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A FIELD STUDY OF THE AESTHETICS  
OF SMALL WIND MACHINES: A  
PRELIMINARY REPORT

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A FIELD STUDY ON THE AESTHETICS OF SMALL WIND MACHINES:  
PRELIMINARY REPORT

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Abstract

A field study was conducted at the Rocky Flats Small Wind Systems Test Center to determine if aesthetic preferences exist for particular designs of small wind machines, and to gather data on the importance of aesthetics relative to other wind system issues. Participants on public tours of the Test Center were asked to answer several general questions and to rate the visual appearance of various working parts (rotor and nacelle), towers, and complete machines. Working parts included vertical- and horizontal-axis designs (both upwind and downwind), while towers included wood, concrete and steel columns, and various truss designs. In spite of a relatively small sample size (N=139), the results indicate definite preferences for particular designs, with downwind horizontal-axis working parts and columnar towers receiving the highest ratings.

Introduction

Various studies concur that a potential problem with "visual pollution" of the landscape exists in the siting of wind machines (1-4); however, little information is available for assessing the magnitude of the problem or ways of resolving it. Only one previous study has dealt in depth with visual impacts of wind systems (5). Major findings from this study were that the old Dutch style windmill was greatly preferred over other designs, and that attitudes toward different designs did not vary much from one environmental setting to another. Practical limitations of these findings derive from the fact that Dutch style machines are not generally used for energy production and that the study was based on having individuals view color slides rather than actual machines.

Because of the scarcity of data on visual impacts of wind systems, SERI designed a pilot study to determine what design configurations, if any, are visually preferred among commercially available models. We also tried to determine the importance of aesthetics relative to other wind system issues.

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Methods

A three-page questionnaire was developed and distributed to participants on tours at the Rocky Flats Small Wind Systems Test Center. In addition to providing background and demographic information, participants were asked what factors they would consider if they were purchasing a small wind system for home use, which one of these factors was most important to them, and they were asked to rate the visual appearance of each wind machine as they viewed it on the tour. Appearance ratings of the tower, working part, and complete machine were based on a five-point scale ranging from very attractive to very unattractive. Nine different machines were rated. Working parts included vertical- and horizontal-axis designs (both upwind and downwind), while towers included wood, concrete and steel columns, and various truss designs. A total of 139 questionnaires was collected from late August until mid-November, 1979, when sampling was discontinued because of inclement weather.

Results and Discussion

It should be emphasized initially that the following results are based on a small (N=139), non-random sample of respondents. Because of this, results should be interpreted carefully and should not be considered as indicative of attitudes of the general public. Only major points will be covered in this preliminary report.

A variety of responses was given when participants were asked what factors they would consider if they were buying a small wind machine. Answers to this question were collected immediately before the tour, and thus should reflect a respondent's existing knowledge or concern about wind machines. Initial cost was the factor most frequently mentioned, being included by 73% of all people who answered the question (N=120). Appearance was the second most frequently cited factor, being included by 33% of respondents. Other frequently mentioned factors and their citation rates were as follows: machine's energy output (29%), long-term economics (25%), reliability (25%), efficiency (18%), maintenance (18%), local wind conditions (15%), feasibility (14%), and machine size (13%). Although twenty-five different factors were identified, those remaining were each identified by less than 10% of the respondents. Based on these data, aesthetics seems to be a very important factor, but the data should be interpreted carefully. Even though answers to this question were

collected before the tour began, some respondents were undoubtedly aware that the questionnaire concerned aesthetics. They may then have been more inclined to include appearance as one of their responses.

When asked to cite the single most important factor they would consider if buying a small wind machine, most respondents listed economic considerations. A total of fourteen different factors was mentioned. Not one person mentioned that appearance was the most important factor, even though 33% of the respondents indicated it was a factor they would initially consider if purchasing a small wind machine.

The major part of the survey was constructed to determine if aesthetic preferences exist for various designs of small wind machines. The purpose of the aesthetic ratings was not to determine consumer preferences for commercial brands, but rather to determine if any general patterns of design preference emerged. In fact, three major patterns were evident. One was that working parts (rotor and nacelle) were considered more attractive than their towers. For eight of nine machines, working parts were rated higher, on average, than their corresponding towers. For the ninth machine, both components were rated equally. On average, downwind horizontal-axis working parts were rated slightly higher than upwind horizontal-axis or vertical-axis working parts. It should be noted, however, that the downwind models all had closed nacelles and were colorful, whereas none of the other models had closed nacelles, and only one had some color. These additional variables thus confound any effects which might otherwise be attributed to rotor orientation.

The second clear pattern to emerge concerned tower designs. The various towers which were rated can be grouped into three basic designs: columnar, narrow-based truss (<4 ft on a side), and wide-based truss (≥8 ft on a side). The weighted average rating for the four columnar towers was almost one category higher than the average for the three wide-based truss towers, while the two narrow-based truss towers were intermediate. Fifty-eight percent of all ratings for columnar towers were in the attractive or very attractive categories, while only 36% of the ratings for narrow-based truss towers and 27% of the ratings for wide-based truss towers were. Conversely, only 12% of the ratings for columnar towers were in the unattractive or very unattractive categories, whereas 23% of the ratings for narrow-based truss towers and 37% of the ratings for wide-based truss towers were.

The third major point to be emphasized about the aesthetic ratings concerns overall machine design. In nearly all cases, the rating for the complete machine fell midway between independent ratings for the tower and working part, suggesting that the two component parts equally influenced perception of the overall design. The four highest rated machines all consisted of horizontal-axis working parts on columnar towers.

These results indicate definite preferences for particular wind system designs, but they are based on a small, non-random sample of individuals. Although our sample population came from twenty

states, the District of Columbia, and three foreign countries, about half of the participants were from Colorado. The sample had a much larger proportion of males, was younger, more highly educated, and had a lower income than the general U.S. population. This was partly attributable to a large number of students. About 2.5% of our sample owned electricity-producing wind systems, and almost half had definite or possible plans to purchase one within the next five years.

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