# From the Dirt to the Grid: Integrating Nutrition Equity and Solar Energy to Advance Community-Centered Energy Justice

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## Abstract

This paper examines the structural convergence of food insecurity and energy poverty as co-occurring, racially patterned inequities in low-wealth communities across the American South. Drawing on community-engaged extension practice at the University of Arkansas at Pine Bluff (UAPB), the authors argue that community solar gardens and urban agriculture initiatives represent complementary, mutually reinforcing strategies for advancing nutritional equity and energy justice simultaneously. The paper presents a framework—Dirt-to-Grid—that integrates EFNEP nutrition education, solar energy literacy, land-tenure advocacy, and cooperative ownership into a cohesive community-development model. Case evidence drawn from UAPB's Cooperative Extension Program service area in Southeast Arkansas illustrates how historically Black communities can leverage federally supported programs to move from extractive energy and food systems toward regenerative, community-controlled alternatives. Policy implications for the Inflation Reduction Act's rural energy provisions, USDA nutrition programs, and HBCU extension capacity-building are discussed.

**Keywords:** energy justice · food sovereignty · nutrition equity · community solar · urban agriculture · HBCU extension · EFNEP · environmental racism · cooperative economics · Dirt-to-Grid framework

## 1. Introduction

In the summer of 2022, a family in Jefferson County, Arkansas, made a choice that millions of low-income households make every year: whether to run the air conditioner or buy groceries. That choice—raw, consequential, and structurally imposed—encapsulates the intersection at the heart of this paper. Energy poverty and food insecurity are not separate crises with separate causes. They are twin expressions

of the same systemic disinvestment in communities where race and poverty overlap, and where federal programs designed to help often arrive siloed, underfunded, and disconnected from one another.

This paper presents the Dirt-to-Grid framework, arguing that community solar energy and urban agriculture are structurally complementary interventions capable of addressing shared root causes when integrated into a coherent community-development strategy. The framework draws on extension nutrition education practice at UAPB and on the university's 150-year legacy of cooperative, land-grant service to historically underserved communities.

The Inflation Reduction Act of 2022 (IRA) allocated over $369 billion for climate and clean energy, including provisions explicitly targeting low-income and environmental justice communities (U.S. Department of Energy, 2023). USDA's nutrition programs—EFNEP, GusNIP, and EFNEP—represent over $120 billion in additional annual federal commitment to food security. These streams rarely converge at the community level. HBCUs like UAPB are uniquely positioned to broker that integration.

## 2. Theoretical Framework

### 2.1 Energy Justice and Environmental Racism

Energy justice evaluates energy systems through the lens of equity, recognition, and procedural fairness (Sovacool & Dworkin, 2015). Communities of color bear disproportionate environmental burdens from fossil fuel infrastructure while receiving disproportionately less benefit from the clean energy transition (Carley & Konisky, 2020). Environmental racism, as articulated by Bullard (1990), describes the systematic siting of polluting industries and degraded infrastructure in predominantly Black and Brown communities. Southeast Arkansas exemplifies this: the region hosts concentrated animal feeding operations and legacy petrochemical sites, while ranking among the nation's lowest in household income. Low-income households here spend an average of 8.6% of gross income on energy costs—more than three times the affordable threshold (Drehobl et al., 2020).

### 2.2 Food Sovereignty and Nutrition Equity

Food sovereignty—the right of peoples to define their own food systems (La Vía Campesina, 2007)—and nutrition equity converge in the American South around conditions of food apartheid, EFNEP participant access, and nutrition education outreach (Holt-Giménez & Shattuck, 2011). Hernandez et al. (2016) documented that high energy burden and food insecurity are bidirectional: households cutting costs to pay utility bills reduce food expenditures, while food-insecure households adopt


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energy-intensive cooking associated with nutrient-poor diets. This bidirectional nexus is precisely where Dirt-to-Grid intervenes.

2.3 Cooperative Economics and Community Wealth Building
Community solar cooperatives and cooperative urban farms represent some of the fastest-growing models of community wealth building in the energy and food sectors respectively (Farrell, 2016; Alperovitz, 2013). Integrating these models under a unified community ownership structure creates genuine economic self-determination—not merely service delivery—for historically disinvested communities.

## 3. The Dirt-To-Grid Framework

The Dirt-to-Grid framework integrates four complementary domains: (1) urban and peri-urban agriculture; (2) community solar energy; (3) nutrition education and food systems advocacy; and (4) cooperative ownership and land-tenure security. It is grounded in the extension education tradition of meeting communities where they are and prioritizing self-determination over externally imposed solutions.

| **Domain** | **Core Strategy** | **Federal Program Linkage** | **Outcomes Targeted** |
|---|---|---|---|
| Urban Agriculture | Community gardens, CSA networks, cooperative farms | EFNEP; GusNIP (USDA FNS); USDA RBCS Rural Cooperative Grants | Food access, household income, land tenure |
| Community Solar | Shared arrays, LMI subscriber programs, agrivoltaics | IRA §48(e) LMI Bonus Credit; DOE Solar Energy Technologies Office (SETO) | Energy burden, GHG emissions, utility costs |
| Nutrition Education | EFNEP curricula, cooking demos, food literacy | EFNEP (USDA NIFA); USDA NIFA Extension Program | Diet quality, chronic disease prevention |
| Cooperative Ownership | Land trusts, worker co-ops, energy cooperatives | USDA RBCS; SBA 7(a); IRA §60105 Environmental & Climate Justice Block Grants | Community wealth, democratic governance |

**Table 1.** The Dirt-to-Grid Framework: Domains, Strategies, Verified Federal Program Linkages, and Targeted Outcomes. All programs are active federal initiatives as of 2026.

### 3.1 The Agriculture-Solar Nexus (Agrivoltaics)

Agrivoltaics—the co-location of photovoltaic panels with agricultural production—simultaneously increases yields for shade-tolerant crops, reduces panel temperatures, and reduces soil water evaporation (Barron-Gafford et al., 2019). In Southeast Arkansas, where summer temperatures exceed 95°F regularly, agrivoltaic community gardens create infrastructure for a unified cooperative generating both food and electricity. A community owning its garden and its solar array owns the means of nutritional and energy production—a replicable model with precedents in California, Minnesota, and Maryland.

### 3.2 EFNEP as Connective Tissue

UAPB's Cooperative Extension Program has delivered EFNEP programming in Southeast Arkansas for over two decades. EFNEP's revised guidelines explicitly encourage community-level interventions targeting the social and environmental determinants of nutrition (USDA NIFA, 2023). In the Dirt-to-Grid model, EFNEP educators link families engaged in nutrition education to community garden programs and solar subscription information—leveraging the trusted, long-term relationships that extension educators build in communities where institutional trust is scarce.

## 4. Southeast Arkansas: Context and Case Evidence

### 4.1 Community Profile

Jefferson County—home to Pine Bluff and UAPB—is approximately 57% African American, with a poverty rate exceeding 28% and median household income of approximately $34,000 (U.S. Census Bureau, 2023). Food insecurity rates consistently exceed the national average by 8–12 percentage points, compounded by the loss of multiple grocery retailers over two decades—a pattern characteristic of food apartheid (Brones, 2018). Energy burden averages 8.6% of gross income for low-income households, driven by aging housing stock, inadequate weatherization, and regressive utility rate structures (Drehobl et al., 2020).

### 4.2 The UAPB Extension Dirt-to-Grid Pilot (2021–2023)

UAPB piloted Dirt-to-Grid elements across three sites in Jefferson and Lincoln Counties, combining EFNEP nutrition education with community garden development and energy literacy sessions on Arkansas's community solar statute (Act 1030 of 2019). Participant surveys (n = 147, 2023) indicated:

- 89% reported increased confidence preparing fresh vegetables after garden-integrated cooking demonstrations.
- 73% reported reduced food expenditures during the growing season.


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- 61% expressed strong interest in community solar subscription programs after energy literacy sessions.
- 44% reported discussing solar energy options with a family member or neighbor following the pilot.

4.3 Barriers and Structural Challenges

Three structural barriers constrain scalability in Southeast Arkansas. First, heirs' property—land held without clear title due to historical exclusion from formal legal systems—affects an estimated 35–40% of Black-owned farmland in the South (Mitchell, 2014), blocking land from serving as collateral for development loans. Second, Arkansas's community solar program remains a limited pilot with constrained subscriber capacity. Third, nutrition and energy programming are siloed within extension organizational culture, requiring administrative commitment and cross-training to overcome.

**5. Policy Implications and Recommendations**

| Policy Domain | Current Gap | Recommendation |
|---|---|---|
| IRA Clean Energy (§48(e), §60105) | LMI solar subscriptions rarely reach EFNEP participant households; limited outreach infrastructure | Fund HBCU extension programs as official IRA outreach partners; create EFNEP-to-Solar enrollment bridges |
| USDA EFNEP | Metrics focus on individual behavior change, not systemic food or energy access | Expand outcome framework to include community-level energy literacy and cooperative development indicators |
| HBCU Extension Capacity | 1890 land-grant programs chronically underfunded relative to 1862 counterparts | Increase USDA NIFA funding parity for 1890 institutions; authorize cross-sector programming grants |

**Table 2.** Policy Recommendations Corresponding to the Dirt-to-Grid Framework's Three Federal Program Streams.

The IRA's §48(e) bonus credit program provides enhanced tax credits for solar projects serving low-income communities—a resource that UAPB-style extension programs are uniquely positioned to deliver through trusted community relationships. Concurrent expansion of EFNEP outcome metrics to include energy literacy indicators would align federal nutrition investment with the integrated reality of household economic survival in communities like Jefferson County.

## Conclusion

The choice between the air conditioner and groceries is not a failure of individual decision-making—it is a structural indictment. The Dirt-to-Grid framework proposes that the federal government's substantial investments in both clean energy and nutrition security can be integrated at the community level through HBCU extension institutions, cooperative ownership structures, and the trusted relationships that extension educators build over decades of community engagement.

Community solar and urban agriculture are not metaphors for each other. They are complementary productive systems that, when combined under cooperative ownership and supported by integrated extension programming, can move communities from extractive dependency toward regenerative self-determination. The evidence from Jefferson County is preliminary—but it is real, and it points clearly toward what is possible when federal silos are dismantled at the community level.

UAPB's Cooperative Extension Program and partners like the HBCU Community Development Action Coalition stand ready to demonstrate that model at scale. The policy infrastructure is in place. What is needed is the institutional will to connect it.

## Author Contributions

Angela Howard: Conceptualization, Investigation, Methodology, Validation, Writing – original draft.
Henry Golatt: Writing – review & editing, Formal analysis, Project administration (adaptation of practitioner content to conference proceedings format).
*All authors reviewed and approved the final manuscript.*

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## References


https://doi.org/10.52202/086673-0005

Alperovitz, G. (2013). What then must we do? Straight talk about the next American revolution. Chelsea Green Publishing.

Barron-Gafford, G. A., Pavao-Zuckerman, M. A., Minor, R. L., Sutter, L. F., Barnett-Moreno, I., Blackett, D. T., Thompson, M., Dimond, K., Gerlak, A. K., Nabhan, G. P., & Macknick, J. E. (2019). Agrivoltaics provide mutual benefits across the food–energy–water nexus in drylands. Nature Sustainability, 2(9), 848–855. https://doi.org/10.1038/s41893-019-0364-5

Brones, A. (2018). Food apartheid: The root of the problem with America's groceries. The Guardian. https://www.theguardian.com/society/2018/may/15/food-apartheid-food-deserts-racism-inequality-america-karen-washington-interview

Bullard, R. D. (1990). Dumping in Dixie: Race, class, and environmental quality. Westview Press.

Carley, S., & Konisky, D. M. (2020). The justice and equity implications of the clean energy transition. Nature Energy, 5(8), 569–577. https://doi.org/10.1038/s41560-020-0641-6

Drehobl, A., Ross, L., & Ayala, R. (2020). How high are household energy burdens? An assessment of national and metropolitan energy burden across the United States. American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u2006

Farrell, J. (2016). Energy democracy: How the public can reclaim power from utilities. Institute
for Local Self-Reliance.

Hernandez, D., Siegel, E., & Hiatt, R. (2016). Energy insecurity and its implications for health and well-being: A matter of social and energy justice. Energy Research & Social Science, 13, 136–149. https://doi.org/10.1016/j.erss.2016.01.003

Holt-Giménez, E., & Shattuck, A. (2011). Food crises, food regimes and food movements: Rumblings of reform or tides of transformation? Journal of Peasant Studies, 38(1), 109–144. https://doi.org/10.1080/03066150.2010.538578

La Vía Campesina. (2007). Declaration of Nyéléni. Forum for Food Sovereignty. https://viacampesina.org/en/declaration-of-nyi/ Mitchell, T. W. (2014). Reforming property law to address devastating land loss. Alabama Law Review, 66(1), 1–61.

Sovacool, B. K., & Dworkin, M. H. (2015). Energy justice: Conceptual insights and practical applications. Applied Energy, 142, 435–444. https://doi.org/10.1016/j.apenergy.2015.01.002

U.S. Census Bureau. (2023). American Community Survey 5-year estimates: Jefferson County, Arkansas. https://www.census.gov/acs

U.S. Department of Energy. (2023). Inflation Reduction Act summary: Clean energy provisions. Office of Policy. https://www.energy.gov/policy/inflation-reduction-act

U.S. Department of Agriculture, National Institute of Food and Agriculture. (2023). Expanded Food and Nutrition Education Program (EFNEP). USDA NIFA. https://www.nifa.usda.gov/grants/programs/expanded-food-nutrition-education-program-efnep


https://doi.org/10.52202/086673-0005