



USING SOCIAL NORMS TO DECREASE ENERGY USE IN PUBLIC HOUSING

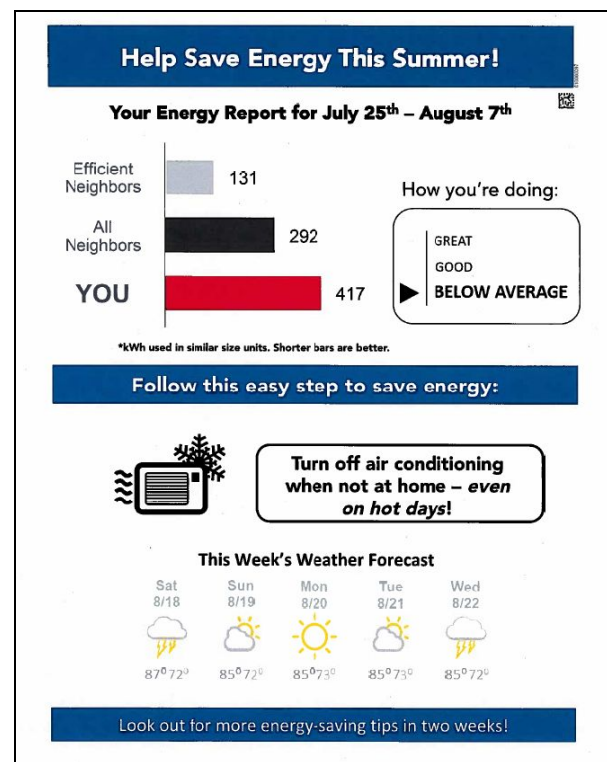
Letters with feedback on energy use and comparisons to efficient neighbors did not reduce energy use among public housing residents

Target a Priority Outcome The Department of Housing and Urban Development (HUD) spends more than \$1.5 billion per year on public housing utility costs for heating, cooling, and lighting.¹ HUD seeks to encourage residents of federally assisted public housing developments to reduce household energy use, thereby reducing Federal expenditures on public housing utilities. New York City Housing Authority (NYCHA), the largest public housing authority in North America, serves over 400,000 public housing residents in 325 developments across New York City's five boroughs.²

Translate Evidence-Based Insights Many public housing residents do not receive regular feedback on their energy use or pay for utilities. Public housing residents may be willing to take action to reduce energy use but may not know whether improvements are possible or what actions to take to conserve energy. Providing descriptive feedback on one's own energy use in comparison to neighbors' energy use, coupled with a statement highlighting that low energy use is a desirable behavior, can reduce energy use among residential utility customers.³ Less is known about how these methods may reduce energy use among public housing residents.

OES and HUD's Office of Policy Development and Research (PD&R) collaborated to test whether

sending letters with individualized feedback and social comparisons of energy use is effective at encouraging federally assisted public housing residents to reduce energy use.



OES developed a series of four letters to provide regular feedback and energy use comparisons to residents. The letters showed the recipient apartment's total energy use in kilowatt-hours (kWh) over the previous two weeks, the average total energy use for all residents in similar-sized apartments, and the total energy use for efficient similar-sized apartments.⁴ The letters also contained feedback to show that lower energy use is better: a text box displayed "great" if the apartments energy use was less than efficient

¹ U.S. Department of Housing and Urban Development. *Progress Report and Energy Action Plan Report to Congress, Section 154, Energy Policy Act of 2005* (2012). <https://www.hud.gov/sites/documents/OSHCENERGYREPORT2012.PDF>

² New York City Housing Authority. *NYCHA 2018 Fact Sheet* (2018). www1.nyc.gov/assets/nycha/downloads/pdf/NYCHA-Fact-Sheet_2018_Final.pdf

³ Studies of social comparisons and norms incorporated in utility bills show a reduction in energy use between 0.81% and 2.55%. Jon M. Jachimowicz, Oliver P. Hauser, Julia D. O'Brien, Erin Sherman and Adam D. Galinsky, "The critical role of second-order normative beliefs in predicting energy conservation," *Nature Human Behavior*, 2 (2018): 757-764.

⁴ Letters for apartments with missing data for the prior two-week period contained the bar chart with only the efficient and average neighbor energy use bars, an a message to "be an energy efficient neighbor!" instead of the image with the comparison indicator.

neighbors, “good” if energy use was less than average neighbors but more than efficient neighbors, or “below average” if energy use was more than average neighbors. All letters included a single energy-saving tip and a five-day weather forecast in the bottom half of the letters. The back of each letter displayed the same information in Spanish.

Embed Tests The evidence-based insight was tested with a randomized control trial of 4,723 apartments between August and October 2018. Approximately half of the apartments (2,360) at seven New York City Housing Authority (NYCHA) developments were randomly selected to be sent a series of four letters with social comparisons and energy-saving tips beginning in August 2018. Average daily energy use for these apartments was compared to average daily energy use for 2,363 apartments that were not sent letters. Apartments were randomly assigned to either the letter or no letter group based on development and number of bedrooms blocks. The effectiveness of the intervention was measured over two outcome periods: the first week after the first letter was sent and the eight-week period after the first letter was sent.

Analyze Using Existing Data Readings from existing wireless energy modules (WEMs) collected by NYCHA were used to observe energy use at 15-minute increments in each apartment. Average daily energy use was observed for two weeks prior to letters being sent to residents (August 1 - August 14), the one-week outcome period (August 22 - August 28), and the eight-week outcome period (August 22 - October 16).⁵ A total of 2,981 out of the full sample of 4,723 apartments had valid energy readings prior to sending the first letter and during the one-week outcome period, and 3,029 apartments had valid energy readings prior to sending at least two of the four letter and during the eight-week outcome period.

Results There was no significant difference in energy use between the letter and no letter groups

of apartments over either outcome period. Average daily energy use in the control group during the week immediately after the first letter was sent was 19.4 kWh; energy use was 0.04 kWh per day lower for apartments in the letter group, but the difference was not statistically significant ($p = 0.824$, 95% CI [-0.830, 0.757]). Average daily energy use for the control group during the eight-week outcome period was 16.0 kWh; energy use was 0.12 kWh per day higher for the letter group, but the difference was not statistically significant ($p = 0.429$, 95% CI [-0.638, 0.873]). Using an alternate method of controlling for covariates yielded qualitatively similar results.⁶

Build Evidence This study shows that housing authorities that have energy data for individual apartments can provide feedback to residents on their energy use, but feedback alone may be ineffective at reducing energy use. One possible reason the results from the private sector did not replicate in this setting is that residents do not pay their own electricity bills. Future tests of energy use in public housing may need to examine the link between financial incentives and energy use, or consider strategies that are expected to result in larger reductions in energy use (for example, energy-efficient upgrades).

⁵ Unless noted otherwise, all of the analysis reported in this abstract was prespecified in an analysis plan, which can be found at <https://oes.gsa.gov/projects/energy-use-feedback/>.

⁶ Including all interactions between treatment and covariates, which was not specified in the analysis plan, resulted in estimates that were similar in magnitude and precision. Winston Lin, “Agnostic notes on regression adjustments to experimental data: reexamining Freedman’s critique,” *The Annals of Applied Statistics*, 7 (2013): 295-318.