

UNDERSTANDING ENERGY BURDEN AND ITS POTENTIAL SOLUTIONS FOR ATLANTA

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- The US Southeast, Georgia, and Atlanta face multifaceted energy consumption and income challenges that contribute to high energy burdens in the region.
- Nationally, Atlanta ranks 4th highest in median energy burden levels (behind Memphis, New Orleans & Birmingham) and 3rd highest among low income household populations
- Atlanta's high energy burden is particularly acute among low income, African-American and renter households and is concentrated within 6 of 25 zip codes
- Regression analysis points to predictors of energy burden in Atlanta that are associated with the "poverty cycle"

- Solutions to energy burden in Atlanta will need to consider the interwoven factors in the poverty cycle and build on public, private, and non-profit partnerships
- Among utilities, best practices for low income programs include these partnership arrangements, customer engagement, innovative financing, and overall education activities that help to mitigate upfront costs and remove other energy efficiency barriers
- Utility-led low income programs are unlikely to increase significantly in scale and scope without supportive regulation that changes the “frame” for both energy efficiency broadly and low income programs in particular

PROJECT TEAM & FUNDERS



TEAM MEMBERS

Team Member	Organization
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PROJECT FUNDERS



Introduction

- Project Impetus & Context
- Problem Statement, Objectives & Timeline

Creating the Picture

- Drivers & Attributes of Energy Burden: Georgia
- Drivers & Attributes of Energy Burden: Atlanta
- Project Team Statistical Analysis of Atlanta Baseline

Towards Solutions

- Critical Barriers & Success Factors

Business Case & Policy Solutions

- Policy Tools & Business Case Opportunities

Findings & Next Steps

- Summary Findings
- Potential Phase 2 Focus Areas

PROJECT ACRONYMS



Acronym	Term
ACEEE	American Council for an Energy-Efficient Economy
AMI	Area Median Income
AMP	Arrears Management Program
CAA	Community Action Agencies
CAC	Community Action Committee
DSM	Demand-side Management
EASP	Energy Assessment & Solutions Program
EE	Energy Efficiency
EIA	U.S. Energy Information Administration
EPB	Chattanooga Electric Power Board
GT	Georgia Tech
KUB	Knoxville Utilities Board

Acronym	Term
LIHEAP	Low Income Home Energy Assistance Program
MSA	Metropolitan Statistical Area
NEB	Non-Energy Benefit
PAC	Program Administrator Cost Test
PCT	Participant Cost Test
PSC	Public Service Commission
PUC	Public Utility Commission
RIM	Ratepayer Impact Measure
SE	Southeast
SoAtl	South Atlantic Region
TRC	Total Resource Cost Test
TVA	Tennessee Valley Authority
US DOE	United States Department of Education
USHHS	U.S. Department of Health & Human Services
WAP	Weatherization Assistance Program

INTRODUCTION

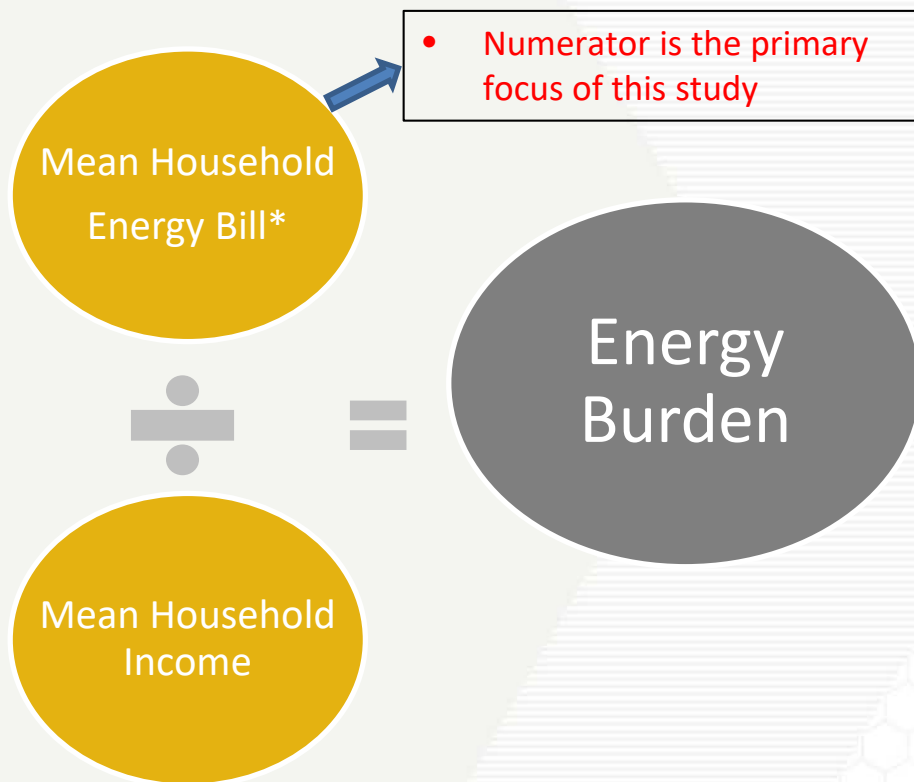
- Project Impetus & Context
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PROJECT IMPETUS & CONTEXT

THE ENERGY BURDEN CALCULATION PROVIDES A GLIMPSE INTO COMPLEX ISSUES INVOLVING QUALITY OF LIFE, POVERTY, & EQUITY

What is an Energy Burden?



*Electric and Gas

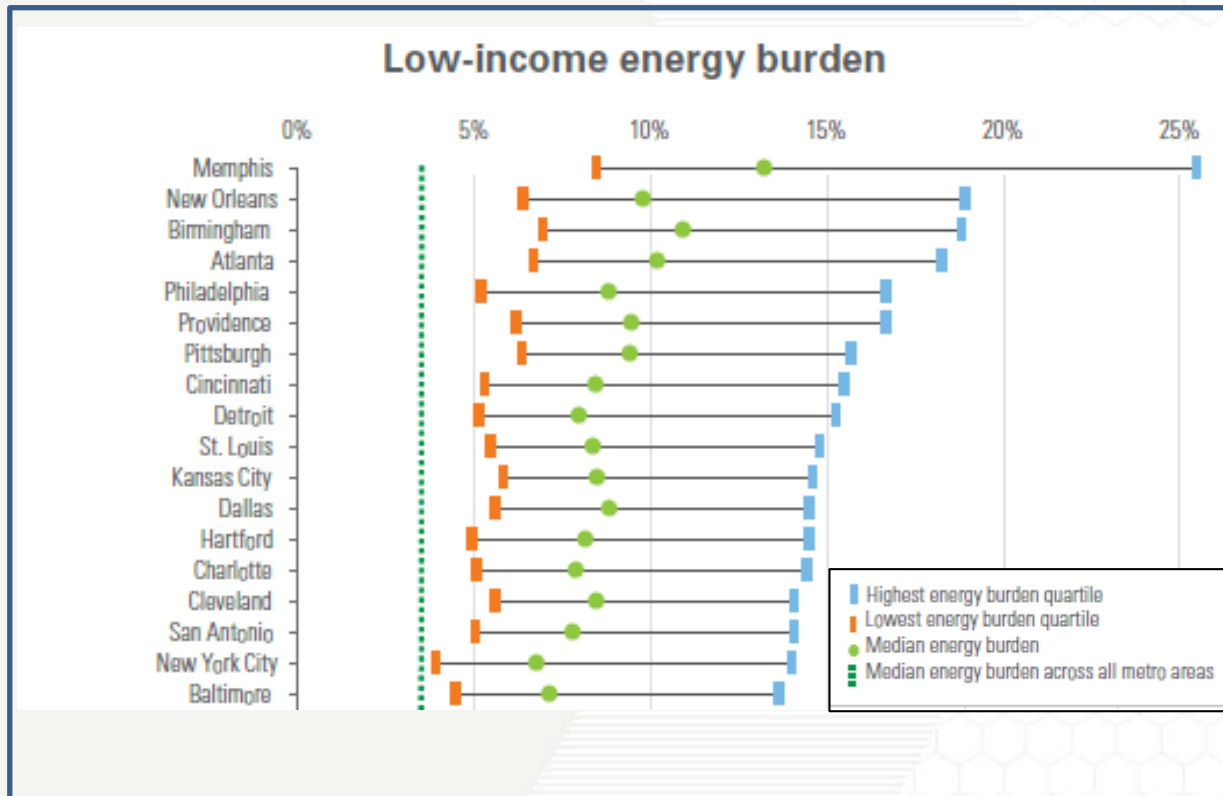
There is no widely accepted value or threshold that establishes whether a household faces a high or unaffordable energy burden. (ACEEE, 2017)

However, the U.S. Department of Health and Human Services classifies an energy burden of above 6% as “unaffordable” (Colton, What is the Home Affordability Gap, 2017)

ATLANTA'S SEVERE ENERGY BURDEN & MULTI-STAKEHOLDER INTEREST IN FINDING SOLUTIONS OFFERS THE IMPETUS FOR UNDERTAKING THIS PROJECT



Figure illustrates low-income household energy burden for the median, highest energy burden quartile, and lowest energy burden quartile households (including both single- and multifamily low-income households).



- Atlanta's energy burden is:
- 4th highest in median energy burden levels (behind Memphis, New Orleans & Birmingham) at 5.3% (versus 3.5% U.S household average)
 - 3rd Highest Energy Burden among low Income household population at 10.2% (vs. 6% "unaffordable" per USHHS)

Source: ACEEE, [Lifting the High Energy Cost Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities](#)

PROBLEM STATEMENT, OBJECTIVES, & TIMELINE

THIS PROJECT SEEKS TO SYNTHESIZE ENERGY BURDEN DRIVERS* & POSSIBLE SOLUTIONS FOR ATLANTA



This GT Energy Burden Project seeks to address the following **problem statements:**

1. What are the primary drivers & baseline attributes of the high energy burden in Atlanta?

(Phase 1)

2. What are the most impactful or promising community, education, rate, and/or finance oriented initiatives for alleviating energy burden circumstances of single and multi-family residents (with meter access) below the poverty line that might be applicable in the Atlanta area?

(Phase 1)

(Phase 2)

3. What are the business case and policy drivers that potentially can offer greater scale to identified approaches and solutions to energy burdened customers in our targeted area?

*Given ranging factors associated with household income (i.e. the energy burden denominator), this project principally focuses the wide on the numerator (**spending on energy**)

PROJECT TIMELINE FOR 2 PHASES OFFERS STEPWISE APPROACH



August - December 2017 (Phase 1)

- Conduct academic & programmatic literature review of root causes and potential approaches/solutions
- Gather data to understand attributes of Atlanta baseline and run statistical analysis of predictors
- Interview stakeholders to inform Atlanta contextual understanding
- Facilitate a stakeholder workshop to capture range of perspectives
- Summarize findings and refine Phase 2 next steps

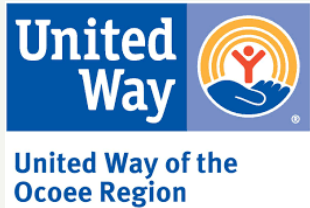
January - May 2018 (Phase 2)

- Host facilitated multi-stakeholder workshops to gather input and feedback on solution ideas
- Provide a pilot/program solution recommendation
- Develop a financial/economic model to reflect energy burden reduction impacts and business case benefits from proposed solutions activities

OUR TEAM MET WITH STAKEHOLDERS & OTHER SUBJECT MATTER EXPERTS TO SUPPLEMENT RESEARCH



Workshop Participants & Interviewees





CREATING THE PICTURE

Drivers & Attributes of Energy Burden: Georgia
Drivers & Attributes of Energy Burden: Atlanta
Project Team Statistical Analysis of Atlanta Baseline

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DRIVERS & ATTRIBUTES OF ENERGY BURDEN: GEORGIA

SEVERAL FACTORS CONTRIBUTE TO HIGH ENERGY BURDENS (VIA BOTH NUMERATOR & DENOMINATOR) IN GEORGIA

Numerator

- 35th in EE policies
- 2nd highest residential natural gas prices in country
- 5th highest average temperature in country
- Among highest in Air Conditioning and space heating use

Denominator

- 41st in per capita income
- ~46% of Southern Co. customers at or below \$40K income*
- ~40% of Georgia Power customers at or below \$40 K income*
- The Southeast lags behind the rest of the nation in terms of % of residents living in poverty



*Source: Southern Company

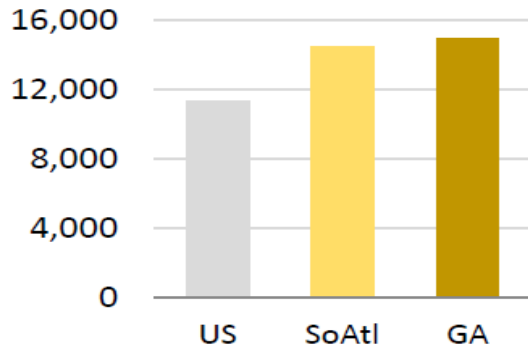
Source: EIA, [Household Energy Use in Georgia](#)

GEORGIA ALSO STANDS OUT IN THE U.S. IN ELECTRICITY CONSUMPTION AND IN AVERAGE HOME SIZE, THEREBY ADDING TO ENERGY BURDEN PRESSURES ACROSS THE STATE

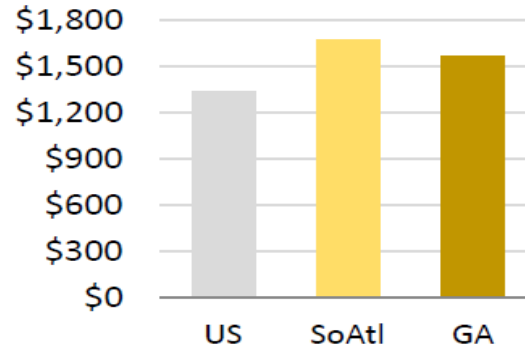


ELECTRICITY ONLY *average per household*

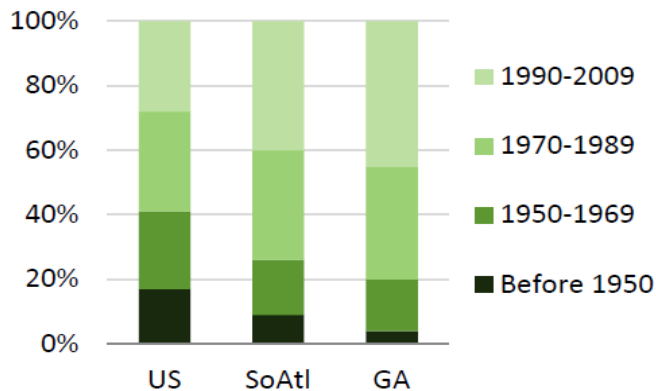
Site Consumption
kilowatthours



Expenditures
dollars



YEAR OF CONSTRUCTION



AVERAGE SQUARE FOOTAGE

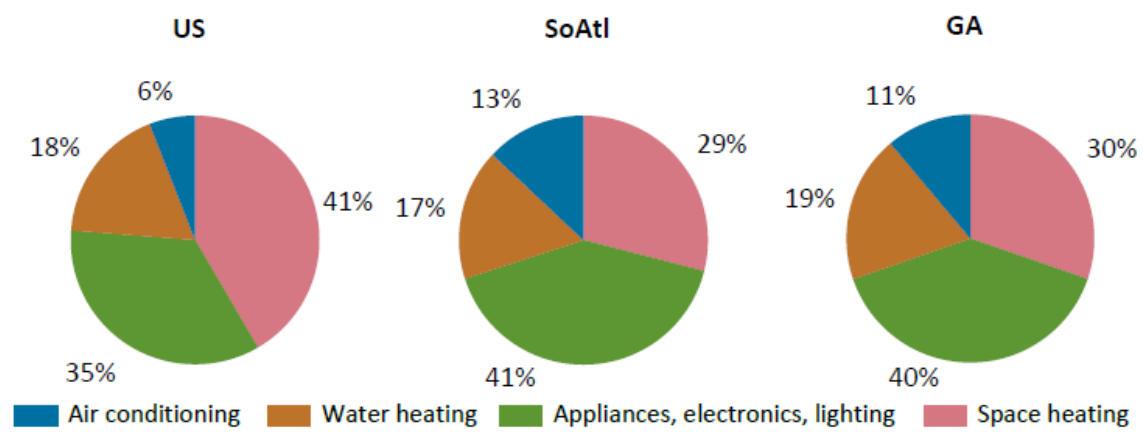
US	1,971
SoAtl	1,944
GA	2,304

- Household electricity consumption in Georgia is among the highest in the country, but similar to other states in the South
- Georgia has higher consumption but lower expenditures than SoAtl indicating lower GA electricity prices
- One reason for high consumption is that while 45% of homes in Georgia were built since 1990 (typically associated with lower per household consumption), Georgia's homes are larger than the U.S. average, likely offsetting some of the efficiencies associated with living in newer homes

Note: SoAtl is South Atlantic Region, which includes Delaware, DC, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia

Source: EIA, [Household Energy Use in Georgia](#)

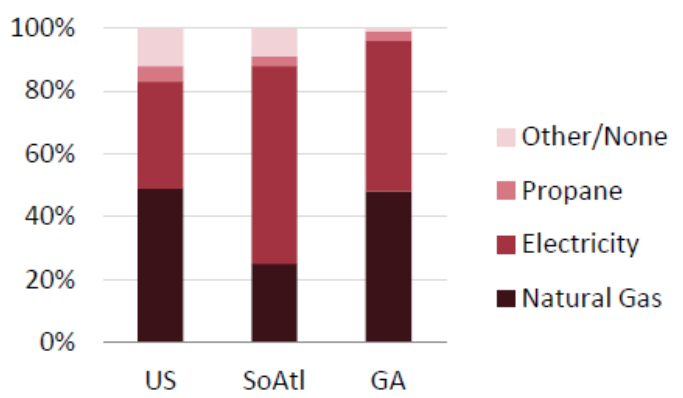
IN ADDITION TO LARGER AVERAGE HOME SIZE, GEORGIA'S HIGH COOLING & HEATING NEEDS CONTRIBUTE ADDITIONAL PRESSURES ON ITS ENERGY BURDEN



CONSUMPTION BY END USE

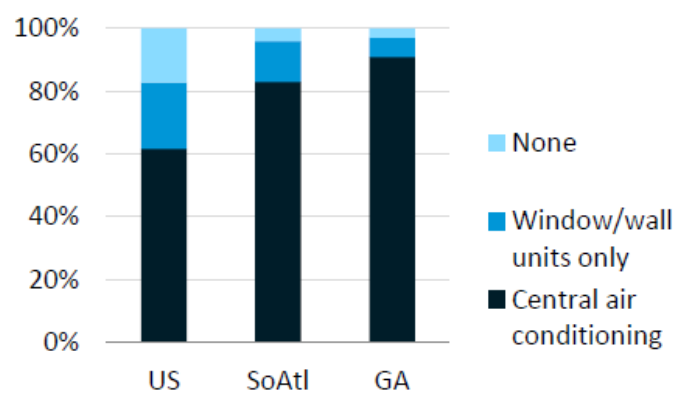
Georgia is one of the few states where at least 30% of household energy consumption is used for space heating and at least 10% of the energy consumed in homes is used for air conditioning.

MAIN HEATING FUEL USED



Natural gas (48%) and electricity (48%) are the dominant main heating fuel choices in Georgia homes.

COOLING EQUIPMENT USED



Over 90% of Georgia residents use a central air conditioning system to cool their homes.

Source: EIA, [Household Energy Use in Georgia](#)

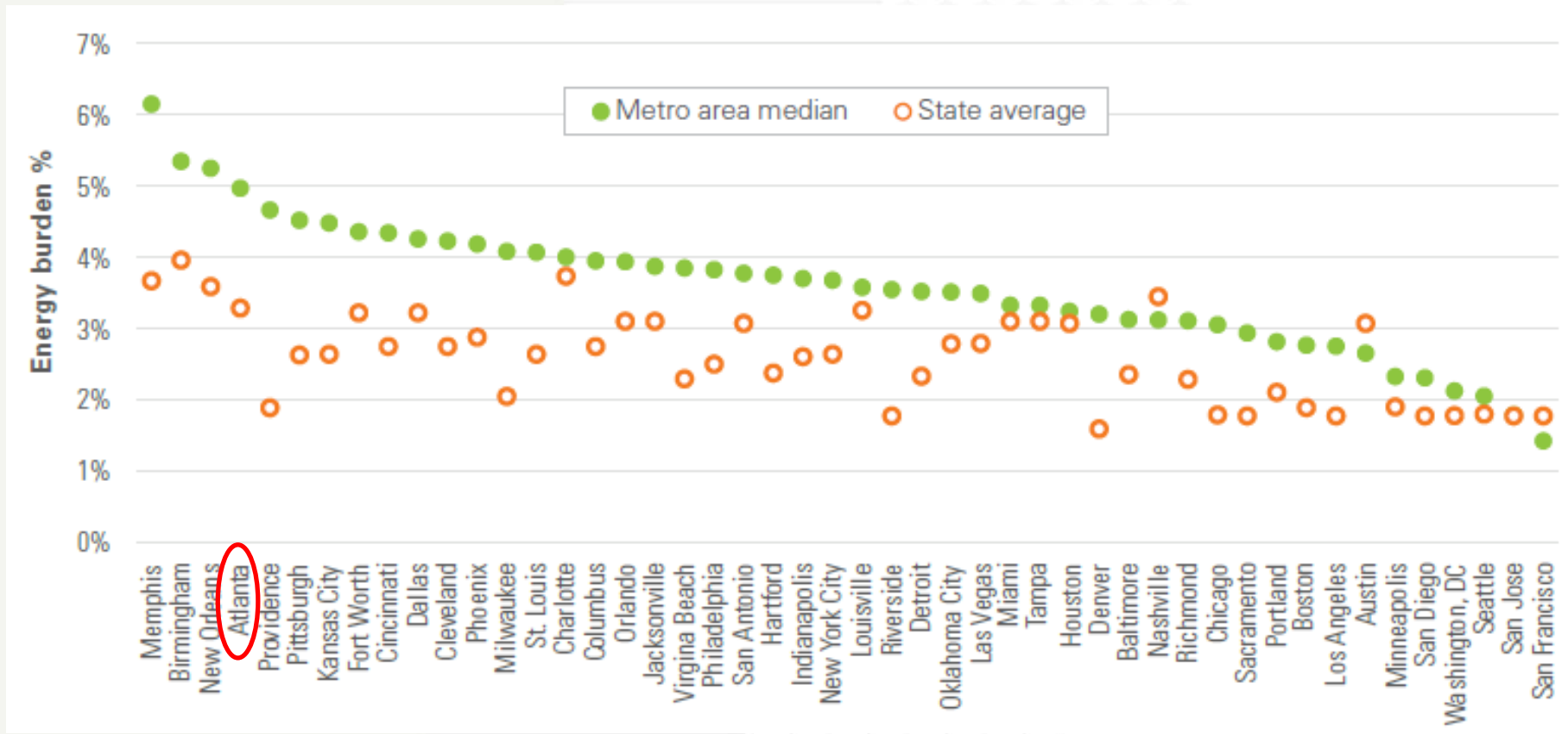


**DRIVERS & ATTRIBUTES OF
ENERGY BURDEN:
ATLANTA**

STATE-WIDE CONDITIONS CONTRIBUTE TO (BUT ONLY PARTIALLY DESCRIBE/EXPLAIN) THE MORE SEVERE ENERGY BURDEN FOUND IN ATLANTA



Median Energy Burden for Metro Area & Average Energy Burden for State Households



Source: ACEEE, [Lifting the High Energy Cost Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities](#)

ATLANTA'S OVERALL HIGH ENERGY BURDEN IS PARTICULARLY SEVERE AMONG LOW INCOME MULTI-FAMILY, LATINO, AFRICAN-AMERICAN AND RENTING HOUSEHOLDS



TABLE 4. Energy burdens for demographic groups in the 10 cities with the highest energy burdens

	All households	Low-income households*	Low-income multifamily households	African-American households	Latino households	Renting households
1	Memphis (6.2%)	Memphis (13.2%)	Memphis (10.9%)	Memphis (9.7%)	Memphis (8.3%)	Memphis (8.6%)
2	Birmingham (5.3%)	Birmingham (10.9%)	Birmingham (8.7%)	Pittsburgh (8.3%)	Providence (7.3%)	Birmingham (7.3%)
3	New Orleans (5.3%)	Atlanta (10.2%)	Atlanta (8.3%)	New Orleans (8.1%)	Philadelphia (7.3%)	Atlanta (6.8%)
4	Atlanta (5.0%)	New Orleans (9.8%)	Providence (7.1%)	Kansas City (7.9%)	Kansas City (6.6%)	New Orleans (6.3%)
5	Providence (4.7%)	Providence (9.5%)	Pittsburgh (7.1%)	Birmingham (7.7%)	Atlanta (6.6%)	Providence (6.2%)
6	Pittsburgh (4.5%)	Pittsburgh (9.4%)	New Orleans (6.9%)	Milwaukee (7.4%)	Birmingham (6.6%)	Kansas City (6.1%)
7	Kansas City (4.5%)	Dallas (8.8%)	Columbus (6.5%)	St. Louis (7.4%)	Phoenix (6.0%)	Pittsburgh (6.0%)
8	Fort Worth (4.4%)	Philadelphia (8.8%)	Dallas (6.5%)	Cleveland (7.0%)	Dallas (6.0%)	Cincinnati (6.0%)
9	Cincinnati (4.3%)	Kansas City (8.5%)	Indianapolis (6.5%)	Cincinnati (6.9%)	Fort Worth (5.7%)	St. Louis (5.9%)
10	Dallas (4.3%)	Cleveland (8.5%)	Kansas City (6.3%)	Atlanta (6.6%)	Detroit (5.7%)	Cleveland (5.5%)

* Low-income includes both single- and multifamily households.

The following slides address several of these Atlanta-specific characteristics

“COMMON” DRIVERS OF ENERGY BURDEN REVEAL INSIGHTS FOR LOW INCOME ATLANTA HOUSEHOLDS



According to ACEEE there are several barriers which prevent low income households from implementing EE programs including:

- 1) High up-front costs of EE investments
- 2) Split incentives between owners and renters
- 3) Lack of access to information about efficiency programs
- 4) Aging housing stock

Moreover, a recent ACEEE survey revealed that most of utilities offer electric efficiency programs for low-income households, such as Georgia Power’s [Energy Assessment & Solutions Program \(EASP\)](#), while only some of them offer natural gas efficiency programs.

Interviews in this project further indicated natural gas account hookup fees were prohibitive for some low income Atlantans, posing a barrier to access of this fuel source for heating

Sources: ACEEE, [Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs](#), [Building Better Energy Efficiency Programs for Low-Income Households](#)

“COMMON” DRIVERS OF ENERGY BURDEN REVEAL INSIGHTS FOR LOW INCOME ATLANTA HOUSEHOLDS (continued)



Overall, ACEEE has documented that low-income households (whether owned or rented):

- Are seldom targeted for appliance and replacement incentives
- Purchase far fewer ENERGY STAR appliances
- Are less likely to have programmable thermostats
- Are more likely to leave heating temperature same when residents are away from home
- Are more likely to have older appliances (obtained secondhand)
- Are more likely to heat their homes primarily with electricity
- Often use portable electric heaters as their primary heating equipment

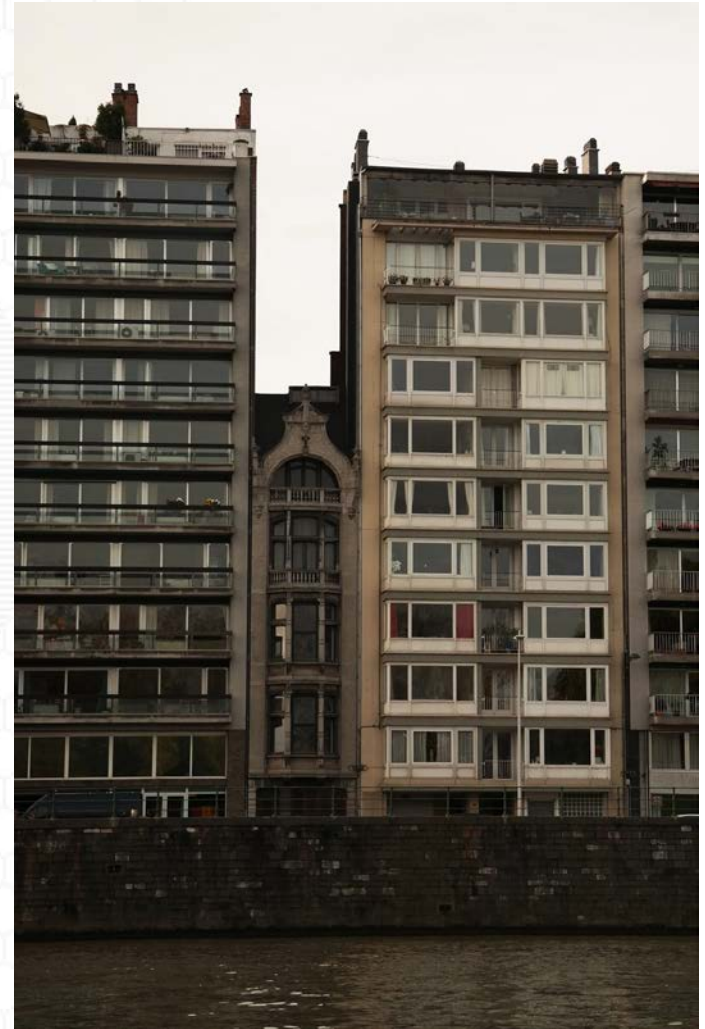


Our interviews & research corroborate many of these findings and notably point to evidence of low-income Atlantans relying on kitchen stoves & kerosene heaters for home heating

Source: ACEEE, [Building Better Energy Efficiency Programs for Low-Income Households](#)

MULTI-FAMILY & RENTING HOUSEHOLDS IN ATLANTA ARE CHARACTERIZED BY A NUMBER OF CHALLENGES THAT CONTRIBUTE TO THE CITY'S HIGH ENERGY BURDEN

- 25% of total housing stock in Atlanta MSA is multifamily
- Most affordable, low-rent apartments are privately owned and do not receive any federal or state rental assistance.
- Average income for multifamily households is lower than single-family households.



Source: ACEEE, [Multiple Benefits of Multifamily Energy Efficiency for Cost-Effectiveness Screening](#)

LOW INCOME (ESPECIALLY AFRICAN AMERICAN AND LATINO) HOUSEHOLDS BROADLY & IN ATLANTA FACE A POVERTY CYCLE THAT LEADS TO SUBSTANTIAL ENERGY BURDENS



Living in energy inefficient housing contributes to an enduring cycle of poverty for low-income families.

- Low-income families unable to pay their high energy bills become vulnerable to utility shutoffs, which can lead to homelessness.
- Cash-strapped families and individuals become prey to predatory payday loans as their only option to pay utility bills and avoid shutoffs. These small, short-term loans come with high interest rates that make repayment difficult.
- Even many who are able to pay bills are unbanked and must rely on high-fee check cashing operators to cash their paycheck, then charge an additional fee to pay utilities.

Unemployment statistics in Atlanta present an even bleaker picture:
“The unemployment rate for African Americans in Atlanta (22 percent) is nearly twice the city’s overall 13 percent, more than three times higher than the rate for their white counterparts (6 percent) and more than twice the rate for Latinos (9 percent).”

Source: [Partnership for Southern Equity, Just Energy Summit 2016: A Framing Document](#)

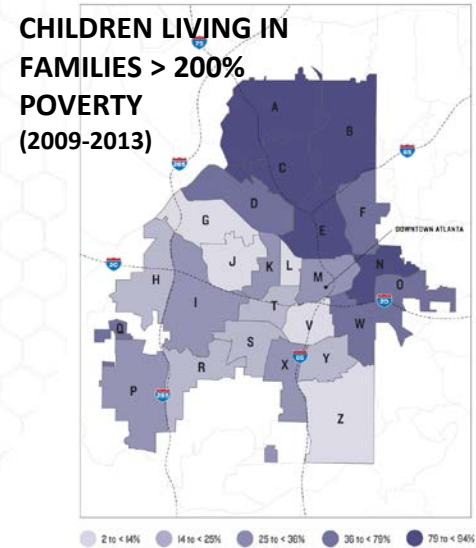
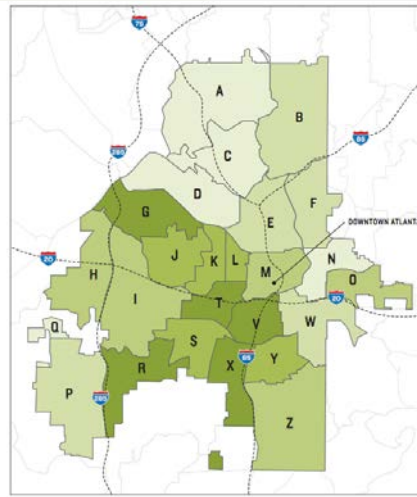
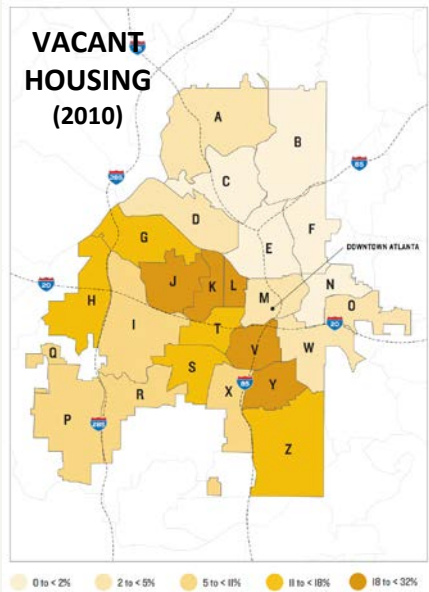
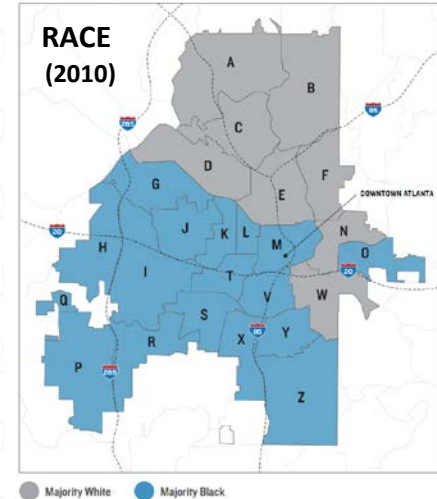
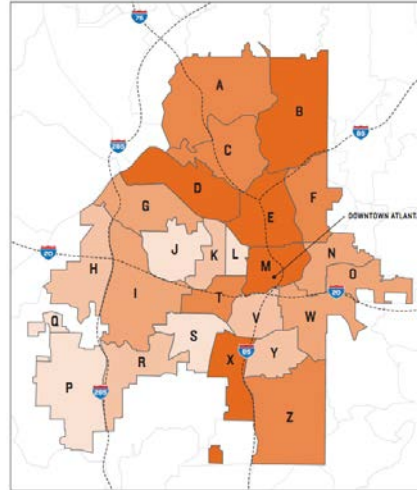
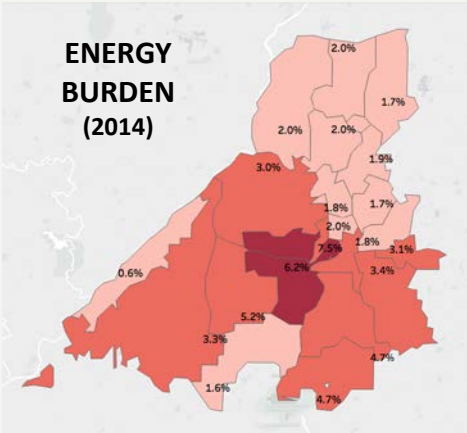
PROJECT TEAM STATISTICAL ANALYSIS OF ATLANTA BASELINE

OUR TEAM CONDUCTED A DEEPER EXAMINATION OF THE ENERGY BURDEN IN ATLANTA



- Assessment of energy burden in Atlanta by ACEEE was based upon household-level data, specifically for low-income households, in 2016.
- Data accessible to GT researchers for this project was limited to zip code level, and only through 2014, despite efforts to access more detailed and current data.
- GT used zip code data combined with multivariate statistical analysis to better understand the correlates of high energy burdens.
- 32 variables plus heating and cooling degree days were selected to develop a fixed-effects regression model of energy burden.

HIGHEST ENERGY BURDEN IN ATLANTA IS FOUND IN COMMUNITIES EXPERIENCING MANY OTHER CHALLENGES

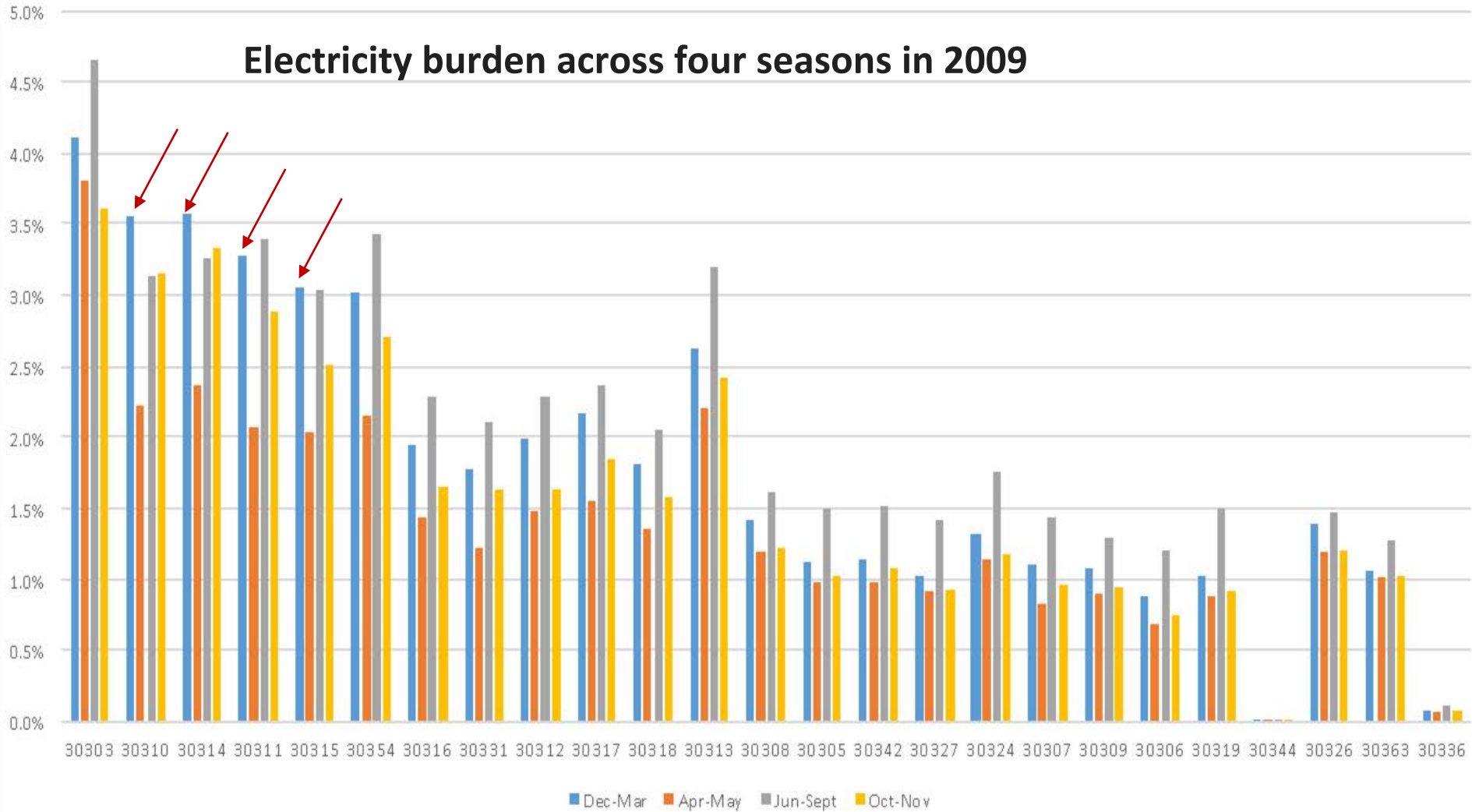


Sources: Annie E. Casey Fdn., [Changing the Odds](#), [ARC Neighborhood Nexus](#)

WHILE SUMMER A/C DRIVES HIGHEST SEASONAL BURDENS ACROSS MOST ZIP CODES, 4 OF THE 6 HIGHEST ENERGY BURDEN ZIP CODES SHOW WINTER AS AN ON PAR OR GREATER DRIVER (POSSIBLY DUE TO USE OF LESS EFFICIENT SPACE HEATING)

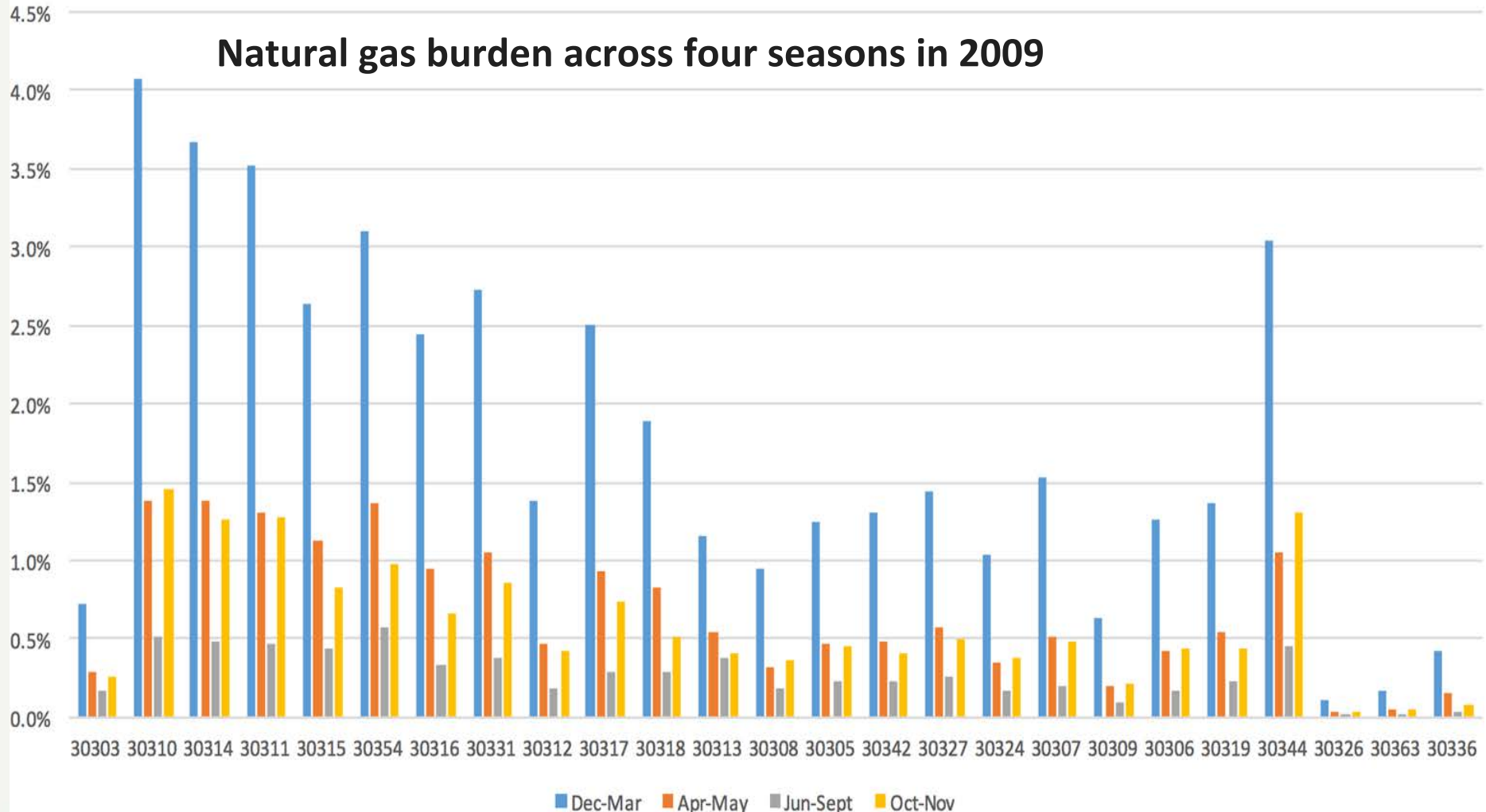


Electricity burden across four seasons in 2009



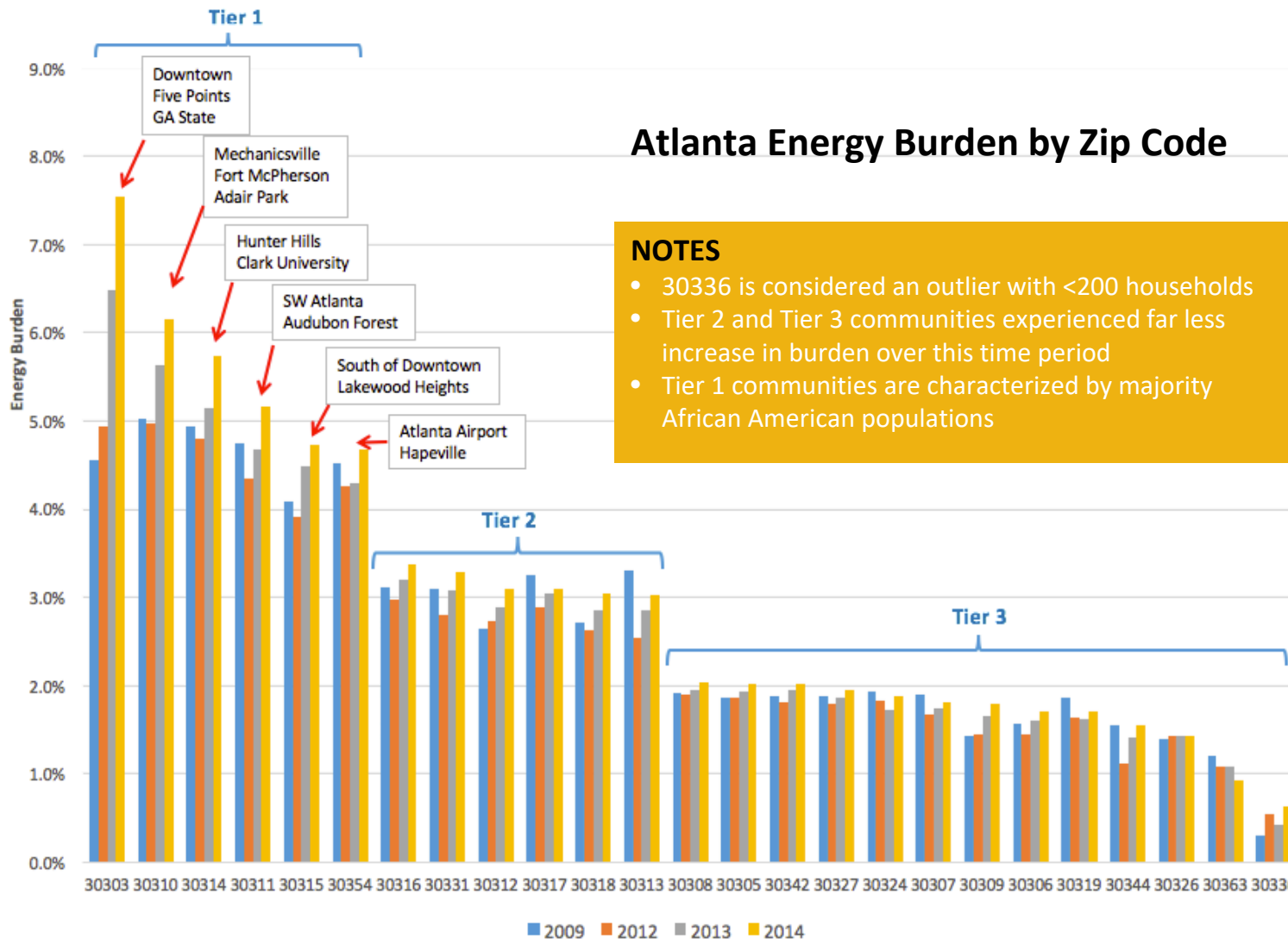
NATURAL GAS BURDEN PEAKS IN WINTER AS IT IS THE PRIMARY SOURCE OF HEATING

Natural gas burden across four seasons in 2009



ENERGY BURDEN IN ATLANTA HAS SEEN SIGNIFICANT GROWTH, WITH DISPROPORTIONATE INCREASES AMONG THE LOWEST INCOME COMMUNITIES

Atlanta Energy Burden by Zip Code



SIX ZIP CODES (TIER 1) IN ATLANTA HAVE PARTICULARLY HIGH ENERGY BURDENS



- Households in Tier 1 (low-income) zip codes spent more on energy in 2014 despite having low average household incomes (see next slide).
- This suggests a substantial opportunity in Tier 1 for energy-efficiency home upgrades and household education.
- The total energy burden was 2.7% in 2009 and it jumped to 3% in 2014. For the tier 1 (top 6 zip codes), it was 4.6% in 2009 and it increased to 5.7% in 2014.

Zip Code	Mean HH Income	Mean Energy Bill	% Energy Burden
30303	\$36,600	\$2,760	7.5%
30310	\$35,103	\$2,161	6.2%
30314	\$33,671	\$1,929	5.7%
30311	\$41,723	\$2,153	5.2%
30315	\$39,115	\$1,850	4.7%
30354	\$39,634	\$1,855	4.7%
30316	\$65,507	\$2,212	3.4%
30331	\$57,360	\$1,890	3.3%
30312	\$53,185	\$1,650	3.1%
30317	\$75,241	\$2,332	3.1%
30318	\$63,356	\$1,930	3.0%
30313	\$59,983	\$1,818	3.0%
30308	\$73,003	\$1,482	2.0%
30305	\$146,565	\$2,951	2.0%
30342	\$128,856	\$2,594	2.0%
30327	\$239,582	\$4,684	2.0%
30324	\$92,423	\$1,735	1.9%
30307	\$124,801	\$2,255	1.8%
30309	\$106,803	\$1,917	1.8%
30306	\$132,706	\$2,276	1.7%
30319	\$133,289	\$2,273	1.7%
30344	\$47,469	\$738	1.6%
30326	\$114,839	\$1,648	1.4%
30363	\$86,429	\$807	0.9%
30336	\$42,751	\$270	0.6%
City	\$82,800	\$2,007	2.9%

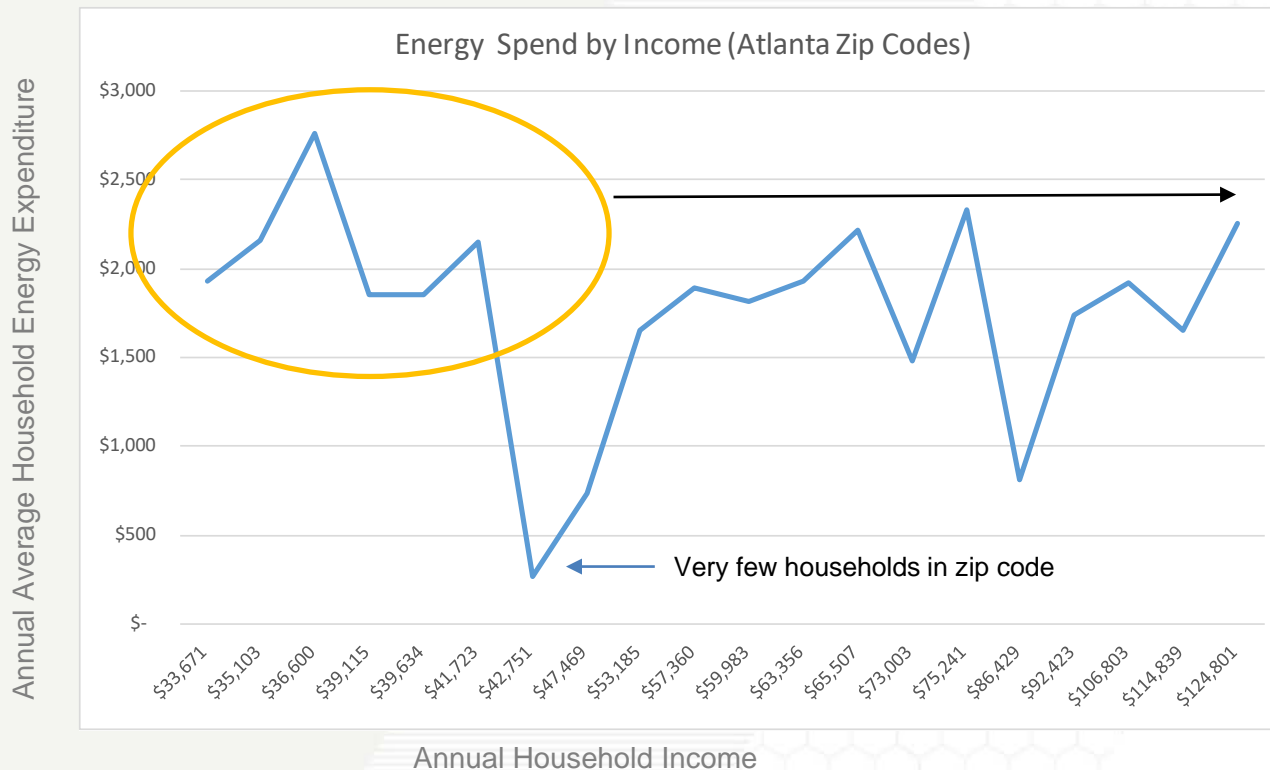
Tier 1

DATA REVEALS THAT LOWER INCOME HOUSEHOLDS SPEND AS MUCH OR MORE ON ENERGY AS HIGHER INCOME HOUSEHOLDS



The energy burden numerator (energy expenditures) for low income (Tier 1) customers is often on par with high income customers while the denominator is much lower, which leads to more severe **energy burdens**

Georgia Tech Zip Code Analysis



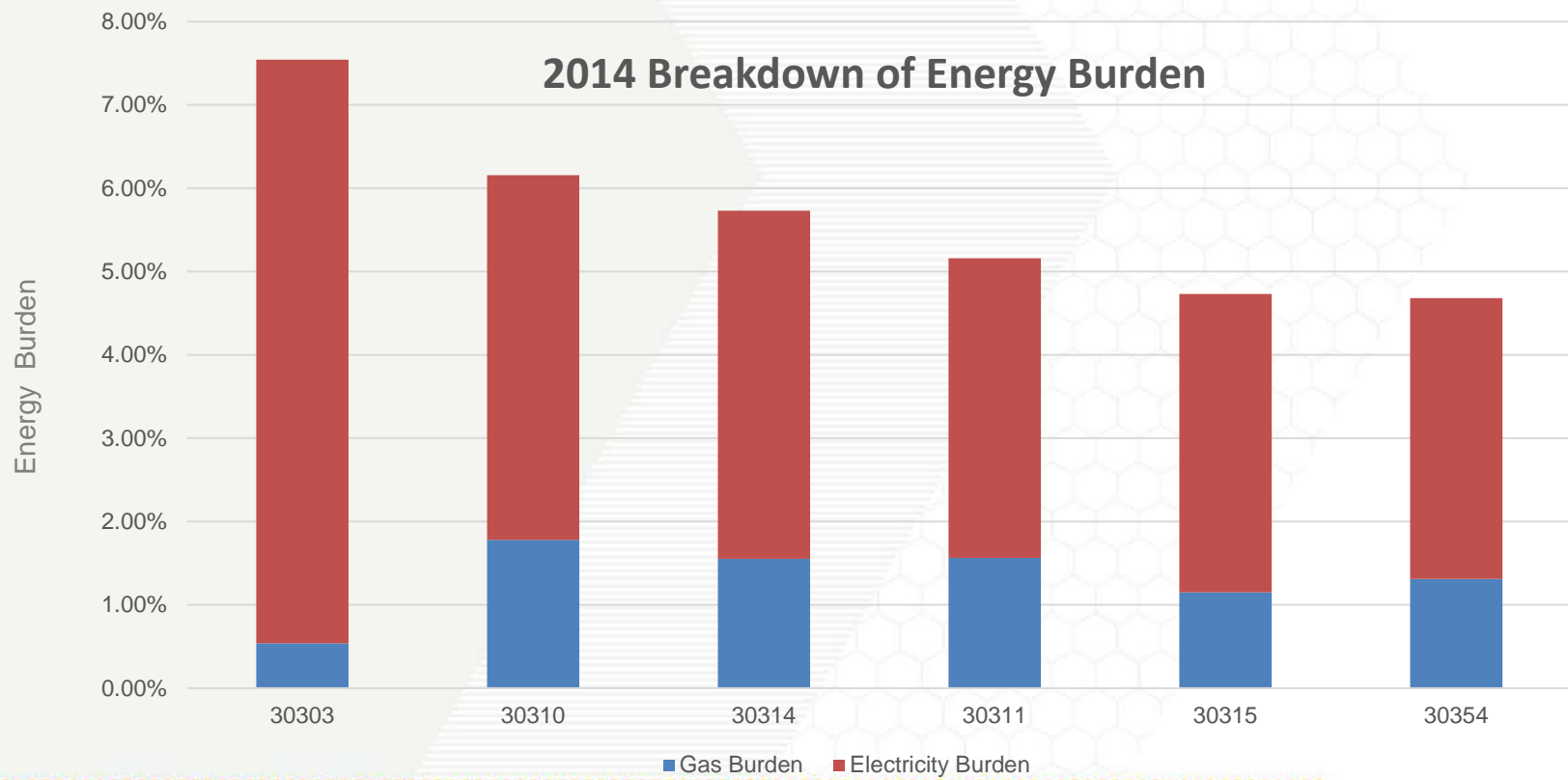
NOTE: Each income level corresponds to average income by zip code. From left to right: 30314, 30310, 30303, 30315, 30354, 30311, 30336, 30344, 30312, 30331, 30313, 30318, 30316, 30308, 30317, 30363, 30324, 30309, 30326, 30307



AS A PROPORTION OF TOTAL ENERGY BURDEN, ELECTRICITY IS SIGNIFICANTLY GREATER THAN NATURAL GAS DUE TO A RANGE OF USAGE & HOME CONSTRUCTION FACTORS



- All-electric homes (with heat pumps) are often less costly to construct
- Construction quality of low income homes are likely not energy efficient
- Interviews and analysis (see zip code 30303) indicate that lack of natural gas hook-ups and heating lead to higher overall energy burden.



TO EXTEND OUR UNDERSTANDING, WE CONDUCTED A REGRESSION ANALYSIS OF ENERGY BURDEN ACROSS ALL THREE TIERS (THE 25 ZIP CODES IN ATLANTA)



32 variables plus heating and cooling degree days were evaluated in a fixed-effects regression model of energy burden.

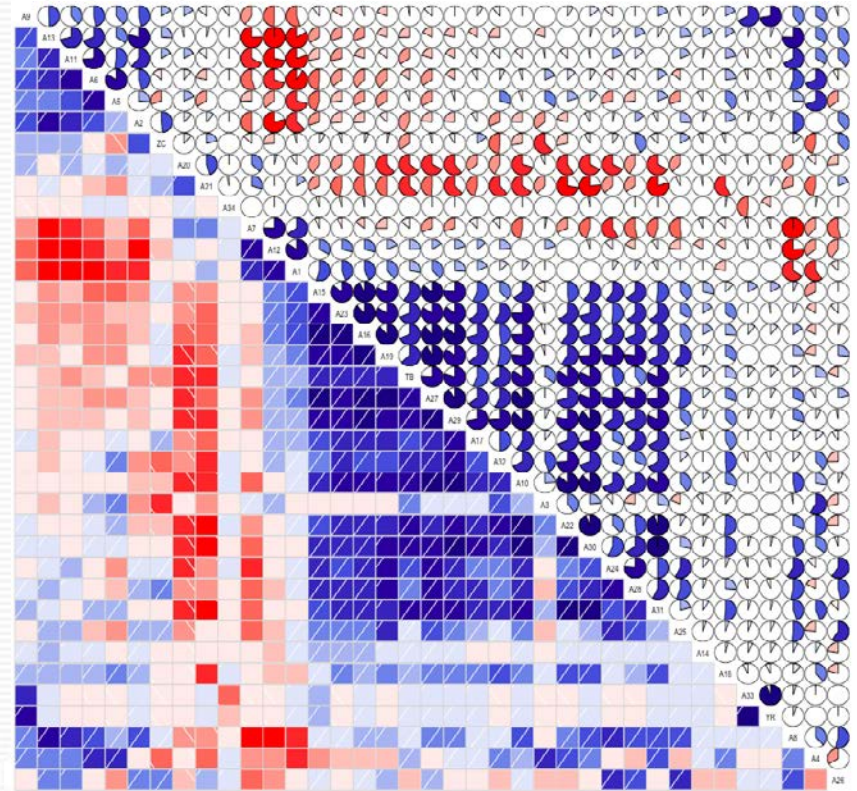
EMPLOYMENT STATUS (Employed, unemployed, etc.)
COMMUTING TO WORK (car, truck, public transp, etc.)
OCCUPATION
INDUSTRY (Agriculture, Construction, etc.)
CLASS OF WORKER
INCOME AND BENEFITS (INFLATION-ADJUSTED DOLLARS)
HEALTH INSURANCE COVERAGE
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL

HOUSING OCCUPANCY
UNITS IN STRUCTURE (1-unit detached, 1-unit attached, 2 units, etc.)
YEAR STRUCTURE BUILT
ROOMS (1, 2, etc.)
BEDROOMS (0, 1, 2, etc.)
HOUSING TENURE (Owner/Renter occupied)
YEAR HOUSEHOLDER MOVED INTO UNIT
VEHICLES AVAILABLE (0, 1, 2, etc.)
HOUSE HEATING FUEL (Gas, Electricity, Kerosene, etc.)
SELECTED CHARACTERISTICS (plumbing, kitchen, etc.)
OCCUPANTS PER ROOM
VALUE of unit
MORTGAGE STATUS
SELECTED MONTHLY OWNER COSTS (SMOC)
Housing units without a mortgage
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME (SMOCAPI)
Housing unit without a mortgage (excluding units where SMOCAPI cannot be computed)
GROSS RENT
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME (GRAPI)

MULTIVARIATE STATISTICAL ANALYSIS IDENTIFIED STRONG PREDICTORS OF ENERGY BURDEN

A fixed-effects regression model explains **60% of the variation** in average energy burden across 25 zip codes and over 4 years with the following major predictors of higher energy burden:

- Low vehicle ownership
- High food stamp receipts
- Low housing values (particularly homes worth less than \$150K)
- High %s of single-family housing (counter to other research findings of other studies (1,2))
- More transiency (particularly for households that moved “after 2005”)
- Older homes (particularly built before 2000)
- High levels of heating and cooling degree days



Correlation Matrix

FINDINGS OFFER IMPORTANT INSIGHTS AND CONSIDERATIONS



- While the scope of this study is limited to the “numerator” of energy expenditures in the energy burden ratio, the overall energy burden challenge is complex and reflective of other “burdens” driving poverty cycles

Finding	Comments
Low Vehicle Ownership	<ul style="list-style-type: none">• Not surprising that energy burdened zip codes lack vehicle ownership• Increased mobility likely to assist with denominator (income)
High Food Stamp Receipts	<ul style="list-style-type: none">• Households that qualify for food stamps have high energy burdens
Low Housing Values	<ul style="list-style-type: none">• “Affordable” housing may not be so cheap when energy bills are considered
High % of single-family housing	<ul style="list-style-type: none">• Contradicts national pattern (per ACEEE)...in Atlanta, high % of single-family housing correlates with high energy burdens
More transiency	<ul style="list-style-type: none">• Transient households do not invest in EE & inefficient housing does not retain occupants
Older Homes	<ul style="list-style-type: none">• Older homes tend to be less efficient
High levels of heating & cooling degree days	<ul style="list-style-type: none">• Households have higher bills in both hot and cold weather (inefficient housing is more climate sensitive)

IN ADDITION TO THESE FINDINGS, RELATIVELY LOW (AND/OR MISALIGNED) INVESTMENT IN EE MAY BE A FACTOR IN HIGHER ENERGY BURDENS



- Overall spending on low income programs: 2014 US electric demand-side management (DSM) expenditures for the low-income customer class were 6% of total expenditures on EE (\$361 million), while spending for all residential programs was 28% (\$1.68 billion).
- Program scope and emphasis: 81% of all funding support to address low-income energy burdens in the US is directed at helping customers pay energy bills, which is important but may not address root causes of energy spending/demand that might be achieved through greater energy efficiency spending.
- Spending in the US SE: Utilities with the least spending on EE programs were those serving southeastern cities. All southeastern cities in the City Energy Scorecard fell within the bottom 40% of the ranking and “on average, the Southeast utilities have the lowest investments in electric efficiency spending and savings.”

Sources: [ACEEE's Enhancing Community Resilience through Energy Efficiency; Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities; SE Scoresheet](#)

TOWARDS SOLUTIONS

Critical Barriers & Success Factors

CREATING THE NEXT®

RECAP: LIKELY DRIVERS & PREDICTORS OF ENERGY BURDEN IN GREATER ATLANTA ARE COMPLEX AND THEREBY NECESSITATE MULTI-PRONGED SOLUTIONS



Numerator (focus of this study)

- GA/ATL - high levels of heating & cooling days
- 2nd highest residential natural gas prices in US
- GA among highest in space heating use
- GA/ATL - Older & larger homes
- Construction quality of low income homes
- Less efficient appliances and behavior among low income households
- National spending on low income programs appears to have room for growth & Georgia/SE ranked relatively low in EE policies & spending

Denominator

- Georgia ranks 41st in per capita income
- The Southeast lags behind the rest of the nation in terms of % of residents living in poverty
- Regression predictors such as low vehicle ownership, high food stamp receipts, low housing values, and more transiency likely exacerbate overall poverty cycle

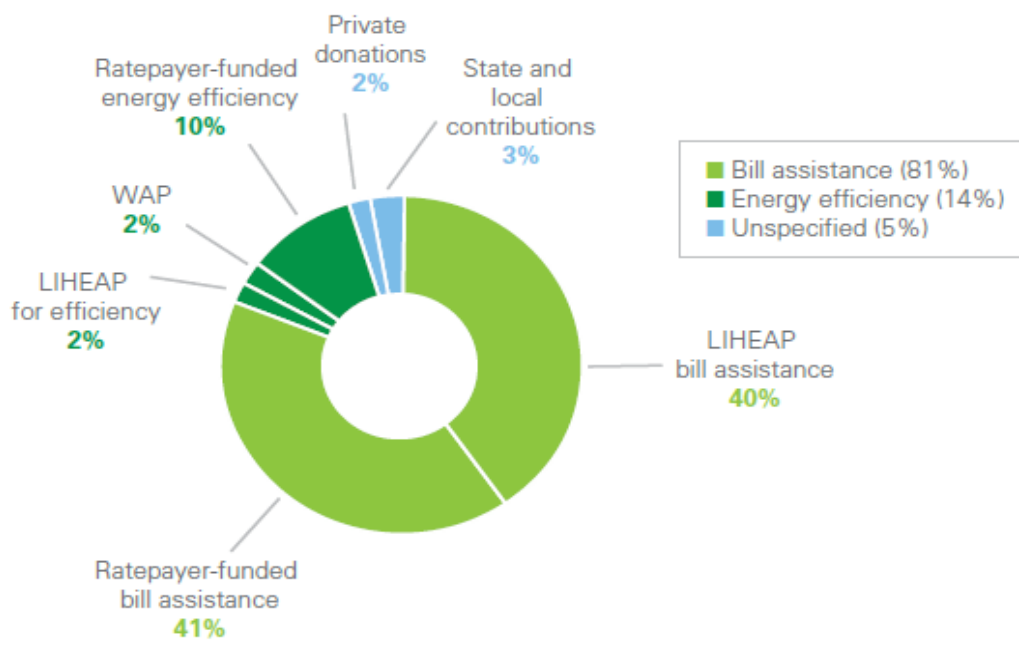
Because this study is focused on the numerator and on addressing potential avenues for scaling programming through a utility business case, the solutions that follow largely focus on weatherization and energy efficiency. This does not diminish the importance of improving, for example, building codes and addressing other low income characteristics.

EXISTING PROGRAMS ADDRESS CUSTOMER EDUCATION, FINANCING, WEATHERIZATION, AND EFFICIENCY BUT CHALLENGES REMAIN WITH SCALE & EFFECTIVENESS



Program type	Program	Funding source
Bill assistance	Low Income Home Energy Assistance Program (LIHEAP)	Federal and state taxpayers
	Other low-income bill assistance programs	Utility ratepayers; private contributions
	Modified rate design, rate discounts or waivers, and modified billing methods	Utility ratepayers
Weatherization	Weatherization Assistance Program (WAP)	Federal and state taxpayers
Energy efficiency	Low-income energy efficiency programs ¹	Utility ratepayers ²

- While a strong foundation of programs exist, many are federal funding-dependent and these efforts may be more reactive than focused on root causes – (81% on bill assistance versus 14% on EE consumption)
- A significant barrier to any EE programming is the frequent need to first conduct safety and weatherization upgrades. In Georgia, the Georgia Department of Human Services allocates 90% of LIHEAP funds towards bill payment assistance & 10% to weatherization – there may be an opportunity advocate for shifting this proportion



Source: ACEEE, [Lifting the High Energy Cost Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities](#)

THOUGH CHALLENGES ARE SIGNIFICANT & EE IS NOT THE ENTIRE SOLUTION TO HIGH ENERGY BURDENS, BENEFITS OF GREATER INVESTMENT IN EE ARE NUMEROUS



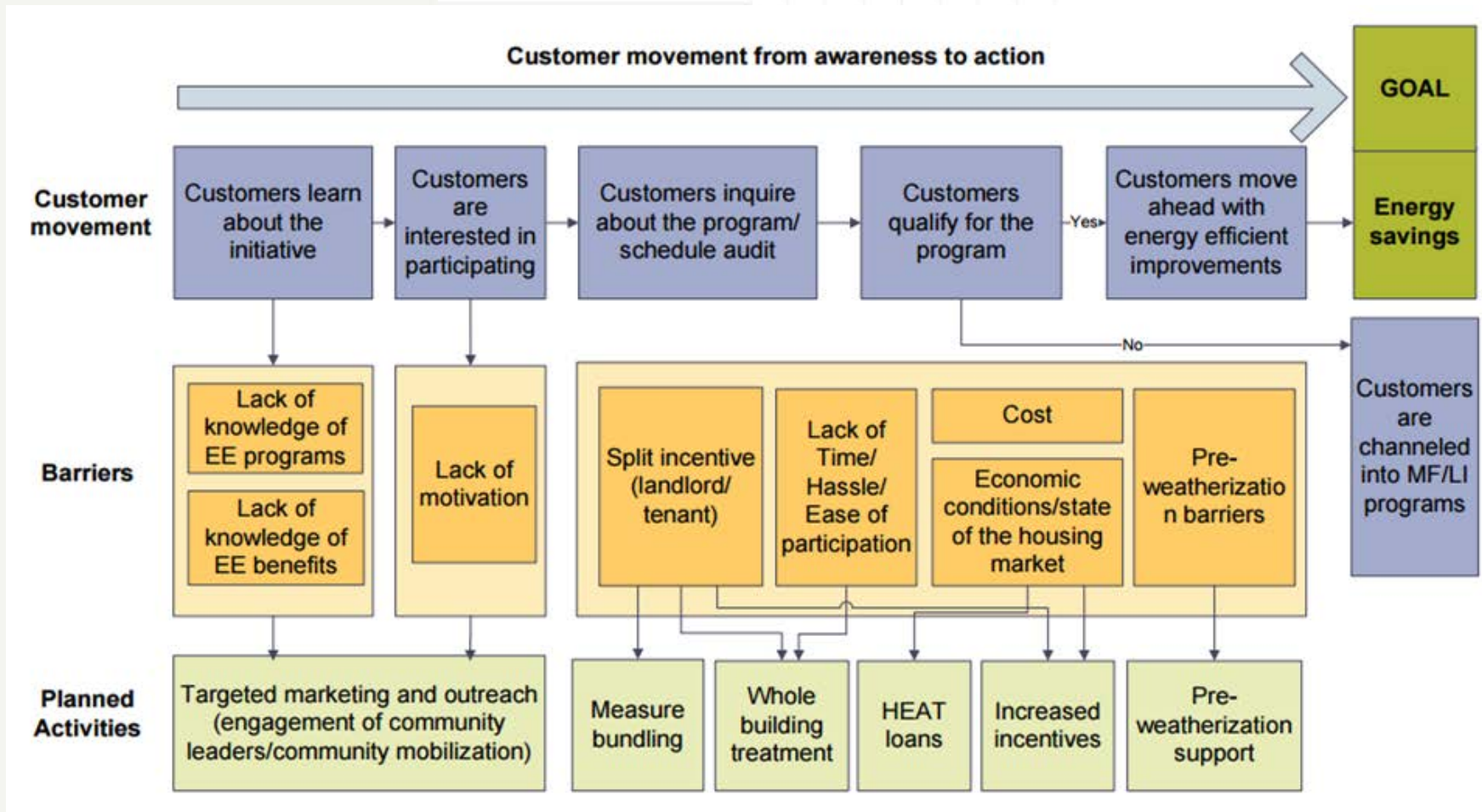
TABLE 7. Energy efficiency benefits for low-income households, utilities, and communities

Benefit recipient	Energy efficiency outcome	Resulting benefit
Low-income program participants	Lower monthly utility bills	Lower household energy burden and greater disposable income
		Reduced stress and fewer trade-offs between energy and other necessities
		Reduced exposure to risk from utility rate increases
	Improvements in the efficiency of the housing stock	Improved health and safety and greater household comfort
		Increased property value, more reliable equipment, and lower maintenance costs
		Greater satisfaction with the building/unit and improved household and neighborhood stability
Utilities and ratepayers	Demand-side management (both gas and electric)	Avoided excess costs of increased generation, capacity, and transmission investments
		Contribution toward compliance with energy efficiency portfolio standards and other environmental legislation
	Cost savings to utilities and ratepayers	Reduced arrearages and cost of shutoffs, which lowers utility operating costs
		Improved customer service
Communities	Lower electric and gas demand	Reduced environmental pollutants and improved public health
	Lower monthly utility bills due to avoided utility costs	More money spent in the local economy due to greater household disposable income, with higher local multiplier effect
		Poverty alleviation and increased standard of living
	Improvements in the efficiency of the housing stock	Local job creation through weatherization programs and energy efficiency providers and trade allies
		Improved quality of life
		Increased property values and preservation of housing stock

- Bringing low income residential housing stock up to the efficiency level of the median household would eliminate 35% of low income excess energy burden
- For African-American and Latino households, almost all of their excess energy burden could be eliminated by raising efficiency to median levels
- Successful EE programs create both professional and skilled trade jobs as delivery partners
- Other health and Non-Energy Benefits are increasingly being considered in calculations

Source: ACEEE, [Lifting the High Energy Cost Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities](#)

SUCCESSFUL EE PROGRAM FEATURES INCORPORATE MULTI-PRONGED STRATEGIES TO REDUCE BARRIERS



Source: Opinion Dynamics, [Efficient Neighborhoods+® Initiative Evaluation Report](#)

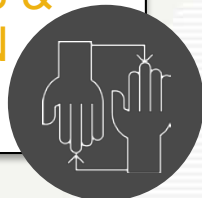
UTILITY PROGRAMS THAT INVOLVE PARTNERSHIPS, CUSTOMER ENGAGEMENT, & KNOWLEDGE SHARING ARE REALIZING BENEFITS



Partnering with local CAAs to leverage WAP and deliver innovative programming:

- Coordinate across partners and programs to better reach highest need households
- Appalachia Power and Community Housing Partner's low-income program
- TVA's Extreme Energy Makeovers project allowed partners to spend to \$10.00/square foot for a whole-house approach

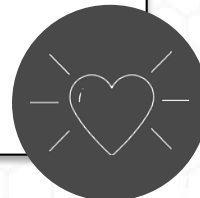
PARTNERSHIPS & COORDINATION



Increasing customer touch points to reduce disconnects and utility debt:

- Single point of contact ("concierge service") helps simplify process
- Cultivating relationships with multi-family owners helps ID and leverage planned renovation cycle
- Georgia Power's Prepay Program
- Chattanooga EPB using AMI data

PROACTIVE CUSTOMER SERVICE



Sharing knowledge to increase EE program participation:

- "Neighborhood sweeps" targeting income-qualified neighborhoods (not income-qualified individuals) have been effective in MA, AL, FL, KY, MS, NC & SC
- Door-to-door outreach builds trust and delivers education
- Mandatory participation in education key to Knoxville efforts

EFFECTIVE ENGAGEMENT & EDUCATION



Sources: ACEEE, [Building Better Energy Efficiency Programs for Low-Income Households](#), [Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs](#), EPA [Bringing Benefits of EE/RE to low-income communities](#)

KEY LEARNINGS FROM PILOTS AROUND THE COUNTRY ON CUSTOMER ENGAGEMENT AND BILLING PRACTICES INFORM POTENTIAL SOLUTIONS



Segmenting audience and offering range of eligible measures to best target different segments:

- Include high-efficiency products/equipment – not just weatherization
- Reduce upfront costs to participate and income qualification barriers

PORTFOLIO APPROACH



Leveraging customer-funded programs to offer weatherization services:

- KUB and Knoxville-Knox County CAC's "Round-It-Up"
- Memphis Light, Gas and Water's "Share the Pennies"
- Mass. AMP eligibility = 60% of state median income, resulted in \$17.9 million revenue to utility

ARREARAGE MANAGEMENT



Offering "balanced billing" to provide a fixed monthly energy expense:

- Georgia Power's "Flat Bill, Budget Bill, & Pre-Pay"
- 4-County Electric Power Association's "Levelized Billing"
- Nashville Electric Service's "Balanced Billing"

LEVELIZED BILLING



Sources: ACEEE, [Building Better Energy Efficiency Programs for Low-Income Households](#), [Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs](#), EPA [Bringing Benefits of EE/RE to low-income communities](#)

INTEGRATED APPROACHES TO ELECTRICITY & NATURAL GAS ALONG WITH A FOCUS ON SERVICE PROVIDERS & HEALTH/SAFETY ARE KEY INGREDIENTS



Developing programs that address natural gas and electricity, and address whole-building:

- Holistic, integrated approach achieves larger improvements, reduces overall burden
- Duke Energy targeted properties where owners cover tenant water bills – removed split incentive, reached 100,000 units across KY, NC, SC, and OH

FUEL-BLIND OFFERINGS



Developing a trusted contractor network:

- Robust implementer training
- Performance-based contractor incentives
- Single point of contact for contractors
- Quality control emphasis

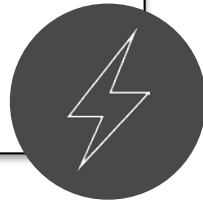
QUALITY CONTROL



Addressing health, safety and building integrity issues:

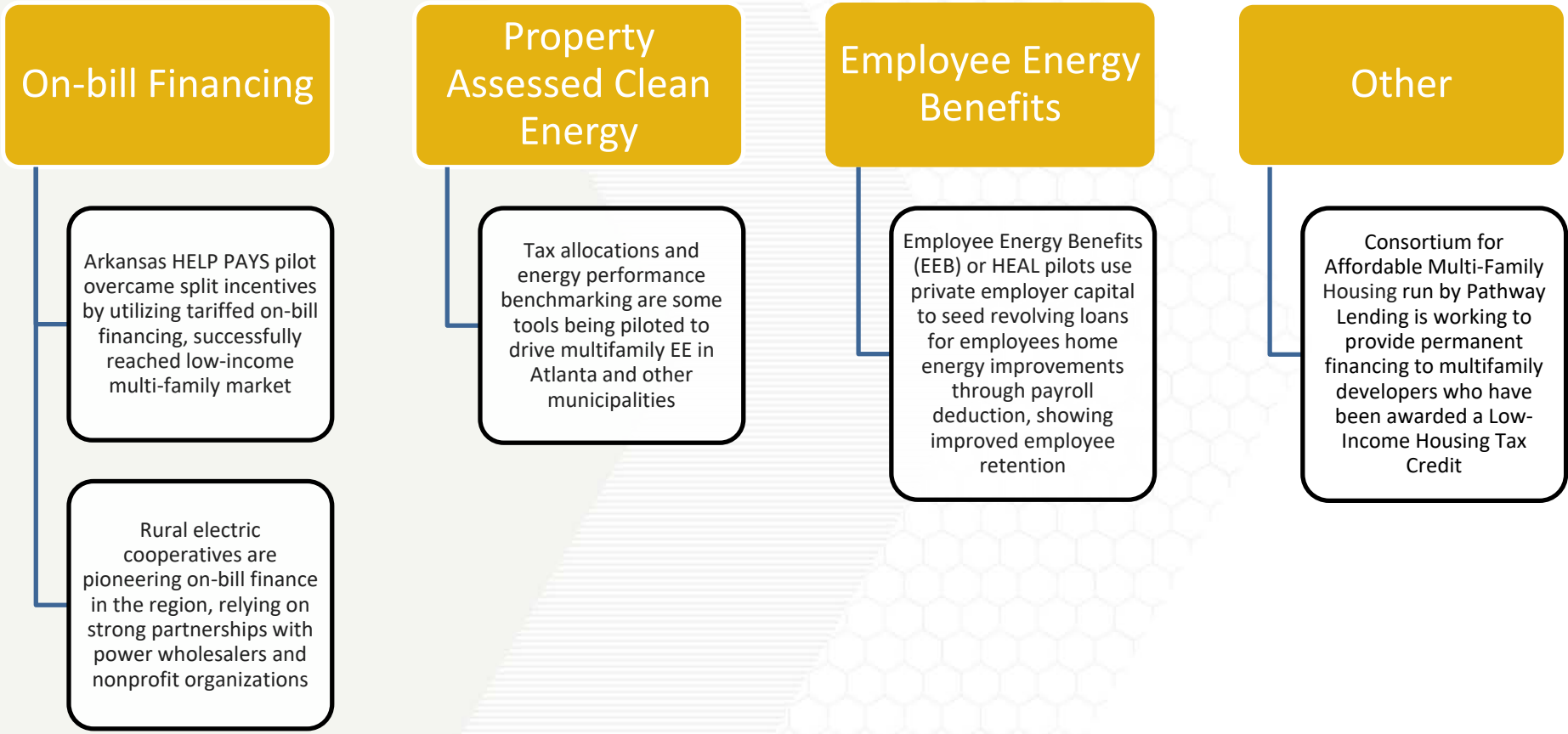
- Prioritizing efficiency improvements that also improve indoor air quality reduces multiple burdens

HEALTH & SAFETY



Sources: ACEEE, [Building Better Energy Efficiency Programs for Low-Income Households](#), [Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs](#), EPA [Bringing Benefits of EE/RE to low-income communities](#)

PILOTS FOCUSED ON FACILITATING ACCESS TO FINANCE ARE INCREASING IN THE SE



Sources: Ouachita Electric Cooperative Corporation, [HELP PAYS Overview](#), ACEEE, [Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs](#), and [Reaching More Residents: Opportunities for Increasing Participation in Multifamily Energy Efficiency Programs](#), U.S. DOE, [Better Buildings Residential Network Peer Exchange Call Series: Walking the Talk: Employer Assisted Programs](#)

ADDRESSING SPLIT INCENTIVES IS AN IMPORTANT ATTRIBUTE FOR MANY SOLUTIONS



	Description	Benefits	Concerns
<i>Contracts</i>			
Green or energy efficiency lease	Landlord and tenant agreement to conserve energy, where landlord retrofit investments are trickled down to tenant.	<ul style="list-style-type: none"> • Higher rents offset by lower utility costs. • Mutual commitment to conservation. 	<ul style="list-style-type: none"> • Requires cooperation from landlord and tenant. • Continual capital improvements and maintenance necessary. • Currently geared toward commercial leases.
Energy efficiency mortgages (PACE financing)	Externally funded loan attached to the property.	Capital improvements can be done at one time and paid in installments.	<ul style="list-style-type: none"> • Benefits remain with the property and lien complicates property resale. • Liability for property owner.
On-bill financing	Capital improvements are tied directly to utility company payments.	Capital improvements can be done at one time and paid in installments with no lien issues.	Usually focused on live-in homeowners, not tenants.
<i>Regulation</i>			
Green building codes	Application of higher energy standards for new construction.	Potential to benefit all new housing developments, including buildings for low-income tenants.	<ul style="list-style-type: none"> • Only applies to new construction. • Higher rent prospects along with higher construction and maintenance cost can create bias against low-income tenants.
Low-income rental mandates	Mandate of higher energy standards for low income housing.	Potential for high scale implementation in low-income rental housing.	Creates serious disincentive to provide low-income housing.
<i>All-in Services</i>			
Weatherization assistance program	<ul style="list-style-type: none"> • National weatherization program, usually implemented as grants. • Differs from state to state. 	<ul style="list-style-type: none"> • Has highest reach; especially under the U.S. Stimulus Program. • Variety of policy programs and state differentiation/experimentation. 	<ul style="list-style-type: none"> • Cannot be implemented at scale because of cost; inefficient. • No follow-up for maintenance. • Hardly used for low-income rental housing.
Concierge Services	Small niche programs designed to provide comprehensive efficiency assistance with education.	Highest success rate for efficiency gains and behavioral improvements; addresses poverty concerns effectively.	<ul style="list-style-type: none"> • Cannot be implemented at scale because of cost. • Highest expense.

BUSINESS CASE & POLICY SOLUTIONS

Policy Tools & Business Case Opportunities

CREATING THE NEXT®

ADDRESSING HIGH ENERGY BURDENS & EE EXPANSION MORE BROADLY REQUIRES A BALANCE OF POLICY, BUSINESS, & CUSTOMER INCENTIVES



What implementable measures result in the right blend of program performance for the low-income customer, the utility and society?

FROM A UTILITY LENS, FOCUS ON EXISTING DRIVERS NOT REQUIRING MAJOR POLICY OR ECONOMIC MODEL CHANGES MAY OFFER BUSINESS CASE OPPORTUNITIES



Low-income EE programs can provide benefits to utilities by reducing:

- Arrearages and their carrying costs
- Bad-debt write-offs
- Electricity terminations and reconnections
- Costs of bill payment assistance programs
- Customer calls, collection activities, and safety related emergency calls

For some utilities, above benefits may go unrealized due to organizational “silos” and/or may not be material enough to change business practices. Georgia Power’s pre-pay program is intended to help manage these issues (arrearages, minimizing disconnects, etc.)

ECONOMIC TESTS FOR EE PROGRAMS ADDRESS IMPORTANT ISSUES FOR PARTICIPANTS, NON-PARTICIPANTS, & UTILITIES



The following tests are typically applied:

- Ratepayer Impact Measure (RIM): Will rates rise and as a result would non-participants be harmed?*
- Program Administrator Cost Test (PAC): Do total utility costs increase or decrease?
- Participant Cost Test (PCT): Do the benefits to participants exceed their costs?
- Total Resource Cost Test (TRC): What are the net direct benefits of the program to both the utility and its ratepayers, regardless of who receives the benefits and who pays?

*RIM is also called the non-participant test, and low-income households are often non-participants. The RIM is Southern Company's and TVA's dominant test. In 2004, the GPC IRP settlement decree said that TRC should be maxed, subject to the RIM test.

Source: The Electricity Journal: [Alternative Business Models for Energy Efficiency: Emerging Trends in the Southeast](#)

APPLYING THESE ECONOMIC TESTS OFTEN LIMIT EE OUTCOMES



Generally, the tests create a vicious cycle: utility earnings are reduced when EE programs shrink sales, unless other policy/economic criteria are added.

ECONOMIC TEST	IMPLICATIONS FOR EE PROGRAMS
Ratepayer Impact Measure (RIM)	<ul style="list-style-type: none">• When reserve margins are high & there are no planned power plants or transmission investments to defer, EE programs can raise electricity rates (RIM test), which customers/utilities will not generally support.• As noted in previous slide, RIM is also called the non-participant test, and low-income households are often non-participants.• The “DRIPE” effect can reduce average rates even after the recovery of program costs.
Program Administrator Cost Test (PAC)	<ul style="list-style-type: none">• The cost of incentives and program administration may exceed the value of avoided costs – making the valuation of other benefits necessary to show cost-effectiveness.
Participant Cost Test (PCT)	<ul style="list-style-type: none">• EE programs can significantly reduce the electricity bills of participants and are generally good investments for participants (but not an incentive aligned with utility revenue maximization)
Total Resource Cost Test (TRC)	<ul style="list-style-type: none">• The TRC test is challenging for EE programs to meet without expanding the test to include indirect (non-energy) benefits (these safety, health, environmental, and other unquantified benefits have societal value and are of particular importance to low income customers)

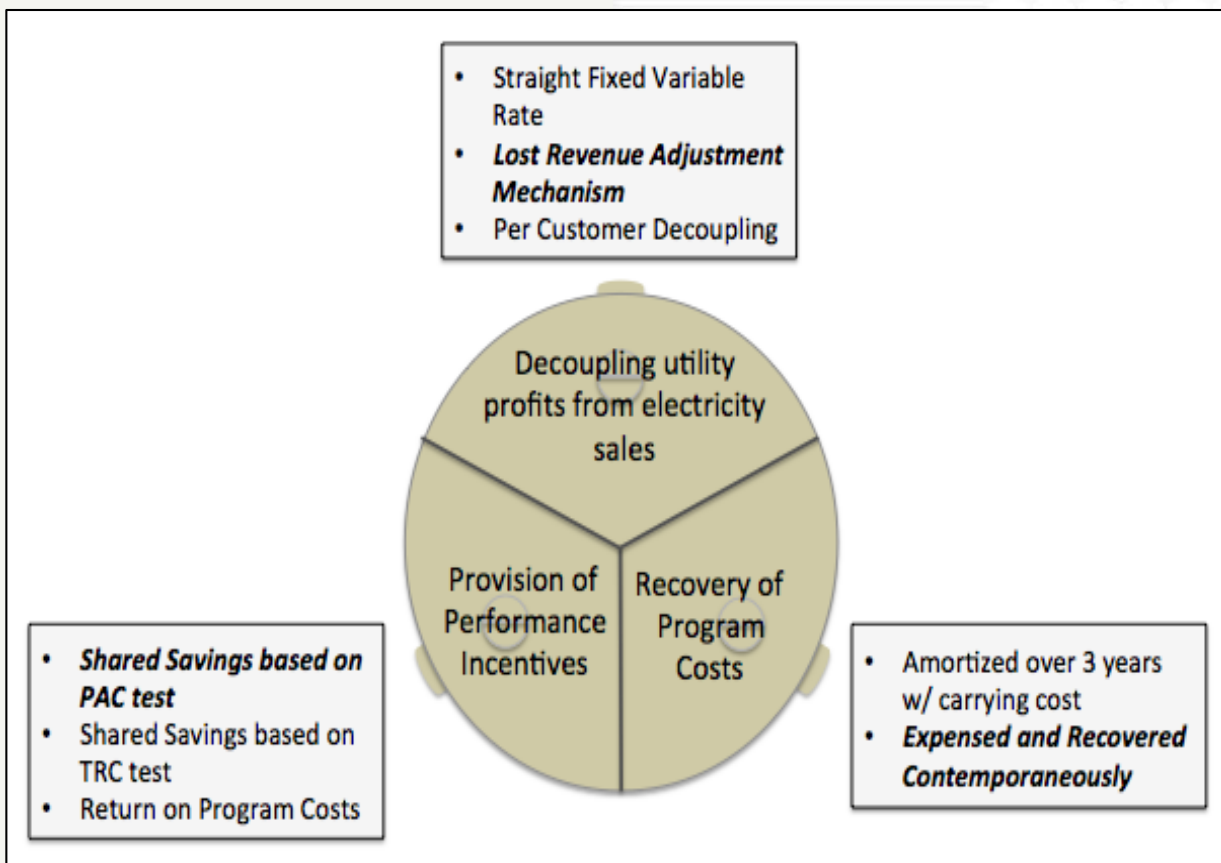
MANY UTILITIES ARE REBALANCING THEIR ENERGY PRICING TO REFLECT FIXED/VARIABLE COST PROFILES WHICH MAY CONTRIBUTE TO INCREASED EE OUTCOMES



- A higher proportion of total costs are now fixed, rather than variable
- However, residential rates are generally dominated by variable charges
- Increasing fixed charges and reducing variable charges would make saving energy less valuable
- But if low-income households are consuming more than the average household, a shift to fixed charges would result in lower bills

UTILITY BUSINESS INCENTIVES FOR EE PROGRAMS CAN BE REFINED THROUGH A BALANCE OF POLICY LEVERS

The National Action Plan for EE focused on this 3-legged stool for addressing the disincentives associated with EE:



- Recovery of EE program costs allows utilities to be compensated for direct costs
- Profit decoupling helps to address the throughput incentive (profit impact of lower revenues & same fixed costs of providing service)
- Performance incentives address impacts of EE on deferring investments in utility assets that provide financial returns allowed by traditional rate regulation.

Sources: National Action Plan for Energy Efficiency, [Model Energy Efficiency Program Impact Evaluation Guide](#);
The Electricity Journal: [Alternative Business Models for Energy Efficiency: Emerging Trends in the Southeast](#)

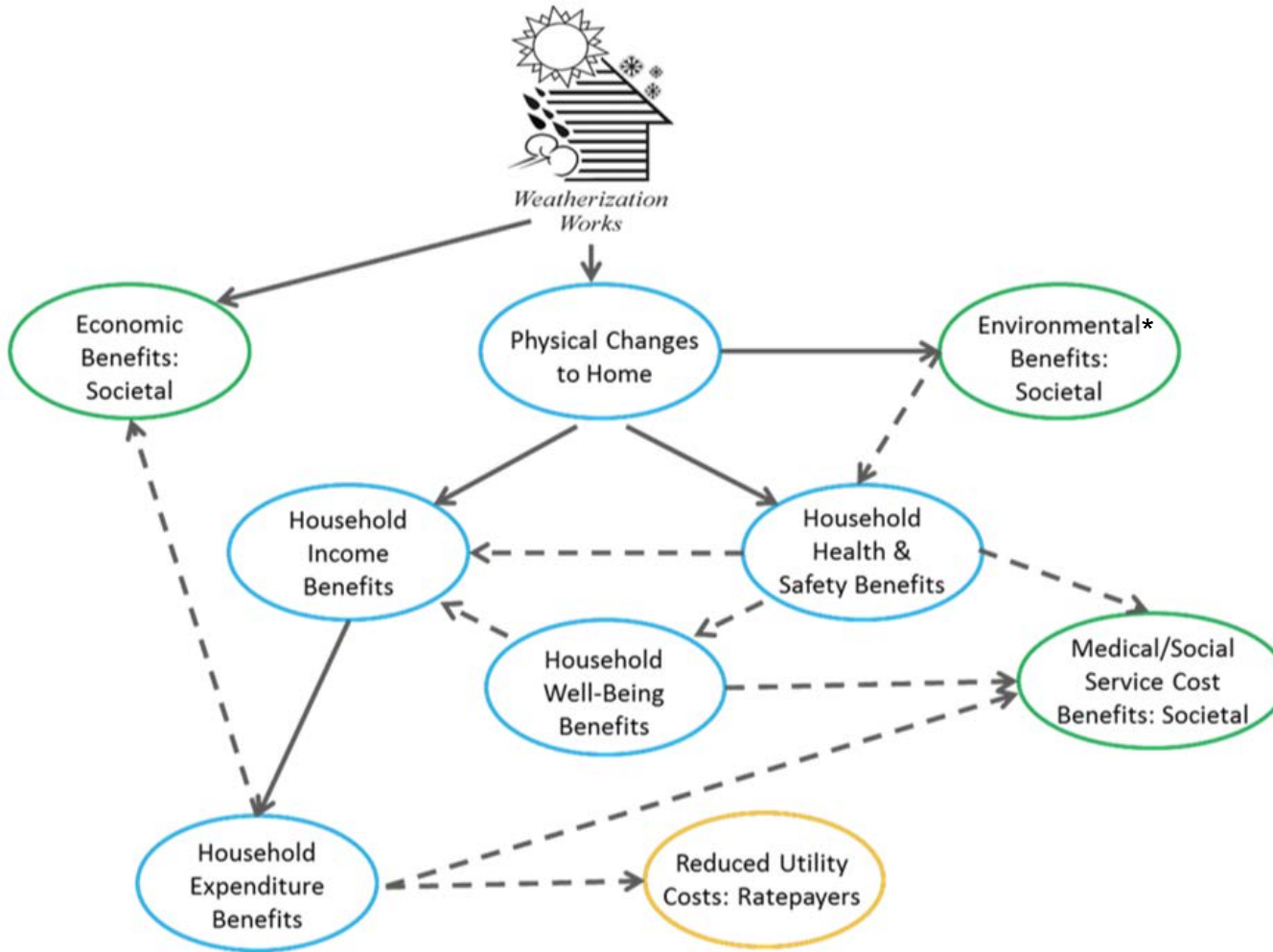
PROMISING RESULTS FROM RECENT STUDY INDICATE VALUE OF POLICY LEVERS INTERVENTIONS VIA THREE LEGS OF STOOL



- Analysis of the financial performance of the utilities included in the study shows that states adopting these levers all performed well by market standards and comparisons.
- The study did not detect a direct connection between increases in EE and increased shareholder value, but the study found no evidence that EE programs have had negative effects on shareholder value.
- Policy frameworks that support robust investments in EE appear to help protect utility investors from being financially harmed.
- Having strong, expansive portfolios of customer EE programs does not appear to affect utility financial performance adversely when coupled with supportive ratemaking practices.
- A key finding is that most of the utilities included in this study have moved ahead with diverse portfolios of customer EE programs without having mechanisms in place addressing all three legs of the financial stool.

Source: ACEEE: [Making the Business Case for Energy Efficiency: Case Studies of Supportive Utility Regulation](#)

EXISTING EE EVALUATIVE CRITERIA ALSO TYPICALLY EXCLUDE NON-ENERGY RELATED SOCIETAL BENEFITS (NEBs)



Potential Home and Community NEBs

- Mental, Overall Health
- Asthma
- Allergies, Sinusitis
- Headaches, Hypertension
- Improved Air Quality
- Increased Safety
- Increased Home Value
- Carbon Emission Reduction
- Work Loss Days Reduction
- Economic Development
- Community Development

*Southern Company reports that it includes air quality costs (such as SOX and NOX) & carbon impacts in its EE program evaluation criteria.

REGULATORY BODIES SET THE FRAMEWORK FOR ADDRESSING NON-ENERGY BENEFITS



Georgia PSC

*“The mission of the Georgia Public Service Commission is to exercise its authority and influence to ensure that **consumers** receive safe, reliable and **reasonably priced** telecommunications, **electric** and natural gas services from **financially viable** and **technically competent** companies.”*

vs.

California PUC

*“The CPUC serves the public interest by **protecting consumers** and ensuring the provision of safe, **reliable utility** service and infrastructure at **just and reasonable rates**, with a commitment to **environmental enhancement** and a healthy California economy. We regulate utility services, stimulate innovation, and promote competitive markets, where possible.”*

Another influencing factor in the potential adoption of NEBs is the utility ownership structure (investor vs. publicly owned)

Sources: [Georgia Public Service Commission](#), [California Public Service Commission](#)

IN REVIEWING/ADDRESSING POLICY AND EVALUATIVE CRITERIA, QUESTIONS REMAIN AS TO HOW NEBS MIGHT BE INCORPORATED

What/whose perceptions need to change for NEBs to become standardized, monetized evaluation criteria for low-income programs?

How are revisions to cost tests made and who approves/accepts them?

What NEBs should be included?

Customer: health, comfort, improved property values, etc.

Utility: disconnects, arrearages, bad debt, lower rate class, etc.

Society: avoided emissions, economic development, better housing stock, etc.

- In one encouraging example, Empower Maryland's Efficiency Act now combines the traditional Total Resource Cost Test with a Societal Cost Test, which opens up consideration for a range of other benefits including NEBs. (See [NRDC](#) for additional detail)

THROUGH BUSINESS CASE, POLICY LEVERS, & INCLUSION OF NEB/RELATED ACTIVITIES, THERE MAY BE ENHANCED OPPORTUNITIES FOR IMPACT



Encourage utilities to Invest in EE

- Provide incentives such as revenue decoupling, in which the drop in revenues below a negotiation level due to EE are matched by the state, monetary performance bonuses, and non-compliance penalties.

Integrated EE and home health interventions directly address three social determinants

- Economic stability through lower energy costs
- Neighborhood and built environment by improving housing quality
- Health and healthcare by the abatement of housing-related hazards

FINDINGS & NEXT STEPS

CREATING THE NEXT®

OVERALL ATTRIBUTES OF THE SE, GEORGIA, AND ATLANTA HEIGHTEN THE NEED FOR GREATER ATTENTION TO THIS CHALLENGE



Summary Attributes

- Energy Burden encompasses a complex array of factors that impact both numerator and denominator
- The Southeast has 3 of the 4 cities with highest energy burdens
- While Georgia has relatively low electricity rates, other energy burden factors are prevalent (large home size, high poverty rates, hot climate, inefficient heating/cooling)
- Atlanta's energy burden situation is substantially worse than the state wide average
- Atlanta's highest burdens are among low income, renter, and African-American/Latino neighborhoods

OUR ANALYSIS HELPS TO DELINEATE IMPORTANT CHARACTERISTICS OF THE ENERGY BURDEN IN ATLANTA THAT WILL INFORM PHASE 2 ACTIVITIES AND FUTURE STUDIES



Summary Findings – Analysis

- Atlanta's highest energy burden neighborhoods are concentrated in six zip codes
- Higher income is not a predictor of greater energy expenditure (the households in the six lowest income zip codes spend as much or more than higher income neighborhoods)
- Regression analysis highlights low vehicle ownership, high food stamp receipts, low housing values, more transiency, older homes, and high levels of heating/cooling degree days as the top predictors of energy burden in Atlanta

PROGRAMMING SOLUTIONS & SUCCESS FACTORS ELSEWHERE IN THE COUNTRY WILL HELP TO HONE FUTURE PILOTS & PROGRAMS



Summary Findings – Success Factors

- Practical examples of successful low income programs are emerging
- These programs demonstrate importance of partnerships, customer engagement (including on-bill financing), and overall education/awareness raising as areas of emphasis
- Within these areas, addressing barriers to upfront costs for higher efficiency products (in addition to weatherization) via innovative financing and identifying trusted contractor networks are important enablers
- Impact can be substantially enhanced through holistic (natural gas, electricity, health, safety) solutions

THE PROGRAMS' SUCCESS FACTORS NEED TO BE COUPLED WITH BUSINESS CASE & POLICY SOLUTIONS TO EXPAND THE SCALE AND SCOPE OF LOW INCOME PROGRAMS



Summary Findings – Business Case & Policy

- Existing business case drivers (bad debt, disconnects, etc.) likely offer some additional potential for justifying low income program investments
- Supportive regulatory frameworks (balanced application of the three legs of the stools) have been shown as useful platforms to elevate the role of EE within utility business models.
- Targeted inclusion of non-energy benefits and integrated approaches to energy / other burdens are highly dependent on policy and regulatory shifts (needed to provide greater economic incentives for both public & investor-owned utilities)

IN PHASE 2, WE EXPECT TO ADDRESS FOUR COMPLEMENTARY ISSUE AREAS AND TO DEEPEN OUR UNDERSTANDING OF TIER 1 (ZIP CODE) NEIGHBORHOODS



POTENTIAL PHASE 2 FOCUS AREAS



Programmatic Focused Elements

- Program considerations beyond income
- Measures Mix
- Health and Safety Issues
- Role of Community Action Agencies



Financial Model and Funding

- How can we enhance the utility business case & existing low income programs to help expand solutions?
- What are other sources of possible funding (beyond the utility)?
- How does the financial model work with other funding sources?



Social Impacts and Non-Energy Benefits

- What other benefits do we need to recognize/leverage?
- Are there organizations interested in these impacts who are not currently included in the conversation (hospitals, clinics, mental health or child services)?
- What are the barriers to utility recognition of these benefits?



Regulatory Environment

- What is a preferred regulatory or legislative model for best program performance?
- What is the difference between current legislative/regulatory environment in ATL/GA and preferred model?