SURVEY QUESTIONNAIRE ON

ENVIRONMENTAL MANAGEMENT PRACTICES

SUMMARY OF RESULTS BY INDUSTRY AND PRACTICES

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Executive Summary

This document provides a summary of the results of a survey on Environmental Management Practices (EMP) conducted by the University of California at Santa Barbara during October and November 2003. The survey was sent to 3255 facilities in 8 industrial sectors: pulp, paper and paperboard mills, chemical and allied products, refining, primary metals, machinery, electronics and electrical, automotive, and utilities. The survey yielded 562 responses, which constitutes a 17.2% response rate. This summary includes a general description of the sample, a profile of the respondents, and summary statistics of facilities' environmental management practices, relations with stakeholders, and environmental performance measures. In addition, we report the factors that respondents noted were influencing them to improve their environmental performance and adopt particular environmental management practices. In many cases, these results are categorized by industry to facilitate comparisons.

The environmental management practices we inquired about include the adoption of an environmental policy and its communication, the number of internal and external audits performed at the facility, the proportion of employees in various departments receiving environmental training, "green purchasing" policies, the adoption of the ISO 14001 international standard, participation in industry and governments voluntary programs, and solicitation of opinions from environmental non-governmental organizations (NGOs).

Overall, we identified important differences between industrial sectors in terms of the level of adoption of these environmental management practices. For example, while 67% of the respondents in the pulp and paper sector provide training to the majority of their sales employees, only 20% do so in the refining sector. While the majority of the automotive industry respondents have successfully implemented ISO 14001, most respondents in the machinery, paper, refining and utility industries are not considering adopting ISO 14001. The adoption of green purchasing policy ranged from 14% of respondents in the refining sector to 30% in the paper sector. Participation in government voluntary programs ranged from around 10% of respondents in the chemicals and refining sectors to more than 30% in the utilities, metals, machinery, and electronics/electrical sectors. We also see important differences for participation in industry led voluntary programs: while 60% of respondents in the chemicals sector indicated participation (likely due to the prominence and maturity of that industry's Responsible Care program), other sectors had very low participation in such programs. (e.g.,

10% among machinery respondents). In general, a very small percentage of facilities indicated that they solicit feedback from NGOs on a regular basis (4%), though respondents in the utility and paper sectors had significantly higher rates (17 and 12% respectively).

We asked respondents to indicate which stakeholders (if any) had been in their facilities' decisions to improve environmental performance. Overall, the most influential external stakeholders were regulators, customers, and local community. Customers were particularly influential in the automotive and paper sectors, and regulators were particularly influential in the refining and metal sectors. We also inquired about which specific corporate departments were particularly influential in stimulating facilities to improve environmental performance, and found that the environmental management, legal, and strategy departments were the most frequently mentioned.

Facilities also reported a diverse set of motivations that have led them to adopt environmental management practices. Perhaps not surprisingly, the most frequently cited motivation was to improve regulatory compliance: 89% of indicated that this motivation was an important or very important motivator. Other motivators appeared to be industry specific to a particular industry, where responses far outstripped those from other industries. For example, 55% of the respondents within the chemical sector considered improving customer loyalty as an important motivator, and 80% of the respondents within the utility sector considered 'influence pending legislation" as an important motivator.

Companies can employ these survey results to benchmark their practices to facilities in their own industry as well as to other industries. In addition, government, NGOs, and local communities can employ this information to learn the prevalence of different environmental management practices across various industries, and to better understand how firms are motivated – and influenced – to adopt environmental management practices.

1. Sample and Method

1.1. Sample

The sample for this survey includes manufacturing facilities across the United States that operate in heavily polluting industrial sectors. We identified these sectors as those with the highest share of toxic chemical emissions reported to the US Environmental Protection Agency's Toxic Release Inventory (TRI) program:

- Pulp, paper and paperboard mills ("paper") (SIC 26),
- Chemical and allied products ("chemical") (SIC 28),
- Refining (SIC 29)
- Primary metals ("metals") (SIC 33)
- Machinery (SIC 35)
- Electronics and electrical (SIC 36)
- Automotive (SIC 37)
- Utilities (SIC 49).[2]

In 2001, the 11,622 facilities from these industries that reported TRI data represent 47% of the total number of facilities that reported data to TRI and 78% of the total toxic air emissions reported in the TRI program that year (US Environmental Protection Agency, 2003). To ensure access to data on performance trends, the sample was restricted to facilities that reported annual air emissions to the TRI program at least three times during 1996-2000. We also restricted the sample to those owned by publicly traded companies to ensure access to financial data. These restrictions reduced our sample to 3255 facilities.

1.2. Survey Administration

We pre-tested our draft survey by asking over 10 corporate environmental managers and environmental management consultants to complete the draft survey, and then discussing their experience to ensure they interpreted the questions the same way we had intended. In addition, we asked feedback from several of our academic colleagues. We finalized the

[2] In our results we received misclassified facilities in the following sectors SIC 20, 22, 24, 27, 30, 32, 38, 39, and 73 that we classified as "other". The industry sectors labeled "other" are not included in further analysis described in this document.

survey by clarifying several questions and responses. The Survey Research Center (SRC) at the University of California, Santa Barbara then administered the survey. The SRC sent the questionnaire to the entire sample twice, on October 13 and November 4, 2003. Respondents were provided the option of returning the paper survey, or logging in to a password-protected website to complete the survey online. During October 23 through November 12, the SRC called all 2312 facilities for whom we had accurate telephone numbers (71% of the sample) to encourage them to respond. In addition, postcards were sent in January 2004 to those who had not yet replied. We received 295 responses by mail and 267 by web for a total of 562. Of our total sample of 3255, this represents a response rate of 17.3%.

Response rate varied by industry from 13% to 24%. Figure 1 provides the number of responses by industry. We received the greatest number of responses from the chemicals industry (113 responses), which accounts for 20% of the all responses.

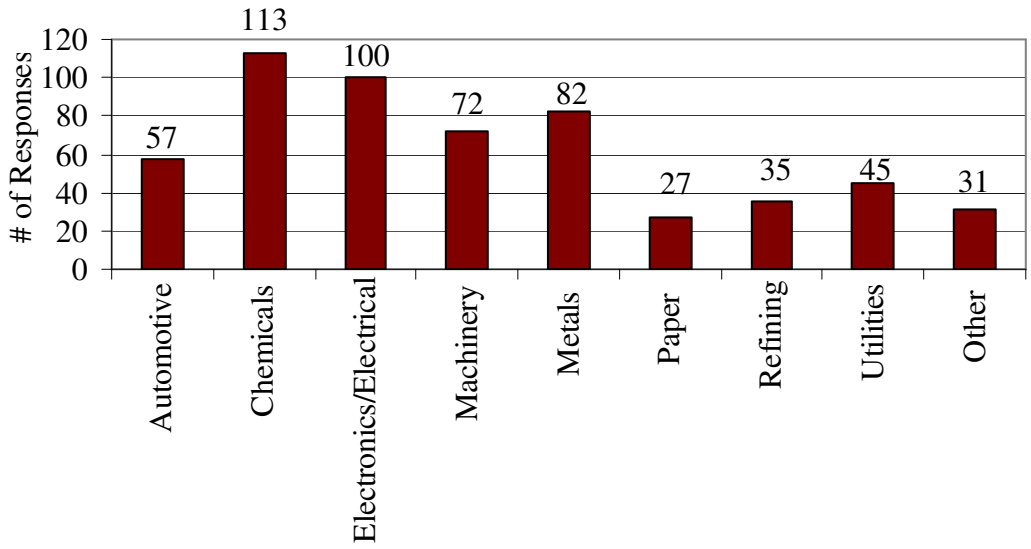


Figure 1: Number of Responses by Industry

We tested sample representativeness of the responses in several ways. First, an analysis of variance (ANOVA) analysis found that the different industries' response rates were not statistically significant (F=0.03). Second, we conducted t-tests to compare respondents to non-respondents along three dimensions and found that the two groups were statistically indistinguishable in terms of facility employment (p=0.19), pollution levels measured as average log pounds of toxic emissions in 2000-2001 (p=0.41), and the environmental harm

resulting from these emissions (p=0.80).[3] The results of these comparisons provide reasonable assurance that the respondents are representative of the entire sample.

We tested for non-response bias by comparing early and late respondents, since late responders may be similar to non-respondents. We created two sets of late respondents: all those who responded after we sent the survey a second time, and the subset that responded only after receiving the postcard reminder several weeks later. We compared each set of late respondents to the early respondents across the 11 survey measures using a chi-squared test of independence. In both cases, the responses from early and late respondents were virtually indistinguishable. Overall, these results suggest that non-response bias is unlikely to be a serious concern.

1.3. Respondent Profile

We addressed our survey to Environmental Managers/Specialists or Environment, Health and Safety (EHS) Managers/Specialists because we thought these individuals would possess the most comprehensive and accurate knowledge about the questions in our survey. Indeed, as depicted in Figure 2, 81% of the respondents held one of the positions we were targeting.

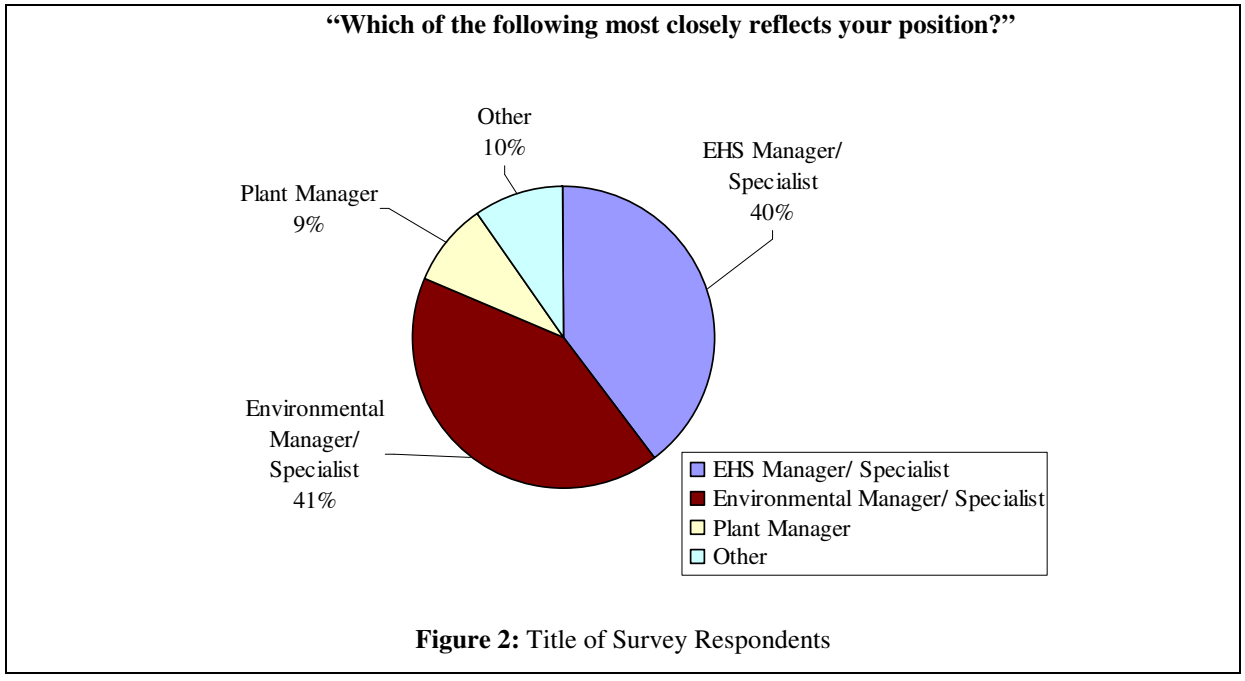


Figure 2: Title of Survey Respondents

[3] We compared pollution levels using data from the US EPA's Toxic Release Inventory (TRI) and environmental harm by weighting TRI air releases during 2000 and 2001 by each chemical's toxicity weight from the US EPA's TRACI scheme, summing these weighted totals and logging the result.

1.4. EHS Staffing

The average number of full time equivalent (FTE) employees in a facility's EHS department ranged across the different industries from 3 to 13, with an overall average of 5.5 (see Figure 3). The highest average is in the refining industry with over 13 employees. On average, facilities' EHS departments include less than 1% of a facility's total employees.

"Approximately how many full-time equivalent employees (FTEs) are working on environment, health and safety issues for your facility?"

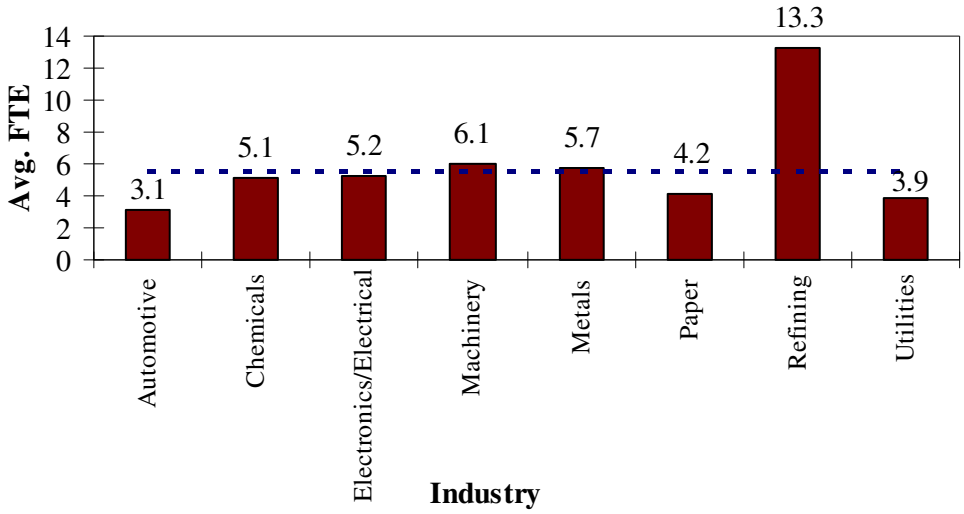


Figure 3: Average Full Time Equivalent (FTE) Employees in EHS Department by Industry

2. Environmental Management Practices

2.1. Environmental Policy

95% of the respondents indicated they have adopted an environmental policy at their facility. Respondents were asked to indicate the methods used to communicate their environmental policy. Figure 4 summarizes these results. The majority of the respondents post hardcopies of their policy at the facility while nearly half of them post the policy on the Internet and distribute it to their employees.

"If your facility or company has an environmental policy, how is it communicated?"

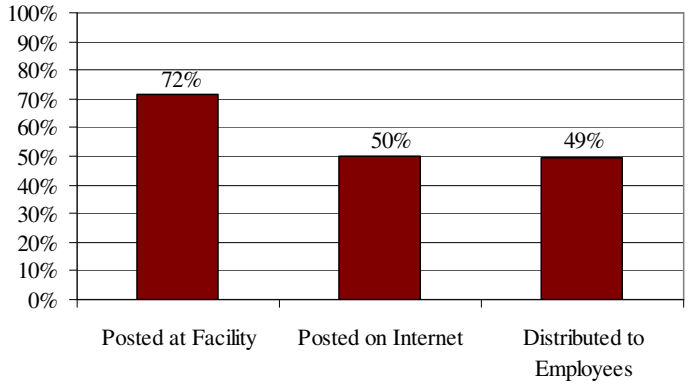


Figure 4: Environmental Policy

2.2. Environmental Audits

On average, facilities have 1.4 internal audits plus 1 external audit per year. Only a few industry averages differed from these overall averages. Specifically, facilities in the refining sector averaged less than 2 audits per year.

"How many times has your facility had an external environmental audit conducted by third parties such as consultants, not including regulators or corporate staff?"[4] (blue bars)

"How many times has your facility had an internal environmental audit conducted by your facility staff and/or corporate staff ?" (red bars)

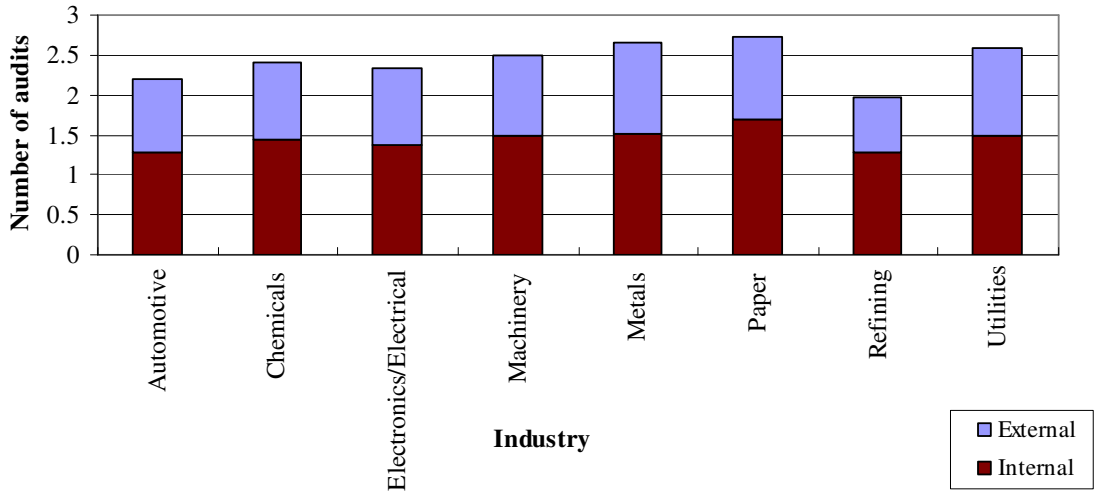


Figure 5: Average Annual Internal and External Audits by Industry

[4] Questions were asked about audits in the past 3 years but figure 5 represents audits per year.

2.3. Employee Training

Figures 6, 7, and 8 present the percentage of facilities providing environmental training for more than 60% of their employees. The graphs below illustrate how departmental training varies within each industry. Maintenance and operations employees usually receive the most training, while sales department employees receive the least.

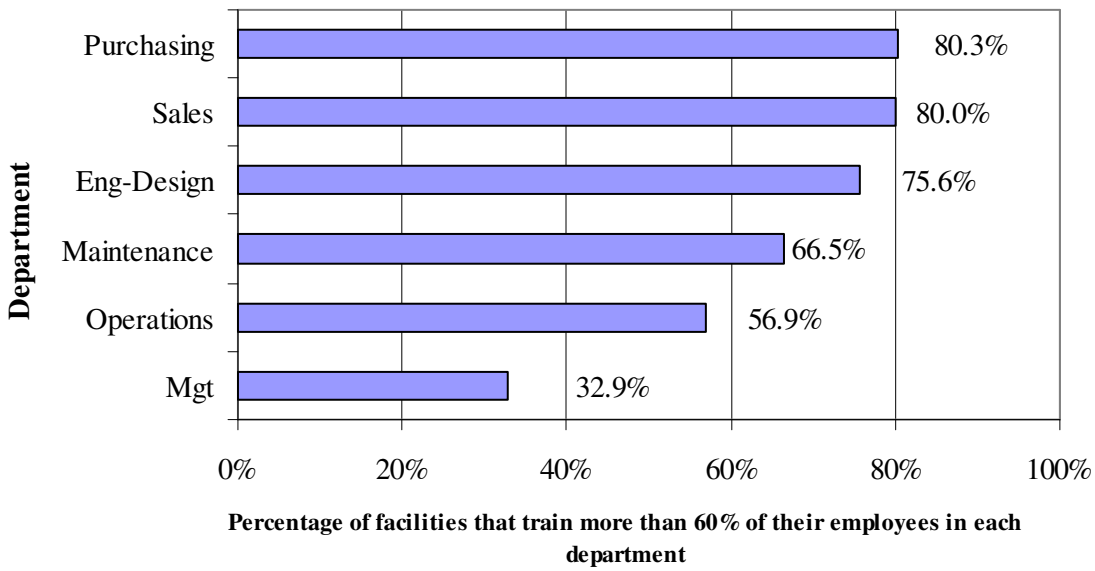
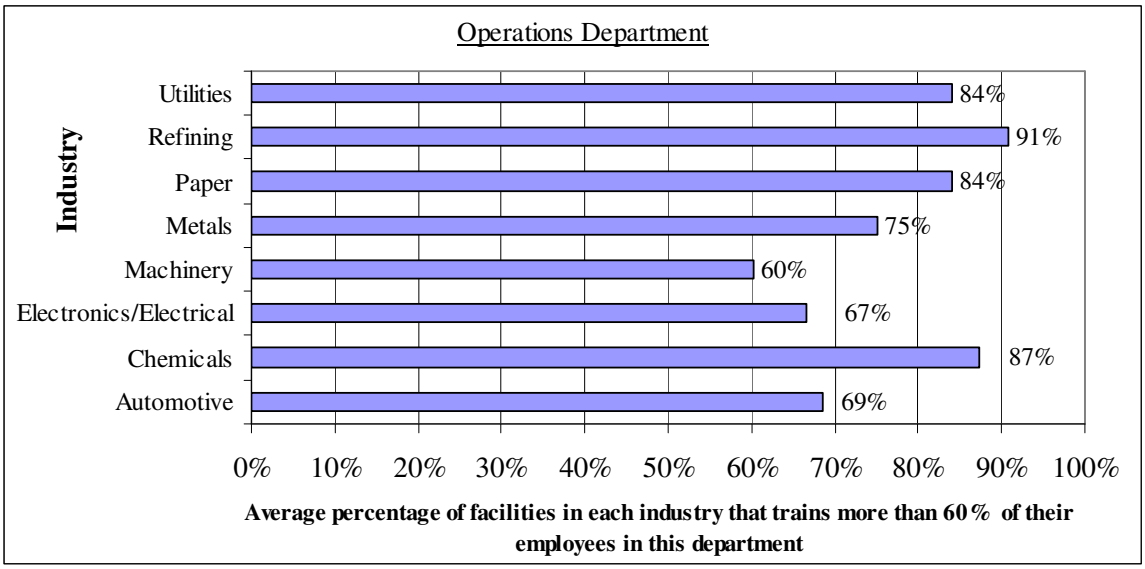
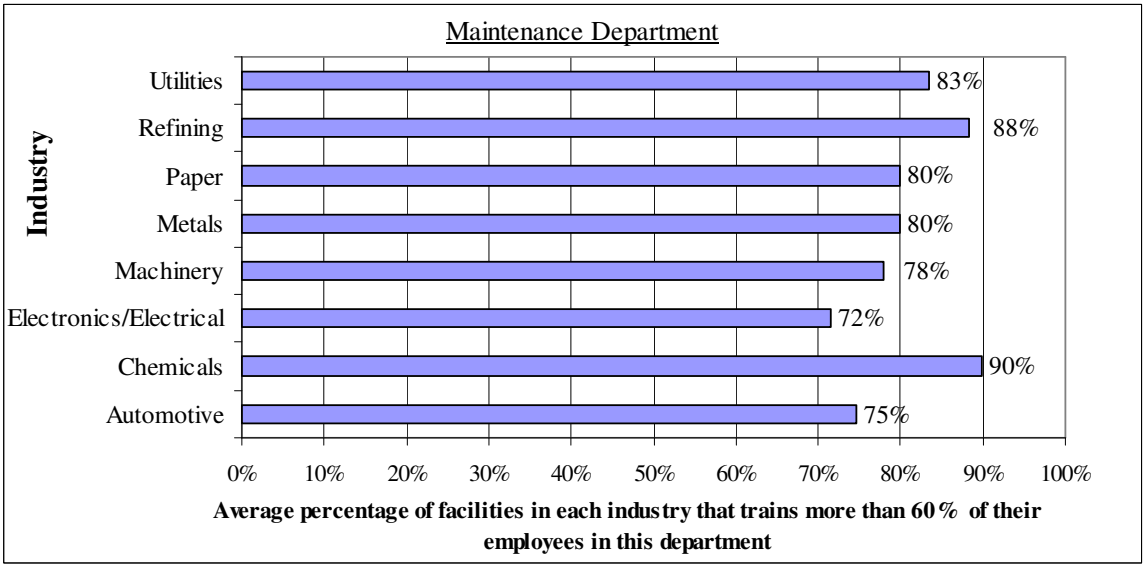


Figure 6: Training Prevalence for All Industries





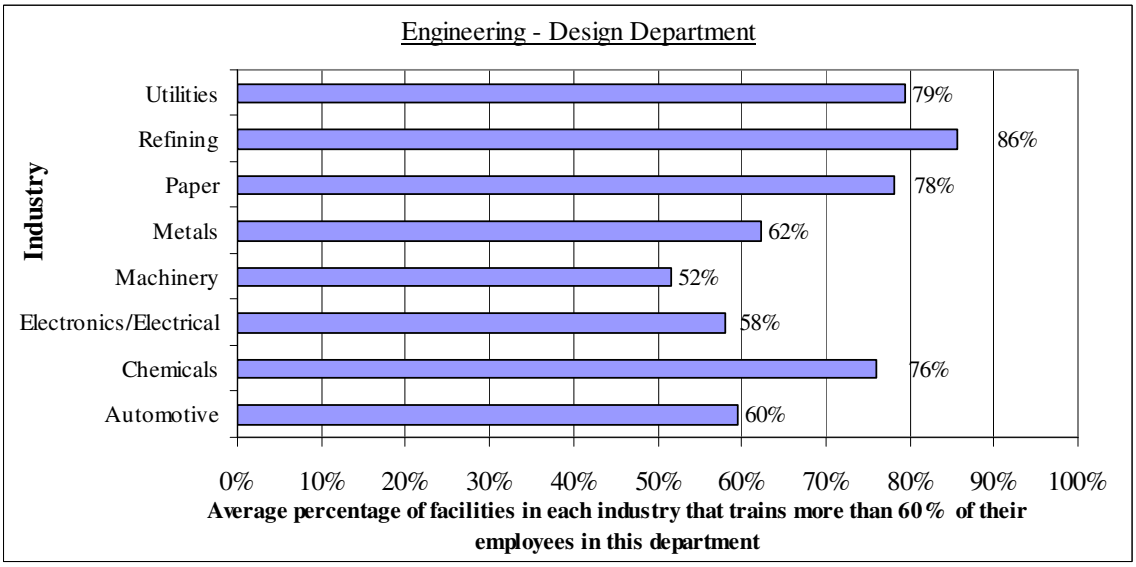


Figure 7: Training Prevalence by Industry: Operations, Maintenance, and Engineering-Design Departments

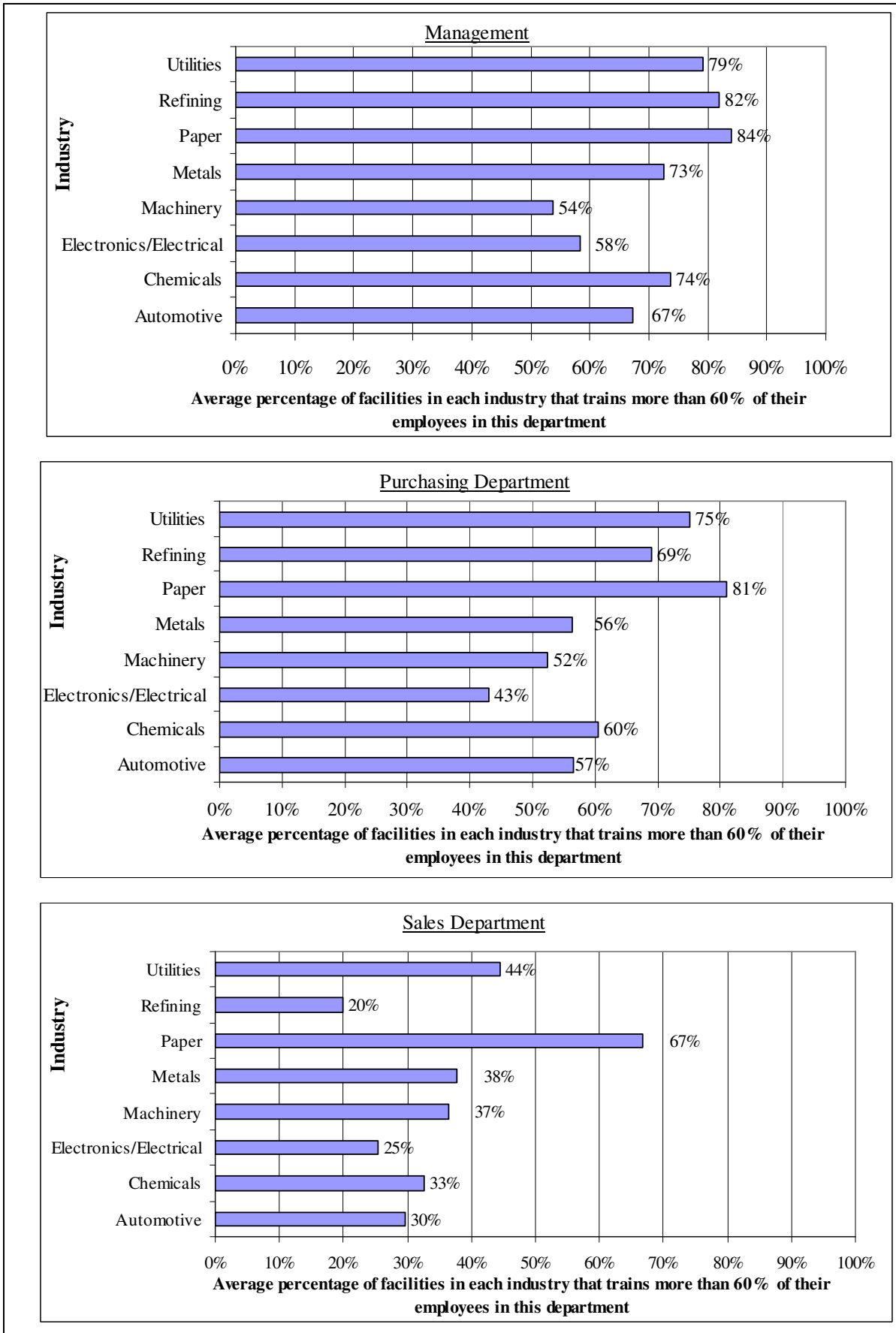


Figure 8: Training Prevalence by Industry: Management, Purchasing, and Sales Departments

2.4. ISO 14001 Implementation

As depicted in Figure 9, just over a third of the respondents indicated that they had already successfully implemented the ISO 14001 Environmental Management System Standard. In addition, 13% of the facilities noted that they are planning to implement or are currently implementing ISO 14001. A fifth is considering implementing ISO 14001 in the future.

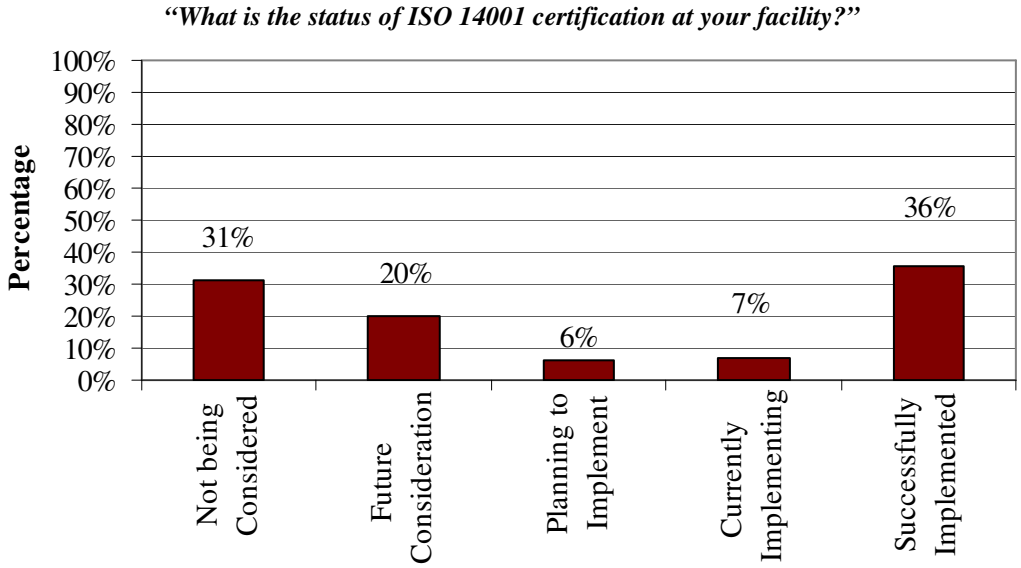


Figure 9: ISO 14001 Implementation Status

The results on the status of certification vary greatly by industry (see figure 10). While most respondents in the automotive industry have successfully implemented ISO 14001, most in the refining, and utility industries are not considering adopting ISO 14001.

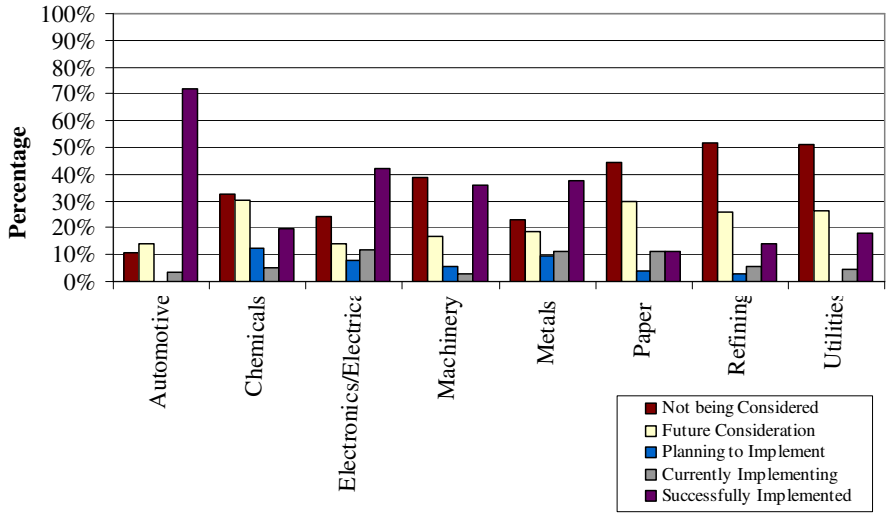


Figure 10: ISO14001 Implementation Status Among Industries

3. Relations with Stakeholders

3.1. Green Purchasing Policy

Figure 11 shows the percentage of facilities whose purchasing departments frequently use a green purchasing policy, which refers to the integration of environmental factors into the criteria used for procuring goods and/or services.[5] While the overall average is 23%, industry averages varied substantially, ranging from 14% of facilities in the refining sector to 30% of facilities in the paper sector.

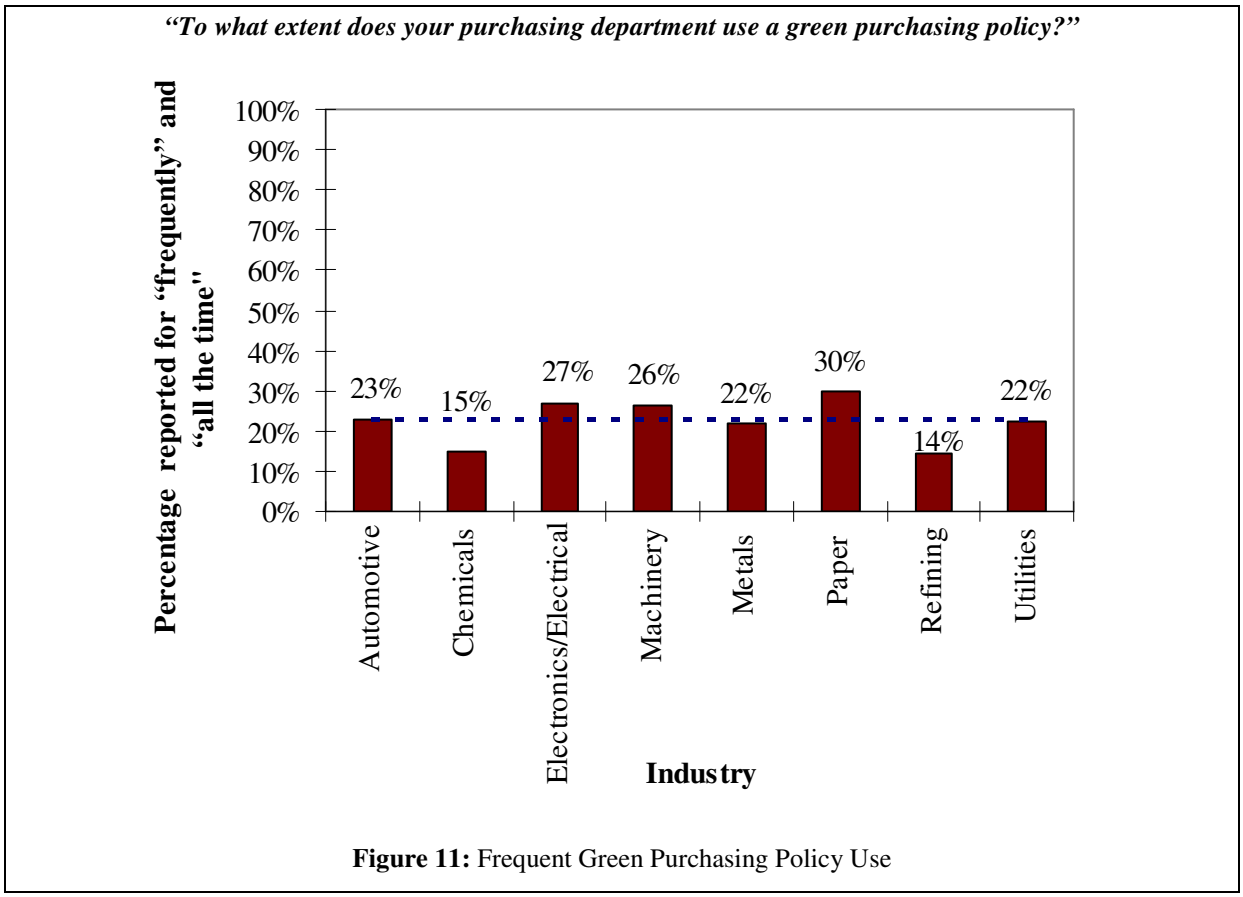


Figure 11: Frequent Green Purchasing Policy Use

[5] Frequently refer to respondents that answered "frequently" or "all the time"

3.2. Government Voluntary Environmental Programs

Figure 12 shows the percentage of facilities within each industry that were currently participating in **at least one** voluntary environmental program initiated by the US Environmental Protection Agency (EPA) or a state government agency, such as Energy Star, Wastewise, Environmental Performance Track. Overall, 26% of the respondents reported participated in a US EPA program, but this varied substantially across industries, from around 10% of facilities in the chemicals and refining sectors to more than 30% in the utilities, metals, machinery, and electronics/electrical sectors.

"What is the status of your participation in voluntary US EPA or state programs such as Energy Star, Wastewise, Environmental Performance track, etc. ?"

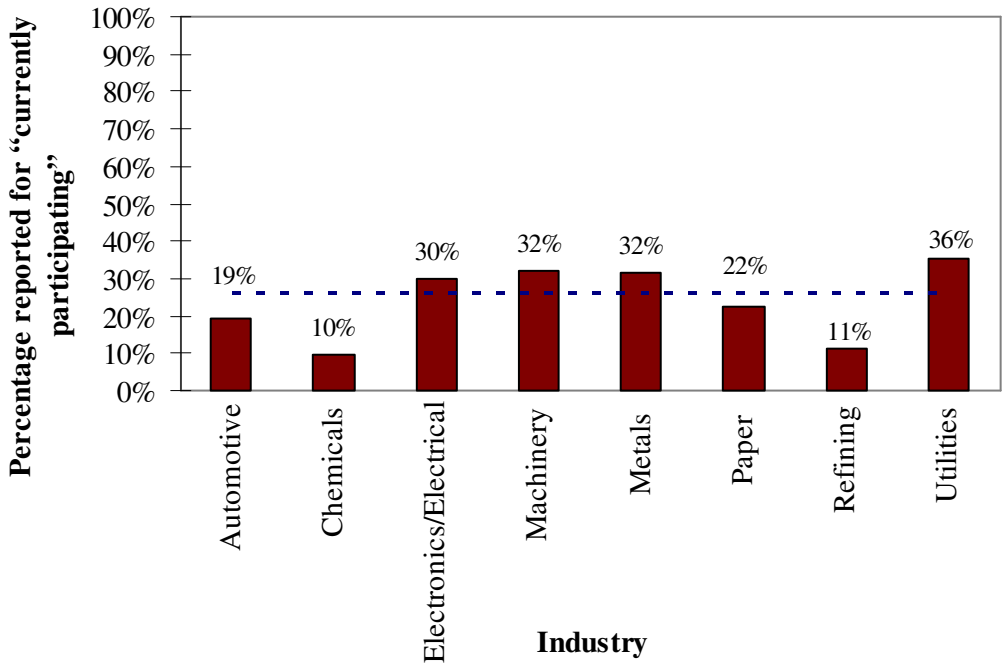


Figure 12: Participation in EPA Voluntary Programs by Industry

3.3. Industry Voluntary Environmental Programs

Figure 13 shows the percentage of facilities that participate in industry voluntary programs such as the chemical industry's Responsible Care program. The chemical sector had the most participation (60%), while the machinery sector had the lowest (10%). Nearly a third of facilities in the paper and refining sectors participated in such programs. Overall, 29% of facilities in the sample were participants in voluntary industry initiatives.

"What is the status of your participation in industry-led environmental programs such as Responsible Care, industry climate challenge programs etc."

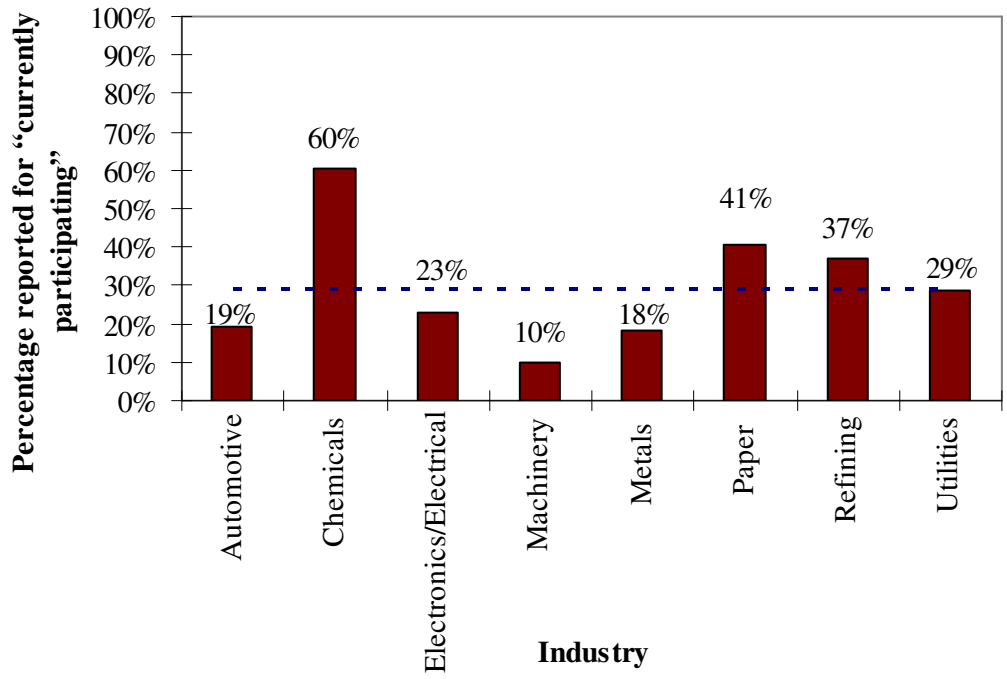


Figure 13: Participation in Industry Voluntary Programs by Industry

3.4. Relationship with Non-Governmental Organizations (NGOs)

Figure 14 shows the percentage of facilities that frequently solicit opinions from environmental non-governmental organizations (NGOs) such as involving them in site planning or in identifying environmental impacts.[6] Overall, few facilities do this (4%). However, this practice is much more prevalent in two industries: 17% and 12% of facilities in the utilities and paper sectors, respectively, solicit opinions from environmental NGOs.

[6] Frequently refer to respondents that answered "very often" or "all the time"

"How often does your facility solicit opinions from environmental non-profit organizations, such as involving them in site planning or in identifying environmental impacts?"

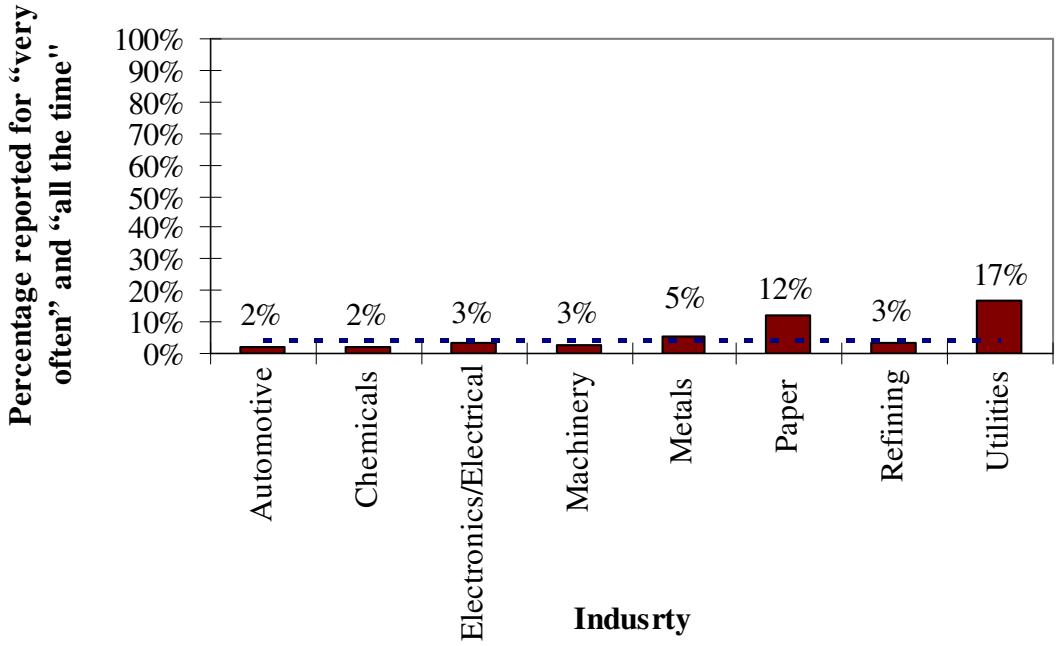


Figure 14: Solicitation of opinions from NGO

4. Setting Objectives and Targets

Figure 15 depicts the percentage of facilities that have objectives and targets for various environmental issues. Overall, most facilities have performance targets for air, water, and waste. Less than a fifth of the respondents have targets for noise reduction. No significant differences were found between industries.

"For which of these environmental issues do you have objectives and targets?"

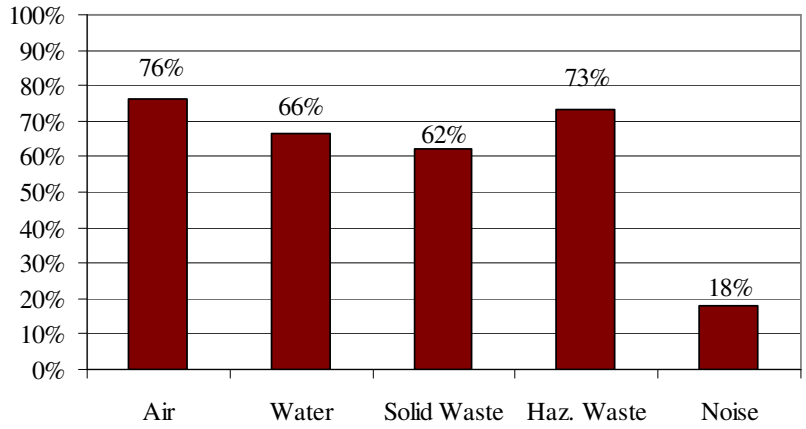


Figure 15: Targets and Objectives by Environmental Issue

5. Influence of Stakeholders to Improve Environmental Performance

5.1. Influence of External Stakeholders

Respondents indicated that a variety of stakeholders exerted a strong influence on their environmental performance improvement. As noted in Figure 16, the three stakeholders most often cited as exerting a strong influence were government (58% of the facilities), customers (41%), and local communities (34%).[7]

"To what extent have each of the following groups influenced your facility to improve its environmental performance?"

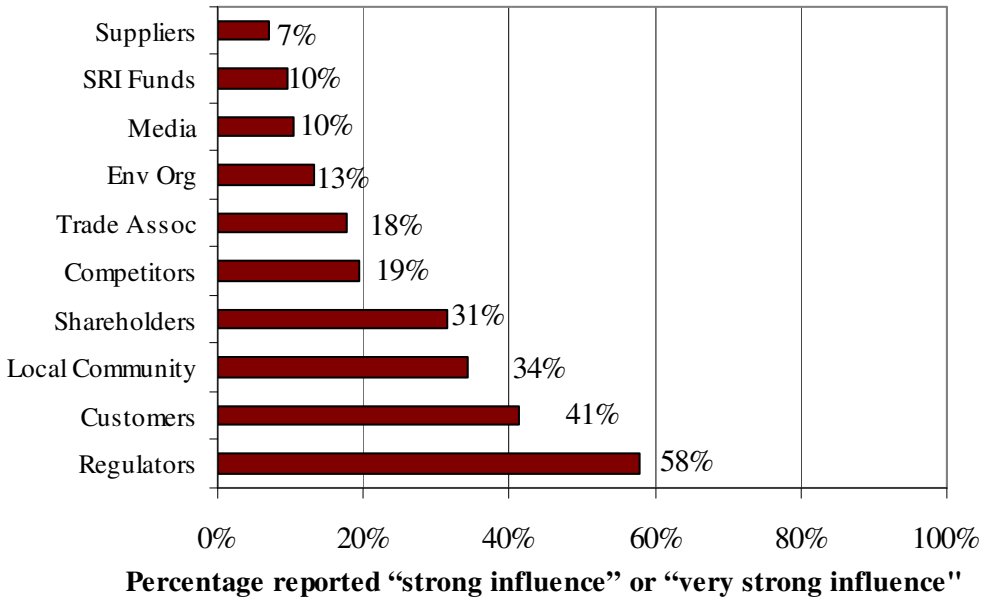


Figure 16: External Influence

[7] Strong refer to respondents that answered "strong influence" or "very strong influence"

Figure 17 depicts the substantial variation across sectors in how influential regulators, customers, and local communities are perceived. For example, local communities are perceived as very influential for facilities within the refinery and metal sectors while facilities within the automotive sector perceive customers as more influential. Not surprisingly, regulators were perceived to be most influential in the refining, chemical, and paper sectors.

"To what extent have each of the following groups influenced your facility to improve its environmental performance?"

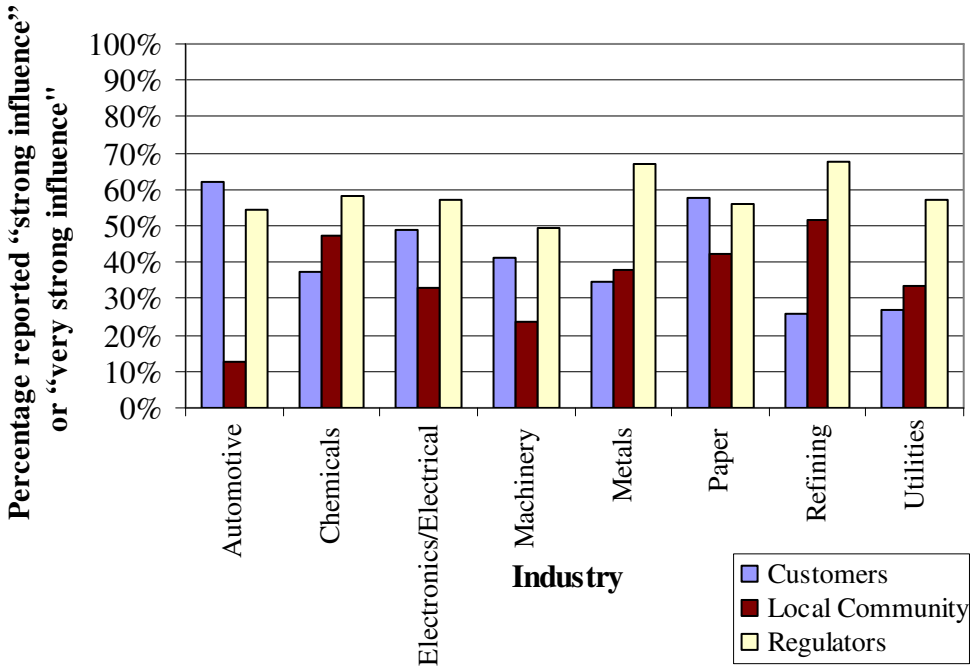


Figure 17: External Influence by Industry: Customers, Local Community, and Regulators

5.2. Influence of Corporate Departments

A variety of corporate departments influence facilities' environmental performance. As one might expect, the Corporate Environmental Management and Corporate Legal Affairs departments are the corporate departments most often cited as being very influential in fostering facilities' environmental improvement.[8] More surprisingly, nearly half the facilities noted that Corporate Strategy departments were strongly influential as well in this domain.

"To what extent have the following corporate departments influenced your facility to improve its environmental performance?"

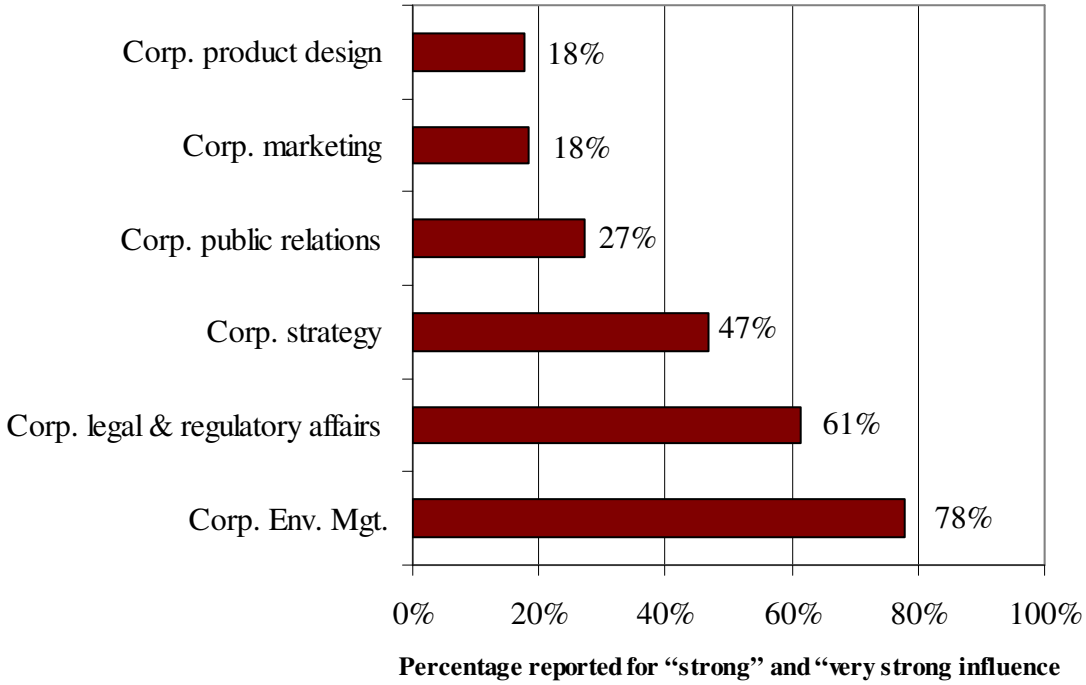
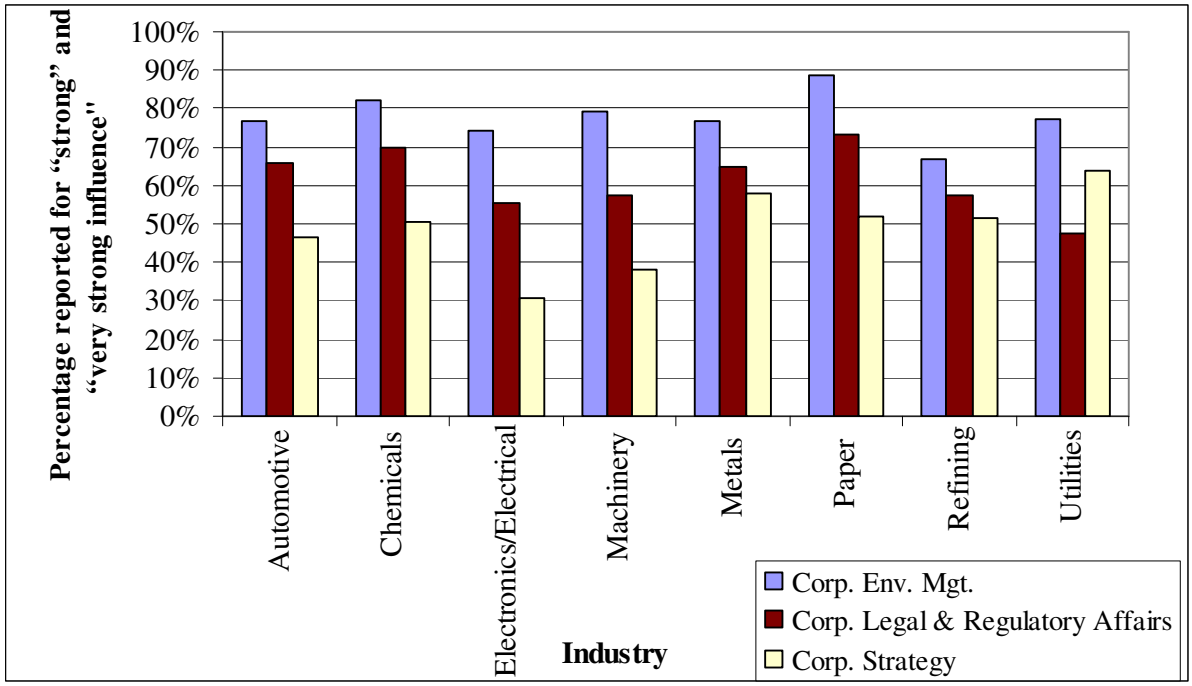


Figure 18: Internal Influence

[8] Strong refer to respondents that answered "strong influence" or "very strong influence"

Looking across industries, Corporate Strategy departments were particularly influential in the metals and utilities sectors. The Corporate Environmental Management and Corporate Legal Affairs departments were perceived as strongly influential by the majority of the respondents in nearly all sectors.

"To what extent have the following corporate departments influenced your facility to improve its environmental performance?"



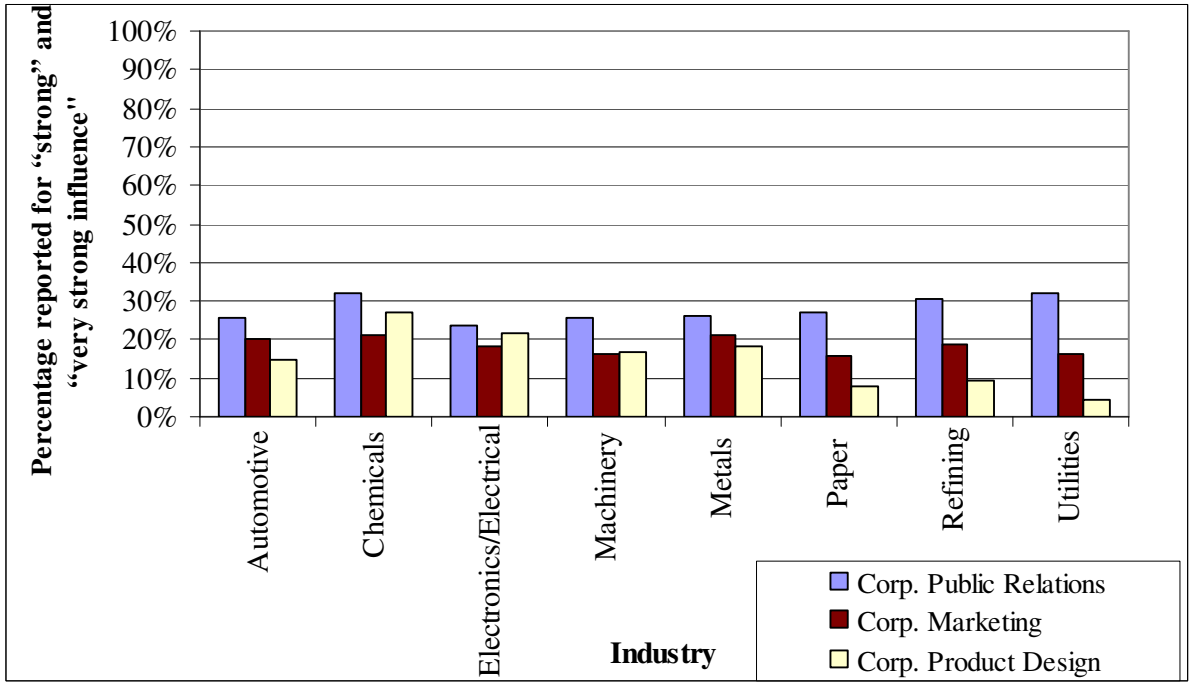


Figure 19: Internal Influence by Industry

6. Motivations for Environmental Management Practices

Facilities were also asked to indicate the factors that motivated them to implement environmental management practices. As expected, nearly 90% noted they were highly motivated by the need to improve regulatory compliance.[9] The other most popular motives were desires to improve community relations and employee.

"In addition to improving environmental performance, how important are the factors listed below in motivating your facility to implement environmental management practices?"

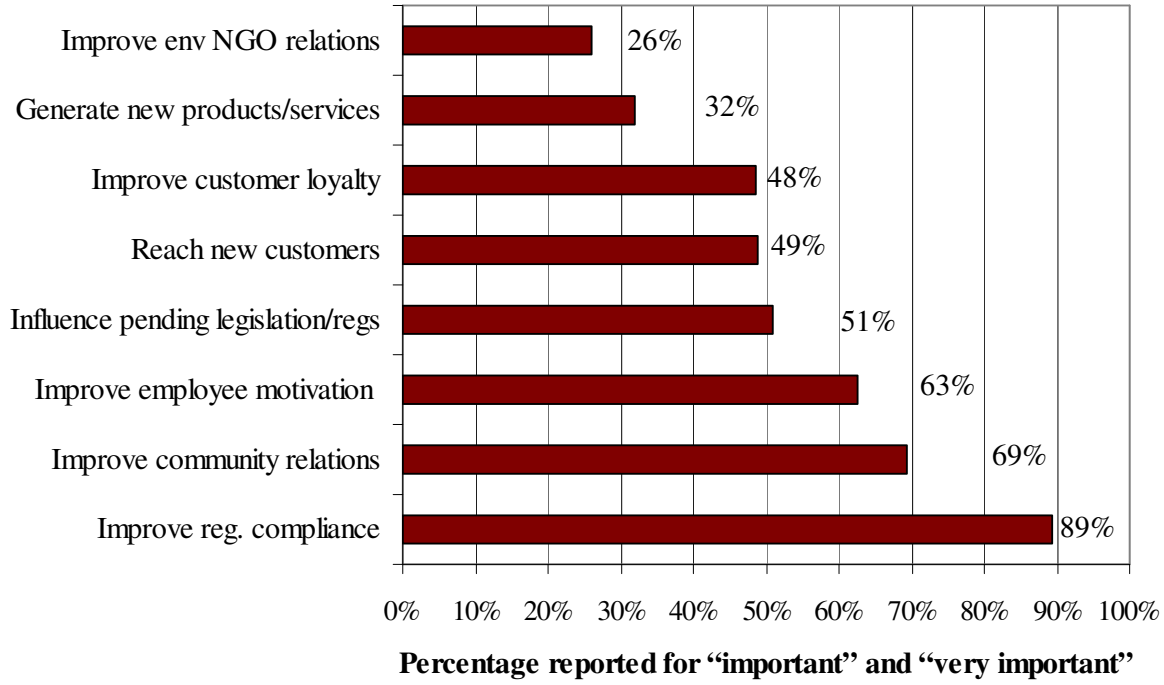


Figure 20: Motivations to Implement Environmental Management Practices

[9] Highly motivated refer to respondents that answered "important" or "very important"

Industries differ in their motivations. For example, reaching new customers is less of a motivator for the utilities and refining sectors, while improving relations with environmental NGOs plays a particularly important role for the chemicals, metals, and refining sectors. The utilities sector is particularly motivated by the desire to influence pending legislation.

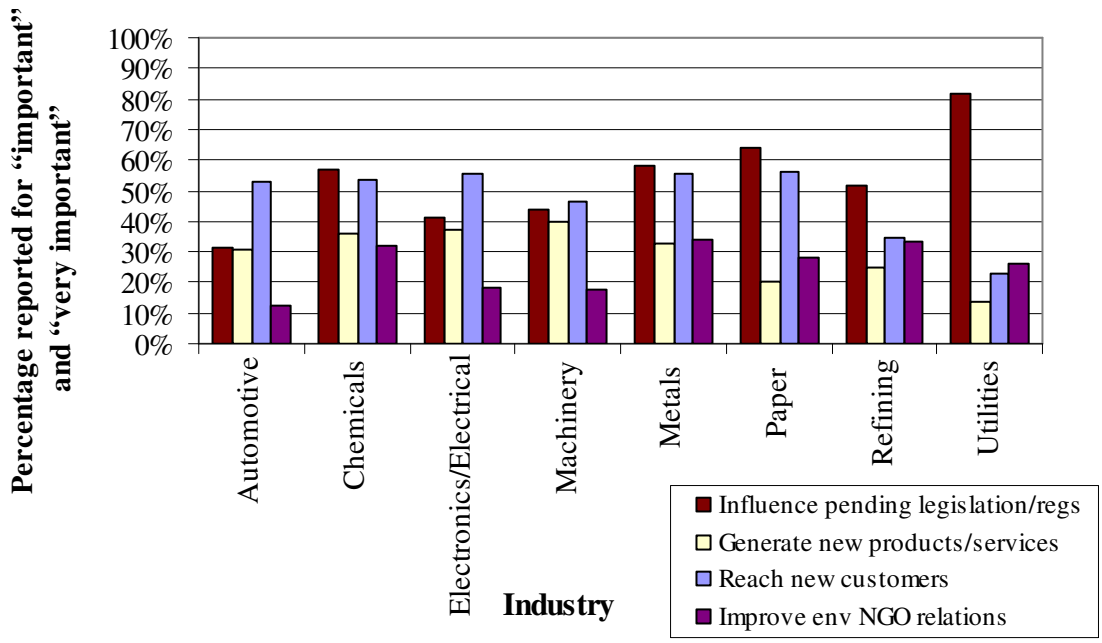


Figure 21: Main Motivations by Industry