

Project Energy Code



Nudges for Energy Conservation

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ABSTRACT

Project Energy Code facilitates a discussion among energy professionals and social scientists about the “green gap” between consumers’ stated intentions and their purchasing behavior. These papers deepen our understanding of the economic, social, psychological, emotional, instinctual and subconscious codes of behavior that affect human energy consumption. Our previous papers have applied anthropology, economics and psychology to explore sustainability. This paper applies behavioral economics to plans, policies and programs that result in measurable energy savings.

While many individuals have goals to save energy, they often fall short of the bars they set for themselves. Behavioral economics helps understand why individuals fail to follow through with their plans, and suggests that policymakers and relevant businesses can employ “nudges” to help communities generate measurable energy savings. This paper is intended to help policymakers and businesses understand what makes for a good nudge and why nudges work, along with the experimental evidence to date and some ideas for further innovation specifically using commitment devices.

PURPOSE AND SUMMARY

Helping individuals better achieve their intended energy reductions is an important first step in reducing overall energy use. Toward this end, policymakers and business concerned with energy reduction can design behavioral “nudges” consistent with the latest findings from behavioral economics to help these individuals achieve their energy reduction goals. This paper explains the concept of a “nudge,” a term coined by economist Richard Thaler and lawyer Cass Sunstein, and discusses the application of nudges to energy policy. The paper then explores some promising avenues for future research and discusses barriers to implementing nudges to promote energy conservation.

Traditional economics also offers several insights into why energy conservation efforts may be difficult. Markets can fail because of externalities, which are costs or benefits that one person causes, but that fall onto another person. A classic example is the tragedy of the commons, in which people overuse common resources because they are unable to enforce a collective agreement to maintain usage at socially optimal levels. In the case of the emission of greenhouse gasses, although everyone gains from a stable climate, responsibility for protecting the earth's climate is sufficiently divided that there is no global management system in place. Because consumers do not bear the cost of the greenhouse gasses that their energy consumption produces, they do not take the full costs into account when deciding how much to consume. This leads to over-consumption of energy from the perspective of society as a whole.

This paper will examine a different but related environmental issue: In many situations, individuals say they have a preference for a healthier environment, but they then find themselves engaging in behavior counter to their stated preference. So they say that they do not want to impose external costs on others, yet they do. Behavioral economics is not necessary to explain this behavior, but it can help us to understand the most effective ways to help individuals internalize the true costs of their consumption choices (in our example, production of greenhouse gasses as a result of electricity production).

Of course, not everyone is the same. Some care more about the environment than others, some care more about social reputation than others, etc. Heterogeneity such as this must be taken into account when designing programs, and I will discuss this in particular when it comes to time inconsistency when I discuss using commitment contracts to help people achieve energy conservation goals.

INTRODUCTION TO BEHAVIORAL ECONOMICS AND NUDGES

Classical economics suggest that all individuals are rational actors who determine utility-maximizing courses of action for themselves, and then always follow through. Under this model, individuals pursue optimal behaviors for themselves without any outside intervention. While this is accurate in some situations, there are many others where individuals carefully design plans and then fail to follow through—a classic example is an unfulfilled New Year's resolution to exercise more and eat healthier.

Anomalous behavior, such as making plans, failing to fulfill them, regretting it, and then doing it all over again, are puzzles for traditional economics. Behavioral economics tries to explain why people consistently make decisions which appear irrational from a purely monetary standpoint by incorporating psychology and incorporating factors related to emotional, social, and cognitive bias. Behavioral economics helps us understand how psychological processes intersect with the more economic “incentive” based analysis to explain behavior such as the above. Much remains to be learned about such behavior, and what types of interventions can help people overcome such problems.

What is a “Nudge”?

A “nudge” is a mechanism used to promote socially- or individually-desirable outcomes while still respecting individual choices. “Nudges” work by shifting the way in which people make choices, in many cases helping them to follow through with things which they desire but, for some reason or other, would not have achieved in the absence of a “nudge.” Three examples of how “nudges” work include the following: through information or how the decision is framed; through commitment devices, which may or may not include rewards for success and/or penalties for failure; and through changing defaults. It is key to note that individuals will respond to a given nudge in different ways. For example, later in this paper I discuss a working paper (Allcott, Social Norms and Energy Conservation) which demonstrated that informing high energy users that their use exceeds that of their peers with comparable houses and living situations, individuals responded by reducing their energy use. However, subsequent research (Costa and Kahn, working paper) showed that people respond to this “nudge” differently depending on their political affiliation: Self-described Democrats and environmentalists responded to the “nudge” by reducing energy use, while self-described Republicans reduced energy consumption by a significantly smaller margin. The data may even suggest that certain Republicans, specifically those who do not use renewable energy or donate to environmental causes, actually respond by consuming more energy. So while the “nudge” as evaluated by Allcott lead to energy savings, careful targeting and flexibility in “nudge” selection remain important to success.

A nudge, sometimes called the wonky “libertarian paternalism,” is libertarian in that people are free to make their own choices, and yet paternalistic in that they help people accomplish the goals they would, at least in their more reflective moments, say they have. In doing so, nudges allow people to overcome their inconsistencies and achieve their long-term objectives. An ideal nudge leaves the individual the option of making the same choices they would have made in the absence of that nudge. So, for example, additional sales taxes on cigarettes do not qualify as a nudge. While many smokers may want to quit and making smoking more expensive may help them to do so, this intervention would still be likely to change the behavior of smokers who had no interest in quitting. Offering an individual a way to pay more for smoking (e.g., a commitment contract to not smoke, as we will discuss later with respect to StickK.com) is a nudge since an individual can simply opt not

to sign such a contract. Thus, not all interventions by social planners qualify as nudges. However, nudges can prove useful to achieve social goals precisely because many people value broader social goals (like conserving energy), but are tempted to avoid the inconvenience of these goals while making everyday decisions.

Successful nudges can work by aligning short-term incentives with long-term goals through a number of different mechanisms. Some nudges make failure more expensive, success more rewarding, or both. Others work to change perceptions of the relative costs and benefits of failure and success. Still others change default options to those of a behavior to be promoted. It is important to stress, however, that any changes in behavior are voluntary responses to a new choice structure. While good nudges do change behavior, they also should have optional participation, or not change the fundamental underlying choices that individuals have. Thus, in retrospect, participants should be happier with the choices they made as opposed to the choices they might have made in the absence of the nudge.

EXAMPLES OF NUDGES

Nudges of all sorts have been employed and studied in a variety of fields. For example, nudges using information have been successfully employed to influence savings, charitable giving and voting. Save More Tomorrow™ by Richard Thaler and Shlomo Benartzi is perhaps one of the most well known nudges, and basically gives individuals the option to increase *future* contributions from payroll into retirement savings. Frey and Meier (*American Economics Review*, 2004) demonstrated that providing different information about social standards for charitable giving greatly influences individuals' decisions to donate; individuals who were told that 64% of their peers had contributed were 11% more likely to contribute than those in the control group (who were provided no information about the rate of giving). Interestingly, a second experimental group which was told that only 46% of their peers had contributed did not have a statistically significant deviation from the rate of giving observed in the control group. In this case, the nudge both provides respondents with additional information about their choices and changes the perceived benefits or costs to giving or not giving. Once they were provided information on others' giving choices, maintaining social conformity acted as an additional incentive to give.

A second example of how information can affect people's choices is provided by Gerber and Rogers (*Journal of Politics*, 2009) who studied the decision to participate in an election. Participants were either told that turnout was very low, so each vote had a higher marginal effect on the outcome of the

election, or they were told that turnout was very high and that everyone else was voting. Participants who were told that turnout was very high were much more likely to vote than those who were told that their vote would be more important to the election outcome. Again, understanding the social context for their decisions changed participants' perceptions of the costs and benefits of voting and not voting, with a desire to conform socially being more important to many potential voters than the desire to influence the election results. This shows how subtle changes in wording of information can make a big difference in outcomes.

There are also many examples of nudges involving voluntary incentives. Typically, these nudges take the form of voluntary commitment contracts. An example of a study of this type of nudge is provided by Giné, Karlan, and Zinman (*American Economic Journal: Applied Economics*, forthcoming), which used commitment contracts to facilitate smoking cessation. The treatment group made weekly contributions to savings accounts which were forfeited to charity if the participants continued to smoke, and were returned if they successfully quit. Individuals who were *offered* the opportunity to participate (of whom 11% said yes) in the treatment group were 3.4 to 5.7% more likely to quit over a longer time period than the control group. Of those offered the account, 11% said yes and opened one. By allowing individuals to raise their cost of smoking, the nudge enabled participants to align their short- and long-term interests.

**Nudges in Practice:
Selling Frozen Yoghurt**

Businesses use “nudges” all the time to increase their profits, even without running controlled experiments beforehand. For example, frozen yoghurt chains which sell frozen yoghurt by weight have begun to offer only one container size: large. Studies have shown that people take more food when offered a larger container, so by only offering large containers, these companies are encouraging their clients to buy more frozen yoghurt. (“Nudge blog”: <http://nudges.org/>)

Finally, an example of a nudge which works to change behavior merely by changing what happens in the case of no action, i.e., the “default,” is provided by Jonson and Goldstein (Transplantation, 2004) in the field of organ donation. Different European countries have different standards for organ donors—in some countries, every individual is assumed to implicitly accept being an organ donor unless they specifically opt out, while in others, individuals must specifically opt in to becoming donors. The rates at which individuals act as organ donors is significantly higher in the opt-out countries (in most cases greater than 90%) than in the opt-in countries (in most cases less than 30%).

NUDGES RELATED TO ENERGY CONSERVATION

While there is a substantial literature on nudges for financial decisions and healthy living decisions, there are fewer articles discussing nudges and energy conservation. Energy conservation first became a broad public goal in the late 1970s and early 1980s as a result of the energy crisis, and there was a corresponding rise in publications related to energy conservation. However, these early studies sometimes lacked a clear counterfactual, e.g., a control group, and so their findings are less robust in their ability to attribute actual behavior change to programs and policies. They also often had small sample sizes or did not test representative samples, and so their conclusions may not hold if the interventions are implemented in a large population. There also may be substantial enough differences between the energy markets and consumer choices of thirty years ago and those of today that earlier findings may not apply so easily to the technologies available today.

However, some generalizations can be made based on these studies. Generally, interventions based on pricing or commitment strategies were more effective in changing consumer behavior than those based on mere information. However, interventions based on information showed lasting effects, while those based on price changes or commitment strategies dissipated once the commitment or price change was removed. It is important to note that, unlike the nudges based on changing participants' perception of social norms, these studies gave out more general information on how to conserve energy and the importance of energy conservation.

REAL TIME PRICING

More recent studies are related to the conservation effects of real time pricing (Allcott, "Rethinking Real Time Energy Pricing," working paper), in which prices vary frequently during the day to reflect the supply and demand for electricity at that point in time. In contrast, most electricity consumers in the U.S. have a nearly fixed price for electricity, regardless of when the electricity is consumed. This is economically inefficient, as electricity is more expensive to produce at when demand is highest, during the day and during times of increased cooling and heating requirements in the summer and winter. Because the price is fixed, when consumers use energy during periods of high demand, they pay less than what the energy is worth, while during periods of low demand, they pay more. Many of the studies of real-time pricing (RTP) are motivated by efficiency interests as much as energy conservation, but these studies are relevant both because evidence suggests

that offering or encouraging consumers to opt in to an RTP program may help them conserve energy, and also because RTP-focused studies provide insight into price-elasticity for electricity, which is information which could be useful to the design of future conservation nudges.

Several studies have found that when consumers are subject to RTP, they use less energy overall. One of these studies (Allcott, "Rethinking Real Time Energy Pricing," working paper) tested the effects of different levels of information about prices in conjunction with participating in RTP. Some participants were given general guidelines about when prices would be high or low with notifications on days when prices were set to be particularly high, while some were given "pricelights" which changed color every 15 minutes according to the price of electricity at that time. All participants received programmable thermostats and smart meters (meters capable of measuring when electricity was used). The study found that groups participating in RTP reduced their energy bills by 1 to 2%, and reduced associated carbon dioxide emissions roughly 4%, largely as a result of reduced energy consumption during peak periods without a corresponding increase in consumption during off-peak periods. Participants given "pricelights" experienced higher efficiency gains, and increased their energy savings by an additional two-thirds at times of peak prices.¹ Additionally, the efficiency gains achieved were insufficient to pay for the cost of the smart meters and "pricelights."

Some caution should be exercised when considering the study results in the above paragraph, as other studies have potentially conflicting results. One such study is Aubin, Fougere, Husson, and Ivaldi (*Journal of Applied Econometrics*, 1995), who studied the response of consumers to a variable rate scheme (similar, but not equivalent to RTP) in France, where consumers have a greater familiarity with variable rate schemes. These consumers showed much greater rates of substitution between high and low cost periods, resulting in greater efficiency gains, but perhaps a lower reduction in overall consumption. As already mentioned, in the Allcott study, consumers reduced electricity consumption during the day but did not increase it at night, leading to conservation gains. In the Aubin, *et al* study, however, consumers did increase consumption during lower-demand periods, suggesting that conservation gains may have been more limited. Especially since there was no control group, the result is not definitive; the result is also weakened by a small, relatively homogenous, and self-selecting sample. Other research done by Taylor, Schwartz, and Cochell (*Journal of Regulatory Economics*, 2005), a study following industrial consumers over eight years after they switched to RTP, shows that consumers develop greater ability to substitute as they gain experience with RTP, which is exactly the difference between the consumers observed by Aubin et al and

those observed by Allcott. Thus more experience with RTP could reduce conservation gains.

Additionally, an econometric analysis by Holland and Mansur (*The Energy Journal*, 2006) found that in most parts of the country, the generating capacity which is activated at times of peak demand emits more greenhouse gasses per unit of electricity generated than does electricity generated at time of low demand—in short, RTP does foster environmental improvements.ⁱⁱ This finding has been confirmed in later models of the environmental effects of RTP by Holland and Mansur (*The Review of Economics and Statistics*, 2008).

Finally, by investigating changes in consumer behavior associated with RTP and other price changes, it is possible to calculate consumers' price elasticity of demand to understand the extent to which changes in electricity prices would encourage conservation. Reiss and White (*The Review of Economics Studies*, 2005) use this approach to analyze the potential conservation associated with a new system of electricity tariffs in California (the study also analyzes the effect this system would have on household expenditure and whether the pricing scheme is efficient). Similarly, Reiss and White (*RAND Journal of Economics*, 2008) make an interesting case study of the electricity shock which occurred in California in 2000 following the deregulation of electricity prices, and shows substantial decreases in demand in response to price increases.

INFORMATION

Other nudges have used information to promote conservation, but with more of a focus on shaping individuals' perception of the social aspects of energy conservation. One effective study along these lines was by Allcott ("Social Norms and Energy Conservation," working paper). The study was implemented as a randomized evaluation—participants were randomly assigned to either a treatment or control group. During the study, individuals in the treatment group received reports on their energy use by mail detailing both general steps to conserve energy and a comparison of their energy use with that of their neighbors with comparably sized houses. It caused a general drop of 2.3% in energy consumption in the treatment group compared to the control group. Much of this shift occurs in high energy use households. Individuals in the treatment group were probably motivated to conserve not only by social norms, but also because the mailings served as reminders about energy conservation in general (e.g., see Karlan, McConnell, Mullainathan and Zinman, "Getting to the Top of Mind: How Reminders Increase Saving," working paper, which shows that reminders

alone influenced savings behavior). Energy use by members of the treatment group was not permanent, and converged toward that of the control group with the passage of time once mailings stopped. Similar studies have shown even greater effects (Nolan et al, *Personality and Social Psychology Bulletin*, 2008) of providing comparisons of energy consumption—roughly 10%—by providing information on door hangers rather than through the mail, perhaps because this form of communication was more personal and harder to ignore. Of course, the study as evaluated by Allcott is much easier to scale up and implement more widely.

Public pressures to conserve energy were also observed to be successful by Reiss and White (*RAND Journal of Economics*, 2008) during the 2000 electricity crisis in California. In this case, broad public appeals were issued for individuals to restrain their energy use after the state government capped electricity prices below levels set by the market. This resulted in a 7% decline in electricity consumption in the absence of other incentives.

COMMITMENTS AND GOALS, SOFT AND HARD

Finally, some nudges have been based on goal setting. This is an area I have focused on personally, both in my research and in the creation of StickK.com. Goals can either be hard or soft. Soft goals ask participants to make commitments as simple as stating their goals, but do not include any additional consequences for their performance other than the psychological disappointment of not doing what they have said they will. Hard commitment devices are more consequential, and typically impose financial or social consequences on participants which depend on their performance.

Soft Commitments

One example of a study using soft commitments is Houwelingen and van Raaij (*The Journal of Consumer Research*, 1989), where respondents were asked to set goals for natural gas use, and provided varying degrees of feedback on their performance. In that study, participants who were given continuous feedback decreased energy use by 12% relative to that of control groups. Another group that received less immediate or frequent feedback or no feedback at all still reduced consumption 4.0 to 7.5% relative to the control groups.

Other, earlier, studies reviewed in Abrahamse, Steg, Vick, and Rothengaller (*Journal of Environmental Psychology*, 2005) involved analyzing the results of various methods of assigning reduction goals or obtaining commitments. In general, respondents given larger goals experienced

greater reductions, as did those with higher levels of feedback. Respondents who publically committed to reducing energy use (with no referee or consequence of non-compliance) also used less energy than a control group.

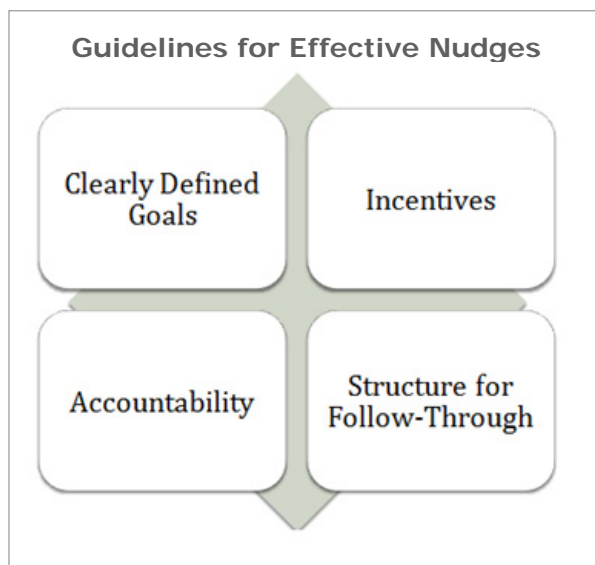
Hard Commitments: “StickK.com”

As we discussed in the introduction, it helps to recognize that not everyone is the same. This seems like an obvious thing to say, yet is often not taken into account when programs and policies are designed and implemented. In the case of time inconsistency, it helps to divide individuals into three different types to target to help make better energy conservation choices: (a) those who are time consistent (i.e., those who genuinely do not want to conserve energy), (b) those who display time inconsistency and are aware of it (i.e., those who have the self-reflection to realize they will fail, yet again, unless they do something differently), and (c) those who display time inconsistency but who are unaware of it (i.e., those who do not fulfill their plans but swear next time they will). Each of these groups makes consumption choices differently, and thus, is likely to respond differently to any public policy or business offering.

The first group of individuals contributes to market failure only through externalities. They assess their own optimal courses of action and follow through on them—it’s only when some of the costs of those choices are externalized that a problem arises. These individuals’ market failures are best treated using standard incentives to discourage negative externalities and encourage positive ones. The second group of consumers displays time inconsistency and thus deviates from what they consider to be an optimal behavior. Because they realize their inconsistency, they are ideal candidates for nudges—in many cases they would voluntarily opt in to programs to force themselves to do tomorrow what they perceive to be best for themselves. This group may also contribute to externality-related problems. The third group is the most difficult, as they are both inconsistent and unaware. They don’t realize that there is a problem and so don’t realize that they could be helped by a nudge, meaning they are unlikely to opt in. Perhaps the best way to help these individuals is through targeted information to help them realize that their behavior isn’t optimal, and then target them with nudges or incentives to affect their externalities.

The existing literature on commitments and goals probably does not capture the full potential of commitment and goal setting techniques. First, studies of commitment devices in other fields finds that the successful compliance with commitment contracts is significantly enhanced when there are rewards for success or penalties for failure; this has not yet been incorporated into nudges to promote energy conservation. Second, much of the existing

literature deals with externally assigned goals, as opposed to targets which the individuals select themselves. Third, goals have been based on the household's energy consumption results, with the typical format being a fixed percentage reduction in energy consumption. This introduces problems with information and monitoring—participants who are given more information achieve higher reductions—but providing that information is expensive. Also, selecting appropriate goals can be difficult (Houwelingen and van Raaij, *The Journal of Consumer Research*, 1989). The article discusses the intuition that goals which are too easy or too hard will reduce effectiveness.



One possible response to these difficulties is adopting procedural, rather than results-based, goals. The commitment or goal thus becomes the effective performance of an activity correlated with energy savings, which could be a one-off action (like buying and installing energy efficient appliances before a certain date) or repeated actions (like turning off the lights upon exiting a room). These sorts of commitments are far easier for individuals to monitor, making implementing this sort of commitment strategy far simpler and cheaper.



Another possible response is allowing individuals more latitude to select their own energy reduction targets. It is even possible that for many individuals, a self-selected goal will be more effective than one imposed externally. This approach could be combined with messaging about typical behavior to influence decision-making as desired.

Weight Loss and StickK

StickK is designed to help many people accomplish a wide variety of goals. I developed StickK after my own experiences with a friend trying to lose the weight we had gained during graduate school. We developed a commitment contract requiring each of us to lose a pound and a half a week; if one party failed to keep up their end of the bargain, they would be forced to forfeit up to \$10,000. Unsurprisingly given the stakes, both of us were committed to our weight loss mechanisms, and successfully lost significant weight. The contract was instrumental in helping me maintain an optimal weight—eventually the contract ended and I regained some of the weight I had lost. So, I started a new contract, lost the weight again, and around the same time, developed StickK.com to help others use commitment contracts to fulfill their goals, just as I used commitment contracts to fulfill mine. With weight loss, as with many behaviors, setting maintenance goals may be essential to continued success, to avoid the difficult rebound problem!

A framework which accomplishes all of these aims exists, in the form of StickK.com that I started which facilitates commitment contracts.ⁱⁱⁱ Participants are invited to select a pre-designed contract or develop their own. With the informational nudge on enrollment, participants could be encouraged to adopt more effective contracts. Contracts can have referees, who are third parties with the power to report them a success or failure. In the case of energy conservation, the referee could be the utility company. Participants can choose to forfeit money to charity or a friend when they miss their contracts, or perhaps even more powerful, to have their energy use reported to their friends. Thus the individual puts their social capital at risk, not their financial capital! For many, this will have far more bite, and also is more palatable when working with lower income levels, or credit constrained individuals. Currently, StickK.com manages a number of contracts with both environmental and other themes. A common energy-savings contract adopted through StickK.com is to turn off lights and appliances every night. Contracts implemented through StickK.com or through a similar system could play a significant role in energy saving.

IMPLEMENTATION AND CHALLENGES

Translating these findings into energy conservation could prove to be a challenge. In many markets, the natural leaders for conservation efforts are local utilities, which have the most information about local energy customers and which, in many localities, now have a legal obligation to pursue energy savings (Allcott, "Social Norms and Energy Conservation," working paper). However, local utilities face significant regulation in most of the U.S., which complicates their ability to promote or implement any nudges which either use higher prices or the risk of penalties in cases of non-compliance. One potential and easy solution is to require that profits made from increased (albeit voluntarily) prices go to charity, or more specifically, to promote

energy conservation. For example, in the context of commitment devices, the increased revenue could go into a pool which is then transferred to those who succeeded in reducing energy use. Thus there is a positive reward to succeeding, and a negative consequence to failure, but consumers as a whole are revenue neutral: the winners win from the losers, and the utility company does not profit from those who fail.

Second, there are problems related to enrollment. As noted earlier in this paper, default nudges like opt-out schemes, are much more effective at encouraging enrollment, and might be the best way for encourage broad-based adoption of nudges related to energy conservation. However, opt-out schemes are a risk for utilities, as they might alienate their customers, and would also face substantial regulatory hurdles. This is most easily solved for new clients, where the selection of a default *must* be done anyhow, and thus consumers' attention can be drawn to it in the moment of signup. Switching an existing customer is more dangerous, as many consumers never really look at their bill. So if one were to "default" a change in their plan barring their intervening otherwise, this may end up enrolling people unwillingly. This could be solved through careful planning, in which inserts in bills, emails and as a last resort more costly phone calls, are used to ensure participation is truly voluntary and informed.

CONCLUSIONS

Nudges can help individuals achieve their goals by aligning their short-term and long-term incentives, changing their perceptions of success and failure, or helping them to understand how to accomplish their goals. While nudging people may not be sufficient to achieve all conservation goals, nudges can produce significant energy savings.

Based on current information, an electric utility or local government planning a nudge-based conservation campaign should combine nudges which have been shown to be effective after taking into account limitations due to regulation and cost. Any method is likely to be most effective when combined with information on topics such as why conservation is important, steps to aid energy conservation, and major sources of energy use in a typical household.

The easiest nudges to implement are information based, as they are relatively inexpensive and unlikely to be regulated. A program of comparing individuals' energy consumption to relevant peers like that used in Allcott ("Social Norms and Energy Conservation," working paper) currently appears to be the best method, as it has been subjected to the most rigorous testing

and shows a clear effect on energy use. Although the evidence is much weaker, it also appears that general calls for conservation can be effective, especially if they follow the template developed during the 2000-2001 California Energy Crisis, with community leaders making requests at times with a clear need for conservation (during peak use periods on hot summer days, for example). It also may be possible to obtain regulatory approval for providing electricity users with information about and mechanisms or incentives to make commitment contracts or voluntary price increases implemented by 3rd parties as means of attaining conservation goals, as long as none of the penalties are imposed by the utility company. Because the energy savings that result from an information campaign are likely to also be temporary, utilities or governments may want to consider making campaigns permanent to prevent reversion. Social pressure has been shown in many settings to be particularly powerful (e.g., in get-out-the-vote research, revealing voter turnout to peers has been shown to be far more effective than just about any other method (Gerber, Green, and Larimer, *American Political Science Review*, 2008), perhaps indicating that many voters place a higher value on social conformity than on the impact of their vote on the political process.

Electric utilities or local governments willing to undertake interventions with more difficult regulatory approval issues and higher costs should consider an opt-in real-time pricing scheme. The feasibility of such a scheme will depend on the pre-existing prevalence of smart meters in the service area or the willingness of utilities or governments to bear the cost of installing smart meters. Optimizing effectiveness may also require expensive investments to increase customer information about prices. This has the potential to improve energy conservation significantly in the short-term, although the long term effects may be smaller.

Finally, governments and utilities willing to undertake interventions involving substantial regulatory barriers could develop commitment contracts or voluntary price increases administered by the utility company. This is likely to be quite effective at promoting conservation, but may be impossible for many companies.

There is substantial latitude for innovation, improvement, and further evaluation of nudges designed to promote energy conservation. Widespread adoption of technologies like smart meters and networked appliances which report on energy use have the potential to make nudges more effective and less expensive to implement. At the same time, as more studies are conducted, the repertoire of proven nudge-based conservation strategies will expand. Rigorous testing of more flexible commitment contracts and the development of incentives and penalties which are acceptable to regulators

will make nudges increasingly effective at promoting conservation in the future.

In particular, further studies are needed to quantify the potential energy conservation which could be attained through the use of nudges, ranging from social contagion strategies, commitment contracts, incentive programs, etc. It is key that we study these carefully, using randomized evaluations, so that we do not fall prey to bias from individuals opting in being more likely to reduce energy conservation anyhow. We also need to examine true habit formation, not just short-term changes, in order to establish confidently appropriate long term policies.

PROJECT ENERGY CODE

EcoAlign, a strategic marketing agency, was launched to understand, document and develop strategies to close the “green gap” between consumers’ stated intentions and their actual purchasing behavior in connection to energy consumption and the environment. We deeply believe that for the “green gap” to be addressed a massive societal behavioral change is required, one that will be driven by more than good green products. For this reason, EcoAlign is now working with social scientists to discuss customer behavior towards sustainable energy consumption and conservation by identifying emotional, social, instinctual, psychological, subconscious codes that shape human actions and perceptions. This initiative is called “Project Energy Code.”

ECOALIGN: THE ENERGY AND ENVIRONMENT AGENCY

EcoAlign is the energy and environment marketing agency. We develop and execute marketing strategies for utilities, renewable energy providers and companies operating in the energy and environment space. We are uniquely suited to help companies achieve their business objectives, from reaching efficiency program targets and improving customer satisfaction, to launching new products, increasing market share and repositioning for growth in the green tech space.

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END NOTES

ⁱ It is important to note that the sample opted into the study, and were not compared to a control group through random assignment. Further, the group that received a "pricelight" was partially self-selected, so there may be other factors contributing to this result.

ⁱⁱ Since different regions of the country rely on different mixes of energy resources, the effect varies considerably by region. The Pacific Northwest, which relies on hydropower for substantial peak generating capacity, is affected differently by RTP than the Midwest, which has a greater reliance on coal. Thus, while the paper does suggest that RTP, if instituted nationally, would reduce carbon emissions, there would be some regional variation. Additionally, as new power plants are built the consequences of RTP will shift, albeit very slowly, as most power plants have long operational lives.

ⁱⁱⁱ As Founder and President, the author discloses that he owns equity in StickK.com, LLC.