Assessing the Commercial/Industrial Markets for On-Site Generation and Renewable Energy: Results from the National Business Energy DataMart Study

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ABSTRACT

On-site generation and renewable energy represent two very different categories of technology that have the potential for radically transforming the electricity industry. This paper presents some of the findings related to on-site generation and renewable energy from a survey of over 10,000 businesses throughout the U.S. For each of these two categories of technology, we first examine current levels of use, and how they vary by customer type. While current levels of use are low, these measures will be key benchmarks as the markets evolve. We then examine levels of interest in these two categories of technology, and assess differences in interest by customer type. Finally, we assess C&I customer motivations for purchasing on-site generation and renewable energy.

Introduction

The National Business Energy DataMart is based on a survey of 10,181 business locations across the U.S., conducted by telephone from September through December, 1998. The study is jointly sponsored by Opinion Dynamics Corporation (ODC), Regional Economic Research (RER), the Gas Research Institute (GRI), and Southern Company Services (SCS). The overall objective of the study is to develop comprehensive profiles of businesses for players in the energy market. Specifically, the primary objective is to provide detailed energy profiles of business locations, including:

- Electricity—hourly, whole-site profiles for one year; end-use profiles for typical days
- Natural gas—daily usage
- Fuel oil—daily usage
- Equipment and technology profiles for key end uses

Additional objectives are to profile these businesses by attitudes, including:

- Customer satisfaction
- Customer needs
- Tradeoffs between aspects of energy offers
- Interest in energy-related products and services

This paper addresses part of the last item: interest in (and current use of) two energy-related products—on-site generation and renewable energy.

As shown in Figure 1, the sample was divided into nine regions. Also, as shown in Figure 2, the sample represents all commercial and small industrial establishments in the U.S., but not residential or large industrial customers. Hence, the National Business Energy DataMart sample represents 53% of the electricity use in the U.S.

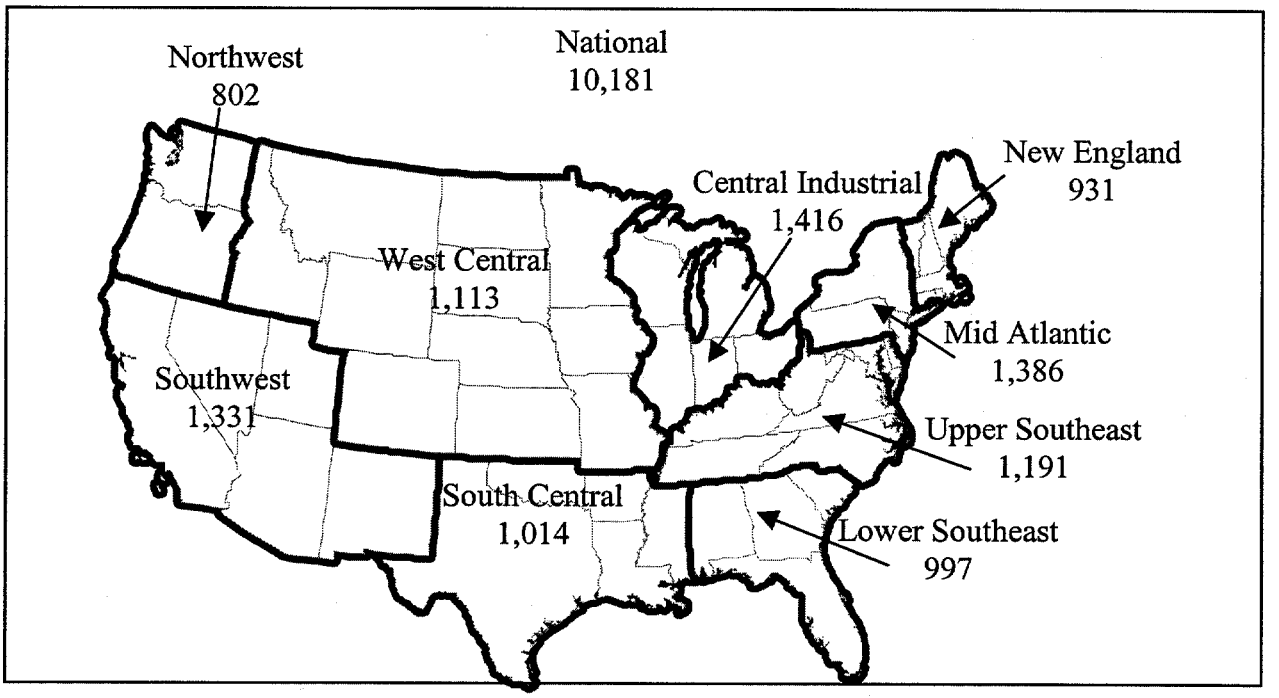

Figure 1. Sample Size by Region

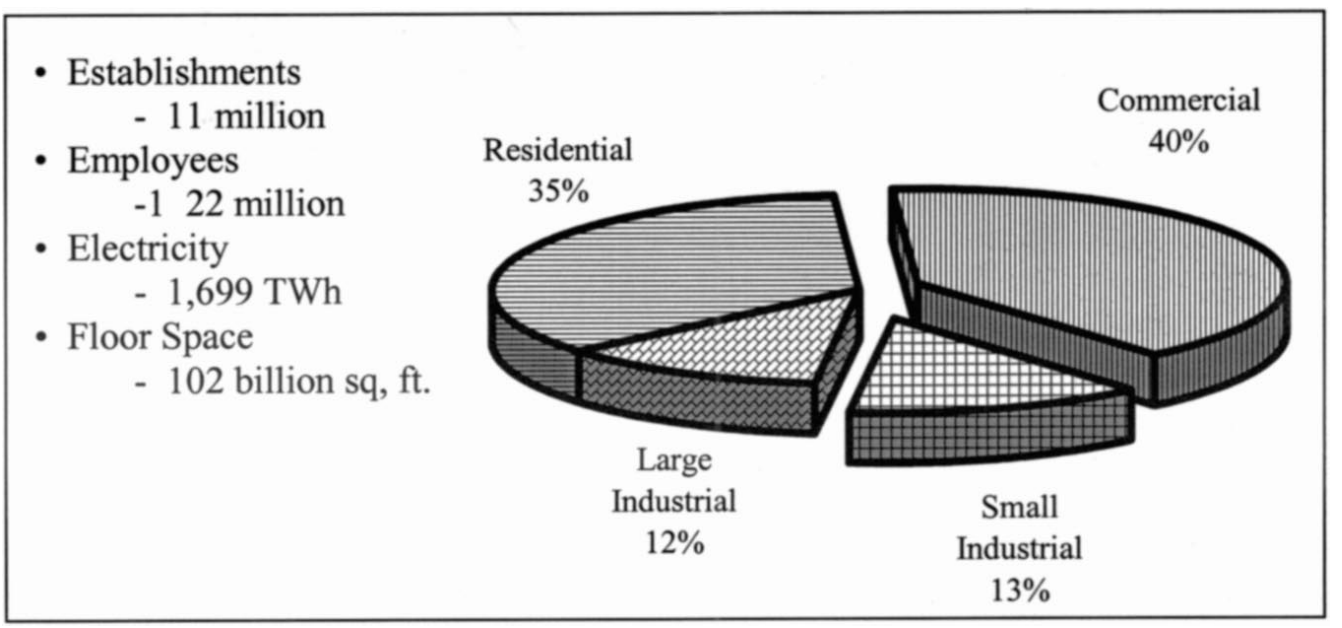

Figure 2. Population Represented: Small Commercial and Industrial Establishments

On-Site Generation

Technological developments, such as fuel cells and ever-smaller gas turbines, are beginning to make electricity generation on the customer premises a viable option for more and more customers. This presents a challenge to generation, transmission, and distribution companies, just as they are beginning to define themselves along these lines. Of course, it also presents an opportunity for companies that can develop the new market—possibly including companies evolved from traditional electric or gas utilities.

Current Use of On-Site Generation

At present, 2.9% of commercial/industrial customers in the U.S. (weighted by size of establishment) use some on-site generation as a primary source of electricity (that is, not standby or backup). As Figure 3 shows, the highest incidence is in New England and the lowest is in the Northwest. Since these two regions have the highest and lowest electric rates in the country, respectively, it might seem that prices are largely driving decisions to self generate. As we shall see, while prices are important, there are also other factors at work.

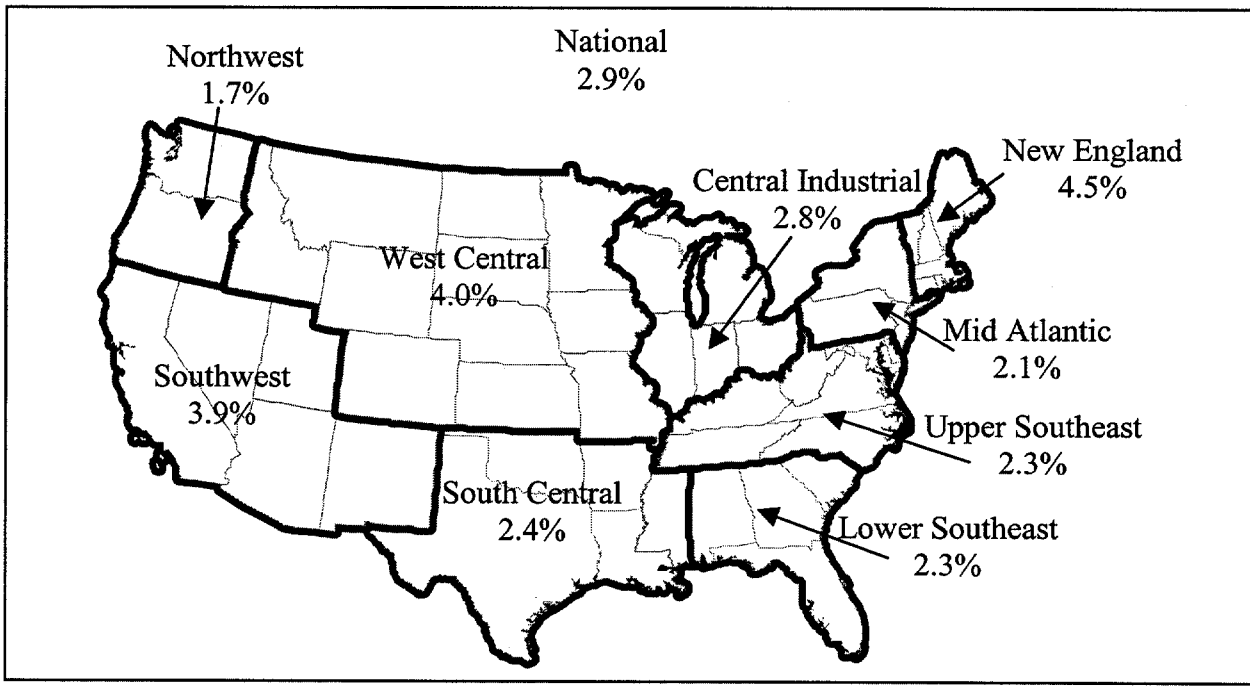

Figure 3. Use of Some On-Site Generation—by Region

Among sectors, as shown in Figure 4, by far the highest incidence of on-site generation is in hospitals, followed by supermarkets, colleges/universities, lodging, material production, and nursing homes. Small commercial facilities, such as post offices, fast food restaurants, convenience stores, and clinics/labs, have little or no on-site generation. As Figure 5 shows, government establishments are much likelier than other types of organizations to have some onsite generation, and more than half of all on-site generation is in either government or chains. This indicates that significant organizational resources may be required to make use of on-site generation.

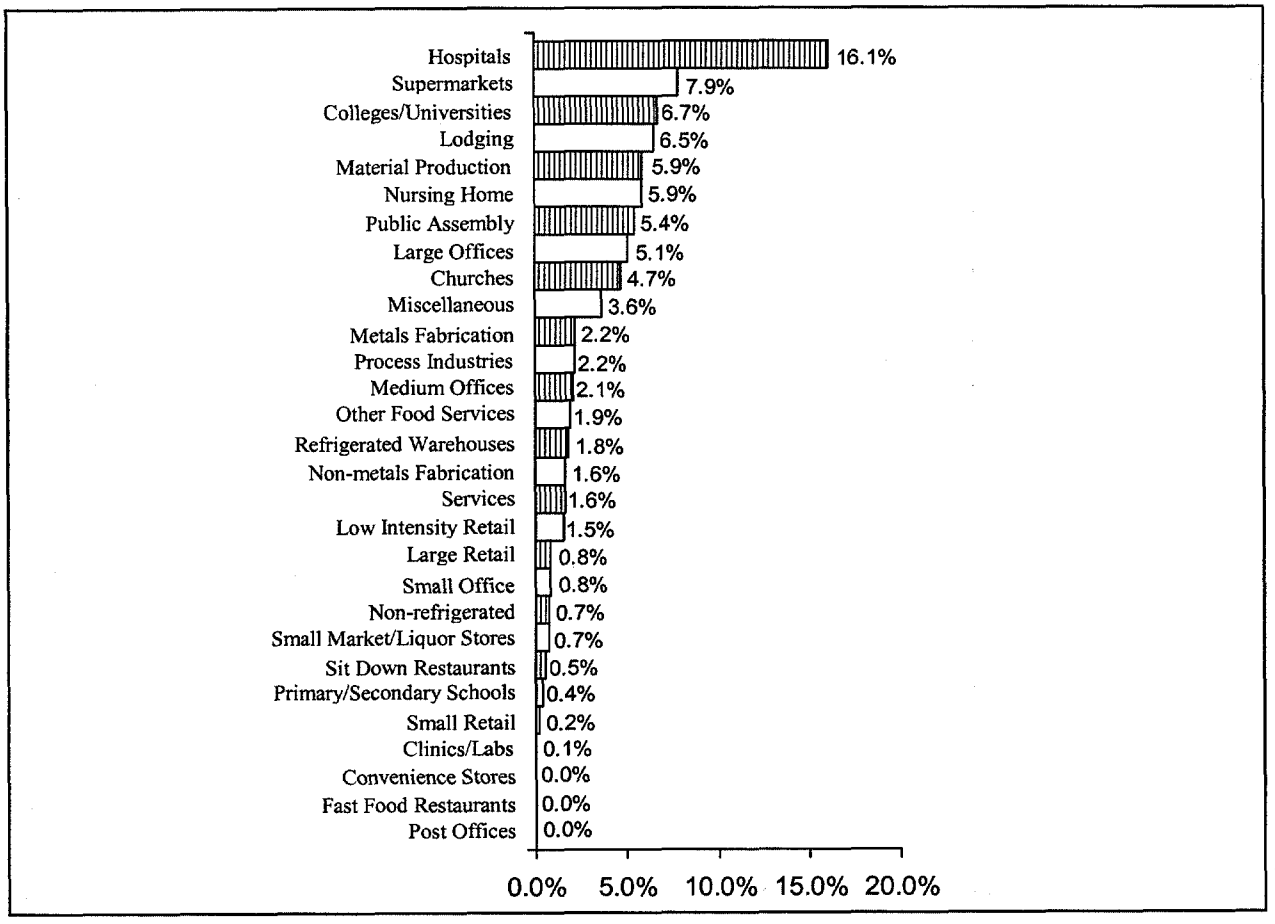

Figure 4. Use of Some On-Site Generation—by Sector

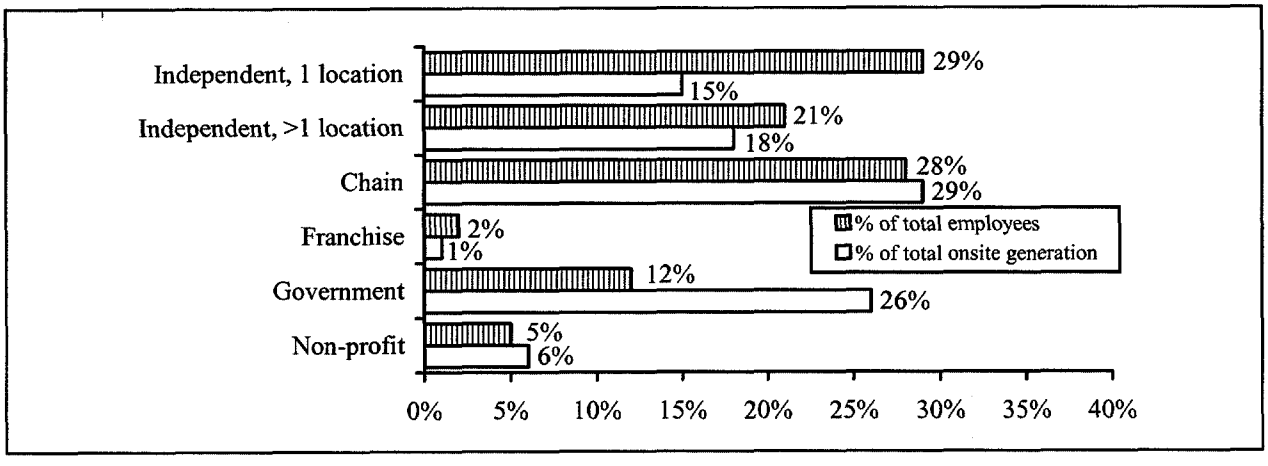

Figure 5. Type of Organization by % of Employees and % of On-site Generation

Figure 6 shows that, on the average, establishments with some on-site generation are much larger than those without it. As an indication of future value, however, the establishments without on-site generation are growing much faster.

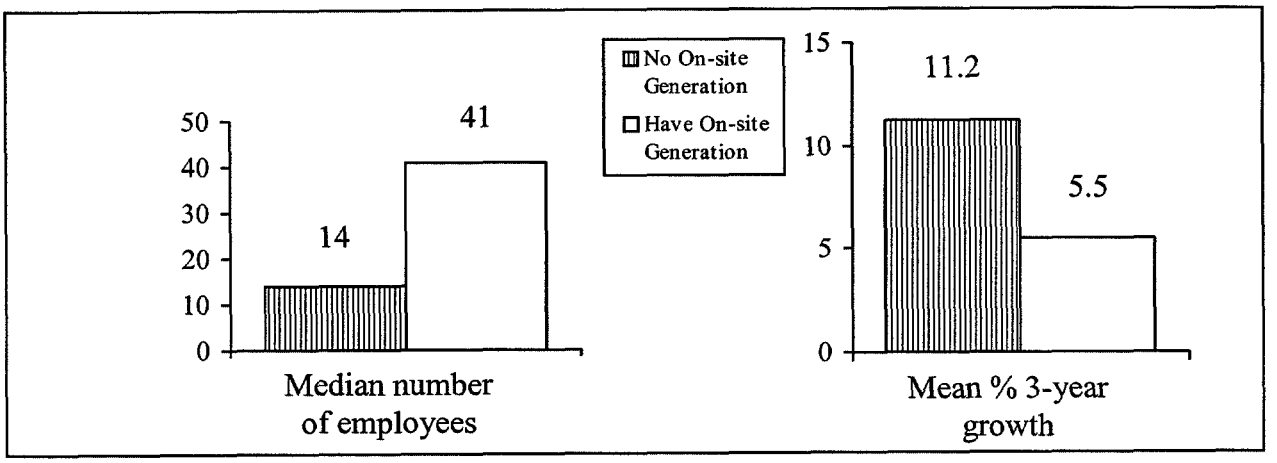

Figure 6. Use of Some On-Site Generation—by Size and Projected Three-year Growth

Interest in On-Site Generation

Interest in on-site generation shows the same pattern by region as does current use: interest is highest in New England and lowest in the Northwest—again, corresponding to the regions with the highest and lowest electric rates, respectively. (See Figure 7.)

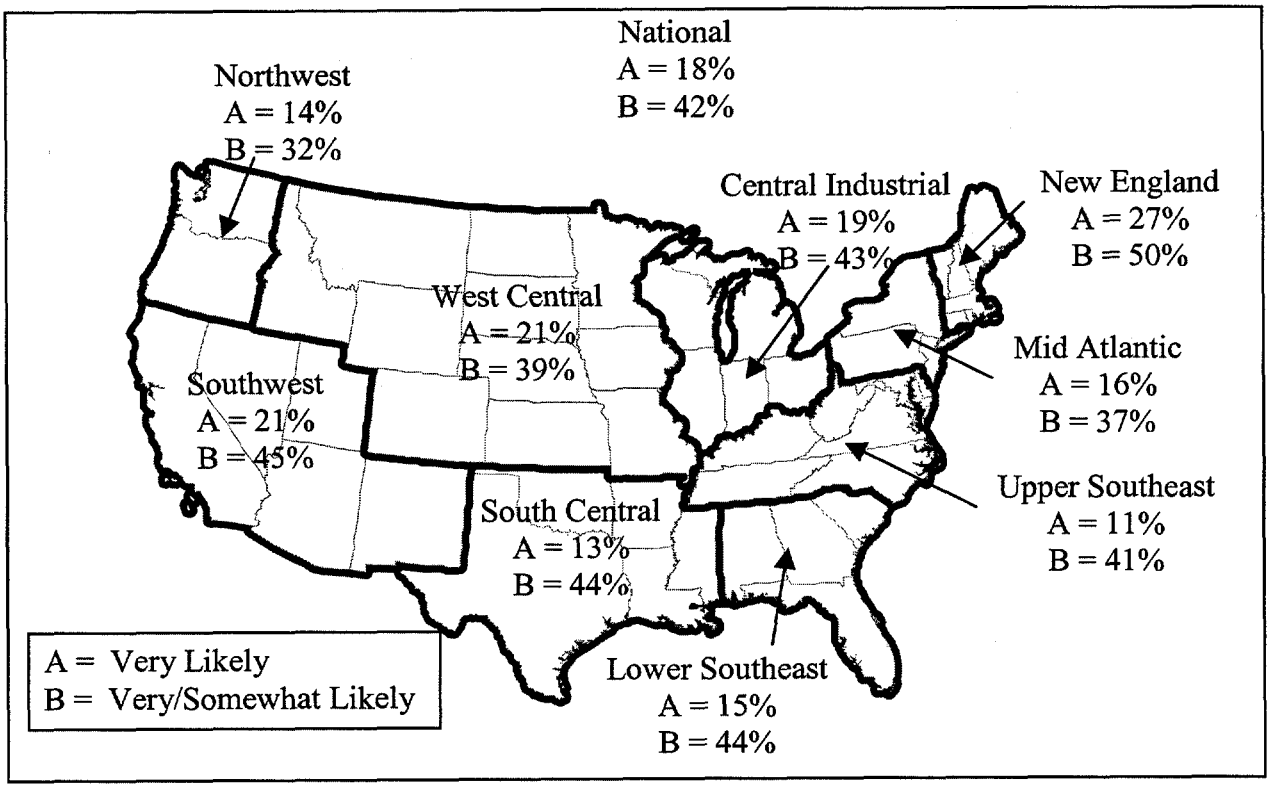

Figure 7. Likelihood to Install On-Site Generation—by Region

Figure 8 shows that the highest interest in on-site generation occurs among some of the same sectors that are currently most likely to have it, such as lodging, colleges/universities, and hospitals. Interest is also high in the metals fabrication sector, in which current use of on-site generation is relatively low.

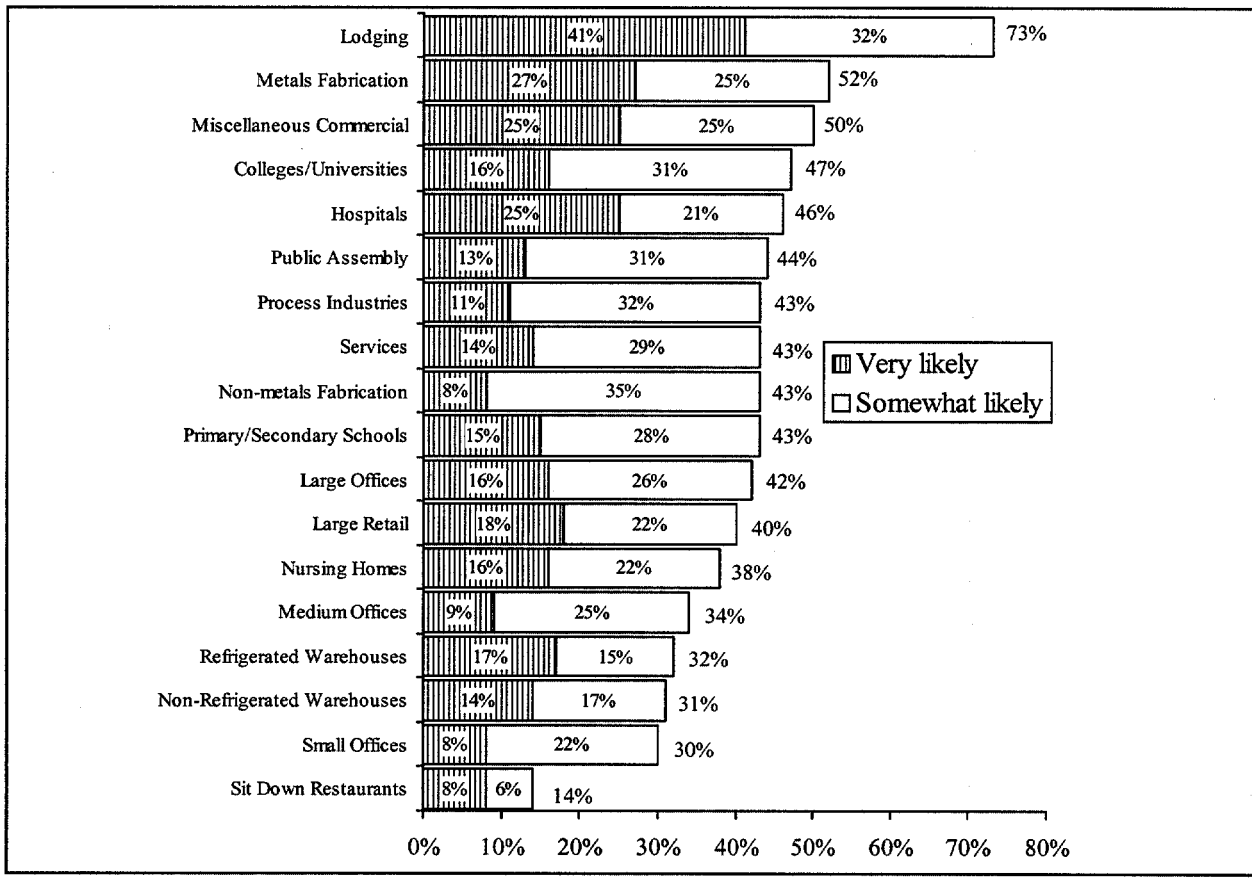

Figure 8. Likelihood to Install On-Site Generation—by Sector

As might be expected, likelihood to install onsite generation is related to customer satisfaction: dissatisfied customers are likelier than satisfied customers to say they are inclined to install it. Also, customers who are dissatisfied with their rates are likelier than those who are satisfied to express interest in onsite generation. However, some aspects of customer satisfaction are more strongly associated than rates with likelihood to install onsite generation: showing concern for customers' needs, offering advice on how to save money on electric bills, and providing bills that are easy to understand. It appears that customers who are interested in onsite generation may want a better *relationship* than they have with their current electricity provider. It also appears that dissatisfaction with current levels of power quality and reliability are not major motivators for interest in onsite generation. (See Figure 9.)

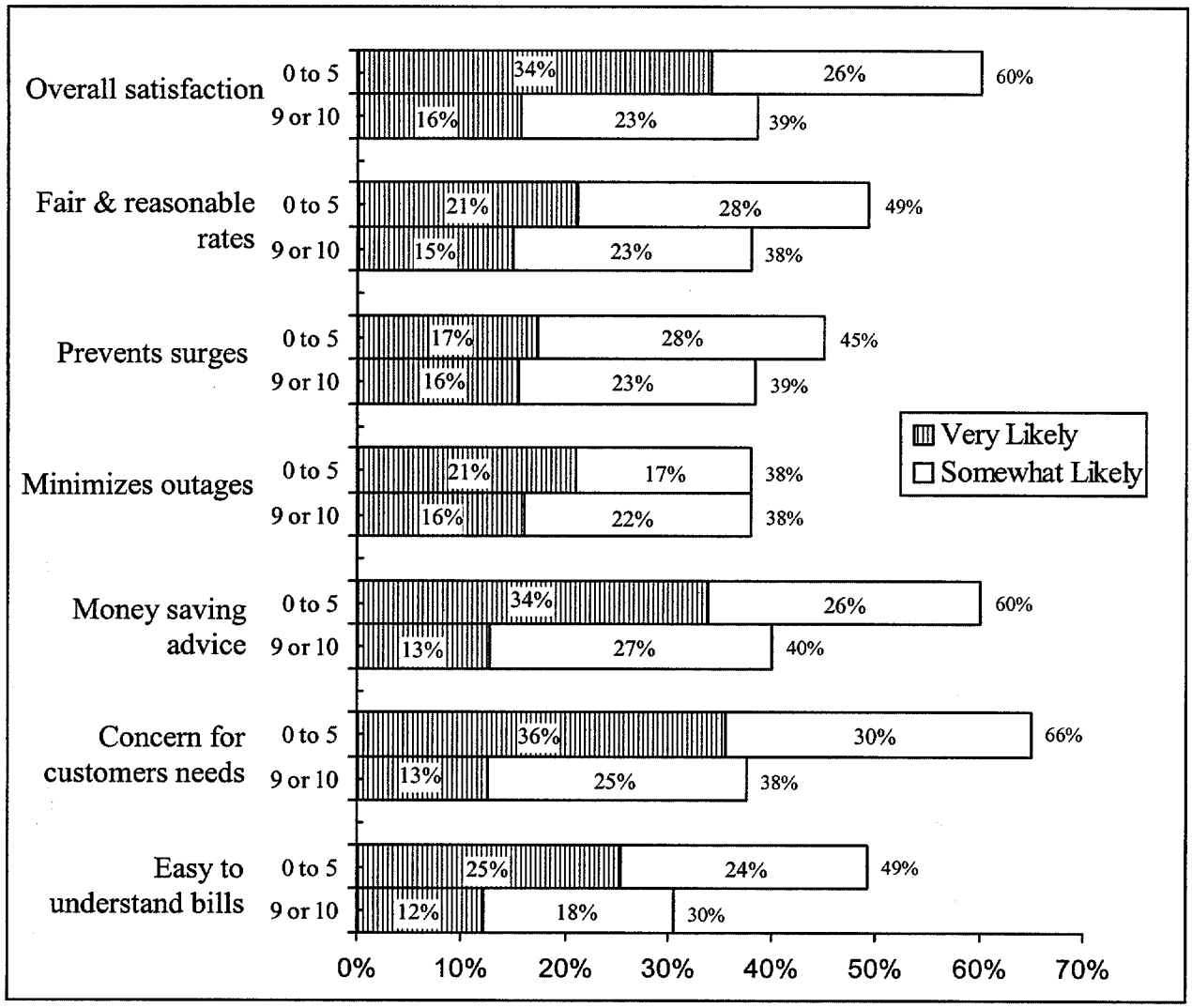

Figure 9. Likelihood to Purchase On-Site Generation by Customer Satisfaction

The above does not necessarily mean that desire for increased power quality and reliability are not major motivators for wanting on-site generation—only that customers do not necessarily blame their electric companies for their power quality and reliability problems. They may well feel that acts of God and geographic factors (such as being at the end of the line) are more to blame, but still may want improvements in their power quality and reliability. Indeed, as shown in Figure 10, respondents who say that power quality and reliability problems are difficult to tolerate are significantly more likely than others to express interest in on-site generation.

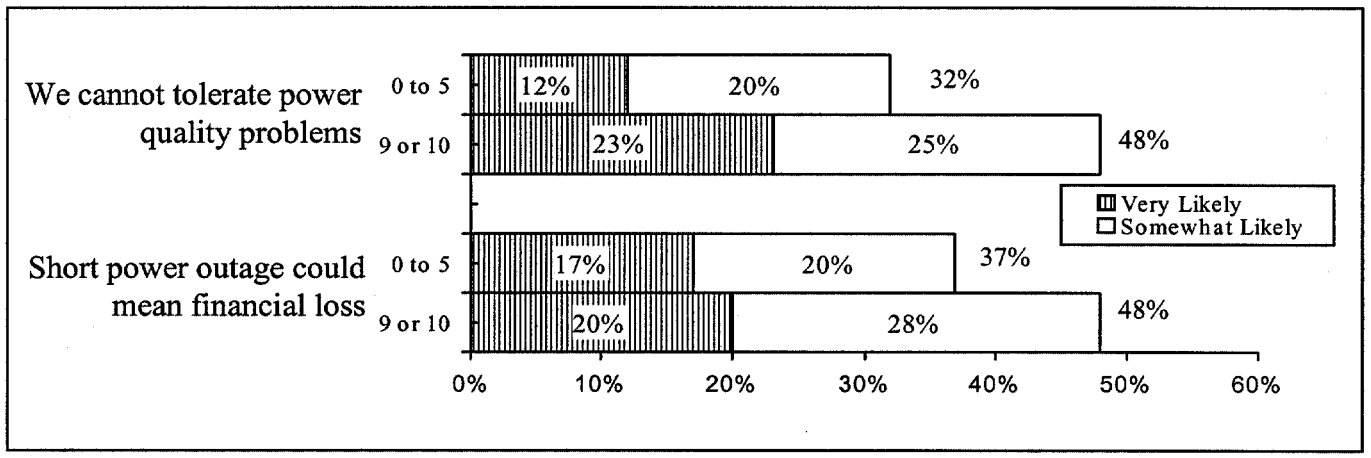

Figure 10. Likelihood to Purchase On-Site Generation by Importance of Power Quality and Reliability

Renewable Energy

Many observers have assumed that only in the residential sector is there a market for renewable energy. This survey shows, however, that at least some commercial/industrial customers are also interested. The reasons may be many, including government mandates and subsidies, concern about global warming, the beneficial effect of green energy purchases on corporate image, and the improving economics of renewable energy production.

Current Use of Renewable Energy

Only 2.3% of businesses in the U.S. currently use renewable energy (weighted by size of establishment), as shown in Figure 11. The most common type of renewable energy is solar thermal (used in 1.3% of establishments weighted by size), followed by passive design (1.0%), photovoltaics (0.6%), and wind (0.2%).

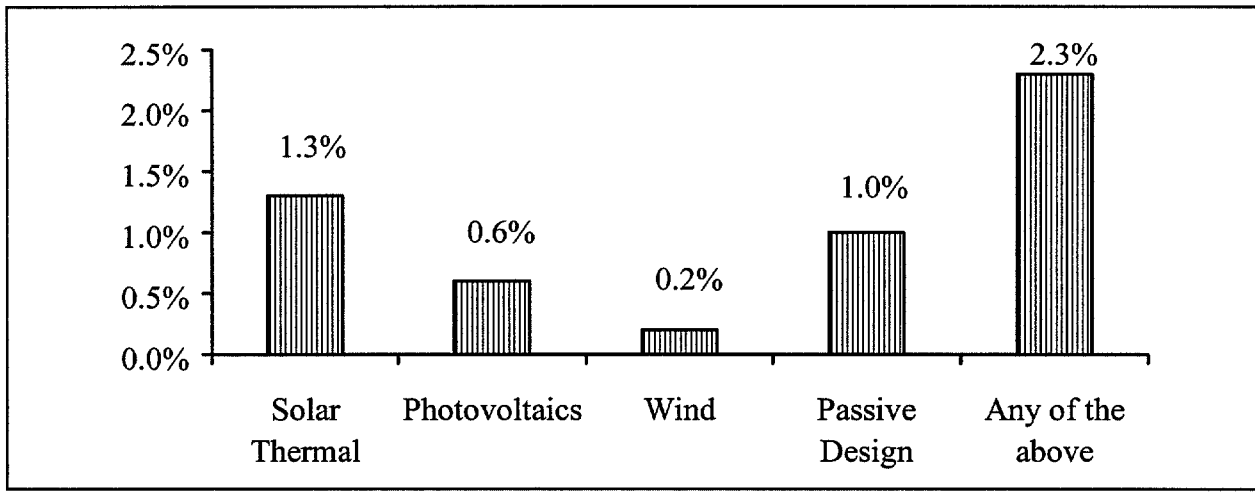

Figure 11. Currently Use Renewable Energy

Not surprisingly, the region with the highest incidence of renewable energy use among businesses is the Southwest, which includes California—a world leader in "green" energy. Another sunny region with a relatively high incidence of renewable energy use is the Lower Southeast, whose largest state is Florida. Interestingly, the other south-lying region—South Central, whose largest state is Texas—has one of lowest incidences of renewable energy use (along with the Mid Atlantic and the Upper Southeast). The low cost of oil and gas, along with loyalty to petroleum as a boon to the regional economy, may be part of the reason. Also, unlike the case with on-site generation, the geographic distribution of renewable energy appears to have little to do with electric rates, as the low-rate Northwest and high-rate New England have about the same levels of use. (See Figure 12.)

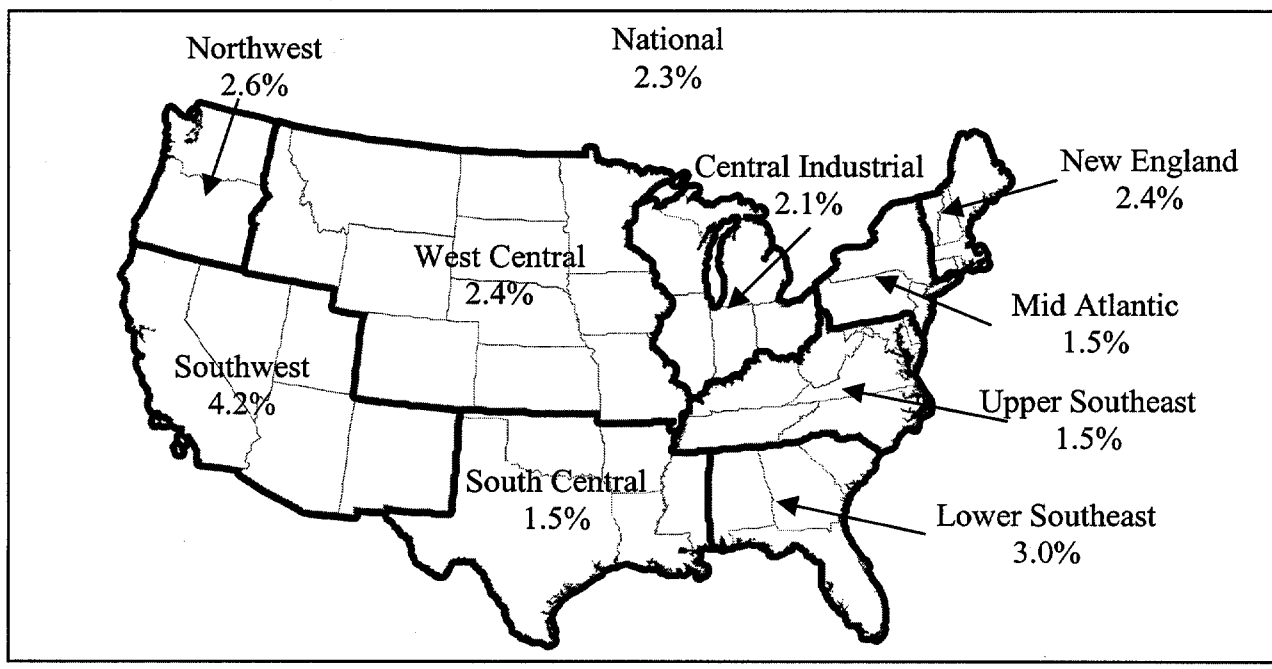

Figure 12. Currently Use Renewable Energy by Region

As shown in Figure 13, the sector with by far the highest rate of use of renewable energy is colleges/universities, followed by large offices, primary/secondary schools, and supermarkets. Industrial sectors tend to have very low use of renewable energy. Figure 14 shows that government establishments—only 12% of the population in terms of employees—account for nearly half (49%) of renewable energy use.

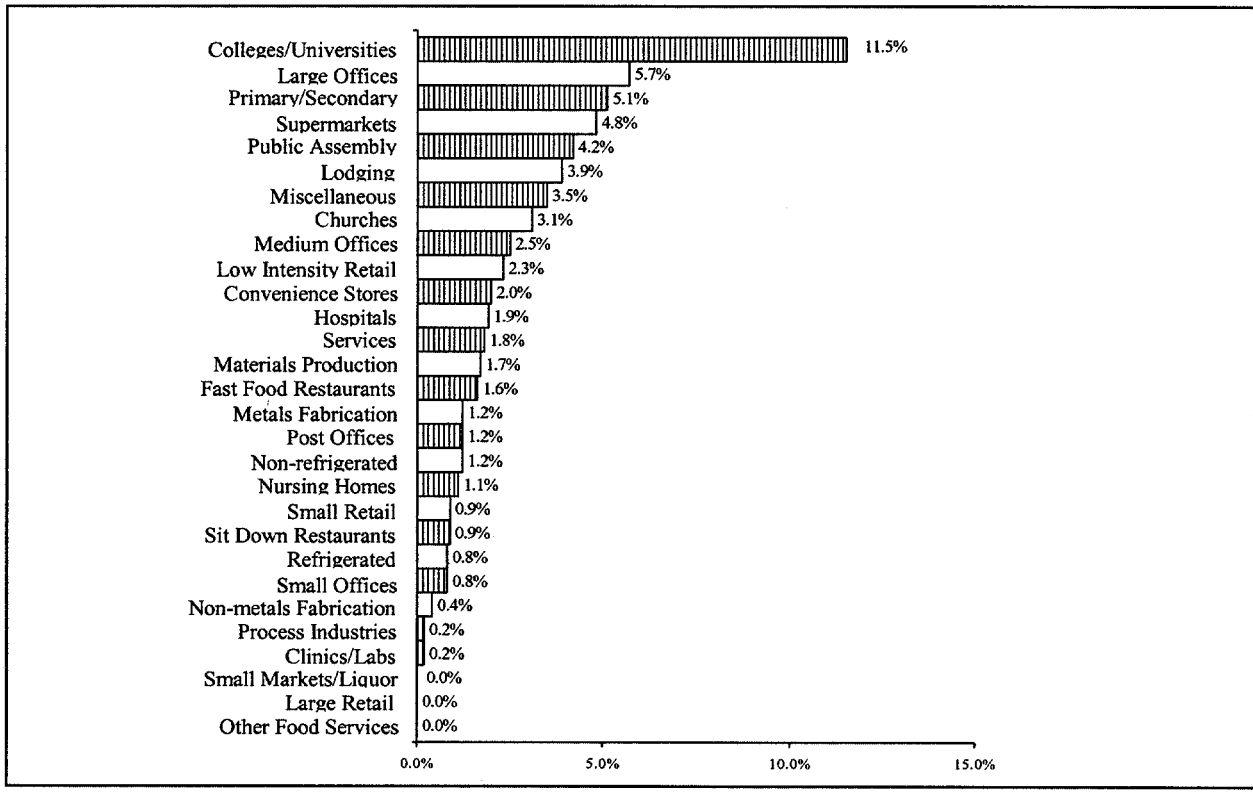

Figure 13. Currently Use Renewable Energy by Sector

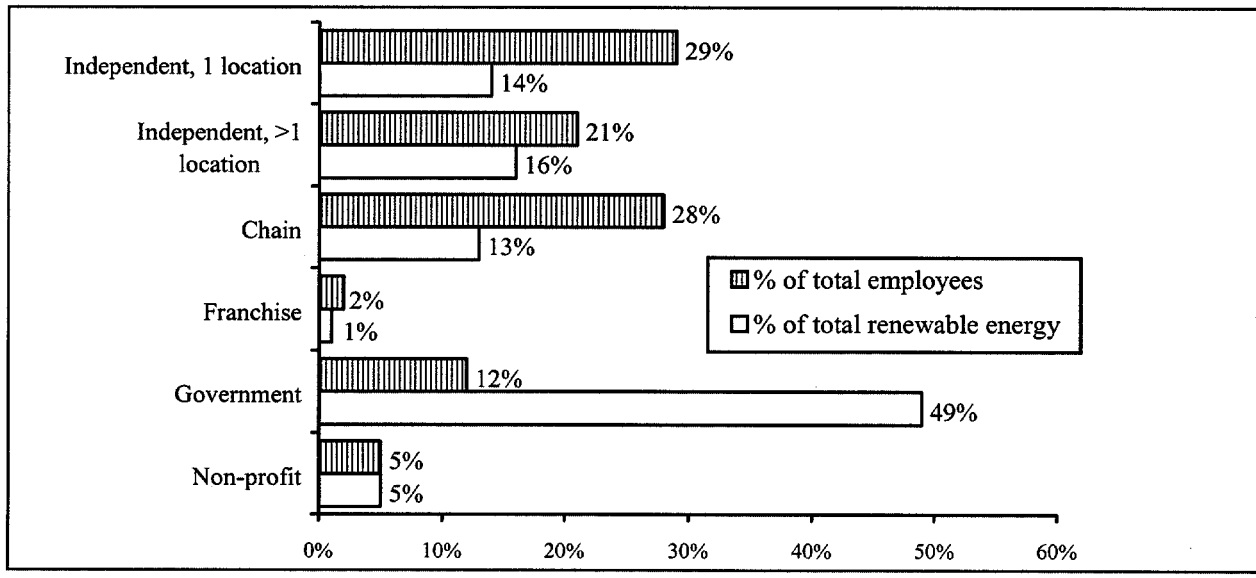

Figure 14. Type of Organization by % of Employees and % of Renewable Energy

Interest in Renewable Energy

In this survey we conducted a tradeoff analysis, in which we asked respondents to choose between several pairs of hypothetical companies that varied on two attributes at a time. Those attributes were price, improved power quality, reduced outages, local presence of provider, and multiple fuels from the same provider. We used multinomial logit analysis to examine the data. One of the findings, as shown in Figure 15, is that 29% of businesses across the U.S. (weighted by establishment) are willing to pay more for renewable energy, other things being equal. Another finding is that businesses in New England and the Northwest are much likelier than businesses in other regions to be willing to pay more. Given that their current rate of use of renewable energy is only about average, it may be that customers in these regions have had fewer opportunities to purchase renewable energy than have customers in sunnier places like California and Florida. We also found, as shown in Figure 16, that small and medium-sized businesses are likelier than large business to be willing to pay extra for renewable energy.

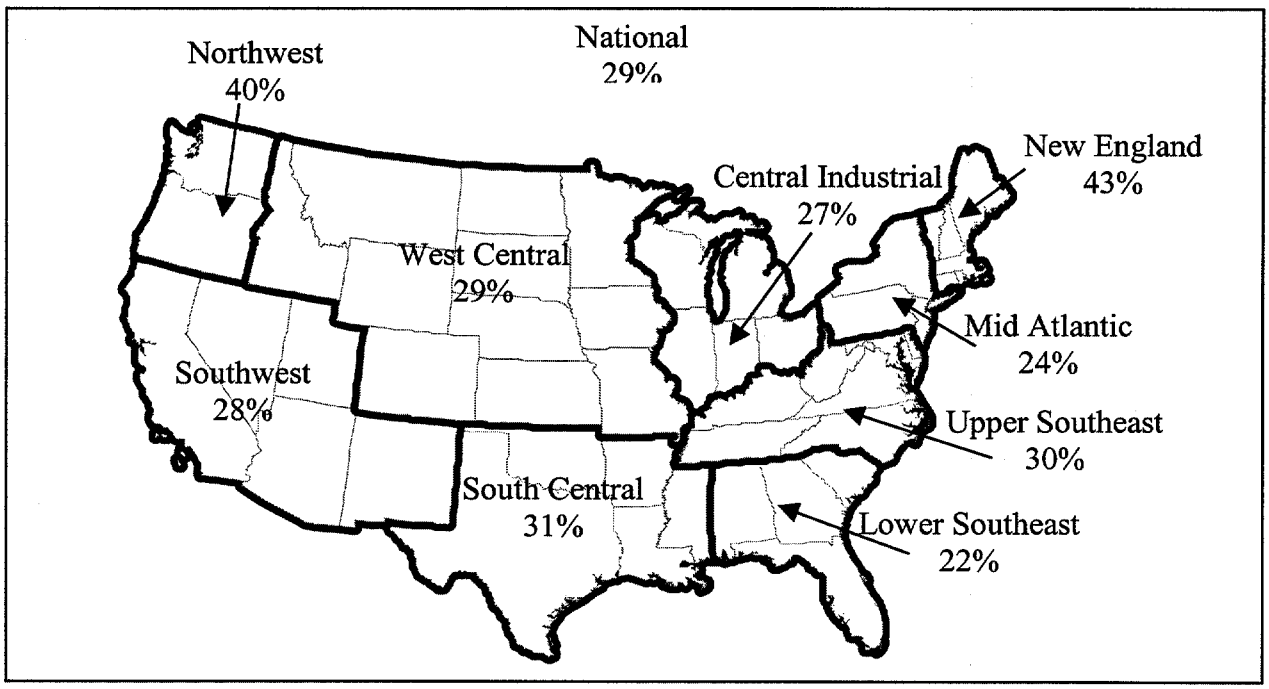

Figure 15. Willingness to Pay More for Renewable Energy—by Region

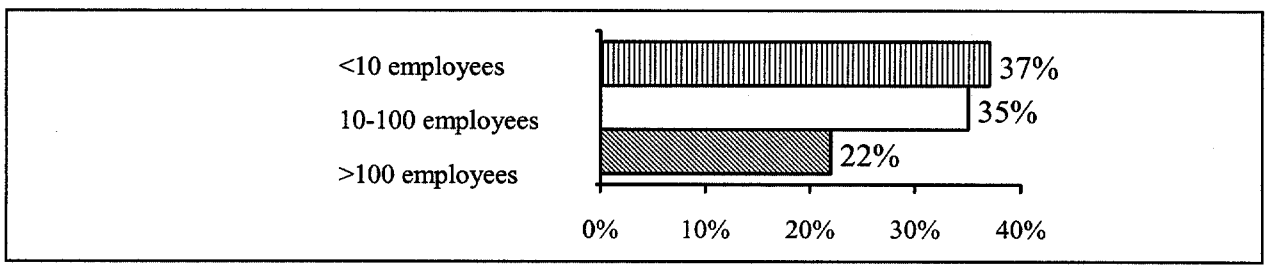

Figure 16. Willingness to Pay More for Renewable Energy—by Size of Business

As Figure 17 shows, unlike the case with on-site generation, there is no relationship between overall customer satisfaction and likelihood to purchase renewable energy; nor is there a strong relationship between satisfaction with rates and likelihood to purchase renewable energy. As might be expected, however, people who are dissatisfied with their electric company's performance in working to improve the environment are more likely than those who are satisfied to say they would purchase renewable energy. Also, customers who are dissatisfied with their electric company's support of the local community are much more likely to say they would purchase renewable energy than are those who are satisfied. It may be that commitment to the environment and commitment to the local community are related in people's minds.

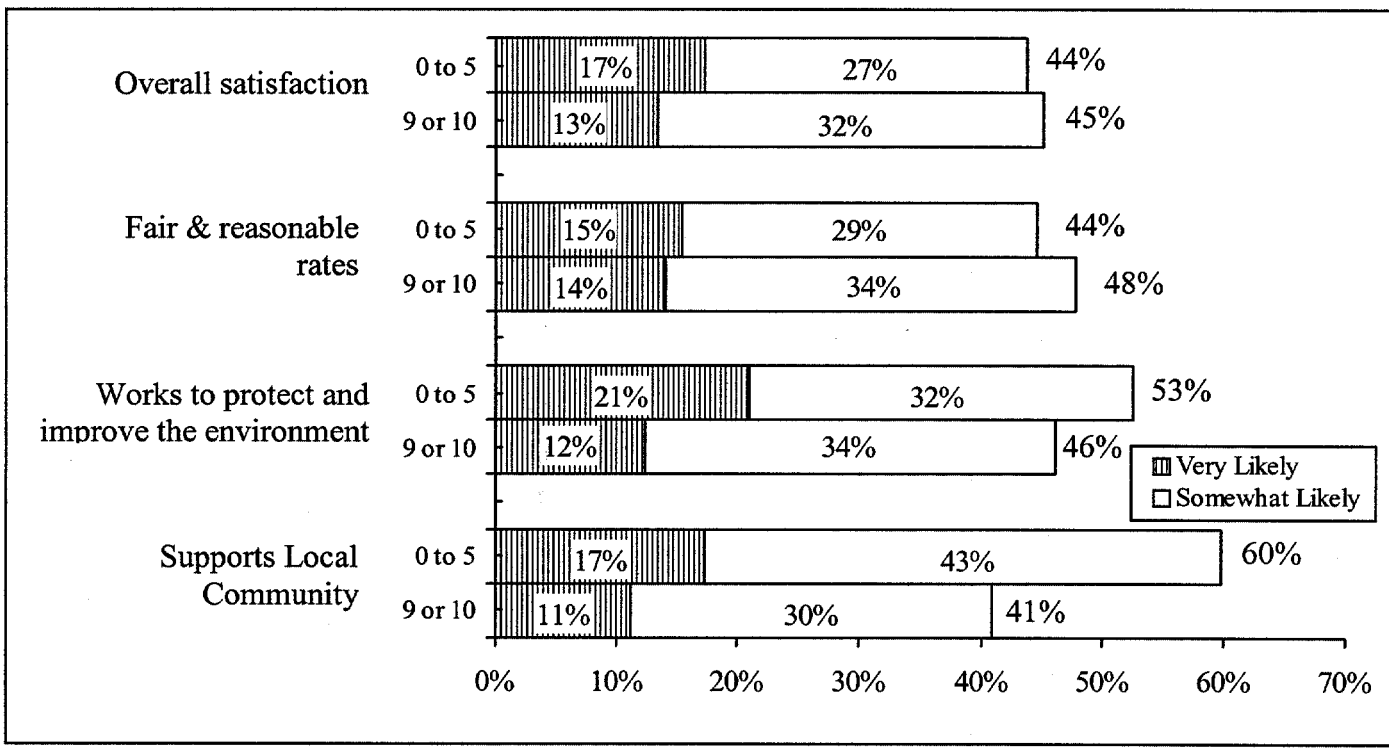

Figure 17. Likelihood to Purchase Environmentally Certified "Brand" of Electricity—by Customer Satisfaction

Conclusion

On-site generation and renewable energy are two very different products that appeal to different types of commercial and industrial customers. They are also two categories of technology that are poised to grow substantially in the coming years. This study provides an unprecedented benchmark of current levels of use of on-site generation and renewable energy in the U.S. commercial/industrial market, and also indicates possible future directions for growth.