Guidelines for Designing Effective Energy Information Feedback Pilots: Research Protocols

Matt Wakefield
Program Manager – Smart Grid Demo’s

EPRI Smart Grid Demonstration Meeting
Hosted by EDF, Clamart France
June 10, 2010

Report Objectives

How to design social experiments involving feedback to:
• Establish causal relationship between experimental treatments and the outcomes
• Specify methods to analyze experimental data.
Provide methods and output that allow comparisons across feedback experiments
• To support the pooling of data across experiments
• While avoiding redundant research
• Determine whether observed differences across studies are statistically meaningful
• Identify the underlying drivers of the differences.
What are Experiments

The 19th Century, John Stuart Mill proposed a set of conditions that must be met in order to show that some condition causes some other condition in the world to change:

• The supposed cause has to precede the supposed effect in time
• The supposed cause must be correlated with the effect
  – When the cause is present, the effect is present
  – When the cause is not present, the effect is not present
• No other plausible explanations can be found for the effect, other than the cause

These conditions describe the minimum requirements for conclusively demonstrating that feedback causes change in the timing or magnitude of energy use.
Feedback Mechanisms

1. Standard Billing
   Monthly or bi-monthly bill

2. Enhanced Billing
   Household-specific info, advice, and comparisons

3. Estimated Feedback
   Web-based energy audits, billing analytics, appliance disaggregation

4. Daily/Weekly Feedback
   From actual usage data, mail, email, self-read, day-by-day, web-based, etc.

5. Real-Time Feedback
   Energy display devices, pricing display devices

6. Real-Time Plus
   Real-time, array monitoring or control, HAN

Low

- Information Availability
- Cost/Effort to Implement

High

Type 2

Type 3

Type 4

Type 5

Type 6

Feedback Research Protocols—An Overview

1. Defining Information Feedback Treatments
2. Determining Outcome Variables to be Measured
3. Delineating Customer Sub-Segments of Interest
4. The Experimental Design
5. The Sampling Plan
6. The Recruitment Strategy
7. Length of Experiment
8. Data Requirements and Collection Methods
9. Minimum Data for Cross-Utility Comparisons and Pooling
10. Key Support Systems and Materials
11. Load Impact Analysis
12. Behavioral Change Analysis
13. Analysis of Participant Use of Information Feedback
14. Documentation of Feedback Experiments

Cost

Experimental Design

Protocol 4

Sampling

Recruitment and Measurement Protocols 5-10

Audit Planning Protocols 1-3

© 2010 Electric Power Research Institute, Inc. All rights reserved.
EPRI Workshop – Guidelines for Designing Effective Energy Information Feedback Pilots

What: A 1.5 day workshop on using experimental design to establish clear, causal relationships between feedback treatments and outcomes of interest

When: Monday, June 21st (1:00 p.m. – 5:00 p.m.)
      Tuesday, June 22nd (8:00 a.m. – 5:00 p.m.)

Where: Hosted by American Electric Power (AEP), Columbus, Ohio

Cost:
- Free for funders of EPRI Program P170A
- $500 for all other EPRI members and guests

To Register: Register via “EPRI Events” website. Or contact Jennifer Robinson (robinson@epri.com, 865-218-8068).

A Second Workshop: In September 2010, likely in the Southwestern US
Cost Benefit Analysis Methodology

• Accomplishments
  – Framework developed with DOE
    • Product ID 1020342
  – Application methods requirements defined
    • DOE requirements
    • EPRI extended requirements

• On the Go Activities
  – Continued DOE coordination to ensure comparability and compatibility
  – Application guide development underway
  – Test-runs of guide underway

• Next Steps
  – Initial application to all project this summer/fall

Thank You

Report Contacts
Bernie Neenan
Technical Executive
865-218-8133
bneenan@epri.com

Jennifer Robinson
Senior Project Engineer/Scientist
865-218-8068
jrobinson@epri.com

Together…Shaping the Future of Electricity

Matt Wakefield
mwakefield@epri.com