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ORIGINAL ARTICLE

Energy efficiency as energy justice: addressing racial inequities through investments in people and places

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Abstract Structural racism in the form of racial residential segregation and the series of laws, policies, and practices that continue to reinforce it have robbed generations of African Americans of socioeconomic opportunity, wealth accumulation, safe, secure or energy-efficient housing, and full societal inclusion. Research indicates that African Americans are more likely to live in older, energy-inefficient homes with structural deficiencies, outdated appliances, and faulty energy systems. These conditions lead to a disproportionate burden of energy insecurity, defined as "the inability to adequately meet household energy needs" among African Americans across the economic spectrum. This, in turn, generates increased costs and decreased comfort, conditions closely linked to adverse physical and mental health outcomes. Persistent income inequality, wealth gaps, and entrenched racial residential segregation have disenfranchised African Americans and reduced their ability to escape this pernicious cycle. Weatherization, which is the practice of protecting a building's interior from the elements while enhancing its energy efficiency and reducing costs, could be a catalyst for reducing the disproportionate energy burden affecting low-income individuals and ultimately improve health and social outcomes among African Americans. We argue for investing in policies that provide energy efficiency and weatherization assistance—and not only energy bill assistance—to provide a long-term and equitable solution to energy insecurity that is also a critical step toward restorative justice.

Keywords Energy justice · Restorative justice · Weatherization · Energy efficiency · African Americans · Energy insecurity · Energy burden · Racial justice

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Introduction

One in three households in the United States is energy insecure (U.S. Energy Information Administration 2017). Energy insecurity is defined as "the inability to meet basic household energy needs" (Hernández et al. 2016). Despite its prevalence, energy insecurity is an often-overlooked policy issue. As a multidimensional construct, energy insecurity is characterized by economic hardship in paying for utility services, physical deficiencies in the home that affect comfort and efficiency, and coping or management responses to such economic and physical adversity that might include behavioral strategies such as carefully managing energy consumption, using a stove or oven for heat, or leveraging medical vulnerabilities to avoid a shut-off (Hernández et al.

2016). These strategies often constitute "high effort coping" and may engender health hazards that are especially pronounced among African Americans (Geronimus et al. 2006).

Energy insecurity is unevenly distributed in the US. This phenomenon primarily affects low-income as well as racial and ethnic minority households, especially those with children (Hernández et al. 2016b; et al. 2014; Hernández et al. 2016a; U.S. Energy Information Administration 2017). African Americans are particularly susceptible to energy insecurity. Energy insecurity is linked to a sister concept, energy burden, measured as the percentage of gross annual income spent on utility services. Energy insecurity, unlike energy burden, captures both the economic and physical hardship that can affect households that live in energy-inefficient housing. Although both hardships often appear simultaneously, a household can still be burdened by the physical hardship, i.e., inefficient or unreliable heating and cooling systems and power outages, even if they are up-to-date on their energy bills. Similarly, households can experience economic hardship even in the absence of physical hardship, at various economic strata. Policy understandings of energy burdens have mostly been reduced to an economic hardship stemming from poverty; however, a more critical analysis would situate energy insecurity and energy burden as functions of structural racism manifested in decades of disinvestment in racially segregated neighborhoods. Clusters of African American communities that exist in cities throughout the USA were formed in part by redlining, in which African Americans were denied mortgages and other lending products that would enable homeownership and other racist housing policies that kept African Americans in less-resourced neighborhoods that lacked economic and educational opportunities for advancement. These policies, often sanctioned by federal and state agencies, prevented African Americans from building wealth through homeownership, inducing them to become renters, while also preventing them from escaping neighborhoods with deteriorating infrastructure and poor environmental conditions that have negatively impacted their health and well-being for generations. This social patterning of energy insecurity by race should inform policy responses given that African Americans across the economic spectrum are disproportionately burdened by energy insecurity (et al. 2014).

Energy insecurity is related to the inferior condition of housing available to disadvantaged households, particularly those in residentially segregated neighborhoods. Deteriorated housing, occupied by households with little to no resources for maintenance or repair, often include energy-related facets such as poor insulation, air leaks and drafts, inefficient and poorly maintained heating, cooling and ventilation (HVAC) systems, and outdated lighting and appliances (Drehobl and Ross 2016; Hernández and Phillips 2015; Reames 2016b; United States Census Bureau 2015). The lack of access to high-quality housing structures and energy-independent systems in the home leads to the inefficient use of energy, which increases the cost of performing basic household functions such as lighting, heating, and cooling. Furthermore, these conditions could lead to thermal discomfort as well as pest infestation, both of which can exacerbate existing chronic health conditions such as arthritis and asthma, respectively (Lavigne et al. 2014; Norton et al. 2018; Norton et al. 2017). Unfortunately, the upfront costs associated with repair, such as performing energy efficiency upgrades, pose a significant barrier, especially for low-income households (Bird and 2012; Reames 2016a). Therefore, many of these households are often left with three options: confront high energy burdens as a result of utilizing energy services, contend with uncomfortable conditions to save money, or seek cheaper alternatives for heating, cooling, and other utility services. Alone and combined, the economic, physical, and coping hardships associated with energy insecurity pose critical challenges for affected households over time and intergenerationally.

The racial links to poverty and material hardship also determine the energy cost burdens disproportionately borne by African Americans who earn less, have less accumulated wealth, and, in many cases, pay more for basic services in what is known as a "poverty tax" (Karger 2007). African Americans have been repeatedly shown to contribute a higher percentage of their household income to energy bills than other racial and ethnic groups (Driebhol and Ross 2016; et al. 2014; U.S. Energy Information Administration 2017). In addition to the limits that poverty presents for this population regarding material resources, the effects of energy insecurity are cumulative and pervasive. The excessive cost of household energy relative to low-incomes induces trade-offs between paying for household utilities and purchasing other necessities, such as food and medications (Knowles et al. 2016; U.S. Energy Information Administration 2017). Moreover, this hardship is often bundled, meaning that it happens in conjunction with

other hardships such as food insecurity and housing insecurity, described elsewhere as the "trifecta of insecurity" (Hernández 2013).

Energy insecurity is a complex problem that cannot be described simply as a binary outcome—energy insecure versus energy secure—since this phenomenon is caused by many factors, not just poverty. Moreover, the impacts of energy insecurity are neither exclusively short-term nor limited to economic trade-offs (as in the heat-or-eat dilemma). From a temporal perspective, the duration and frequency of energy insecure events add an additional layer of complexity. According to the Residential Energy Consumption Survey, energy insecure events—as defined by service interruptions, disconnection notices, and trade-offs—can be episodic or chronic, meaning that some household experience energy insecurity 1–2 months in the year, whereas other households have no reprieve and face these hardships throughout the year (U.S. Energy Information Administration 2017). Some of this uncertainty is a product of severe weather events over which the members of a household have relatively little, if any, control—such as heat waves or particularly cold winters—events that are becoming more frequent in the wake of climate change (Hernández 2013).

To illustrate the lived experience of energy insecurity, below we present illuminating quotes from two African American participants in a national-level, interview-based study recently conducted by the co-author (Diana Hernández). The quotes demonstrate the experiential and financial hardship that exemplifies the multi-faceted challenges of energy insecurity.

> *It's kinda hard because you can never level out [the temperature]. With the temperature being so cold, I even had to go and buy a heater because I cannot cut my heat up on 80, otherwise, I'm looking at a six, or $700 light bill. At 68 degrees the house is not warm enough for us. That's even with us putting on extra blankets on the bed … The apartment may not be insulated right, but I've talked to the landlord about that. He has put insulation but its still cold in here. It's just certain rooms are hot and others are cold you just can't get it leveled.* –African American Memphis resident, interviewed in 2018

> *That furnace was in there since the house was built. It's one of those old-fashioned furnaces that looks like an octopus with all the ducts everywhere. It needed to be replaced and I called the heating/cooling person. He had gotten it to run before but then he said, there wasn't nothin' that he could do for it this time. He said I should find me another house to live or buy another furnace, which would probably cost $10,000. That's when I started using my stove to have a little heat.* –African American Detroit resident, interviewed in 2018

The inclusion of the above quotes in this paper provides useful context for the impending discussion of energy insecurity among African Americans and the need for restorative justice through energy efficiency. As we elaborate throughout this paper, African Americans are often tremendously burdened by the experience of energy insecurity, as well as by the circumstances that cause this phenomenon and the adverse consequences that are sorely and unevenly distributed by race and class in the US. This paper aims to call attention to the various forms of injustice that pertain directly and indirectly to energy and that disproportionately and negatively impact African Americans. The following section demonstrates the mechanisms of racial injustice as they intersect with energy. We then provide an overview of the tenets of energy justice and make the case for energy efficiency as a form of restorative justice. After providing a status update on policy initiatives, we go on to showcase active initiatives that are designed for redress–that is restoring the homes, communities, and dignity of those most affected by the atrocities of structural racism. All in all, we believe that transformative systems change, such as household energy efficiency, is required for African Americans to overcome the housing- and energy-related injustices that have hampered their ability to live in affordable dignity and comfort.

Mechanisms of energy insecurity and injustice adversely impacting African Americans

Social inequality is one of the primary reasons for the disproportionate impact of energy insecurity. While many individuals and families in the US have trouble meeting their basic household energy needs, the impact of energy insecurity is greatest among African Americans (Drehobl and Ross 2016; et al. 2014; Hernández et al. 2016a; Mohr 2018; U.S. Energy Information Administration 2017). For many African American households, the conditions that led to their energy

insecurity are a direct result of decades of racist housing policies, which simultaneously forced them to live in undesirable and segregated neighborhoods while preventing investment in these same areas (Aalbers 2006; Blumgart 2017; Woods 2012). Without the means needed to improve their living situations, many African American families have, for generations, contended with several injustices and adverse outcomes, related to inadequate housing structures and deteriorated energy infrastructure. These factors include (1) racial residential segregation; (2) housing burden; (3) energy burden and shut-offs; (4) bundled burdens, economic trade-offs, and material hardship; (5) health disparities; (6) extreme weather and climate impacts; (7) depletion of the resilience reserve, (8) energy transitions; and (9) gentrification and displacement. These mechanisms of injustice form the basis of our appeal for restorative justice via energy efficiency.

1. *Racial residential segregation.* African Americans have been historically channeled into low-resource neighborhoods by racist housing policies, such as redlining, resulting in racial residential segregation (Geronimus 2000; Massey and Denton 2003; Oliver and Shapiro 2006). Lacking the opportunity for social advancement or the means to change circumstances due to discriminatory practices in the housing and labor markets, African Americans are still more likely than other racial/ethnic groups to live in older and more deteriorated homes with inefficient energy infrastructure and appliances. Several studies that have mapped the spatial distribution of energy efficiency by racial and socioeconomic characteristics have found that African Americans live in the most inefficient areas, thereby using and paying more for lesser quality (Bednar et al. 2017; et al. 2014; Reames 2016a). The mean annual energy use intensity (EUI), which is a proxy for physical energy insecurity by way of high energy use from low housing efficiency, is much higher in communities with higher concentrations of African Americans and poor residents (Bednar et al. 2017; Reames 2016b). Furthermore, in cities that are racially segregated, the neighborhoods with low income and higher concentrations of minority populations are comparatively more likely to experience challenges affording or accessing modern energy services (Bednar et al. 2017; Morello-Frosch and Jesdale 2006).
2. *Housing burden.* Housing insecurity is a frequently cited competing hardship to energy insecurity (Hernández 2013). Dimensions of housing insecurity include frequent moves, lack of housing options, homelessness, high housing costs, overcrowding, and unstable neighborhoods (Johnson and Meckstroth 1998). Households that do not have enough money to afford high-quality housing also often encounter an inability to pay high utility bills, potentially leading to unpaid balances and shut-offs. In this vicious cycle, affected households are then unable to catch up or establish accounts at a new address because utility debts are often not transferable, thereby forcing residents to live in poorer quality housing and/or resorting to other means of accessing services such as putting the account in another householder's name (Hernández et al. 2016a). Conversely, another common form of housing insecurity is frequent moves. African Americans and low-income families are more likely to experience evictions, foreclosures, and other forms of transient housing (Desmond and Kimbro 2015; Evans and Kantrowitz 2002). These experiences often stem from housing affordability challenges, which can be exacerbated by high utility bills because they force trade-offs. Therefore, high energy costs and shut-offs play an important role in housing insecurity as they are often precursors to housing displacement.
3. *Energy burden and shut-offs.* Energy burden refers to the proportion of household income that is spent on household energy and utility bills that include electricity, heating, and fuel. Not only do high energy burdens inherently reduce a household's disposable income but also they indicate an increased likelihood that a household will experience difficulties in paying their energy and utility bills. A 2016 study of energy burden in American cities found that the households with the lowest incomes often have the highest energy burden (Drehobl and Ross 2016). In addition, the same study also suggests that African Americans have an energy burden that is almost twice that of all households (Drehobl and Ross 2016). In fact, African Americans are still the most likely to both occupy older homes with structurally deficient and poorly functioning energy infrastructure as well as spend the highest percentage of their income on energy (5.3% compared with the national average of 3.5%) (Drehobl and Ross 2016).

Relatedly, results from a national survey suggest that African Americans are more likely to experience disconnection notices compared with other racial groups with over 11% of the households that received a disconnection notice in 2015 reported receiving a notice nearly every month (U.S. Energy Information Administration 2017). Other findings indicate an elevated susceptibility among African Americans to utility disconnections and shut-offs, which can have a devastating impact on physical and psychological health and well-being (Franklin and Kurtz 2017).

4. *Bundled burdens, economic trade-offs, and material hardships.* Energy insecurity is not a singular threat; instead, it is a cumulative risk. Not only do the conditions of energy insecurity compromise daily household activities, so many of which are energy-dependent, but they also limit opportunities to engage in health-promoting behaviors, such as the purchasing of healthy foods or affording higher quality housing in neighborhoods with better opportunities (Bhattacharya et al. 2002). Many energy-insecure households regularly face these trade-offs in addition to high energy cost burdens, thermal discomfort, and the co-occurrence of food and energy insecurity also known as the "heat or eat" dilemma (Fernández et al. 2018; Hernández and Siegel 2019; Mohr 2018). RECS data shows that African Americans are disproportionately exposed to trade-offs (i.e., between energy expenditures and food/medicine) and of the households that reported forgoing food and medicine to pay for energy; over 28% of them faced that decision every month (U.S. Energy Information Administration 2017). Moreover, in the context of a shut-off or extended power outage, households may experience food spoilage and may be deterred from purchasing fresh food or food in bulk due to the uncertainty of adequate and uninterrupted energy service. Therefore, in addition to being an economic and experiential hardship, energy insecurity is a biologically and psychologically stressful condition that compromises opportunities for health and full societal participation (Hernández et al. 2016b).
5. *Disparate health vulnerabilities.* African Americans experience among the worst health outcomes and the lowest life expectancy of any racial group in the USA (Arias et al. 2017; National Center for Health Statistics 2017). When compared with other racial groups, they bear a disproportionate burden of numerous diseases such as diabetes, HIV, obesity, preterm births, hypertension, coronary heart disease, stroke, and infant mortality (Hill 2016; National Center for Health Statistics 2017). Furthermore, evidence also points to an increased rate of housing-related diseases or health conditions, such as lead poisoning, asthma and other respiratory diseases, unintentional injuries, poor sleep quality, and poor mental health outcomes (Bryant-Stephens 2009; Green et al. 2013; Rauh et al. 2008). A 2016 study found that poor thermal comfort and difficulty paying energy bills, two of the three key features of energy insecurity, were associated with increased stress levels (Hernàndez et al. 2016b). As such, the persistent nature of energy insecurity can lead to extended periods of chronic stress, which can be harmful to long-term health (Geronimus 2000; Geronimus and Thompson 2004; Hernández et al. 2016b)

   Often the spatial distributions of housing, energy, and health-related inequities affect the same population—low-income African Americans. This cumulative burden thus contributes to chronic and toxic stress over the life course and can be transferred intergenerationally, which then contributes to a poorer health, diminished quality of life, and a shorter life expectancy. These go beyond economic shortfalls to prominently include health inequities that widen over the life course, as stress-mediated wear and tear of body systems can dysregulate and exhaust physiological function, accelerate aging, promote the early onset of chronic health conditions, and lead to excessive disability and mortality within African American families and communities (Geronimus et al. 2006). Stress-related health inequities can also be transmitted to the next generation through their biological effects on pregnancy and their contribution to adverse childhood experiences (ACEs) stemming from parental loss, mental illness or drug abuse, and tense, sometimes abusive interactions (McEwen 2018).
6. *Extreme weather and climate impacts.* (Fothergill and Peek 2004). Communities that are most vulnerable to daily hardships are also most vulnerable to the impact of weather events, and the disparity will become worse with repeated shocks from climate

change (O'Brien et al. 2006). During extreme weather events including hurricanes, African Americans have fared worse than others. Hurricane Katrina provided a lens into the dehumanizing treatment faced by African Americans throughout this monumental ordeal. African Americans affected by Katrina experienced disproportionate morbidity, mortality, and displacement as a result of the storm (Sharkey 2007). Short of such disasters, climate change also has increased the chance or length of extremely hot summers or cold winters, increasing the energy needs of affected households. A heat wave in Chicago in 1995 shed light on demographic disparities in mortality rates, whereby lower income and older African Americans died at much higher rates than others in the city. Much of their vulnerability was rooted in a lack of adequate cooling options in their homes and social isolation (Klinenberg 2015). One study found that during heat wave events in four different US cities, the rate of air conditioning was twice as high in the white versus African American populations and that African American populations were more likely to die during extreme heat events (O'Neill 2005).

7. *Depletion of the resilience reserve.* Energy insecurity can impact the availability of resilience resources. Resilience is defined as the capacity for a person to "maintain relatively stable, healthy levels of psychological and physical functioning" after a traumatic event (Bonanno et al. 2007). *Resilience reserve* is a framework that describes how resilience that should be available for use in a specific event such as a natural disaster becomes depleted from its continual application to restore equilibrium following chronic daily struggles (Hernández et al. 2018). As described above, marginalized groups—including African Americans—contend with social, economic, medical, physical, and geographic vulnerabilities that require the use of resilience resources and high effort coping strategies to combat energy insecurity and cumulative burdens which may delay recovery from acute events (Hernández et al. 2018). For example, years after Hurricane Sandy, public housing residents in New York City—many of whom are African American—reported longstanding difficulties and emotional trauma which delayed recovery after the storm (Hernández et al. 2018). This suggests that inadequate reserve capacity encumbered their ability to resist, be resilient, and quickly recover from this traumatic experience (Norris et al. 2009).
8. *Energy transitions.* Energy transitions refer to the evolution of energy systems that are often a result of improvements in technology, development of new policies, or the discovery of new resources. Modern energy transitions have included shifts to clean and more efficient energy sources, sometimes compelled by the impending threat of climate change. Carrión, Lee, and Hernández et al. (2018) explored the spatial distribution of cleaner heating fuel source conversions in New York City, demonstrating that while many communities were originally impacted by the use of dirty fuels, neighborhoods marked by social and economic disadvantage were the least likely to benefit from these clean heat transitions. The resulting implications include diminished air quality in racially segregated communities as air quality improves in more privileged neighborhoods.

With the expected increased adoption of renewable energy sources, the reduction of fossil fuels, and greater support for energy efficiency measures, questions remain regarding who will be (dis)advantaged in the coming energy transitions. In considering energy efficiency policies, equity must be kept in full view. There has been much discussion and planning regarding energy transitions globally and its impact on the distribution of benefits and burdens in the emerging energy landscape, characterized by greater reliance on renewables and cleaner energy sources. As it is, the US is deeply divided in the experience of energy efficiency burdens. That is, clean energy technology and energy efficiency are considered a luxury, not a basic need or common standard. Thus, the benefits of new and efficient energy technologies primarily accrue to those households that can afford them, rather than those most in need of such cost-effective strategies to manage household energy. The increased availability and uptake of renewable energy sources have lessened the dependence on the traditional grid system, thereby beginning to impact the existing financial models on which utility companies have long relied (Klose et al. 2010a, b; Wainstein and Bumpus 2016). As more households (typically privileged ones) transition to alternatives like solar, utility companies are faced with diminished profitability, which may eventually force them to raise rates for existing customers in order to

remain financially solvent and maintain the grid. These rate increases are more likely to impact low-income and African American communities, of which the uptake of renewables, particularly solar, has occurred at a much slower pace compared with other groups (Lennon 2017), thereby leaving these populations that already struggle to pay their utility bills with even higher rates for traditional energy services and an increased likelihood of missed payments and arrearages. Moreover, utility companies may struggle to maintain existing infrastructure, thus increasing the susceptibility of service interruptions and power outages in low-income and African American communities that rely on traditional energy services.

9. *Gentrification and displacement*. As we consider the need for energy efficiency in African American communities, we cannot lose sight of the underlying societal trend, in which increased public and private investments in these same communities are often the (un)intended mechanisms of displacement (Fullilove 2013). Equipping energy-insecure households, specifically people of color, with federal energy efficiency resources is likely to drive up the value of home properties—indeed, this is one of the restorative justice benefits. However, we should learn from previous efforts to reinvest in African American communities that have had pernicious impacts. In the last few decades, many inner-city communities have experienced rapid growth and unprecedented levels of investment. On the one hand, these revitalization efforts have been characterized by the addition and improvement of the housing stock and the development or rehabilitation of community facilities and infrastructure. On the other hand, these changes drive up the cost of living in the area and therefore often attract higher income residents, not the original community members that withstood decades of disinvestment and neglect. As a result, many of the low-income incumbent residents find themselves struggling to afford their basic needs, until they are eventually priced out and displaced from their neighborhood in search of more affordable accommodations. This process of gentrification and displacement is the reality that many urban communities, particularly low-income African American communities, are facing around the country. Drawing on this cautionary example, any effort to upgrade the efficiency and quality of African Americans homeowner's and renter's residences should come with assurances that they can benefit from these investments in the long haul. As gentrification continues to proceed in US cities, affordability of urban housing is becoming increasingly out of reach for many low-income families, forcing evictions, moves, overcrowding, and an increase in homelessness (Morrow 2015). While there are many factors that contribute to gentrification and displacement, a recent study suggests that gentrification may be associated with energy insecurity (Hernández and Siegel 2019). In other words, gentrification and displacement may be unintended consequences of energy upgrades. This is, in part, driven by higher incomes and investments in energy efficiency measures that privilege newcomers. The association between gentrification and energy insecurity may also be accompanied by pernicious tactics on the part of landlords to deny long-term residents their right to decent living environments through lack of heat or deferred maintenance practices that affect overall housing quality. More research is needed to unpack the relationship between energy insecurity and gentrification, but the impact of the latter is becoming clearer. Evidence suggests that gentrification fundamentally threatens the continuity of social ties due to displacement and acts as a major source of psychosocial stress (Keene et al. 2010; Shmool et al. 2015). Similarly, energy insecurity may contribute to social isolation that may limit visits from friends or family or add additional economic pressure to members of the social network (i.e., to contribute to bills to avoid a shut-off) thereby compromising social support.

Energy justice and the need for redress and restoration in the USA

The *energy justice* framework provides a powerful opportunity to reveal and reduce injustices related to unaffordable household energy and lack of residential energy access (Jenkins et al. 2016). The energy justice framework is anchored in four forms of justice: (1) recognition justice, (2) procedural justice, (3) distributional justice, and (4) restorative justice. First, *recognition justice* refers to the acknowledgment of, and respect for, the complex circumstances and vulnerabilities of individuals and social groups in patterns of cultural

value. The rights and needs of groups that are often marginalized or misrepresented can be brought to the fore by employing a recognition justice framework in the context of energy-related hardship (Walker and Day 2012). Second, *procedural justice* relates to fairness in decision-making processes, including those that develop and deliver policies that impact people's ability to secure energy services (Simcock 2016). Procedures impacting affordable, accessible energy services apply at multiple levels of governance with international, national, community, and hyper-local policies and schemes. Having a recognizable and actionable descriptor for the specific challenges of energy-related hardship is important for securing commitment from the multiple levels of governance (Bouzarovski and Petrova 2015; Thomson et al. 2016). Third, *distributional justice* concerns the distribution or "sharing out" of material resources and environments across society and space (Walker 2012). It asks whether the current distribution of material "benefits" and "burdens" is fair and approaches the normative philosophical question of what a "fair" distribution might encompass (Sandel 2010). Distributional injustice is also a central issue in the production, experience, and morality of energy-related hardship (Walker and Day 2012). Lastly, *restorative justice* pertains to the opportunities for redress or making right past wrongs. It requires action that is premised on the recognition of those wrongs (in this case, energy insecurity and its correlates) and provides a pathway to improving conditions and circumstances that led to the problem to begin with.

We see the concept of energy insecurity through the lens of the African American experience as particularly salient to energy justice in the US. The concept of energy insecurity and the burgeoning evidence of it in the US are examples of recognition injustice. Moreover, highlighting the undue and overwhelming burden borne by African Americans with regard to energy insecurity is also a matter of recognition justice. In a practical sense, procedural justice means ensuring that energy-insecure households can actively contribute to the development of solutions that seek to address the conditions that have led to challenges meeting energy needs. There may be some level of trade-off between acknowledging the complex nature of individual experiences and using a generalized descriptor in decision-making. Reducing or eradicating energy insecurity therefore requires greater distributional justice, meaning a more proportional distribution of the benefits and harms of energy service delivery and rates. In the context of energy insecurity, household energy efficiency is a tangible restorative effort that has the potential to forge a path to not only investing in homes but also investing in people and communities (Geronimus and Thompson 2004).

Energy efficiency as restorative justice

As evidenced here and elsewhere the "energy insecurity pathway to disease and disadvantage" emerges from a history of racist policies that, perhaps most enduringly, has worked through poor housing conditions and ends in disproportionate chronic illness and premature death among African Americans (Geronimus 2000; Geronimus and Thompson 2004; et al. 2016). This vicious cycle can be interrupted by improvement in the overall quality of housing and energy efficiency in homes. This can be accomplished through weatherization and energy efficiency upgrades, which can mitigate the effects of long-term exposure to housing and household energy-related stressors, particularly among African Americans.

Weatherization is the practice of protecting a building and its interior from the elements, particularly from sunlight, precipitation, and wind, and of modifying a building to reduce energy consumption and optimize energy efficiency. As a multi-step process, weatherization begins with a trained professional performing a comprehensive assessment of the energy infrastructure to identify any structural deficiencies present in the home (U.S. Department of Energy 2017). These deficiencies are then addressed through the repair or replacement of existing infrastructure, or the installation of new, energy-efficient features. Typical weatherization measures can include installing insulation, sealing ducts, tuning or repairing heating and cooling systems, and mitigating air infiltration (U.S. Department of Energy 2009). Each weatherization measure contributes to the reduction or elimination of energy loss that drives up energy costs and reduces comfort. In fact, weatherization can reduce a household's annual gas consumption by 32% and generate energy savings of over $350 a year, therefore reducing the energy cost burdens on low-income and energy-insecure households (U.S. Department of Energy 2009).

Another way to break the racialized energy pathway is through investments in energy efficiency measures. While weatherization primarily refers to upgrades to the

foundational structure of the home, energy efficiency measures can refer to both enhancements made to any non-structural items or objects within the home as well as a blanket term that encompasses any effort to improve energy efficiency. This may include, but is not limited to, appliances, lighting, faucets, and showerheads. These measures help reduce the end-use loss of energy and are just as important as weatherization in reducing overall household energy burden. Therefore, energy efficiency measures should be paired with weatherization practices to maximize the benefits. Accordingly, any mention of energy efficiency in this paper is also assumes the incorporation of weatherization measures.

Energy efficiency is a multipronged solution that not only addresses energy insecurity but also improves overall housing quality, providing several other benefits to residents. Evidence suggests that energy efficiency is effective in eliminating numerous health and safety hazards that are also sources of biopsychosocial stress. For example, repairing holes will reduce energy waste and is also a mechanism for managing pests as well as reducing mold and other household exposures with serious health consequences (Norton et al. 2018; Norton et al. 2017, Norton et al. 2016; Schweitzer and Tonn 2003). Furthermore, energy efficiency has also been shown to promote greater residential stability and wealth creation through increased property values (Nevin 2010; Schweitzer and Tonn 2003).

By improving housing quality, energy efficiency can begin the process of restorative justice for the African American population that has long been impacted by substandard housing conditions. This is critically important for African American households, who have been living in poor quality and energy-inefficient homes for multiple generations since the deliberate origination and in view of the continued legacy of racist housing policies. We posit that weatherization and energy efficiency upgrades can be an effective response to help mitigate these effects of long-term racial injustice. By improving housing quality, energy efficiency can begin the necessary process of disrupting the "energy insecurity pathway to disease and disadvantage" that has long been impacted by the substandard housing conditions in African American homes. As a restorative approach with tangible improvements, energy efficiency offers the possibility of reinvestment and restoration—not only in the homes in which African Americans reside but also in the people as well.

Discussion

Making the case for greater investment in energy efficiency

Current policy solutions to address energy insecurity are woefully inadequate (Bird and 2012). The main federal vehicles for addressing energy insecurity are the Low-Income Home Energy Assistance Program (LIHEAP), which supports energy bill assistance, and the Weatherization Assistance Program (WAP), which funds weatherization and energy efficiency for low-income households. Energy bill assistance is an essential resource that is critical for many households, who are subject to extreme heat and cold temperature crises. However, unlike weatherization, energy bill assistance does not address the root causes of the problem (U.S. Department of Health and Human Services Office of Community Services n.d.). Historically and to date, energy bill assistance supports only a fraction of the households in need and the assistance is temporary. Energy bill assistance is typically awarded once a year for either heating or cooling assistance, which is an issue for families with both needs. Households can continue to apply for energy assistance every year, but still, there is no guarantee that they will receive assistance ("Energy Assistance," n.d.). Furthermore, while some households are only in need of energy bill assistance one-time, many households rely on energy bill assistance on an annual or seasonal basis due to persistent poverty or homes with structural deficiencies that lead to higher energy-related operational costs. In September of 2018, Congress passed a minibus bill that increased FY19 funding levels for the Low-Income Home Energy Assistance Program (LIHEAP), which is the main federal vehicle for energy bill assistance, by $50 million from 3.64 billion to $3.69 billion (Rep. Michael K. Simpson 2018). In addition, Congress also increased FY19 funding for the Weatherization Assistance Program, which is the main vehicle for weatherization and energy efficiency by $6 million from $251 million to $257 million (Consolidated Appropriations Act, 2018). This decision to increase funding for energy bill assistance and energy efficiency is a tremendous win for both programs as they work to reduce the prevalence and impact of energy insecurity. However, the disparity in funding of LIHEAP versus WAP is a clear example of the US government's failure to acknowledge the social inequities that contribute to the widening gaps by race and class and, in fact, may

reinforce them. While LIHEAP is important, WAP should be funded at the same level or more to provide a more long-term solution to energy insecurity. Furthermore, energy efficiency efforts should be targeted toward African American households, particularly those that are low-income, to end the cycle of racialized outcomes related to housing and energy and to maximize the benefits of improvements to housing quality and health.

Despite its inherent value in providing critical relief to households in need, energy bill assistance does not address the more enduring and structurally racialized consequences of energy insecurity. A similar argument can be made for cash assistance. For instance, neither solution addresses the adjacent issue of rampant economic inequality and wealth gaps that preclude African Americans from having the financial means to meet and exceed their basic needs. This requires not only increasing the safety net but also supporting living wages and opportunities for educational and economic advancement through higher-paying and more meaningful jobs and careers. Energy efficiency and weatherization can begin to address these issues by increasing the value of homes and, in even more quickly, by using the need for deep retrofits and housing renovations that weatherization entails to develop training and jobs for local residents. Furthermore, continuing to provide energy bill or cash assistance, especially to those with chronic need, can be costly to government agencies if they are not paired with interventions that address the upstream causes of energy insecurity. For these reasons, we propose that more resources should be devoted to energy assistance, in the form of energy efficiency and weatherization programs, which provide a more long-term solution to energy insecurity and the underlying inequities that lead to disparities in health and well-being.

Energy efficiency as restorative justice: examples of ongoing and planned action

The notion that investing in the homes of low-income groups can be restorative and targeted to support healthy, stable living for all is not just an abstract proposition. There are several groups throughout the US that are actively working to plan the details of this vision and making strides to achieve it through policy and planning efforts. Below, we highlight three active initiatives that offer a way forward. These projects are fundamentally rooted in a multi-level approach to investments in people *and* places and moreover, rooted in the notion that energy efficiency offers a tangible solution to the problems of injustice and exclusion.

Energy efficiency for all

Energy Efficiency for All (EEFA) is a national campaign, "dedicated to linking the energy and housing sectors together to tap the benefits of energy efficiency for millions of low-income families." While the effort is national in scope, there are twelve states (California, Georgia, Illinois, Louisiana, Maryland, Minnesota, Missouri, New York, North Carolina, Pennsylvania, Virginia and Rhode Island), where energy, housing, health, and environmental organizations have partnered together to form EEFA state coalitions that explore policy solutions at the state and local level. Each of these state coalitions employs various strategies to both support increased funding for and actively contribute to federal, state, and utility weatherization and energy efficiency programs. With a focus on multifamily housing, EEFA hopes to foster social equity by enabling low-income families and households of color to access energy efficiency and its many benefits.

Emerald cities collaborative

The Emerald Cities Collaborative (ECC), a national non-profit network of organizations, provides a model for addressing the structural inequities that contribute to energy insecurity in low-income communities of color while preventing displacement of long-term residents. Their goal is for all metropolitan areas to adopt the principles of an *Emerald City*, in which there is equitable distribution of clean energy benefits as well as opportunities for collaboration among community members, government, and local businesses in shaping the future of their community. Six US cities (Cleveland, Los Angeles, New York, Oakland, San Francisco, and Seattle) have partnered with ECC to employ strategies for achieving an *Emerald City* that features intentional and inclusive collaboration, large-scale energy efficiency retrofits of community infrastructure and affordable housing, and community and workforce development. The ECC's work serves as a reminder that climate impacts, resiliency, community revitalization, and displacement are all interconnected and require a comprehensive solution. Currently, the ECC model has only been implemented in metropolitan areas. However,

there is also a need for an "Emerald Cities" type approach in rural and suburban African American communities, where similar challenges exist. Though it remains to be seen, differences in geographic and demographic composition may suggest that solutions for energy insecurity are different for rural and suburban communities. Regardless, targeting this type of initiative to African American communities can open a pathway for good health and economic prosperity that has been obstructed for generations by a deteriorating housing stock, a lack of community investment, and the inability for marginalized residents to participate in and contribute to the community decision-making in cities and beyond processes.

WE ACT for environmental justice

WE ACT for Environmental Justice (WE ACT) is a grassroots organization that was founded in 1988 by a group of community activists fighting against environmental racism in their West Harlem community, comprising traditionally low-income communities of color. For 30 years, WE ACT sought to "build healthy communities by ensuring that communities of color and/or low-income residents participate meaningfully in the creation of sound and fair environmental health and protective policies and practices." Two pillars of WE ACT's work include climate justice and social equality. Recognizing the critical junction of these two sectors and the disproportionate impact of climate change on marginalized communities, WE ACT led a community-based planning process in 2015 that resulted in the development of the Northern Manhattan Climate Action (NMCA) Plan. This plan describes 28 concepts that, when combined, outline a vision for what energy justice and resilience looks like in Northern Manhattan. Two of those concepts were particularly relevant to this paper, Affordable Cooperative Housing and Resilient Housing, and their presence in the plan signifies the importance of housing in mitigating the effects of climate change in low-income communities and communities of color. These approaches are not premised solely on building new homes but also on improving those that already exist.

Conclusion

Racist housing policies and practices, the rapidly rising costs of housing, stagnant wages, and the lack of investment in communities of color, particularly predominantly African American communities, have limited the residential prospects of generations of Black families forcing many to inhabit substandard housing marked by energy inefficiences. Furthermore, the disparity in access to energy resources as well as the US reliance on fossil fuels has led African Americans to experience the increasingly disproportionate burdens that are described in this paper. Until there is an intentional commitment from policymakers, business, and local leaders to invest in solutions that seek to eradicate the toxic history of racism in affected communities, we will continue to see poor health and social outcomes for African Americans. The broader implications of these policy gaps are further related to energy justice and just energy transitions. Utilizing weatherization and energy efficiency to render restorative justice to African Americans is a exploratory and remove concept, thus more research needs to be done to further measure the co-benefits of this opportunity. Still, the work of EEFA, ECC, and WE ACT provides models of how to strive for said justice through weatherization, energy efficiency, and investments in resilient people, homes, and communities.

Compliance with ethical standards

Conflict of interest Diana Hernández is a member of the ACEEE Research Advisory Board. The authors do not have any other conflicts of interest to report.

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