



## Using Experiments to Foster Innovation and Improve the Effectiveness of Energy Efficiency Programs<sup>1</sup>

Michael J. Sullivan - - Freeman, Sullivan, Inc

April 2009

Much of the remaining economically justifiable energy efficiency potential lies in changing the *behavior* of energy users – in particular, changing the decisions that they make about adopting energy-efficient technologies and practices, and in changing the ways in which they use energy (e.g., lifestyle changes). A review of the literature in psychology, sociology, social psychology and behavioral economics suggests that some behavioral science-based approaches to improving the acceptance of energy-efficient products in the market show great promise. However, this promise has yet to be realized because practical field experiments are required to discover what works and what does not work and why, and these experiments have not been conducted.

To improve the effectiveness of energy efficiency programs by increasing the likelihood that consumers adopt energy-efficient technologies and practices, a formal research and development (R&D) effort designed to find effective strategies for improving energy efficiency program performance must be undertaken. This effort should focus on discovering effective behavioral science-based strategies for improving the performance of existing programs and on developing new and more effective approaches to offering these programs. Currently, California government and regulators sponsor substantial R&D designed to accelerate the rate at which more energy-efficient technology is available in the market. At the same time, almost no R&D is expended that is intended to improve the likelihood that customers adopt these technologies once they are commercially available. This is a significant gap in program development.

There are well-established procedures for managing and carrying out product and service R&D efforts. They are generally discussed in the academic literature under the heading of the Management of Innovation. Innovation is managed by moving new product and service design ideas through a stepwise process from idea generation at the very beginning, to full-scale integration with business operations at the end. Along the way, a number of appropriately scaled experiments are carried out to solve the myriad technical problems that surround the development of something new. Most major corporations rely on innovation to survive and to maintain their market position. This paper argues that the establishment of a process designed to manage innovation must be developed in California to foster the creation of badly needed program improvements and develop new and more effective energy efficiency delivery programs.

Experimentation is a critical requirement in the process of innovation. It is the mechanism that innovators use to identify what works and what does not work during the process of product development and marketing. Historically, there is very little evidence of the use of experimentation to test alternative energy efficiency program design features offered by utilities in California or

---

<sup>1</sup> This paper was prepared for the California Institute for Energy and Environment and the California Public Utilities Commission. The report is available at <http://ciece.ucop.edu/energyeff/behavior.html>.

elsewhere. Instead, programs tend to emerge full-blown from concept testing to implementation – without significant prototype development and testing.

Pilot studies and demonstration projects have limited usefulness in product and program development – particularly when they are undertaken before the program has undergone prototype testing. Because pilots are generally large-scale program demonstrations and do not vary design alternatives, they don't produce useful information for improving program performance. It takes months or even years to complete a pilot in the current energy efficiency program environment and, in the end, very little can be learned. This paper argues that instead of pilot testing, realistic small-scale experimental versions of key program components (i.e., messages, delivery channels, social network effects, etc.) should be completed prior to any full-scale pilot testing.

In part, the rush to market of energy efficiency programs is driven by the perceived urgent need to implement energy efficiency programs. Probably more important are significant institutional barriers (inside utilities and in the regulatory relationship) that discourage experimentation. This paper argues that the need to develop effective programs outweighs the need to act quickly and that institutional barriers are surmountable.

To stimulate interest and thought about how experimentation can be used to improve program performance, this paper describes a number of experimental techniques that can be applied to the study of the impacts of behavioral factors on consumer decision-making. It provides examples of important research questions that can be answered using experimental techniques. It further discusses several institutional problems that are significant barriers to innovation and the use of experimentation in energy efficiency program development including:

1. The need for improvement in the effectiveness of energy efficiency programs through the development of more effective behavioral interventions has to be recognized by the policy community.
2. A thoughtful decision has to be made by regulators concerning the proper locus of responsibility for overseeing the necessary R&D efforts.
3. Funding for R&D designed to improve the design of energy efficiency programs must be made available by regulators to the party(s) that oversee development of improved energy efficiency.
4. Failures in the R&D process must be recognized as a natural part of progress in R&D efforts.
5. To the extent that utilities are assigned responsibility for such R&D, they must develop the manpower, management capability and business strategies that incorporate routine R&D related to improving program effectiveness into their energy efficiency program operations.
6. Regulators must develop the manpower, management capability and business strategies that will allow them to provide meaningful oversight of the R&D process without hindering progress.