

Home Energy Displays: The Nevada Product Trials

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Background

- Sierra Pacific Resources (SPR) Integrated Resource Plans
 - Nevada Power and Sierra Pacific Power Company
 - Collaborative and the Public Utilities Commission of Nevada
 - Conservation & efficiency programs guided by technology trials (e.g., GoodWatts), Total Resource Cost test
 - Home Energy Displays (HEDs)
 - Innovation, introduction and deployment
 - Southern California Edison information display research
 - SPR research team: Boice Dunham Group, Paragon Consulting Services, University of Nevada – Las Vegas
- ➔ Do HEDs have a place among SPR's programs?

Design Concerns

- Test the program which will be implemented
 - Learn from other HED programs, marketing
 - Avoid special customer care, brief experimental lifestyles
 - Associate measures with changes in behavior and energy use
 - Self-reporting by volunteers in an experiment (no control)
 - Changing market population
 - Other influences on energy use awareness , literacy, and use
 - Trial, learning, habit and persistence
- ➔ Does the presence or use of a HED alter energy use?

Utility Objectives

- Expand and improve conservation & efficiency programs
 - Contribute to Renewable Portfolio Standard (RPS)
 - Prepare for Automated Metering Infrastructure (AMI)
 - Investigate promising new technologies
 - Identify and validate role of HEDs among SPR's programs
 - Reliable, cost-effective, customer-satisfying programs
 - *Incremental* value of particular design *over alternatives*
 - Serve mass market and special segments (senior, low-income)
- ➔ Pursue prudent and innovative program design

Experimental Design

- Product trial
 - Identify features and functions correlated with customer changes in behavior and energy use, across basic and specialized devices
 - Market test
 - Deploy preferred devices at scale to validate feasibility, performance and economics of program design
 - Program launch
 - Achieve target segment adoption with broad public influence
- ➔ Apply the best traditions of disciplined product development

Product Trial

- Goal: identify HED features and functions correlated with customer changes in behavior and energy use
 - At least seven basic and specialized devices deployed across residential households (Reno and Las Vegas communities)
 - Recruitment, installation, communication and support of functional devices *according to normal utility practices*
 - Device features and functions correlated with changes in energy use awareness, behavior, and consumption
- ➔ Establish requirements for a HED Request-for-Proposal (RFP)

Market Test

- Goal: deploy one or more preferred HEDs at scale to validate program design feasibility, performance, strategy and economics
- Manufacturers respond to RFP with improved HEDs, which are deployed to ~3,000 target customers
- Program validation and optimization
 - Program economics (processes in preferred design)
 - Customer offer (e.g., device, rate, distribution, price, support)
 - Marketing strategy (e.g., messaging, channels)
- ➔ Validate SPR HED business case (e.g., market, target segments)

Program Launch

- Goal: achieve target segment HED adoption with broad public influence
 - Negotiate contract with selected vendor around preferred design (device and program)
 - Execute launch to obtain ~30,000 customers, pervasive awareness among Nevada residential households)
- ➔ Build an entry platform adequate to grow customer demand

Who are the Product Trial Customers?

- Stable households of a typical size and typical equipment
 - Las Vegas (~110 households)
 - Reno (~70 households)
 - Segments
 - Single-family homeowners (across five energy use strata)
 - Seniors (~17 households)
 - Low-income (~17 households)
 - Multi-family
- ➔ No control group, results not statistically projectible

What are the Product Trial Devices?

- At least seven dissimilar, demonstrably-functional devices
- Current participants
 - Kill-A-Watt (P3 International)
 - PowerCost Monitor (Blue Line Innovations)
 - The Energy Detective - TED (Energy, Inc.)
 - Whole House Energy Monitor (Energy Monitoring Technologies)
 - The Energy Joule (Consumer Powerline)*
 - In-Home Display (AzTech)*
 - Power Cost Display Monitor (ECSI)(multifamily)*
- ➔ Two tracks: basic and specialized* HEDs

How do the Devices Compare?

- The customer programs a rate into the Kill-A-Watt EZ, plugs in the device, then plugs in an appliance to read cumulative energy and cost
 - The PowerCost Monitor can be customer-installed, as its sensor is clamped outside the meter glass, and transmits consumption time and costs wirelessly to the in-home display
 - The Energy Detective may require licensed installation: its sensors clip across the main circuit breaker, connect to a panel box transmitter, and radio to the plugged-in in-home display
- ➔ Must information be whole-house to make a difference?

How do the Devices Compare?

- The Whole House Energy Monitor also may require licensed installation, as its sensors clip across the main circuit breaker, and connect by coaxial cable to the plugged-in in-home display
 - With steady or flashing color signals and a rate indicator, The Energy Joule is a simple plug-in device responding to high energy use (by a KYZ meter pulse) as well as price points and events (by utility signal)
- ➔ Is usage information more impactful than color signals?

How do the Devices Compare?

- A demand meter with a built-in radio transmitter provides The In-Home Display with cumulative energy use and cost, and can respond to price points and events (by utility signal)
 - The Power Cost Display Monitor transmitter inserts between the panel box and the meter (utility supervision required), and sends usage and cost estimates to its in-home display plugged into any standard household outlet
- ➔ Do in-home displays provide value from advanced metering?

Assessing Changes in Awareness and Behavior

- Recruiter and installer surveys
 - Periodic participant surveys to profile households, record reports of changed behavior
 - Concluding conjoint survey to assess feature/function impact
 - Focus groups and in-home interviews to obtain household use cases, insight, models, stories
- ➔ Identify valuable HED features and functions

Assessing Changes in Energy Use

- Past year month-to-month bill comparisons
 - Energy strata and special segments
 - ‘Reasonableness’ comparison to past studies including interval metering
 - Guidance for market test design
- ➔ Estimates of any gross and net savings (\$ and energy)

Opportunities for Utilities

- HED showcase under development in Reno
 - Sharing of research findings with SPR
 - Creation of a utility working group in coordination with the Advanced Load Control Alliance (ALCA)
 - Home, office, and commercial/industrial energy displays
 - Interaction of information, devices, rates, program design, and program execution (e.g., recruitment, installation and service)
 - Online energy information
- ➔ The customer is the energy management system's singularity

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