

Study explains how consumers can be encouraged to conserve energy during peak periods

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Smart thermostat. Credit: Dan Lefebvre/Unsplash

New research by the UCLA Luskin Center for Innovation has identified how effective certain incentives can be in motivating people to use less

energy in their homes.

Electricity providers often need to encourage customers to reduce consumption in order to prevent blackouts or to avoid having to activate additional power plants—often natural gas-powered plants that pollute the environment.

The researchers found that promotional messages about how customers could save money on their electricity bills or earn other [financial rewards](#) were effective at motivating them to use less energy.

For [the study \(PDF\)](#), which was funded by a grant from the California Energy Commission, the UCLA researchers assessed data from [energy bills](#) for more than 20,000 California households in territories served by Pacific Gas and Electric, Southern California Edison and San Diego Gas & Electric.

The customers all participate in "demand [response](#) programs," which encourage users to save energy at times of high stress on the electrical grid, like during heat waves; they all also used one of two [smartphone apps](#)—[Chai Energy](#) or [OhmConnect](#)—that help users manage their home energy consumption. Often, the apps offered cash incentives to participants for adjusting their thermostats during times when demand for energy was highest.

The study revealed that offering participants financial rewards, on top of the amount of money they'd save simply for using less energy, had a measurable effect on reducing their energy use—although the amount of the financial incentive made relatively little difference. Collectively, the 20,000 households in the study had received over \$1 million in rewards over the previous two years through those incentive programs, in addition to the savings on their [electricity bills](#) from using the apps.

Encouraging flexibility in our energy system is especially important as the nation's infrastructure continues to shift to clean energy. For instance, weather can be unpredictable and impact the amount of electricity generated by solar panels or wind turbines. Demand response programs can be effective at reducing energy use during these times to avoid blackouts.

"In more good news for the environment, our study found that demand response programs result in overall reduction in energy use—not merely a shift of consumption to other hours or days," said J.R. DeShazo, the study's principal investigator and the director of the Luskin Center for Innovation.

That finding is particularly significant because some observers had suspected that demand response programs merely encouraged energy customers to shift their electricity use to other times of day—for example, by waiting to run their dishwashers or clothes dryers during overnight hours, when overall energy demand was lower—but without actually reducing the amount of energy they consumed. But the UCLA report concluded that customers' energy consumption did not increase in the hours or days surrounding a demand response event, suggesting that the approach resulted in actual reductions in consumption.

The households with the greatest reduction in consumption during demand response events were those with solar panels, plug-in electric vehicles and automation devices—gadgets like smart thermostats that can automatically alter energy usage but can be overridden by the owner. For example, automation devices can delay charging an electric vehicle or turn down an air conditioner until an off-peak time.

"Automation devices make participating in demand response programs effortless, and ultimately rewarding," said Kelly Trumbull, a co-author of the study and a Luskin Center for Innovation researcher. "They also

help secure predictable and reliable energy savings."

Demand response providers typically reward users based on their energy conservation relative to an energy consumption goal assigned by the utility. Researchers found that households reduce their [energy use](#) more when that consumption goal is more ambitious, assuming all other factors are constant.

"This finding underscores the importance of setting baselines and communicating them to customers," DeShazo said. "If we are asked to do more, we often will."

The study recommends actions utilities and third-party demand response providers—like the ones that market the energy management apps—can take to maximize both the environmental and economic benefits of residential demand response programs, including:

- Offering financial incentives and emphasizing the economic benefits to participants.
- Supporting the adoption of automation devices like smart thermostats.
- Inducing greater [energy](#) savings by setting ambitious conservation targets for customers.

Most Californians, depending on their [electricity providers](#), are eligible to participate in existing demand response services.

More information: Electricity Conservation During Critical Times: Identifying and Shaping Effective Demand Response Programs for Residential Customers: [innovation.luskin.ucla.edu/wp- ... g_Critical_Times.pdf](http://innovation.luskin.ucla.edu/wp-content/uploads/2015/07/Innovation-Critical-Times.pdf)

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