EVALUATION OF WISCONSIN PUBLIC SERVICE CORPORATION'S GOOD CENTS HOME PROGRAM

Daniel M. Violette, RCG/Hagler, Bailly, Inc. and
Deborah L. Buchanan, Wisconsin Public Service Corporation

INTRODUCTION

Wisconsin Public Service Corporation (WPSC) is conducting an evaluation of WPSC's Good Cents Home Program. Results are expected in August, 1988.

Key design features of the project include:

1. The use of a multivariate regression model to estimate energy savings.
2. The use of PRISM to weather normalize energy consumption data.
3. A comparison of energy savings estimates from the regression model with estimates from heat gain and loss calculations made from building blueprints.
4. The use of discrete choice techniques to examine factors influencing participation rates among residential customers and across builders.
5. Focus group interviews of customers, builders and other trade allies.
6. Interviews with WPSC staff involved with program implementation.

This project design allows a number of interesting research questions to be addressed. These include:

- o a comparison of energy savings estimates generated by multivariate regression models with both PRISM estimates and engineering estimates.
- o the use of discrete choice participation models, in combination with the energy savings regression model, allows tests for self-selection bias to be conducted.
- o the focus group interviews and interviews with WPSC staff allow a number of program design and implementation issues to be addressed.

This paper provides background on the WPSC Good Cents program and discusses data collection methods and evaluation issues. The presentation at the ACEEE Summer Study will focus on the energy savings analysis method and results. Energy savings estimates will be available for distribution at the August meetings.

BACKGROUND

The Good Cents Home Program is an energy-efficient new home program.

Wisconsin Public Service Corporation began offering the program in May 1984. As of the end of 1987 WPSC had certified nearly 3,200 Good Cents homes.

Objectives of the program are to:

- o reduce the amount of energy it takes to heat and cool the home, thereby enabling customers to lower their bills;
- o increase the value of the home;
- o make the home more comfortable.

Heat gain and loss calculations are performed on new homes (often from blueprints) using WPSC's Residential Building Energy Program. In order to qualify for Good Cents certification, the thermal efficiency of the envelope enclosing the conditioned space must not exceed certain Btu/hr./sq. ft. heat loss standards, depending on 91) whether the conditioned space is above or below grade; and (2) square footage of conditioned space (less than 1,200 sq. ft., or greater than or equal to 1,200 sq. ft.). In addition, Good Cents homes must meet minimum AFUE standards for furnaces and boilers, and minimum SEER ratings for central air conditioning systems. Water heaters must be high efficiency; recently, minimum energy factor requirements were imposed.

METHODOLOGY

Data Collection

The following data collection mechanisms are being used to conduct the Good Cents Home Program evaluation:

- o focus group interviews of customers, builders, realtors and mortgage lenders.
- o mail surveys of participating and nonparticipating customers and participating and nonparticipating builders. (The nonparticipating customer group includes a segment whose homes were modeled by WPSC's Residential Building Energy Program but did not achieve Good Cents certification.)
- o mail surveys and personal interviews of WPSC field and staff marketing personnel involved in implementing the program.
- o WPSC electric and gas billing records.

Experimental Design

Energy usage across three groups of customers whose homes were built during the same time period - 1984 through the first quarter of 1987 - will be compared:

- o Good Cents Home Program participants;

- Customers whose homes were modeled by WPSC's heat gain and loss program but did not achieve Good Cents certification;

- Customers whose homes were built to Wisconsin Uniform Dwelling Code standards (nonparticipants).

Of particular interest will be whether energy usage of those homes that were modeled but not certified resembles energy usage of Good Cents homes, code homes, or neither of the two.

Sampling

For the mail survey, stratified random samples of participating and nonparticipating customers whose homes were built in 1985, 1986, and early 1987 were taken. The stratification is based on:

- structure type (single family or duplex)

- geographical area (WPSC division/district)

- space heating fuel type (electricity or gas)

Since the majority of WPSC's Good Cents Homes are heated with natural gas, electric space heat customers are over-sampled to allow energy savings estimates to be generated for that segment. It is expected that all-electric customers may account for a large fraction of the benefits produced by the program due to their greater expenditures on space heating.

Energy Savings and Participation Analysis

Because the Good Cents Home Program only applies to new homes, pre- and post-time period energy consumption data are not available. As a result, the estimation method will utilize a cross-sectional comparison across three groups - participants, customers whose homes were modeled but not certified, and nonparticipants.

The Princeton Scorekeeping Method (PRISM) will be used to clean and weather normalize consumption data. All homes having 12 months or more of usable billing data will be modeled. The twelve months of data are required by PRISM to allow the model to split energy consumption for these homes into weather sensitive and non-weather sensitive components.

Both the customer's decision to participate and the builder's decision to participate in the program will be modeled. Weather-normalized energy savings due to the program will be estimated in a regression model that will account for customer and builder participation decisions. We hypothesize that the following factors may be important in the customer's participation decision: income, age and education of head of household; number of occupants; whether occupants own or rent; whether home is occupants' primary residence; whether occupants engage in other conservation activities/own energy-efficient appliances; availability of Good Cents homes in area where the customer lives; how long occupants plan to stay in the home; and awareness of the Good Cents

program.

The following factors may be important in the builder's participation decision; customer interest; rebates; staying competitive with other builders; building homes that are already as efficient as Good Cents homes; personal belief in conservation; opportunity to obtain more knowledge about energy-efficient construction and appliances; and urban versus rural/seasonal market area.

At the time of this writing, a model is being devised which should do the following:

- Test whether Good Cents home sales are supply-side or demand-side driven (i.e., Are sellers acting as agents for buyers? Are builders building what customers want?).
- Remove the effects of conservation that would occur without the program.
- Provide energy savings and participation information on an "intermediate" set of homes that are not built to Good Cents standards but may be significantly more energy-efficient than code (control group) homes.
- Test for the presence of potential self-selection bias across the three customer groups.

The energy savings analysis will also include a comparison of the weather-sensitive portion of actual billing consumption with estimated energy requirements for heating and air conditioning provided by WPSC's Residential Building Energy Program. Survey responses will then be used to try to explain any differences between estimated and actual consumption.