Title: Climate Change and Energy Insecurity: A Growing Need for Policy Intervention

Authors: Michelle Graff[a,*], David Konisky[b], Sanya Carley[c], Trevor Memmott[d]

[a] Paul H. O'Neill School of Public and Environmental Affairs, Indiana University, 1315 E. 10th St., Bloomington, IN 47408; ORCID: 0000-0002-2869-7597; email: graffm@indiana.edu
[b] Paul H. O'Neill School of Public and Environmental Affairs, Indiana University, 1315 E. 10th St., Bloomington, IN 47408; ORCID: 0000-0002-1146-3938; ; email: dkonisky@indiana.edu
[c] Paul H. O'Neill School of Public and Environmental Affairs, Indiana University, 1315 E. 10th St., Bloomington, IN 47408; ORCID: 0000-0001-9599-4519; email: scarley@indiana.edu
[d] Paul H. O'Neill School of Public and Environmental Affairs, Indiana University, 1315 E. 10th St., Bloomington, IN 47408; ORCID: 0000-0001-7820-8707; ; email: tmemmott@indiana.edu

***Corresponding author:** Michelle Graff; graffm@indiana.edu

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Abstract
Energy insecurity, or a household's inability to afford its basic energy needs, is an under-appreciated material hardship that millions of low-income U.S. households face every month. When households experience energy insecurity, they are more likely to take financial risks, engage in unsafe coping strategies, as well as suffer adverse mental and physical impacts as they try to pay their energy bills and avoid utility disconnection. In this commentary, we share new survey data that identifies the energy insecure population in the U.S., revealing that Black and Hispanic households are more likely to experience this material hardship than white households. We argue that climate change will likely deepen this problem due to ongoing and projected increases in average and extreme temperatures, thus exposing those that cannot afford to maintain comfortable temperatures inside their homes to extreme heat, which can lead to severe health consequences, including death from heatstroke or heat exhaustion. We maintain that current policies and programs are insufficient to mitigate climate-induced energy insecurity and conclude by offering several policy recommendations state and federal policymakers should consider as the effects of climate change mount and adversely affect energy insecure communities.

Introduction
Every month, millions of U.S. households face decisions about which expenses they can afford, and which they cannot. People are often forced to decide if they should pay their rent or mortgage, feed their family, or seek medical care.[1] A widespread, but under-appreciated, concern many households experience is their (in)ability to afford their basic energy needs, a concept that has been defined as 'energy (in)security'.[2] Energy insecurity not only places a financial burden on millions of Americans, but it can also lead households to engage in unsafe behavior (e.g., using stoves or space heaters, which are the leading causes of domestic home fires and related deaths[3]) and pursue risky financial decisions (e.g. taking out high-interest payday loans[4]). In some circumstances, energy insecurity is also associated with mental (e.g., stress, disrupted sleep, and depression[2]) and physical health impacts (e.g., asthma, upper respiratory infections, and premature death).[5,6,7]

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[1]Bhattacharya, Jayanta, Thomas DeLeire, Steven Haider, and Janet Currie. "Heat or eat? Cold-weather shocks and nutrition in poor American families." *American Journal of Public Health* 93, no. 7 (2003): 1149-1154.
[2] Hernández, Diana. "Understanding 'energy insecurity' and why it matters to health." *Social science & medicine* 167 (2016): 1-10.
[3] Campbell, Richard B. *Home Fires Involving Heating Equipment*. National Fire Protection Association, 2016.
[4] Levy, Rob, and Joshua Sledge. "A complex portrait: An examination of small-dollar credit consumers." *Center for Financial Services Innovation, Report* (2012).
[5]Shenassa, Edmond D., Constantine Daskalakis, Allison Liebhaber, Matthias Braubach, and MaryJean Brown. "Dampness and mold in the home and depression: an examination of mold-related illness and perceived control of one's home as possible depression pathways." *American Journal of Public Health* 97, no. 10 (2007): 1893-1899.
[6] Mendell, Mark J., Anna G. Mirer, Kerry Cheung, My Tong, and Jeroen Douwes. "Respiratory and allergic health effects of dampness, mold, and dampness-related agents: a review of the epidemiologic evidence." *Environmental health perspectives* 119, no. 6 (2011): 748-756.
[7] Reames, Tony G., Dorothy M. Daley, and John C. Pierce. "Exploring the Nexus of Energy Burden, Social Capital, and Environmental Quality in Shaping Health in US Counties." *International Journal of Environmental Research and Public Health* 18, no. 2 (2021): 620.

The concept of energy insecurity is related to energy justice,[8] which argues that policymakers should ensure that everyone has access to safe, reliable, affordable, sustainable, and modern energy.[9] When a household is energy insecure, it either lacks affordable and/or reliable energy. Related concepts to energy insecurity are energy burdens – or the proportion of income spent on energy – and energy poverty, both of which have been studied extensively in European contexts.[10,11] Unlike in the U.S., the U.K. government has differentiated energy poverty from general poverty,[12,13] considering a household energy poor if their energy costs are above the national median and, if the household spent this amount on energy, would their remaining income put them below the poverty line.[14]

Climate change is likely to exacerbate household energy insecurity. Higher incidence of extreme temperatures will place further burdens on those experiencing energy insecurity and may force other households to confront it as well. With much of the United States expected to experience more days of extreme heat,[15] the problem of energy insecurity will deepen. Building resiliency to address the impacts, especially for communities of color and low-income populations who have higher residential energy usage,[16] more often live in dilapidated or inefficient housing,[17] and experience higher rates of energy insecurity,[18] requires a rethinking of current programs and policies to ensure that vulnerable households are actively considered and cared for.

In this commentary, we share new survey data revealing that household energy insecurity is already widespread among low-income U.S. households and argue that climate change will likely worsen this material hardship. We posit that current state-level policies and federal-level programs are insufficient to alleviate or protect vulnerable communities from climate-induced

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[8]McCauley, Darren A., Raphael J. Heffron, Hannes Stephan, and Kirsten Jenkins. "Advancing energy justice: the triumvirate of tenets." *International Energy Law Review* 32, no. 3 (2013): 107-110.

[9] Jenkins, Kirsten, Darren McCauley, Raphael Heffron, Hannes Stephan, and Robert Rehner. "Energy justice: a conceptual review." *Energy Research & Social Science* 11 (2016): 174-182.

[10]Middlemiss, Lucie, and Ross Gillard. "Fuel poverty from the bottom-up: Characterising household energy vulnerability through the lived experience of the fuel poor." *Energy Research & Social Science* 6 (2015): 146-154.

[11]Sovacool, Benjamin K. "Fuel poverty, affordability, and energy justice in England: Policy insights from the Warm Front Program." *Energy* 93 (2015): 361-371.

[12]Bednar, Dominic J., and Tony G. Reames. "Recognition of and response to energy poverty in the United States." *Nature Energy* 5, no. 6 (2020): 432-439.

[13] Boardman, B. (1991). *Fuel poverty: from cold homes to affordable warmth*. Pinter Pub Limited.

[14] Department for Business, Energy & Industrial Strategy. Fuel Poverty Statistics. GOV.UK. Last updated June 25, 2020. https://www.gov.uk/government/collections/fuel-poverty-statistics

[15] Romanowsky, Erik, Dörthe Handorf, Ralf Jaiser, Ingo Wohltmann, Wolfgang Dorn, Jinro Ukita, Judah Cohen, Klaus Dethloff, and Markus Rex. "The role of stratospheric ozone for Arctic-midlatitude linkages." *Scientific reports* 9, no. 1 (2019): 1-7.

[16] Reames, Tony Gerard. "Targeting energy justice: Exploring spatial, racial/ethnic and socioeconomic disparities in urban residential heating energy efficiency." *Energy Policy* 97 (2016): 549-558.

[17] Hernández, Diana, Douglas Phillips, and Eva Laura Siegel. "Exploring the housing and household energy pathways to stress: A mixed methods study." *International journal of environmental research and public health* 13, no. 9 (2016): 916.

[18] Memmott, Trevor, Sanya Carley, Michelle Graff, and David M. Konisky. "Sociodemographic disparities in energy insecurity among low-income households before and during the COVID-19 pandemic." *Nature Energy* (2021): 1-8.

energy insecurity. For these reasons, we recommend that state governments broaden disconnection protections and moratoria to all vulnerable groups and focus on expanding these protections to better cover the hot summer months. At the federal-level, Congress should provide additional funding for both bill assistance and weatherization programs; however, they should prioritize efforts to escalate the weatherization of low-income homes to reduce household carbon emissions *and* the cost of energy bills, thus providing a longer-term solution for vulnerable households.[19]

Household Energy Insecurity in the United States

Household energy insecurity is a prevalent problem in the United States. Every four years, the U.S. Energy Information Administration (EIA) administers the Residential Energy Consumption Survey (RECS), which asks Americans about their energy use and bills. According to the 2015 survey, the most recent version available, approximately 14 million households had unpaid energy utility bills, 17 million households received a disconnection notice from their utility provider, and 2 million households had their electricity service disconnected by their utility.[20]

Recent survey data collected by the authors further elucidate the extent of household energy insecurity in the United States among low-income Americans.[23] As part of a nationally-representative survey fielded in May 2020 to approximately 2,000 households with incomes at or below 200% of the federal poverty line, we found that nearly 4.7 million households (or about 24 million individuals) could not pay an energy bill in at least one month of the prior year. In addition, 4.8 million households received a disconnection notice from their utility, and approximately 2 million households lost service due to nonpayment.[11]

During the early months of the COVID-19 pandemic, we found even higher rates of energy insecurity. Between April/May 2020 and August 2020, 21% of respondents (representing approximately 3.8 million low-income households) indicated that there was at least one month during this period in which their household could not afford to pay their bill; 15% of respondents (representing about 2.8 million households) indicated that they had received a disconnection notice, and 6% (representing about 1.2 million households) noted that they had their service shutoff.[21]

Past research has identified race- and income-based disparities in household energy insecurity,[22,23,24] and we find similar results, even among low-income households. As shown in

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[19] Tonn, Bruce, Beth Hawkins, Erin Rose, and Michaela Marincic. "Income, housing and health: Poverty in the United States through the prism of residential energy efficiency programs." *Energy Research & Social Science* 73 (2021): 101945.

[20] U.S. Energy Information Administration (EIA). “2015 Residential Energy Consumption Survey.” (2018).

[21] Authors-anonymous for peer review

[22] Drehobl, Ariel, and Lauren Ross. "Lifting the high energy burden in America’s largest cities: How energy efficiency can improve low income and underserved communities." (2016).

[23] Lyubich, Eva. "The Race Gap in Residential Energy Expenditures." *Energy Institute at HAAS. https://assets. ctfassets. net/ntcn17ss1ow9/6Xj2o8VJUWjKDwh-CzRooKY/00464dbde818d4656101d8c398fcf6dd/The_Race_Gap_in_Residential_Energy_Expenditures. pdf* (2020).

[24] Hernández, Diana, Yumiko Aratani, and Yang Jiang. "Energy insecurity among families with children." (2014).

Figure 1, between April/May-August 2020, Black and Hispanic households were about twice as likely as white households to be unable to pay an energy bill. Moreover, Black and Hispanic households were, respectively, two and three times more likely to receive a disconnection notice and three and eight times more likely to be disconnected from the electric grid due to lack of payment.

[Insert Figure 1]

Climate Change will Exacerbate Energy Insecurity

According to the most recent National Climate Assessment, the average U.S. temperature is projected to rise by at least 2.5 degrees Fahrenheit by 2050 as a direct result of the increases in greenhouse gas concentrations.[25] Additionally, researchers predict the U.S. will experience 20 to 30 more days over 90 degrees Fahrenheit by 2050, with increases of approximately 40 to 50 days in the Southeast.[26] While this increase in average and daily temperature extremes will contribute to fewer cold spells (6-days with minimum temperatures below the 10th percentile), especially in Alaska and the Northeast, it will result in more severe and frequent heat waves (6-days with maximum temperatures above the 90th percentile), particularly in the Southeast, Southwest, and Alaska.

Studies reveal that domestic heat waves are already occurring more often than in previous decades due to climate change, especially in cities. In the 2010s, metropolitan areas averaged six heat waves per year, an increase from the 1960s average of two times per year.[27] In 2020, many cities endured long stretches of record-breaking heat due to the urban heat island effect – when highly urbanized areas endure higher temperatures as compared to suburban and rural locations because heat is more easily absorbed and emitted by buildings and asphalt.[28] For example, Phoenix, Arizona broke several heat-related records in 2020, experiencing more than 145 days above 100 degrees, 15 days above 115 degrees, and approximately 300 recorded heat-related deaths.[29]

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[25] Wuebbles, Donald J., David W. Fahey, Kathy A. Hibbard, Jeff R. Arnold, Benjamin DeAngelo, Sarah Doherty, David R. Easterling et al. "Climate science special report: Fourth national climate assessment (NCA4), Volume I." (2017).

[26] Vose, Russell, David R. Easterling, Kenneth Kunkel, and Michael Wehner. "Temperature changes in the United States." (2017).

[27] Habeeb, Dana, Jason Vargo, and Brian Stone. "Rising heat wave trends in large US cities." *Natural Hazards* 76, no. 3 (2015): 1651-1665.

[28] Dupigny-Giroux, L.A., E.L. Mecray, M.D. Lemcke-Stampone, G.A. Hodgkins, E.E. Lentz, K.E. Mills, E.D. Lane, R. Miller, D.Y. Hollinger, W.D. Solecki, G.A. Wellenius, P.E. Sheffield, A.B. MacDonald, and C. Caldwell, 2018: Northeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 669–742. doi: 10.7930/NCA4.2018.CH18

[29] Hersher, Rebecca, and Lauren Sommer. "2020 May Be the Hottest Year on Record. Here's the Damage it Did." *National Public Radio:* (2020). Available here: https://www.npr.org/2020/12/18/943219856/2020-may-be-the-hottest-year-on-record-heres-the-damage-it-did.

As highly populated regions of the U.S. face increasing exposure to extreme heat, we not only expect the energy insecure population to grow but also the potential adverse consequences to worsen. Research has documented that exposure to extreme temperatures, especially heat, can compromise the body's ability to regulate its internal temperature.[30] Therefore, as temperatures rise, those households with access to air conditioning or fans will face higher energy costs,[31] while other households that cannot afford larger energy bills may decide to forgo air conditioning or fans to limit their expenses.[32] Those households that cannot maintain comfortable temperatures are more likely to experience exposure to extreme heat, which can lead to illness, including heat cramps, heat exhaustion, and heatstroke, and can also aggravate preexisting conditions, such as cardiovascular, kidney, and respiratory diseases.[25] These risks affect energy insecure households, people of color, elderly individuals, those living in public housing, in urban areas, and in homes without air conditioning more often.[33,34,35,36]

In some circumstances, exposure to extreme heat is also correlated with increased hospital admissions and excess deaths.[37] Recent research suggests that we do not have an accurate estimate of the number of historical weather-related deaths in the U.S., especially as it pertains to heatstroke or heat exhaustion.[38] According to the Centers for Disease Control and Prevention (CDC), an estimated 65,000 people visit the emergency room for acute heat illnesses annually, with 618 cases of premature mortality documented every year.[39] However, the CDC (2016) argues that the number of deaths is underestimated because extreme heat is often not identified by a medical examiner as the primary cause of death, and the estimate is closer to 5,600 each year.[45]

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[30] Sarofim, Marcus C., Shubhayu Saha, Michelle D. Hawkins, David M. Mills, Jeremy Hess, Radley Horton, Patrick Kinney, Joel Schwartz, and A. St Juliana. *Ch. 2: Temperature-related death and illness*. US Global Change Research Program, Washington, DC, 2016.

[31] Chen, Mo, George A. Ban-Weiss, and Kelly T. Sanders. "Utilizing smart-meter data to project impacts of urban warming on residential electricity use for vulnerable populations in Southern California." *Environmental Research Letters* 15, no. 6 (2020): 064001.

[32] Newsham, Guy R., and Brent G. Bowker. "The effect of utility time-varying pricing and load control strategies on residential summer peak electricity use: a review." *Energy policy* 38, no. 7 (2010): 3289-3296.

[33] Berko, Jeffrey. *Deaths attributed to heat, cold, and other weather events in the United States, 2006-2010*. No. 76. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2014.

[34] Rey, Grégoire, Anne Fouillet, Pierre Bessemoulin, Philippe Frayssinet, Anne Dufour, Eric Jougla, and Denis Hémon. "Heat exposure and socio-economic vulnerability as synergistic factors in heat-wave-related mortality." *European journal of epidemiology* 24, no. 9 (2009): 495-502.

[35] Klinenberg, Eric. *Heat wave: A social autopsy of disaster in Chicago*. University of Chicago Press, 2015.

[36] Levy, Barry S., and Jonathan A. Patz. "Climate change, human rights, and social justice." *Annals of global health* 81, no. 3 (2015): 310-322.

[37] Bouchama, Abderrezak. "The 2003 European heat wave." *Intensive care medicine* 30, no. 1 (2004): 1-3.

[38] Weinberger, Kate R., Daniel Harris, Keith R. Spangler, Antonella Zanobetti, and Gregory A. Wellenius. "Estimating the number of excess deaths attributable to heat in 297 United States counties." *Environmental Epidemiology (Philadelphia, Pa.)* 4, no. 3 (2020).

[39] Centers for Disease Control and Prevention (CDC). "Climate Change and Extreme Heat." (2016). Available here: https://www.cdc.gov/climateandhealth/pubs/extreme-heat-guidebook.pdf.

In sum, as the effects of climate change continue to worsen, especially increasing rates of extreme heat events, those households that cannot afford to keep their homes at comfortable temperatures as well as those already experiencing material hardships, such as preexisting medical conditions, will likely experience the brunt of domestic energy insecurity and the health consequences are likely to be severe.[40]

Policy Discussion

To address the growing issue of energy insecurity, federal and state government officials need to consider policies that address the scope of the problem and that better align with the mounting health risks posed by climate change. Currently, there is no federal policy that protects vulnerable customers from utility disconnections. State governments have enacted policies, but these vary considerably in design and reach, and collectively provide only a patchwork of protections.[41,42]

State disconnection protections fall into four general categories: vulnerable populations, procedures regarding notification, financial considerations, and extreme temperatures.[43] Regarding vulnerable populations, all but a handful of states limit the shut off of energy services (usually, electricity and natural gas) for customers with medical conditions; whereas, protections for low-income populations, elderly customers, households with young children, or persons with disabilities are less common. Importantly, the burden of documenting eligibility for these protections generally falls on the customer. Moreover, state policies vary in the type of notification (e.g., written, telephone, in-person) they require of utilities prior to discontinuing services as well as in provisions that may require utilities to offer payment plans for customers in arrears before ending their service.

Of most relevance for this commentary, states have adopted two common approaches with respect to extreme temperatures: 1) date-based, such that utilities are limited from disconnecting customers during certain times of the year; and 2) temperature-based, which impose similar restrictions on disconnections when temperatures are above or below a defined threshold. In some instances, these protections apply to all users, while in others they are limited to specific groups (e.g., low-income, elderly). Importantly, as illustrated in Figure 2, while 42 states have cold weather-related protections, just 14 have protections for hot weather.

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[40] Dahl, Kristina, Rachel Licker, John T. Abatzoglou, and Juan Declet-Barreto. "Increased frequency of and population exposure to extreme heat index days in the United States during the 21st century." *Environmental Research Communications* 1, no. 7 (2019): 075002.

[41] Franklin, M., C. Kurtz, M. Alksnis, L. Steichen, and C. Younger. "Lights out in the cold: Reforming utility: Shut-off policies as if human rights matter." *National Association for the Advancement of Colored People* (2017).

[42] Flaherty, Matthew, Sanya Carley, and David M. Konisky. "Electric utility disconnection policy and vulnerable populations." *The Electricity Journal* 33, no. 10 (2020): 106859.

[43] Disconnection protection policies only apply to the utilities regulated by public utility commissions, which often only includes investor-owned utilities, leaving most customers served by electric cooperatives and municipal utilities unprotected or subject to utility-specific policies.

Given expectations of more excessive heat due to climate change, these policies are not aligned with future risks of heat-related illness and mortality.[44,45] This is a major shortcoming of existing protections that states should rectify immediately.

[Insert Figure 2]

Moreover, the two federal programs that aim to alleviate energy insecurity – the Low Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program (WAP) – are historically underfunded. WAP, which aims to reduce energy costs for low-income households through energy efficiency upgrades, only serves 35,000 households each year.[46] And, LIHEAP, which helps low-income households pay their energy bills, can only provide bill assistance for approximately 22% of the income-eligible population. [47] LIHEAP funds are so limited that they tend to focus on helping people pay for their heating rather than cooling needs because they often are exhausted by the spring and summer months.[51] In sum, current levels of government assistance are inadequate and electricity disconnection protections across the country are uneven, which leaves millions of Americans in potentially precarious circumstances.[48]

Policy Recommendations

Without policy interventions to help U.S. households improve their home's energy efficiency, pay their utility bills, and protect them from utility disconnections, millions of vulnerable Americans will face severe risks to their health and well-being as the effects of climate change intensify. There are several steps that government officials can take, in the near- and long-term, to improve the policies and programs aimed at helping energy insecure households withstand or adapt, more easily recover from, and in general be resilient to rising residential energy costs, declining economic security, and increasing climate change-induced threats.

In the near-term, the federal government should provide additional funding to both LIHEAP and WAP. Appropriating more funds to LIHEAP would help customers with near-term concerns, such as paying their energy bills, avoiding disconnection, and relieving debt accrual. Importantly, providing more funding to bill assistance could allow state program offices to remain open through the hot summer months and help low-income households cool their homes and fix or replace broken air conditioning equipment. Simultaneously, the federal government should also prioritize funding WAP to help households achieve longer-term goals,

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[44] Bobb, Jennifer F., Roger D. Peng, Michelle L. Bell, and Francesca Dominici. "Heat-related mortality and adaptation to heat in the United States." *Environmental health perspectives* 122, no. 8 (2014): 811-816.

[45] Mills, David, Joel Schwartz, Mihye Lee, Marcus Sarofim, Russell Jones, Megan Lawson, Michael Duckworth, and Leland Deck. "Climate change impacts on extreme temperature mortality in select metropolitan areas in the United States." *Climatic Change* 131, no. 1 (2015): 83-95.

[46]Department of Energy. Action, Weatherization In. "Weatherization Works!." Available at: https://nascsp.org/wp-content/uploads/2020/01/WAP-Fact-Sheet-2019.pdf.

[47] Perl, Libby. "LIHEAP: program and funding." Library of Congress, Congressional Research Service, 2015.

[48] The third COVID relief package enacted by Congress – the American Rescue Plan Act of 2021 – included $4.5 billion in new funding for the LIHEAP program.

including improving deficient housing stock, reducing energy use and carbon emissions, and increasing energy bill affordability. Funding WAP at higher levels could alleviate strains on LIHEAP and other bill assistance programs and may also translate to the availability of more local energy efficiency jobs. In addition, the federal government should not only appropriate higher levels of funding for both the LIHEAP and WAP programs every year, but they should 1) coordinate efforts across programs to improve efficiency and implementation of both programs; 2) target the most vulnerable populations in the U.S.;[49,50] and 3) when possible, reduce hurdles that applicants face to gain access to both LIHEAP and WAP[51] as well as allow local agencies flexibility to implement these programs to meet their specific community's needs.[52]

In the long-term, state governments should carefully reconsider their current disconnection policies and make reforms to broaden their coverage and to reduce the administrative burdens that households need to overcome to meet eligibility requirements. For example, all states should consider implementing date-based, in addition to temperature-based, protections so as to standardize and simplify these policies for customers. States should also consider indefinite and absolute protections for certain groups, including those who require the use of an electronic medical device. In particular, it is critical that these reforms cover all low-income households and types of utilities so that protections are not contingent on where one lives or who their energy is provided by. And, in anticipation of rising temperatures because of climate change, most states need to update their policies so that they include heat-related protections. For most parts of the country, climate change will bring more days with excessive heat, and utility disconnection policies should reflect these changing circumstances.

When determining how to improve household energy and climate resiliency, federal and state governments as well as electric utilities must consider energy insecurity as a tangible material hardship that low-income families face and therefore an important aspect of general household and societal health and well-being.[53] Once they do, federal and state governments should work together with public utility commissions and electric utilities to strategically generate and implement a comprehensive set of programs and policy interventions to help households experiencing energy insecurity. Building resiliency to the effects of climate change requires addressing the unequal impacts it will bring, including the increasing costs of energy that are likely to result.

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[49]Bednar, Dominic J., and Tony G. Reames. "Recognition of and response to energy poverty in the United States." *Nature Energy* 5, no. 6 (2020): 432-439.

[50]Reames, Tony. "Improving the Effectiveness of Federal Energy Assistance for Low-Income Households." *Scholar Strategies Network,* (2017).

[51] Herd, Pamela, and Donald P. Moynihan. *Administrative burden: Policymaking by other means*. Russell Sage Foundation, 2019.

[52] Raissi, Shiva, and Tony G. Reames. "If we had a little more flexibility." perceptions of programmatic challenges and opportunities implementing government-funded low-income energy efficiency programs." *Energy Policy* 147 (2020): 111880.

[53] Bohr, Jeremiah, and Anna C. McCreery. "Do energy burdens contribute to economic poverty in the United States? A panel analysis." *Social Forces* 99, no. 1 (2020): 155-177.

As federal, state, and local governments address the problem of energy insecurity, they may find more traction if they address it through a coordinated approach that considers its inter-related challenges with housing, education, and health. Energy insecurity is a complex problem that involves more than just whether a household has enough money to pay its energy bill; it correlates with housing options and conditions, employment opportunities, and mental and physical health, among other important dimensions. Therefore, a comprehensive approach that addresses a range of personal and structural challenges faced by vulnerable households is most likely to generate durable outcomes. Such efforts have the potential to help households build resiliency to the looming and growing threats of climate change.

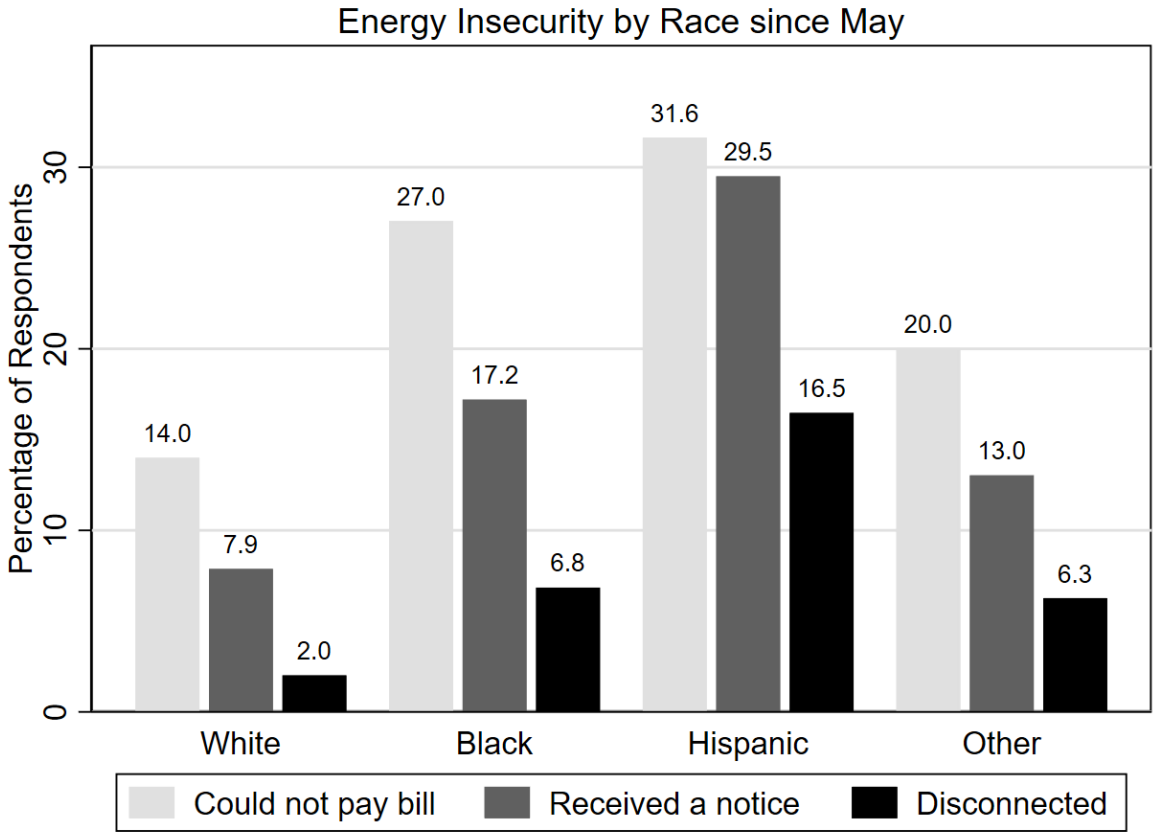

Figure 1. Energy Insecurity by Race, between May and August 2020

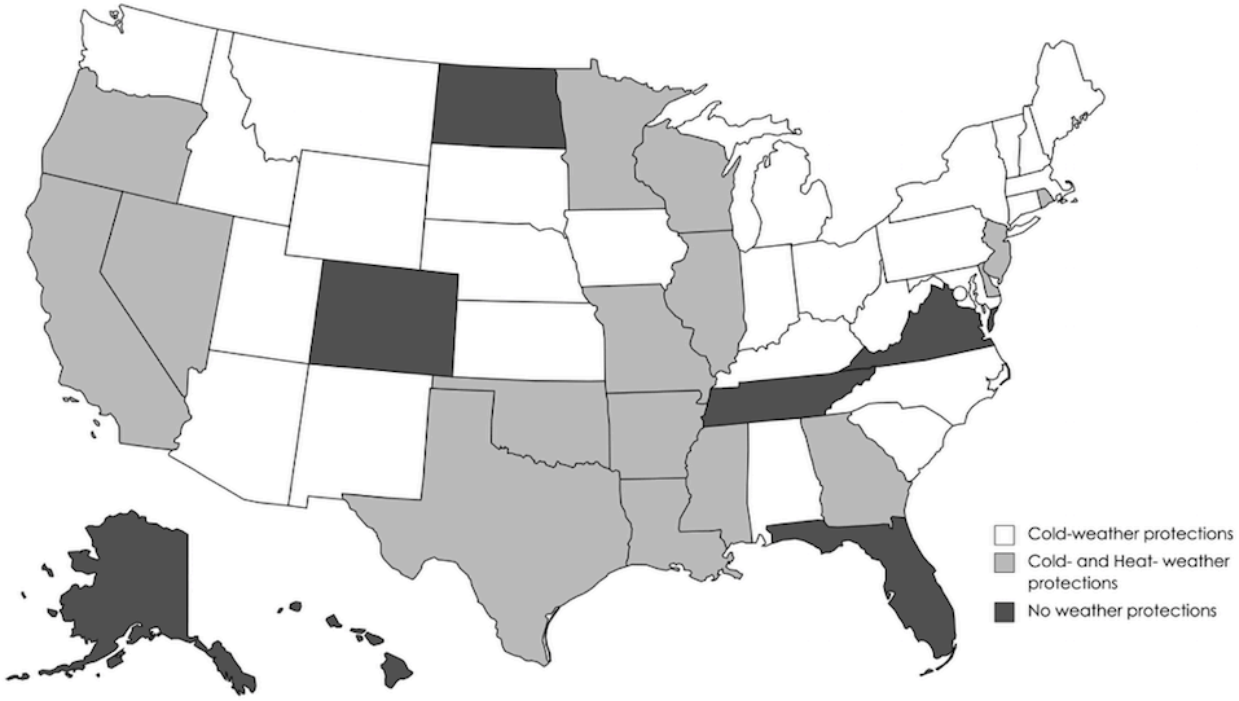

Figure 2. Map of Weather-Related Disconnection Protections
Source: Data was collected from all 50 states to generate the map of state-level disconnection policies.