Residential Energy Insecurity and Affordability

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POWER LINES

THE HUMAN COSTS OF AMERICAN ENERGY IN TRANSITION

Sanya Carley & David Konisky

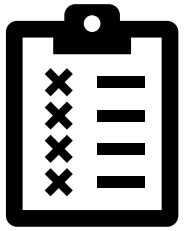
Each year in the United States, over one in four households experience energy insecurity

Source: Energy Information Administration, 2020. Residential Energy Consumption Survey.

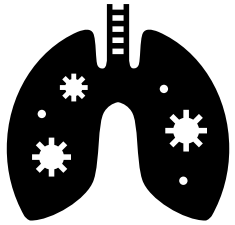
In 2024, about 3 million households had their electricity or natural gas shut off due to nonpayment of their utility bill

Source: Utility Disconnection Dashboard

Implications of energy insecurity



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

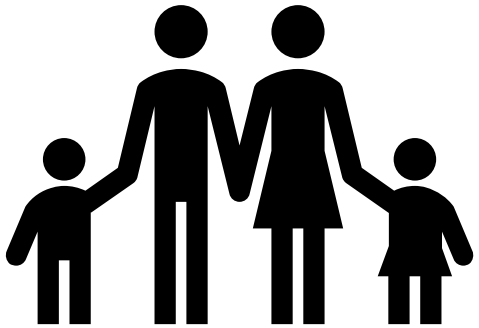


Acute and chronic health conditions such as asthma, poor sleep, and lower self-reported mental health

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

Who is disconnected most often?

Households of color

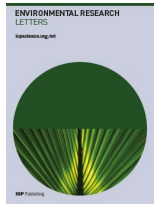


Children under 5 years old

Electronic medical devices

Poor housing conditions

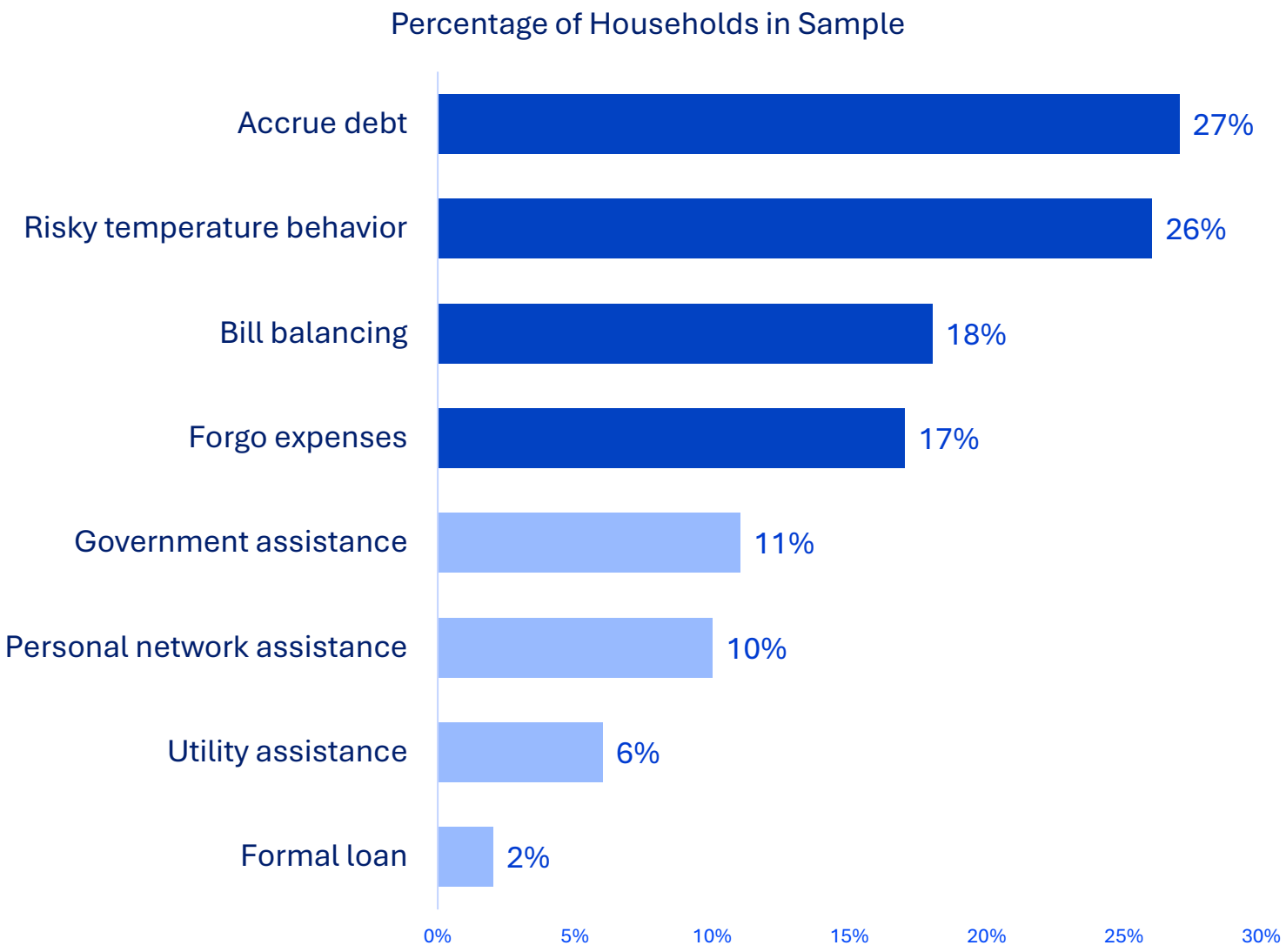
Source: Memmott, Carley, Graff, Konisky. 2021. Socioeconomic disparities in energy insecurity among low-income households before and during the COVID-19 pandemic. *Nature Energy 6*, 186-193

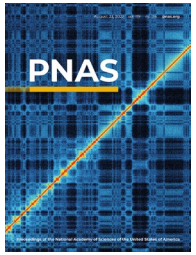


Source: Konisky, Carley, Graff, Konisky. 2022. The persistence of household energy insecurity during the COVID-19 pandemic. *Environmental Research Letters.*

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.*

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

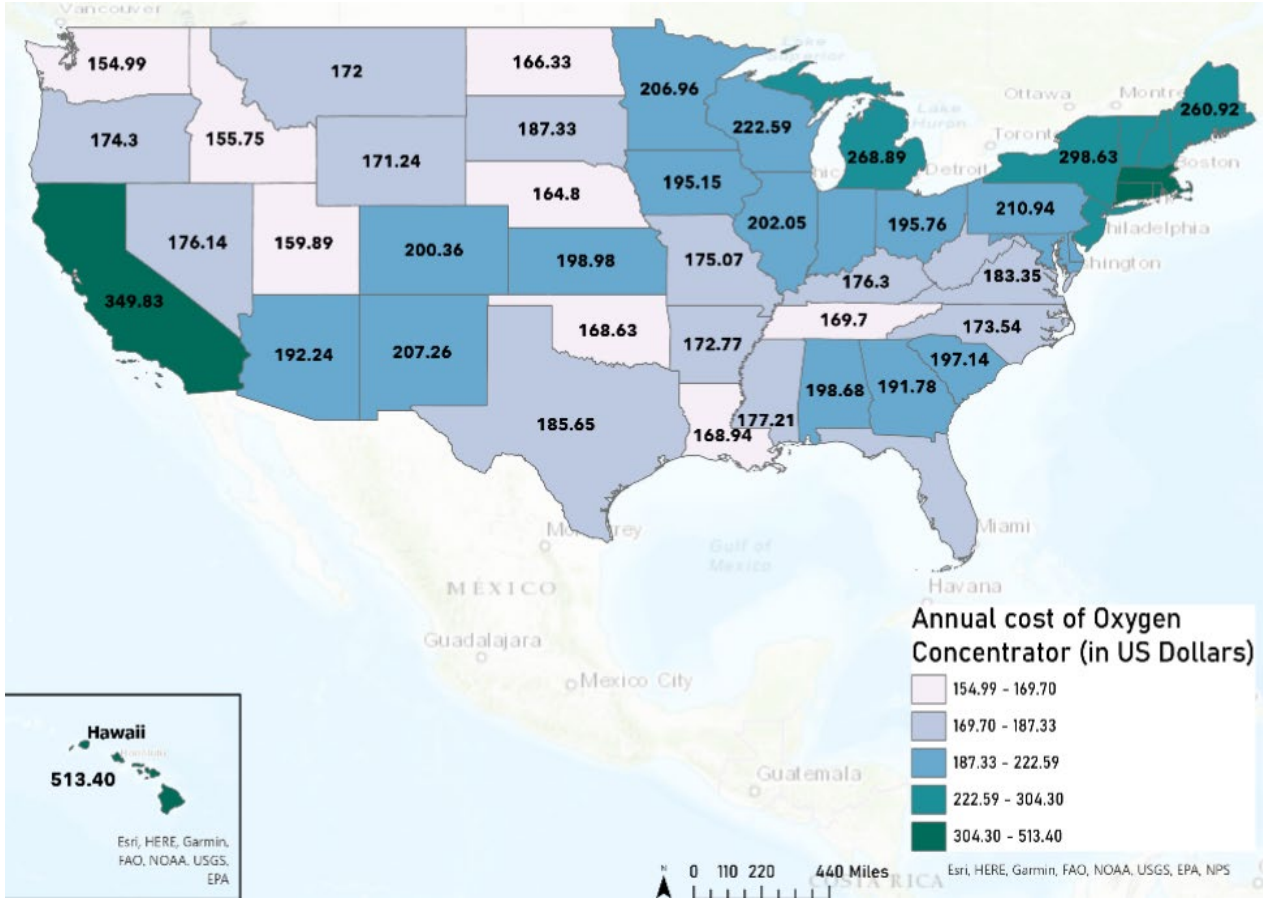
BY TRIBUNE WIRE REPORTS
APR 07, 2015 AT 10:05 PM

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.

Durable medical equipment can significantly increase bills



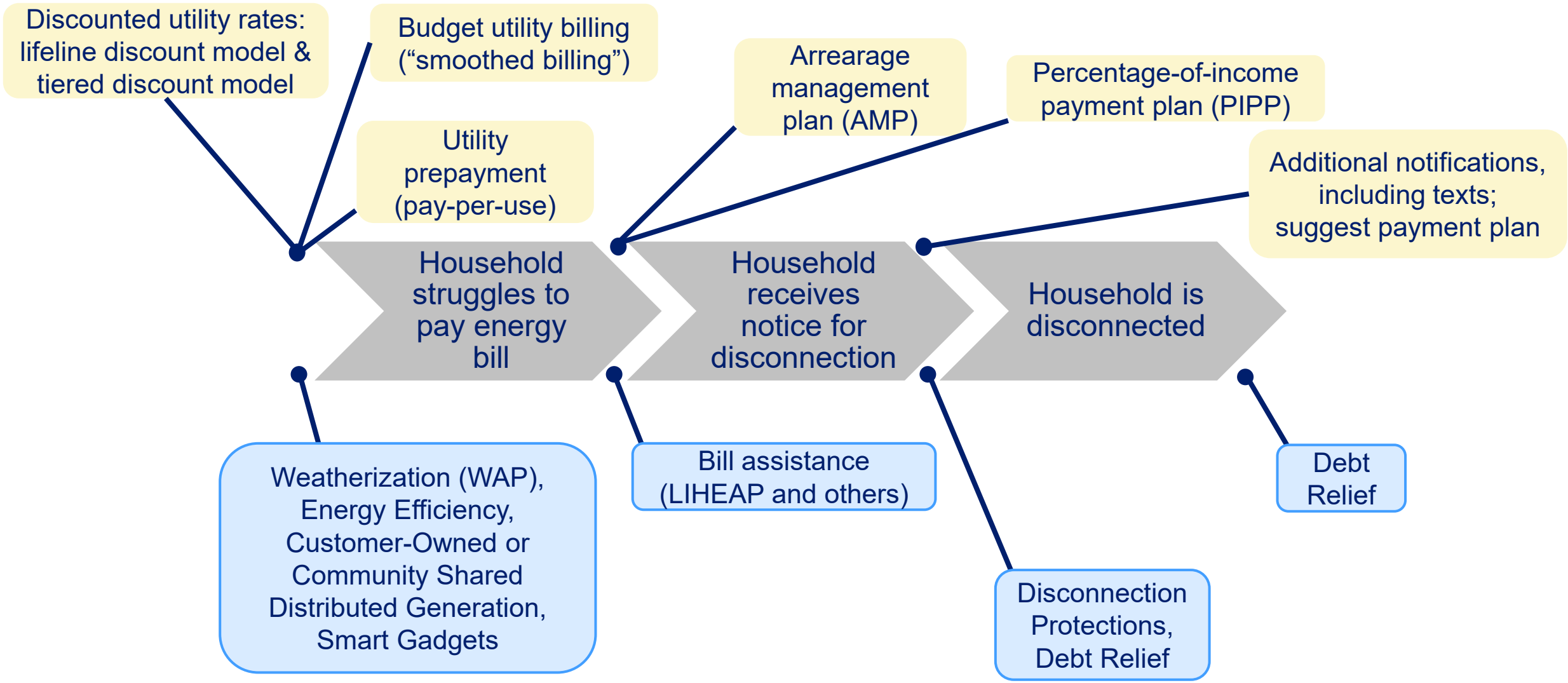
Source: Carley, Bansal, Harak, Kahn, Konisky, Simon. The electricity cost burden of durable medical equipment in the United States. *Scientific Reports* 14.

Weather patterns increase disconnections

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

- 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 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 and programmatic support



Can solar reduce incidence of energy insecurity?

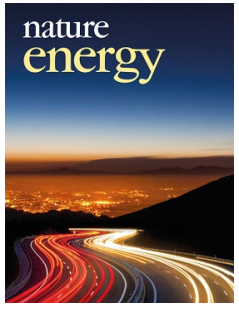
In 2023, sent a survey to low-to-moderate households

Compare self-reported energy insecurity among a matched sample:

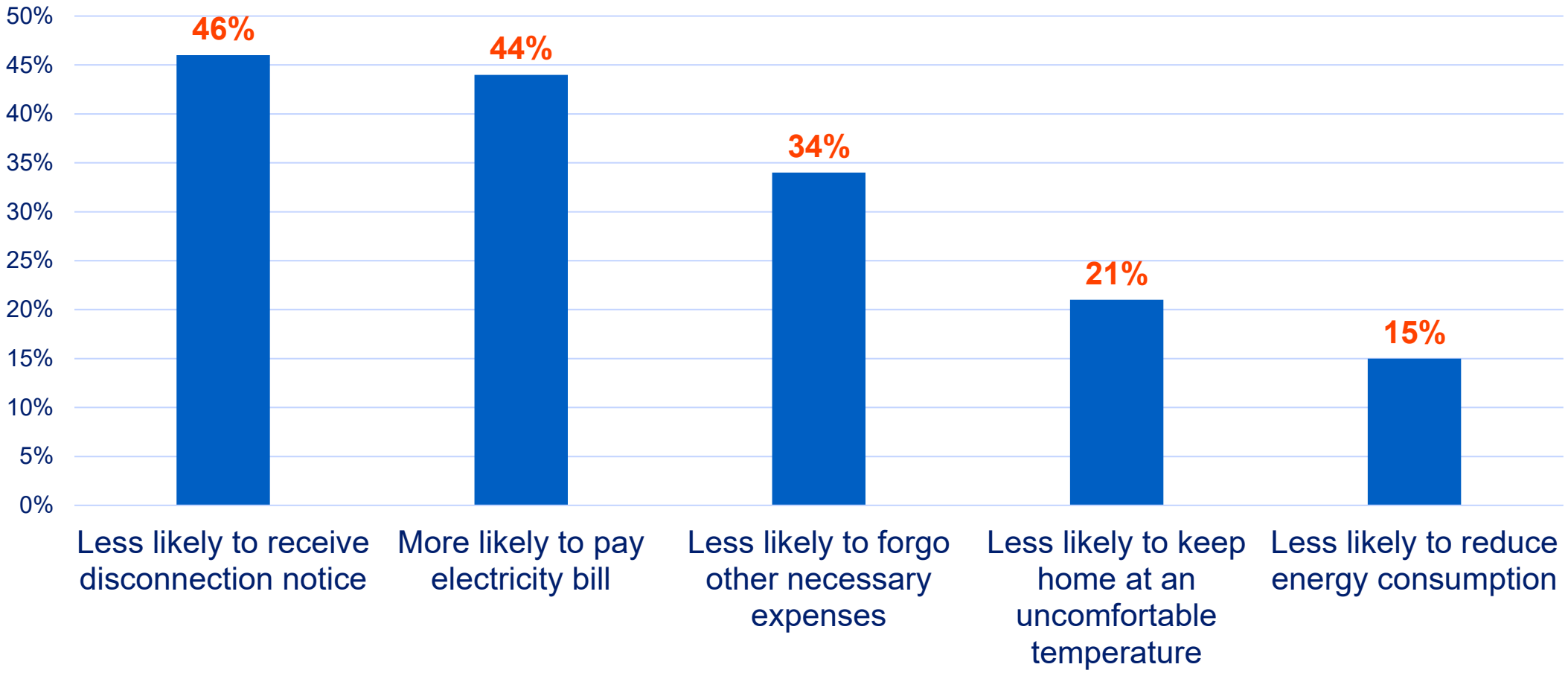
Solar Households	vs.	**Non-Solar Households**
Households who adopted in 2021 with the lowest estimated income*		Households that are similar on mean **observable** characteristics+

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:

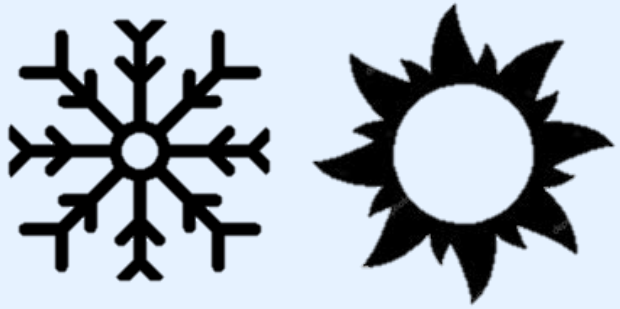


While technologies like solar would most benefit energy insecure households…

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

Customer Protection Policies

WINTER SUMMER



Temperature and seasonal moratoria

Notification requirements

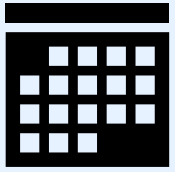
Protections for vulnerable groups

Utility disconnection protections

Source: Energy Justice Lab, Utility Disconnections Dashboard

Disconnection protections: Utility Opportunities for enhancement

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

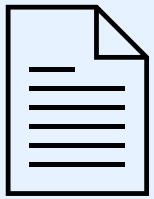


Establish date-range when customers can pay bills before being considered late or delinquent

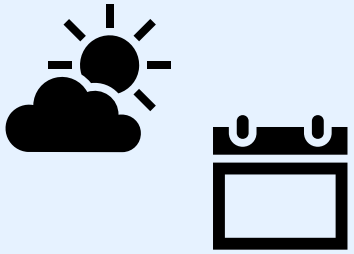
Regularly provide information to customers (e.g., at least twice annually)

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

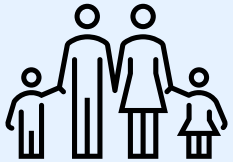


Easily understood and transparent language with few administrative burdens



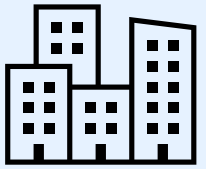
Combined temperature & date-based protections

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



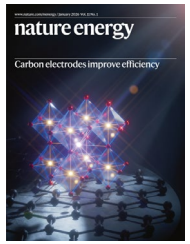
Tenants should not suffer disconnection due to their landlord's failure to pay the building's utility bills

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



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

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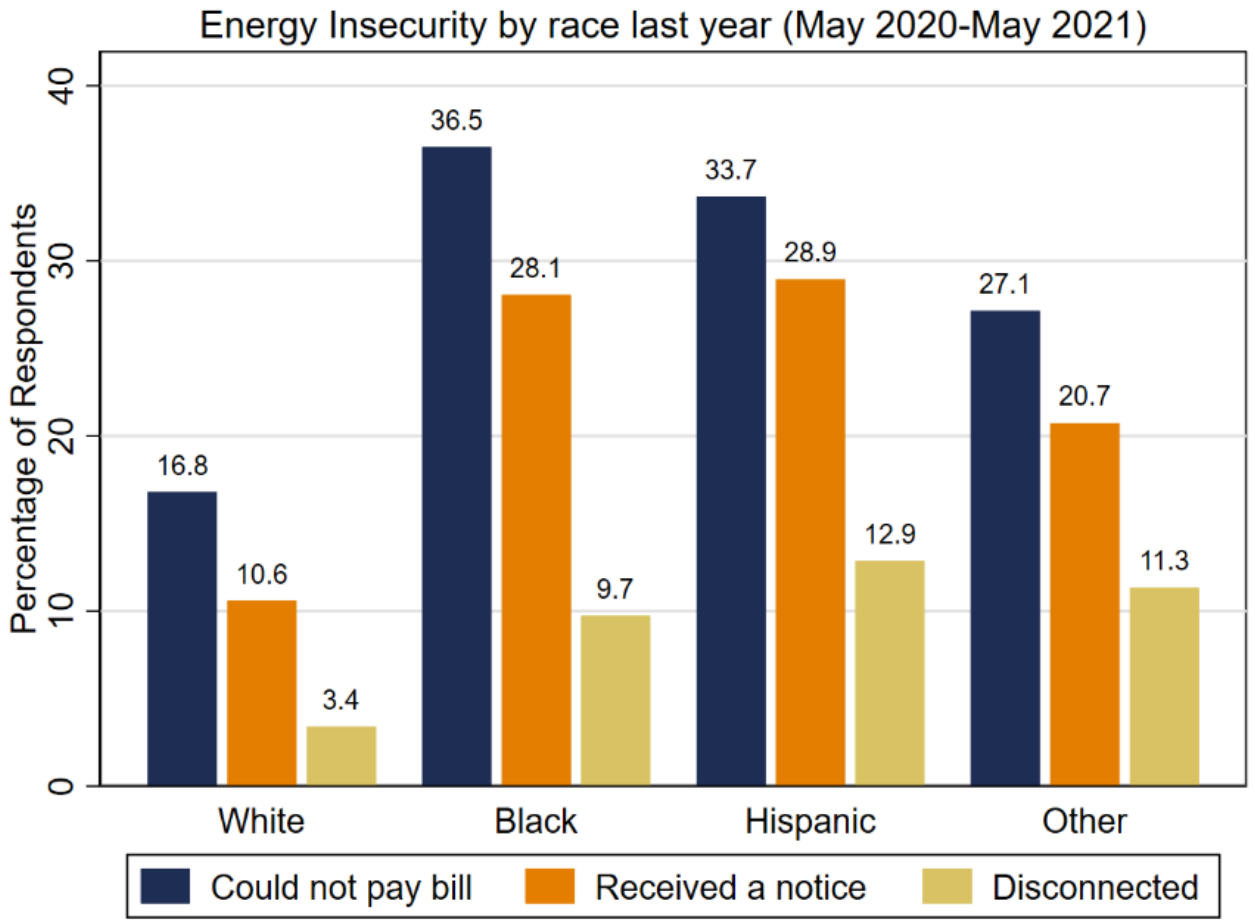
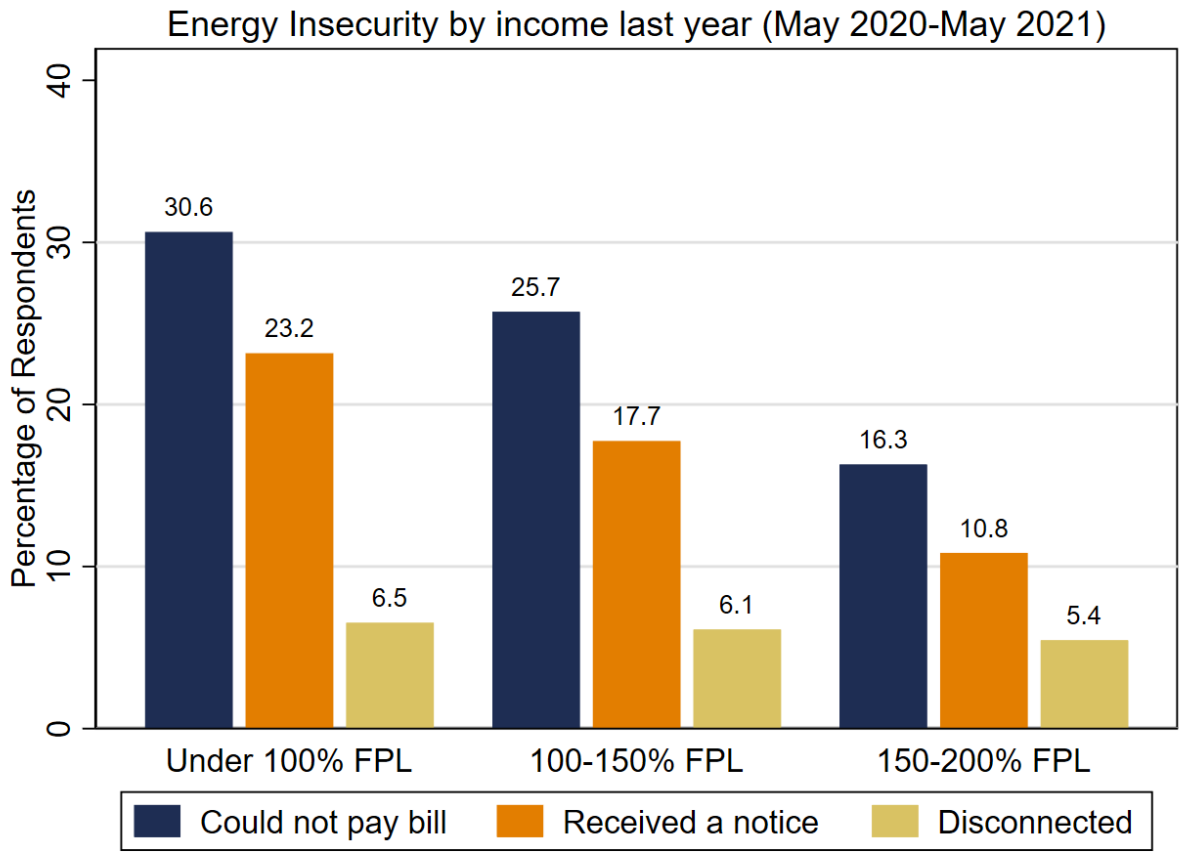
Disparities by Race



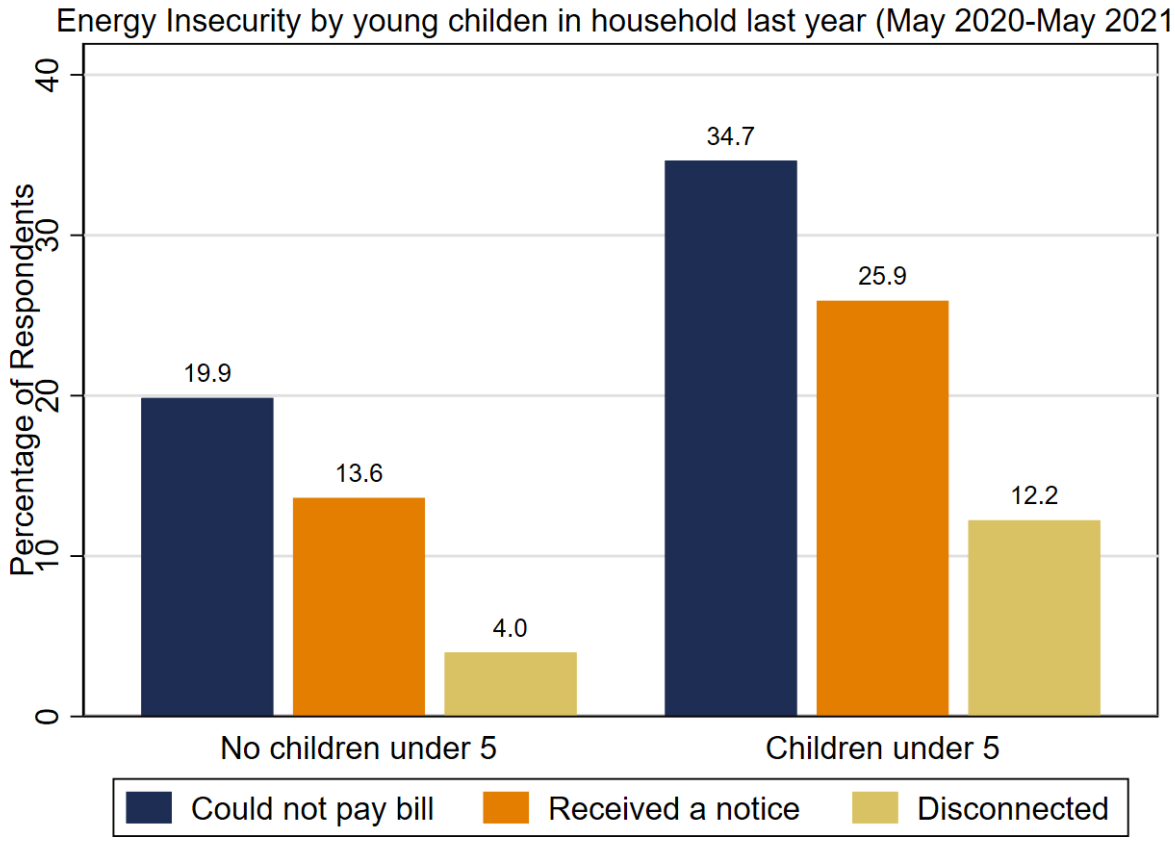
Source: Carley and Konisky. 2021. Survey of Household Energy Insecurity in Time of COVID. Wave 4 Report.

Disparities by Income



Source: Carley and Konisky. 2021. Survey of Household Energy Insecurity in Time of COVID. Wave 4 Report.

Disparities by Children



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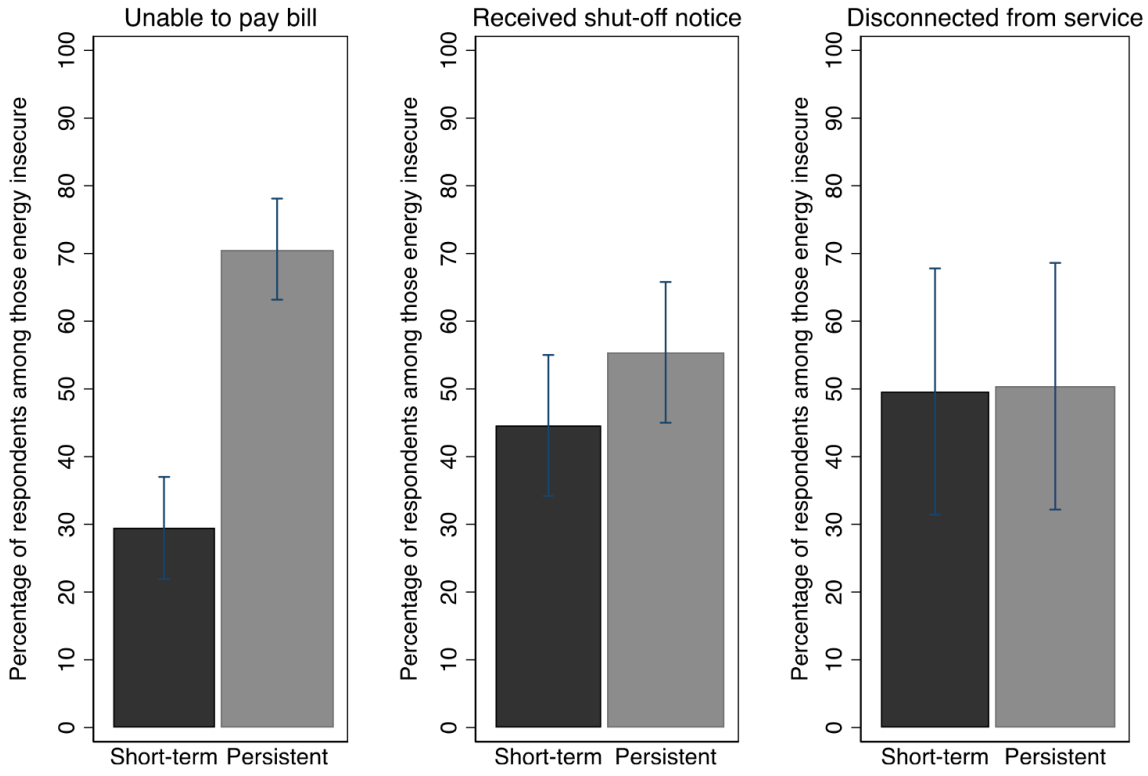
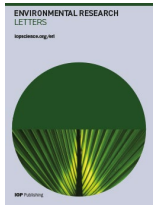
Energy insecurity is reoccurring for more than half of those who experience it





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