In-Home Displays Spike Interest in Energy Usage and Efficiency

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About Our Speakers

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Agenda

- Energy usage feedback
- Customer interest
- Energy usage devices
  - Indirect or non-communicating
  - Communicating
    - Utility-centric
    - Customer-centric
- Recommendations for utilities
Information Is Critical to Making Energy-Use Decisions

- Behavior greatly affects energy use
- Feedback makes clear the link between cause and effect
  - Indirect feedback—mediated through another channel
    - Bill
    - Newsletter
  - Direct feedback—in real time
    - In-home display
    - Appliance-specific display
- Even monthly feedback helps
- Time between action (behavior) and consequence (feedback on resulting energy use and cost) is very important
- Feedback most useful when accompanied by specific goal
- Direct feedback results in savings of 4-15%
- Conveying price information lets customers know when to conserve or shift use
Savings from Energy Feedback Devices

- Use and cost displays show customers results in real time
- Hydro One pilots
  - Found savings of 6.5% for customers on flat rates
    - 500 homes followed for 2½ years
  - Customers on TOU rates with home displays showed a greater reduction in overall energy consumption and in reducing peak load
- Illinois Smart Pricing Program (RTP rate)
  - RTP customers with Ambient Orb had higher price elasticity than those without the orb
- Pre-payment programs see reductions of 10-20%
  - Include direct feedback
  - SRP pilot (IHD) saves slightly less than prepayment plus IHD
- Integrating in-home displays with AMI still requires work
Customer Interest in IHDs

Energy Insights National Residential Online Panel In-Home Display Survey

- October 2007
- 270 respondents
- Surveyed panel to determine:
  - Interest in in-home energy displays
  - Preferred type of device
  - Type of information wanted
  - Effect of displays on likelihood to automate appliances, participate in TOU or CPP rates
Some utilities are offering their customers in-home display units to help customers better manage their energy use and control costs.

In-home displays provide customers with current information about their energy use, such as the amount of electricity a home is using from moment to moment, the difference in electricity consumption caused by turning on and off the various electrical appliances in the home, and the total amount of money the customer is spending on electricity.

Customer Interest in IHDs
Preferred Type of Device

- Programmable thermostat w/enhanced display: 46%
- Stand alone wireless: 19%
- Stand alone plug-in: 16%
- Refrigerator Magnet: 10%
- Glowing device: 7%
- Internet website: 3%

Customer Interest in IHDs
Information Customers Would Find Valuable

- Cost of the electricity using right now
- Monthly costs in dollars and cents
- Daily costs for 3 major appliances
- Current month's use compared to same month last year
- Current monthly use compared to last month's use
- Price paying in kWh
- Amount using right now in kWh
- Daily use in kWh
- Monthly use in kWh
- Daily electricity use for 3 major appliances
- Carbon dioxide emissions
- Outside temp at meter
- Daily costs in dollars and cents

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Customer Interest in IHDs

Impact of In-Home Displays on Variable Pricing Programs Participation

- In-home displays controlled by the customer have a positive impact on variable pricing program participation.
- A large group of customers, however, are resistant to giving that control to their utility company.

![Impact of In-Home Displays That Could Be Used to Automate Appliances on Dynamic Pricing Program Participation]

Energy Usage Devices

“Non-communicating” Energy-Use Displays

- No communications with utility, so can’t handle dynamic pricing, e.g., RTP or CPP (real time pricing or critical peak pricing)

- Data collection
  - Optical sensor
    - Attaches to electromechanical or solid-state meter
    - Meter accurate
  - Current-transformer (CT) at electrical panel
    - May require electrician to install
    - Power factor affects accuracy, most correct for this
  - Meter collar
    - Meter accurate
    - Requires utility installation

- Complex rate handling ability varies
Energy Usage Devices

Display with Optical Reads — Blue Line Innovations PowerCost Monitor

- Works with existing electro-mechanical or solid-state meters
- External installation by customer at meter
- Display mobile within house
- Homeowner can program rates including fixed, tiered, TOU (two or three periods)
Display with Optical Reads — Blue Line Innovations PowerCost Monitor

- Furthest along in commercialization
  - Over 70,000 units installed
  - Product ordering online
- Hydro One, 30,000 units
- NSTAR
  - Goal 200 units, 3,200 sold, $29.95
  - Evaluation in process
- Dominion Power, 1,000 units
- OPPD
- Sierra Pacific
- Nevada
- Turnkey solution for utilities
  - Advertising, direct marketing, fulfillment, customer support, monitoring and evaluation
Energy Usage Devices
Displays with CTs

- CT installed at breaker panel
- Probably requires electrician and access to home
- Works independently of meter
- Not revenue grade, accuracy varies by product

Display location
- Hard wired
- Movable

Several manufacturers
- The Energy Detective (TED)
- EM-2500
  - Both part of the Nevada Pilot
- Cent-a-Meter (Australia)
Display with Meter Collar — Energy Control Systems, Power Cost Display Monitor

- Remove meter, install meter collar, replace meter
- Limited number of demo units installed
- Powerline communication (PLC) to display
Critical Peak Pricing response – Comverge LoadGuard

- Currently available for ComEd as part of their critical peak pricing and demand response programs
- LoadGuard is programmable, not necessary to reprogram all the time. Customers can go online to a portal (thewattspot.com) and set how they want to react to pricing signals.
- Have to have smart metering installed and load management equipment for air conditioners
- One way communication for pricing information and curtailment information
Energy Usage Devices

Communicating Displays

- Connect to some type of network
- Best integrated with Advanced Metering Infrastructure (AMI)
- Can show real-time costs for dynamic rates
- Utility-centric: Work with specific meter or communication network
- Customer-centric: Can be installed individually and not dependent on utility network
Energy Usage Devices

Communicating Displays — Ambient Devices Orb and Home Joule

- Ambient’s Orb product used in CA Statewide Pricing Pilot and for a sample of participants in the Illinois RTP program
- New Home Joule is nightlight-like device
- Shows pricing signal and overall demand signal for market
- Pilot with Consumer Powerline
Energy Usage Devices

Displays with Communications — Landis+Gyr ecoMeter

- Display works in conjunction with metering system
- Shows cost for excessive usage, current TOU pricing tier, and usage based in dollars
- Can display load profile data for water, gas and electricity
- Visual indications using red, green and blue LEDs for usage events down to customer level
- Plugs into outlet in home
- On 3rd generation (early versions in Australia and South America)
Energy Usage Devices
Displays with Communications — Aclara (DCSI) TWACS IHD

- Device is an endpoint in the TWACS system so does not need a meter
- Currently utility-centric
- Plugs into outlet in home
- Shows cost for usage, what pricing rate is, comparative usage (yesterday, last month)
- 3 alert indicators with icons that flash for low balance if prepay, general messages or critical peak pricing period
Displays with Communications — Comverge SuperStat

- Supports direct (for HVAC) and 2-way load control (for HVAC, pool pumps, hot water heaters or other major appliances) and price responsive control

- Consumer can reduce KWh usage by user-defined time and temperature setbacks and/or price signal responses

- Devices can be controlled for up to 8 hours from a single utility command and then adjust to next control level without a surge
Energy Usage Devices
Displays with Communications — Aztech

- TOU times and electricity rates can be updated via internet through the USB interface or by utility broadcast using wireless connection to smart meter.

- Arched colored lights indicate present TOU period:
  - Green Off-Peak
  - Yellow Mid-Peak
  - Red On-Peak

- Non-TOU — arched red light

- Intuitive displays show power consumption and cost information
- Electricity consumption summaries can be reset by consumer
Energy Usage Devices
Displays with Communications — Tendril

- Both consumer-centric and utility-centric

- Real two-way communications with consumers
  - Check single appliance consumption
  - Ability to communicate with other smart energy devices

- Single platform for enabling
  - Demand response
  - Energy efficiency
  - Variable pricing
Energy Usage Devices
Displays with Prepayment Systems

- Smart metering prepayment manufacturers
  - Aclara
  - Landis+Gyr (AMPY)
  - Elster partnered with Exceleron Software

- City of Tacoma’s PrePay metering program PayGo uses fiber optic network

- Woodstock Hydro uses Info Energy (switching out to smart metering)
## Energy Usage Devices
### IHD Vendors at a Glance

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<th>Vendor</th>
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<th>Two-way</th>
<th>Utility-centric</th>
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<td>The Energy Detective</td>
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*Looking at or planning incoming generation of product*
Recommendations for Utilities Considering In-Home Displays

- Utilities have many reasons to support in-home display devices
  - Energy efficiency
    - Savings of 4-15%, more if targeted
    - Growing public interest in better managing rising energy costs and concerns about climate change
  - Dynamic pricing and demand response needs
    - Price notification for time of use
    - Critical peak pricing events
    - Load shedding events
  - Smart metering capabilities
    - Accurate data, near real-time, to both utility and consumers
    - Communications facilitate targeted messages
    - Can support multiple rates
Recommendations for Utilities Considering In-Home Displays

- Include in-home and in-business energy management in the corporate energy efficiency strategy
  - Consider decoupling rates with your public utility commission
  - Include energy efficiency tips to your consumers through communications
  - Articulate what you plan to achieve in energy efficiency measures

- Analyze now
  - Consider devices that match smart metering options as well those that operate independently from the smart metering vendor
  - Consider whether it is better to implement energy display technology before smart metering for selected customers

- Determine a plan of action
  - Forecast your demand response and new capacity needs
  - Model time-of-use and real-time pricing tariffs, to help in approval by local public utility commissions
  - Build a communications plan for your customers and your customer service representatives
Recommendations for Utilities Planning or Implementing a Pilot/Program

- **Get Internal Buy-In**
  - Have a working unit in your call center that CSR’s can try out and use
  - Have lunch meetings for staff to demo product
  - Consider featuring the product in a demonstration center and invite regulators, staff and other stakeholders

- **Marketing**
  - Many of these devices are considered “sexy” and can capture the media’s attention. Good PR will boost your acquisition rate
  - Focus on consumer messages about controlling energy use and reducing bills. These are the main drivers for customer interest right now. The green message is also useful, but secondary
  - Considering tying it into an existing energy efficiency program that needs a boost
  - Reach out to builders and developers, particularly those involved in Energy Star homes. They see the displays as an added selling point for their houses
Energy Insights Research – Currently Available

- **In-Home Display Units: An Evolving Market, Part 1** (Energy Insights # EI211079, February 2008)
- **In-Home Display Units: An Evolving Market, Part 2** (Energy Insights # EI211426, March 2008)
- **Energy Use Data at Your Fingertips: Customer Reaction to In-Home Display Units** (Energy Insights # EI210074, December 2007)
- **Tell Me More: What Customers Want on Their Monthly Bills** (Energy Insights # EI209584, November 2007)
- **Time-Based Pricing Programs: Creating a Favorable Customer Response** (Energy Insights # EI207309, June 2007)
- **Prepaid Metering: Moving Beyond Collection Challenges into Customer Service** (Energy Insights # EI202602, July 2006)
Energy Insights Research – Upcoming

- **Customer Strategies**
  - AMI-Enabled Utility Programs: Conservation and Prepayment Metering
  - In-Home Display - An Update on Utility Pilot Results
  - Small Business Customer Response to Time Based Rates
  - Using New Technology to Broaden the Market for Demand Response

- **Customer Operations Strategies**
  - In-Home Display Devices – Updates on Technology
  - Business Energy Management Systems – Market Overview

- **Load Analysis Strategies**
  - Energy Impact of In-Home Displays
  - AMI and End Use Data Collection
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