Residential Energy Insecurity and Affordability

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Energy Justice Lab

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The Energy Justice Lab is a research collaboration between Indiana University (IU) and the University of Pennsylvania (Penn), co-directed by Dr. David Konisky of IU and Dr. Sanya Carley of Penn. The Lab mission is to explore, measure, and improve the equity and justice dimensions of society's ongoing energy transition. Meet the team

INDIANA UNIVERSITY
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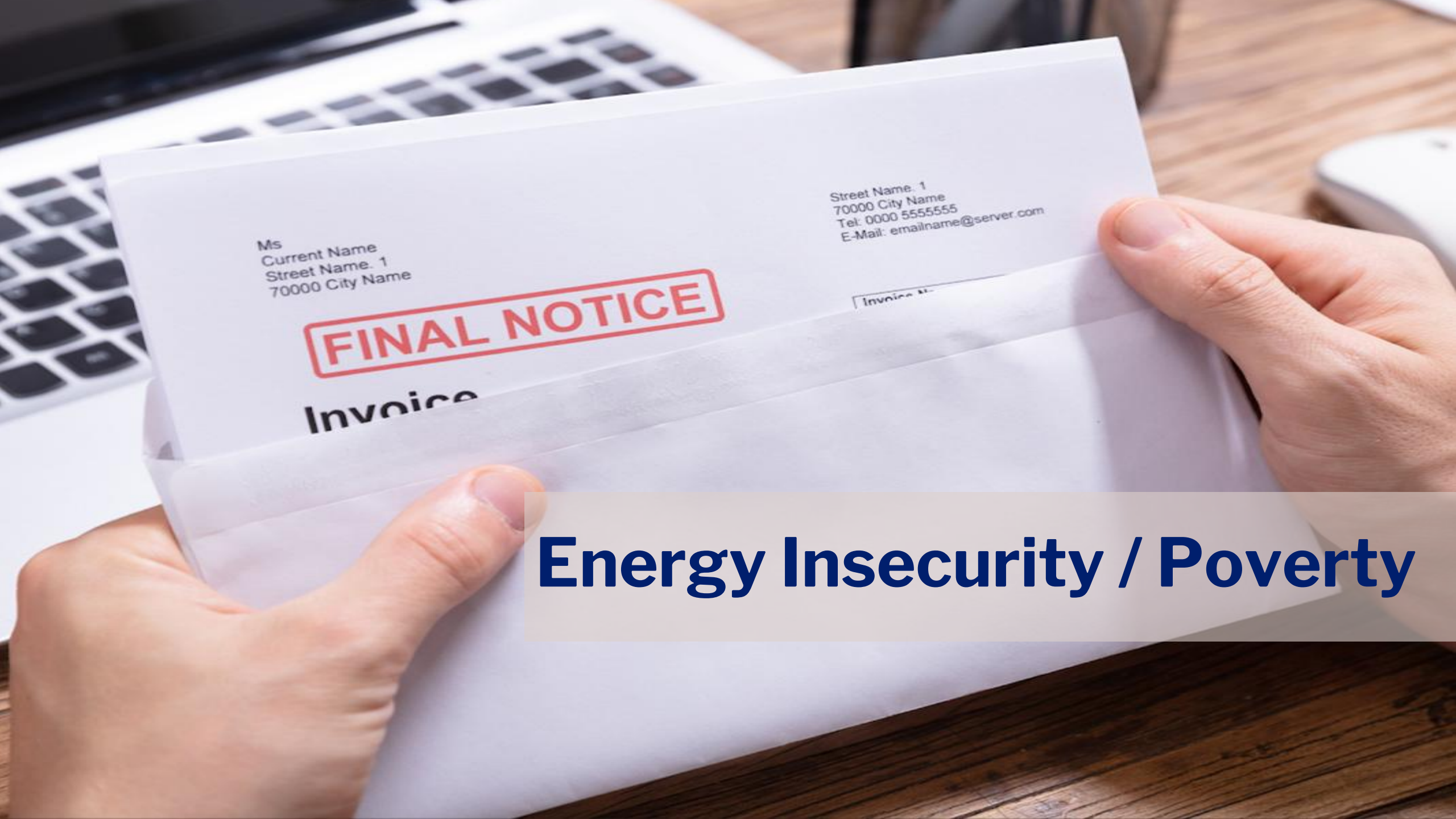
Outline

1. What is energy insecurity?
2. Incidence and determinants of energy insecurity
3. Energy prices and unaffordability
4. Policy opportunities



Energy Insecurity / Poverty

Each year in the United States, over one in three households experience energy insecurity

Source: Energy Information Administration, 2024. Residential Energy Consumption Survey.

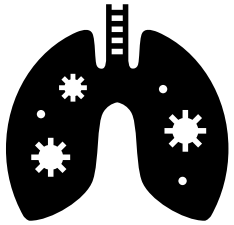
In 2024, 13.4 million households had their electricity shut off due to nonpayment of their bill

Source: EIA 2024 Residential Utilities Disconnection Report

Ongoing source of utility disconnection data: The Utility Disconnection Dashboard

Implications of energy insecurity

More likely to experience **long-term poverty**



Acute and chronic health conditions such as asthma, poor sleep, and lower self-reported mental health

Children more likely to face hospitalization, lower health ratings, consume fewer calories, face social stigmatization and struggle in school, and face **developmental delays**

What is energy insecurity?

Curtailment

Coping strategies

Dangerous temperatures in the home

Full consumption

High energy burden

Higher risk of debt & disconnection

Source: Recreated from Destenie Nock's work

Space heater sparked fire in the Bronx that killed 17 people, including 8 children

BY SUSANNAH CULLINANE, BRYNN GINGRAS, BONNEY KAPP, MIRNA ALSHARIF AND AMIR VERA, CNN

POSTED JAN 10, 2022 0

Emergency personnel work at the scene of the fatal fire on Sunday.

NATION & WORLD

Family died of gas poisoning after utility cut power to home

BY TRIBUNE WIRE REPORTS
APR 07, 2015 AT 10:05 PM

HEATBEAT

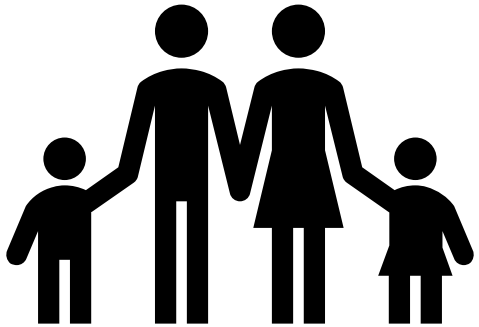
82-year-old APS customer died after power was shut off in May 2024

An 82-year-old woman died in May 2024 after her power was cut off on a very hot day. Her son and an advocate say this shows an issue with state policies.

Incidence and Determinants of Energy Insecurity

Who is disconnected most often?

Households of color



Children under 5 years old

Electronic medical devices

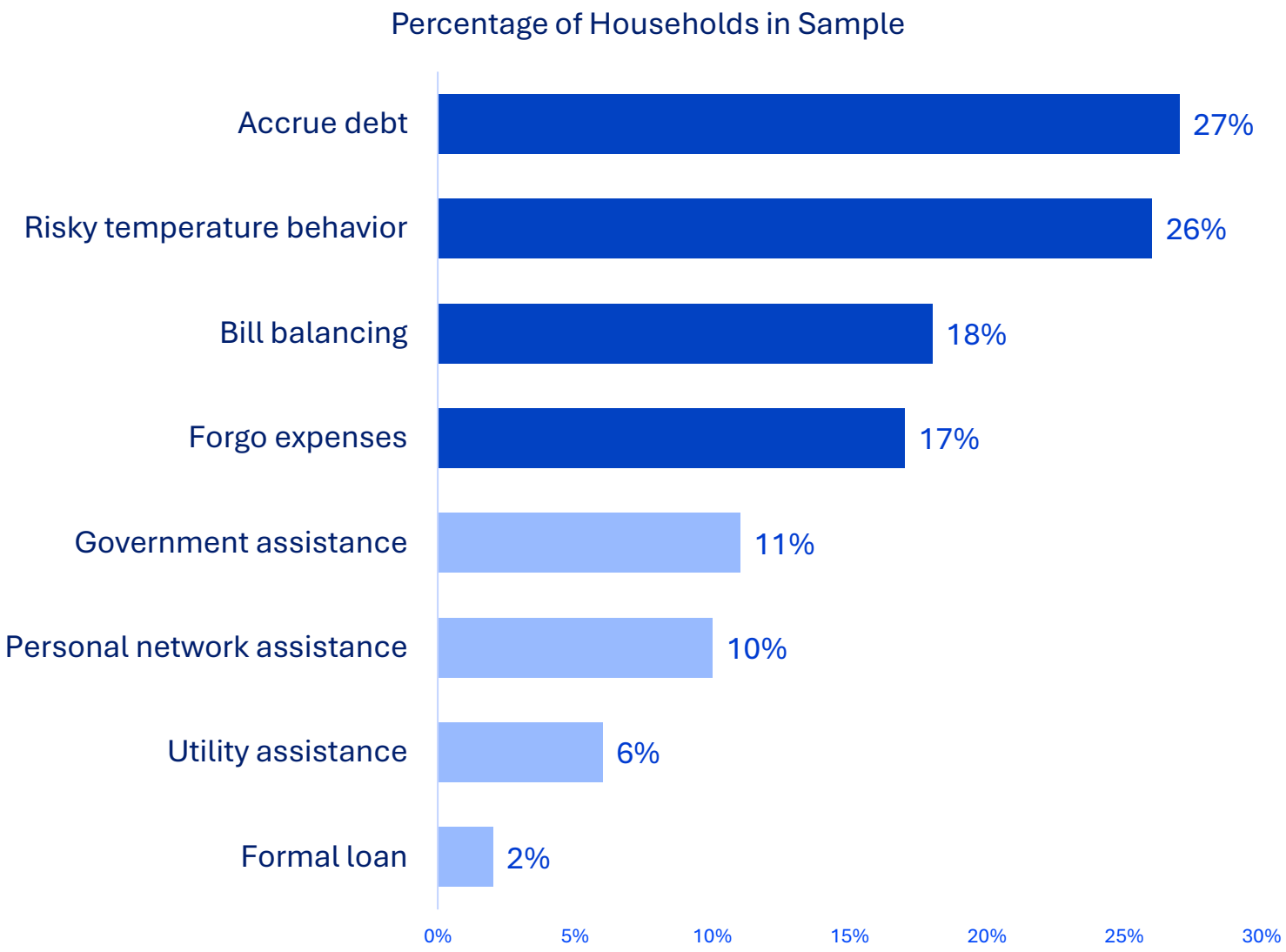
Poor housing conditions

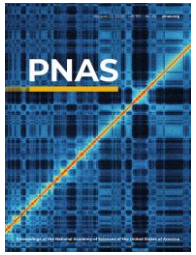
Source: Memmott, Carley, Graff, Konisky. 2021. Socioeconomic disparities in energy insecurity among low-income households before and during the COVID-19 pandemic. *Nature Energy* 6, 186-193

Source: Konisky, Carley, Graff, Konisky. 2022. The persistence of household energy insecurity during the COVID-19 pandemic. *Environmental Research Letters.*

Source: Memmott, Konisky, Carley. 2024. Assessing demographic vulnerability and weather impacts on utility disconnections in California. *Nature Communications* 15.

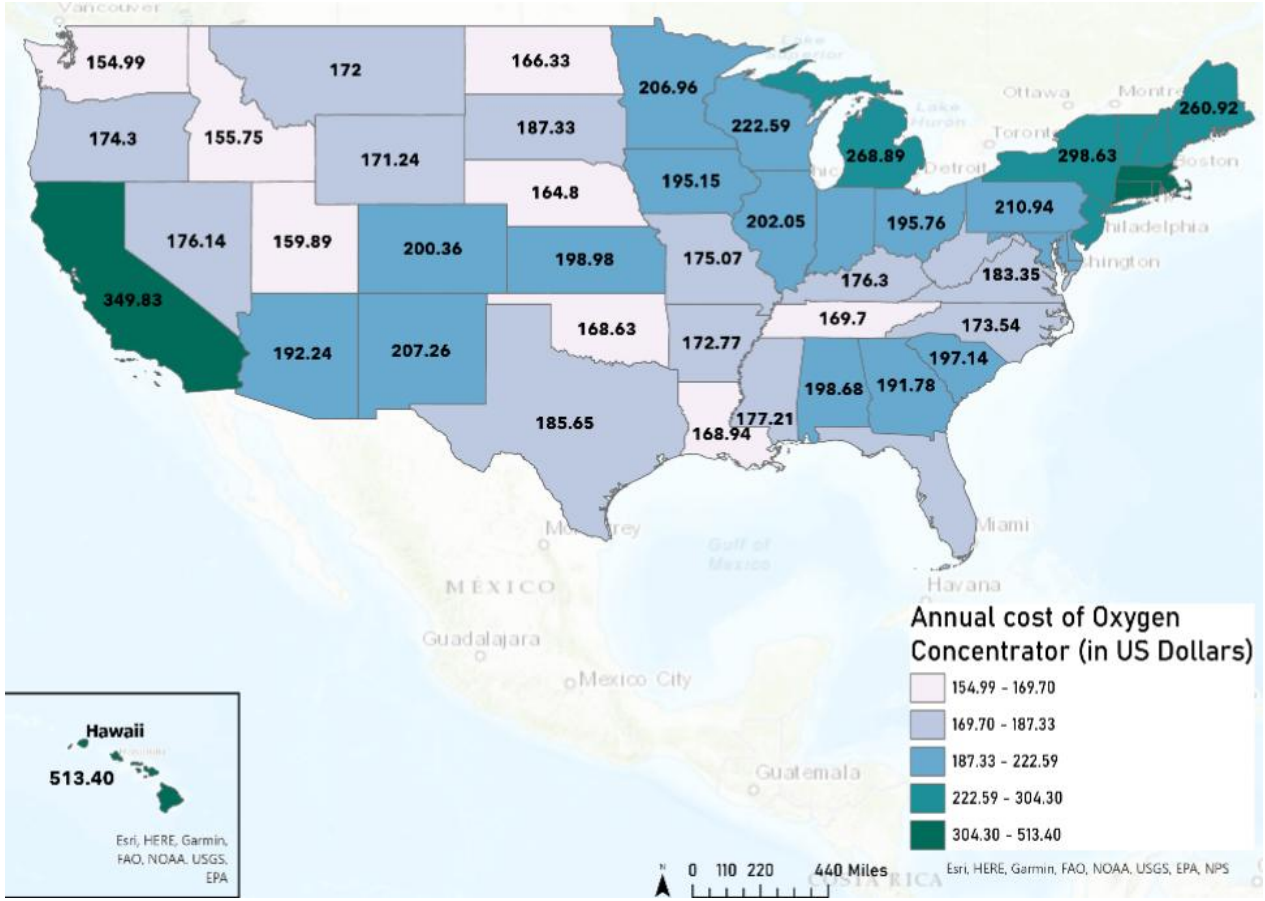
When households are energy insecure, how do they cope?





Source: Carley, Graff, Konisky, Memmott. 2022. Behavioral and financial coping strategies among energy insecure households. *Proceedings of the National Academy of Sciences.*

Durable medical equipment can significantly increase bills

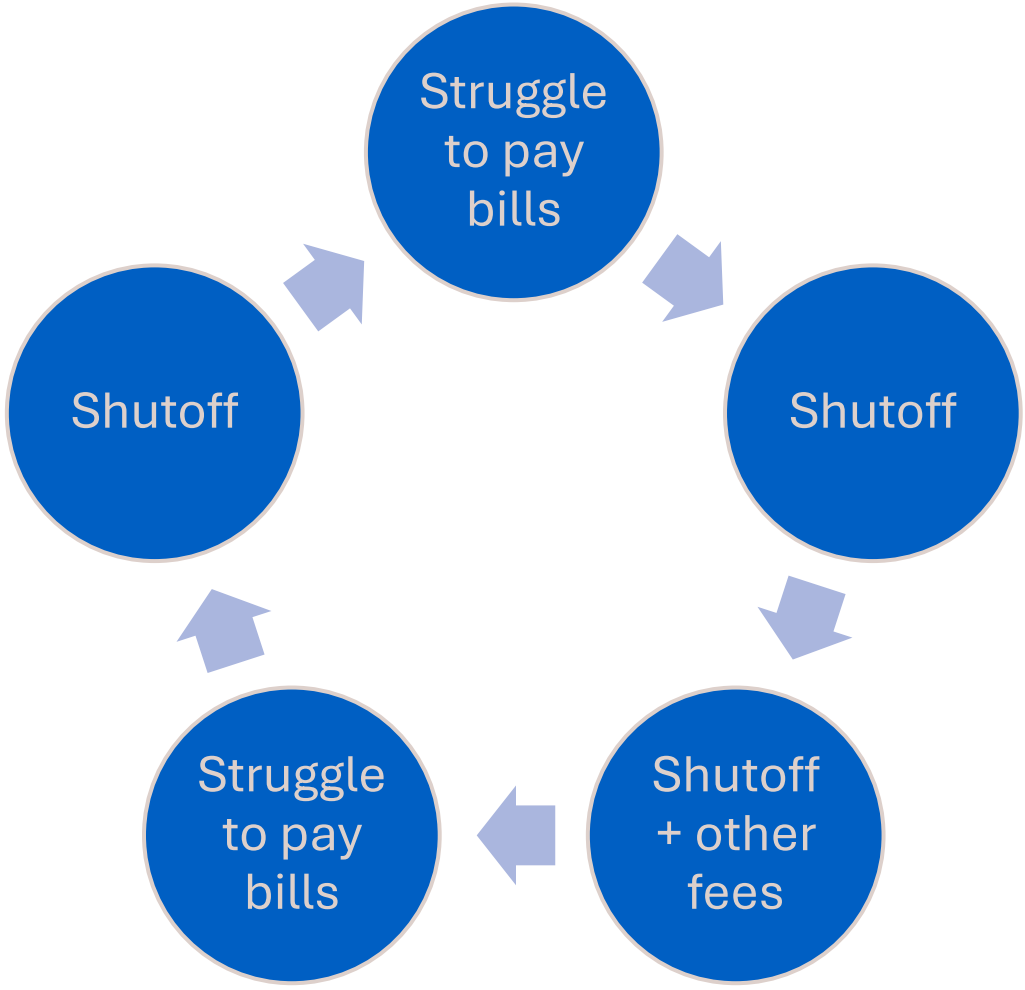


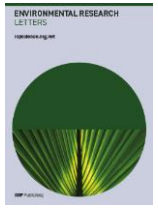
Source: Carley, Bansal, Harak, Kahn, Konisky, Simon. The electricity cost burden of durable medical equipment in the United States. *Scientific Reports* 14.

Weather patterns increase disconnections

Source: Memmott, Konisky, Carley. 2024. Assessing demographic vulnerability and weather impacts on utility disconnections in California. *Nature Communications* 15.

Energy insecurity is reoccurring





Source: Konisky, Carley, Graff, Konisky. 2022. The persistence of household energy insecurity during the COVID-19 pandemic. *Environmental Research Letters.*

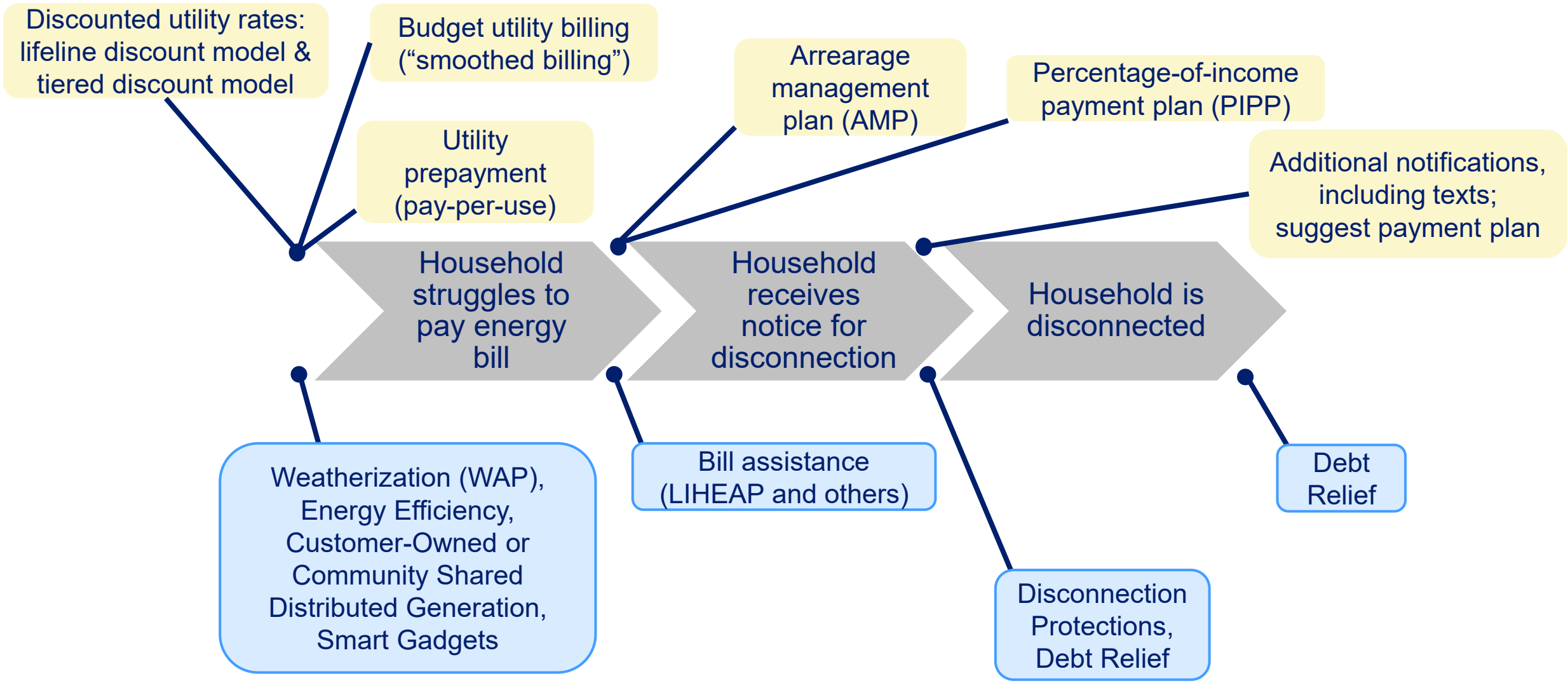
Energy Is Becoming Increasingly Unaffordable

Energy Prices

- Electricity prices have increased by 30% on average over the past five years
- The EIA estimates that prices will continue to increase, by an estimated 8.5% this year
- The average residential electricity bill in the U.S. in 2024 was $144
- This would make the average electricity bill increase by over $12 on average
  - Much more in some regions (Pacific, New England, Mid Atlantic)
  - This does not account for natural gas expenditures, which are also predicted to rise
  - Also does not account for months when more electricity/gas is needed

Policy Opportunities

Policy and programmatic support



Preventative, Temporary, and Long-term Management Solutions

Preventative Investments

- Weatherization
- Energy efficiency
- Residential solar, storage, distributed energy resources, demand side programs

Temporary Relief

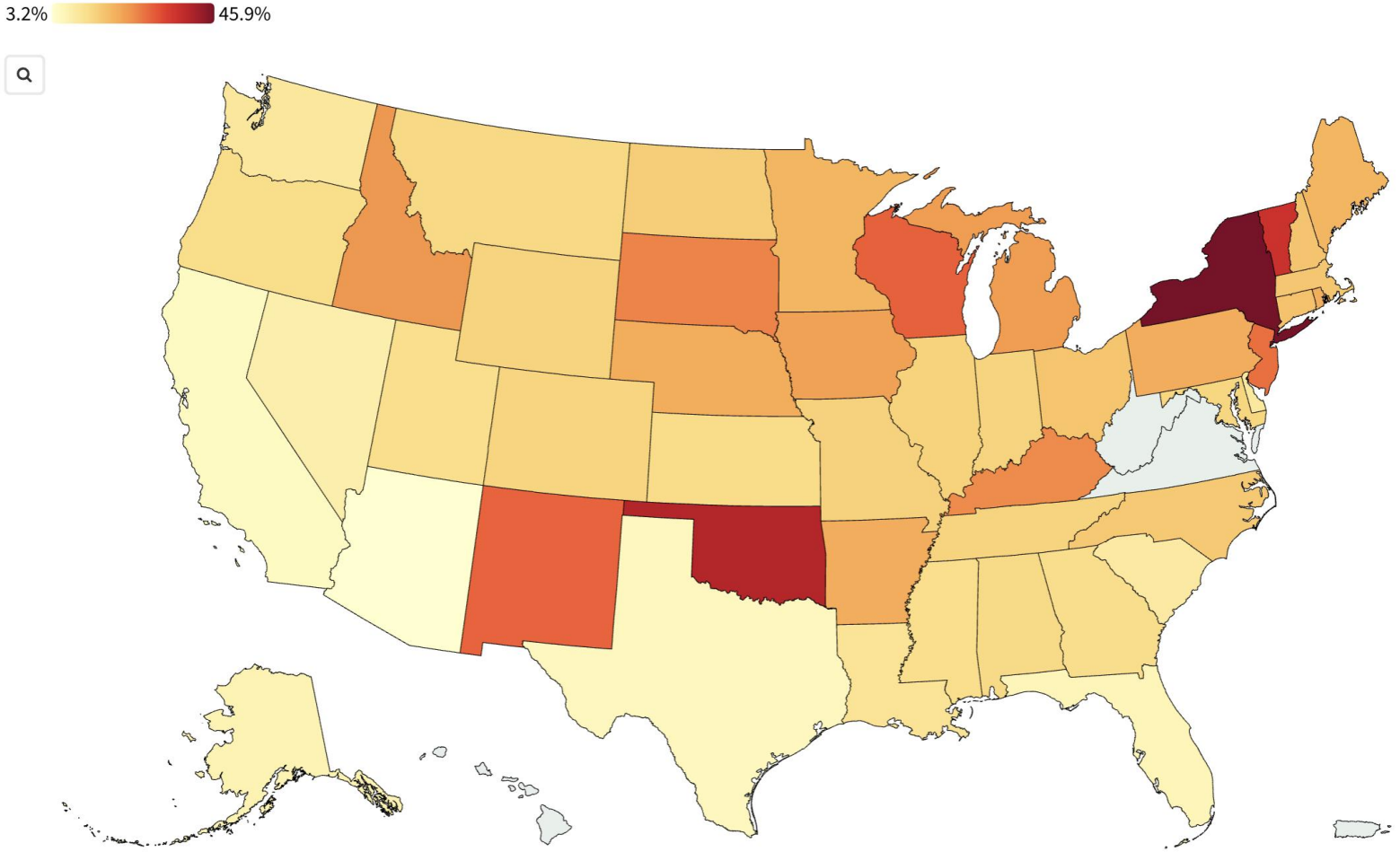
- Bill assistance (utility payment plans, Low-Income Home Energy Assistance Program)
- Disconnection moratoria

Long-term Management

- Utility payment programs

Percent of eligible population served by LIHEAP, 2021

The Low income Heating Energy Assistance Program (LIHEAP) provides financial assistance for heating and cooling to income-eligible households



Source: Administration for Children and Families, United States Department of Health and Human Services
Boston University Institute for Global Sustainability | visualizingenergy.org | CC BY 4.0

visualizingEnergy

Source of visual: Cleveland & Wang, 2022. https://visualizingenergy.org/is-the-united-states-government-doing-enough-to-reduce-energy-poverty/

LIHEAP Challenges

Overall

1. Insufficient funding, given need

Process

2. Opaque allocation process
3. Inconsistent annual funding
4. Funds not available year-round

Formula

5. Allocation favors cold weather states, despite increases in extreme heat events
6. Insufficient consideration of all energy poverty factors in state allocations

Carley, Konisky, 2025. It is time to modernize energy insecurity policies to account for extreme heat. *Joule*.

LIHEAP Opportunities for Enhancement

- ✓ Increase appropriations
- ✓ Disperse funds so that enough remain by the hottest months
- ✓ Modernize the funding formula to give more equal weighting to hot weather conditions
- ✓ Target outreach of households with vulnerable household members

Carley, Konisky, 2025. It is time to modernize energy insecurity policies to account for extreme heat. *Joule*.

Can solar reduce incidence of energy insecurity?

In 2023, sent a survey to low-to-moderate households

Compare self-reported energy insecurity among a matched sample:

Solar Households

Households who adopted in 2021 with the lowest estimated income*

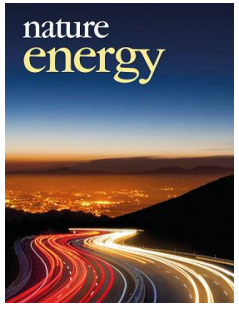
vs.

Non-Solar Households

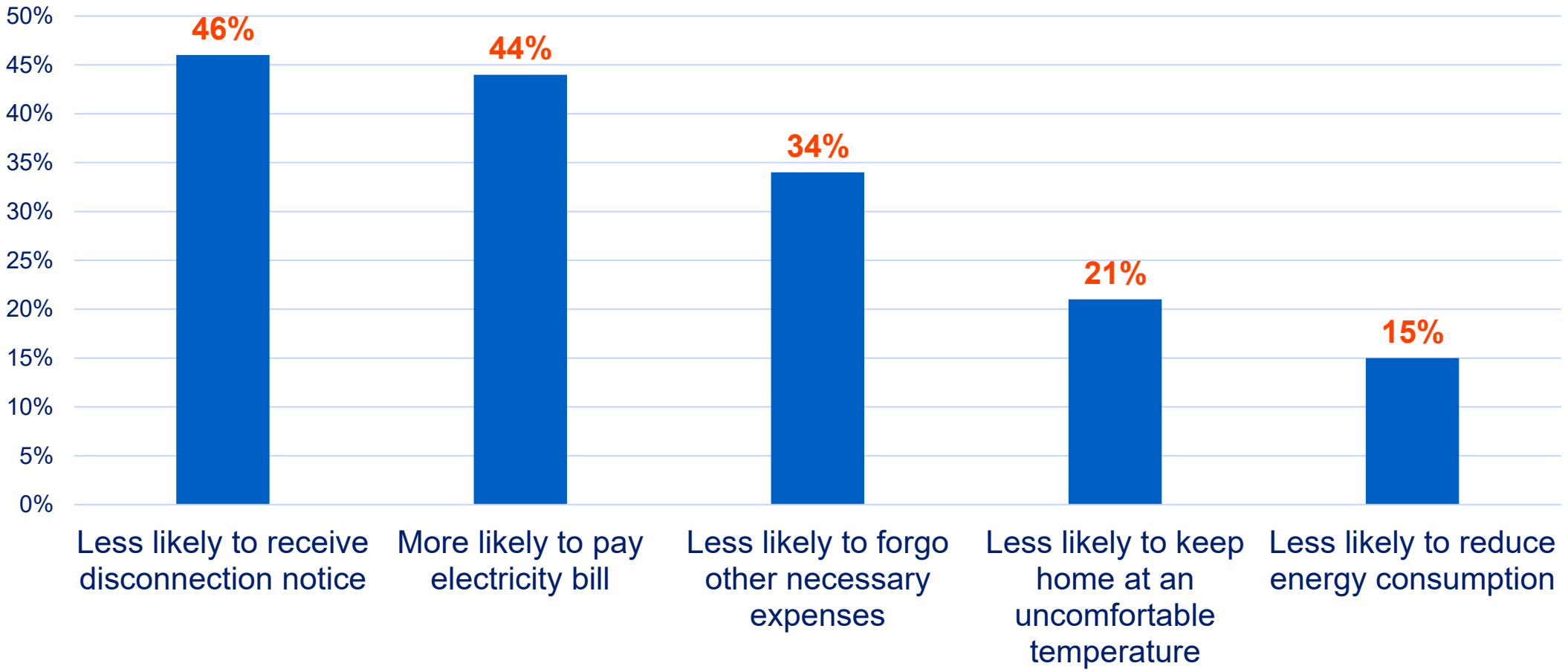
Households that are similar on mean **observable** characteristics+

Data:
*Tracking the Sun, Experian
+Core Logic (housing), Experian (income), "wru" algorithm (race)

Yozwiak, Barbose, Carley, Montanes, Forrester, Konisky, Memmott, O'Shaughnessy, 2025. The effect of residential solar on energy insecurity among low- to moderate-income households. *Nature Energy*.



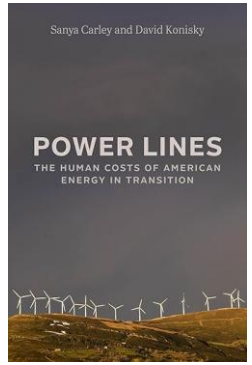
We find that those with solar are:



While technologies like solar would most benefit energy insecure households…

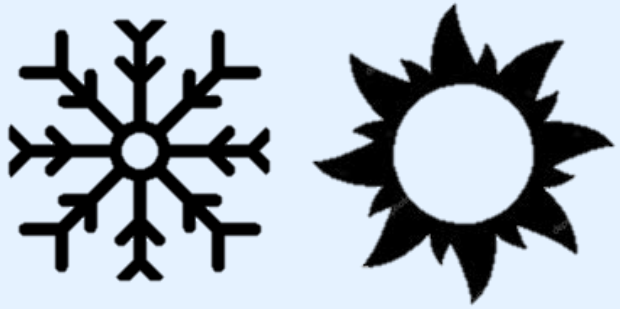
1. Access to benefits is uneven
2. Barriers to adoption are more pronounced for certain groups
3. Access to and contributions toward government incentives is uneven
4. Access is also geographically constrained
5. Wealth begets wealth
6. Given market structures, these inequities could become more pronounced in the future

Carley, Konisky. 2025. Power Lines: The Human Costs of American Energy in Transition



Customer Protection Policies

WINTER SUMMER

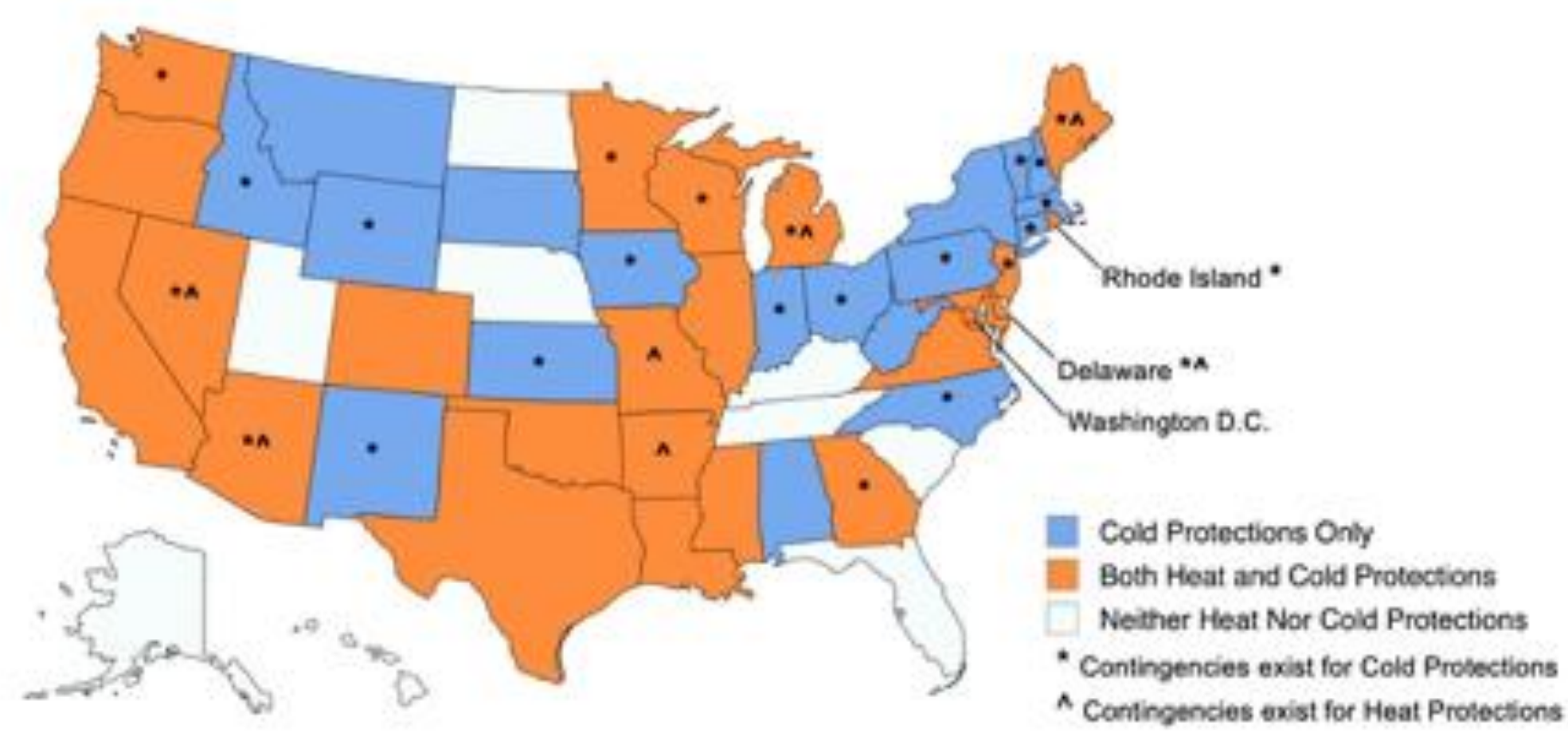


Temperature and seasonal moratoria

Notification requirements

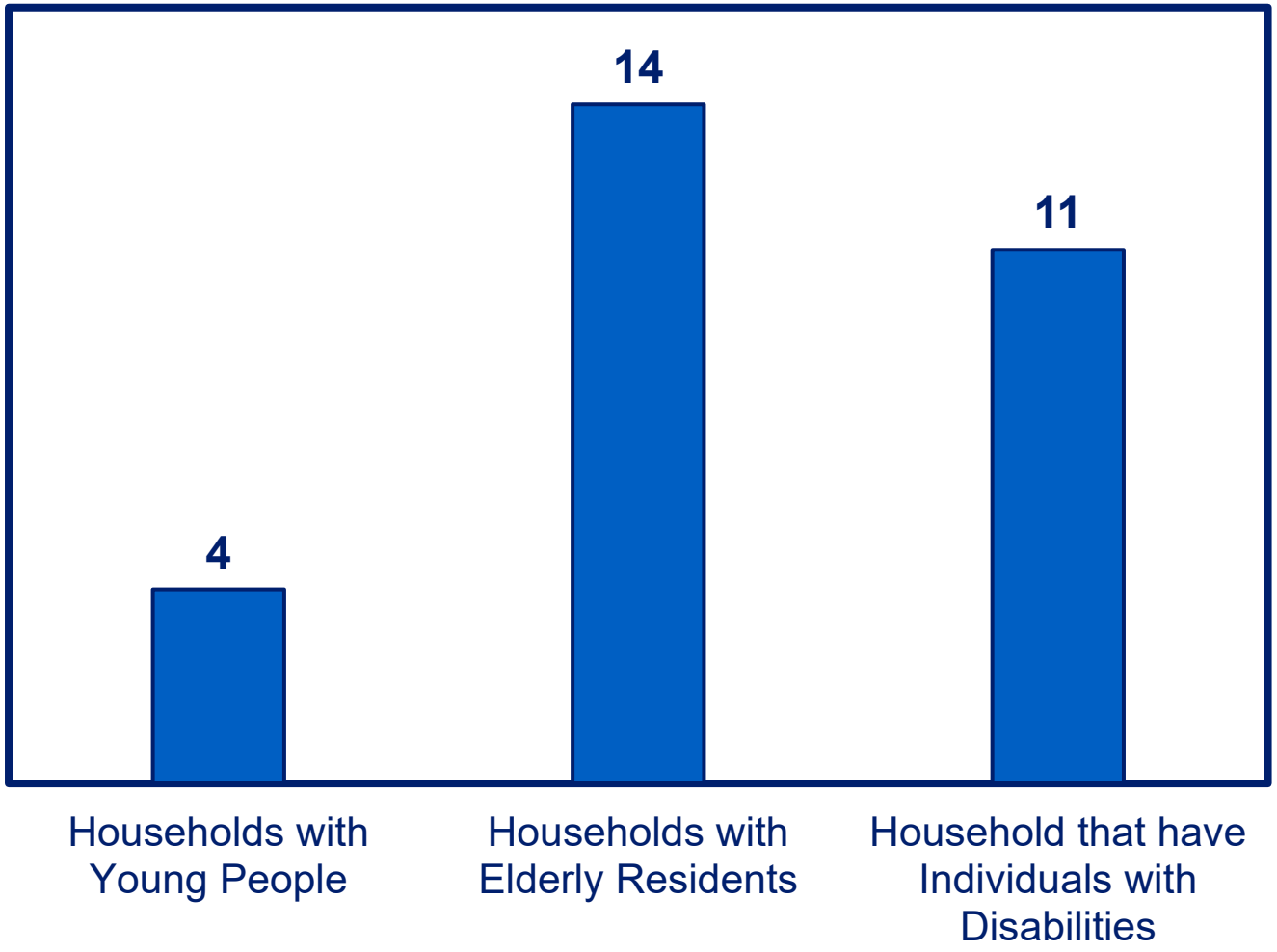
Protections for vulnerable groups

Utility disconnection protections



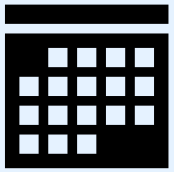
Source: Energy Justice Lab, Utility Disconnections Dashboard

Age-Based Protections



Disconnection protections: Utility Opportunities for enhancement

Clearly specify minimum days of notice prior to disconnection + provide multiple forms of notice



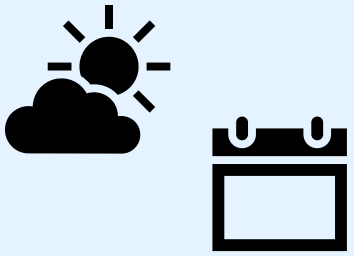
Establish date-range when customers can pay bills before being considered late or delinquent

Regularly provide information to customers (e.g., at least twice annually)

Carley, Konisky. 2025. It's time to modernize energy insecurity policies to account for extreme heat. *Joule* 9(3).

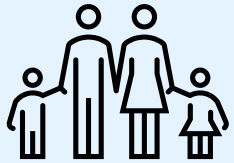
Disconnection protections: Government opportunities for enhancement

Easily understood and transparent language with few administrative burdens



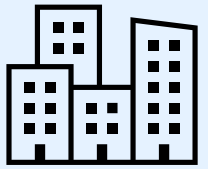
Combined temperature & date-based protections

Broad definitions of medical conditions & delays for utilities requiring certificates



Protections for households with children, elderly, or people with disabilities

Establish a minimum arrearage before disconnections occur



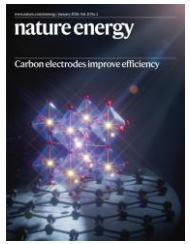
Tenants should not suffer disconnection due to their landlord's failure to pay the building's utility bills

Source: Carley, Konisky. 2025. It's time to modernize energy insecurity policies to account for extreme heat. *Joule* 9(3).

Levers extend beyond direct protections and bill assistance

Examples:

- **State legislatures** can provide funding for weatherization and distributed energy resources (DERs)
- **Public utility commissions** can adopt explicit “energy justice” principles in their rate-making
- **Utilities** can pursue grid distribution planning that prioritizes affordability and reliability; and facilitate DER interconnection
- **Regional transmission organizations** can work to make interconnection queues faster and more efficient
- **Federal Energy Regulatory Commission** can mandate practices for transmission planning, interconnection procedures, and practices that prioritize affordability
- **Local governments** can direct communities toward resources and amend zoning ordinances to facilitate energy infrastructure siting; provide cooling centers



Knasin, Carley, Klass, Konisky, Welton. 2026. Levers to address energy insecurity in the United States. *Nature Energy*.

Conceptualizing Solutions

Preventative Investments

Temporary Relief

Long-term Management

Structural Changes

POWER LINES

THE HUMAN COSTS OF AMERICAN ENERGY IN TRANSITION

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