




Big Bills No Money

Behavioral insights from an energy study of low-income households with high electrical usage





*A virtual snapshot
Presented at BECC 2020*

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We conducted a study

Purpose: Inform ComEd programs for income eligible customers

	Chicagoland (including rural parts of northern Illinois)
	ComEd income eligible customers with high usage <ul style="list-style-type: none"> • 80th percentile (11,000 kWh/year or more)
	Late 2018, early 2019
	Screening for income eligibility (n=483) Telephone-web survey (n=293) In-home visits (n=19) Telephone interviews (n=16)

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This snapshot presents selected behavior-oriented insights from a study of low-income households with high usage in northern Illinois. Read on if you would like more details about the study or move on to the next slide to read about results.


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Commonwealth Edison (ComEd) commissioned this study to better understand income eligible customers with high usage after responsibility for providing energy efficiency services to income eligible households shifted from an Illinois state agency to the state's utilities. We conducted the study in late 2018 and early 2019 to help inform ComEd's program efforts. The study consisted of an examination of all residential accounts, sampling of 483 households that were modeled to be likely to meet income eligibility thresholds, a screening survey to verify eligibility (n=483), a detailed telephone-web survey to understand these households' homes from a technical and behavioral perspective (n=293), and follow-up visits (n=19) and in-depth telephone interviews (n=16).

For ComEd customers, income eligibility thresholds are set at 80 percent of

area median income. As of the date of this BECC conference, that means \$51,000 for a one-person household and \$65,550 for a household of three people in most of the Chicago metropolitan area. We defined high usage as the 80th percentile of residential usage, or 11,000 kilowatt-hours of electric consumption per year.

Just to be clear, income eligible households use less energy, on average, than residential customers generally. However, some use a lot. The resulting energy bills are a challenge for these households (or require public support in other cases). High users often have the greatest efficiency opportunities, and that is why we study them.

 **We found all the usual causes of high usage...**

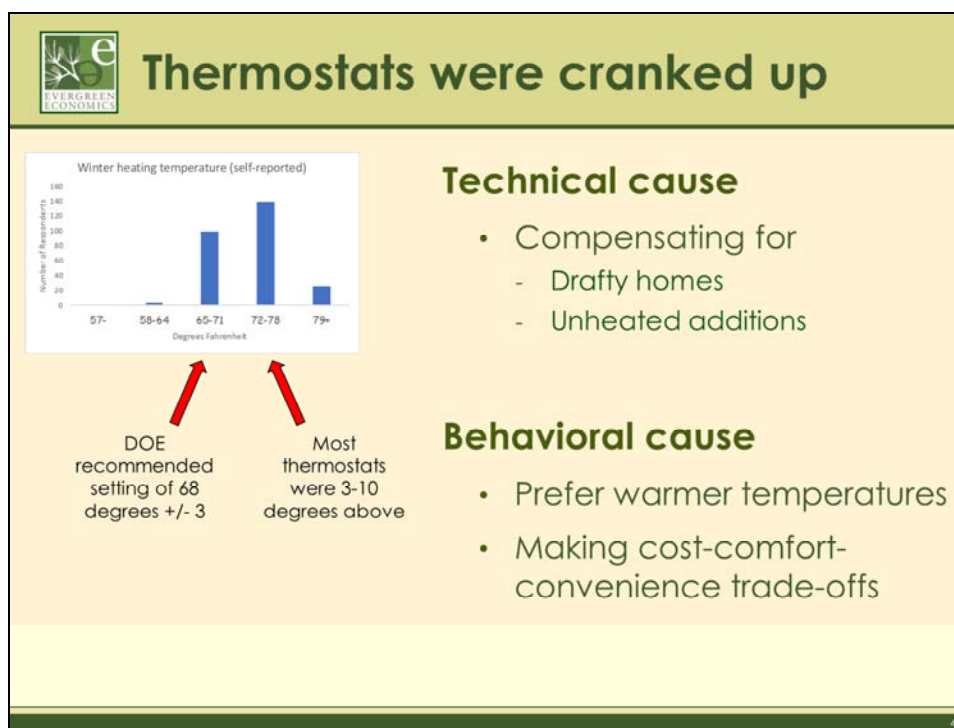
Contributors to high electric usage	
	Building envelope deficiencies (insulation, air infiltration, drafts)
	Inefficient appliances
	Split incentives (renters, owners with short time horizons)
	Electric heating (primary plus supplemental electric space heaters)

... but there were surprises too.

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Many of the causes of high usage are exactly what one might expect. We found old, leaky, underinsulated buildings; inefficient appliances; electric heating; and split incentives. Existing low-income weatherization programs already address these issues. Let's focus instead on some of the surprising findings from our study, which coincidentally also shed light on the behavior-technology intersection.


One brief note on electric heating. While it is to be expected that households with primary electric heating would appear as electric high users, we also found fairly frequent supplemental electric space heating with portable space heaters. That is an indication of efficiency opportunities by eliminating the reasons for the need for supplemental heating or an educational opportunity for households that do not realize how inefficient electric heating can be.




The majority of our survey respondents self-reported winter thermostat settings that exceeded DOE recommended temperatures by more than 3 degrees, some by substantially more. Our field researcher reported uncomfortably warm temperatures in multiple homes. These settings lead to higher energy use. There are both technical and behavioral causes. In many homes, leaky building envelopes and uneven heating due to additions or other factors create cold spots. Occupants compensate by raising the home thermostat or using electric space heaters. Both approaches lead to energy inefficiencies and neither solves the root cause. (Low-income energy efficiency programs seek to address those root causes with free home weatherization.)

But, we also noted behavioral factors at play through our interviews. Some home occupants referred directly to preferring higher temperatures and to choosing not to ask household members to put on socks to stay warm. Those households are making trade-offs not just between comfort and cost, but seemingly also between convenience and cost.

This finding has implications both for considerations of equity and for the use of smart thermostats in some low-income households.



Refrigerators and freezers galore



1/4 of single-family households had 3+ refrigerators / freezers...

- Many are old / second hand
- These devices drive electricity usage
- Low-income programs often allow for just one

... often for very good reasons


- Purchase food in bulk monthly to save money
- Feed family members who live elsewhere

The study finding that surprised us the most is the prevalence of second and third refrigerators and freezers and the very good reasons people presented for operating them. Often, in the energy efficiency field, we view a second refrigerator as a luxury and perhaps an unnecessary one. Some residential efficiency programs seek to convince households to abandon secondary refrigerators, and low-income programs generally assume that household only need one (and will replace an older model with a newer, energy-saving one at no cost). Yet, a quarter of our survey respondents indicated they had at least three refrigerators or freezers!


Interviews revealed surprising reasons high energy-using low-income households maintain multiple refrigerators or freezers. Some explained that they purchase food in bulk, sometimes monthly, to save money and manage cashflow. They need the storage capacity to facilitate their efforts to reduce food costs. Others indicated that they feed more people than just their immediate household members. Family members who live nearby – especially children associated with the extended family – come and go regularly. Thus, a seemingly small household can feed larger numbers of people at times.

These revelations have implications for the design of low-income energy

efficiency programs that seek to improve household well-being rather than just reduce energy costs.



Home Energy Reports getting noticed to little avail...



Home Energy Reports are energy efficiency's most common behavioral intervention. They provide social-normed feedback to high users.

Income eligible high users notice the Home Energy Reports (HERs)

- People mentioned them to us ... unprompted

HERs are not actionable

- HERs provide generic tips that assume home ownership and financial means
- "Tell me something I can use"


Reports customized to income eligible high users would be more effective

- Drive them to participate in the program AND/OR
- Identify likely issues through billing data analysis and drive customers to solutions for their specific problems

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Finally, we were intrigued to hear households we visited refer to the home energy reports they receive. Some utilities, including ComEd, hire a vendor to send these reports to their top 10 or 20 percent of residential users. The reports essentially say "you are using more than your peers" and provide some tips to reduce usage. Overall, these reports account for meaningful shares of verified energy savings reported by energy efficiency programs. In other words, they work. The combination of social norming and feedback engages recipients and prompts them to reduce their energy usage by an average of 1 or 2 percent, which is meaningful in the energy efficiency world.

However, we had a different experience with some of the homes we visited. People volunteered that they had gotten those letters, but they didn't know what to do with them. It was obvious that the generic energy saving tips on them don't apply to high user income eligible households in the same way since some of the agency they have to make changes and some of the changes that can be made are different than for higher earning high users. They would probably be more effective if they were customized to the income eligible households by driving them to the programs designed for them. Even better, they could speak to some of the specific savings opportunities in the homes based on remote data analysis.



To engage further ...

Check out ComEd's study summary

- [Follow the link here](https://www.comedemergingtech.com/project/high-use-needs-assessment)
(<https://www.comedemergingtech.com/project/high-use-needs-assessment>)

Reach out to the study's principal investigator

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Thank you for checking out my snapshot presentation. I'd be happy to discuss our results and their implications further or to connect you with the ComEd team. - Ingo