

## **Public Commitment and Energy Conservation**

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*A field experiment was conducted to evaluate comparatively the effectiveness of two community interventions designed to reduce energy consumption. Building on prior research which discovered that energy conservation could be increased if residents perceived themselves to be publicly committed to conservation, the present research evaluatively contrasted "mild" and "strong" forms of public commitment. The results suggested that the milder form of public commitment which simply associated volunteers in an energy conservation program to community conservation efforts was more effective than a strong commitment intervention. The latter intervention was designed to inform the community at large of the progress registered (energy saved) by program participants. Various conceptual explanations for this effect are explored and the policy implications for community energy conservation programming are also discussed.*

Since the Arab oil embargo of 1973-74, a burgeoning psychological literature devoted to the area of community energy consumption and conservation has appeared (see reviews by McClelland & Canter, in press; Shippee, 1980, Winett & Neale, 1979; Ellis & Gaskell, Note 1; Stern & Gardner, Note 2). From this research, several community interventions

<sup>1</sup>The authors would like to extend their appreciation to Jack K. Mainey of Consumers Power Co. (Lansing office) for coordinating the retrieval of energy consumption data. The authors would also like to thank George W. Fairweather for contributions to this research. The research was funded by a grant obtained from the Michigan State University Foundation.

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have been found to be effective in reducing the energy consumption of residential energy users. Behavioral community psychologists have found that the provision of monetary rebates, made contingent upon reductions in energy use, have led to reductions in energy use as high as 30% (Kohlenberg, Phillips, & Proctor, 1976; Winett, Kagel, Battalio, & Winkler, 1978; Winett, Kaiser, & Haberkorn, 1977; Winett & Nietzel, 1975). Slightly less effective has been the provision of consumption feedback to residents, informing them of their daily electricity consumption. As a rule, the feedback studies have yielded reductions in consumption of from 10-20% (Hayes & Cone, 1977; Seligman & Darley, 1977; Seligman, Becker, & Darley, in press).

One divergent intervention strategy which has received scant attention has involved the use of public commitment as a mechanism to enhance residential energy conservation (Pallak & Cummings, 1976). Utilizing a theoretical rationale derived from social psychological research on commitment processes (e.g., Kiesler, 1971), Pallak and Cummings reasoned that if community residents could be committed publicly to engage in energy conservation, conservation behaviors would increase. To test this notion in an initial experiment, Pallak and Cummings (1976) randomly assigned residents of a midwestern community to a public commitment condition, to a private commitment condition, or to a control condition. Residents in the public commitment condition were informed that at the conclusion of an energy conservation program for which they had volunteered, their names were to appear in a local daily newspaper. In the private commitment and control conditions, residents were requested to volunteer for the program without being explicitly informed about the possibility of the community becoming aware of their participation. The results obtained by Pallak and Cummings suggested that residents who were publicly committed to energy conservation utilized less energy (natural gas and electricity) than did residents in the control and private commitment conditions.

While the public commitment intervention utilized by Pallak and Cummings produced a significant decrease in residential energy consumption, their procedure is not easily implementable in most current community energy conservation contexts. That is, Pallak and Cummings did not actually provide their residential participants with newspaper publicity as they were promised. While such a procedure is acceptable in the case of theoretical research, it would not be an appropriate intervention approach for community conservation programs sponsored by governmental, public, or private sector organizations. In particular there exist clear ethical and legal problems with withholding a promised event from program participants. One purpose of the present investigation was to design and experimentally evaluate a set of alternative public commitment intervention

strategies that might offer a more practical and usable set of models for use in community settings (Fairweather & Tornatzky, 1977; Shippee, in press).

One method of harnessing public commitment for use in community energy conservation programs would involve the actual provision of public recognition to program participants. This might be accomplished by extending the original Pallak and Cummings (1976) procedure to include the publication of participants' names in the local newspaper. There is much precedence for this approach in community organizational contexts. Newspaper publicity methods have been utilized extensively by community organizers almost since the inception of this area of professional practice (e.g., Alinsky, 1946; Biddle, 1968; Brekenfeld, 1974; Perlman & Gurin, 1972). Viewed from the perspective of commitment theory (Kiesler, 1971), this approach exemplifies a mild form of commitment where resident's names would be publicly associated only with participation in an ongoing community energy conservation program.

A second and more powerful variety of public commitment would attempt to heighten participant's concern with their social or public image. Operationally this would involve utilizing the same publicity medium as before, but in addition this approach would include the publication of residents' actual energy savings levels while in the program. This more powerful form of commitment would in all likelihood elicit a tendency for residents to conserve energy in order to protect their public image in the community. Specifically, participants would recognize that if they did not behaviorally follow through with a verbal conservation commitment, the result would be the loss of a positive civic image, social esteem, and/or community standing.

In the present investigation, these alternative public commitment interventions were evaluated comparatively in the context of a completely randomized field experiment. This was accomplished by creating three experimental conditions. One experimental condition (Strong Commitment) was designed to publicly commit volunteers to energy conservation by providing them with newspaper advertisements which acknowledged their participation in a university-sponsored, energy conservation program, along with publishing their levels of energy savings. The second experimental condition (Mild Commitment) was designed to publicly acknowledge only participation in the program. These advertisements *did not* include information concerning participant's energy savings. Both of these experimental conditions were contrasted to a no-advertisement control group.

It was hypothesized that the Strong Commitment intervention would lead to greater levels of energy conservation than the Mild Commitment condition. However, it was also anticipated that the Mild Commitment

condition would lead to greater levels of energy conservation than the Control Condition.

A second objective of the present investigation was to extend the evaluation of community conservation interventions to a broader target population of energy consumers. While nearly all of the community-based intervention studies have assessed residential users of energy, an analysis of national energy utilization data suggests that commercial-industrial energy consumers constitute the largest energy-consuming sector. This group of consumers accounts for 56% of the nations' annual energy consumption (Seligman et al., in press). Residential applications, in contrast, account for only 16% of the nations' annual energy consumption. Of considerable significance to energy policy-makers, then, are community researches which are oriented toward understudied populations such as the commercial-industrial sector. The present investigation represents a beginning step in this line of community research.

## METHOD

### *Participants and Setting*

The research was conducted in Jackson, a small urban center (population 50,000) in South Central Michigan. The Jackson metropolitan area is largely commercial-industrial, with agricultural and residential areas surrounding the central business district. Participants in the study were 24 small commercial-industrial firms. To be eligible for participation in the research, firms had to meet the following criteria: (a) be locally owned and not part of a national chain, (b) employ 25 employees or less, and (c) be involved in the production and/or provision of retail goods and services to local community residents.<sup>3</sup> The firms meeting the above criteria were identified initially by randomly selecting them from the local phone directory. Examples of the types of participating firms included floral shops, bakeries, groceries, pharmacies, and hardware outlets.

<sup>3</sup>There were two primary reasons for imposing these restrictions on the sample. The first was that in the case of national chains, managers of these establishments frequently had no authority to enter the firm into a research agreement. The rationale for limiting participation to small firms concerned the value of the advertisements provided in the research. Since model-building research should be initiated on a small scale (Fairweather & Tornatzky, 1977), the advertisement campaign provided in the present study would probably have been viewed as "insignificant" by large businesses (e.g., Goodyear Tire, Sears, K-Mart, etc.).

### *Procedure*

Initial contact with all of the participants was made via a personal visit to owners of the firms originally selected for inclusion. Contacts were initiated in January of 1979. A research team member introduced owners to the program during the initial contact period. The program was described as a university-sponsored, energy conservation project designed to help small retailers conserve energy. Owners were informed that the program consisted of three segments. First, owners would receive a set of educational materials (Department of Energy materials) which described "energy savings tips" for the small retailer. Second, owners were informed that they would also be eligible to receive an energy efficiency audit. For this segment of the program, a trained energy auditor would evaluate the conservation potential of their establishments. Finally, experimental condition owners were informed about a "community relations component" of the program, in which selected firms would receive community recognition for their participation in the program. Owners were also informed, however, that different types of publicity programs would be utilized including one in which firms received no community recognition. At this point, each type of program (the experimental conditions) was explained fully to business owners.

Following this introduction, owners were then asked to volunteer for the program (of 24 firms, only 1 refusal occurred). Two to three days following initial contact, a research team member revisited the volunteering firms for the purpose of providing them with the educational materials and conducting the energy efficiency audit. Approximately 6 weeks later, business owners were recontacted to inform them of the results of the energy audit and to answer any questions pertaining to the educational materials. At this meeting, owners were also reminded of the community relations element of the program and they were assigned to a particular program (experimental condition). (They were informed that the programs and energy use monitoring would begin as of March 1, 1979.) Final contact with all firm owners was made by mail in July of 1979, and a set of postexperimental questionnaires was included. Following the completion of the research project, all business owners were provided with a "final report" describing the results of the project.

### *Independent Variables*

For each of the two experimental conditions, the small business firms were provided with cost-free, full-page newspaper advertisements. These advertisements appeared in the local daily newspaper semimonthly

for each condition during the months of March and April 1979. The control condition received no advertisements. Businesses receiving the advertisements were informed of the date of their appearance by postcard a few days prior to their publication.

*Mild Commitment Condition.* The newspaper advertisements in this condition were designed to depict the names of all of the firms assigned to this condition. The advertisement was headed in 1½-inch block letters with the words "Jackson Thanks You." At the bottom of the advertisement were printed details of the conservation program (e.g., sponsorship, program activities).

*Strong Commitment Condition.* The advertisements in this condition were virtually identical to those in the incentive condition. However, for these advertisements the reading public could determine the actual energy savings of the firms for the period prior to the appearance of the advertisement (electricity and natural gas).

*Control Condition.* These firms received no advertisements.

### *Dependent Variables*

The primary dependent variables were obtained from utility company data which reported the amounts of natural gas and electricity that the businesses in all conditions consumed for the 2-month period of the experimental manipulations, in addition to a 2-month follow-up period.<sup>4</sup> Two indices of energy use were constructed for analysis purposes. Electricity use was calculated utilizing the formula

$$\bar{x} \text{ kilowatt hours/day (1978)} - \bar{x} \text{ kilowatt hours/day (1979)}.$$

Natural gas use was calculated utilizing the formula

$$\frac{\bar{x} \text{ cubic feet/day (1978)}}{\bar{x} \text{ heating degree days/day}} - \frac{\bar{x} \text{ cubic feet/day (1979)}}{\bar{x} \text{ heating degree days/day}}$$

To assess the actual conservation behaviors undertaken by owners and employees and their perceptions of the program, a 16-item scale was administered by mail to business owners and their employees in the two experimental commitment conditions. Specific items included on the instrument concerned owners' and employees' estimates of their firm's

<sup>4</sup>Only a 2-month follow-up could be utilized, since the last follow-up month was June and heating and electricity use diminishes drastically in Michigan following June.

actual levels of conservation, perceptions of the advertisements, perceptions of consumers' responses to the advertisements, and desire to continue participation in the program. Three open-ended items were also included to assess the number and range of conservation behaviors attempted by owners and employees.

## RESULTS

Of the 23 firms who initially volunteered for the project, 7 firms had to be excluded from the statistical analyses performed on the actual energy consumption indices. Five of the seven firms were excluded when it was discovered that their utility records included usage necessary for the lighting and heating of their homes as well as for their business establishments; one business was excluded since its owner made a significant transfer to a solar design; one firm went out of business during the course of the study. With this attrition, the control, strong commitment, and mild commitment conditions contained five, six, and five firms, respectively.

### *Electricity Consumption*

To ensure that the three experimental groups included in the design did not differ in their level of electricity consumption prior to the study, the prior years' (1978) consumption levels for the firms were subjected to a one-way analysis of variance. No significant differences ( $F < 1$ ) emerged from this analysis, which suggests that the randomization procedure was successful.

The difference score index (1978 electricity consumption–1979 electricity consumption) which served as one of the primary dependent variables was subjected to a set of planned comparisons, since specific hypotheses had been advanced on an a priori basis (Winer 1971). This analysis revealed no significant differences between any of the experimental conditions.

### *Natural Gas Consumption*

The natural gas consumption of the firms for the same period of the year preceding the experiment (1978) was again assessed via an analysis of variance. As with the electricity consumption data, no preexperimental differences emerged from this analysis ( $F < 1$ ).

A difference score index which again reflected the difference in natural gas consumption between the experimental and follow-up periods

Table I. Mean Differences and Percentage Changes in Natural Gas Consumption Condition<sup>a</sup>

Variable	Control	Strong commitment	Mild commitment
Mean difference	-.24	-.01	.23
Percentage change	+15%	+1%	-30%

<sup>a</sup> Scores based on cubic feet per day used in 1978 and 1979. Larger positive numbers on mean difference index indicate greater levels of conservation.

and the same months of the year prior to the experiment (corrected for weather) was subjected to the planned comparisons. This analysis revealed that the mild commitment condition firms utilized less natural gas than did the strong commitment firms,  $F(1, 15) = 6.47, p < .03$ . The strong commitment firms, however, utilized less natural gas than did the control firms,  $F(1, 15) = 4.79, p < .05$ . Table I shows the mean difference scores and the percentage reduction in natural gas consumption from the prior years' consumption levels.

### *Conservation Behaviors and Processes*

The 16-item "conservation behavior scale" administered to business owners and their employees in the mild and strong commitment conditions was analyzed via *t* tests. Three items of the 13 structured items amenable to statistical analyses resulted in significant differences.

In response to two Likert-scaled items requesting that owners estimate their electricity and natural gas savings for the period of the study (1 = up 25%, 7 = down 25%), owners in the strong commitment condition ( $\bar{x} = 5.38$ ) were more likely than owners in the mild commitment condition ( $\bar{x} = 4.25$ ) to estimate that they had saved greater amounts of electricity,  $t(15) = 2.30, p < .05$  (two-tailed). Similarly, with respect to natural gas consumption estimates, strong commitment owners ( $\bar{x} = 5.38$ ) again estimated that they had realized more savings than did mild commitment condition owners,  $\bar{x} = 4.25, t(15) = 1.83, p < .08$  (two-tailed).

Finally, employees in the strong commitment firms ( $\bar{x} = 3.72$ ) were more likely than employees in the mild commitment condition firms ( $\bar{x} = 2.43$ ) to report that they had been informed (1 = not informed, 7 = fully informed) about the energy conservation program in which their firms were participating,  $r(25) = 1.43, p < .10$ .



## DISCUSSION

The primary objective of the present investigation was to devise, implement and evaluate comparatively two intervention programs designed to publicly commit commercial-industrial firms to energy conservation. It had been anticipated that a powerful commitment intervention in which business firms were (a) acknowledged for their participation in a community energy conservation program and (b) motivated to protect a positive community image by behaviorally following through with a public commitment to conserve energy, would lead to greater levels of energy conservation than would a mild commitment intervention which only acknowledged firms' participation. The results of the present evaluative investigation were inconsistent with this hypothesis. What emerged instead was the finding that the mild commitment intervention led to greater levels of natural gas conservation than did the strong commitment intervention. However, the strong commitment condition firms exhibited significantly greater levels of energy conservation (natural gas) than was exhibited by control firms.

Many conceptual explanations exist for why the stronger, and theoretically, the most powerful intervention strategy was less effective in the present experimental context. One reason may be related to the perceptual responses of those owners whose firms were in the strong commitment condition. The postexperimental questionnaires returned by these owners indicated that two emotional responses were frequently elicited by their participation in the strong commitment program. The first was one of despair and the second was one of resistance to the project. It should be noted (see Table I) that none of the firms in the strong commitment condition could demonstrate consistently significant energy reductions for the publicity program. Many owners reported that when their initial attempts to reduce consumption were unsuccessful, they simply "quit trying." The second response frequently expressed by strong commitment condition owners was that they "felt trapped" by the community feedback portion of the intervention. Interestingly, this type of response may reflect a social psychological state of "reactance" (Brehm, 1966). This state may have led owners to resist conservation in favor of consumption because their freedom to consume had been threatened by the strong commitment intervention.

The structured postexperimental data obtained from owners also revealed some perceptual responses that were inconsistent with the outcome measures. Strong commitment owners and employees showed a marked tendency to report that they communicated about the program to a greater degree than did their mild commitment condition counterparts. Further, strong commitment owners estimated that they had conserved

more energy than did mild commitment owners. There is precedence in the community energy conservation literature for these types of perceptual-behavior and attitude-behavior discrepancies (Nietzel & Winett, 1977; Seligman, Kriss, Darley, Fazio, Becker, & Pryor, 1979). However, unlike these studies, the present inconsistency exhibited by owners may represent the presence of a defensivelike perceptual process. Specifically, it may be that the failure of strong commitment condition owners to conserve energy (see Table I) led to the formation of a defensivelike perception of high energy savings. The possibility that persons can engage in "cognitive jostling" to transform failures to conserve energy into successful conservation efforts warrants additional research attention. If this process is found to be a widespread response to failures to conserve energy, future intervention-oriented researches should be designed to discover programming which will prevent the formation of these perceptual-cognitive defenses.

In addition to the above theoretical considerations, the policy implications of the present study suggest that the most effective means of translating public commitment processes into an effective community energy conservation program is to utilize an approach similar to that reflected in the mild commitment condition. That is, a simple public acknowledgment of energy conservation efforts appears sufficient to bring about energy conservation.

To this point, it is still uncertain why the strong or mild commitment interventions were unable to effect the small firms' utilization of electricity. One possibility was again suggested by some of the open-ended responses on the postexperimental questionnaires administered to business owners. These responses suggested that very few business owners reported attempts to reduce *display lighting*. That is, while most owners did report that they attempted to reduce work-related lighting, few owners indicated that they reduced product or firm display lighting. The credence of this alternative is enhanced when it is considered that the small business relies heavily on electricity to advertise the presence of the firm and to enhance the display of a limited variety of products. A reduction in electricity use, given this set of circumstances, could have had an extremely deleterious effect on the retail sales of the firm. In contrast, a reduction in the use of natural gas (the resource which provides heat for the retail establishments) was not as likely to have had an adverse effect on sales. Most of the small businesses participating in the project had a highly specialized and limited product selection, and few customers spent long periods of time "browsing through" these establishments. Hence, for businesses to reduce the temperature of their establishments (and to install weatherstripping, insulation, fix cracks in walls, insulate water heaters, fix broken windows and doors in the rear of their establishments, etc.), did not require a trade-off which would function to reduce retail sales.

The failure to obtain significant differences on the electricity consumption index raises the possibility that the findings of the present study may be less than robust over time. One of the major arguments that would dispute this perspective is related to the nature of the energy conservation activities undertaken by owners in the mild commitment condition. In addition to the behavioral measures adopted by these owners (e.g., lower thermostat settings, reduced work lighting), these owners made several physical and structural changes to their establishments. It is these latter types of changes that are likely to lead to long-term reductions in consumption. Several authors in the energy-behavior area have speculated that the stability of changes in consumption over time is positively related to the introduction of physical changes and retrofits to dwellings and buildings (e.g., Stern & Gardner, Note 2). However, the only definitive answer to questions concerning the long-term effects of community energy conservation programs will have to stem from longitudinal community researches in this area.

Additional research is also required to assess the generalizability of the results of the present experiment to a broader range of commercial-industrial energy consumers. The overarching orientation adopted for this research was that community intervention programs in the energy conservation area should initially proceed on a small scale (e.g., Fairweather & Tornatzky, 1977; Shippee, in press). Consequently, very small commercial-industrial consumers were initially employed as a target population. Certainly the nature of the sample employed prevents wholesale generalization to larger commercial-industrial energy consumers. The firms utilized in the present investigation differ from larger firms on several organizational and social process variables such as communication, centrality of decision-making, type of employees, energy conservation potential, prior efforts to conserve energy, and the like. However, as Fairweather and Tornatzky (1977) suggest, it is desirable initially to demonstrate the effects of interventionary approaches to social and environmental problems on a small-scale basis. This approach is advocated since the wide-scale implementation of a program can be preceded with empirical feasibility data. Extended to the present context, this perspective suggests that subsequent research is required to extend and reevaluate these intervention approaches with larger commercial-industrial firms in differing geographic regions of the nation.

A final policy-relevant concern of the present research surrounds the cost-effectiveness of employing intervention approaches similar to those utilized here. With respect to the most effective intervention model in the experiment, a 30% reduction of natural gas consumption was exhibited by firms in the mild commitment condition. Translated into a dollar figure, this represents for the average firm a monthly savings of approximately \$75. To the firms in this study, this figure represented a

significant reduction in overhead expenses. On the other hand, to offer the conservation program, nearly \$150/month per business (not including staff) was required. Hence, in the present context the mild public commitment approach was not cost-effective with respect to energy savings. There are, however, several modifications that could be made in the program to render it more feasible for wide-scale use. First, the advertisements for participating firms were provided twice monthly. This schedule could be reduced considerably, thus reducing the costs necessary for this aspect of the program. Second, only a small number of firms were included in the mild commitment condition. With a greater number of firms, the energy savings likely to be obtained by each business would easily offset the stable costs for advertisement provision. In short, several alternative procedures exist for increasing the cost-effectiveness of offering a public recognition program similar to that utilized in the mild commitment condition. These modifications would make such a program feasible for governmental, private, or public sector sponsorship in the future.

From all of the available evidence (e.g., Hayes, 1979), it is clear that energy availability problems will continue to pose a major social-environmental problem well into the 1980s and beyond. Community psychologists possess the skills necessary to address energy problems through the conduct of action-oriented researches. Such research efforts should be targeted to all segments of the population, including "nontraditional" sectors of society usually not included in community researches. With the knowledge gained through such investigations, energy policy-making in the public and private sectors can be effected with greater possibility of success.

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