon, 1999), to say nothing of the adverse publicity.

In this light, a firm with a responsive image could help a problematic firm ease regulatory scrutiny and even transfer its "dirtier" reputation to other, less responsive firms, for it has more to gain in the court of public opinion (Arora & Cason, 1996; Gunningham & Kagan, 2003; Khanna & Damon, 1999). Therefore, we hypothesize the following:

Hypothesis 4: A firm with a poor environmental track record is likely to participate in the Green Lights program.

Likewise, a firm in an industry with a poor environmental track record is more likely to participate in the GL voluntary program relatively early. The firm could use the early voluntary investment as a strategic vehicle to improve the negative common environmental image it shares, not to mention promoting an environmental image of its own. Therefore, it could harvest collective environmental legitimacy from regulatory agencies. The improvement of collective image can be important because adverse government agency perceptions about the industry could lead to more stringent regulations and subsequently incur higher costs of compliance imposed by governmental regulations. This leads to a fifth hypothesis:

Hypothesis 5: A firm in an industry with a poor environmental track record is likely to participate in the Green Lights program.

In addition to its environmental track record, a firm's size could be an important factor that influences its decision to participate in the GL program. A larger firm is more visible and susceptible to public and regulatory scrutiny and thus is more likely to be under greater institutional pressure (Arora & Cason, 1996; Lyon & Maxwell, 1999; Rivera, 2002; Rivera & deLeon, 2004; Welch et al., 2000). Larger firms, due to their economies of scale, are assumed to produce a greater volume of pollutions and have greater resources and expertise to handle environmental problems (Rivera & deLeon, 2004). This could lead to higher expectation from institutional actors, including both regulatory agencies and nongovernmental groups (e.g., environmental groups) for their environmental performance.

Hypothesis 6: A larger firm is more likely to participate in the Green Lights program.

DATA AND METHOD

This study investigates corporate participants in the GL voluntary program initiated in 1991 and later merged into the first stage of the ESB voluntary program in March 1995. It focuses, in particular, on the participants (i.e., partners) who made their commitments to the program, prior to the incorporation of the GL program into the ESB program (i.e., between 1991 and 1994). This group of participants is considered to be early participants. The program incorporation from GL to ESB serves as a clear break point to determine early (versus late) adopters for two major reasons. First, the incorporation could influence potential adopters' perception about the program. The number of program participants slowed down after the incorporation in the year 1995 (see Figure 1), as the GL practices became mature and the relevant market became relatively saturated. Second, 1995 was also the first year in which it was possible to evaluate 5-year GL adopters' commitments and determine the preferred ways to upgrade lighting systems. These previous experiences of the adopters and results of the evaluation could influence potential adopters' decisions for investment in the GL program.

Two restrictions are imposed on a firm's inclusion in the sample. First, firms have to be publicly traded. Firms that are not publicly traded in U.S. stock markets are precluded because financial and some organizational-level data (e.g., number of employees or sales) are not publicly available. The second restriction is that firms must be U.S. owned. Foreign-owned firms are excluded because they may exhibit different environmental behavior, part of which may be the decisions to invest in the GL program. It is generally more difficult for foreign firms to establish relations with their customers and suppliers (Buckley & Casson, 1976; King & Shaver, 2001). Given that environmental reputation becomes an important factor in the establishment of relations, foreign firms may tend to pay more attention to their environmental performances (King & Shaver, 2001).

Once GL participants are selected, the lists are merged with Standards & Poors (S&P) 500 firms and used to determine whether the S&P firms participate in the GL program. S&P 500 firms are selected as a sample frame because most environmental data are only available for those firms. The final sample size is 393, after deleting firms with missing data for more than one variable, predominantly their environmental track record. Among these firms, 55 firms (14%) adopted the GL voluntary measures.

Dependent Variable

The GL participation of a firm is measured by looking at parent firms and determining whether they joined the GL program between 1991 and 1994. This is because in most cases parent firms made final decisions about whether to participate in the GL program. Most GL participants are parent firms and few are subsidiary organizations and divisions. Those subsidiaries and divisions are identified with parent firms, using Hoovers online's business databases (http://premium.hoovers.com). The participants are coded 1 and nonparticipants are coded 0.

Independent Variables

To ensure that independent variables are not endogenous with the participation decisions, independent variables are measured before the firms started to participate in the GL program in 1991.

Two major databases are used to measure corporate financial information and environmental track record, respectively. First, the S&P COMPUSTAT database is adopted to measure a firm size, capital investment expenditures, and financial performance. The database contains financial information (e.g., sales and assets) for most of the publicly traded companies in the United States and around the world. The second database is the Investor Responsibility Research Center's (IRRC) Corporate Environmental Performance Profile Directory (CEPPD) (1993). The CEPPD includes information on environmental data, including liabilities, compliance, and practices.

Contact with final consumers is measured by a proxy variable determining whether firms produce final (consumer) goods such as automobiles, household furniture, and pharmaceutical preparations. The final goods are defined here as "commodities that will not undergo further processing and are ready for sale to the final demand user, either an individual consumer or business firm" (www.dol.gov). The identification of finished goods producers is determined by industrial standardization codes (SIC).

Capital investment intensity is estimated by the ratio of capital investment expenditure to total employees in 1990. It is designed to indicate how much capital expenditure is spent per employee (million dollars). The S&P COMPUSTAT database is used to obtain the data on capital investment expenditure and total employees.

Financial performance is measured by return on assets (ROA), that is, the ratio of sales to total assets (million dollars) in 1990. The measure is most widely accepted (Russo & Fouts, 1997). The data on sales and total assets are obtained from the S&P COMPUSTAT database.

The environmental track record of a firm is measured in three different ways. The first measure is the total number of the Resources Conservation and Recovery Act (RCRA) corrective actions that the EPA required a firm to undertake between 1988 and 1990. Firms with previous contamination at their operating facilities are required to initiate a RCRA corrective action as a condition of maintaining their RCRA permits. The corrective action involves extensive assessment to evaluate the presence of hazardous substances and cleanup activities to prevent the spread of contamination if present. The second measure is the toxic chemical emission intensity, or the sum of toxic chemical transfers and releases divided by a firm's revenues in thousands of dollars, in 1990. The final measure is the penalty index value (total penalty amount of a firm assessed between 1988 and 1990 divided by the firm's revenues in thousands of dollars in 1990). It correlates the levels of corporate compliance with major federal environmental regulations, including RCRA; Clean Air Act; Clean Water Act; Safe Drinking Water Act; Toxic Substances Control Act; Federal Insecticide, Fungicide and Rodenticide Act; Occupational Safety and Health Act; Mining Safety and Health Act; Atomic Energy Act; and Endangered Species Act. The data on these environmental track record measures of a firm are obtained from the CEPPD.

A poor environmental track record of an industry is calculated by averaging the total number (or ratio) of each environmental measure of firms making up the industry, including the total number of RCRA Collective Actions, firms' toxic chemical emission intensity, and penalty index value. The CEPPD is adopted to obtain the data on these poor environmental track record measures of an industry.

Size of a firm is measured by a firm's total sales in 1990. Firm size (i.e., the sum of sales at all of a firm's facilities) is obtained from the COMPUSTAT database.

Control Variables

Industrial sectors are used to control levels of regulatory stringency and regulatory costs across industries. For example, natural resources industries (e.g., oil industry, forest product industry) are constrained by more stringent regulations than the retail services industry. Industries are categorized by SIC codes 1000–1900 (mining and construction), 2000–2700 (food, textile, wood product), 2800–3000 (chemical and petroleum refining), 3100–3900 (rubber, leather, metal products, electronics), 4000–4800 (transportation, communication), 4900 (electric and utilities), and 5000–9900 (retail, banking, hotel, other services). Degrees of industry specificity are limited, due to sample size limitation (degrees of freedom). Six dummies are created to control these industries. For example, SIC 1000–1900 is coded as 1 and otherwise 0. The other SIC codes are coded in the same way until SIC 5000–9900.

Empirical Models

To estimate binary dependent variables of whether firms participated in the GL voluntary program between 1991 and 1994, a probit regression model (PRM) is adopted. The probit model assumes a normal distribution of ε with $E(\varepsilon|x) = 0$ and $\text{Var}(\varepsilon|x) = 1$ (Long, 1997). The model is described as

$$y_i^* = \beta_1 x_1 + \beta_2 x_2 + \varepsilon_i$$
$$y_i = 1 \text{ if } y_i^* > 0$$
$$y_i = 0 \text{ if } y_i^* \leq 0$$

in which

- y_i is the probability of ith firm participating in the GL program.
- x_1 is a vector of market competitiveness strategy, including a firm's contact with final consumers, capital expenditure intensity, and financial performances.
- x_2 is a vector of regulatory influence strategy, including the poor environmental track record of a firm and an industry and a firm size.
- ε_i is the random error term.

The important difference with the equation of the linear regression model is that the dependent variable is not observed (Long, 1997). The latent variable y* is observed by y, that is, whereas positive values of y* are observed as y = 1, negative or zero values of y* are observed as y = 0.

RESULTS AND DISCUSSION

Table 1 displays the descriptive statistics that describe mean and standard deviation. Results of the probit model are provided in Table 2. We calculate marginal effects of the variables where they are statistically significant to report the magnitudes of coefficients (Long, 1997).

Table 1: Descriptive Statistics

Variable	N	M	SD	*Minimum*	*Maximum*
GL adoption	393	0.1399491	0.3473765	0	1
Proximity to final consumers	393	0.524173	0.5000519	0	1
Capital investment intensity	393	175.7855	218.647	7.081	1586.254
Financial performances	393	1.101814	0.7470233	0.093	4.919
Poor environment track records of a firm					
RCRA corrective actions	393	0.870458	7.638524	0	148.81
Toxic chemical emission efficiency	393	1.12799	3.347668	0	41.43
Penalty index value of a firm	393	331.4032	6298.256	0	124865
Poor environment track records of an industry					
Industry average of RCRA corrective actions	393	0.851323	3.017053	0	24.8
Industry average of toxic chemical emission efficiency	393	1.14631	2.539729	0	15.68
Penalty index value of an industry		19.4731	73.14829	0	761.95
Size (million dollars)	393	7139.225	12714.07	115.55	123276.2

Note: GL = Green Lights program; RCRA = Resources Conservation and Recovery Act.

Table 2: Firms' Green Lights Program Participation

	Coefficient	SE	p *Value*
Response to market pressures			
1. Proximity to final consumers	0.6448637***	0.2421585	0.008
2. Capital investment intensity	–0.000476	0.000639	0.456
3. Financial performances	–0.2165824	0.1473329	0.142
Response to institutional and regulatory pressures			
4. Poor environment track records of a firm			
RCRA corrective actions	–0.0016363	0.0158723	0.918
Toxic chemical emission intensity	0.1054726**	0.048598	0.030
Penalty index value of a firm	–1.84E–05	0.0001688	0.913
5. Poor environment track records of an industry			
Industry average of RCRA corrective actions	0.014159**	0.0296573	0.633
Industry average of toxic chemical emission intensity	–0.262967	0.1132185	0.020
Penalty index value of an industry	0.0039394**	0.0015964	0.014
6. Size	0.0000136**	5.73E–06	0.018
Industry dummies			
SIC 1000–1900	–0.0874226	0.5296149	0.869
SIC 2000–2700	–0.485226	0.3328135	0.145
SIC 2800–3000	0.5521781*	0.3256523	0.090
SIC 3100–3900	0.464775	0.2491585	0.852
SIC 4000–4800	–0.4600255	0.4436482	0.300
SIC 4900	–0.5738981	0.5229435	0.272
Constant	–1.232618	0.2858179	0.000

Note: RCRA = Resources Conservation and Recovery Act.
*$p < .10$. **$p < .05$. ***$p < .01$.

Hypothesis 1 is supported by a highly significant ($p < .001$) coefficient for a firm's proximity with final consumers as reflected in the regression model, suggesting that a firm with a close relation to the final consumers is more likely to participate in the GL program. The effect of being a firm with proximate consumer contacts increases the probability of a firm's participation by 11%. However, other factors—including a firm's previous capital investment intensity (Hypothesis 2) and financial performance (Hypothesis 3)—are not related to GL participation.

Hypothesis 4, which indicates the relationship between a firm's poor environmental record and participation in the GL program, is weakly supported. Specifically, among three measures for the poor environmental record—including total number of RCRA corrective actions, toxic chemical emission intensity, and penalty index value—only the toxic chemical emission intensity measure is significant ($p < .05$). The effect of the variable measure is that one unit change in toxic chemical emission intensity (one more toxic chemical transfer and release per a firm's revenues in thousand of dollars) causes a 1.8% increase in the probability of a firm's participation in the GL program.

Hypothesis 5, which states the importance of an industry's poor environmental track record in terms of a firm's decision to participate in the GL program, is strongly supported overall. Among the three measures for the poor environmental record of an industry—the measures that average the total number (or ratio) of the environmental measures of firms (including RCRA corrective actions, toxic chemical emission intensity, and penalty index value) making up the industry—both an industry's toxic chemical emission intensity and penalty index value are significant at $p < .05$. The effects of the variable measures are that one unit change in toxic chemical emission intensity on an industry (one more toxic chemical transfer and release per a firm's thousand dollar revenue averaged into a firm's industry group) and one unit change in penalty index value (a thousand dollar penalty amount averaged into a firm's industry group) increase the probability of a firm's GL participation by 4.60% and 0.07%, respectively.

Hypothesis 6, which relates a firm's size to GL participation, is highly significant ($p < .05$). This finding suggests that a larger firm is more likely to participate in the GL program. The effect of one unit change in the size (a million dollars more in sales revenue) increases the probability of a firm's GL participation by 0.1%.

The research results are generally consistent with previous findings in voluntary programs (Arora & Cason, 1996; Khanna & Damon, 1999; King & Lenox, 2000; Rivera & deLeon, 2004; Videras & Alberini, 2000; Welch et al., 2000). Firms with proximate consumer contacts whose voluntary actions can promote a green reputation and hence attract environmentally conscious consumers are more likely to participate in voluntary programs such as the EPA's 33/50 (Arora & Cason, 1996; Khanna & Damon, 1999) and Waste Wise (Videras & Alberini, 2000). In addition, firms with a poor environmental history or those in poor environmental performing industries who perceive greater regulatory pressures are more likely to participate in voluntary programs, such as the Chemical Manufacturing Association's Responsible Care (King & Lenox, 2000) and the National Ski Areas Association's Sustainable Slope Program (Rivera & deLeon, 2004; Rivera, deLeon, & Koerber, 2006), as a means to improve adverse perceptions of regulatory agencies about them or overall industry and hence ameliorate regulatory scrutiny, either existing or forthcoming. Similarly, larger firms are more likely to be a voluntary participant, due to their visibility and susceptibility

to regulatory scrutiny (Arora & Cason, 1996; Khanna & Damon, 1999; King & Lenox, 2000; Videras & Alberini, 2000; Welch et al., 2000).

CONCLUSIONS

This research has examined the contexts in which a firm is encouraged to undertake voluntary environmental actions and evaluated environmental strategies associated with them. We have focused on two major contexts: (a) the RBT market contexts in which a firm adopts voluntary actions as a strategic means to respond to market pressures and to advance competitiveness; and (b) neoinstitutional contexts in which a firm takes voluntary postures as a strategic means to respond to institutional pressures, to obtain institutional legitimacy and weaken regulatory scrutiny.

The research results partially support both contexts and their associated strategic behaviors in terms of estimating a firm's early decision to undertake voluntary environmental actions. Specifically, a firm whose industry is more susceptible to consumer relations and reputation (i.e., consumer producers) is more likely to adopt voluntarism to obtain an environmentally conscious reputation and attract green consumers. On the other hand, firms such as those with poor environmental performance history, either in their own facilities or in their industry, are more likely to be under institutional and regulatory scrutiny and thus employ voluntary initiatives to relieve it. This type of institutional scrutiny could also be inevitable for larger firms because they are more visible to the public and regulatory agencies.

One institutional variable worth close attention is that a firm's poor environmental history (i.e., a "dirtier" firm) in the GL program is not as strongly supported in its decision to commit to the GL program as in other voluntary programs such as 33/50 (Arora & Carson, 1996; Khanna & Damon, 1999) and Responsible Care (King & Lenox, 2000). The weak empirical support for a dirtier firm could be related to two unique features or emphases of the GL program. First, the program emphasized the prevention of greenhouse emissions that were not currently regulated and weakly scrutinized by the public in the United States. Under conditions of weak institutional and regulatory pressures, a dirtier firm might acknowledge less pressure to adopt the program; moreover, program adoption is consistent with its immediate interest in dealing with existing environmental problems scrutinized by regulatory agencies. Second, the installation of energy-efficient lighting systems through the GL program does not directly contribute to a firm's own pollution abatement but to its utility firms' performances. This GL program feature, with its indirect measure of pollution control, may not be attractive to a problematic firm that wants to improve its own environmental performances.

In addition, a firm's resource, such as financial performance, does not appear to be statistically significant, which is not consistent with previous studies of other VEPs such as 33/50 (Khanna & Damon, 1999) and ISO 14000 (Darnall, 2003). This inconsistent empirical result may be related to the peculiarities of the GL program features that assist the participants in finding possible financing sources and provide technical assistance throughout the lighting upgrade process. These programmatic supports could make firms with fewer slack financial resources less financially burdened by the GL investment. A second possible explanation for this insignificant finding may be associated with the immediate and tangible cost savings (lower electricity bills) that firms can realize through

the GL program. The immediate savings could make a firm seem more comfortable in investing in the GL program, even firms with lower financial performance. Finally, the GL pollution prevention strategy is not as immediately complicated and expensive as the ISO 14001 management strategy in terms of implementing and managing the strategy. Certifying and implementing ISO 14001 is complex and requires high initial expenditures, although the cost of certification varies widely, depending on the size of facilities and previous experiences and capabilities (Kolk, 2000; Moon & deLeon, 2005; Prakash & Potoski, 2006).

These weak empirical results suggest that incorporation of the contexts surrounding the voluntary program into theoretical models is important to capture the varying nature of corporate environmental behaviors. That is, firms' internal resources and institutional environments are not static but influenced by the program contexts. The program contexts themselves are the potential sources from which firms can acquire internal resources and that influence the firm's existing institutional situations, such as regulatory pressures or altered market forces. When firms decide to participate in voluntary programs, they are likely to consider not only existing internal resources and the institutional environment they possess but also such resources and results that they can potentially obtain from the program. The program resources and institutional conditions could minimize (or reinforce) the effects of firms' existing resources on possible VEP decisions.

Empirical findings in this research lead to the following observations. First, policy managers and designers should pay close attention to contexts in which interactions between a firm and market and institutional actors (e.g., regulators and the public) occur and in which voluntary environmental actions are encouraged. This is because these contexts may offer a cue for particular voluntary interests and thus differentiate one interest from another. This contextual cue can also be used for designing and developing specific policy mechanisms by which certain interests are promoted (or discouraged) in a way that makes voluntary programs viable (Moon & deLeon, 2005). Where a contextual cue (e.g., a firm's frequent and close interaction with market actors) indicates a marked primacy in market interests, policy managers and designers may want to promote them because of their potential benefits of the improvement of both environmental and market performances. This change can be accomplished by stimulating green market pressures via two principal policy means: (a) disseminating information about a firm's voluntary eagerness through communication channels, such as the news media and professional conferences; and (b) nurturing public environmental education. These means also can be used to increase institutional pressures essential to combat a firm's poor response to environmental problems.

On the other hand, where a contextual cue describes regulatory and institutional interests (e.g., a firm with poor environmental credits), policy managers and designers may want to discourage them from a VEP initiative because of the potential danger that the firm could use voluntary program participation as a symbolic gesture (without showing actual environmental actions) to either improve its environmental credits or disguise its poor environmental performances (Darnall & Carmin, 2005). This is more likely in the GL program context where the firm's program adoption is not directly linked to its own pollution reduction. To deter this opportunistic behavior, policy designers should carefully craft and adopt deterrent mechanisms (e.g., monitoring and sanctions). The oversight

mechanisms, however, should be adopted and implemented with caution because they could adversely affect a firm's voluntarism (Rivera & deLeon, 2004).

Further VEP research needs to address two important areas. First, it is important to evaluate a firm's actual interaction with market and institutional stakeholders (the networks of interconnected social relationships) and the network influence on the adoption of voluntary initiatives. Specifically, the effect of networks can be analyzed at both interorganizational levels (e.g., relationships between businesses and suppliers, customers, competitors, and regulators) and at intraorganizational levels (e.g., possible relationships between managers, decision makers, and employers). The second area is related to the evaluation of a firm's actual environmental performances or of the satisfaction of program requirements within and across voluntary programs with different program requirements. These include performance requirements (e.g., environmental goals), administrative requirements (MOU or cooperative agreements), and conformance requirements (monitoring and sanctions) (Darnall & Carmin, 2005), as well as voluntary programs with different sponsorships, such as government sponsored, industrial association sponsored, and third party sponsored.

Finally, this research is limited in terms of generalizing the empirical results to the general population of firms because all of the firms surveyed here were primarily large (i.e., S&P 500 firms). Future VEP studies might wish to include small- and medium-sized firms to detail these firms' voluntary behavior.

In closing, we would suggest that VEPs, as part of an arsenal of programs intended to protect the environment, can serve as a valuable component, if we understand the nature of the voluntary components of the programs and how they interact in the institutional world. This article addresses these concerns, but surely more work is necessary before we can fully appreciate and use the VEP.

NOTES

1. For a review of voluntary environmental programs, see *Policy Sciences*, September 2005, issues 2 and 3, "Symposium on Voluntary Environmental Programs." Also see Steelman and Rivera (2006).

2. In 1995, the program was incorporated into the first stage in a five-stage upgrade strategy of the Energy Star Buildings (ESB) program, which focuses not only on lighting but on air distribution and heating and cooling equipment in commercial facilities (U.S. Environmental Protection Agency, 1996).

3. In the United States, lighting accounts for approximately 25% of the electricity demand, 80% to 90% of which goes to light industrial and commercial buildings (International Association for Energy-Efficient Lighting, 1996).

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