Who Pays and Who Benefits?

How To Incorporate Equity in Utility Resource Planning

SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

OUR MISSION

To optimize the use and impact of energy to enhance the quality of life in the Southeast.

OUR VISION

All people in the Southeast live and work in healthy and resilient buildings, utilize clean and affordable transportation, and thrive in a robust and equitable economy.

OUR VALUES

Take Initiative

We take responsibility for realizing a better quality of life in the Southeast.

Value Others

We seek, respect, and promote diverse perspectives.

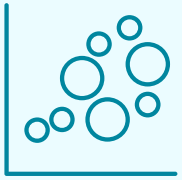
Earn Trust

We pursue our work with benevolence, competence, and reliability.

Pursue Equitable Solutions

We recognize, acknowledge, and account for a history of prejudice and inequality in Southeastern communities.

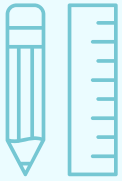
Our Core Services



Research

Facilitation

Consultation & Education



Program Management & Financial Services

SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

National Standard Practice Manual & Equity

SEEA

SOUTHEAST ENERGY EFFICIENCY ALLIANCE

Energy Insecurity in the Southeast

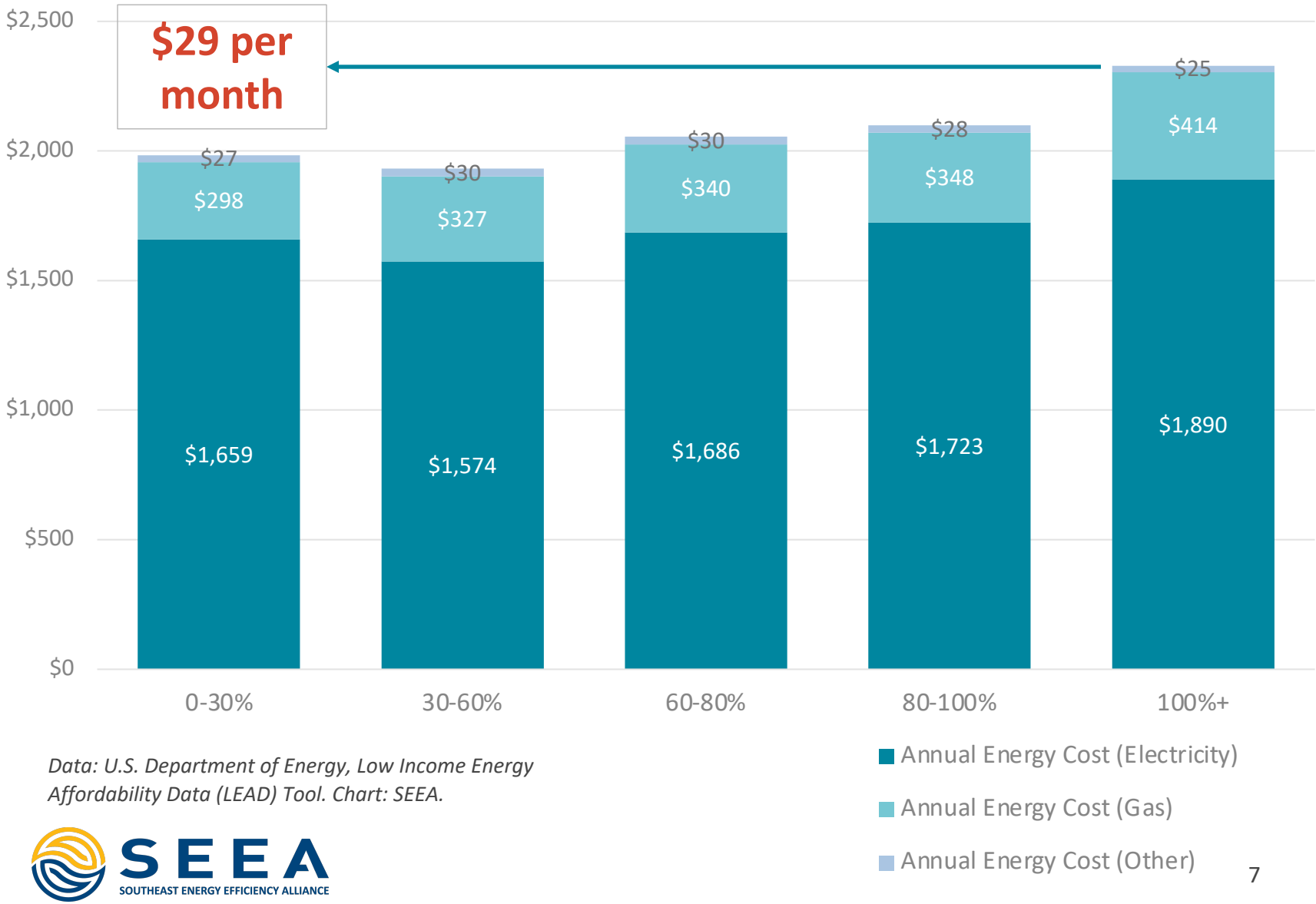
Will Bryan, Ph.D.
Director of Research
wbryan@seealliance.org

The Southeast has the lowest electric rates in the contiguous United States, but the highest residential bills.

Data and Map: Energy Information Administration (EIA). Chart: SEEA.

SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

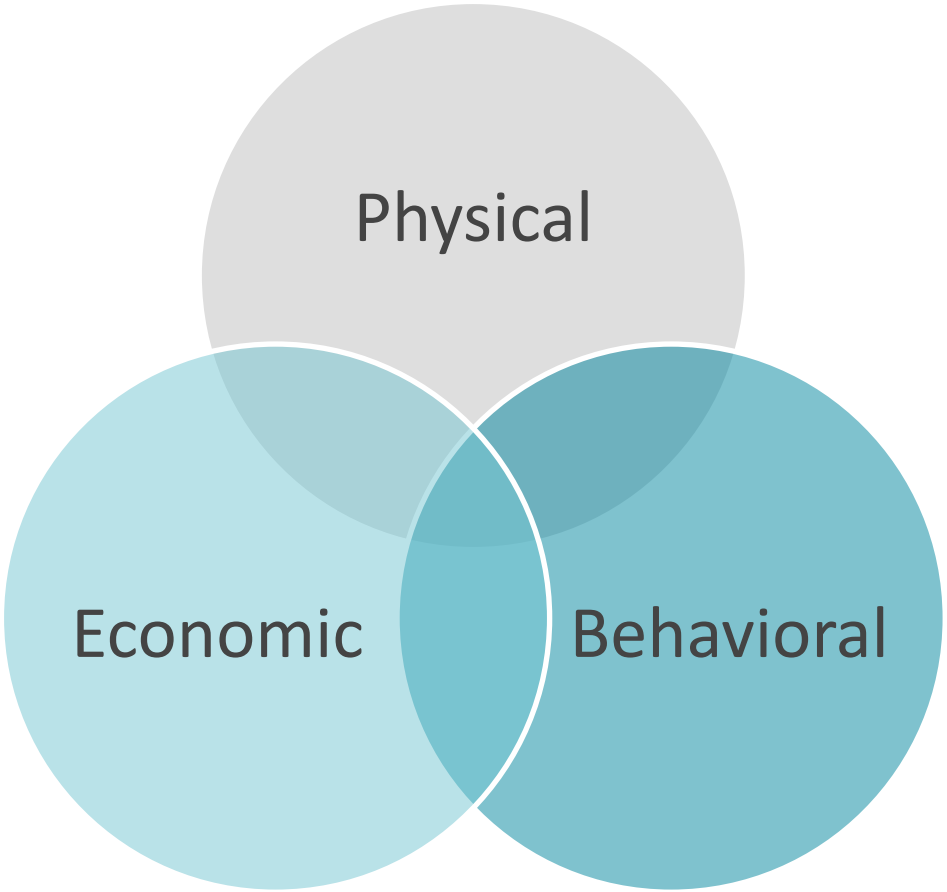
High energy bills disproportionately impact the region's low-income households and people of color.



Data: U.S. Department of Energy, Low Income Energy Affordability Data (LEAD) Tool. Chart: SEEA.

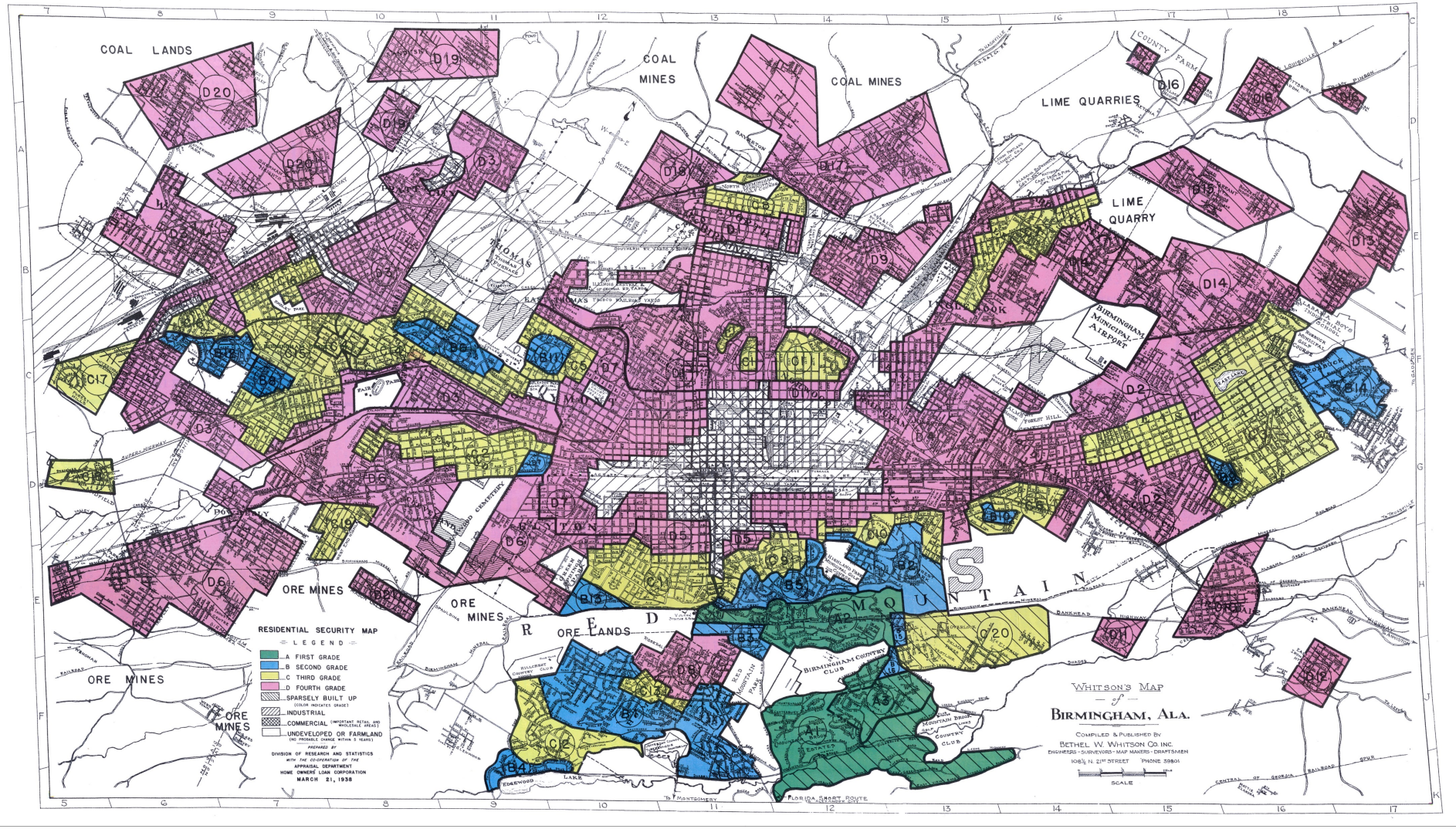
SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

One out of every three people in the South faces **ENERGY INSECURITY**, "an inability to adequately meet household basic energy needs" including heating, cooling, and lighting.

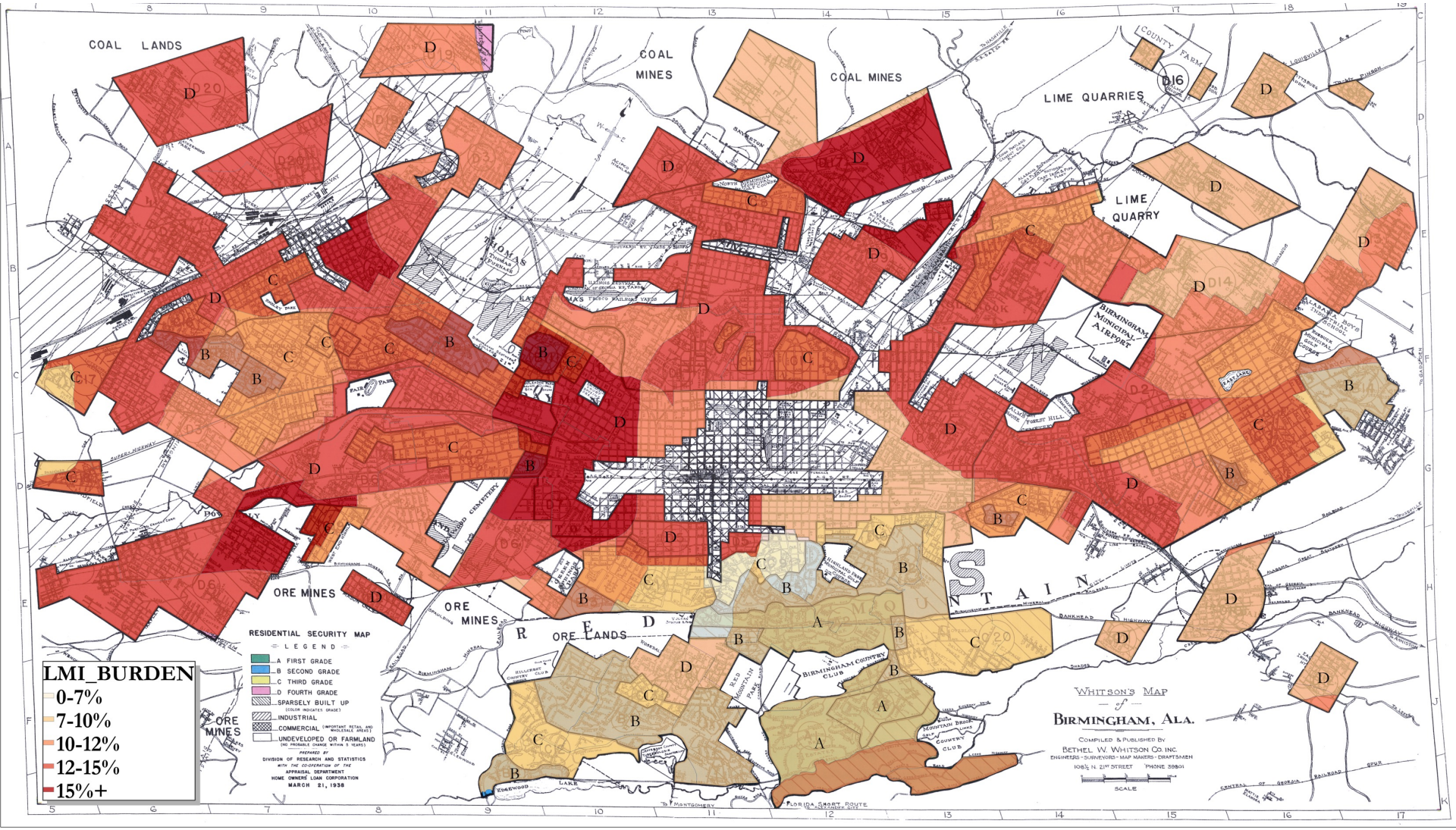


SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

Energy insecurity is rooted in the past.



SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE



SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

HOLC Map: University of Richmond; Data: U.S. Department of Energy, Low Income Energy Affordability Data (LEAD) Tool. Map: SEEA.

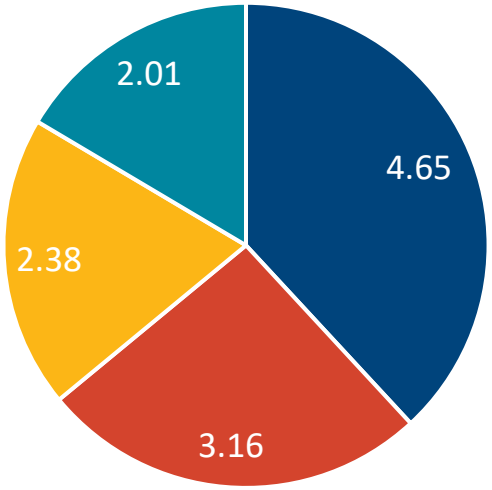
Energy insecurity was common in the South, even before COVID-19.

The **dark blue** section in these pie charts demonstrates the need among Southern households (millions of households.)

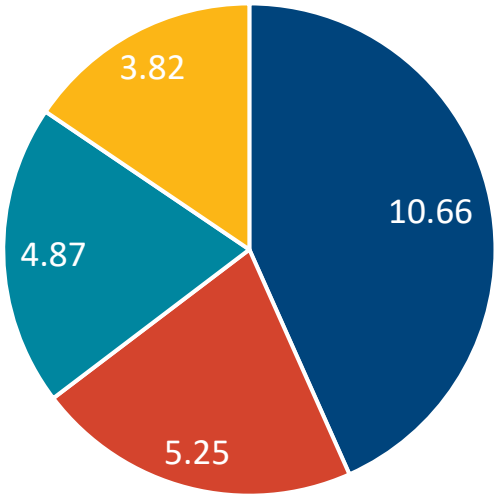
South
West
Midwest
Northeast

SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

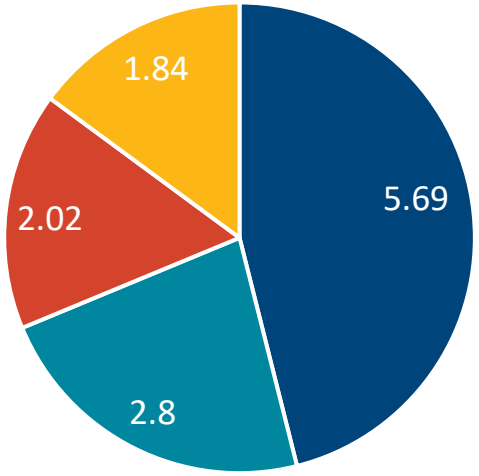
Home at Unhealthy Temperature



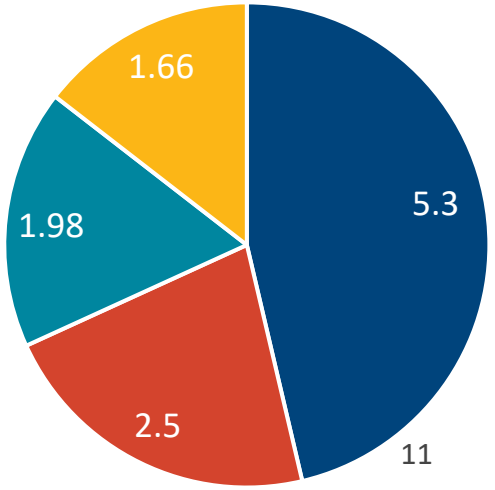
Reduce Food/Medicine



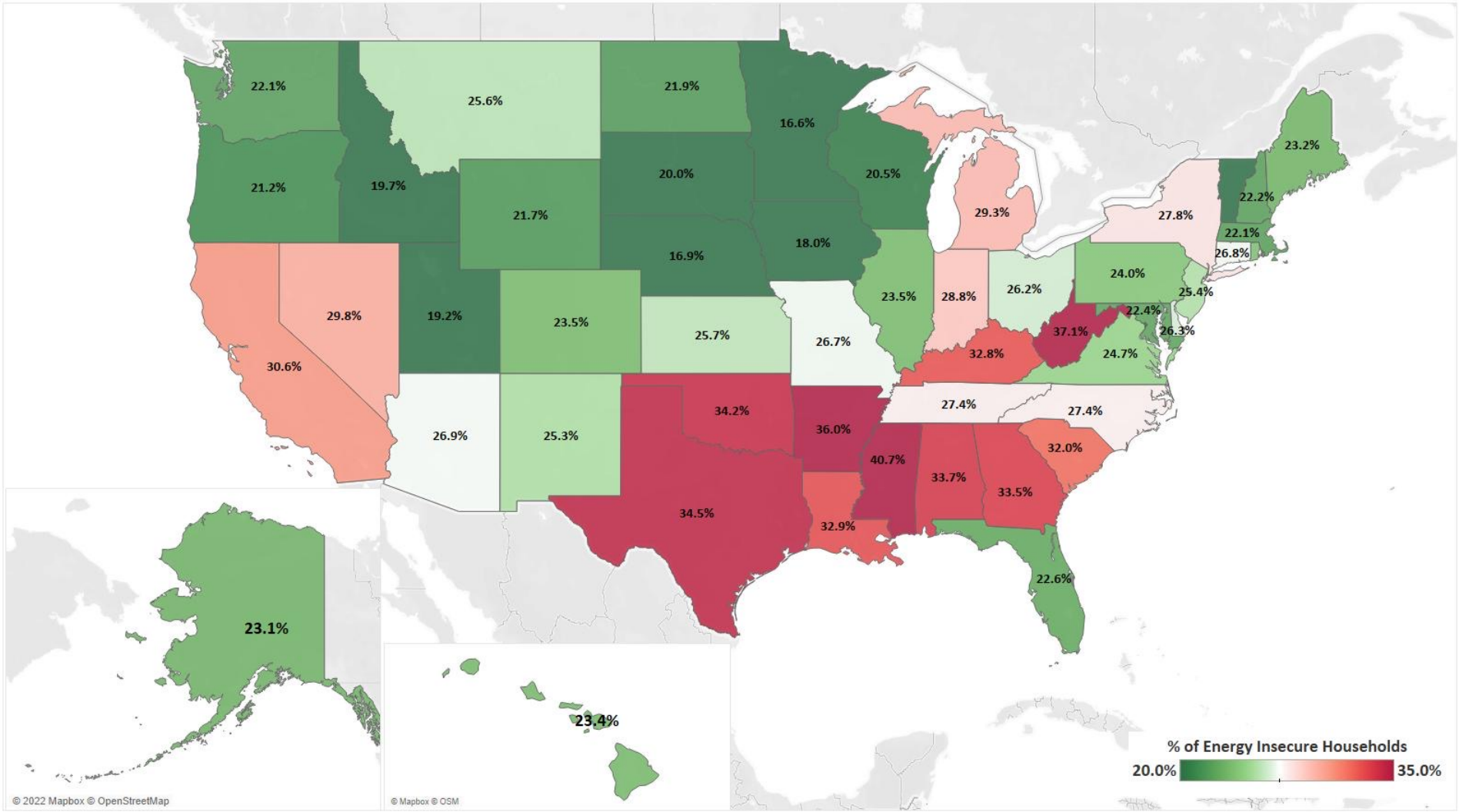
Disconnected/Stop Service Notice



Unable To Use Heat/Cooling Equipment



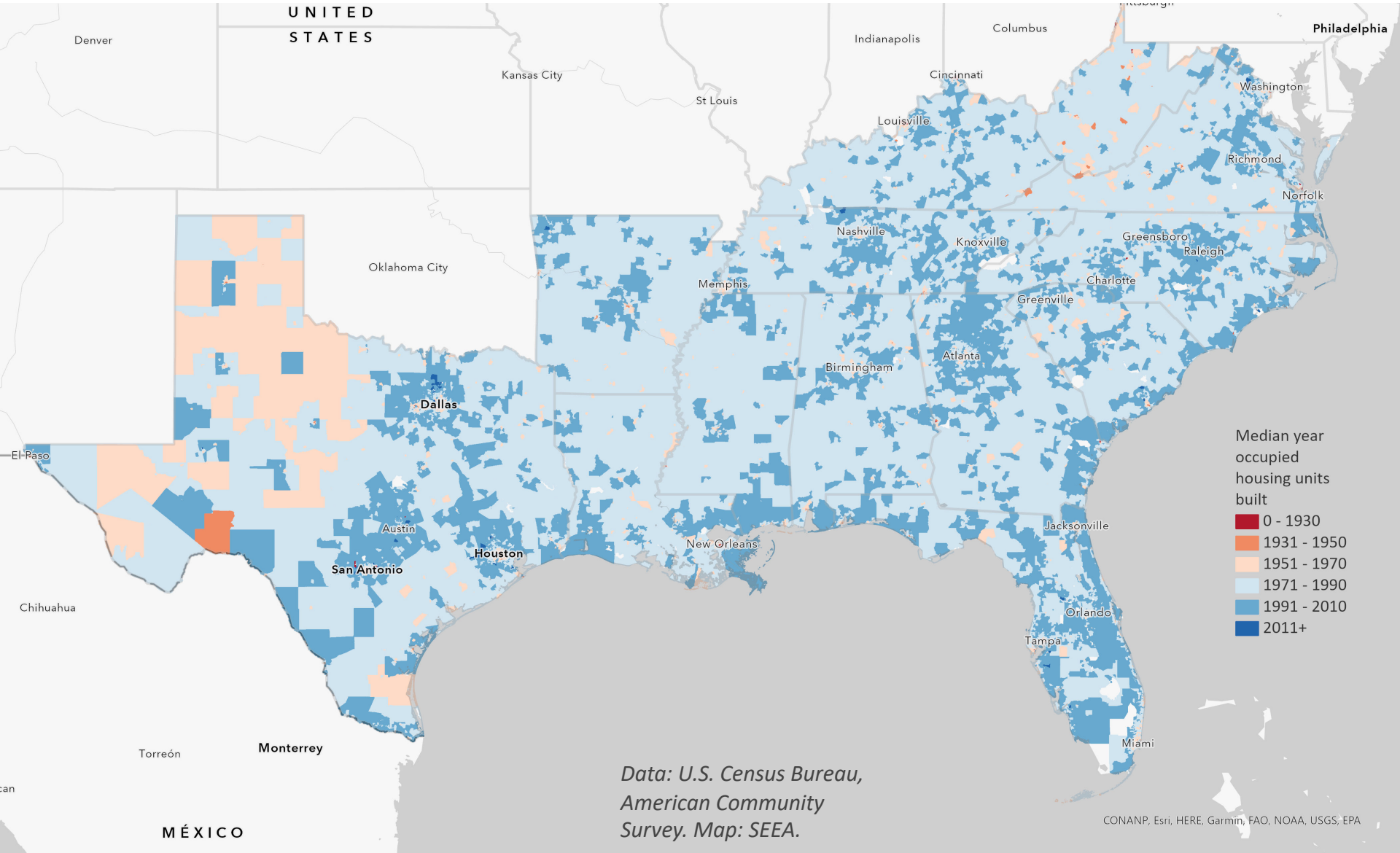
Data: U.S. Energy Information Agency (EIA), Residential Energy Consumption Survey (RECS)



Data: EIA, Residential Energy Consumption Survey (RECS), 2020. Map: SEEA.

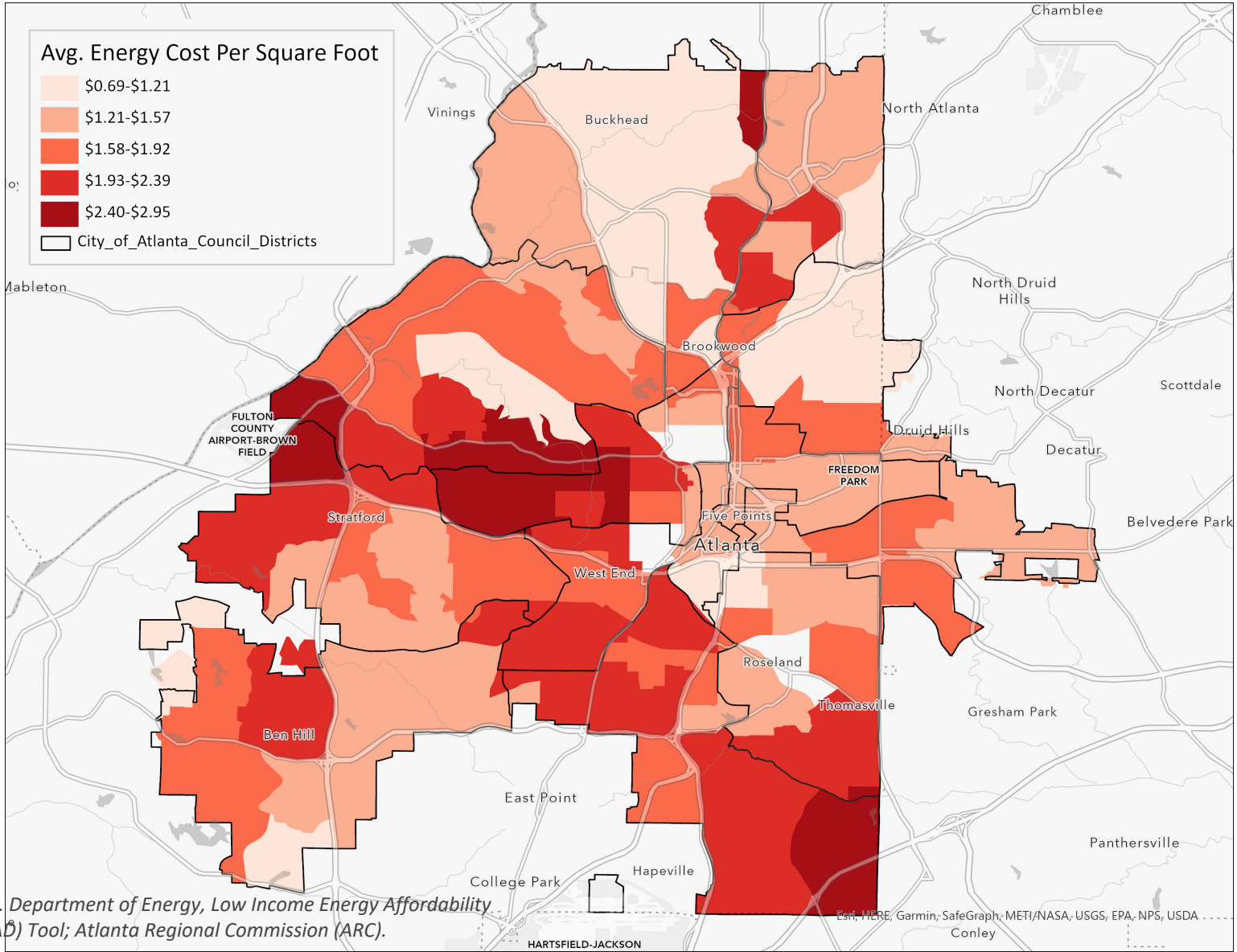
SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

53% of homes in the Southeast were built before the earliest energy codes were developed.



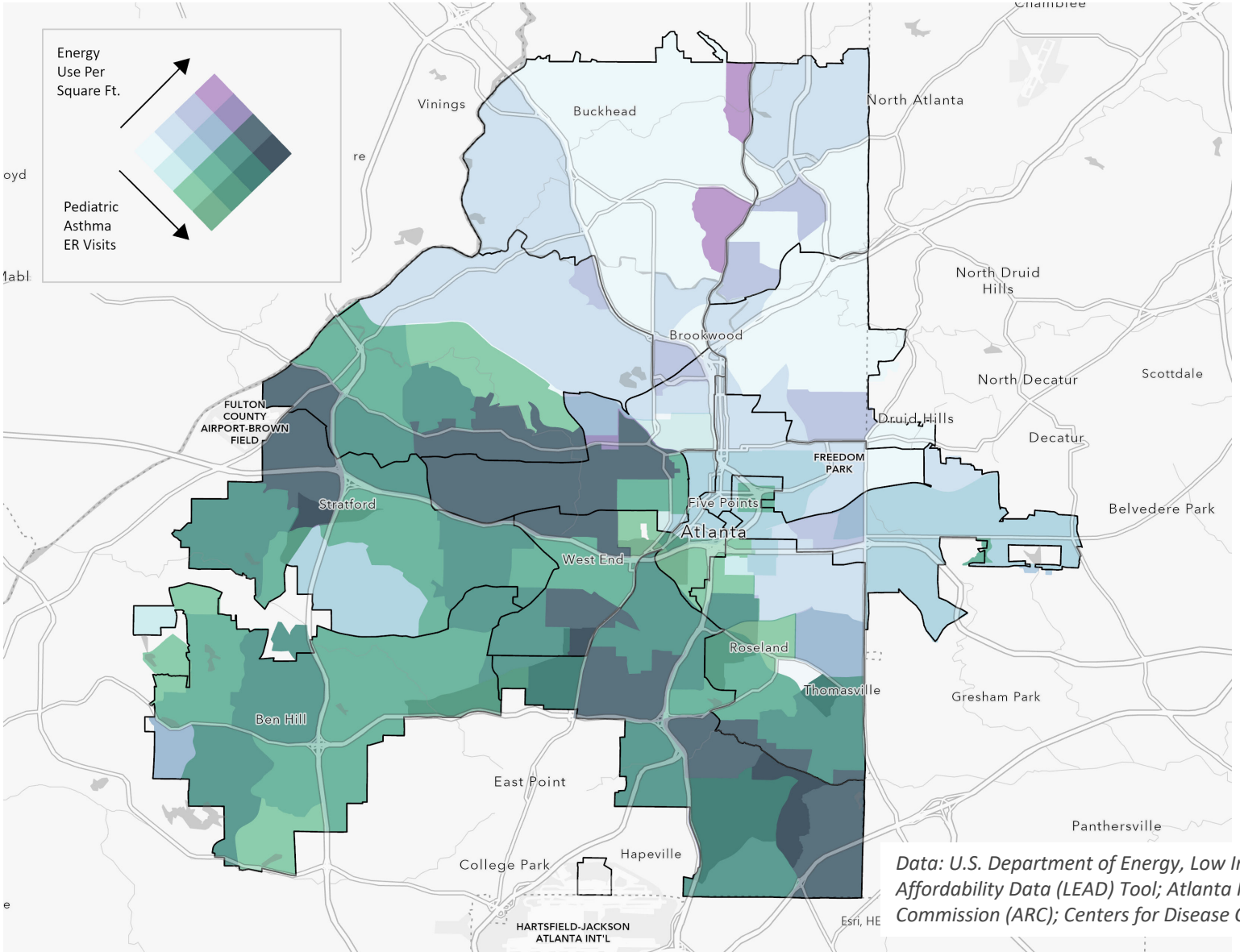
Data: U.S. Census Bureau, American Community Survey. Map: SEEA.

Energy insecurity is not just an issue of incomes



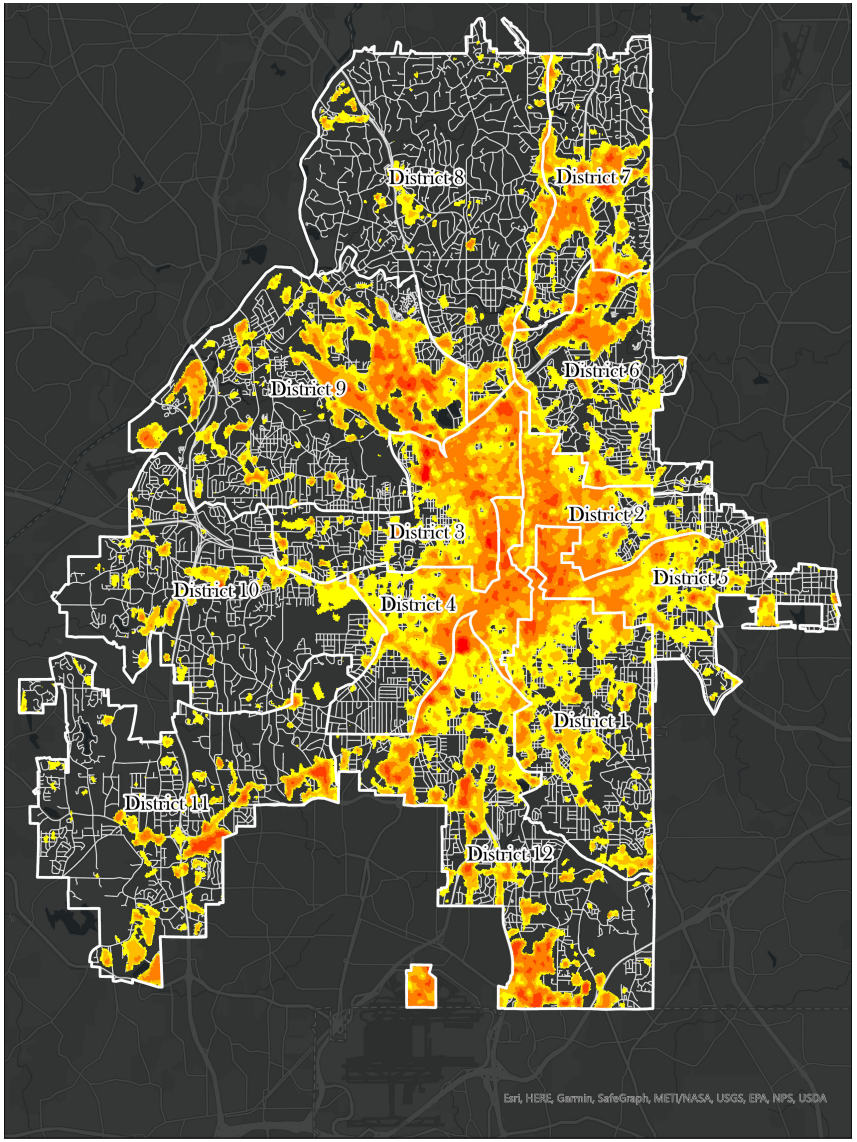
Data: U.S. Department of Energy, Low Income Energy Affordability Data (LEAD) Tool; Atlanta Regional Commission (ARC).

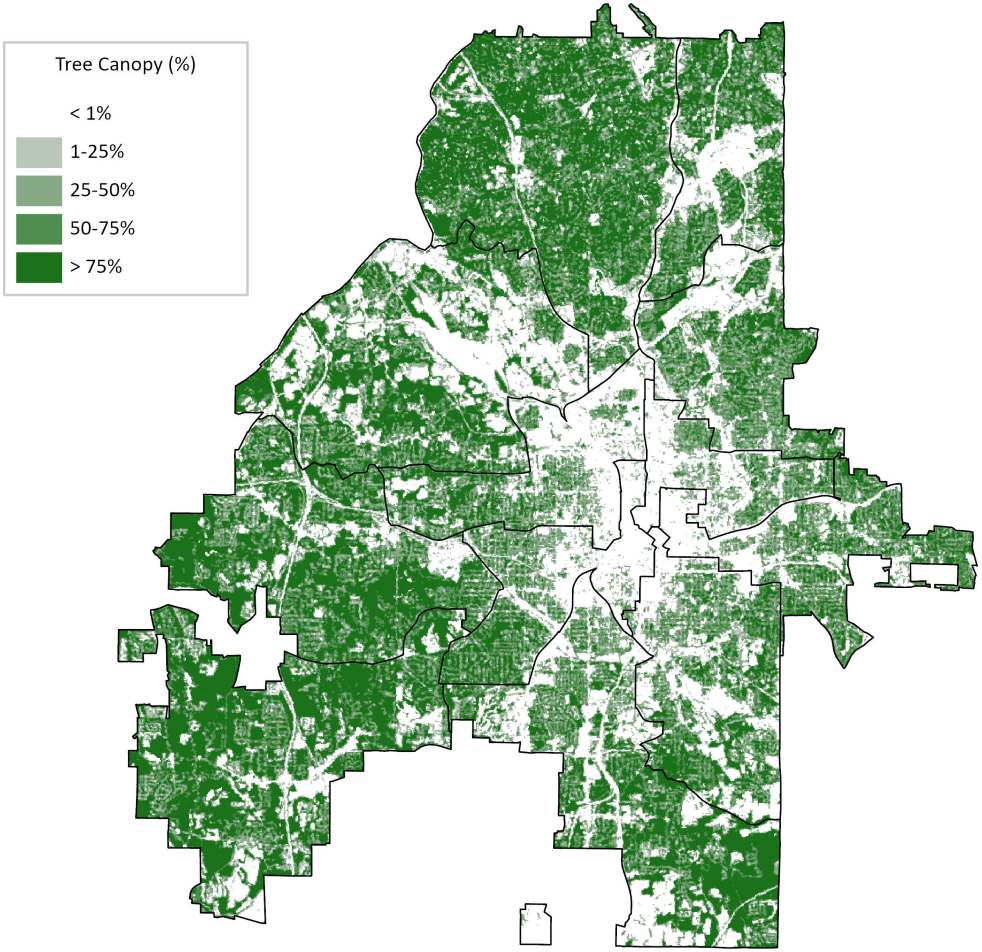
Unaffordable Homes Are Unhealthy Homes



Data: U.S. Department of Energy, Low Income Energy Affordability Data (LEAD) Tool; Atlanta Regional Commission (ARC); Centers for Disease Control.

Energy insecure communities are vulnerable to extreme weather and other disaster events.

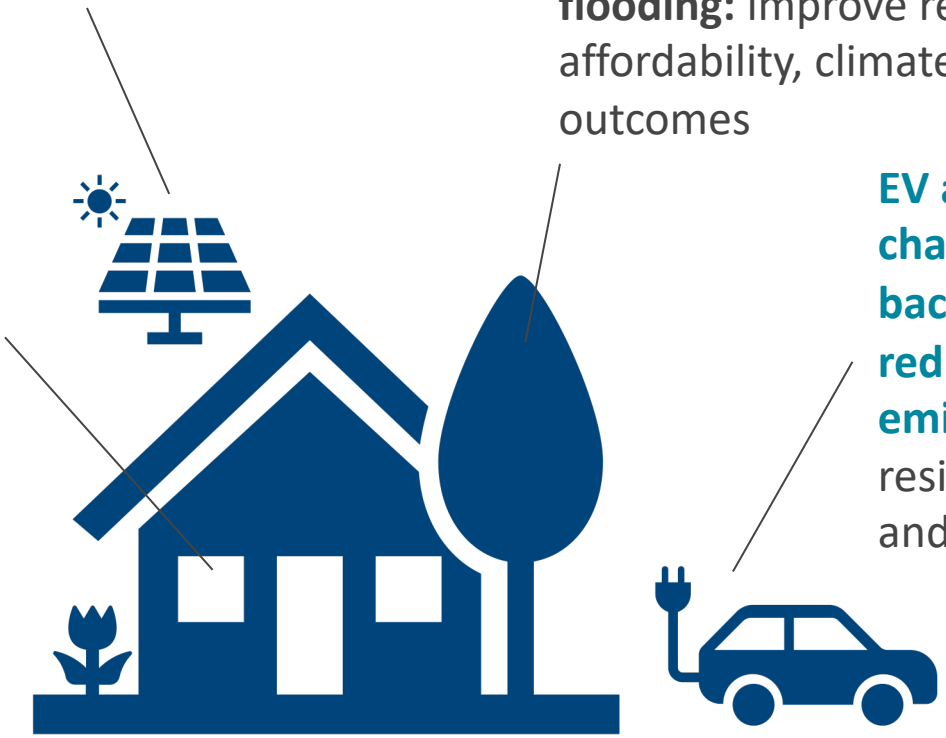




Housing is infrastructure

Rooftop solar decreases energy expenditures and emissions: improve resilience, affordability, climate, and health

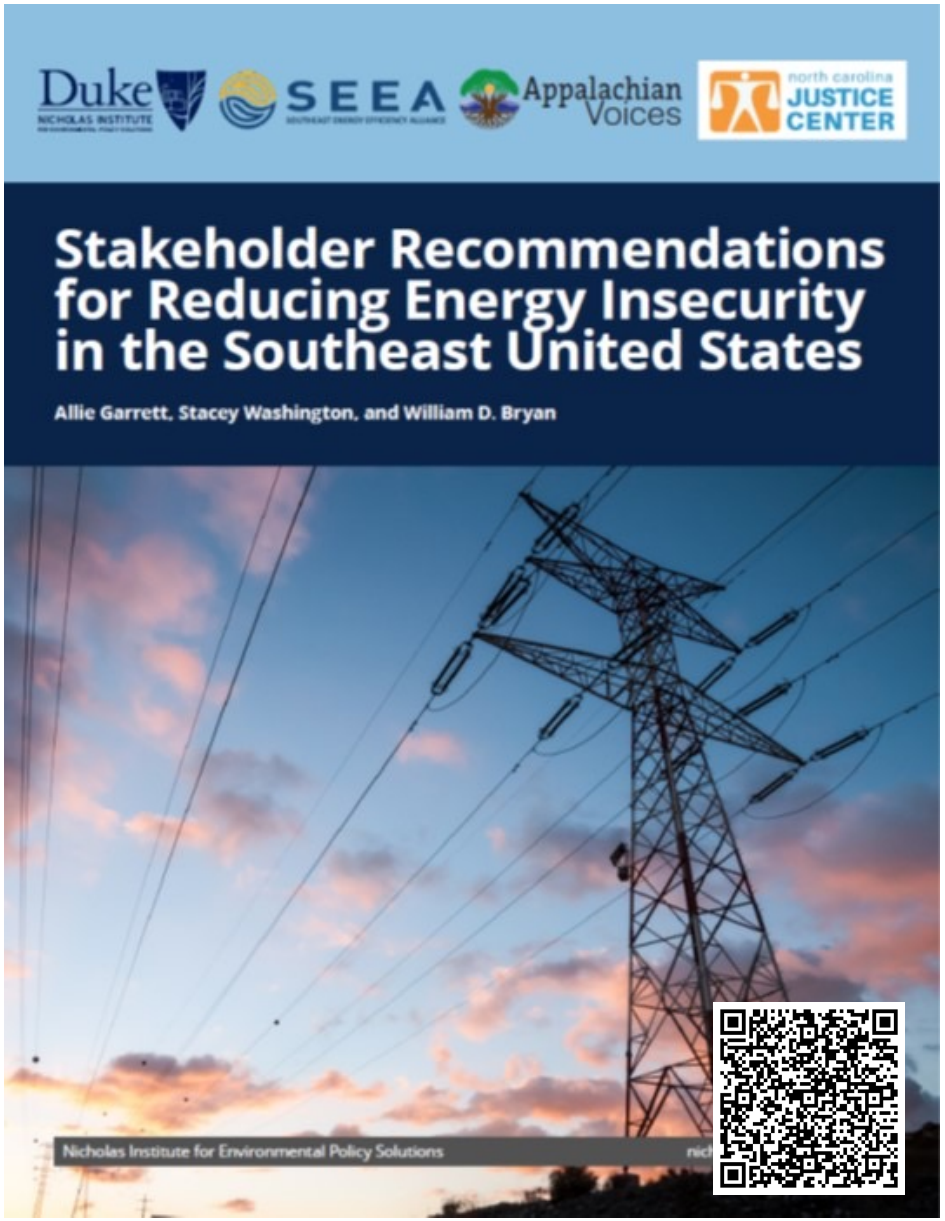
Weatherization improves energy performance and reduces health hazards: improve resilience, affordability, climate, and health outcomes

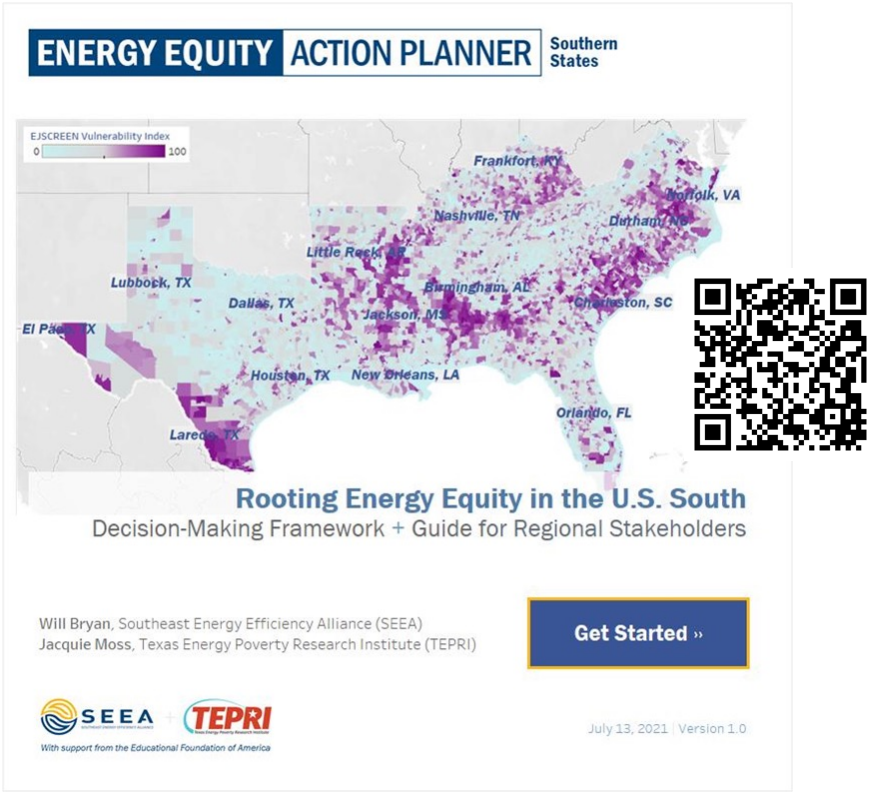


Expanding greenspace and decreasing impervious surfaces reduce air temperature and flooding: improve resilience, affordability, climate, and health outcomes

EV access and charging provides backup power and reduces auto emissions: improve resilience, climate, and health outcomes

SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE





SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

Low Income Affordability Collaborative

December 13, 2022

DUKE ENERGY®

Commitment to Affordability

Deliver affordable, reliable and increasingly clean energy to customers

Target smart investments to support one of the most impactful transitions in our history

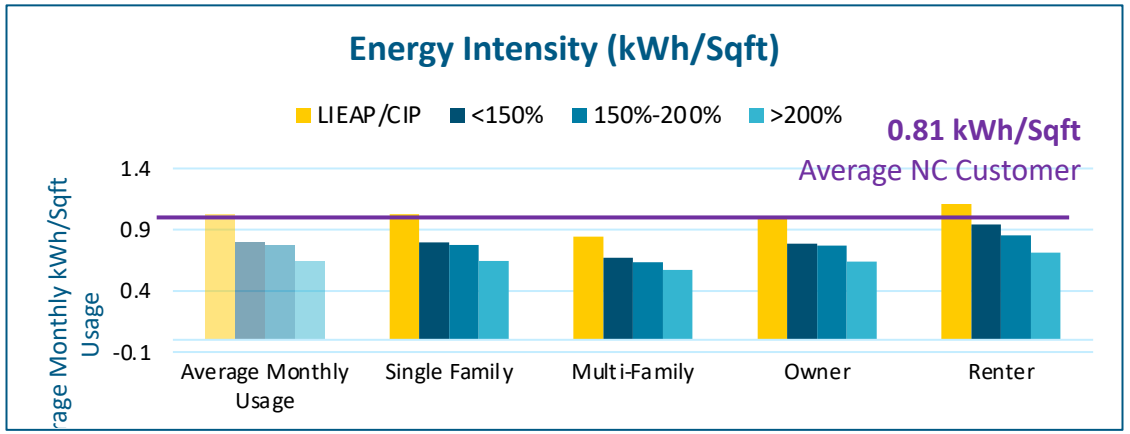
Create short-term and long-term solutions

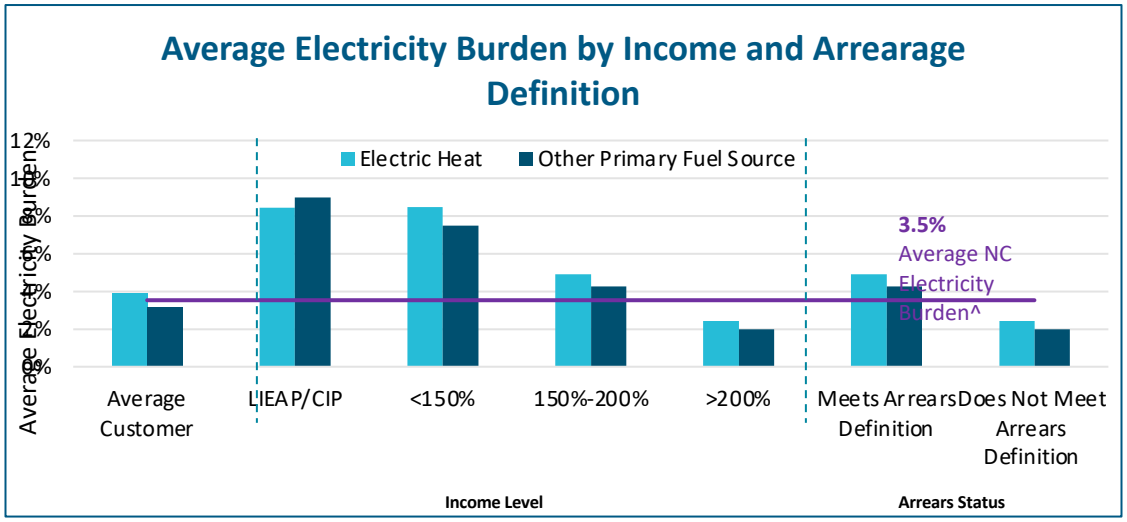
SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

20

Low Income Affordability Collaborative Members

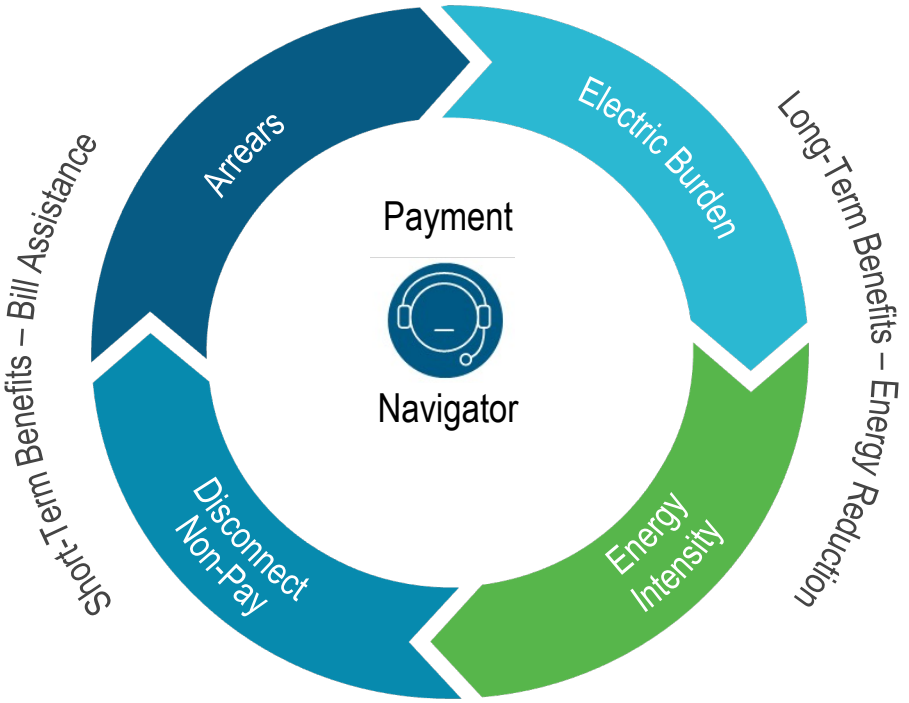
Low Income Affordability Collaborative Insights





SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

Low Income Affordability Ecosystem



SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

23

A Framework for Addressing Cost-Effectiveness and Distributional Equity

Southeast Energy Efficiency Alliance
December 13, 2022

Alice Napoleon
Synapse Energy Economics

Today's Discussion

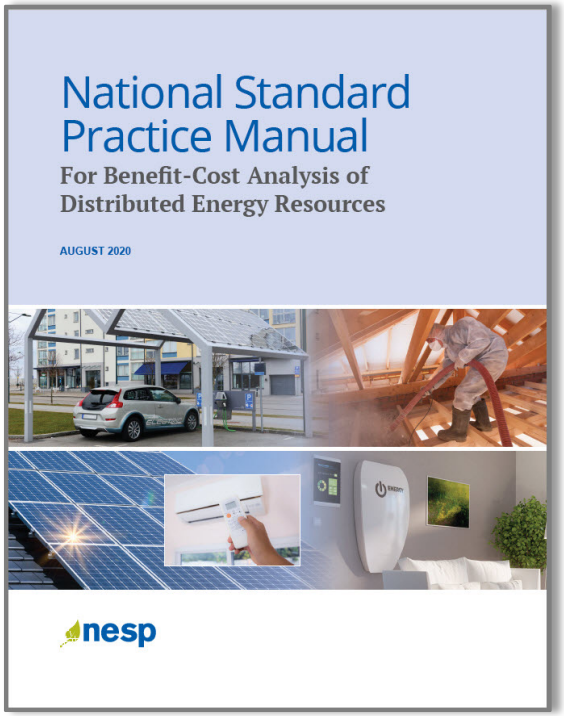
- Benefit-cost analysis (BCA)
- Distributional equity analysis (DEA)
- Conceptual DEA framework

About NESP

National Energy Screening Project (NESP): stakeholder organization that works to improve cost-effectiveness screening practices for distributed energy resources (DERs).

NESP's main products to date

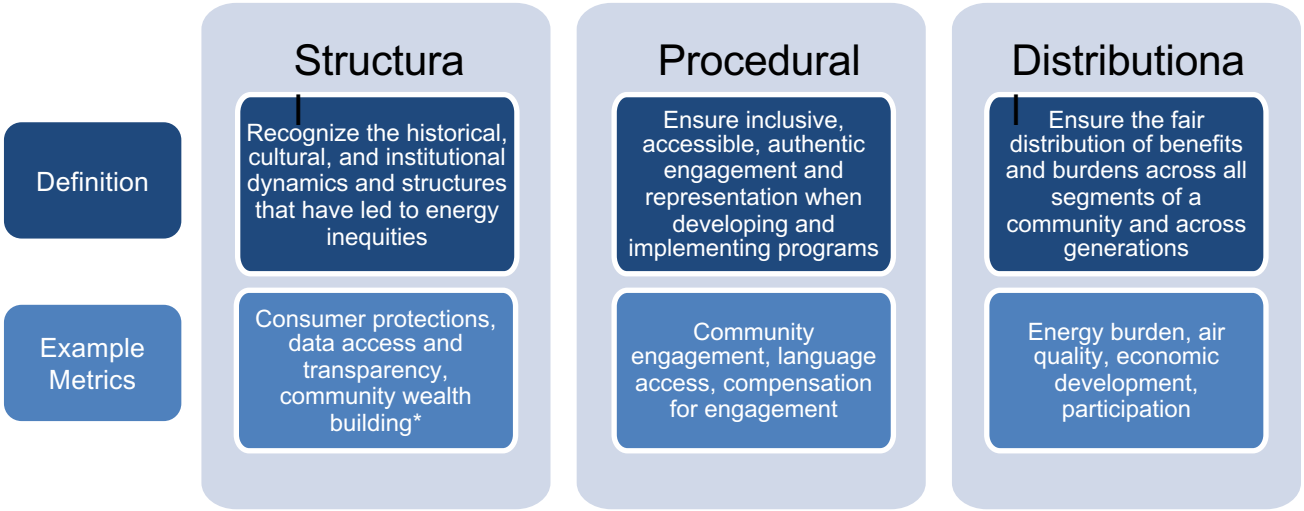
- National Standard Practice Manual for DERs
- Methods, Tools and Resources Handbook for Quantifying DER Impacts for Benefit-Cost Analysis (MTR handbook)
- Database of Screening Practices (DSP)



Energy Equity

An equitable energy system is one where the economic, health, and social benefits of participation extend to all levels of society, regardless of ability, race, or socioeconomic status. ***Achieving energy equity requires intentionally designing systems, technology, procedures, and policies that lead to the fair and just distribution of benefits in the energy system*.**

PNNL 2021- https://www.pnnl.gov/projects/energy-equity



- Many structural/recognition metrics, like building community wealth, don't necessarily intersect with a regulatory process.

Adapted from ACEEE's *Leading with Equity White Paper*

Benefit-cost analysis (BCA)

- BCA is widely used to assess the cost-effectiveness of DER programs
- BCA compares the present value (PV) of a DER's benefits with the PV of its costs
- The DER is cost-effective if
  - The benefit-cost ratio ≥ 1.0
    - Benefit-cost ratio = PV benefits / PV costs
  - The net benefits are positive
    - Net benefits = PV benefits – PV costs

BCA is not designed to evaluate equity impacts

- BCA does not directly address structural or procedural equity
- BCA is not designed to address distributional equity, because it measures impacts on average across the utility system
  - Costs – typically recovered across all customers
  - Benefits – typically a blend of avoided costs
- BCA cannot distinguish impacts on target populations
  - Exception: DER programs that are designed to serve only target populations (e.g., low-income programs)
- BCA focuses mostly on monetary results
  - Many equity metrics cannot be put into monetary terms
- BCA does not and should not account for rate, bill, or participation impacts
  - The Rate Impact Measure (RIM) Test combines BCA results with rate impact results
    - Obscures both rate impacts and BCA results
  - Instead, rate, bill, and participation impacts should be analyzed separately from BCAs
  - Traditional rate, bill, and participation analyses do not address target populations

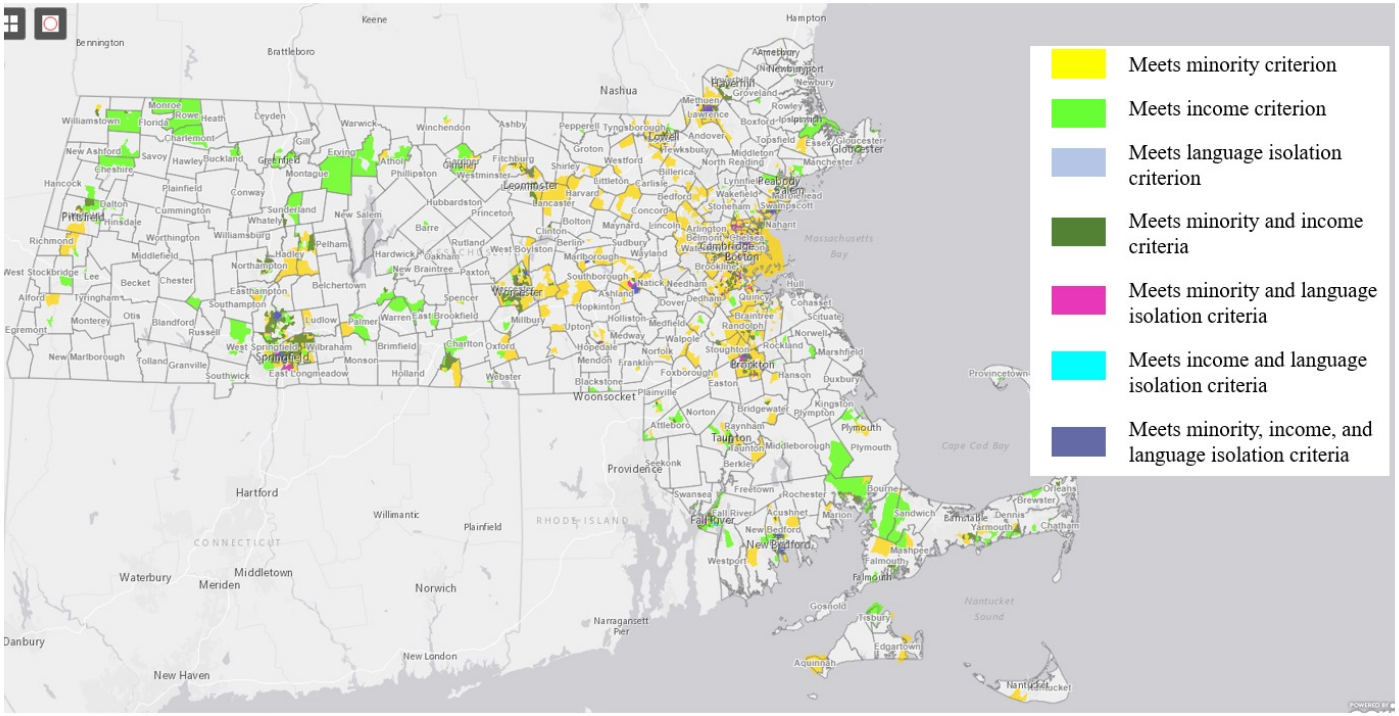
BCA can address distributional equity only in limited ways

- BCA can analyze programs that are designed to serve only target populations (e.g., low-income DER programs)
  - However, the results show only whether the program benefits exceed the costs. They do not provide information on the other energy equity metrics
  - The results say nothing about how the *other* DER programs affect target populations
- Rate, bill, and participation analysis can be used alongside BCA to get one indicator of distributional equity
  - By comparing the rates and bills of program participants versus non-participants
  - However, this says nothing about the rate and bill impacts on target populations
  - This also says nothing about the other energy equity metrics

Target populations – Massachusetts example

Environmental justice neighborhoods defined by the following

- Median income,
- Minority population,
- English proficiency, or
- Combination of minority population and income



Source: Massachusetts Executive Office of Energy and Environmental Affairs

Distributional equity metrics

- There are many initiatives and studies that describe energy equity metrics
  - One recent example: The Energy Equity Project Report 2022
- For DEAs, distributional metrics are needed
- Example distributional equity metrics include
  - Impacts on rates, impacts on bills, participation in DER programs
  - Energy burden, reliability, resilience, public health, etc.
- These metrics should be applied separately to the target population and other customers
- These metrics should be determined by each state, based on the state's distributional energy equity goals.

Comprehensive Decision-Making Framework for DER Investments =

Benefit-Cost Analysis

Compares costs and benefits to all customers on average

Typical Metrics:

- Costs
- Benefits
- Net benefits
- Benefit-cost ratio

+

Distributional Equity Analysis

Compares impacts on target populations relative to other customers

Typical Metrics:

- Rate impacts
- Bill impacts
- Participation rates
- Energy burden
- Reliability
- Resilience
- Public health
- Other

BCA and DEA comparison

	Benefit Cost Analyses (BCA)	Distributional Equity Analyses (DEA)
Purpose	To identify which DER programs utilities should invest in or support	To identify how DER programs impact target populations relative to other customers
Questions Answered	What are the costs and benefits of a DER program across all customers?	How will DER impacts accrue to target populations compared to other customers?
Impacts Analyzed	• Utility system impacts • Participant impacts • Societal impacts	• Participant and societal impacts • Rate, bill, and participation impacts • Distributional equity metrics
Example Metrics	• Costs (PV$) • Benefits (PV$) • NPV • BCR	Disaggregated for target populations and other customers: • Rates ($/kWh) • Bills ($/month) • Participation rates (% of eligible) • Energy burden (% of income on energy bills) Additional metrics of health (ER visits), environmental impacts (PM 2.5), economic development (# of jobs), etc.
Scope	A single BCA to assess absolute DER program impacts	One analysis for target population and another for other customers to compare impacts across groups

Conceptual steps to conduct DEA

1. Define the target population
2. Identify distributional equity metrics
3. Map equity metric data to the target population
4. Analyze the equity metrics to determine program impact on the target population relative to other customers
5. Present results of the BCA and the DEA together
6. Use DEA results to inform final decision on whether and how to proceed with the DER being considered

DEA results - example

Analysis	Impact of Energy Efficiency Portfolio	Results	
Benefit Cost Analysis (BCA)		All Customers on Average	
	Cumulative Costs (million PV$)	200	
	Cumulative Benefits (million PV$)	300	
	Cumulative Net Benefits (million PV$)	100	
	Benefit-Cost Ratio	1.5	
Distributional Equity Analysis (DEA)		Target Population	Other Customers
	Participation (% of eligible population)	11	22
	Rates (% change)	1.4	1.4
	Participant Bills (% change)	-5.6	-1.5
	Participant Energy Burden (% change)	-5.6	-1.5
	Non-Participant Bills (% change)	1.4	1.4
	Non-Participant Energy Burden (% change)	1.4	1.4
	Criteria Air Pollution Emissions (% change)	-2	-9
	Asthma Emergency Room Visits (% change)	-4	-6
	Reliability (% change in SAIFI)	-3	-7

Portfolio is cost-effective for all customers on average

But target population is underserved

Those customers that are served see reduced energy burdens

Target population experiences fewer societal benefits

DEA challenges

- No standardized DEA methods
  - Academic and federal examples appear limited
  - There are few, if any, examples in the context of the utility industry
- Data access and availability
  - DEA analyzes highly specific target populations
  - Data requirements depend on definition of target population
  - Some data may not map directly onto the target populations
    - Census tracts and blocks may not align with utility circuits and customer accounts
  - Utilities may not have sufficient data for some distributional equity metrics
  - Utilities may be reluctant to provide customer data for customer privacy reasons
- Using DEA results in decision-making
  - BCA relies mostly upon monetary results, while many DEA metrics cannot be monetized
  - DEA and BCA can provide conflicting results, which might require policy / judgment calls

New project to develop DEA guidance

- NESP and Lawrence Berkeley National Laboratory (LBNL) are partnering to develop a DEA Guidance Document in 2023
  - Project jointly funded by US DOE and E4TheFuture
  - Project team includes LBNL, E4TheFuture, Synapse Energy Economics
  - Will build on conceptual DEA framework described in the MTR Handbook, which was developed by Synapse Energy Economics
- New project will
  - Focus on BCAs and decision-making for utility investments
  - Research current state of equity metrics and measurement
  - Develop a how-to guide for stakeholders to conduct DEA, applicable to any jurisdiction
  - Target audience includes a variety of practitioners including utilities, public utility commissions, state energy offices, utility consumer advocates, equity advocates, consultants, and more.
  - Build on existing equity initiatives and research
  - Present a real-world case study application of DEA
  - Be guided by an advisory group convened in November 2022

Contact Information

Alice Napoleon

Principal Associate
Synapse Energy Economics

ANapoleon@synapse-energy.com

Check out NESP Events for NSPM and BCA webinars

Stay informed with the NESP Quarterly Newsletter

Questions?

Save the Date for Member Events

February 27, 2023

New Orleans, LA

At AESP Annual Conference

June 22-23, 2023

Huntsville, AL

Hosted by TVA and Huntsville Utilities

SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

Thank you!

We want to hear from you. Please **share your feedback** about today's webinar.

Scan here for the survey!

Thank you to our partners and members who supported the creation of this presentation.

SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE