

## ***Incentives and Patterns of Joining the U.S. EPA ENERGY STAR® Program***

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ENERGY STAR® is a partnership between product manufacturers, local utilities, retailers, the U.S. Environmental Protection Agency (EPA), and the Department of Energy (DOE). This partnership promotes the manufacture of energy-efficient products by labeling them with the ENERGY STAR logo and educating consumers on energy-efficiency. There are currently 33 product categories in the ENERGY STAR program including various office equipment, audio/visual equipment, lighting fixtures, and heating and cooling products. The objective of the program is to promote the use of energy-efficient products, thus reducing the demand for and supply of energy and enhancing quality of life. In 2000, the ENERGY STAR program achieved reductions of 35 million metric tons of carbon equivalent (MMTCE) (EPA 2000 Annual Report).<sup>i</sup>

Much research has been conducted on the energy savings associated with ENERGY STAR but little has been done on the incentives and characteristics that make a firm more likely to join voluntary environmental programs. The successful administration and development of environmental programs should be based on a sound understanding of the inherent characteristics and incentives that motivate firms. Our research on ENERGY STAR identified the incentives leading to a firm's decision to join ENERGY STAR, and the factors that influence the timing of joining. These findings will provide a foundation to the EPA and DOE for better management of current, and development of future, voluntary environmental programs.

### **Objective**

Although there are potential environmental benefits for society by joining voluntary environmental programs such as ENERGY STAR, these benefits alone may not be sufficient to motivate firms to participate in such a voluntary program considering the likely

associated costs. The objective of our research was to provide an assessment of a given set of incentives and the patterns of joining the ENERGY STAR program. To meet this objective, we developed ten motivations and four hypotheses regarding why and when firms join ENERGY STAR based on current literature on voluntary environmental programs.

### **Motivations**

1. Improving relationship with EPA
2. Improving image to consumers
3. Increasing market share
4. Aiding in employee morale, recruitment, and retention
5. The quality/characteristics of other participants in the program
6. Enhancing image to investors
7. Improving product distribution
8. Aid in designing additional energy-efficient products
9. Increasing government contracts
10. Shaping industry energy-efficiency standards.

### **Hypotheses**

- 1) The closer the location of the firm to the EPA headquarters, the earlier the joining date.
- 2) Larger firms, as measured by number of employees and volume of sales, join ENERGY STAR earlier than smaller firms.
- 3) 'Greener' firms join ENERGY STAR earlier.
- 4) A firm's motivation for joining ENERGY STAR influences the time of joining

### **Approach**

To perform our analysis, we evaluated 14 of the 33 current ENERGY STAR product categories and surveyed 573 firms (See Table 1). A questionnaire was sent to a representative of each firm identified by the EPA as the firm's contact for ENERGY STAR program information. Three waves of questionnaires were sent between October and December 2001 resulting in receipt of 160 questionnaires. After accounting for duplications (there were 25 duplications, as some firms are partners in multiple product categories) and

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GROUP PROJECT BRIEF

SPRING 2002



deleting any rejected questionnaires (we deleted 27, due to incorrect contact information), we achieved an overall response rate of 29.3 percent.

| Product Category                                 | EPA Product Category<br>Initiation Date<br>(month/year) | Number of Firms |
|--|---|-----------------|
| Computers  | Jun/1992  | 71              |
| Monitors   | Jun/1992  | 75              |
| Facsimile Machine, Printer, and Mailing Machines | Oct/1994  | 73              |
| Photocopiers                                     | Apr/1995  | 21              |
| Thermostats                                      | Apr/1995  | 9               |
| Air Conditioners                                 | Apr/1995  | 22              |
| Furnaces   | Apr/1995  | 18              |
| Geothermal Heat Pumps                            | Apr/1995  | 10              |
| Boilers  | Jun/1996  | 18              |
| Exit Signs                                       | Jun/1996  | 32              |
| Scanners   | Mar/1997  | 16              |
| Multifunction Devices                            | Mar/1997  | 18              |
| Lighting Fixtures                                | Mar/1997  | 53              |
| Roofing  | Feb/1999  | 137             |
| <b>Total Number of Firms</b>                     |   | <b>573</b>      |

**Table 1: EPA Product Categories and Initiation Dates**

## Results

### Motivations to Join: The Why Question

To answer the *why question*, we analyzed how a firm evaluated a given set of motivations for joining the program. The ten motivations we evaluated are listed in the box above.

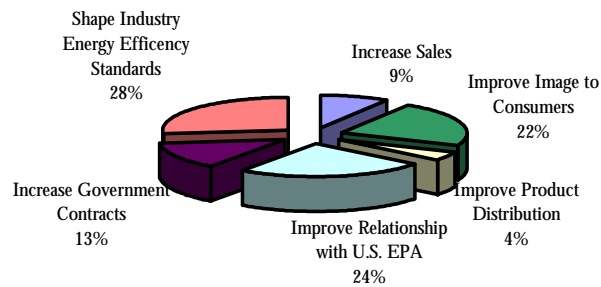
Survey respondents were provided with this set of motivations for joining ENERGY STAR and asked to rate each of these on a five-point scale ranging from “Not Important” to “Very Important.” For analysis purposes, the five choices were grouped into three categories titled: “Most Important,” “Important,” and “Least Important.” “Most Important” included choices four and five, while “Least Important” included choices 1 and 2. Based on the percentages of “Most Important” responses, we ranked the motivations from 1 to 10, as shown in Table 2.

| Motivation   | Rank Based on “Most Important” Responses | Percentage of “Most Important” Responses |
|--|--|--|
| Improve Image to Consumers                                 | 1  | 78                                       |
| Improve Market Share                                       | 2  | 65                                       |
| Promote the Design of Additional Energy-Efficient Products | 3  | 64                                       |
| Improve Product Distribution                               | 4  | 56                                       |
| Shape Industry Energy-efficiency Standards                 | 5  | 47                                       |
| Increase Government Contracts                              | 6  | 39                                       |
| Enhance Image to Investors                                 | 7  | 32                                       |
| Quality and Characteristics of Other Participants          | 8  | 31                                       |
| Improve Relationship with the EPA                          | 9  | 30                                       |
| Aid in Employee Morale                                     | 10                                       | 12                                       |

**Table 2: Ranking of Incentives Based on 'Most Important' Responses**

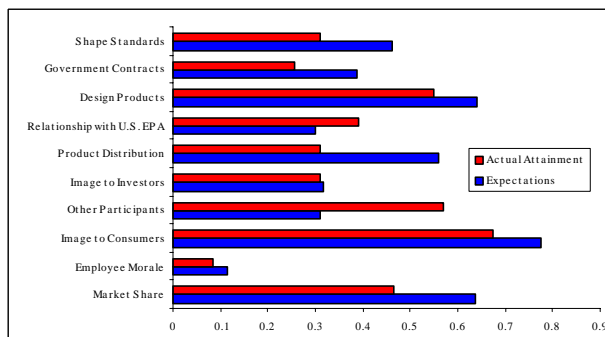
A ranking of the results based on the “Most Important” percentages indicates that the motivation *improve image to consumers* is considered as “Most Important” by the majority of survey respondents. The incentive *increase market share* ranks second with respect to perceived importance. However, this incentive is almost equivalent to *design of energy-efficient products* in terms of the percentage of firms that deemed this motivation to be “Most Important.” It should furthermore be noted that more than 50 percent of survey respondents attributed a high importance to the motivation *improve product distribution*. *Employee morale, recruitment and retention* as well as *improving image to investors* received the highest number of “Least Important” evaluations from survey respondents. The *quality/characteristics of other participants in the program*, as well as incentives pertaining to the *relationship to the EPA, government contracts*, and the possibility to *shape industry energy-efficiency standard* received a heterogeneous evaluation by the survey respondents.

Additionally, we asked if there were benefits that firms could not receive on their own but could receive through participation in voluntary environmental programs. Figure 1 graphically shows the benefits that firms expected to receive from the EPA after joining the ENERGY STAR program. The most expected benefit was *to shape industry energy-efficiency standards*.



**Figure 1: Benefits Firms Expected from the U.S. EPA**

We were also interested to see if firms had yet received the benefits they were expecting when they joined the ENERGY STAR program.



**Figure 2: Comparison of Expected Benefits to Actual Benefits**

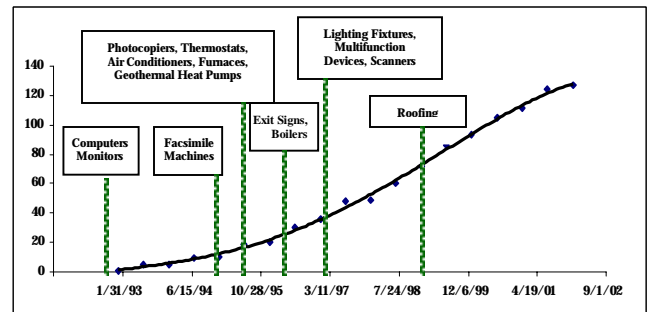
As shown in Figure 2, the results demonstrate that many expected benefits were not realized after joining the program. For example about 64 percent of the 145 firms that responded to this question said that the expectation of a *positive effect on market share* was an important incentive to join, but only 47 percent of respondents felt that the actual benefit of attaining a higher market share was realized after joining. Equally, there were far more firms that expected an *improvement in product distribution* from joining the ENERGY STAR program than those who actually received this benefit. The result also fell short of the expectation with respect to the motivations *to shape industry energy-efficiency standards* and *improve image to consumers*. It is probable that some of the expected benefits were not yet attained at the time of the survey but may well be attained in the future.

On the other hand, the results also indicate that, although the quality and characteristics of other firms might not have been a strong motivation for joining, 60 percent of the respondents felt that after

joining ENERGY STAR they were in a better position to compete within their industry.

**Timing of Joining: The When Question**

Another important aspect of a voluntary program is the pattern in which firms join the program. In social sciences, this phenomenon is referred to as diffusion. Each program reveals a specific diffusion pattern depicted in a diffusion curve. Based on data availability we looked at diffusion in three product areas – office equipment, lighting fixtures and exit signs, and roofing – and overall including all product categories. We found that within the roofing product area, the program diffuses the fastest, followed by office equipment and lastly, lighting fixtures and exit signs. When evaluated in aggregate (all product categories) the overall diffusion rate was the slowest, most likely due to EPA resource concerns and the desire to avoid congestion within the ENERGY STAR program office. Figure 3 shows the diffusion of the ENERGY STAR program across all the product categories we analyzed.



**Figure 3: The Diffusion Curve of ENERGY STAR**

In order to determine the factors that significantly influence firms' timing of joining ENERGY STAR, a multiple regression analysis was performed. Each survey respondent was asked to list the approximate month and year of when their firm joined the program. We converted this response into the number of months the firm joined ENERGY STAR after the program was initiated for the respective product category. This value was our dependent variable.

The independent variables included in the model reflect the hypotheses developed above accounting for: location of the firms, volume of sales, number of employees, 'greenness' of the firm (based on presence of an environmental department, use of Life Cycle Analysis, and utilization of Design for the Environment [DfE] principles), product category, and the motivations for joining, as previously described.



The regression analysis identified the following variables as significantly influencing firms' timing of joining ENERGY STAR. We found that proximity to the EPA, size of the firm based on number of employees and volume of sales, the motivation of enhancing employee satisfaction, and the quality/characteristics of other ENERGY STAR partners all lead firms to join the program earlier.

On the other hand, firms that were motivated by increasing product distribution and government contracts, as well as those applying Design for the Environment principles, were likely to join later. This may be explained by the following. It was not until recently that the EPA instituted a campaign with retailers to improve product distribution of ENERGY STAR compliant products. Regarding increased government contracts, the ENERGY STAR program received a significant boost late in the program (June, 1999) with Executive Order 13123 that requires government agencies purchase ENERGY STAR compliant products exclusively. DfE, another EPA voluntary partnership, was created in 1992, the same year as ENERGY STAR. We speculate that firms originally joined either DfE or ENERGY STAR.

**Conclusion**

Our results show that the majority of respondents considered the improvement of their image to consumers as the most important motivation for joining the ENERGY STAR program. Regarding factors that affect the timing of joining, a firm that highly valued the quality and characteristics of firms already in the program, was more likely to join earlier.

Since ENERGY STAR targets firms by providing incentives to join, it is necessary to account for firm characteristics. Our findings provide statistical evidence on the motivations for joining based on firm characteristics. The given incentives can provide insight into the motivations of firms joining and thus guide the EPA with respect to the areas of the program that require the most attention.

**Recommendations**

Our finding that the most important motivation to join was the improvement of the firms' image to consumers suggests the EPA should use education as a marketing tool to empower consumers.

Since the quality and the characteristics of the firms that have already joined the program was another factor that positively affected diffusion, we suggest the EPA should first target the leading firms in

each product category. Non-leading firms striving to obtain the same status of the leaders might result in more joiners and more innovative energy-efficient products. We propose that the EPA should continue to publicize its top partners.

Our results indicate that some firms joined the ENERGY STAR program after it emphasized cooperation with major retailers. Therefore, including retailers as a part of the program was confirmed to be a good policy method to gain more joiners after the initiation of the program.

Additionally, on the partner end, the EPA should consider keeping closer relations and soliciting feedback from its ENERGY STAR partners, to ensure that their needs and expectations are met. Our research indicates that many firms have not yet received the benefits they considered as important when they joined.

As other voluntary environmental programs may face the same challenge with respect to the participation of firms, the findings on the ENERGY STAR program can be used to update and develop other voluntary environmental programs. For example, DOE's Climate Challenge and EPA's Climate Wise are based on the disclosure of the firm's environmental achievements. Consequently, the findings of our study, which imply that firms want to improve their environmental image to consumers could provide a rationale for the EPA to design an advertisement campaign to better proclaim such achievements and promote joining in these programs.



<sup>1</sup> U.S. EPA Climate Protection Partnerships Division (2001). "The Power of Partnerships, Energy Star and Other Voluntary Environmental Programs." 2000 Annual Report