

The Fort Collins Wind Power Pilot Program: Who Subscribed and Why

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ABSTRACT

In May 1998, the City of Fort Collins electric utility began implementing its Wind Power Pilot Program after marketing it for the previous year. By paying a premium of 2¢/kWh, utility customers could ensure that the equivalent of the electricity they use is produced by wind turbines. Because utility staff maintained records of who subscribed and who requested information but did not subscribe, we were able to address the central issue of why pre-program estimates of subscribers are always considerably higher than the number who subsequently subscribe. The analysis comparing “stated preferences” vs. “revealed preferences” is a primary focus of this study, permitting us to make projections as to future numbers of subscribers and how to target them.

Subscribers are distinctly different from other customers—both interested nonsubscribers and customers who had not expressed interest in the program. They are considerably more educated, with concomitant higher incomes and professional occupations. They are not innovators in the classic sense, but subscribe because of their commitment to the environment, loyalty to the utility and the City, and other altruistic attitudes. Subscribers are highly knowledgeable about wind power and green energy and obtain most of their information from printed material, including that from the utility. Subscribers are willing to pay more for wind energy, but expect that eventually everyone should pay. Interested nonsubscribers who intend to subscribe in the future seem to have the same educational and attitudinal characteristics as subscribers, but are a bit younger and, therefore, anticipate that their incomes will increase to where discretionary dollars can be put toward support of the Wind Power Program.

Scope of the Study

The study (funded by a grant from the Governor’s Office of Energy Conservation in Colorado) addresses the validity of several common assumptions about green energy and green power programs:

- In general, people are unfamiliar with the term “green energy” and know little about it.
- People who agree to pay a premium for green energy do so because they are innovators.
- People who agree to pay a premium for green energy do so because they are “tree huggers.”
- Residential utility customers are willing to pay about \$5/month more for green energy.

The Wind Power Pilot Program is targeted to the 24,000 non-renter, non-student customer households in Fort Collins. (In this paper, the terms “customers” and “households” are used interchangeably.) The City originally planned to install three 750-kW turbines in Wyoming. Each turbine would require 350 subscribers to support its construction and operation. Fort Collins business and commercial customers were also eligible. The nine businesses that subscribed were not part of this study. An interesting footnote is that in early 1999, a local brewing company opted to pay for construction of a new turbine that would supply all of its electricity.

As a result of Fort Collins' marketing efforts (see the program's logo in Figure 1), by May 1998, about 700 customers (2.9%) had subscribed to the program, meaning that two turbines could be put in place. An additional 1,500 customers (6.25%) who asked for information about the program did not subscribe. About 24,000 households served by Fort Collins were eligible for the program.

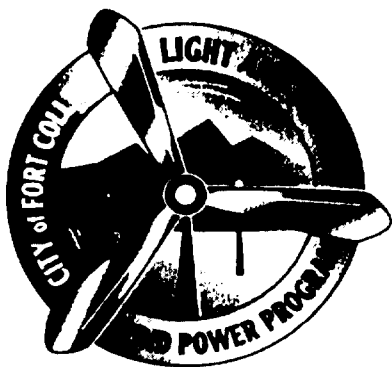


Figure 1. The Wind Power Pilot Program Logo

The study answered the following questions:

1. *Why and how did people make their decisions about whether to subscribe? Were their decisions related- either positively or negatively to:*
 - Awareness of the program among "other customers"
 - Knowledge of wind power and/or green energy
 - Desire for a greater amount of green energy in the system
 - General desire to improve the environment
 - The potential for postponing construction of another coal-fired power plant
 - Attitude toward the Fort Collins electric utility
 - Commitment to community involvement and well-being
 - Interest in innovative technologies
 - Negative aspects of wind power production (e.g., raptors, noise, visual pollution)
2. *To what degree did marketing and information material affect decisions to subscribe?* Materials include the quarterly newsletter (for the first two groups), a web site, literature, word-of-mouth, open houses, articles/editorials in the print media, radio and television items, and other marketing activities implemented by the Fort Collins electric utility.
3. *How much are people willing to pay for green power?* In addition:
 - What is the optimum premium that will attract sufficient subscribers to make the program viable?
 - Is it better to price green energy at a per kWh rate, as a flat add-on amount per month, or in a block rate structure?
4. *Are there characteristics common to each group that will allow predictions as to who will or will not subscribe?* These characteristics could be related to demographic and lifestyle factors as well as the factors addressed in the previous three questions.

Methodology

We addressed these issues based on an analysis of telephone interviews conducted with simple random samples from three groups: subscribers, “interested nonsubscribers” (people who requested information but did not subscribe), and “other” customers. The “other customer” sample was drawn from the remaining customers who were likely to be neither Colorado State University students nor renters. Students were excluded because the program was targeted to households willing to commit to continuing in the program for a three-year period; renters were excluded because many do not pay their own electric bills. In this study, the subscribers represent peoples’ revealed preferences, while interested nonsubscribers represent stated preferences without subsequent revealed preferences.

The sample sizes for subscribers, interested nonsubscribers, and other customers were 248, 307, and 381 households, respectively. Results were analyzed at the 95% confidence level with a $\pm 5\%$ level of precision. Prior to analyzing the data, demographic characteristics of the respondents were compared to those responding to several recent Fort Collins surveys. Because no significant differences were found (when students and renters were excluded), we assumed that our respondents were representative of the total population and we did not need to apply weights to responses.

Three telephone interview survey instruments were developed—one for each group. The subscriber version included questions about participation in the Wind Power Pilot Program; the interested nonsubscriber version included variants of most of these same questions. The version for other customers posed modified versions of the program questions if the respondents indicated that they were aware of the program. Questions about attitudes toward the utility and demographics were asked of all three groups. The surveys were completed in August and September of 1998.

Awareness, Information Sources, and Knowledge of Green and Wind Power

Slightly more than 60% of the other customers reported that they were aware of the Wind Power Pilot Program. Based on this percentage, the number of subscribers, and the number of interested nonsubscribers, we concluded that Fort Collins Wind Power marketing efforts had reached and made aware about 70% of all eligible customers at the time of our surveys. (An April 1998 study for Fort Collins found that 55% of customers were aware of the program, so awareness had increased by 15% in just four months.)

Sources of information recalled by respondents about the program varied considerably among the three groups (Figure 2). Printed material was, by far, the most relied upon source of information for all three groups, but subscribers were much more attentive to information from the utility. All three groups cited the utility as their main source of information—90% of interested nonsubscribers, 73% of subscribers, and 49% of other customers. Of interest, though, is that subscribers made significantly more use of the utility-provided information. Subscribers were also significantly more likely to have received information through personal contacts. Clearly, the marketing efforts raised the level of awareness about the program, but the information channels used differed by the type of customer.

Figure 3 shows that subscribers are much more knowledgeable about wind power and green energy and are more likely to have studied the subjects. The divisions within the bars show how respondents assessed their knowledge. Half of the subscribers compared to a quarter of other customers said they had a fair amount or a great deal of knowledge about wind power. Two-thirds of the subscribers said they know a fair or great deal about green energy, compared to a quarter of other customers.

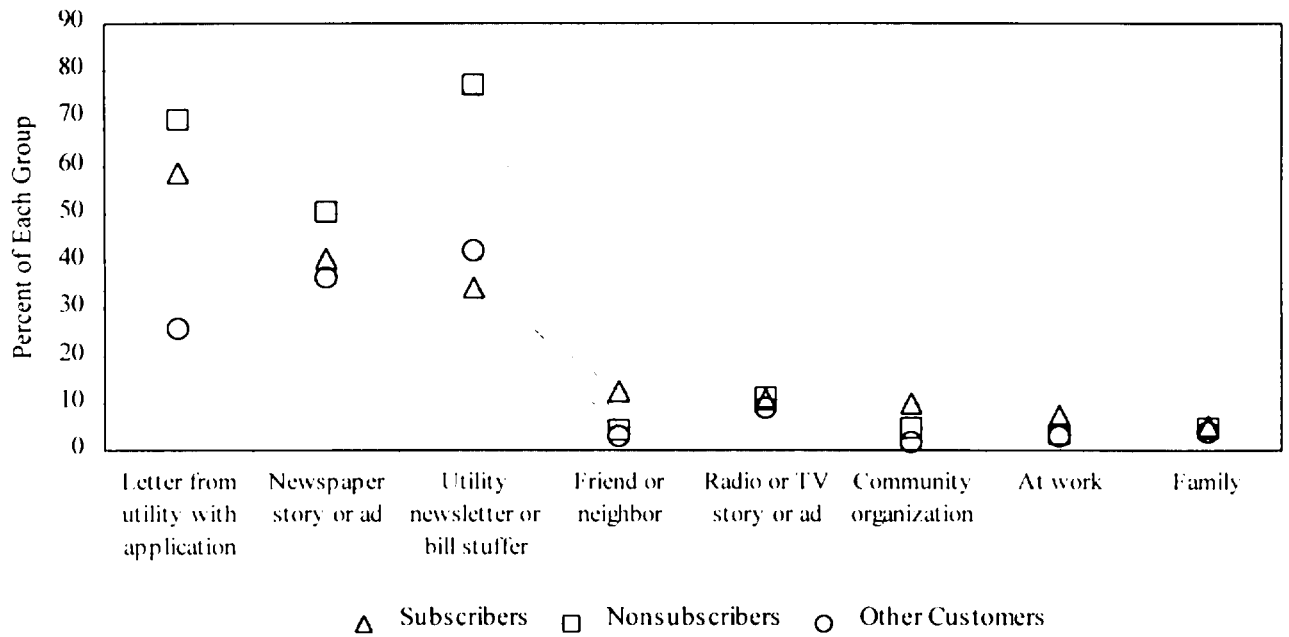


Figure 2. Comparison of Sources of Information About the Program

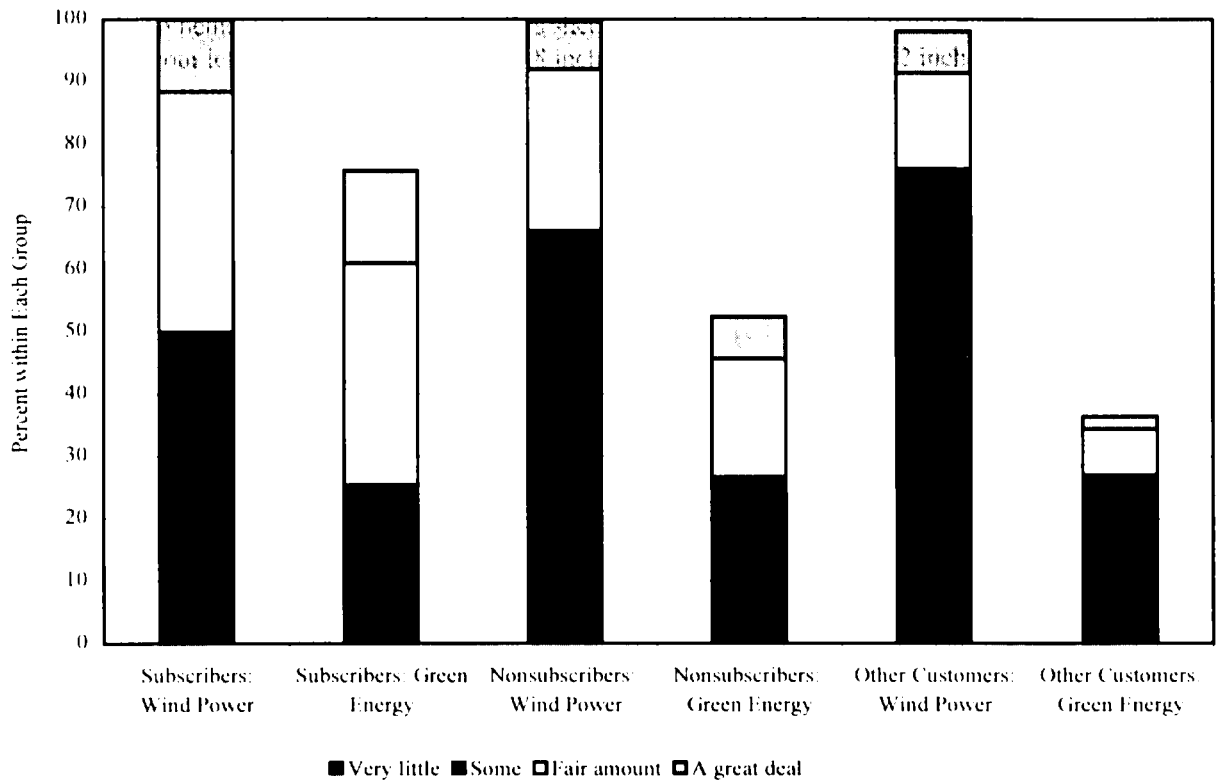


Figure 3. Levels of Knowledge about Wind Power and Green Energy

Attitudes About the Program

Subscribers were asked why they subscribed (an open-ended question) and the relative importance for each reason. Ninety percent rated “improve/protect the environment” and “conserve natural resources” as “extremely important.” Other highly rated reasons were “encourage clean energy sources,” “good for the community,” “encourage wind technology,” and other similarly altruistic reasons.

Subscribers are clearly committed to the environment and may have held this position for a long time. Based on their responses to open-ended questions, subscribers do not view wind power generation or green power as new or innovative and welcome the opportunity to show their support for both. Interested subscribers and other customers who were aware of the program also perceived the benefits of the program to be environmental in nature, but not as strongly.

One way to measure satisfaction is to ask subscribers if they will continue in the program and whether they would recommend the program to others. Nearly 80% said they would continue and 90% would recommend it to others. Another way of assessing attitudes toward the program is to ascertain why people did not subscribe. We summarized the verbatim responses for not subscribing given by interested nonsubscribers and other customers who were aware of the program. These responses were grouped into six categories, which resulted in clear differences between these two groups (Table 1). Interested nonsubscribers cited pricing, cost, and equity (i.e., cost for green power should be spread across all customers) issues as their primary reasons for not following through and subscribing. Other customers cited a range of issues, although few gave even one response.

Table 1. Reasons for Not Subscribing

Reasons	Interested Nonsubscribers		Other Customers	
	Number	Percent ^a (n = 307)	Number	Percent ^a (n = 381)
Pricing/cost/equity issues	69	23%	26	6%
Eligibility/appropriateness of the program	34	11%	4	1%
Personal priorities	19	6%	18	5%
Information/awareness issues	15	5%	19	5%
Program related issues	11	4%	2	1%
Technology issues	4	1%	4	1%
Number responding	153	—	74	—

^aMultiple responses could be given; percentages are of all customers in each group.

We also asked an open-ended question about the least liked aspects of the program. Again, respondents most frequently cited cost and equity. Many said they should not have to pay *more* for energy generated from wind power because it is “free.” Visual and noise pollution and raptor issues (hot issues when the program was introduced to the public) were cited by less than 10%.

Loyalty and Attitudes Toward the Utility

Fort Collins customers expressed a great deal of loyalty to the electric utility. About half of the other customers said they would not switch utilities if they were offered savings of a few dollars a month to switch (Figure 4). Only 16% would definitely switch for such an incentive and about a

quarter said they would think about it. Almost 70% of the subscribers said they would not switch, while just 3% would; 17% would think about it. Lower utility bills are clearly less of an issue for the subscribers than for the others, and their extreme loyalty is consistent with their support of the City, the utility, and the environment as evidenced throughout responses to other questions.

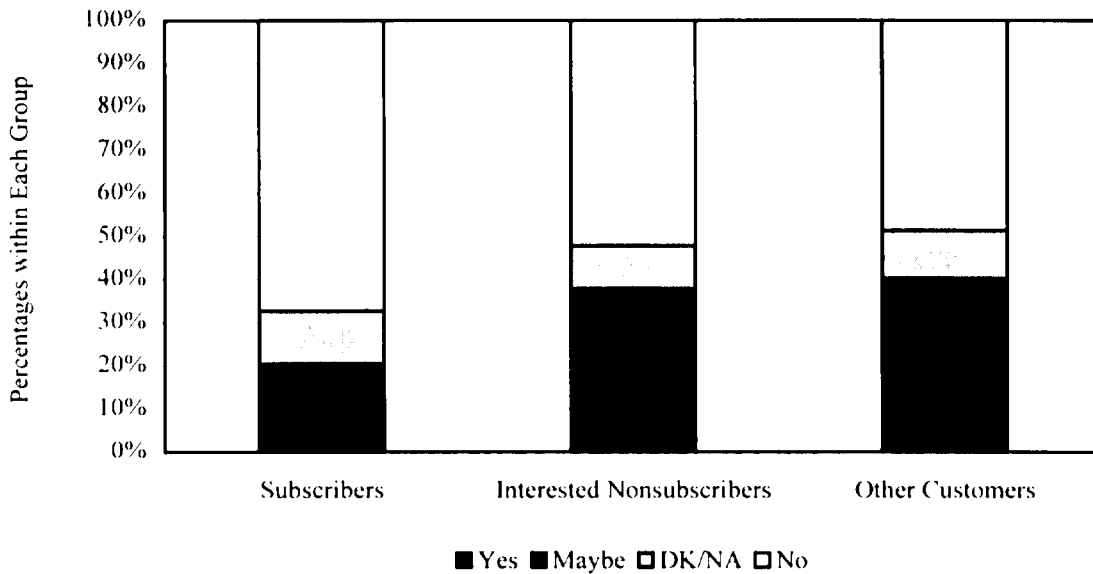


Figure 4. “Would You Switch Utilities?”

We created two sets of factors relating to the utility and the utility’s products and services—*environmental orientation* and *service orientation*. The environmental orientation factors examine how customers perceive the role of the utility with respect to the environment and how the costs for producing power from environmentally beneficent sources (e.g., wind power) should be distributed. To measure service orientation, we asked the respondents to rate the value of utility services, such as high reliability, energy efficiency programs, green power generation, local office, and quick response to outages.

We found two types of environmental orientated customers, whom we call *cost-conscious individualists* and *egalitarian greens*. The cost-conscious individualists believe that costs should be kept low, that the utility should place less emphasis on the environment, and that people who are interested in environmental programs should pay for them. Egalitarian greens believe that the environment should take precedence over cost and that all customers should pay for the costs of generating energy from green sources.

Within the service orientation, we found three patterns. There are people who want all services, including environmentally friendly sources of power (*full-service greens*), people who believe the utility should pay attention to keeping the lights on at the lowest possible cost (*traditionalists*), and *no-frills greens*, who want energy from green sources, quick response to outages but not necessarily high reliability, and energy efficiency programs. Among the subscribers, the no-frills greens predominate, while the other two groups are more likely to be full-service greens. It is clear that Fort Collins electric utility customers expect their utility to provide services above and beyond those that might be provided by a more conservative utility.

These two sets of characteristics are summarized in Figure 5. Percentages of variance accounted for by identifiable groups within the two sets of factors are given in Table 2.

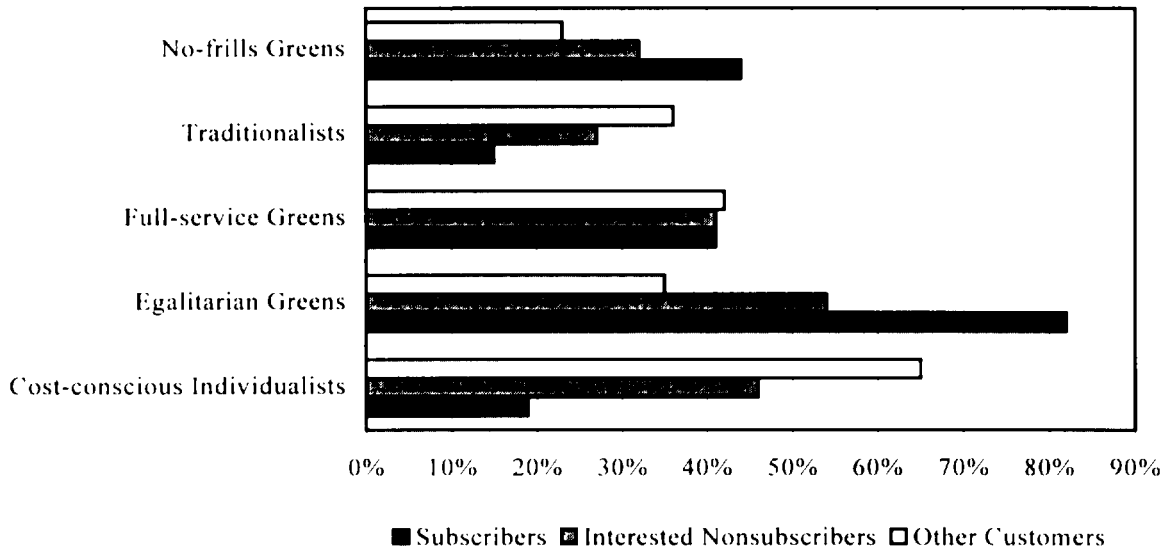


Figure 5. Where Respondents Fall on the Two Sets of Orientation Factors

Table 2. Explained Variance for the Two Sets of Orientation Factors

Orientations and Factors	Percent Variance
<i>Environmental Orientation</i>	
Cost-conscious individualists	44%
Egalitarian greens	22%
Unexplained	34%
<i>Service Orientation</i>	
Full-service greens	43%
Traditionalists	17%
No-frills greens	13%
Unexplained	27%

Willingness to Pay for Wind Power and Green Energy

We addressed the issue of how much people are willing to pay for green energy and wind power under three schemes: (1) a premium per kWh; (2) a flat rate added per month; and (3) a block rate system. Fort Collins uses the premium per kWh method. Prior to the program, customers paid 6¢ per kwh. The premium for the wind energy is 2¢/kWh. The typical bill for subscribers was expected to increase by about \$10 - \$12 per month as a result of the program. Subscribers were probed to learn if they would be willing to pay more, in increments of \$2 up to \$20. The percentage of subscribers who would continue to subscribe at increasing rates were:

- \$12/month: 88.3%
- \$14/month: 62.9%

- \$16/month: 41.9%
- \$18/month: 33.9%
- \$20/month: 26.6%

Our analyses suggest that subscribers are willing to pay as much as 2.5¢/kWh for wind/green power before they will begin to drop out of the program in large numbers. At this rate, revenue is maximized and the number of subscribers is optimal. However, one of the clearest findings in the study is that subscribers are willing to pay and have the means to pay, but they prefer that eventually everyone share in the cost of clean energy generation. When asked if they remembered seeing the new “wind charge” on their utility bills, only half had noticed it. Of those, 55% said it was about what was expected; 35%, higher than expected; and 8%, lower.

Many other pieces of data indicate that cost was an issue for both the interested nonsubscribers and other customers. When we asked if customers would subscribe in a flat rate scheme, a quarter of interested nonsubscribers and 45% of other customers would not. Those who answered yes or maybe were then probed to learn what would be the highest flat rate they would pay. Another portion of each group “dropped out,” saying at this point in the interview that they would not sign up at any price. Only respondents answering yes to the next payment level were asked about a higher rate. At a \$5/month flat rate, almost 60% of the interested nonsubscribers and 35% of the other customers said they would subscribe. When the flat rate was raised to \$10, half or more dropped out; a similar “half-life” was found when the rate was raised to \$15/month. It appears that \$5 is the optimal rate for attracting the most customers and maximizing revenue. These findings are shown in Table 3.

Table 3. Amount Willing to Pay in a Flat Fee Program^a

Response	Interested Nonsubscribers (N = 307)	Other Customers (N=381)	Both Groups
Not pay in flat rate scheme	24.1%	44.4%	35.3%
Would not sign up at any price	18.9%	18.6%	17.7%
Would pay \$5/month	57.0%	34.6%	44.6%
Would pay \$10/month	30.3%	14.2%	21.4%
Would pay \$15/month	12.7%	6.3%	9.2%

^a Columns do not add to 100%; each percentage is the proportion of the total sample size in each group.

We found similar results when we analyzed interest in block rate fee structures. The telephone interviewer asked each respondent if he/she would pay at each block rate level (\$2.50 to \$4.50 per block) and queried how many blocks, with 6 being the highest. We calculated the most each respondent would pay and plotted the curves and linear regressions (Figure 6) for both groups. Subscription is highest at the lowest rates and steadily declines as rates increase, with interested nonsubscribers willing to pay more.

Table 4 summarizes the number of potential subscribers for each rate structure. These numbers are based on the current 700 subscribers in the program, 2,300 interested nonsubscribers, and 24,000 households in the other customers group. Almost half the interested nonsubscribers and a quarter of other customers said they expected to subscribe in the future. These figures translate into a potential subscriber base of about 6,000 to 7,000 customers. When those responding “maybe” are added, the potential is about 17,000. These numbers are based on “stated preference,” rather than “revealed preference” (in which the action taken verifies the expected action). The real number could be 25-30% lower than these estimates, based on these preliminary analysis.

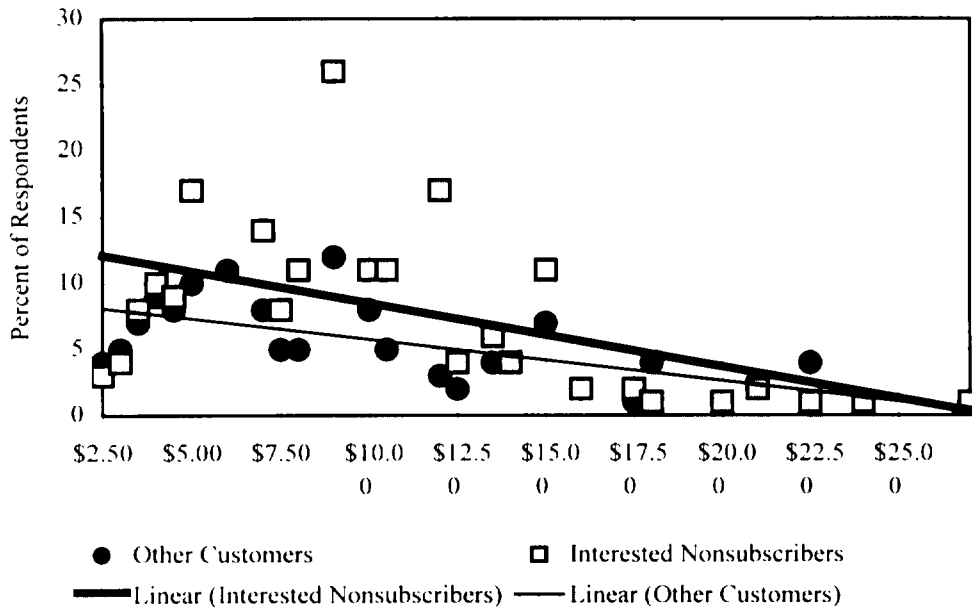


Figure 6. Plot of Actual Cost per Month if Block Rates Were Selected

Table 4. Potential Subscribers to the Program

Green Energy Program Type	Definitely Would Subscribe	Might Subscribe	Total Potential Subscribers
Continue to subscribe; will subscribe	6,927	10,482	17,409
Would subscribe for a flat fee . . .	6,023	10,495	16,518
. . . at \$5/month	10,273	NA	
. . . at \$10/month	4,650		
. . . at \$15/month	2,363		
Would subscribe in a block rate scheme	6,512	6,112	12,624

A number of observations should be made regarding Table 4 and its contents. One general comment is that the numbers who would definitely subscribe do not vary much depending on the program type, but those who *might* subscribe, while similar for the current program and in a flat fee structure, are considerably lower in a block rate scheme. We suspect that this is related to the difficulty in visualizing how the block rate structure works and how each response translated into monthly payments. Another observation is that, in this table, we are calculating stated preferences, rather than revealed preferences, so the potential number of subscribers would be much smaller, particularly for the other customer group.

Summary of Characteristics of the Three Groups

In designing the interview instruments, we began with the theoretical assumption that subscribers would be innovators or early adopters—either because they were intrigued with the technology or because they wanted to be the first on the block to sign up. To this end, we asked a set

of questions designed to categorize where people typically are located on the adoption curve. (We designed this set of questions and had previously validated it in other projects.)

When we did not find subscribers to be predominantly innovators or early adopters, and, further, found no differences across the three groups, we examined our data to further understand the reasons for or for not subscribing, as we have described in more detail in this paper. Simply put, the program was preaching to the already converted. In many verbatim responses to open-ended questions, subscribers said it was “about time” wind power was used to produce electricity. In other words, they did not view wind turbines as a new or innovative technology and assumed a proactive role in supporting the addition of green energy to the City’s power supply.

The customers’ decisions to subscribe are heavily influenced by their social and cultural backgrounds. Half of the subscribers are members of environmental organizations, compared to 30% of interested nonsubscribers and 10% of other customers. The subscribers tend to have higher incomes, be more highly educated, and have professional careers (educators, engineers, and scientists).

Fully 55% of all subscribers held graduate degrees, compared to one-third of the interested nonsubscribers and slightly fewer of the other customers. Although it was no surprise to find statistical interactions between education, income, and occupation, we found this to be the strongest indicator of whether customers were likely to subscribe in the future (see later discussion). In addition, subscribers and interested nonsubscribers tend not to have children living in the household, indicating either empty-nesters or couples postponing child-rearing; both point to the potential of greater discretionary income. Figure 7 summarizes many of these differences.

These characteristics are summarized in the following bullets. When available and appropriate, statistically significant differences are provided for each key characteristic.

- Subscribers have higher levels of education (college or graduate degrees) and household income ($p < .001$); they are slightly more likely to be male and older ($p < .01$). Households tend to be composed of one or two adults, with no children.
- Subscribers are members of environmental organizations and obtained program information from the utility or through personal contacts ($p < .001$). They also subscribed to more newspapers ($p < .01$). There were no significant differences in service organization membership or involvement in community activities.
- There was no indication pointing to members within any of the three groups being (or not being) innovators in the classic sense.
- Subscribers have strong positive environmental orientations and want the utility to include green energy in its resource mix, but believe that the cost of the program eventually should be shared across customers ($p < .001$).
- Other customers are *traditionalists* in their service orientations, rather than *full-service greens* or *no-frills greens* ($p < .001$).
- Subscribers are less likely to switch utilities than other customers and think their electric rates are lower than other Colorado utilities (both $p < .001$).
- Subscribers are more aware of and knowledgeable about green power and wind power than other groups (all at $p < .001$).
- Interested nonsubscribers want to subscribe, but do not because of cost issues; however, they intend to subscribe in the near term.

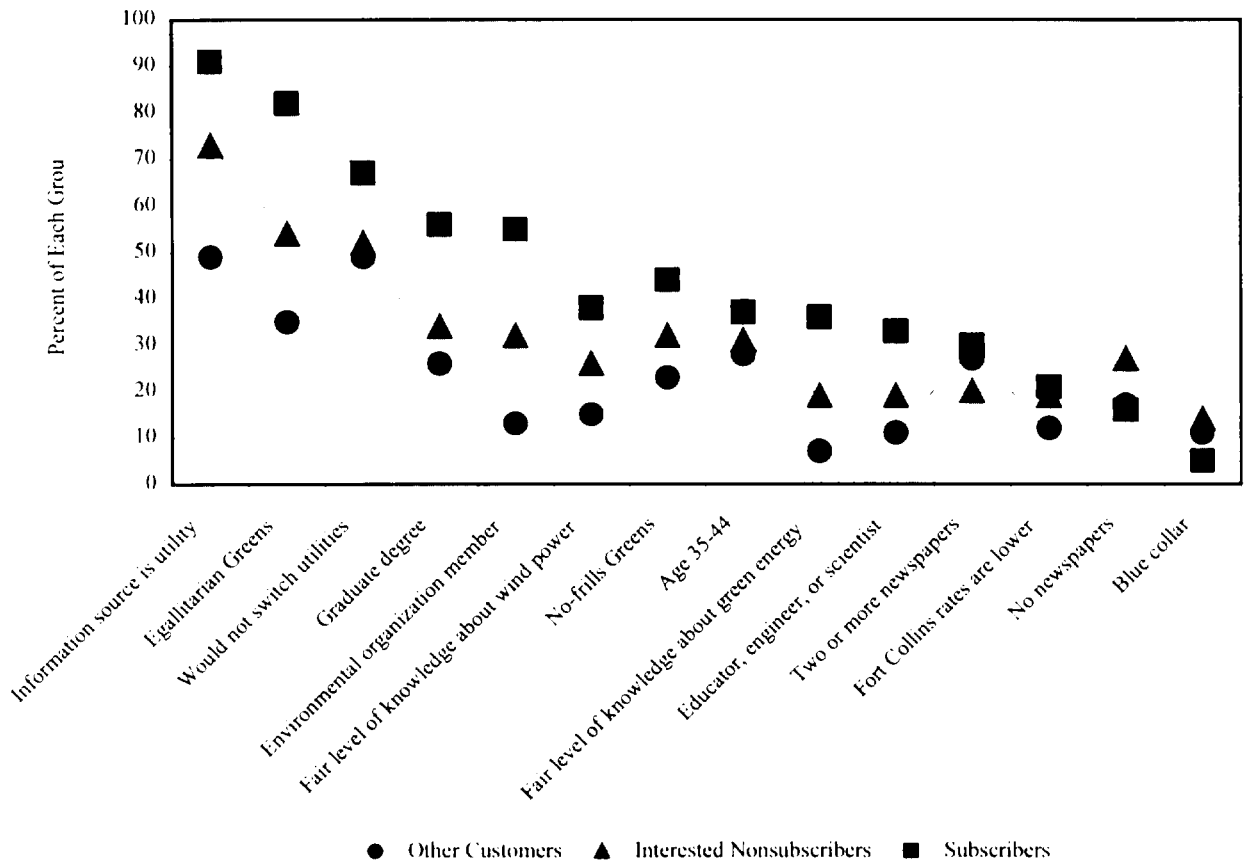


Figure 7. Summary Comparing Selected Characteristics of the Three Groups

Conclusions and Recommendations

The Fort Collins Wind Power Pilot Program has been well received by customers and should be continued. Subscribers are very interested in receiving feedback from the utility about the program. Their subscriptions are important to them and they want to know that they are doing something worthwhile. The utility should continue to provide information to all customers about the Wind Power Program and green energy in general. Fort Collins would be well served by creating a differentiated green energy product, which would allow more people to subscribe at levels compatible with their life circumstances.

The environment is the key theme in this program—not just the environment in general, but the environment in the sense of clean power generation. This is a theme that must be stressed in recruitment and retention efforts because at least 60% of all customers believe the utility should offer green services.

The interested nonsubscriber group clearly includes a large number of people who want to subscribe in the future, so everything possible should be done to maintain contact with them and encourage their participation. For the other customers, the utility should provide “better” explanations of how the program “works,” how the premium translates to real added costs (based on experiences of subscribers now that real data are available), and more information about the technology.

We recommend that Fort Collins continue to track subscribers and interested nonsubscribers, both to better understand the broad issues of stated versus revealed preferences and to correlate marketing efforts with responses. The emerging interest of commercial and business customers in subscribing to green power programs is another trend that should be carefully monitored and assessed. The question to be addressed is whether there is a limit to number of subscribers that may be well below the estimates developed by the authors.

This is a broader issue, however. We recommend that this study be replicated in other locations as a means of controlling for results that could be explained by the nature of Fort Collins (a small, university town in an area of the country known for its positive environmental attitudes) and with other green energy sources (either individual or mixed) as a means of controlling for what we found to be a familiarity with energy produced by wind.

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