Paving the Way for a Richer Mix of Residential Behavior Programs

Recent research suggests that behavior programs the California utilities currently offer use only one of many possible strategies for influencing residential energy-related behaviors. This paper was commissioned to identify behavior change intervention options for addressing behaviors inherently part of California's broad set of programs and are grounded in social science research. The paper provides three types of reference materials: a typology of residential energy-related behaviors that programs might aim to influence, a summary of social science theories relevant to consumer energy-related behavior, and a set of promising behavior intervention strategies for consideration in next-generation programs. It also provides examples of how theory, interventions, and behavior change can be integrated in different programs. The paper concludes with recommendations for next steps in developing residential behavior program policy and designs.

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Foreword

The first time I heard the term “behavior-based program,” I was perplexed by the concept and its seemingly novel introduction to demand side management (DSM). The past twenty-plus years of research studies that I’d encountered in my work in Measurement and Evaluation at Southern California Edison usually addressed consumers’ decision making processes regarding participation in energy efficiency programs. The conjoint models and other analytical approaches of the 1990s were oriented to prediction of consumer action-taking, with a decided focus upon estimating the influence of a particular program or intervention.

So, what was novel about the “behavior-based” concept and what was being declared amiss in utility program portfolios? California investor-owned utilities (IOUs) needed to better understand the purpose and direction of the new wave of small pilots and trials. However, before a basic and balanced common understanding was close to achievement, policy-makers and program managers leapt into the nuts and bolts of narrowly-defined mandates for “behavior-based programs” in terms of content, presentation, and claimable savings. What was lost in this rush to include and, in California’s case, mandate such programs or intervention strategies in utility portfolios, was clarity about the goals of such inclusions and the range of useful possibilities. The mandate in the California IOU case generated at least as many questions as answers.

That’s when the California IOU EM&V team in collaboration with the CPUC Energy Division initiated this white paper to add to the body of knowledge on the topic, especially in its evolving form in California DSM portfolio implementation and policy making. I thank the project manager, Caroline Chen of StatWizards, for pulling together a “star team of experts” from EnerNOC Utility Solutions, Cadmus Group, Research Into Action, Opinion Dynamics, and Portland State University as well as reaching out to secure excellent contributory reviews from other academicians, theorists, and practitioners in the field.

This paper is not expected to provide a “Eureka!” moment for the reader. What I hope it will do is widen the horizons of the multi-perspective stakeholders interested in behavior programs and behavior-related strategies in DSM—from policy makers to intervenors, from program planners to program implementers, from program designers to program evaluators. The taxonomic nature of this white paper will help all stakeholders to acknowledge the breadth of the concept.

When a behavior-based program or aspect of a program is claimed to be savings-generating in and of itself, then the measurability of effects of the behavior-influencing intervention becomes paramount. While the white paper does not address measurement, the wide range of listed behavior theories and behaviors point towards the need for clarifying and testing the underlying causal linkages argued to be delivering savings. The paper’s listed behavior-influencing strategies also carry an important message for traditional energy efficiency programs. The range of behavior-influencing strategies stemming from established theories of behavior change point to the complementary role of such strategies in traditional programs. To policy makers, it points up possibilities for not merely adding programs to portfolios, but to augment the

strategies and activities within traditional, existing programs, including even “deep retrofit” offerings, to increase their impact and persistence. To theorist and academician, it identifies gaps in the energy efficiency field’s exposure to social science. To evaluators, it introduces the challenge of isolating and testing the causal claims of theorists, practitioners, and regulators.

Needless to say, the implicit treatment of consumer behavior in yester years’ portfolios should be made explicit in today’s portfolios. The topic opens up endless possibilities for further exploration in terms of enhancing the efficiency of an integrated DSM portfolio—via innovation at the program level and in blending behavior-influencing components into traditional programs.

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Executive Summary

White Paper Background and Objectives

Recent research suggests that comparative usage feedback programs, such as those currently offered by the California investor-owned utilities (IOUs), represent only one of the ways behavioral interventions can influence energy use, thus raising the need to better define the range of energy-related behaviors toward which programs might be directed and explore additional behavior change theories and intervention policy options. Thus the IOUs, in agreement with California Public Utilities Commission (CPUC) staff, commissioned this white paper to define a full range of energy-related behavior intervention possibilities appropriate for California and develop a set of intervention strategies not limited by current programmatic classifications and/or restrictions.

This white paper seeks to provide policy makers, utility staff, and the broader community of DSM practitioners with ideas on energy-related behavior change intervention strategies to consider in developing behavior program policy and program design. The paper has two objectives:

- To demonstrate that social and behavioral science offers a rich set of theories and solid empirical research about behavior and behavior change that support using a wide range of intervention strategies in residential DSM programs.
- To identify a set of specific, promising behavior intervention strategies grounded in this social science theory and research that utility DSM program portfolios can utilize to influence energy-related behaviors.

White Paper Structure and Contents

This white paper includes an introduction followed by chapters that, although closely related, may also be used as individual sets of reference information to help policy makers and program practitioners more consciously define and integrate behavioral components into next-generation DSM programs.

Chapter 1 – Introduction

Chapter 1 addresses the white paper's purpose and scope, and outlines the topics covered within the white paper as well as those topics not covered.

Chapter 1 also discusses the general characteristics of behavior programs and behavior change interventions. Behavior change is part of every DSM program, almost by definition, and the industry lacks a commonly held definition of exactly what constitutes a behavior program. While intervention strategies are not programs, they are the lever that programs use to influence energy-related behaviors. As a starting point of the paper, the authors identify the desirable attributes that characterize behavior intervention strategies.

Behavior intervention strategies…

- *Target one or more specific behaviors that affect end users' energy use.* They may address any of the broad arrays of energy-related behaviors including those that are infrequent or habitual; those that require purchases and those that do not; those that affect when energy is used; and those that relate to renewable energy generation.
- *Are rooted in social science research.* They rely on social science concepts that explain behavior to inform their design. These interventions may be used alone or in combination with traditional program interventions.
- *Consciously consider which behavior(s) they will affect.* Each intervention used in a program identifies one or more energy-related behaviors it aims to influence.
- *Yield evaluable effects.* They are implemented in a way that enables evaluation of quantifiable effects on energy-related behavior, both immediately after intervention and over time.

Chapter 2 – Categories of *Energy-Related behaviors*

Chapter 2 develops a characterization of the types of energy-related behaviors subject to influence by behavioral interventions. These run the gamut from infrequent to ongoing or habitual behaviors, and from purchase through installation and usage decisions. Discussions the authors had about the full range of energy-related behaviors figured heavily in the scope of the intervention strategies subsequently developed.

This chapter first examines a variety of schemes that have been used before synthesizing the various ideas to develop a recommended typology for thinking about behaviors. This typology takes the householders' point of view as they interact in various ways with their homes. It articulates seven broad categories of behaviors, from changing how and when activities are done at home all the way to committing to a different lifestyle. It suggests dozens of specific behaviors that DSM program planners might focus on trying to influence.

Chapter 3 – Social Science Research as the Basis for Influencing Energy-Related Behavior and Behavior Change

Chapter 3 provides a survey of foundational social and behavioral science theories and empirical research, and their relevance to energy-related consumer behaviors. Every social and behavioral science discipline has something to say about human behavior. The social science theories and studies described in this chapter convey a wide range of concepts from psychology, sociology, economics, anthropology, legal theory, and product design and adoption theory that can be useful in describing and invoked to influence energy-related behavior.

There is not a one-to-one correspondence between theories and behavior, and no unifying theory is sought. Individually and collectively, however, they provide considerable and applicable insight into energy-related behaviors and factors that influence them.

Chapter 4 – Strategies and Interventions for Influencing Residential Behaviors

Chapter 4 discusses promising behavior intervention strategies that program planners and implementers might use to encourage specific types of behavior change. It outlines a dozen intervention strategy categories and describes 30+ interventions, suggesting a rich set of behavior intervention strategies. This provides a way of thinking about mechanisms that DSM program policy makers, planners, and implementers can test and evaluate in pilots and full-scale programs to influence householders' energy-related behavior. It includes interventions that have proven effective in influencing similar behaviors in fields like health and environmental conservation, and some already used in energy programs. This builds on work initially conducted for NYSERDA, adapted to the market and regulatory conditions in California.

Chapter 5 – Uniting Behaviors, Theory, and Interventions into New Program Designs

Chapter 5 combines the concepts in Chapters 2, 3, and 4 by creating examples that show how the varied intervention strategies can be deployed to refresh existing programs and develop new ones. Through these examples of possible "next-generation" programs, the white paper illustrates the applicability of the varied intervention strategies, the behavioral influences and theoretical roots that support them, and the specific behaviors they aim to change—connecting the dots, if you will, from theory through specific behavior change.

This is not to suggest that designing effective next-generation DSM programs is as easy as stringing a few interventions or theories together. Social science theories, while they can inform and support specific interventions, do not present program ideas. But, with help from social scientists and evaluators who are accustomed to using program theory and logic models to understand and assess programs, policy and program practitioners can incorporate what interventions informed by social science have to offer into program design.

Chapter 6 – Implications for Behavioral Program Policy and Planning and Next Step Recommendations

Chapter 6 summarizes findings and suggests a number of steps to help policy makers, program planners, and program implementers create next-generation DSM programs, in which behavior change is a better understood and recognized component of program logic, ultimately leading to measurable and reliable reductions in energy use.

This paper is in no way a final statement on DSM behavior program design. It is but one step in a process, the goal of which is to help California policy makers and program practitioners think more expansively and creatively to achieve their intended goals. Having said that, the white paper does include recommendations that we hope can help all policy makers and practitioners, within and beyond California.

The key findings in the paper are summarized below.

- *Influencing energy-related behaviors and modifying policy to promote change are complicated things to do.* The behavior of householders is complex, with conflicting forces affecting decisions and behaviors. The social science disciplines have differing ways of explaining them, which reflects the complicated fabric of human decision-

making. No one is suggesting that theories can be randomly mixed and matched or directly turned into programs. But they do provide the basis for the wide choice of program intervention strategies that can be empirically tested. Changing the way policy makers and program planners think about programs within the regulatory environment is also complicated. Experience has shown, however, that persistent encouragement and support can bring about improvements in regulatory policy and program planning, implementation, evaluation, and the eventual transformation of various markets.

- *Developing programs that use multiple and different intervention strategies holds promise.* Social science theory and empirical research offer a rich array of concepts that can explain energy-related behavior and behavior change. For example, traditional DSM program interventions have largely focused on technology purchasing behaviors. Additional interventions can help influence post-purchase installation and use behaviors. The interventions presented in this white paper can be used either singly or in combination with one another. We urge policy makers and encourage program planners and developers to be creative and test alternative combinations of strategies.

- *More work is needed to develop policies and design programs that fully embrace behavior change.* By exploring intervention strategies, this paper addresses a key component of behavior programs. But interventions are not in themselves programs and additional work is needed to create programs that effectively engender changes in energy-related behaviors that policy makers seek.

The recommendations are briefly summarized below, with additional details given in Chapter 6.

1. **Consider using a wider-range of interventions in DSM programs as described in this paper.**

2. **Conduct trainings on how to create behavior interventions and programs from the information provided in the paper.** Intervention strategies are not programs. Policy and program staff both require training and additional resources to understand how interventions can be formulated into effective programs, with evaluable effects. We recommend engaging social scientists and possibly evaluators, who often do have the social science/behavioral training. This will require funding allocations.

3. **Devote more time to the logic of each program at the planning stage.** Past experience shows that, despite the common sense of developing logic models to articulate program assumptions, these models are seldom systematically used. While considerable experimentation has been conducted on program features and delivery alternatives, they often don't address the underlying logic. The social science concepts and studies described in this white paper remind us of the considerable body of work from which planners can draw to guide program logic, with attention to metrics for testing whether program activities produce desired outcomes.

4. **Establish a pilot design process for developing and testing pilot programs.** Imposing cost-effectiveness requirements on all small-scale pilots can stunt innovation. By developing a process by which pilots can be developed, tested, and evaluated, existing full-scale programs can be refreshed and new programs added with less risk of misdirecting funds. In this way, the boundaries of effective strategies for enhancing residential energy savings can be expanded continually and incrementally.

5. **Use pilot testing to make incremental and alternative changes to programs.** Rather than propose sweeping changes in full-scale programs, we advise testing assumptions and alternative interventions in the market using small-scale pilots. Where possible, use experimental design to compare the outcomes of different behavioral interventions. Testing that introduces multiple interventions sequentially and/or in different order, and assesses their effects separately, can help identify the most effective combinations and perhaps develop an optimal loading order of interventions. Incorporate lessons learned in the next round of programs.

6. **Conduct more research related to specific program planning and evaluation issues.** Consider examining specific energy-efficiency planning and regulatory concepts in light of the various social science theories and studies described in this paper. For example; what might careful application of social science theory and empirical research have to say about free ridership, spillover or market effects, price elasticities, measure persistence, or code compliance? Analytic literature reviews related to specific energy-efficiency problems and particularly energy-efficiency behavior program problems could lead to pilot intervention experiments specifically designed to address those issues. And, finally, these next-generation programs may require development of additional evaluation approaches and techniques to assess effects.

7. **Conduct additional activities to help articulate and embrace an inclusive vision of DSM behavior programs to reduce energy use.** Additional activities that can support better program policy, planning, implementation, and evaluation might include developing an explicit definition of behavior program that reflects policy goals, assessing how current programs meet the definition, and workshops to assess opportunities for the design of next-generation programs.

8. **Develop a companion white paper that examines organizational theory and proposes intervention strategies for non-residential energy users.** Analogous opportunities for influencing the behavior of organizations warrant exploration to help non-residential behavior programs capture additional savings as well.

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