



## RESEARCH SUMMARY

# Nudges in the Marketplace: The Response of Household Electricity Consumption to Information and Monetary Incentives

by Anant Sudarshan

### KEY TAKEAWAYS

1. Policymakers use a variety of techniques to encourage households to reduce their energy use. One such technique employs “nudges,” or information aimed at persuading households to change their behaviors.
2. This study provides the first field evidence to evaluate the effect of information-based “nudges” on electricity consumption in the context of developing countries, where the significance of such approaches is profound given that access to electricity is insufficient and needs are rising.
3. The study uses a randomized control trial from evidence gathered through a real-world program. Households who were part of the experiment were separated into three groups: One group received report cards comparing their electricity usage to that of their peers; the second group received the report cards and were enrolled in a financial rewards program where they received money (or lost money) for reducing (or increasing) their electricity consumption in comparison to their peers; and the third group did not participate in either program.
4. The study found that people who received the informational “nudges” reduced their electricity use by 7 percent. To compare nudges to a traditional policy instrument, the study also looked at how households respond to price changes. This showed that duplicating the effect of nudges would require a tariff increase as high as 12.5 percent.
5. Counterintuitively, households increased their electricity consumption when they received both the behavioral information and monetary incentives. When people are responding to non-monetary incentives, throwing in money to ‘sweeten the deal’ may destroy responsiveness, not increase it. The psychology and behavioral economics literature suggests that one reason might be emerging distrust. That is: Why is a utility paying me? What’s in it for them?
6. Additionally, in a novel finding, the study found that information changed behavior in two ways. Not only did it reduce consumption directly, it also made households more responsive to tariffs.
7. Although “nudges” may have significant potential, they also come with challenges for policymakers seeking to use them in reliable ways. Mixing policy tools may have unexpected results.

## Introduction

Policymakers around the world see energy efficiency as a tool to reduce electricity use, saving consumers money and reducing emissions that lead to pollution and climate change. However, its usefulness as a policy tool has even greater significance in developing countries where access to electricity is insufficient and needs are rising.

This study examines techniques to encourage energy efficiency in India, where 300 million people lack access to reliable electricity. While lack of access remains a significant challenge, demand for electricity is rising because of population growth and a growing middle class that rightly views electricity as a necessary element of economic prosperity. Conserving electricity in this setting is important from the perspective of households who would like to save money. And, it is important from the perspective of the government and utilities who could then use the conserved electricity to ensure more reliable supplies.

Policymakers use various techniques to encourage energy efficiency. For example, in the United States many programs provide households with subsidies to make energy-efficiency improvements like weatherizing windows or improving insulation. Some studies have found these approaches to be ineffective and costly. Another approach could be to “nudge” consumers towards behaviors that would allow them to conserve energy by comparing their usage to that of their peers and supplying tips for ways to save.

“With three hundred million people lacking access to reliable electricity in India, finding a way to conserve electricity is an essential policy objective. This study demonstrates significant impacts via an approach that relies on simply telling households how they compare with their peers, and thus ‘nudging’ them to make the right choices.”

ANANT SUDARSHAN  
DIRECTOR, EPIC-INDIA

## Research Design

This study evaluates the use of “nudges” as a policy technique to encourage households to conserve electricity. The study used both a randomized control trial and a quasi-experiment to determine its results.

The randomized control trial ran between May and August 2012 in New Delhi, India. All the households in the experiment were part of a single residential community living in identical two- or three-bedroom apartments. The large appliances in the homes were also similar, with most homes containing the same pre-installed air conditioners and water heaters.

This underlines the role individual behaviors, as opposed to unique features of the appliances and buildings, played in determining electricity consumption.

Homes in the experiment were provided electricity from two sources. The primary supply source for households was electricity sourced from the grid. However, households also faced frequent, unscheduled grid outages because of crippling electricity shortages occurring at different times of the day for varying durations. During these outage periods, households used captive power generated via four on-site diesel generators within the residential community. An estate management company for the community provided this diesel power, but at a price. Regular grid power supply was billed at 3.2 Indian Rupees per kilowatt-hour (about 5 cents) and captive diesel power at 12.10 Indian Rupees per kilowatt-hour (about 20 cents).

During the four-month period studied, the estate management company decided to pilot two interventions aimed at reducing household electricity consumption. The author used these pilot projects to form the randomized control trial, using data from 466 apartments. Households were separated into three groups.

One group received a weekly report card, delivered by the estate management company. The report cards provided the households’ electricity consumption for the preceding week for both grid electricity (low priced) and backup diesel power (high priced). It then compared this usage to the average consumption of other households in the community. The weekly report cards also provided a general set of tips on how to save energy.

The second group received the same report cards, but were also enrolled in a reward scheme. Every household was provided with a starting reward balance of 750 Indian Rupees (about \$13). This reward balance could increase or decrease depending on the difference between household electricity consumption and the peer average. So, when consuming less than the average, the reward balance increased at the rate of 2.00 Indian Rupees (3 cents) per unit for grid electricity and 4.00 Indian Rupees (6 cents) per unit for diesel electricity. When consuming more than the average, the reward balance decreased by the same rates.

The third group, the control group, was not part of either program.

To benchmark the effect of nudges, the author also sought to measure the effect of electricity price changes. To do this, he exploited a unique feature of households in the study. It turned out that different households in exactly the same gated community experienced different outage durations on any given day because their electricity supply originated from different portions of the grid. This meant the daily prices they experienced were also different. Using this variation, the author was able to cleanly estimate how households responded to price changes and nudges at the same time.

## Findings

### 1. Information to “nudge” households to decrease their electricity use, such as comparing their usage to that of peers and providing tips on how to conserve, helps households save electricity.

The study found that over the course of the summer months studied, the households that received “nudges” to reduce electricity consumption through information about how their electricity stacked up to that of their peers and tips on how to save reduced their average electricity usage by 7 percent. Of those households, those that had been consuming more than their peers saved the most—though even households consuming less than their peers still saved. That said, although nudges worked on average, not all consumption responded the same way. During outage periods, households did not reduce consumption.

### 2. Providing information to help households save electricity proved about as effective as a 12.5 percent tariff hike. It also made households more responsive to tariff changes in general.

Separately estimating the response to price showed that replicating the effect of the “nudge” through price changes alone would require at least a 12.5 percent increase in the price. Interestingly, the response to price also depended on the nudge. In a novel finding, the study found that information not only reduced consumption directly, it also made households more responsiveness to tariffs.

### 3. When monetary incentives were added to the behavioral information households no longer reduced consumption.

Counterintuitively, the author discovered that households who received both the informational “nudges” and the reward system did not reduce consumption at all.

The psychology and behavioral economics literature suggests that one reason might be emerging distrust when offered a financial contract. When a profit-making entity provides households with financial incentives to save money, they may question the motivations of the utility and the offer as a whole. Households may perceive the program as being less about the environment and their own welfare and instead a way for the utility to save money or charge them more in the future. Given that electricity utilities and governments often enjoy very little trust to begin with, this type of response may indicate a problem in creating conservation policies reliant on monetary incentives.

## Policy Implications

Policymakers use a variety of techniques to encourage households to reduce their energy use—from subsidies aimed at employing energy-efficiency measures to financial rewards for using energy-saving practices. One possible technique is the use of “nudges,” or supplying households with information to encourage them to change their behaviors.

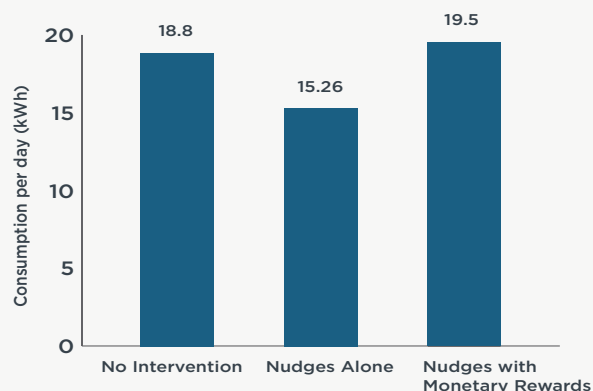
“The challenges identified raise important design questions for policymakers moving forward, not just in India but in other developing countries as well, where it is so important to identify approaches that can boost electricity supplies at a time when demand is exponentially rising. These tools are a wonderful opportunity for policymakers, but there is an art to using them effectively.”

ANANT SUDARSHAN  
DIRECTOR, EPIC-INDIA

This study explores the strengths and weaknesses of using “nudges” in a developing world context, and makes important discoveries that policymakers can use to help form effective policies that incorporate such behavioral cues. Nudges by themselves can work well and match the effectiveness of modest tariff hikes. Yet there is often the temptation to pair “nudges” with other financial incentives. It appears that doing so may crowd out the impact of the “nudges” and may reverse the effect on energy conservation efforts. This response may be exacerbated where there is a lack of trust between consumers and utilities or governments.

Thus, although “nudges” may have significant potential, they also come with challenges for policymakers seeking to use them in reliable ways. This study highlights the importance of careful design for policymakers seeking to use these behavioral instruments.

Figure 1 • Experiment Scenarios



The Energy Policy Institute at the University of Chicago, India (EPIC-India) is confronting the global energy challenge by working to ensure that energy markets provide access to reliable, affordable energy, while limiting environmental and social damages. We do this using a unique interdisciplinary approach that translates robust, data-driven research into real-world impacts through strategic outreach and training for the next generation of global energy leaders. A hub of our efforts centers in India, where we maintain a robust research portfolio and deep network of collaborations. EPIC-India is based at the University of Chicago Center in Delhi.