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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