

Measuring Advertising Impacts on Conservation Behavior: A Business Application of the Theory of Planned Behavior

Ken Seiden, Essential Economics, Portland, OR
Jane S. Peters, Research Into Action, Portland, OR
Doug O'Brien, Wisconsin Electric, Milwaukee, WI

ABSTRACT

The theory of planned behavior has been widely used by behavioral psychologists to understand the motivational factors influencing behavioral actions. Researchers have applied the model to cognitive processes leading to physical fitness, voting, leisure and other activities. The planned behavior model hypothesizes that behavioral actions are directly influenced by intentions toward performing those actions, which in turn are influenced by individual attitudes about the activity, perceptions of individual control over the behavior, and societal norms. Our application measures the impacts of an advertising campaign on energy conservation behavior.

This study employs a traditional pre/post treatment/control group design. We present midterm results from waves 1 through 3 of a five-wave panel survey. Several SAS procedures (CORR, FREQ, REG, and SYSLIN) are used to test each aspect of the behavioral model: the validity of each survey question in the development of the theory's behavioral constructs, the explanatory power of individual constructs and the theory as a whole to conservation actions, and the behavioral response of individuals to the advertising campaign. The results reveal the intentions toward energy conservation are consistent with the planned behavior model, and that advertising positively influences conservation intentions for certain behaviors.

INTRODUCTION

As utilities move away from rebates and incentives, many choose to use educational campaigns as a means to continue energy efficiency acquisition efforts. Measuring these effects is difficult and has long been considered nearly impossible.

In 1997 Wisconsin Electric (WE) introduced the Energy Conservation Campaign (Campaign). Through a series of television advertisements, the Campaign aims to educate and inform residential customers of the ease of energy conservation, to change customer attitudes regarding energy conservation, and consequently to make energy

conservation behavior "second nature." The evaluation reported here seeks to determine if the Campaign influenced WE customers to increase the likelihood that they would take the conservation actions addressed by the Campaign.

One problem occurs during measurement when the informational campaigns focus on changing attitudes toward energy efficiency or energy consumption rather than attitudes toward making an energy efficiency investment. Typically, such efforts have little success. Katzev and Johnson (1987) document a variety of studies in which attitudes towards energy efficiency were changed, but associated energy efficiency behaviors were not implemented. The primary critique leveled by Katzev and Johnson is that the focus of attitude change efforts was misplaced. A more appropriate focus should have been on health, safety and comfort (known to correlate with energy consumption behavior), not on energy conservation.

Even if a campaign is focused on the most appropriate attitudes, there are a variety of reasons why measuring the effects of the campaigns is difficult. The actions taken by consumers typically do not coincide with their experience of the information and education efforts, (i.e. consumers wait until the right time to make investments in a new water heater or to install insulation.) The actions taken by individual consumers following an information campaign may result in very small savings, which cannot be readily measured without detailed customer response and demographic information. Similarly, since education and information campaigns are mass targeted, the consumers who actually take actions may be difficult to locate.

Given the difficulty of observing behavior changes associated with educational campaigns, researchers sometimes seek to measure the likelihood that consumers exposed to a campaign will take the action. Fishbein and Azjen (1975) demonstrated that the links between attitudes and behavior are not direct. There are intervening factors between attitudes and behavior that are influenced by attitudes and beliefs. One of these factors is itself directly linked to

behavior. In developing their model of reasoned action, Fishbein and Ajzen postulated that intention would be a better predictor of behavior than attitudes to the behavior.

A refinement of this model by Ajzen (1991) is called "the theory of planned behavior." Ajzen demonstrates that measuring behavior change is possible. Rather than merely asking survey respondents whether they have changed their behavior in response to a stimulus such as an ad campaign, the model that evolved from the theory of planned behavior uses a structured series of questions designed to measure the individual "thought processes" regarding a behavior and their intentions to perform the behavior. This model has been used in a variety of settings in which behaviors were more readily measured and has been found to be very effective in predicting behaviors (Ajzen (1991), Beck and Ajzen (1991), Godin, et al. (1993), and Sheppard, et al. (1988).

THE THEORY OF PLANNED BEHAVIOR

The prime focus of this application of the theory of planned behavior is customer *behavioral intentions* regarding conservation actions. Many studies have found strong causal linkages between behavioral intentions and actual behavior. (Sheppard, et al., (1988) summarize dozens of applications of the model.) If the Campaign influences intentions to perform a specific conservation behavior, then it is highly likely to have also influenced the conservation behavior.

According to the theory of planned behavior, three primary factors contribute to the development of behavioral intentions: *attitude, perceived behavior control, and subjective norms*.

As described further in the next section, we performed preliminary analyses with the pre-Campaign baseline data to test the model's applicability to the development of behavioral intentions (BI). All of the behavioral constructs appeared to be working as intended except for the subjective norm variable, which measures the impact of others' approval or disapproval of a behavior. This construct and the items comprising it were insignificant and/or yielded incorrect signs in all model specifications. This finding is similar to many other findings in the literature summarized by Ajzen (1991), where eleven of nineteen studies also show that societal influences are negative or do not significantly influence behavioral intentions. As noted by Ajzen (1991, p. 189), "this finding suggests

that, for the behaviors considered, personal considerations tended to overshadow the influence of perceived social pressure." In the case of residential energy conservation most behaviors cannot be observed by outsiders, finding societal influences to be limited for conservation behaviors is reasonable. The study team therefore eliminated the subjective norm construct from subsequent survey waves and analyses.

If someone views the purchase of an energy-efficient appliance favorably, then that person would likely intend to purchase an energy-efficient model. We include both direct and indirect attitude measures in this study. The direct attitude construct (AACT) refers to the degree an individual has a favorable or unfavorable feeling toward the behavior. For example, purchasing an energy-efficient water heater might be seen as a desirable or undesirable behavior.

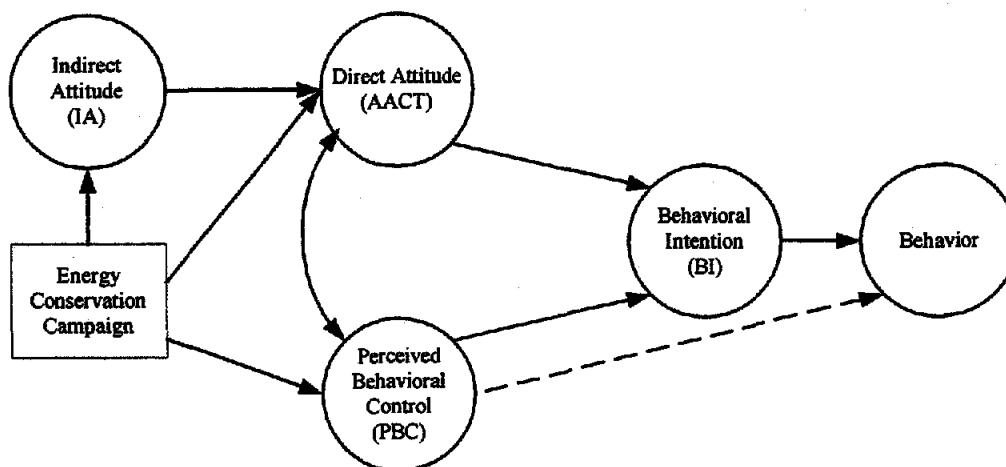
Indirect attitudes (IA) are estimated by combining individual responses relating two constructs: *behavioral beliefs* regarding the outcome of the action in question and the individual's *subjective evaluation* of that outcome. For example, someone might believe that an energy-efficient water heater will help the environment and evaluate improvements to the environment as a good thing.

Indirect attitudes (IA) are estimated by combining individual responses relating two constructs: behavioral beliefs regarding the outcome of the action in question and the individual's subjective evaluation of that outcome. For example, someone might believe that an energy-efficient water heater will help the environment and evaluate improvements to the environment as a good thing.

Perceived behavioral control (PBC) refers to the ease or difficulty of actually performing the behavior. If appliance dealers do not stock high-efficiency items, individuals might perceive they have no control over the purchase of an energy-efficient model. As with attitude, the theory predicts a positive relationship between perceived behavioral control over an action and the performance of that action.

Figure 1 summarizes the application of the theory of planned behavior to Wisconsin Electric's Energy Conservation Campaign in a structural path diagram. According to the theory, AACT and PBC influence one another and BI, and BI in turn influences actual behavior. Additionally, IA is an antecedent of AACT. Finally, we hypothesize that the Campaign affects BI through each of the intermediate constructs.

Figure 1: Application of the Theory of Planned Behavior to the WE Campaign



The dotted path between PBC and behavior represents the notions that perceptions of control may be directly related to actual control over the behavior. This path and the path between BI and behavior are beyond the scope and design of this study. Based on the strong relationship between BI and behavior summarized by Sheppard, et al., (1988), we reasonably expect that any changes in these measures as a result of the Campaign will translate to changes in energy conservation behavior during the time the campaign is in effect and for a limited period after.

STUDY DESIGN

The WE Campaign is designed to influence three distinct energy-using behaviors: (1) the purchase of energy-using goods with short lifetimes that are purchased relatively frequently (e.g., shower heads and light bulbs), (2) durable goods (e.g., water heaters) and investments with longer lifetimes (e.g., insulation and shade trees), and (3) everyday energy using behavior that does not involve equipment purchases (e.g., thermostat setting behavior).

To study design focused on one type of energy conservation action relating to each of these three groups:

1. Low flow shower head purchases
2. Energy efficient water heater purchases
3. Energy saving from manually or automatically adjusting thermostat settings

Each behavior construct is developed from a series of questions that vary according to the behavior of

interest. Example questions for thermostats and their relationship to the constructs previously described are illustrated below.

IA is the sum of the product of each behavioral belief (**B**) and associated outcome evaluation item (**E**). **B** is measured by items using a seven point bi-polar scale with strongly disagree (-3) and strongly agree (+3) at opposite ends of the scale: "Setting your thermostat a little lower would make you feel cool." **E** is measured by items associated with each behavioral belief question, and are measured items using a seven point bi-polar scale with very bad (-3) and very good (+3) at opposite ends of the scale: "Feeling cool while in the house is..."

AACT is measured by the sum of direct attitude items that use seven-point semantic differential scales: "In the next two weeks . . . when I'm home during the day . . . setting my thermostat a little lower would be..." Example of the semantic differential scales include 'unpleasant-pleasant' and 'uncomfortable-comfortable'.

PBC is also measured by the sum of items that use seven-point semantic differential scales: "During the day when I am at home . . . lowering my thermostat a little more than I do now would be . . ." very difficult-very easy

BI is measured by the sum of intention items (questions) that use seven-point semantic differential scales: "In the next two weeks...when you are home during the day...do you intend to set your thermostat a little lower than you do now?" definitely do not intend to-definitely intend to.

Depending on the measure, a total of twenty to twenty-five questions are used to complete these

constructs. In addition to these questions, the surveys also include several questions on exposure to different media which consumers might use to obtain information on energy conservation, and past experience with conservation measures and programs. Finally, the surveys include questions relating to household demographics.

In this study, we chose a control group strategy. In addition to the random sample of residential customers from WE's service territory, a control group was randomly sampled from a similar metropolitan area. These consumers were surveyed at the same time. The control group area utility had offered energy efficiency rebates in the past, but was not currently running a conservation advertising campaign. For each action type, the sample sizes for each wave provide 95% confidence with an error margin of $\pm 5\%$ —each wave contains 400 responses each from WE and the comparable utility service area.

The time-series includes five waves of surveys with the panel of respondents. The first wave collected pre-campaign data in Spring 1997. In this paper, we compare these baseline data with data collected from the second and third survey waves performed in Fall 1997 and Spring 1998, respectively. Additional data will be collected in Fall 1998 (end of program) and March 1999 (post program).

BASELINE ANALYSIS

The first baseline analysis data from the initial, pre-campaign survey to determine whether conservation action intentions are consistent with the theory of planned behavior

Correlation coefficients are used to test the overall reliability of the constructs postulated for behavioral intention (BI), direct attitude toward the action (AACT), indirect attitude toward the action (IA), and perceived behavior control (PBC). Reliability coefficients measure the overall correlation between the construct and the group of items that comprise the construct, while standard correlation coefficients between behavior constructs and individual items that comprise the construct show the reliability of that item. Correlation coefficients between constructs are one measure of the efficacy of the planned behavioral model in this setting.

The CORR procedure is used to generate these statistics. For example the following program statements are used to test for the overall reliability of AACT toward efficient water heaters and the five items that comprise AACT:

```
Proc CORR data=watdata alpha;
  Var AACT Q10 Q11 Q12 Q13 Q14;
Run;
```

The option 'alpha' refers to Cronbach's coefficient alpha, which gives the correlation between each variable and all of the remaining variables in the Var statement. The alpha coefficient on AACT in this instance provides an overall measure of the reliability of the set of items comprising each behavioral construct.

The bold diagonals in Table 1 show baseline reliability coefficients, and the figures below the diagonals reflect correlation coefficients among behavioral constructs. BI and AACT reliability constructs are strong, and are consistent with other reported findings (Beck and Ajzen, 1991, Godin, et al, 1993). Reliability coefficients are weaker for IA and PBC, but coefficients between individual items and associated constructs (not reported) are significant at the 1% level. Finally, all construct correlations in Table 1 are positive and significant at the 1% level.

Table 1: Wisconsin Electric Construct Reliabilities and Correlations

	BI	AACT	IA	PBC
Showerhead				
BI	0.83			
AACT	0.74	0.89		
IA	0.51	0.51	0.59	
PBC	0.44	0.47	0.27	0.53
Water Heater				
BI	0.71			
AACT	0.52	0.88		
IA	0.26	0.31	0.35	
PBC	0.44	0.29	0.32	0.47
Thermostat Setting				
BI	0.71			
AACT	0.61	0.87		
IA	0.35	0.57	0.38	
PBC	0.34	0.44	0.24	0.43

Analysis of control group customers yielded very similar results. Chi-square tests from the FREQ procedure reveal that Wisconsin Electric customers are more likely than control group customers to purchase energy efficient water heaters, while there is no difference in showerhead intentions between these groups.

Analysis and Modeling

Least squares regression (REG, GLM, and several other SAS procedures can be used) results also showed that baseline conservation intentions are consistent with the planned behavioral model. These models, which regressed BI on AACT, BI, and PBC, explain over 80% of the variance in behavioral intentions.

CAMPAIGN ANALYSIS FRAMEWORK

We utilize two distinct econometric modeling frameworks to test for the impact of the Campaign on BI. The first is a very simple regression model of the campaign, and includes demographic and other exogenous variables while excluding other behavior constructs. The second represents the theory of planned behavior path diagram model shown in Figure 1 and is estimated via a system of regression equations

The first model represents a traditional regression model or reduced form approach to the impact on BI, and is designed to merely show whether the Campaign has a statistically significant impact on intentions, and how large that impact is. It is important to recognize that this simple model cannot explain why or how the Campaign is influencing behavioral intentions. The planned behavior model is designed precisely for this purpose. Thus, the two approaches should be viewed as complementary.

The reduced form model is estimated by an OLS regression of equation (1):

$$(1) \quad BI = f(AGE, EDUC, INCOME, ADULTS, KIDS, SMARTMON, CONTCONS, Campaign\ variable, CONTAD)$$

where:

- AGE is the age of the respondent
- EDUC is the highest level of education attained by the person who makes energy-related decisions;
- INCOME is the household's total annual income;
- ADULTS equals the number of adults in the household;
- KIDS equals the number of children in the household;
- SMARTMON is a binary variable set equal to 1 if the household previously participated in WE's Smart Money conservation program, and zero otherwise;
- CONTCONS is a binary variable set equal to 1 if the household previously participated in a conservation program offered by the control area utility, and zero otherwise;
- The Campaign variable is SHOWAD, WATERAD, or TEMPAD, and is equal to the frequency of viewing showerhead, water heater, or thermostat conservation advertisements, respectively, reported by WE customers; and
- CONTAD is the frequency of viewing television advertisements sponsored by the control area utility reported by control group.

Estimation of the planned behavior model expands on the reduced form framework through the impacts of these variables via the paths depicted in Figure 1. We specify a four-equation system with dependent variables representing BI, AACT, PBC and IA. The Campaign influences BI through its influence on attitudes (AACT and IA) and control (PBC). Additionally, the IA influences are indirect (through AACT), and PBC & AACT influence one another. Tracing these influences leads to the following regression framework:

$$(2a) \quad IA = f(Campaign)$$

$$(2b) \quad AACT = f(Campaign, IA, PBC)$$

$$(2c) \quad PBC = f(Campaign, AACT)$$

$$(2d) \quad BI = f(AACT, PBC)$$

There are two issues associated with estimating equations (2a) through (2d) via ordinary least squares (OLS). First, OLS estimates ignore the simultaneity in the first three equations, which results from the fact that IA, AACT and PBC are not truly exogenous variables. OLS estimates are inconsistent and can be improved upon by simultaneously estimating these equations (Greene, 1997).

Second, the equations lack the other exogenous variables included in the reduced form framework. In addition to helping explain the behavioral constructs, these variables allow the system to be identified. Equations (3a) through (3d) represent the final set of equations to be estimates. With the exception of equation (3c), these equations are exactly identified: the number of exogenous variables excluded from each equation is equal to the number of endogenous variables included as explanatory variables.

$$(3a) \quad IA = f(AGE, EDUC, INCOME, SMARTMON, CONTCONS, ADULTS, KIDS, Campaign, CONTAD)$$

(3b) $AACT = f(IA, PBC, SMARTMON, CONTCONS, Campaign, CONTAD)$

(3c) $PBC = f(AACT, EDUC, INCOME, SMARTMON, CONTCONS, ADULTS, KIDS, Campaign, CONTAD)$

(3d) $BI = f(AACT, PBC)$

All of the variables from equation (1) are included in (3a) because IA does not contain "endogenous" variables as explanatory variables. All of the pure demographic variables are excluded from equation (3b). Interestingly, a statistical exclusion test for this equation always failed when one or more of the demographic variables were included, but passed in many instances (depending on the campaign variable and wave) when all were excluded. We believe this is consistent with the planned behavior model which holds that demographics are important variables contributing to IA and PBC, but since IA and PBC are included in AACT all of the demographic variables need to be excluded from the equation to properly identify the system. AGE is the only variable excluded from equation (3c), and is selected because the system-weighted R-square statistic is highest when it is the variable excluded from the PBC equation.

All exogenous variables are excluded from the BI equation, consistent with Ajzen (1991). This equation is "recursive" because no feedback loops emanate from BI. It does not appear as an endogenous variable in any other equation, and should therefore be estimated via OLS and excluded from simultaneous estimation of the other three equations.

To summarize, the planned behavior model given by (3a) through (3d) indicates that there are a total of six factors potentially influencing BI. The total impact is given by the sum of these factors. Three of these flow from the AACT-to-BI path:

(4) Total AACT Impact = Direct impact of AACT (3b and 3d) + Indirect impact of

(5) PBC on AACT (3b, 3c, and 3d) + Indirect impact of IA on AACT (3a, 3b, and 3d)

Similarly, three potential impacts flow from the PBC-to-BI path:

(6) Total PBC Impact = Direct impact of PBC (3c and 3d) + Indirect impact of AACT on PBC (3b, 3c and 3d) + Indirect impact of IA on AACT on PBC (3a, 3b, 3c, and 3d).

Each of these six factors multiplies the appropriate coefficients from each equation. For example the last factor, the indirect impact of IA on AACT on PBC, is given by:

(7) Indirect impact of IA on AACT on PBC = Campaign coefficient from (3a) * IA coefficient from (3b) * AACT coefficient from (3c) * PBC coefficient from (3d).

We combine the midterm survey datasets for each measure with their respective baseline datasets and estimate the regression equations above. Two estimation techniques are employed within the SYSLIN procedure: ordinary least squares (OLS), and three-stage least squares (3SLS). OLS is applied to the reduced form model (equation 1) and the planned behavior model (equations 3a through 3d). The 3SLS estimator is applied to the simultaneous portion of the planned behavior model (equations 3a through 3c). Although the extent of the bias in this system is unknown, we performed the Hausman specification test (Hausman, 1978) on individual equations and determined that we could not reject the hypothesis of no simultaneity. Both the OLS and 3SLS estimates of the planned behavior model are reported here.

MIDTERM RESULTS

Summary results from the reduced form models are presented in Table 2. It contains the contribution of each variable, including the Campaign.

Table 2: Reduced Form Results (t-statistics in parentheses)

Behavior / Survey Wave	AGE	EDUC	INCOME	ADULTS	KIDS	SMARTMON	CONTCONS	CONTAD	Campaign
Showerhead - Wave 2	0.67 (11.42)	0.74 (7.32)	0.22 (2.62)	0.75 (5.29)	0.41 (4.40)	1.18 (4.20)	0.43 (1.37)	0.33 (2.66)	0.21 (1.17)
Showerhead - Wave 3	0.71 (11.59)	0.63 (6.20)	0.26 (2.99)	0.84 (5.59)	0.43 (4.47)	0.91 (3.17)	0.13 (0.39)	0.22 (1.70)	0.69 (3.42)
Water Heater - Wave 2	0.80 (22.65)	0.88 (14.32)	0.69 (12.99)	0.52 (5.85)	0.36 (6.23)	0.19 (1.06)	0.02 (0.13)	0.27 (3.74)	0.26 (2.94)
Water Heater - Wave 3	0.81 (22.84)	0.98 (16.02)	0.63 (11.82)	0.54 (5.88)	0.27 (4.73)	0.21 (1.16)	-0.39 (-2.04)	0.10 (1.30)	0.18 (2.34)
Thermostat Setting - Wave 2	0.41 (6.96)	0.59 (5.33)	0.05 (0.56)	0.54 (3.51)	0.40 (4.03)	0.26 (0.85)	-0.07 (-0.20)	0.46 (3.47)	-0.01 (-0.15)
Thermostat Setting - Wave 3	0.45 (7.08)	0.60 (5.03)	0.07 (0.66)	0.59 (3.67)	0.42 (3.93)	-0.02 (-0.05)	-0.45 (-1.19)	0.68 (4.71)	0.13 (1.24)

Analysis and Modeling

All of the demographic variables have a positive influence on BI. Participation in previous conservation programs tends to positively influence BI, but there are cases where the effects are insignificant or negative. Both the Campaign and control group ads have a positive influence on BI when statistically significant. The Campaign's influence is statistically significant for showerheads in the wave three analysis, and in both water heater waves

The reduced form model demonstrates that several variables one might expect have an effect on intentions to purchase energy efficient equipment. The model also demonstrates, that holding these factors constant, the WE Advertising Campaign had a statistically significant effect to increase intentions to purchase energy efficient showerheads at the time of

wave three, and energy efficient water heaters at the time of both wave two and wave three.

Absolute and percentage impacts of the Campaign on BI from the planned behavior models are reported in Table 3, along with the Campaign impacts from the last column of Table 2. Statistical significance is not provided here because, as illustrated in equations (4) through (6), several path analysis coefficients must be combined to yield the total impact of the Campaign on BI. Nevertheless, the results indicate that the planned behavior model provides estimates that are comparable to the reduced form model. On average, the 3SLS impacts are closer to the reduced form estimates than those from the OLS system, but the system root mean squared error is higher from the 3SLS estimates.

Table 3: Absolute and Percentage Impacts of Campaign on BI

	Behavioral Intention	Total Impact on BI: OLS Regression		Total Impact on BI: 3SLS Regression		Total Impact on BI: Reduced Form	
		Absolute Impact on BI	Percentage Impact on BI	Absolute Impact on BI	Percentage Impact on BI	Absolute Impact on BI	Percentage Impact on BI
Wave 2	Showerhead	0.203	2.00%	0.204	2.01%	0.207	2.04%
	Water Heater	0.123	0.93%	0.218	1.65%	0.257	1.94%
	Thermostat Setting	0.170	2.60%	-0.129	-1.98%	-0.014	-0.21%
Wave 3	Showerhead	0.311	3.06%	0.504	4.97%	0.686	6.76%
	Water Heater	0.161	1.22%	0.251	1.90%	0.178	1.35%
	Thermostat Setting	0.174	2.68%	0.061	0.93%	0.126	1.93%

The results in Table 3 provide an estimate of the increase in behavioral intentions that occur as a result of the WE Advertising Campaign. Averaging the impacts across the three approaches for the wave/behavioral intention combinations that are statistically significant in Table 2 yields a 5.0% increase for energy efficient showerhead purchase intentions after wave 3, and a 1.5% and increase energy efficient water heater purchase intentions after both wave 2 and 3.

INTERPRETATION AND FUTURE RESEARCH

Are the impacts reported here "large," and can the Campaign be viewed as a success? The results presented here suggest that the Campaign is having a positive influence on the efficiency of showerheads and water heaters if customers follow through on

stated intentions. Three of the four reduced form models show that this impact is statistically significant, and these results are consistent with the impacts estimated from the planned behavior model. Any measure of whether the impacts are large or the Campaign is successful, however, requires additional analysis. Specifically, this requires an estimate of the relationship between behavioral intentions and behavior (sales) from other studies, and a benefit-cost analysis comparing conservation savings with Campaign costs.

An interesting outcome from this analysis is that thermostat-setting intentions do not appear to be significantly influenced by the Campaign. The results are generally insignificant or negatively significant. Reviewing these findings we suspect that thermostat setting behavior may no longer be subject to influence from information efforts. Previous work by

Meyers and Schipper (1984) found that reduced thermostat settings were the single most important reason for reduced energy consumption in the residential sector between 1973 and 1981. Given this, we suspect that consumers may have already gone as far as they are willing to go in reducing thermostat settings, until they have a better reason to do so than that provided by the Campaign and other information campaigns.

Analysis of the components of the total impacts from the planned behavior model provides support for the notion that the planned behavior model is a valuable tool for evaluating information efforts. The primary influence of the Campaign emanates from the "bottom up" through the effect on indirect attitudes. For example, the average IA index for those who saw the showerhead wave 3 advertisements is 22% higher than the average for other respondents. The IA increase in this instance is approximately three times that of AACT and PBC, which in turn are larger than the increase in BI. This is consistent with the theory of planned behavior and the goal of the Campaign, which is to change beliefs, attitudes, intentions, and ultimately energy conservation behavior without providing rebates or other monetary incentives.

Indeed, the impacts on and from the behavioral constructs provide program designers with information *how* and *why* an educational advertising campaign is influencing conservation intentions, whereas the simple reduced form model can only show the size of the impacts. Consider, for example, the thermostat setting wave three analysis which shows that the Campaign effects are insignificant. The average IA index is only 7% higher among those who saw the ad, and this difference is not significant. According to the theory of planned behavior, there are no impacts on thermostat setting BI because the ads did not significantly affect customer attitudes.

The Theory of Planned Behavior model can be applied to other types of advertising and marketing campaigns. For example, it can be combined with traditional regression analysis and new data mining techniques designed to generate the most "lift" from a direct mail or television advertising campaign. In most cases these types of non-structural analyses are profitable, but in some instances they don't work or do not provide as much profit as anticipated. The planned behavior model can explain how and why a campaign is working (or not working), and provides decision-makers with a powerful tool to improve future endeavors.

REFERENCES

- Ajzen, I. 1991. "The Theory of Planned Behavior." *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Beck, L. and I. Ajzen. 1991. "Predicting Dishonest Actions Using the Theory of Planned Behavior." *Journal of Research In Personality*, 25, 285-301.
- Chi, M. and D. Guinn. 1992. "Billing Analysis of Low-Income Weatherization Programs-A Case Study: Comparing PRISM to a Multivariate Regression Technique." In *ACEEE 1992 Summer Study Proceedings*. pp.4.29-4.39.
- Degens, P. 1992. "Stability and Persistence of Savings in Residential Homes." In *ACEEE 1992 Summer Study Proceedings*. pp.4.41-4.48.
- Fishbein, M., and I. Ajzen. 1975. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley.
- Godin, G., P. Valois, and L. Lepage. 1993. "The Pattern of Influence of Perceived Behavioral Control upon Exercising Behavior: An Application of Ajzen's Theory of Planned Behavior." *Journal of Behavioral Medicine*, 16, 1, 81-102.
- Green, W. H. 1997. *Econometric Analysis*, Third Edition. Upper Saddle River, NJ: Prentice Hall.
- Hausman, J. A., 1978. "Specification Tests in Econometrics," *Econometrica*, 46, 6, 1251-1271.
- Katzev, R. and T. Johnson. 1987. *Promoting Energy Conservation: An Analysis of Behavioral Research*. Boulder, Co: Westview Press.
- Meyers, S. & Schipper, L. 1984. *Energy in American Homes: Changes and Perspectives*. *Energy*, 9, 6, 495-504.
- Sheppard, B., J. Hartwick, and P. R. Warshaw. 1988. "The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research." *Journal of Consumer Research*, 15, 3, 325-343.