Overview of Behavior and Energy White Papers

On behalf of the California Public Utilities Commission (CPUC), the University of California (through the California Institute for Energy and Environment (CIEE)) managed the following behavior and energy projects that resulted in white papers. For more information, contact Ed Vine at Edward.Vine@uc-ciee.org, or 510-486-6047.

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- **Pursuing Energy-Efficient Behavior in a Regulatory Environment: Motivating Policymakers, Program Administrators, and Program Implementers**
  This white paper examines how policymakers, program administrators, and program implementers can be motivated to pursue behavioral change in a regulatory environment. For the purposes of this report, behavior change is defined rather broadly, encompassing both behaviors associated with the purchase and installation of energy-efficiency technologies as well as behaviors, decisions, and actions that might be thought of as more independent of technology. The latter include energy use habits, lifestyle choices, and consumption patterns. The insights and lessons discussed in this paper are drawn from a wide variety of sources including interviews with representatives from the energy and utility communities, as well as program documentation for energy-related programs and projects. The paper also draws from information on non-energy related programs that operate within a similar environment, and publications that explore the effective strategies of high-performance government organizations. The three primary goals of this report include: (1) identifying common perceptions of behavior change strategies; (2) identifying contexts in which program administrators, implementers and others have been or are likely to be motivated to pursue behavior change as a means of reducing energy consumption; and (3) specifying effective policy options to further motivate policymakers, program administrators, and program implementers to pursue behavior change as a means of enhancing energy and carbon savings.
  Lead Author: Karen Ehrhardt-Martinez (ACEEE)

- **The Climate Imperative and Innovative Behavior: Encouraging Greater Advances in the Production of Energy-Efficient Technologies and Services**
  This white paper examines why a larger array of innovative institutions, behaviors, technologies, and services is needed – specifically in the context of

what we call "the climate imperative." The author explores possible mechanisms that can encourage the more robust development of innovative programs and policies within the State of California, with special attention to the activities of the California Public Utilities Commission. The potential for future innovation is described in the context of California's impressive past technological and institutional achievements, especially as they impact energy efficiency improvements and energy policy more broadly. Notwithstanding its past achievements, the author contends that if the Golden State is to meet the climate imperative head-on it will need to promote significantly greater levels of innovation in the development of new ideas, new services, and new technologies – and to do so at a scale that has not been previously imagined or managed. This will demand innovation in all of the four stages of the technology development pipeline.

Lead Author: Skip Laitner (ACEEE)

- **Using Experiments to Foster Innovation and Improve the Effectiveness of Energy Efficiency 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 elsewhere. Instead, programs tend to emerge full-blown from concept testing to implementation – without significant prototype development and testing. This paper argues that 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. 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.

  Lead Author: Michael Sullivan (Freeman, Sullivan & Co.)

- **Behavioral Assumptions in Energy Efficiency Potential Studies**

  This white paper considers the behavioral assumptions in energy efficiency potential studies, and options for modifying and supplementing these assumptions, using recent California energy efficiency potential studies as the main example. Besides fulfilling planning and administrative roles as intended, energy efficiency potential studies present a statement on what energy efficiency programs can and should do, and even a template for thinking on the diffusion of energy efficiency and the future energy use of society. Such broader interpretations, of interest outside the utility planning community, transcend the original intended scope of the studies. An analysis of the behavioral assumptions

of energy efficiency potential studies properly considers both what is expressed in energy efficiency potential studies on their own terms, as well as what these studies – and device-centered views of energy efficiency in general – miss. This paper addresses both the narrower and broader views of bottom-up energy efficiency potential studies.

Lead Author: Mithra Moezzi (Ghoulem Research)

- **Behavioral Assumptions Underlying California Residential Sector Energy Efficiency Programs**
  This white paper explores the ways in which residential consumers are addressed by California utility-managed energy efficiency programs, and to offer suggestions for improvements in support of the state's ambitious greenhouse gas reduction goals. This paper first reviews the assumptions that underlie the state's residential energy efficiency policies and programs, and then examines the portfolio of residential energy efficiency programs currently operated by the regulated utilities. The paper then considers a series of social science reviews of energy efficiency programs and paradigms and then considers some alternative perspectives on energy user behavior and choice. The concluding section of the white paper discusses evolving program perspectives and strategies and identifies a number of key research questions, such as: (1) research on the fundamentals of consumption and choice, (2) research to improve communications and influence, and (3) research to support joint private/public action. □

  Lead Author: Loren Lutzenhiser (Portland State University)

- **Behavioral Assumptions Underlying Energy Efficiency Programs for Businesses**
  This white paper describes the behavioral assumptions underlying utility sponsored energy efficiency programs offered to businesses in California. The author describes how assumptions about business decision making (that are built into the design of these programs) can affect the ability of these programs to foster increased investment in energy efficient technology. Challenges to the program design and evaluation community are identified, and recommendations are made to address these challenges.

  Lead Author: Michael Sullivan (Freeman, Sullivan & Co.)

- **Market segmentation and energy efficiency program design**
  This white paper describes the existing state of market segmentation among California's electric utilities, with an emphasis on the investor-owned utilities (IOUs). The paper covers how segmentation is applied in various other economic sectors, in part to provide a framework to identify potential practices that could be effectively adopted in the utility industry. Segmentation is an important marketing tool. If used effectively, it can result in the advancement and uptake of products and services that more closely match household and business needs, inform marketing campaigns so that they can more successfully motivate the various populations to take action, and lead to faster and more widespread adoption of new technologies. In depth application of market segmentation has only recently emerged within the utility sector as a way to implement demand-

side management programs among residential and non-residential customers. Greater use of this marketing approach could help the state achieve its ambitious energy efficiency and conservation goals.

Lead Author: Steven Moss (M.Cubed)

- **Process Evaluation Insights on Program Implementation**
  This white paper provides a resource to energy efficiency program implementers and designers by extracting lessons learned from process and market evaluation experience over the past 30-plus years (1975 to 2008) in which energy efficiency programs have operated in the United States. There are many lessons that have been learned over the course of over 30 years in implementing energy efficiency programs; key among them is that process evaluations are useful. Most of the interviewed contacts with more than 15 years of experience described a process among program administrators of slow and steady recognition that evaluation is important. Process evaluation should be included from the beginning of program implementation (not as an afterthought), since process evaluation functions best as a management tool, not as a grading system. This paper, therefore, seeks to focus on two things: one, the lessons learned about program implementation and, two, a discussion of evaluation methods. The discussion of process and market evaluation methods is to help implementers gain a greater understanding of what is and is not a process evaluation, and to help evaluation practitioners assess how to handle challenges in evaluation practice.

  Lead Author: Jane Peters (Research Into Action)

- **Lessons Learned and Next Steps in Energy Efficiency Measurement and Attribution: Energy Savings, Net to Gross, Non-Energy Benefits, and Persistence of Energy Efficiency Behavior**
  This white paper examines four topics addressing evaluation, measurement, and attribution of direct and indirect effects to energy efficiency and behavioral programs:
  - Estimates of program savings (gross);
  - Net savings derivation through free ridership / net to gross analyses;
  - Indirect non-energy benefits / impacts (e.g., comfort, convenience, emissions, jobs); and
  - Persistence of savings.

  Evaluation and attribution methods have reached a point that they must evolve in order to provide credible results for the next generation of programs. New program generations have complicated evaluation. Education, outreach, training, and market-based approaches make it harder to count "widgets" and assign savings for energy efficiency programs. New and multiple actors providing programs and outreach within utility territories increases the influence "chatter" and make it harder to isolate the impacts associated with one agency's program, or even the influence of one vs. another program from one utility or entity. These important evaluation complexities have become harder to ignore. Some have argued that traditional evaluation approaches are failing and not worth

conducting. Others have proposed modifications and patches. It may be the case that varying and evolving programs may not be suited to "one size fits all evaluation protocols" and need tailored evaluations, but, to paraphrase, not measuring is not the best answer. The best programs will not be identified – or valued and taken seriously by system planners and regulators – unless they are measured and verified.

A review of the state of evaluation in these areas – gross and attributable net savings, and non-energy benefits – suggests some lessons are old lessons (up-front evaluation design and random assignment may seem difficult, but there is no reliable "after the fact" substitute). Some are new possibilities (for example, reflecting market share through price decomposition, revisions to the regulatory tests to incorporate NEBs). Some concessions to chatter and overlaps may be needed (portfolio-level decision-making or scenarios may be an appropriate evolution). There needs to be more up-front market assessment and baseline attention (saturation studies, perhaps augmented with behavioral aspects) to support evaluation of effects at least at the portfolio level. In some cases, deemed estimates associated with template program types may be appropriate if they are updated based on periodic measurement. Most importantly, evaluations need to continue and to loop back to program design to assure that the public dollars are being well-spent and "wrong" program decisions are avoided.

Lead Author: Lisa Skumatz (SERA)