

Portland General Electric Co.

DIRECT LOAD CONTROL  
PILOT FOR  
ELECTRIC SPACE HEAT

Pilot Evaluation and  
Impact Measurement

Revised: October 22, 2004



## ***Pilot Evaluation and Impact Measurement***

### **Forward to Revised Report**

In December 2003, Portland General Electric (PGE) filed with the Oregon Public Utility Commission (OPUC) an evaluation report of its direct load control pilot for electric space heat, called “Direct Load control Pilot Electric Space Heat: Pilot Evaluation and Impact Measurement, issued December 30, 2003”. Since that time, PGE rebuilt its demand side program measurement and evaluation model. The load data collected for the load control pilot was rerun through the new spreadsheet model and the results are reported here in the revised report.

There are three changes incorporated in the evaluation. The fundamental change in the methodology is a close adherence to the California Standard Practice Manual for measuring the Total Resource Cost (TRC) of demand side programs. PGE also revised its capacity values to reflect current market indicators for generating capacity, and updated the values used for avoided T&D upgrades. Another major change was measuring the effectiveness of the program on a going forward basis that excluded costs for meters and meter installation.

The original analysis reported that the TRC benefit/cost ratio (B/C) was 0.51 for late afternoon reductions, and 0.42 for early evening reductions. A B/C of 1.0 or greater is considered cost effective.

Under the revised calculation, the higher reduction impact of 0.73 for early late afternoon reductions was used. Using the avoided cost of capacity that includes the value for avoided T&D upgrades, the TRC is 0.52. Without T&D savings, the B/C is 0.41

**Table 1 – Revised TRC**

	<b>Avoided Capacity With T&amp;D Savings</b>	<b>Avoided Capacity Without T&amp;D Savings</b>
<b>High impact 0.73 kW (4:00 p.m. to 6:00 p.m.)</b>	0.52	0.41
<b>Lower impact 0.48 kW (6:00 p.m. to 8:00 p.m.)</b>	0.37	0.30

The analysis excluded costs for meters and meter installations, costs for modifications to the billing system, and excluded a factor for free riders.

The analysis assumed that all direct load control customers were on the Time of Use (TOU) rate plan, and that curtailments were called during on-peak periods. Therefore the TRC reflects price difference for curtailments during on-peak periods. The TRC does not change if no customers are on the TOU rate plan. Nor is there any change in TRC under critical peak price scenarios.

## Executive Summary

On August 30, 2002, PGE filed Advice No. 02-14 with the OPUC to introduce a research pilot program for remotely controlling residential central electric space heat load, under rate Schedule 8. The purpose of the pilot was to test customer acceptance and company capability to support the utility's control of residential customers' central electric space heating systems.

The space heat direct load control pilot was conducted with 77 participants during January and February 2003.

Key findings from the pilot include:

1. Residential customers generally accept remote control of their space heat as long as the temperature difference is not noticeable and they have override capability at the thermostat. The tolerable reduction was about 1 degree before customers felt uncomfortable.
2. The average kW demand impact for the space heat reductions evaluated was in the range of 0.48 to 0.73 kW/node<sup>1</sup>. It should be noted that the kW demand impact should be used with caution because the sample group was small.

**Table 2 - Demand Impact**

	4:00-6:00 p.m.	6:00-8:00 p.m.
Average demand impact/node	0.73 kW	0.48 kW

3. Preliminary benefit/cost analysis for a full program rollout where the avoided cost of capacity includes an assumption for avoided T&D savings, indicates negative net benefits in the range of 0.52 to 0.37 where 1.0 is breakeven. It should be noted that the benefit/cost ratios should be viewed as only indicative because of the small sample size.

**Table 3 – Benefit/Cost Ratio**

	High reduction (0.73)	Low reduction (0.48)
Benefit/cost ratio with T&D savings	0.52	0.37
Benefit/cost ratio without T&D savings	0.41	0.30

The small potential market for electric space heat may not allow savings for T&D efficiencies to be realized. The TRC without T&D savings is between 0.41 and 0.30.

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<sup>1</sup> The term "node" is used here to mean appliance or furnace. Only one furnace per residence was allowed for the pilot purposes.

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4. Customer participation requires careful screening and is limited by installation and other at-site issues.
5. Load control equipment selection, installation, and back office support are critical to a successful mass market-level program.

### Summary of Recommendations

Based on the indicators from this pilot and analysis of potential costs of a program rollout, further testing should be deferred until equipment costs decline, avoided capacity costs increase and there is a higher likelihood of acceptable levels of customer participation.

The report is presented in the following parts:

- Section 1. Pilot Overview
- Section 2. Pilot Activities and Analysis
- Section 3. Measurement and Evaluation
- Section 4. Conclusions and Recommendations