

## Thermostat control: Sophisticated and successful

(Note: This article is reprinted by permission from *Strategies*, the quarterly newsletter of the Association of Energy Services Professionals, Summer 2001, Vol. 12, No.3. Editor: Jill Cliburn.)

This spring some of the liveliest exchanges on the AESP-Net listserv began with a request for comments on a **Puget Sound Energy** test program, which used remote control of thermostats to lower residential heating loads. The listserv discussion took off in all directions, until it seemed that one thing missing was a summary of the PSE program!

In fact, the PSE test program ran for ten weeks in early 2000. The utility worked with **Schlumberger CellNet**, **Carrier Electronics**, **Silicon Energy**, and test participants in 105 gas- and electric-heated homes. Each participating household received a thermostat, equipped for control and verification by wireless signal from the utility. Customers could control the unit directly or over the Internet.

Each participant received \$100, with the caveat that any time a participant overrode a call for temperature reduction, the utility would deduct two dollars, down to a minimum incentive of \$50. Control events occurred 41 times during the test, at different times of the day and at different levels (two- or four-degree reductions, lasting hours each). When an event was about to begin, the thermostat signaled a warning, which also appeared on the Web site. Customers could override the temperature reduction by pressing a button on the thermostat, or they could check and reset the thermostat on the Web.

During control events, PSE reduced target loads by 10 to 40 percent. On average, just over five percent of customers overrode the automated adjustments. PSE notes that the result was true load reduction, not load shifting, as with some direct load program.

At the same time, load effects were small. It would take nearly 100 gas heat customers to save one thousand cubic feet of gas during a four-degree morning event. To save one megawatt-hour of electricity during the type of event, it would take 300 electric heat customers. The program might deliver mass-market load management, but only if masses of customers get involved.

PSE found that forecasting the impact of a load-control event requires a thorough understanding of customer energy-use patterns and of the relationship between weather and furnace cycling. For instance, a four-degree setback at midday in a gas heated home yielded weak results, while the same setback in the morning yielded strong results. Evening setbacks in some gas homes were foiled when customers turned on their gas fireplaces instead.

For all its technical sophistication, personal interactions greatly affected the program's success. Customers looked to system installers for all kinds of information. And the impact on customer relationships was greater than expected. PSE has concluded that a refined thermostat control program might be a good fit with the utility's Personal Management System. That program already gives residential customers online reports and feedback on their energy use, including tracking household energy use against the utility's new time-of-day rates.