Researcher finds ways to convince consumers to reduce their energy usage

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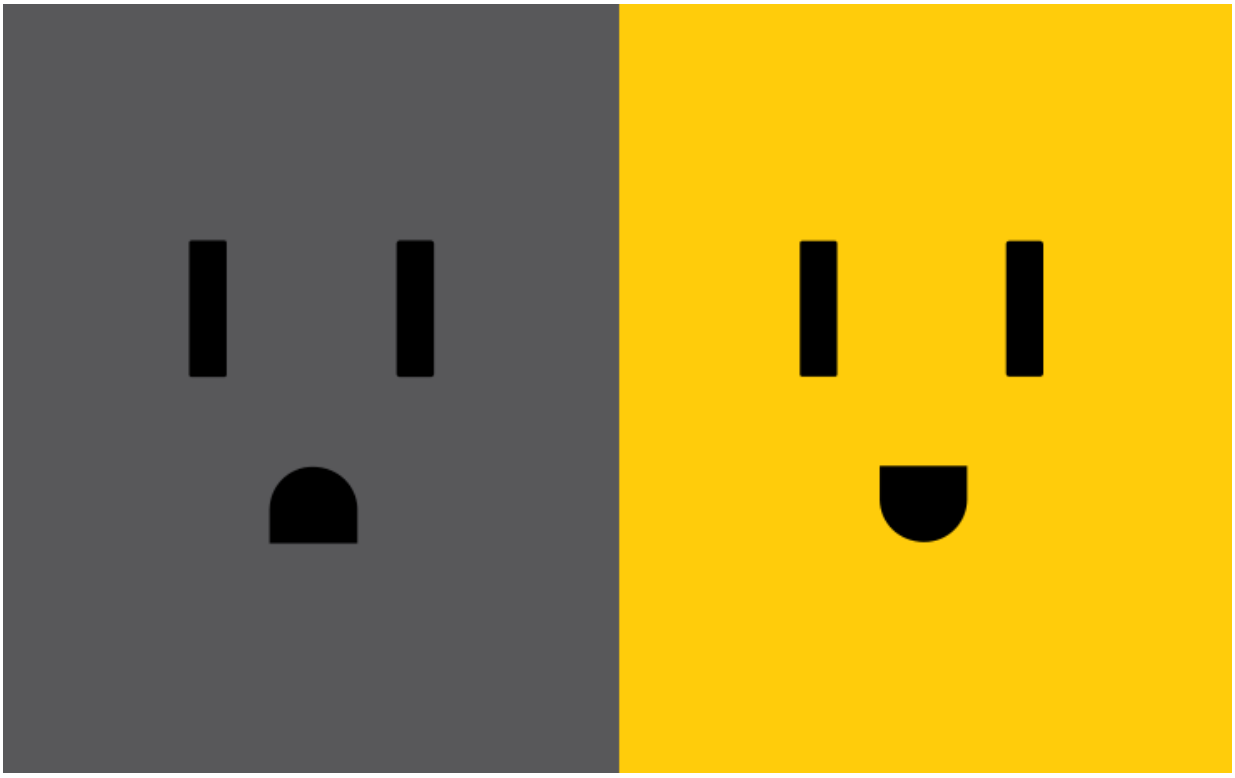

Credit: University of California, Los Angeles

Magali Delmas picks up her smartphone and touches the icon for her home thermostat. She is inside UCLA'S Institute of the Environment and Sustainability, where it is warm. But an icy wind is blowing outside, and she worries that her house might be too cold for her father, who is

visiting from France. With a tap-tap, she changes the thermostat to a warmer setting.

Delmas is a native of France, where conservation is encouraged from childhood. She is ever mindful of energy use, and not just her own. An environmental economist, her latest research focuses on motivating changes in behavior to conserve electricity, using unique and effective nudges. "Our stream of research explores how people are responding to any type of mes- saging and what drives change in terms of conservation," said Delmas, a management professor at both IoES and the Anderson School of Business. "It is very rare that people behave altruistically. So how do you make people aware of their impact, and how do you get them to care and act?"

Finding ways to persuade people to save electricity is an increasingly urgent quest. By law, Californians must double their energy efficiency by 2030. Scientists say 2015 was Earth's hottest year on record, mostly because of greenhouse gases. A quarter of all carbon dioxide emissions in the United States are caused by generating power for homes and businesses. Conserving with new technology and changing behavior could reduce carbon discharge by 123 metric tons per year—or about 20% of the dispersion attributed to household use.

Encouraging households to conserve power is difficult. Electricity is relatively cheap, about 4% of monthly expenses. "Keeping lights on all day and night probably won't cost you more than a few bucks a month," said Noah J. Goldstein, a professor at the Anderson School, whose primary research focuses on motivating behavioral change, and who responded to questions by email. "So people think, 'For only pennies a day, I don't even have to think about turning off the lights.' It is not that people don't respond to financial incentives; the problem is that financial incentives for engaging in environmentally friendly ways aren't typically big enough to sway people's behavior."

Raising electricity prices is difficult and not always politically feasible. Many utilities in the United States are subsidized, obscuring costs. "Not only is the environmental impact of electricity use invisible, meaning people don't really know what the impacts are," Delmas said, "but people don't really know how much electricity each appliance is using—and they don't really care."

Measuring consumption

To measure the value of informing consumers about harm to the environment and childhood health related to their energy use, researchers led by Delmas designed a study, published last year in *Proceedings of the National Academy of Sciences*, which analyzed the consumption of electricity by 118 graduate student households in UCLA apartments over eight months. The households received real-time, appliance-specific information about their energy use. The information was available around the clock on a website and summarized in weekly emails.

The experiment tested the effectiveness of different messages on energy conservation behavior with two groups. In the first, each household received information about its energy use paired with its negative impact on the environment and children's health. In the second group, each household received this information paired only with its monetary cost. Households in both groups were compared to the top 10% of their most efficient neighbors—and to a control group.

An example of an email showing environmental impact was: "Last week, you used 29% more electricity than your efficient neighbors. Over one year, you are adding 456 pounds of pollutants, which contribute to health impacts such as childhood asthma and cancer."

Residents who received messages about their energy consumption paired

with corresponding pounds of pollutants and negative impacts on childhood health cut their energy use by 8.9%. If they were families with children, they reduced their energy use by 19%.

The study showed that frequent messaging about household electricity consumption linked to its generation of fine particulate air pollution and its damage to health changed daily decision-making. Participants said they turned off unnecessary lights and unused electronic devices. Messages about health and environment may have resonated because

they were "morally sensitized consumers" who were disturbed by wasting energy and harming health, Delmas said. "People told us that they were surprised to learn about their impact on the environment and felt some kind of moral duty to reduce their consumption."

However, residents who received the monetary message did not change their electricity consumption. "People just learned that electricity is quite cheap," Delmas said. When the average users reduced consumption to levels of the most efficient users, they saved only about $5 per month.

The experiment was repeated in faculty housing in New Delhi with the same results. "Air pollution is a major issue in India," Delmas said. "Those who responded to health and environment messages reduced their electricity consumption by 18%, as compared to a control group." Again, monetary messages had no effect. "This was a surprise to us," she said. "We were expecting Indian households to be more sensitive to the financial savings." This also contrasted starkly with what people had said in a survey before the experiment. They claimed that saving money would be their main reason for saving electricity, but they acted differently.

The role of social pressure

In a separate study, Delmas' team investigated the role of social pressure to reduce energy consumption. The team installed electricity meters in 66 standardized dormitory rooms. The meters ran for nine months. Consumption in each room was compared weekly to that of the average electricity user.

One group of students received their readings privately, by email. "We gave people the information in real time and detailed appliance-level use," Delmas said, "but it had no impact."

Another group of students received their readings both privately and publicly. Their information was displayed on posters next to elevators so other students could see it. The posters marked above-average conservers with virtuous green dots and below-average conservers with red dots for wasters. "When the posters went up, it became serious," one student said. Thermostats were lowered. "I turned off all the lights and wore a lot of sweaters," another student said, "so I could get a green dot."

The result was impressive: a 20% reduction in energy use.

"We used social pressure to motivate them to act," Delmas said. "This was based purely on information, because students do not pay for electricity."

Delmas said the reduction lasted for three months after the feedback ended.

Peer pressure works among members of like-minded groups who know what the others are doing. Driving a Prius or a Tesla is a conspicuous badge of green values, Delmas said, just as drought-tolerant front yards show who is making water-saving changes. But it is more difficult to make a public showing of virtue among consumers of electricity.

Some utilities use software offered by Opower, a Texas-based technology company, to create detailed, personalized home energy reports comparing an individual household's usage to that of similar-sized households and offering tips on power reduction and goal-setting. Utilities that send such comparisons to their customers include Pacific Gas & Electric, Southern California Edison, Glendale Water & Power and San Diego Gas & Electric. Consumers compete for top spots on an Opower list sent out by Glendale Water & Power. "People will say, 'I went outside to turn off my circuit breaker so that I would win,' " said Craig Kuennen, a marketing administrator for the city. "Some people ask us to recheck the numbers because they were not No. 1!"

Home energy reports have contributed to consumer reductions in energy use of up to 2.5%, said Matt Maurer, vice president of communications for Opower. The firm has based the design of its energy reports on studies conducted by researchers including Professor Goldstein at UCLA and Robert Cialdini, professor emeritus of psychology at Arizona State University, who is on the Opower advisory board. Using peer pressure created by the reports, Glendale has reduced power consumption by 4% during times of peak demand, usually heat waves, Kuennen said. The savings totals 248,000 kilowatt hours of electricity annually, he said. This means that each household saves about 2 kilowatt hours per heat wave by turning air conditioners down or off, closing drapes, and turning off lights and TV sets. Kuennen said the changes endure after the heat waves end.

Using peer pressure can backfire. This hap- pens, said P. Wesley Schultz, a psychology professor at California State University San Marcos, when low-energy consumers become aware of the norm (sometimes called the magnetic middle) and increase their electricity use to meet the average. The effect can be eased, Schultz and his colleagues found, merely by adding happy faces to above-average conservation numbers on home energy reports and sad faces to below-average

numbers. "The basic smiley face message is quite a strong, universal one," Schultz said. "It is feedback from your group saying, 'We like what you are doing.' "

Financial vs. social incentives

"What's interesting is that most people think they are motivated by financial incentives and not at all by social norms," Goldstein said. "And yet, my colleagues and I have found that just the opposite is true in terms of what actually motivates people to conserve energy."

One advantage of messaging to motivate behavioral change is that it does not matter whether people understand what is influencing them to act. By coming up with a new way to frame information about electricity use—making it personal by citing pounds of pollutants and damage to children's health—the Delmas team created messaging that caused people to care and act. Using the information to exert social pressure made it doubly effective.

Until now, policymakers have focused on cost savings to motivate reductions in electricity use, Schultz said, because that is what people think is their own greatest concern. But because cost savings and penalties for not saving are so small, research shows that financial incentives simply do not work. Goldstein said it would be different if electricity prices were increased by, say, 4,000%—not a likely scenario. Meanwhile, consumers can be coaxed to care enough about negative environmental and health impacts to cut their use of power. With carefully worded messages, technological advances such as smart meters and computerized generation of highly detailed, real-time energy reports, researchers hope that policymakers, utilities and environmental activists can make the consequences of wasting electricity so clear that reducing consumption becomes the only choice.