New Imagery and Directions For Residential Sector Energy Policies

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ABSTRACT

A series of recent energy crises have led to price increases for consumers throughout the United States and concerns about energy supplies as demand continues to grow. Energy efficiency is being called upon as an important energy policy option for responding to the tight supply-demand balance in our energy systems. A variety of energy efficiency policy approaches have been used over the past 30 years to improve product efficiency, increase adoption of energy efficient technologies, change energy-related behaviors and practices, and transform markets for energy efficient products and services. As energy markets continue to evolve and change, it is important to consider whether reproducing historical policy approaches is adequate or whether a new mix of policy strategies is needed.

In this paper we draw on research conducted by the authors during and after the 2000-2001 California energy crisis to suggest new imagery to inform energy policy. We offer some new ways of thinking about, conceptualizing, and viewing energy use and the energy user. We argue that new ways of accounting for household energy use behavior can enhance the effectiveness of a wide range of energy efficiency policy and program approaches.

The Energy Situation

The United States has experienced a series of recent energy problems: the California and West Coast electricity crisis of 2000-2001, recurrent natural gas price and supply concerns over the past several years, the East Coast power outage, and gasoline price increases in 2004. As energy demand continues to grow, a tight balance between supply and demand has led to higher prices and concerns about the adequacy of energy supplies. At the same time, global climate change and the situation in the Middle East have heightened other concerns about energy. Energy efficiency is receiving renewed interest as a policy option for responding to the current energy situation. It is one of the few policy approaches that can be implemented fairly quickly and with little controversy.

Energy efficiency and energy conservation approaches have been successfully applied at a national, regional, and local level since the energy crises of the late 1970's. However, interest in energy efficiency faded during the 1990's when energy supplies seemed adequate and prices were relatively low. As we re-introduce energy efficiency policy approaches, it is important to consider what we have learned from recent energy events and to recognize that the energy situation has changed. Are the sometimes-fragmented energy efficiency policy strategies of the past still appropriate today, or is there a need to develop new ideas and images that address energy use on a broader scale? In the remainder of this paper, we consider the need for the continued evolution of energy efficiency policy, and we offer new concepts and strategies that

more effectively account for (and incorporate) the energy efficiency behavior of households in the policy context.

Evolving Policy Experiences

Our past experiences and changes in the energy efficiency movement helped to shape the policy and program options we are pursuing today (Table 1). During the period of the first energy crisis, the U.S. Department of Energy was created and Congress passed legislation that laid the groundwork for future energy policies. This groundwork evolved into the use of codes and standards and the deployment of improved technologies to acquire energy efficiency resources. More recently, "market transformation" emerged as a key approach for achieving energy efficiency in a competitive, market-based environment.

Table 1. Simple History of the Energy Efficiency Movement

Phase	Period	Motivation	Approach
Energy Crisis	Late-70's to early-80's	Energy Scarcity and National Security	National Energy Policy
Integrated Resource Planning	Early-80's to mid-90's	Energy Efficiency is a Resource Option	Integrated Resource Plans/Regulation
Restructuring/ Competition	Mid-90's to 2001/2002	Energy Efficiency Provides Market and Resource Value	Market Transformation/ Energy Services

During the market transformation period in the mid to late-1990s, program planners recognized the need to go beyond developing and installing more efficient devices one at a time, by considering the ways in which manufacturers, retailers, trade allies, contractors, and consumers interact to produce and consume more (and less) efficient technologies. Energy use, technology choice, and economic behavior were seen as better understood in market or *systems* terms (e.g., see Wilhite et al. 2001; Blumstein et al. 2000; Lutzenhiser 2002). This shift in focus from devices to actors in larger contexts is not unique to energy analysis. It roughly parallels the evolution of thinking in the larger environmental policy arena. Mazmanian and Kraft (1999), for example, have noted an evolution of environmental intervention approaches from the "command and control," "end of the pipe," and "hardware focused" theories and regulations of the 1970s-80s (they call this "Epoch 1"), to "incentive" and "market based" approaches in the 1980s-1990s (Epoch 2), and finally, to an emerging focus on "sustainable development," "system dynamics," and "community involvement" (Epoch 3). We believe that thinking about energy efficiency and conservation policy approaches and the role of consumers is evolving along similar lines—from a device-centered view to a people-and-devices view.[1]

Of course, all of these policy paradigms continue to be influential in the current period, and all contribute to our understanding of phenomena and our ability to influence their dynamics. But we believe (and we believe the research reported here helps to demonstrate) that progress in energy efficiency is not well served when policy development is *dominated* by Epoch 1 and

[1] In reference to the scientific underpinnings of these perspectives and solutions, Epoch 1 was dominated by natural science and engineering frameworks, Epoch 2 by economic models, and Epoch 3 by emerging interdisciplinary perspectives. In terms of the energy system's conceptions of consumers and consumer behavior, there has been a related shift in thinking from "device-centered/non-existent consumer," to "rational actor/device-invisible," to "actor-network" or "people-and-devices" understandings of the systems of interest.

Epoch 2 thinking. As we move forward, there are clearly important roles for regulations and standards, for well-functioning markets for energy and energy-using goods, and for a variety of both hardware and behaviorally-centered interventions. The trick is first to recognize that complex systems may require a mix of approaches, and then to get the mix right.

Learning from the California Experience: The Power of Behavioral Response

When the 2000-2001 energy supply shortages overtook California, the energy conservation policy framework in place focused on making marginal improvements in hardware efficiency, with a hope that competitive energy supply markets might encourage efficiency investment (uptake of hardware). So when faced with skyrocketing costs and supply uncertainties, policy-makers had few concrete options. Policy strategies that were aggressively pursued by California energy agencies included accelerating the purchase and installation of more efficient hardware (lighting, motors, refrigeration, and cooling systems) and improving large energy users' abilities to track energy use and market prices via interval ("real time") meters and associated communications hardware/software.

The magnitude of the situation, however, required more and exceptional action. So the California Legislature and executive branch went beyond the conventional policy framework to appeal directly to energy consumers via a novel "Flex Your Power" campaign. The campaign used a combination of media messages, appeals from public officials, executive orders to state agencies, news stories, and direct contacts with major corporations, local governments and other large energy users, to ask for voluntary energy use reductions of *any sort* (Bender, et al. 2002).

With a welcome conservation response, households, businesses, and governments cut their total energy consumption and peak demand enough to prevent blackouts and stabilize the system. Consumer response generally involved persons' behavioral curtailment and control of energy use—actions that included changes in habits and practices such as using less lighting, turning off unused equipment, reducing the use of cooling energy, shifting loads to off-peak times of day, and preparing for rolling blackouts. Installation of more efficient hardware was fairly rare. On the other hand, sometimes-surprising behavior, such as using little or no air conditioning on hot days, produced needed savings.[2]

The events of the 2000-2001 energy crisis in California offer evidence of the potential power of behavioral response. This has significance for the continued evolution of energy policy thinking (policy frames) and policy implementation (programs and initiatives to secure demand-side energy benefits) in California and elsewhere. We have seen what is possible. Now we have an opportunity to consider what might be possible in the future.

Inertia in Current Energy Efficiency Policy Thinking

It is useful to examine the current California post-crisis residential energy policy context, where, in many ways, little has changed from the pre-crisis focus on hardware and incentives. The authors conducted a content analysis of nearly all of the formal statements submitted by interested utility companies, government agencies, energy efficiency advocates, and firms selling energy-using products and/or energy services as part of a recent California Public Utilities

[2] For a discussion of the crisis events, policy interventions and consumer responses, see CEC (2003), Lutzenhiser et al. (2002a), Bender et al. (2002), Janda et al. (2002), McBride et al. (2002), Lutzenhiser et al. (2003; 2004).

Commission (CPUC) workshop focused on "consumer needs" in energy efficiency programs.[3] It is interesting to note that those submitting comments focused, almost exclusively, on program oversight and administrative details, particularly for large business and institutional "consumers" (e.g., the need for predictable multi-year program funding, simplified program rules, more generous program benefits, continued support for hardware purchases, verification of savings).

Issues related to residential or small business consumers were mentioned only in a few cases—for example, questions about the adequacy of consumer information and education, the value of home appliance efficiency standards, the possibility of financial incentives for behavioral as well as hardware improvements, and differences in program impacts and benefits for different consumer subgroups. These few comments were uniformly thoughtful, but revealed little agreement (or common understanding) among the commentators. For example, one utility believed that improvements could be made in consumer energy efficiency information and education, while two others said that they provided more than adequate information already. One city government held that, because consumers were unable to make well-informed judgments about energy when purchasing appliances, more stringent appliance performance standards are needed. Several utilities, on the other hand, held that standards were not needed and/or that rebates were superior policy tools. Several energy consuls and consumer advocates urged consideration of financial incentives for non-hardware actions (e.g., improved system management and/or installation practices). But utility reactions ranged from skepticism to concern.

While support was voiced by both utilities and grassroots efficiency advocates for greater consumer involvement in program design—particularly for special attention to the financial and cultural situations of "hard to reach" consumers—for the most part, the policy discussions around the role of "the consumer" in energy efficiency programs remained firmly in the grip of Epoch 1 and Epoch 2 paradigms. While the purposes of the proceeding were intended to focus closely on programs, the absence of perspectives that recognized the potential power of consumer response as evidenced in the California electricity crisis, or that credited consumers with having anything to offer in the control of their energy use, was striking.

Taking an opposite tack, we believe the widespread, flexible, and at least somewhat durable conservation actions (mostly behavioral) of California consumers calls into question conventional assumptions about the nature of electricity demand and offers some new ways of thinking about consumer role(s) in energy efficiency planning. But to deal with this new actor on the policy landscape, we need to better understand how, when and where s/he might be willing to curtail energy use in emergencies, to reduce or shift loads during times of peak demand, to purchase and effectively use higher efficiency equipment, and to make routine the frugal use of energy in concert with efficiency investment.

There is a fairly extensive literature on consumer motivation, choice, energy use behavior, and conservation action, infrequently applied to energy program design, that we can draw upon. While we will not summarize that literature here, we do draw upon it in suggesting that the flexibility and responsiveness of consumer action can be understood with a little effort, and that this understanding can inform the development of much more effective energy efficiency policies that demonstrate the "Epoch 3" characteristics of complexity, community, and partnership between energy users, energy providers and state agencies.

[3] The filings were made as part of the CPUC's ongoing proceeding on energy efficiency program funding and design (Rulemaking R.01-08-028) and were submitted as part of a series of workshops beginning in December 2003 (CPUC 2004).

New Imagery and Conservation Potentials

We next consider some policy-relevant insights about household behavior and the character of routine conservation. We also sketch the outlines of a model (the "3-Cs" model) of conservation change and efficiency adoption. Together, they lay the groundwork for an illustration of next-generation (Epoch 3) energy efficiency policy innovation.

Policy Implications of Routine Behavior

We see four basic insights about conservation behavior that follow from the California crisis experience that are relevant to next-generation energy efficiency policy. These include: (1) a need to move thinking about behavior beyond the efficiency "measures" framework, (2) the evolving nature of behavior, (3) conservation as a routine feature of household energy use, and (4) the susceptibility of behavior to external influence. Each of these is considered briefly.

Moving beyond the efficiency measures framework. As we have noted, the vast majority of residential energy efficiency programs focus on encouraging the adoption of more energy efficient technologies in dwellings. The effects of such technologies can be estimated or actually measured. There is a natural inclination to want to define and measure behavior similarly to energy efficiency measures. This is illustrated in the CPUC filings related to "providing incentives for behavior changes." Yet the fluid nature of energy conservation behavior makes it difficult to define and categorize in this way. It is challenging to determine when "conservation" is occurring, and the extent to which it is occurring, given problems with self-reports, changes in diligence, increasing energy use in other household activities, and so on. Comparing a household's conservation behavior over time is difficult. Any savings also are likely to be small and within the normal variation of household energy use.

While all these considerations make it difficult to define and categorize energy conservation and savings at a measure or even a household level, *in aggregate* many small changes add up to considerable savings. The experience of the summer of 2001 in California indicates that demand reduction from energy conservation behavior can be real and substantial. Rather than trying to force behavioral effects into an energy efficiency measure framework, we think it is useful to try to find alternative ways of understanding energy conservation action.

Energy conservation behaviors in households are widespread and evolving. Energy efficient technologies tend to be fairly tangible. They are either present or not. However, energy conservation behaviors are not as discrete and tangible. Common conservation behaviors are typically not just turned on or off. For example, consider turning off lights when not in use. Most households are somewhere between the extremes of leaving their lights on all the time and diligently turning off all lights in unoccupied rooms. During the energy crisis, many households increased their diligence in turning off their lights. Likewise households typically don't leave their air conditioning on all the time. They have habits that they use to limit their air conditioning use. These can be rooted in past experiences (when they did not have air conditioning), or they can be new habits (using the programmable thermostat to control the air conditioning). Some households might rely on these habits more than others and this may change over time. So people draw on their past and current experiences, meaning that their resulting conservation behavior can occur across a wide spectrum. It can change and evolve. It

is also not static or discrete, but is more continuous. It ebbs and flows. The key point is that these energy conservation behaviors exist to some degree in all households, and this latent capacity can be utilized. There is some flexibility in household energy demand.

Energy conservation behaviors are part of how households manage and routinely use energy. Energy conservation behavior fits within the ways households are managed and operated to meet the needs of the people living in the homes. Understanding energy conservation behavior requires understanding household patterns of energy use and their management. Households have a set of existing energy habits and behaviors that are viewable as their "plan" (or "strategy") for managing energy use. How households follow through with their plan reflects how energy conserving they are. Due to a variety of circumstances, households can do things that may not follow their plan and that increase their energy use (for example, forgetting to shut windows during the day or setting back the thermostat). During the energy crisis, households may have returned to their plans and managed their energy use better. And they may have modified their plans to eliminate habits that were increasing energy use. In this manner, households learn new patterns of energy use. The patterns that meet their needs and either enhance or maintain comfort are likely to be incorporated into the household strategy for energy use. Over time, a household may become more lax in following the plan, but a change in circumstances can also lead to more diligence in executing it.[4]

The ability of households to act can be enhanced by external influences. The events of the 2000-2001 energy crisis illustrate that households can be influenced by external factors such as the media to become more diligent in their energy conservation behaviors. The events of 2001 raised household awareness and concern about energy and made this a relevant issue for action. Households responded primarily by taking a variety of energy conservation actions depending on their circumstances and capacity. These were actions that can widely be adopted and in many cases fit within the plans and experiences households already had regarding energy. Hardware-type energy efficiency measures were less common because circumstances severely limited the ability of many households to take these actions, particularly in the short term. The ability to shape and influence household energy behavior provides a significant opportunity for demand reduction.

Fundamentally, what we are suggesting is that energy efficiency actions in households are not isolated events, but need to be understood in the context of household energy use patterns and the factors that shape the household's ability to act (discussed below). These patterns and circumstances are changing and evolving and possibly can be shaped and influenced to enhance the effectiveness of energy efficiency policies and programs.

The Concern, Capacity and Conditions ("3 C's") Model

How might the flexibilities (and uncertainties) of conservation behavior be better understood? Under what circumstances might behavior be tractable? Can we understand its logic and dynamics?

Based upon our studies of conservation decision-making by firms and government agencies during the California crisis (Lutzenhiser et al. 2002b; Janda et al. 2002), and from the literature on household energy conservation (e.g., Gardner and Stern 1996; Lutzenhiser, Harris

[4] We credit Jamie Woods for first formulating the idea of the "conservation plan" in this research.

and Olsen 2001) we have developed a fairly simple heuristic model that helps us understand why some energy users adopt conservation and efficiency practices and devices, while others do not. In this "3-Cs model," conservation and efficiency adoption is seen to depend upon a combination of three factors, namely the consumer's: (1) level of *concern*, (2) his/her *capacity* to act, and (3) the *conditions* (including *constraints*) surrounding that action.

In the case of California households, we know from our surveys that there was a high level of concern about the energy situation and a widespread commitment to conserve among residential consumers in California in both 2001 and 2002. So concern—the first crucial ingredient—was in place for most households. Where persons were not concerned, no action was either expected or observed.

At the same time, we saw that residential consumers varied widely in their capacities to act. Despite their levels of concern, without specific capabilities (e.g., appropriate hardware knowledge, ownership of the target appliances and/or buildings, market access to efficiency technologies and installation services, having the cash or access to credit, etc.), hardware action was not possible. In fact, we observed a different likelihood of efficiency investment depending upon home ownership, income, and related factors. However, these limitations did not stop persons from making behavioral changes when hardware changes were not within their capacities. In fact, previous knowledge and habits of frugality could be reactivated, and these did not require any investment. We believe that, where requisite knowledge and habit were not present (regardless of concern and even financial means), significant conservation and efficiency improvement were also absent.

Finally, even when concern and capacity are present, the conditions surrounding choice (i.e., context factors and constraints) can shape (and, most frequently, limit) efficiency choice. These include: lack of time, competing claims on attention, uncertainty about length of residence in a dwelling, and the constraints of existing housing and technology (e.g., what will fit, whether efficiency can be improved or the technology must be replaced). In the residential sector, hardware response is normally severely constrained by household capacity and conditions. This is why efficiency hardware improvements are relatively unusual, even with the availability of rebates, incentives, and tax credits. During the crisis, the immediacy of the need for a conservation response dictated that it would necessarily be a behavioral one. And even when hardware purchases were made, households combined them with a range of behavior changes (see Lutzenhiser et al. 2003).

Elaborating the Model: The Importance of Consumer Perceptions

We further draw upon the literature and the empirical evidence from 2001-2002 to elaborate the model a bit before applying it to a mix of policy strategies—all of which are currently under discussion in California. Although we might imagine capacity and conditions to be less "subjective" than concern, in fact all of the 3 C's are heavily dependent upon the understandings and interpretations of the situations people find themselves in. The rise and fall of effective programs and policies depend heavily on this, often-overlooked, fact. So in considering some of the policy options now under consideration, it is important to use an elaborated 3 C's model that takes this fact into account.

For example, consumers' concern relies on at least two cognitive factors: a belief that the problem at hand is actually *real*, and a perception that it is *important* enough to warrant attention. One can imagine a problem described by public officials to be real, while at the same time it may

seem to be unimportant, engendering little concern. And one often hears of problems that would be important, if only we could believe that they are as real as their advocates claim them to be.

The capacity to act is present if, and only if, the consumer believes that his/her personal action is *possible*—that s/he has options that can be implemented and that will have effect in the real world. I may be concerned, but I also may not see anything that can be done. Finally, the conditions that permit action to occur can be said to exist if, among other things, the request for consumer participation is seen to be *reasonable* (e.g., it may be reasonable to ask persons to turn off unused lights, but perhaps not to unplug their televisions). What's more, a key condition is that the requested response be seen as *equitable* (i.e., that the consumer is not being asked to contribute beyond his/her means and significantly more than others who are "doing their part" for the common good).

Incorporating Consumer Response in Policy Strategy

At the most fundamental level, persons' understandings are crucial simply in terms of their recognition that public energy efficiency goals and programs exist. The households that we surveyed reported very high levels of energy and environmental concern and strong support for energy policies to increase efficiency and renewable sources of energy. But despite nearly two decades of state and utility-sponsored (mostly hardware-focused) energy efficiency programs operating in all localities across the state, our survey respondents also reported low levels of program awareness. Only about 39% knew of any energy conservation programs available in their locale (and we used a very liberal definition of "program," allowing respondents to identify virtually *any* activity as an energy program). Of this number, only about a one-fourth (7 percent of the total population) reported participating in or benefiting from such a program.

Even though there may have been opportunities to better promote these programs, these results suggest that program participation criteria and benefit levels may both explicitly and de facto work to exclude a wide array of households and household types, as the 3 C's model illustrates. Furthermore, consumer response to the "shotgun approach" to efficiency (e.g., refrigerator rebates that come and go, locally-variable CFL buy-downs, home energy audits for high bill complaints, websites with links to programs and information, low-income energy assistance) should not be expected to be any less uneven than the program offerings themselves.

An Example of an Epoch 3 Policy Approach

We do not propose to replace hardware-focused efforts with behavioral ones. However, if we really want to achieve the optimal economic, social, and environmental benefits from energy efficiency policies, we should be thinking about efficiency initiatives that are campaign-based, problem-focused, consumer-centered, and complexly integrative—that make sense to energy users and other relevant market actors, and that coordinate a range of behavioral, hardware, and hardware-plus-behavior interventions.

The success of the *Flex Your Power* campaign (an approach that would never have been attempted under pre-crisis conditions), as well as high levels of recognition of the Energy Star™ brand and reports by our respondents that three-quarters considered energy in recent hardware purchases, indicate that media is key to widespread awareness, and that focused messaging and branding can be important—and may be crucial—for widespread problem recognition and program success. Large-scale concerted campaigns may be required for consumers to recognize

the reality and importance of energy system problems and the appropriateness of the proposed solutions—to link their general concerns about energy with particular issues and outcomes. Consumer realities need to be recognized in program designs and messaging and a variety of different ways for persons to contribute to collective problem solving need to be devised and offered to consumers.

An example might be a media campaign coupled with an array of conservation/efficiency offerings related to *residential cooling*. Table 2 presents a thought experiment about what such an initiative might involve, perhaps expanding the New York state "Keep Cool" campaign (Hammer and Maxwell 2003), or at least adopting that very nice label or something like it for a much broader effort than that undertaken in New York.[5]

Table 2. A Hypothetical California "Keep Cool" Campaign

Problem: Peak energy demands on hot days strain energy delivery capacity, produce levels of pollutants during poor air quality periods, and expose the system to high and sometimes erratic spot market energy costs. Residential cooling loads are a primary contributor to all of these problems.

Solution: Reduce residential cooling loads, particularly demands from compressor-driven central air conditioning systems. Based on technical potential studies (e.g., Ruffo 2003), we know that residential cooling has much to contribute to overall efficiency gains. Based on our research in California in 2001-2002, we know that non-AC cooling behavior was adopted by a significant number of consumers, and that its use continued after the crisis.

Marketing Approach: Develop awareness of connections between peak load/system problems and background concerns about energy supplies and environmental impacts. Establish an appreciation that the problems are real, important and actionable. Create brand identification, for example linking "Keep Cool" (or some other significant label) and Energy Star™ as elements of a broad campaign to address collective problems with common efforts—where persons can all "do their part," in a variety of ways.

Program Design: Based on consumer research (e.g., studies focused on differences in concern, capacity and conditions related to residential cooling), as well as understandings of technical potentials and knowledge from program experience, design and launch a *portfolio of programs* that simultaneously target hardware, behavior, and hardware plus behavior changes that will produce optimal results. These programs would provide opportunities for households with different circumstances and constraints to participate in different ways. As household capacities and conditions change and evolve, there will be new opportunities to take part in various program offerings. Elements might include:

- Television news/weather coverage and video documentaries analyzing energy and environmental problems, and identifying the connections between cooling and peak loads as particularly problematic
- Advertising that promotes behavioral as well as investment solutions to the peak problem; celebrate "low-tech" but common sense approaches, such as turning off lights and other interior heat-generating equipment, managing curtains and blinds to keep the heat out, managing windows to cool at night and vent accumulated heat in the evening, using fans in a variety of clever ways, etc.; include continuous linking with Energy Star™
- Educational materials in K-12, as well as community-based information efforts focused on cooling and peak demand, and various feasible household responses; community-level forms of the campaign tailored to local conditions and opportunities (that, in fact, vary widely across the state)
- Subsidized, high quality whole-house energy audits and retrofit planning with particular focus on cooling loads and peak benefits
- Revived programs to increase insulation levels, seal ducts and install cool roofs, thermal barriers, and improved windows, etc.; supply appropriate incentives (subsidies, tax credits, rebates, etc.)
- Bring to market non-compressor cooling technologies, including night venting and evaporative cooling

[5] The NYSERDA "Keep Cool" campaign was primarily focused on buy-back of room AC units, with an advertising campaign and longer-term market transformation goals.

- Promote and incentivize replacement of existing air conditioning units with high efficiency (Energy Star™) models
- Aggressive pursuit of appliance standards and building codes that take peak demand and residential cooling efficiency improvements into account
- Focused efforts to build the retrofit and service industry infrastructure necessary to deliver a new level of "green building" services to millions of homes
- Integrated new construction program that brings together building techniques, high efficiency cooling, non-compressor cooling, labeling/branding, and marketing/builder incentives to produce more cooling efficient homes
- Provide opportunities for households to participate in remote load control programs for air conditioning that deliver utility system benefits as well as clear and tangible consumer benefits
- Offer time-of-use and/or critical peak period electricity pricing to further reinforce preferred cooling actions

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None of these program elements is particularly novel, and, in fact, creative minds (including consumers themselves) and careful analysis could undoubtedly develop others. However, the key to improved conservation and efficiency efforts under non-crisis conditions, we believe, is to offer an integrated portfolio in a coordinated fashion—matching the right incentives/services to different consumers, by taking consumer concerns, capacities and conditions carefully into account.

Conclusion: Pursuing Epoch 3 Policy Approaches

If we are to take the lessons of the 2000-2002 California energy crisis and its aftermath seriously—and as a result, bring the consumer more fully into the energy policy picture and planning process—further social science research is required. This research should focus on developing a better understanding of the context for household energy efficiency action. This includes examining patterns of household energy use, how energy habits and knowledge result in a plan for managing energy use, the changing nature of the household plan, and how household energy plans can be shaped and influenced. The application of the concern, capacity, and conditions model to household energy behavior needs further review and refinement. In this we emphasize the need to better understand the management of household energy use, rather than individual actions or decisions.

In our work, we are attempting to extend our knowledge of the significant role played by consumers in the shaping of their own energy demands under a variety of changing social, economic, environmental, and public policy conditions. The experiences from the California energy crisis illustrate the potential value of this knowledge for more fully realizing the energy efficiency and demand responsiveness potentials of households. As Epoch 3 of environmental problem-solving unfolds in the U.S., California is, once again, poised to emerge as a leader. This time with energy policies that move well beyond both hardware and markets.

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