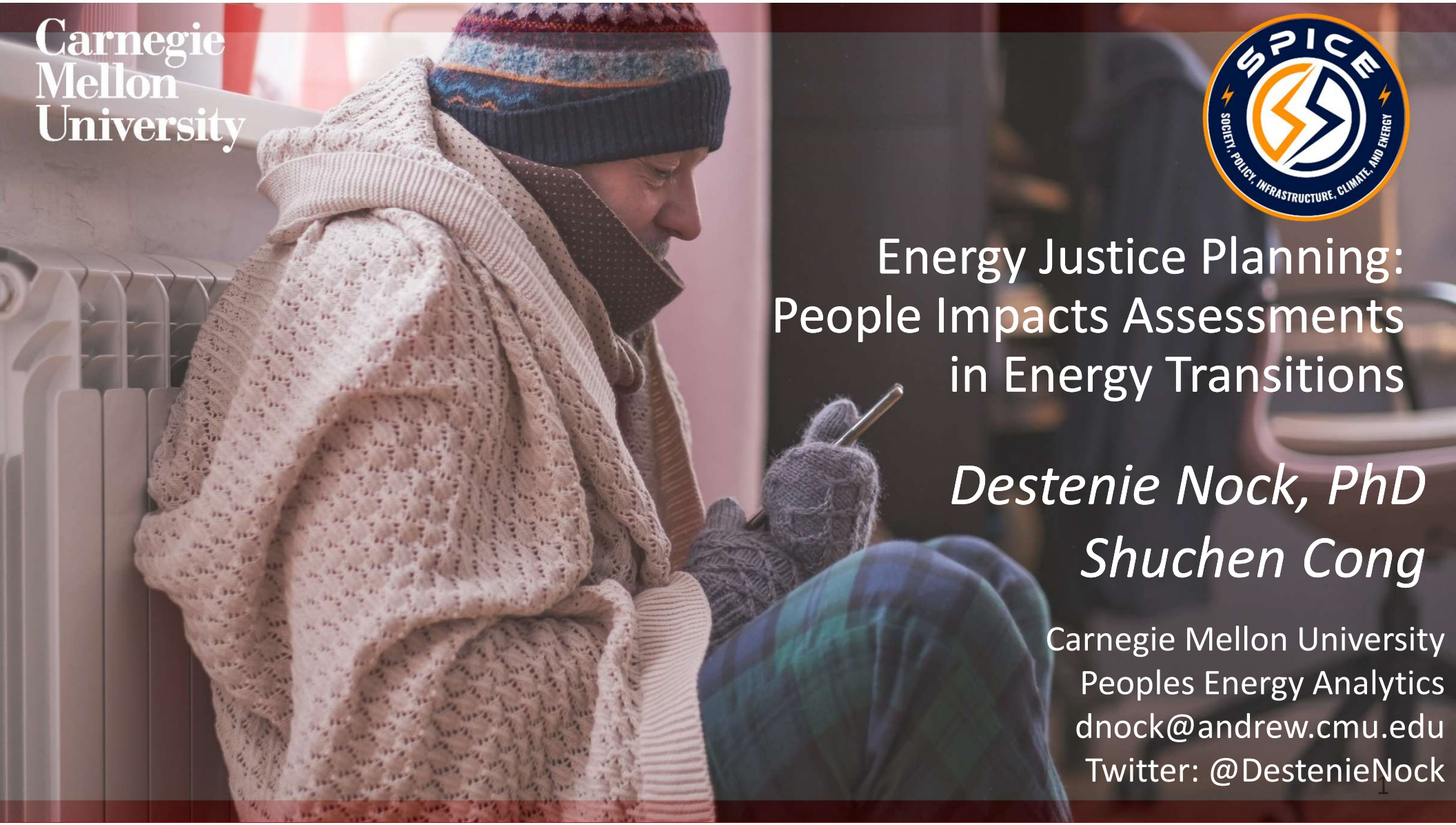

Carnegie Mellon University

Energy Justice Planning: People Impacts Assessments in Energy Transitions

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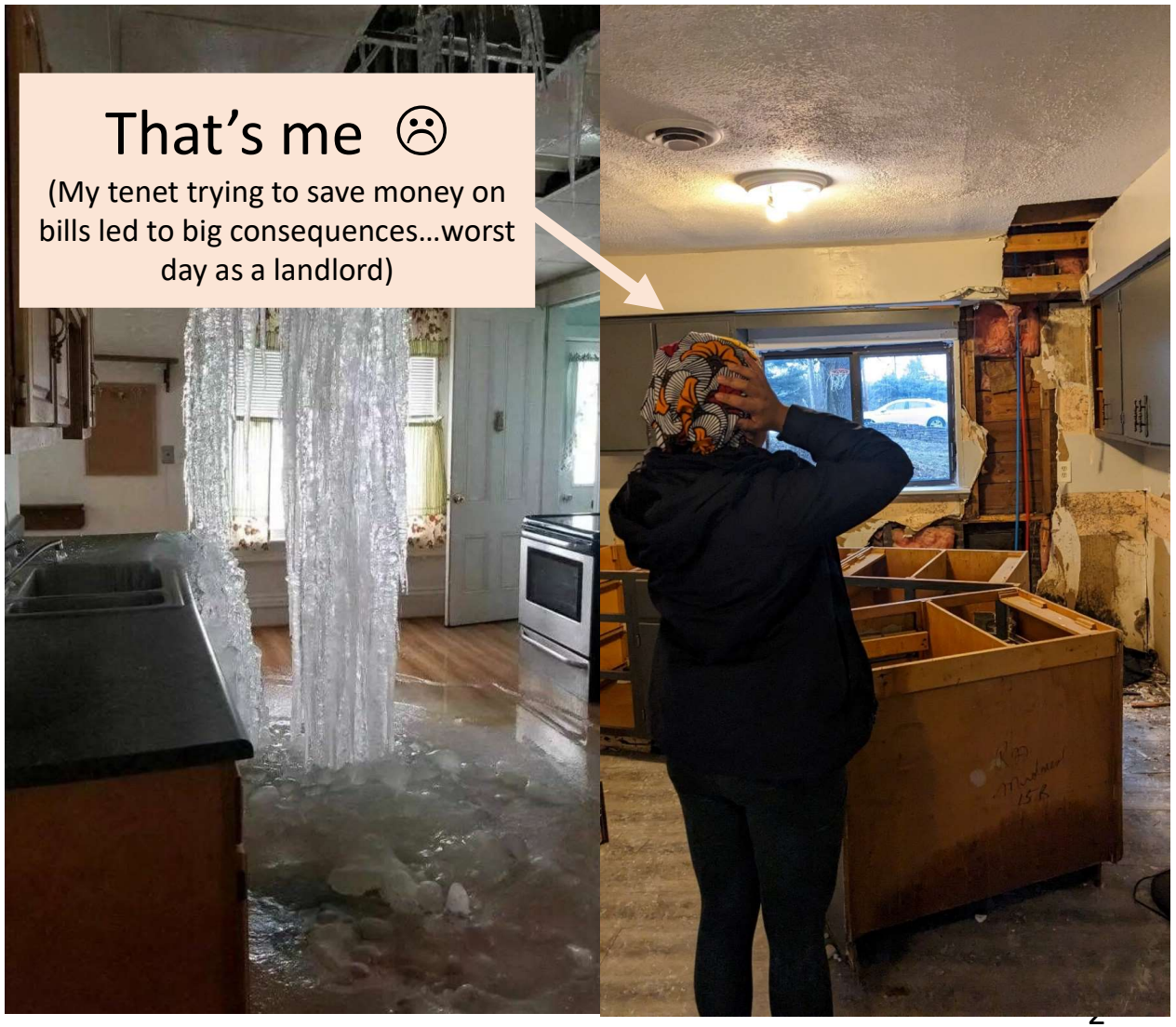
How Many People In the Audience Have Experienced Pipes Freezing in your Home?

2022 Christmas cold snap in led to the entire duplex losing access to water



The Problem

US households behind on utility bills

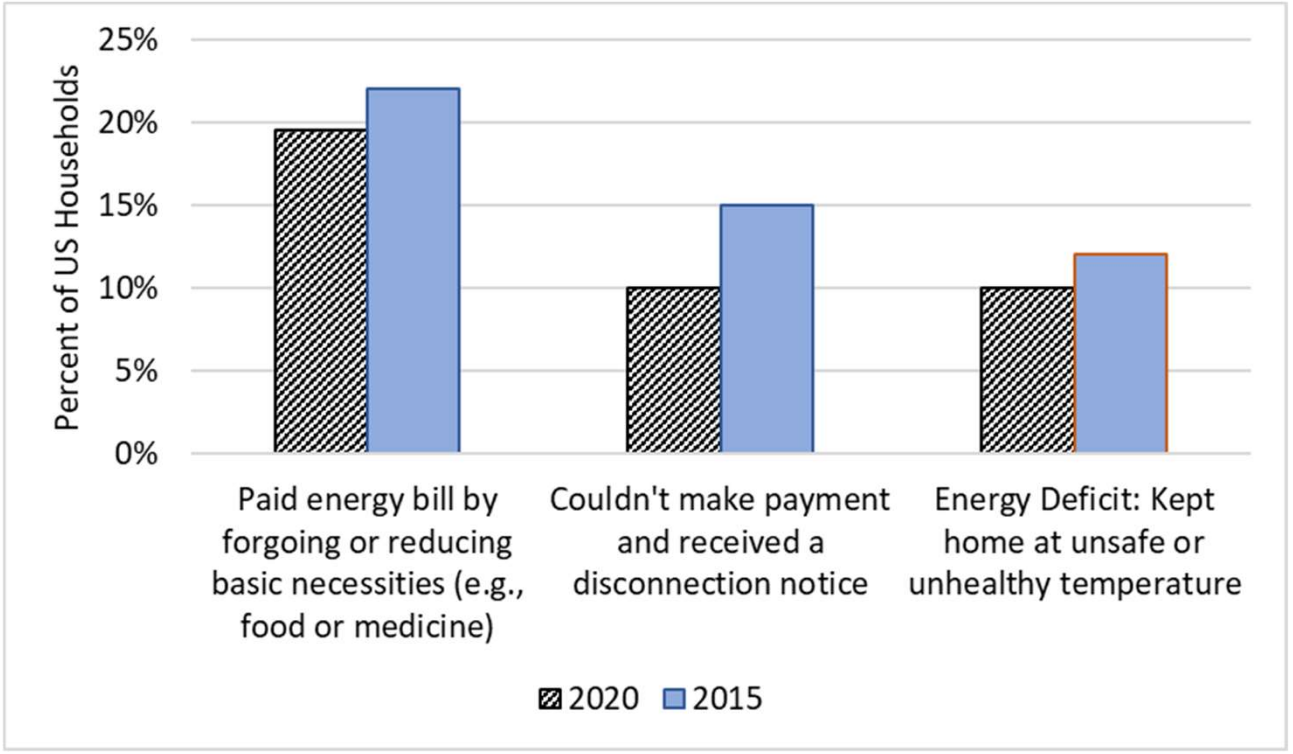
Owed to 169 electric and gas utilities by the end of 2020

Estimated unused low-income energy assistance annually

Energy Insecurity is High In the US

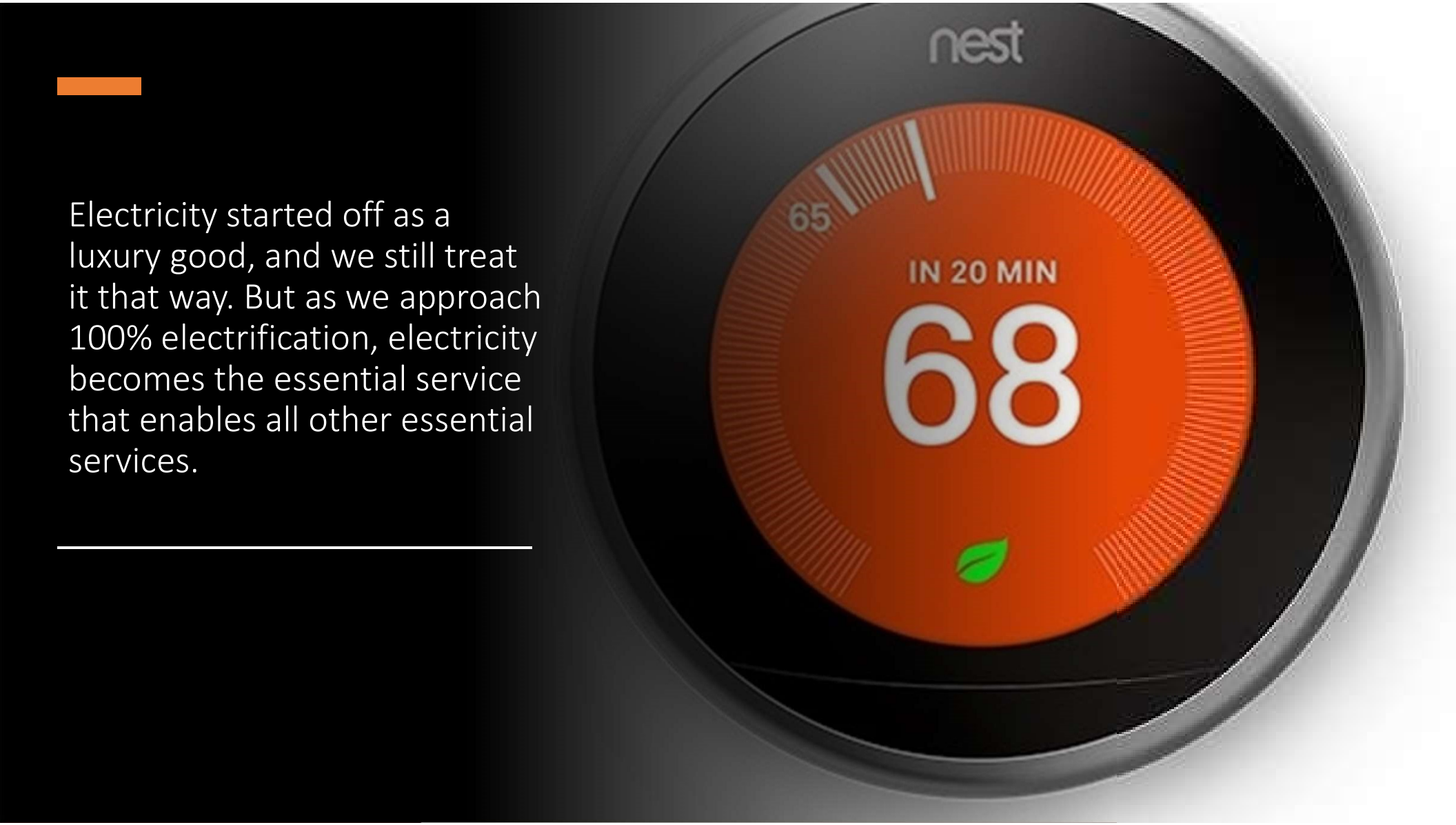
RECS 2022

Energy Insecurity is High In the US

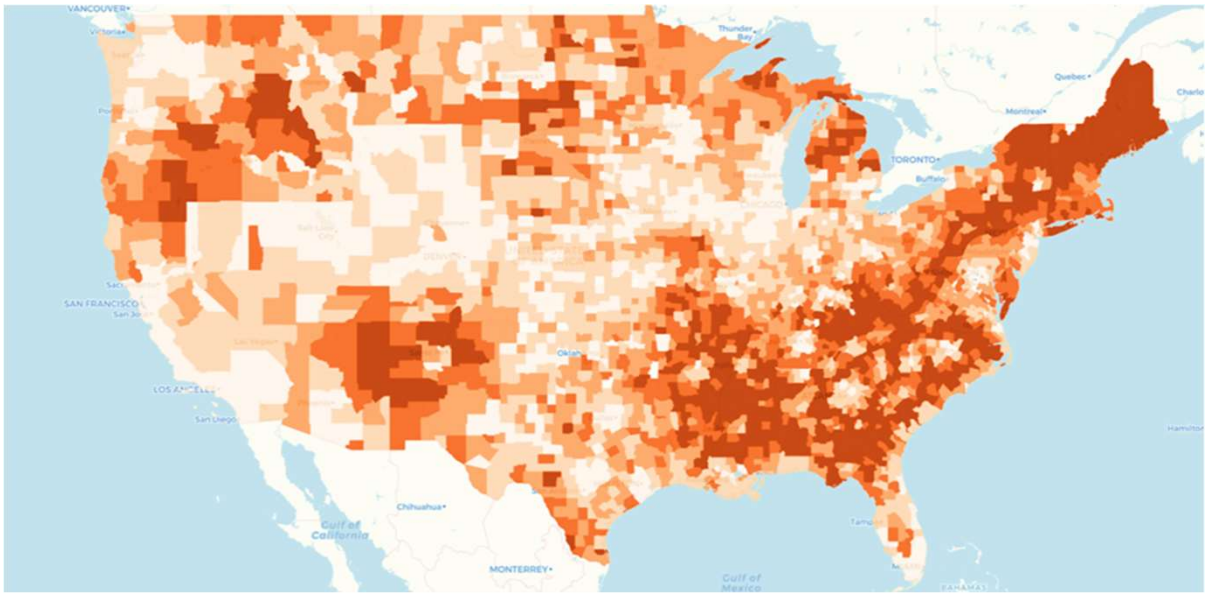


RECS 2022

Electricity started off as a luxury good, and we still treat it that way. But as we approach 100% electrification, electricity becomes the essential service that enables all other essential services.

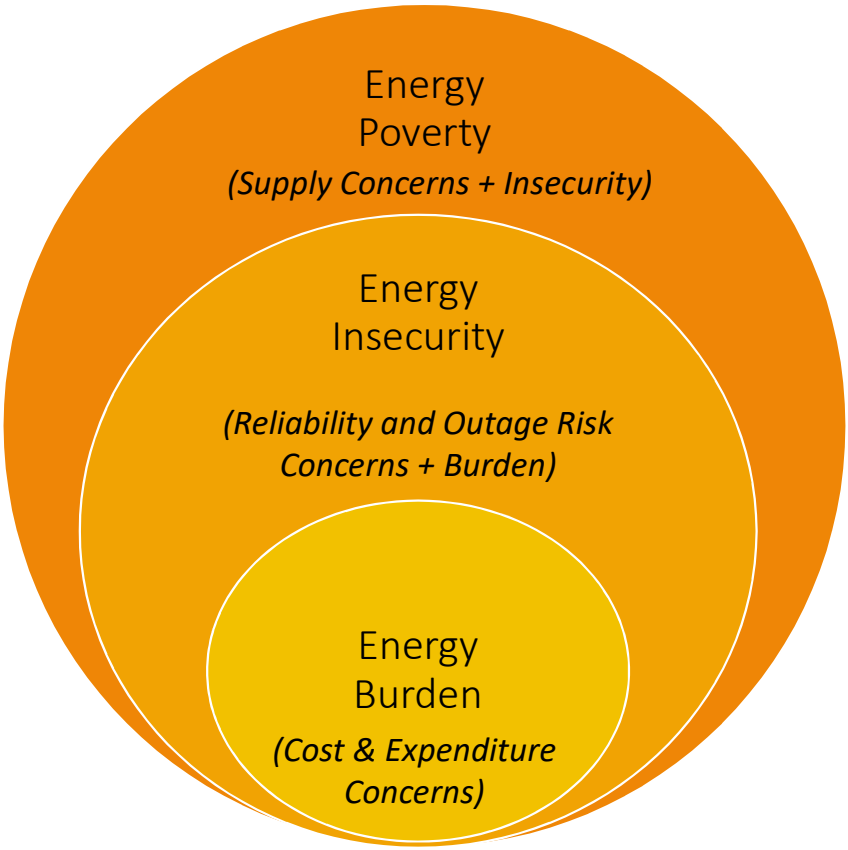


Energy poverty discussions dominated by Energy Burden



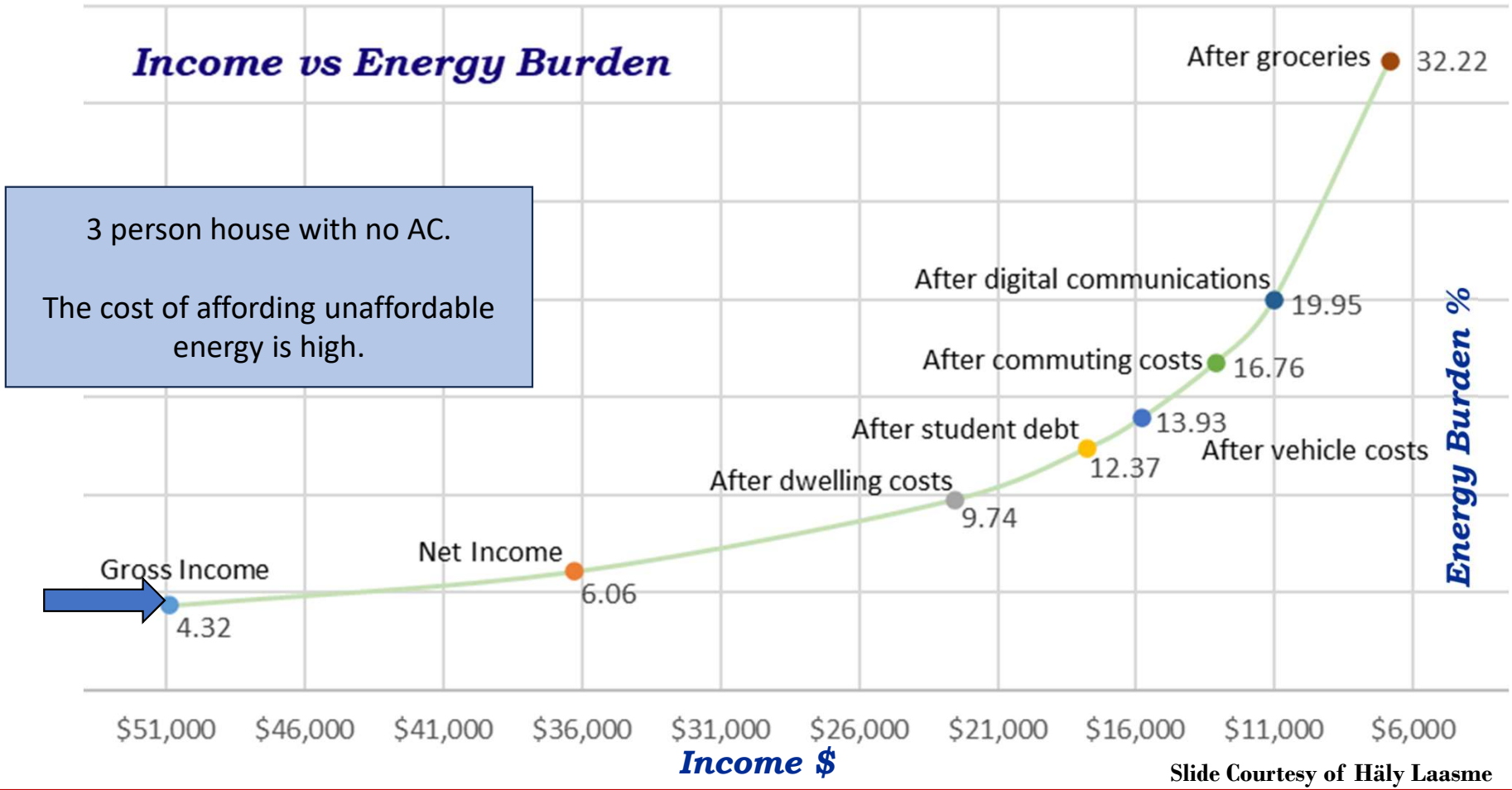
Energy burdens (at the county level) for LMI (low and moderate-income) households. The lightest color in the choropleth scale is <6% of annual income spent on housing energy bills, and the darkest is >19%.

https://blog.ucsusa.org/joseph-daniel/how-to-make-energy-burden-less-bad



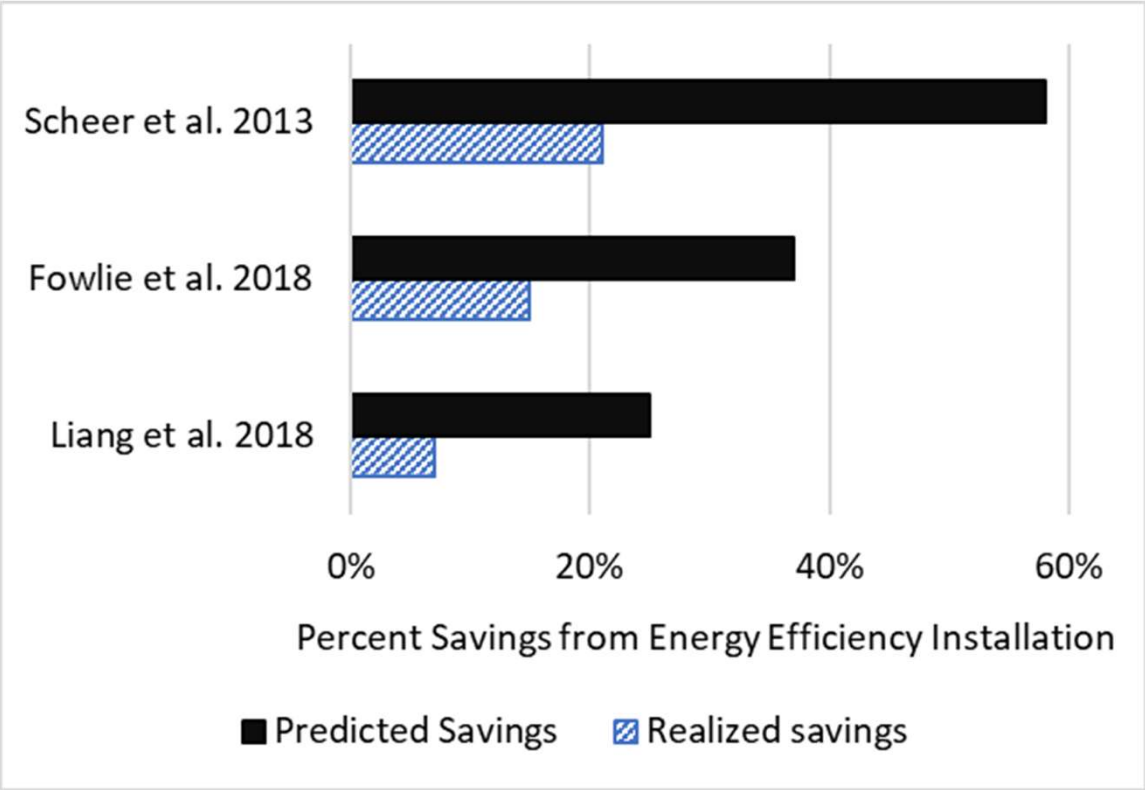
Many things you need to pay before you get to your energy bill

Gross Income misses the big picture and true fraction



Slide Courtesy of Häly Laasme

Energy Efficiency is a Solution But There Are Reports of Savings Being Less than Projected



- Rebound effect isn't always bad

Energy Limiting Behavior: A Hidden Inequity

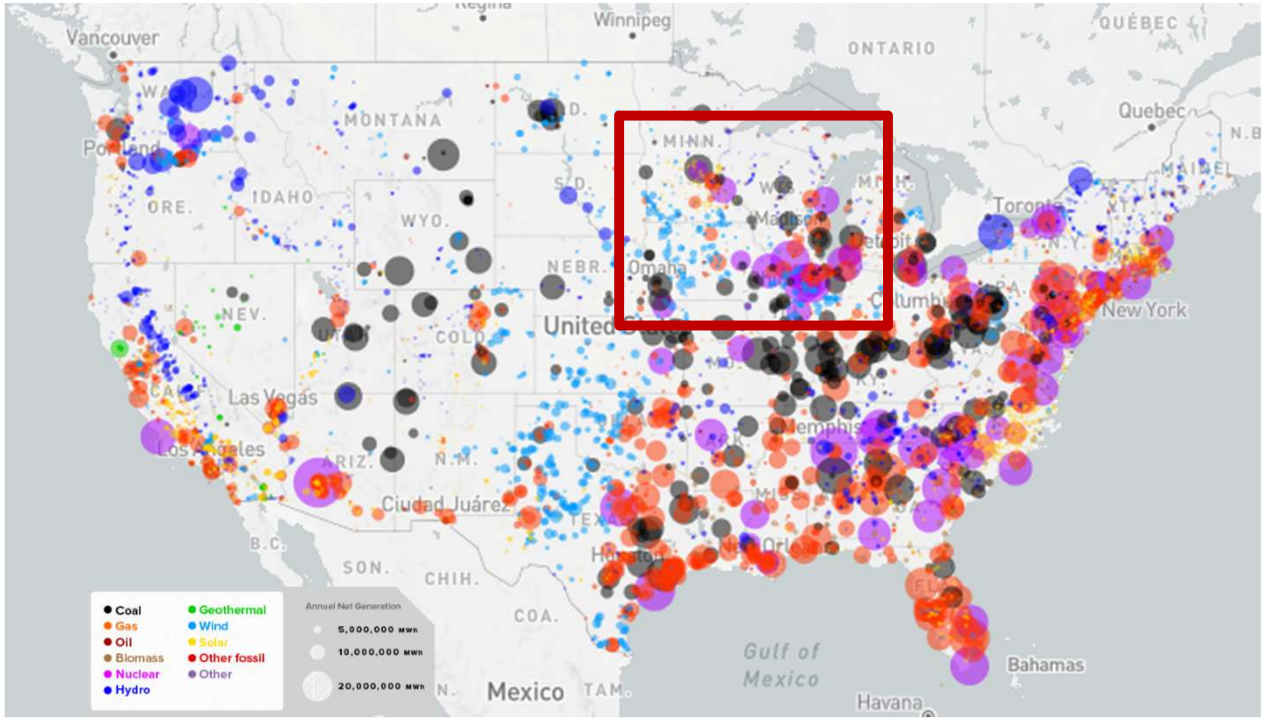
Able to satisfy all your demand but high cost.

People able to satisfy partial needs, but may be at risk

Unable to satisfy any of your demand (outage, disconnected)

Need to integrate human behavior and people's tendency to reduce their energy consumption to save money, and potential long term energy limiting behavior into energy models.

Study area: Illinois

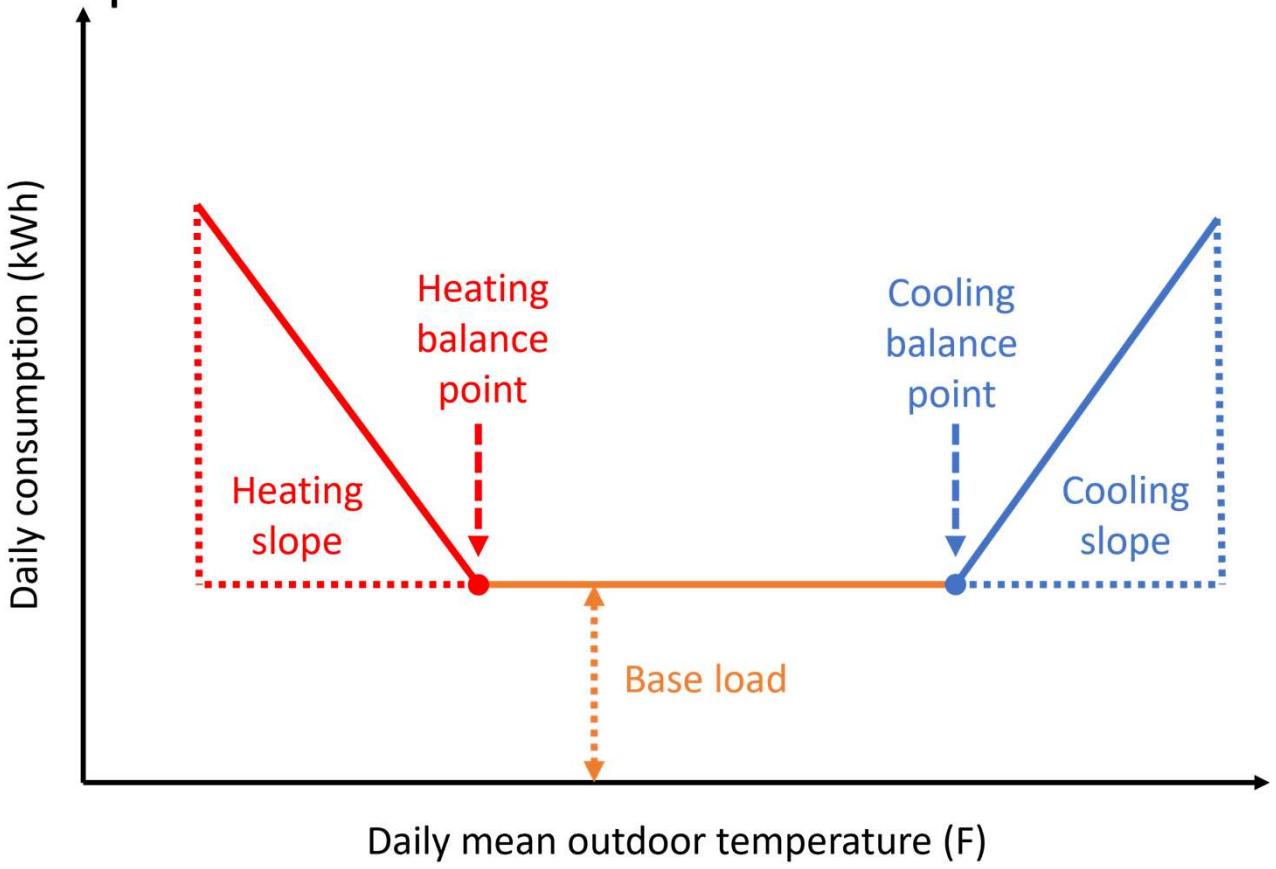


US Power Plants, 2019
https://physics.weber.edu/schroeder/energy/PowerPlantsMap.html

Climate Illinois: Cold and harsh winter, mild summer

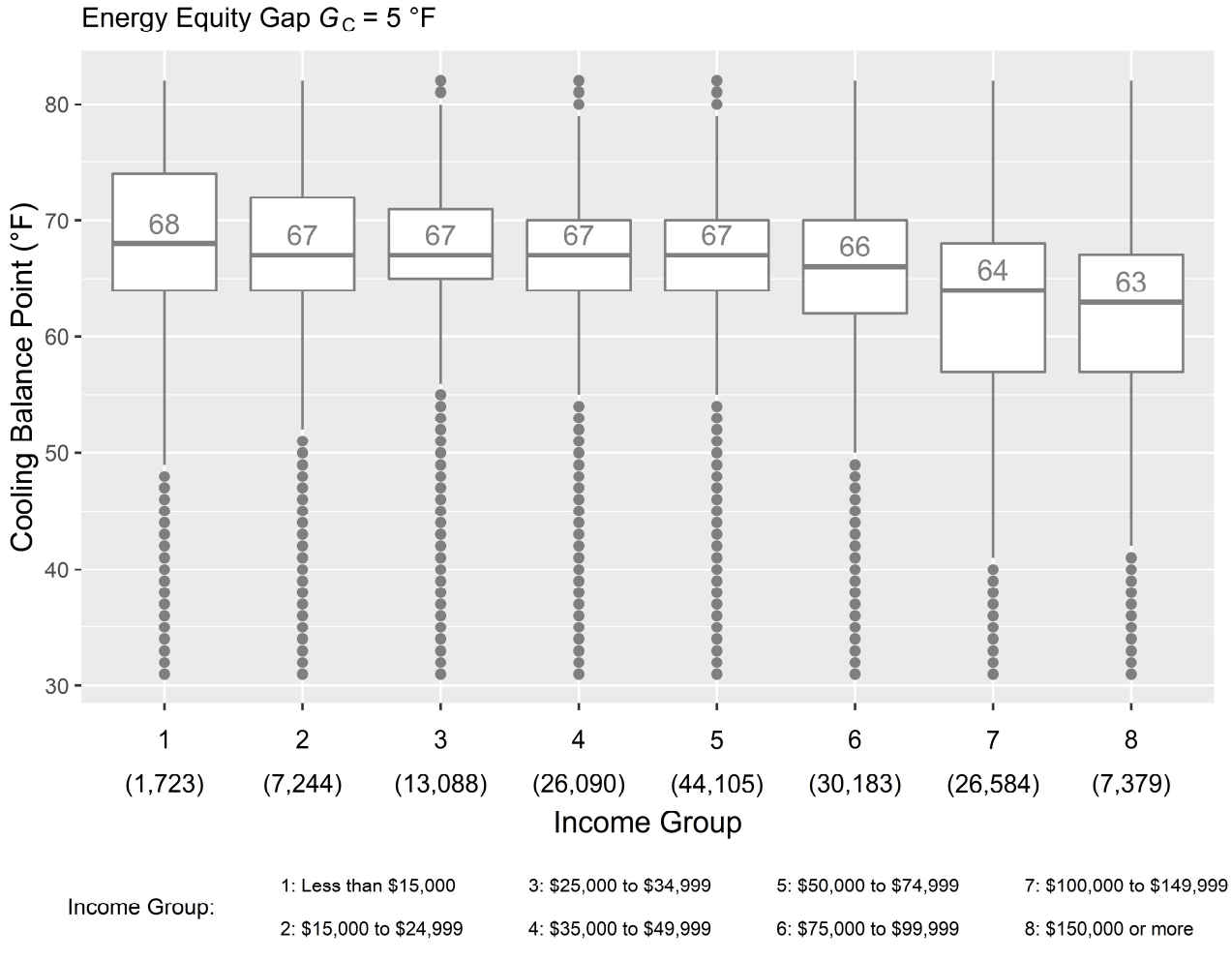
Analysis of over 150,000 households in ComEd region

Five Point Regression to Identify Electricity Consumption Behavior



Chicago: the energy equity gap (EEG) for cooling

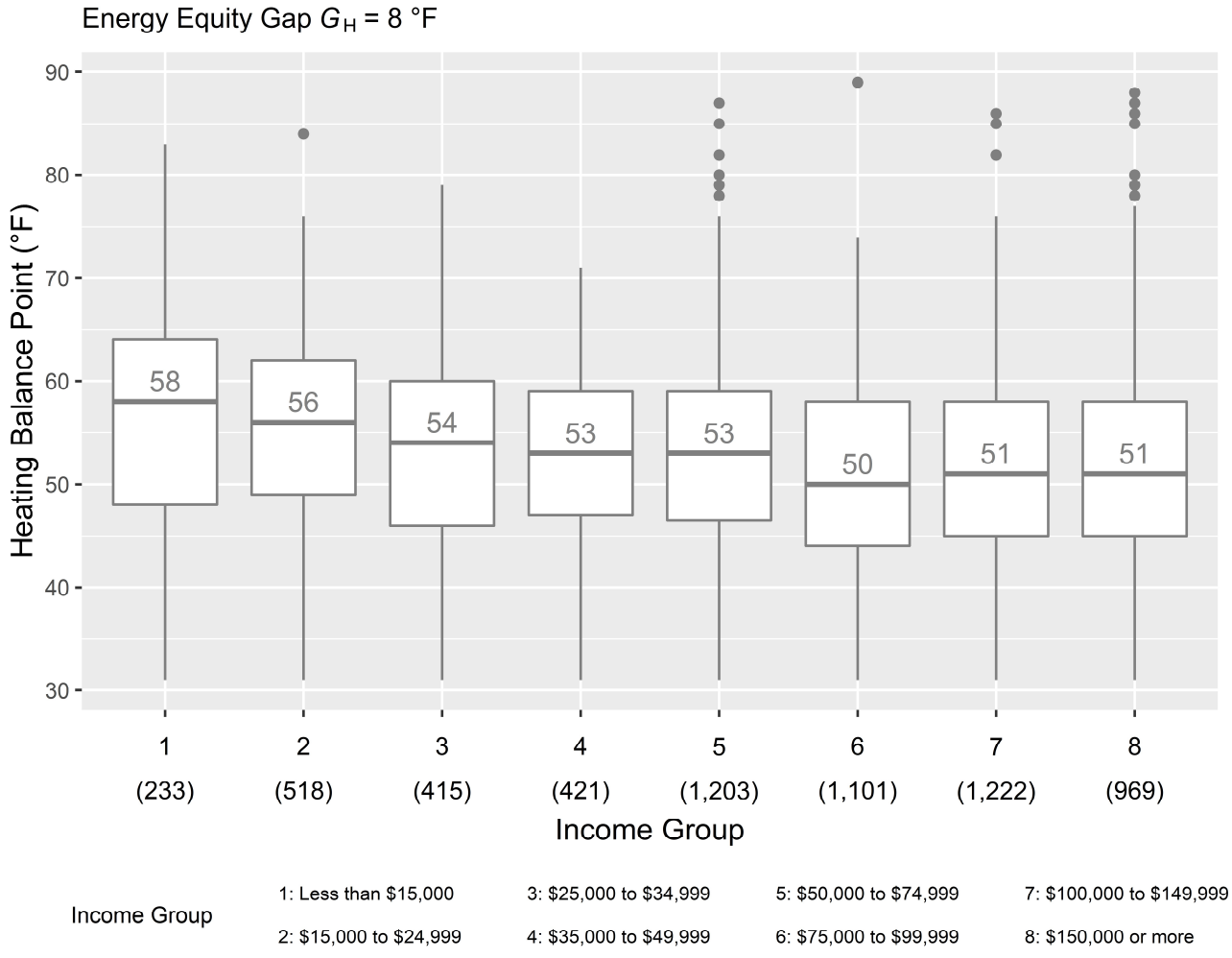
- Smart meter data for over 150,000 households
- $EEG = \max(\text{inf}\_temp_{median}) - \min(\text{inf}\_temp_{median})$



Huang et al (under revision)

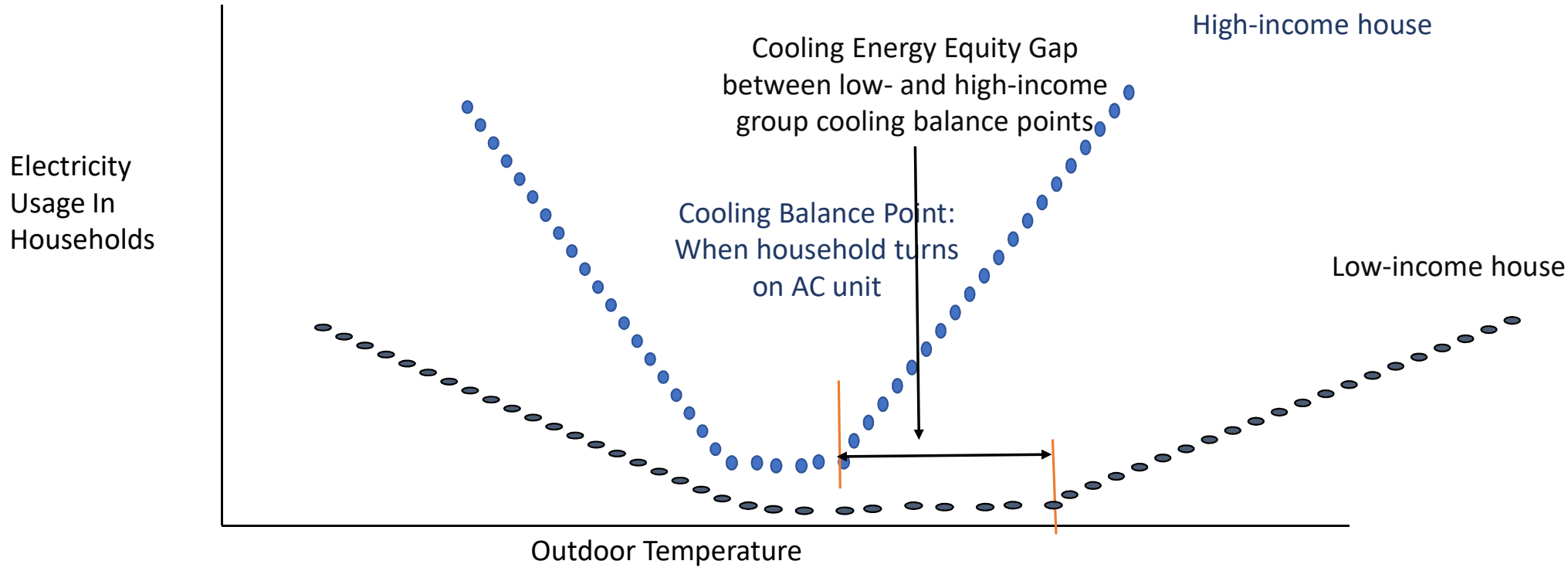
Chicago: In heating the low income groups start using earlier.

- Smart meter data for over 20,000 households
- Low income groups start using heating earlier in the winter in Chicago
- Housing characteristics and lack of insulation



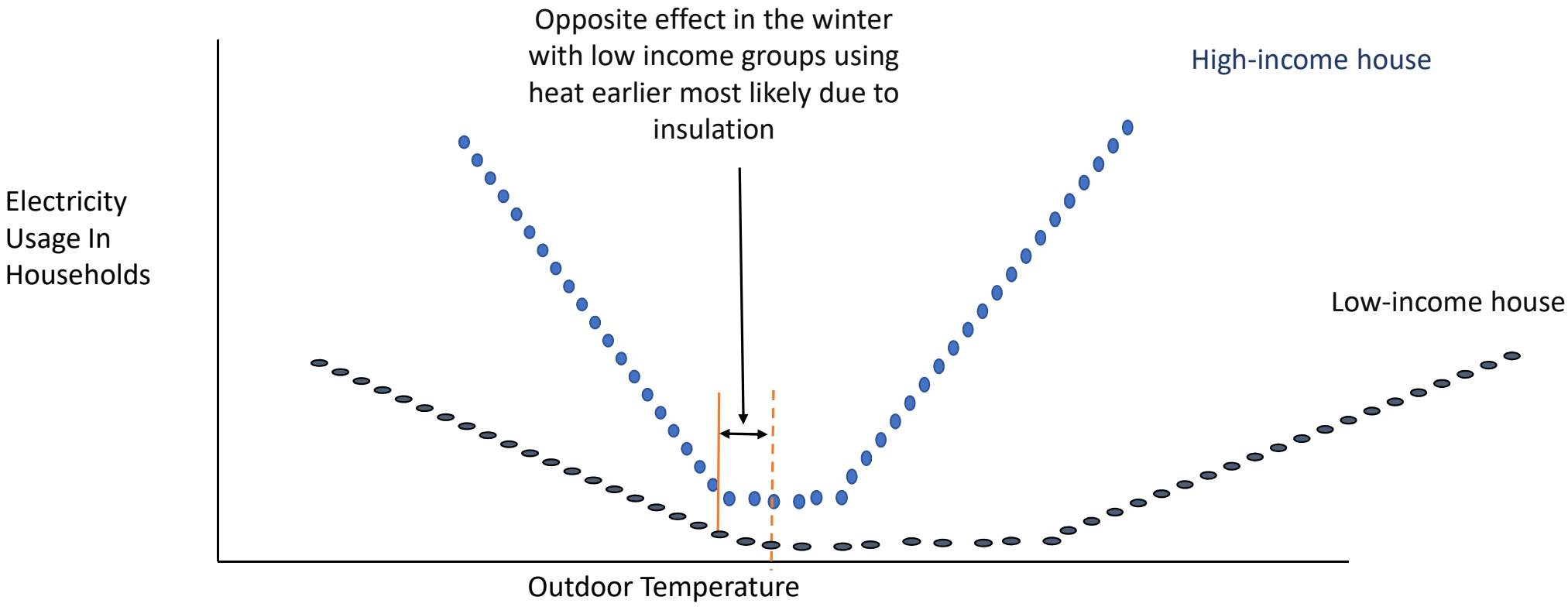
Huang et al (under revision)

Energy Equity Gap



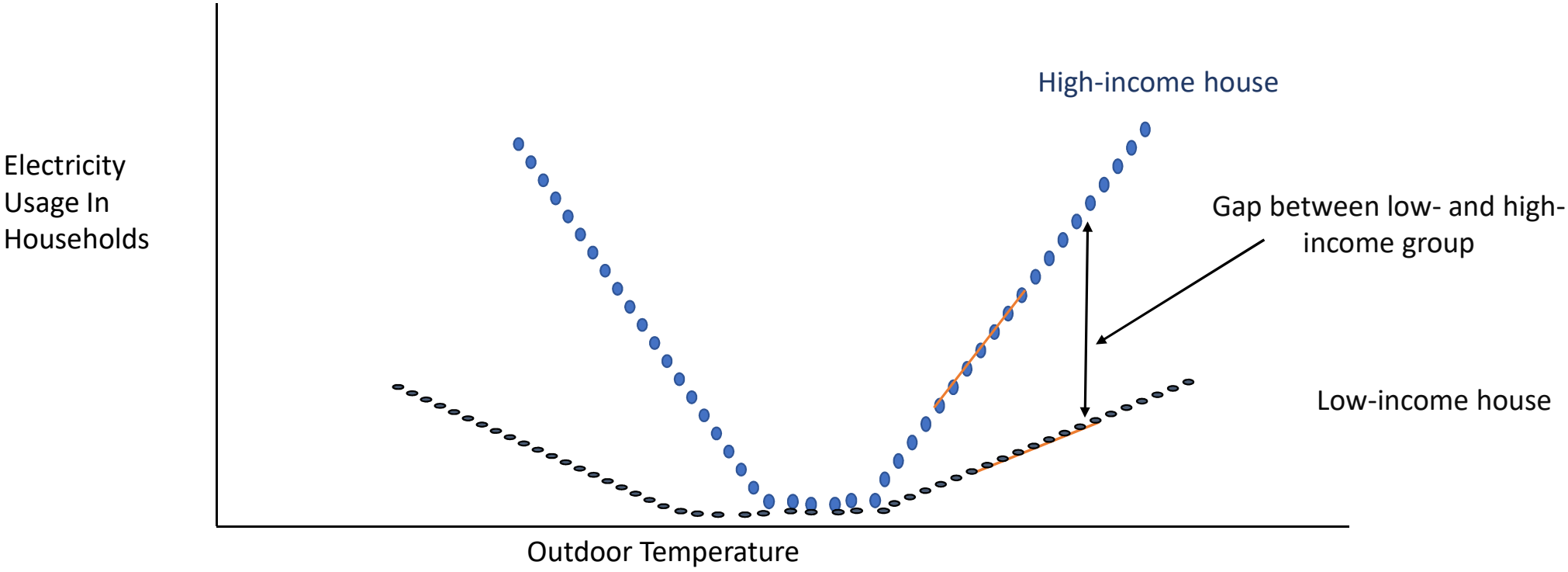
(Cong et al 2022 in Nature Communications and Huang et al (under revision))

Energy Equity Gap



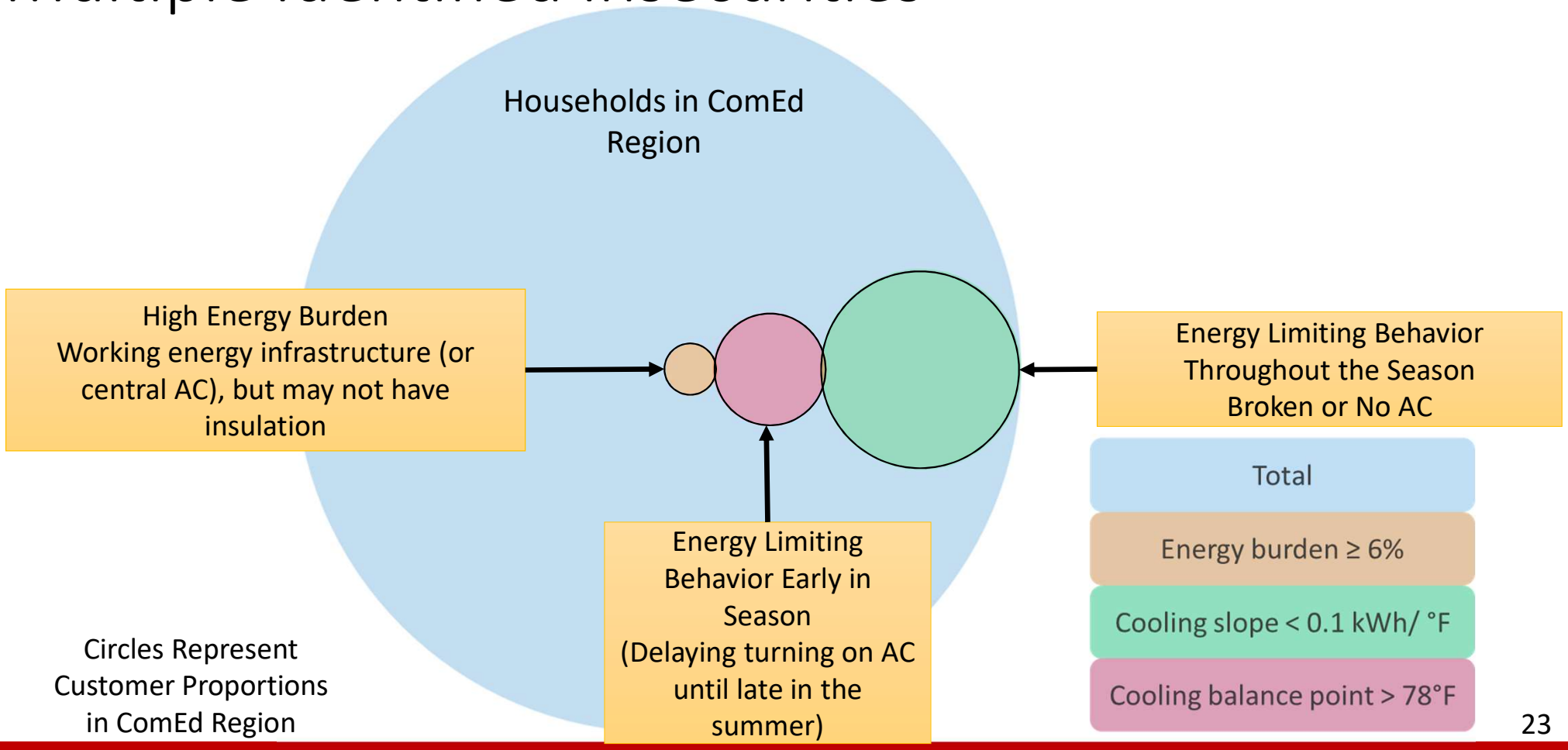
(Cong et al 2022 in Nature Communications and Huang et al (under revision))

Slope Gap

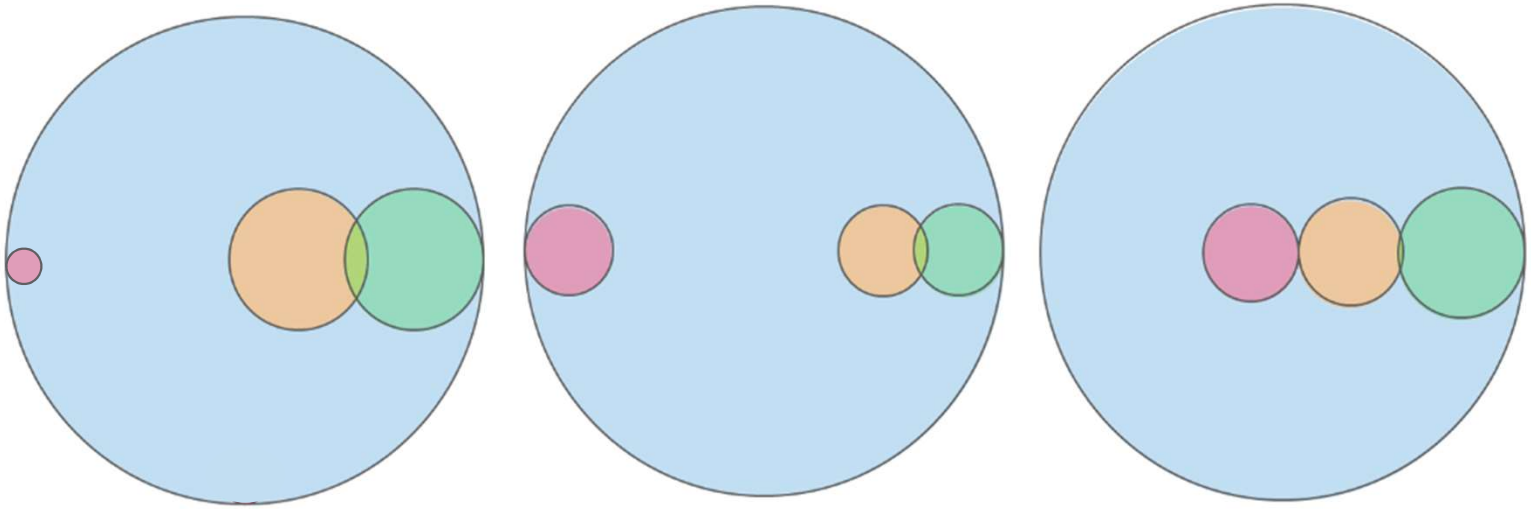


(Kwon et al (submitted to journal))

Multiple Identified Insecurities



Comparing the Incidence of energy poverty differs across study regions



SRP
2018

ComEd
2020-2021

Utility X
2018

Total

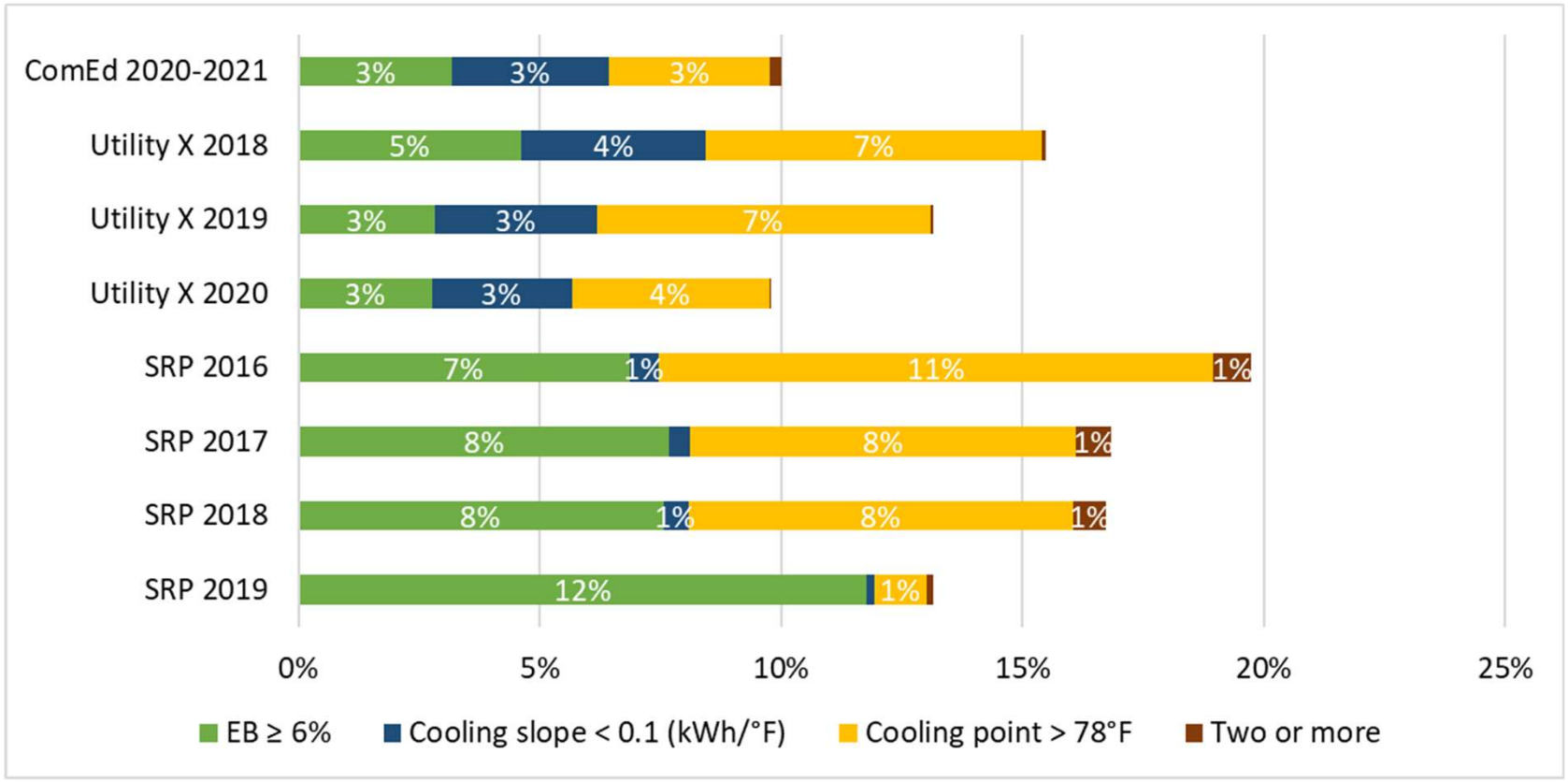
Energy burden ≥ 6%

Cooling balance point > 78°F

Cooling slope < 0.1

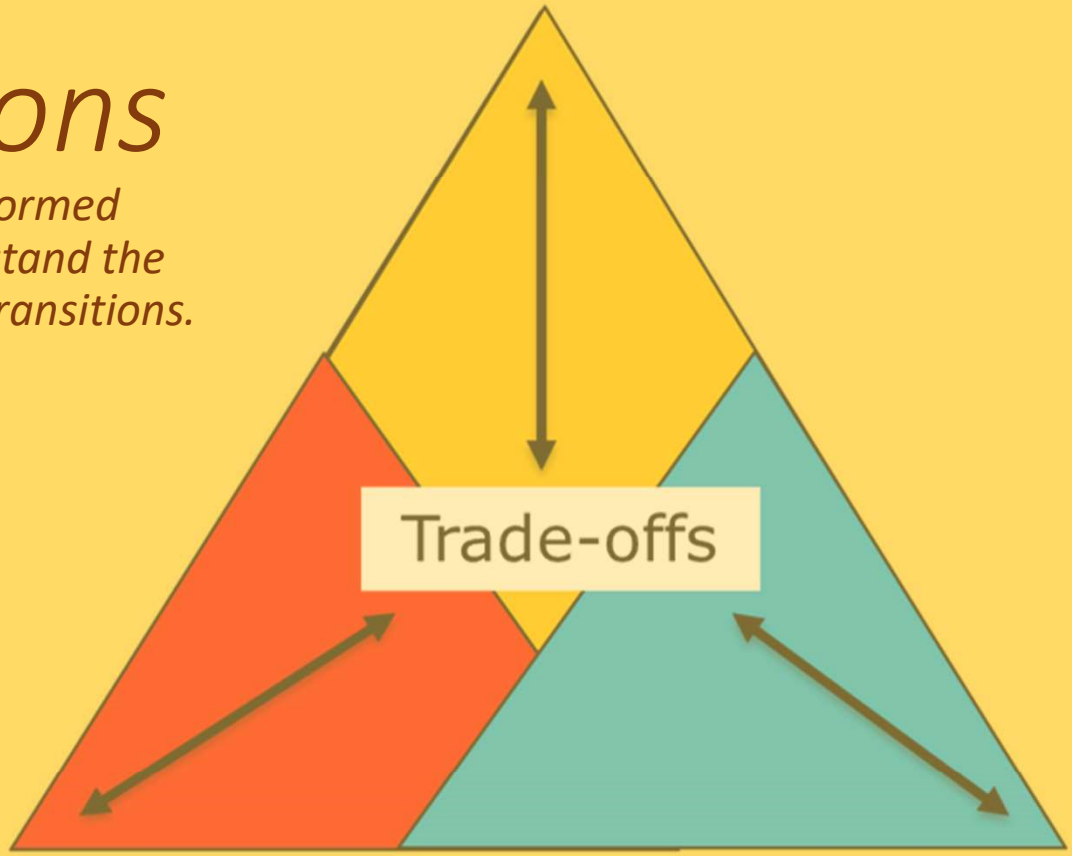
Models need multiple consumer profiles with varying behavior

Comparing the Incidence of energy poverty differs across study regions



Conclusions

Need community informed research and to understand the trade-offs from energy transitions.



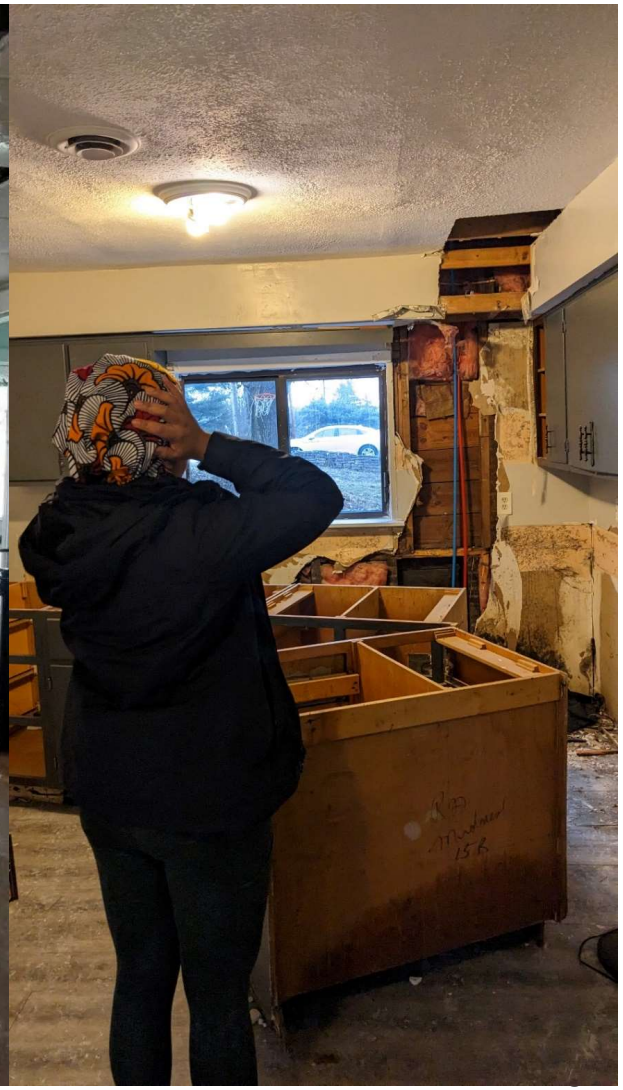
Want to Work together?

- Peoples Energy Analytics
- Our Company which helps utilities analyze customer data to identify energy poverty.
- More effective targeting of vulnerable customers leads to greater program participation and less bad debt.

Peoples Energy Analytics

www.PeoplesEnergyAnalytics.com

Remember at the end of the day this is about people. Yes, the modeling, policy, and decisions get complicated, but **34 million people** in the US experiencing energy poverty are counting on you. (RECS 2022)



The SPICE Team

SPICE

SOCIETY, POLICY, INFRASTRUCTURE, CLIMATE, AND ENERGY

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