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Leveraging the Clean Power Plan to Expand Low-Income Energy Efficiency Programs and Investments

ACEEE Webinar Series

April 21, 2016

ACEEE Webinar Series

"Energy Efficiency and the Clean Power Plan"

Series of five webinars through July

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- Paying for Clean Power Plan Compliance
- People's Choice!

Links to Register - aceee.org/topics/clean-power-plan

Webinar Speakers

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Lifting the High Energy Burden in America's Largest Cities

How Energy Efficiency Can Improve Low Income and Underserved Communities

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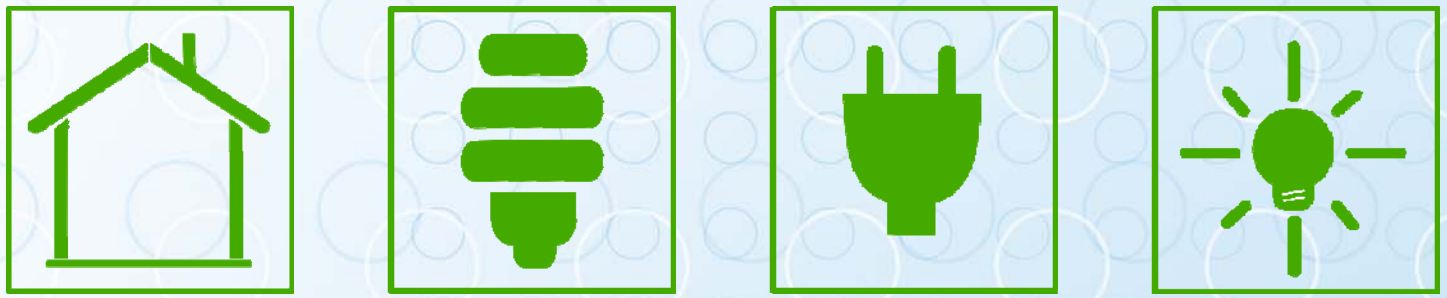
April 21, 2016

What is energy burden?

- The proportion of total household income that goes towards home energy bills, which includes electricity, natural gas, and other heating fuels.



Drivers of household energy burden

Type of driver	Examples
Physical	Inefficient and/or poorly maintained HVAC systems
	Heating system and fuel type
	Poor insulation, leaky roofs, and inadequate air sealing
	Inefficient large-scale appliances (e.g., refrigerators, dishwashers) and lighting sources
	Weather extremes that raise the need for heating and cooling
Economic	Chronic economic hardship due to persistent low income (see text box “Income Inequality and Energy Affordability”)
	Sudden economic hardship (e.g., severe health event or unemployment)
	Inability or difficulty affording the up-front costs of energy efficiency investments
Policy	Insufficient or inaccessible policies and programs for bill assistance, weatherization, and energy efficiency for low-income households
	Certain utility rate design practices, such as high customer fixed charges, that limit the ability of customers to respond to high bills through energy efficiency or conservation
Behavioral	Lack of access to information about bill assistance or energy efficiency programs
	Lack of knowledge about energy conservation measures
	Increased energy use due to age or disability

Methodology

How to calculate energy burden

Home Energy Burden =

$$\frac{\text{Total energy utility spending}}{\text{Total gross household income}}$$

Households included if:

- Pay for their electricity
- Pay for their main heating fuel
- Report a positive household income

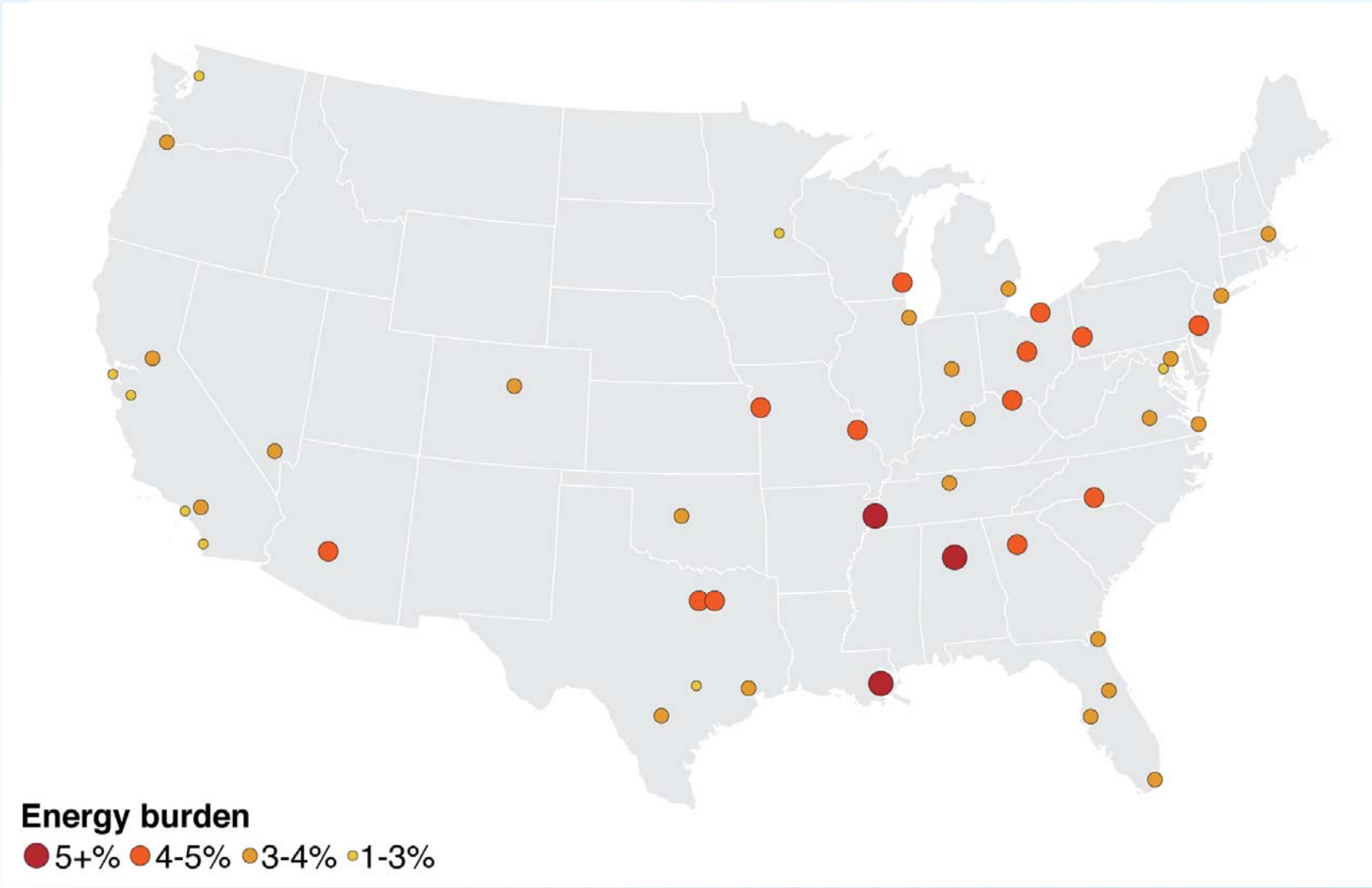
Four main subgroups:

1. Low-income (80% AMI)
2. Communities of color (Black and Latino)
3. Low-income multifamily (80% AMI and reside in 5+ units building)
4. Renters

Trends by region:

- Northeast
- Southeast
- South Central
- Southwest
- Midwest
- Northwest
- California

Energy burdens in US cities



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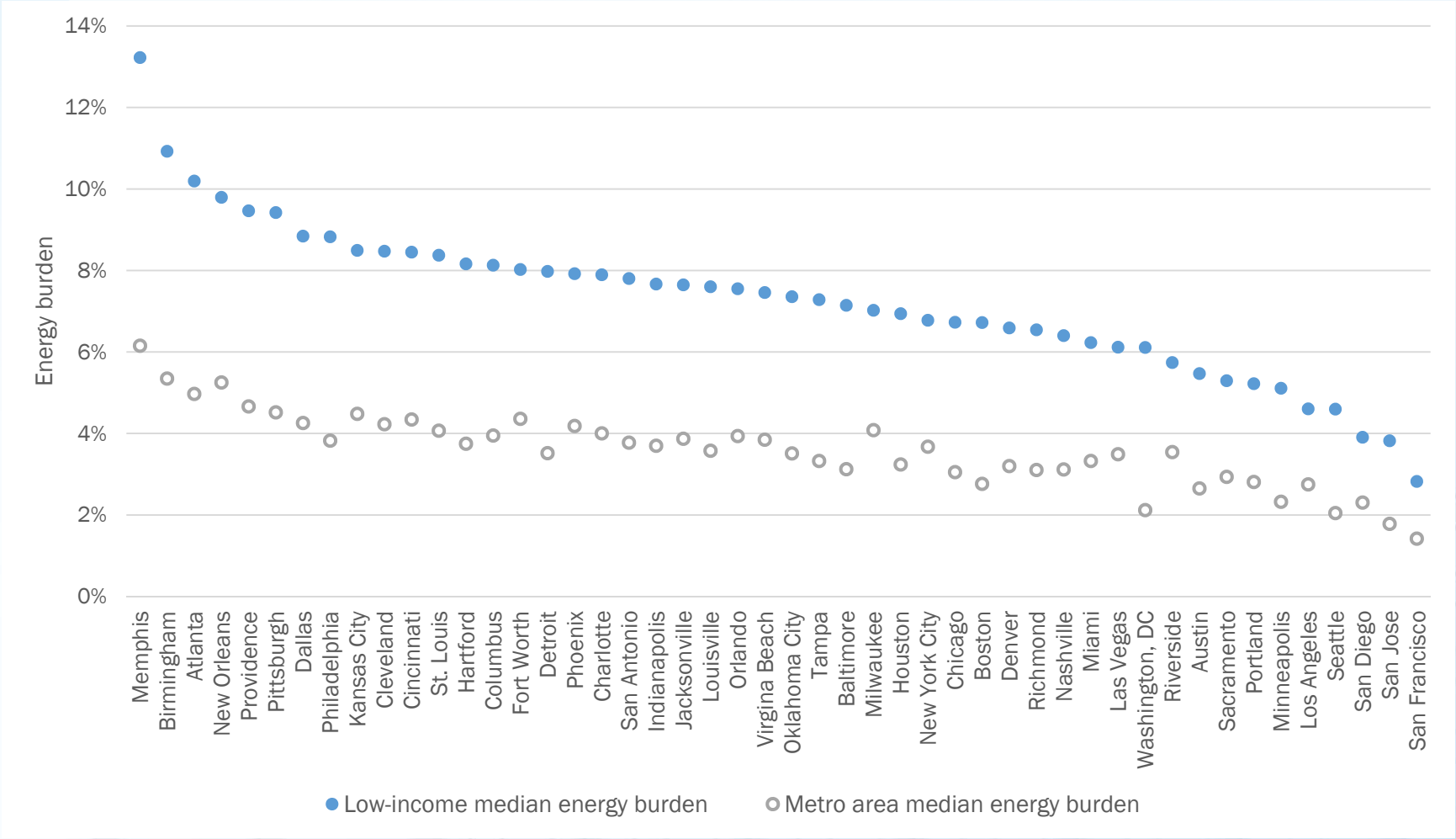
Energy burden trends by household group

	Household type	Median annual income	Median size of unit (square feet)	Median annual utility spending	Median annual utility costs per square foot	Median energy burden
Income type	Low-income (≤80% AMI)	$24,998	1,200	$1,692	$1.41	7.2%
	Non-low-income	$90,000	1,800	$2,112	$1.17	2.3%
	Low-income multifamily (≤80% AMI)	$21,996	800	$1,032	$1.29	5.0%
	Non-low-income multifamily	$71,982	950	$1,104	$1.16	1.5%
Building ownership	Renters	$34,972	1,000	$1,404	$1.40	4.0%
	Owners	$68,000	1,850	$2,172	$1.17	3.3%
Head-of-household race	White	$58,000	1,600	$1,956	$1.22	3.3%
	African-American	$34,494	1,290	$1,920	$1.49	5.4%
	Latino	$39,994	1,200	$1,704	$1.42	4.1%
All households	N/A	$53,988	1,573	$1,932	$1.23	3.5%

Median energy of low-income households compared to the overall median for each city



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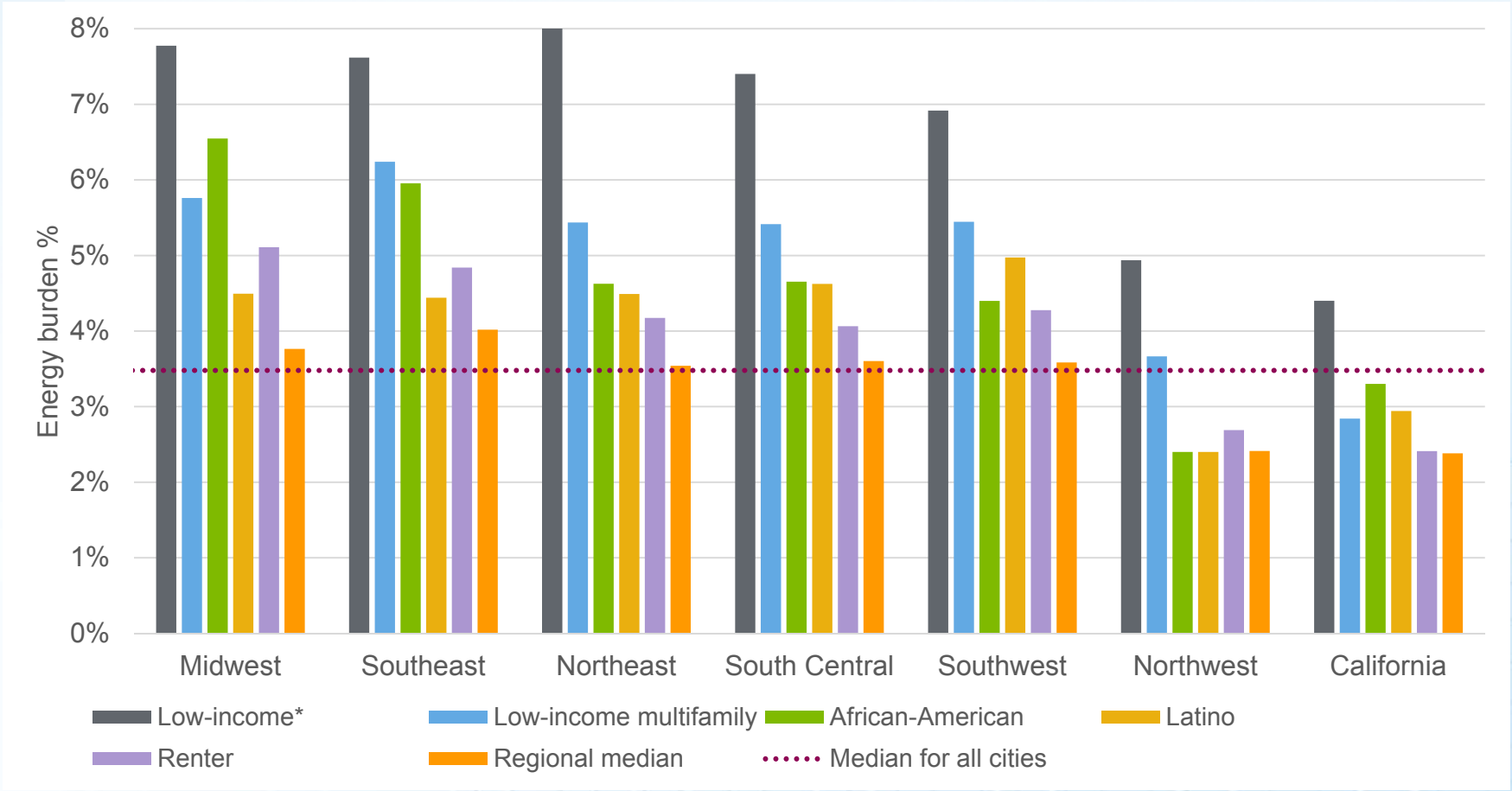
Beyond medians: the worst off

	All households	Low-income households	Low-income multifamily households	African-American households	Latino households	Renting households
1	Memphis (12.8%)	Memphis (25.5%)	Memphis (21.8%)	Memphis (19.4%)	Memphis (15.9%)	Memphis (18.5%)
2	Birmingham (10.8%)	New Orleans (18.9%)	Birmingham (16.2%)	New Orleans (16.4%)	Philadelphia (15.7%)	Birmingham (15.1%)
3	New Orleans (10.0%)	Birmingham (18.8%)	Atlanta (15.7%)	Kansas City (16.2%)	Pittsburgh (12.4%)	Atlanta (13.3%)
4	Atlanta (9.7%)	Atlanta (18.2%)	Pittsburgh (15.7%)	Pittsburgh (16.1%)	Kansas City (12.0%)	St. Louis (12.9%)
5	Providence (8.7%)	Philadelphia (16.7%)	Chicago (14.6%)	Cincinnati (15.6%)	Providence (11.7%)	New Orleans (12.6%)
6	Pittsburgh (8.6%)	Providence (16.7%)	Cincinnati (13.0%)	Milwaukee (15.5%)	Atlanta (11.5%)	Cincinnati (12.1%)
7	Cincinnati (8.5%)	Pittsburgh (15.7%)	St. Louis (12.9%)	Birmingham (15.4%)	Hartford (11.1%)	Cleveland (11.9%)
8	Kansas City (8.4%)	Cincinnati (15.5%)	Cleveland (12.3%)	Chicago (15.3%)	Phoenix (10.7%)	Pittsburgh (11.9%)
9	Philadelphia (8.3%)	Detroit (15.3%)	Hartford (11.8%)	Detroit (14.8%)	Birmingham (10.4%)	Providence (11.7%)
10	Dallas (8.2%)	St. Louis (14.8%)	Fort Worth (11.4%)	St. Louis (14.4%)	Detroit (10.2%)	Kansas City (11.7%)

Regional trends

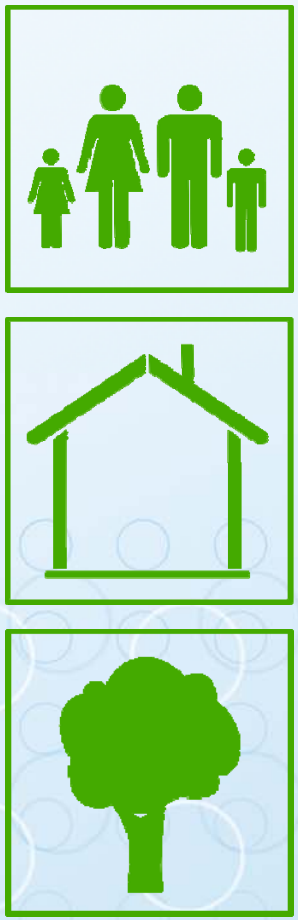


Policies and programs to address high energy burdens

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	Utility ratepayers

Multiple benefits of energy efficiency for low-income households

- **Lower monthly bills (residents)** – more disposable income, reduced stress, more money spent in local economy
- **Improved housing (residents)** – better health and safety, increased property value, lower maintenance costs, greater housing satisfaction
- **Local economic development (community)** – more local jobs, improved quality of life, increased property values
- **Less power used (utilities and community)** – reduced environmental pollutants, improved public health, avoided excess cots of increased generation, capacity, and transmission investments



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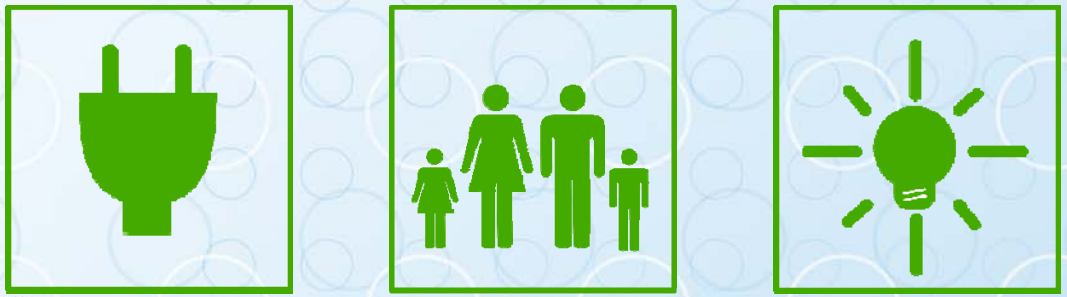
Strategies for improving energy efficiency in low-income communities

1. Improve and expand low-income programs
2. Collect, track, and report demographic data on program participation
3. Strengthen policy levers and more effectively leverage existing programs
4. Utilize the Clean Power Plan to prioritize investment in low-income energy efficiency

Final thoughts

- The overwhelming majority of low-income and households of color in major US cities experience higher energy burdens.

- We encourage cities and other stakeholders to use the data from this report and the recommendations as they work to address high energy burdens in their communities.



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Thank you!

Questions?

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Link to full report:
http://aceee.org/research-report/u1602

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Building Better Energy Efficiency Programs for Low-Income Households

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April 21, 2016

Report overview

1. What are the housing and energy use characteristics of the low-income households?
2. Program landscape addressing low-income energy efficiency and energy affordability?
    1. Program types, approaches, delivery mechanisms for utility programs
    2. How low-income programs compare to general residential programs (spending and savings)
3. Primary challenges for low-income utility programs
4. Strategies being used to overcome these challenges
5. Technologies and measures underutilized in current programs and opportunities to realize greater savings by incorporating them into programs

Low-income housing and energy use characteristics

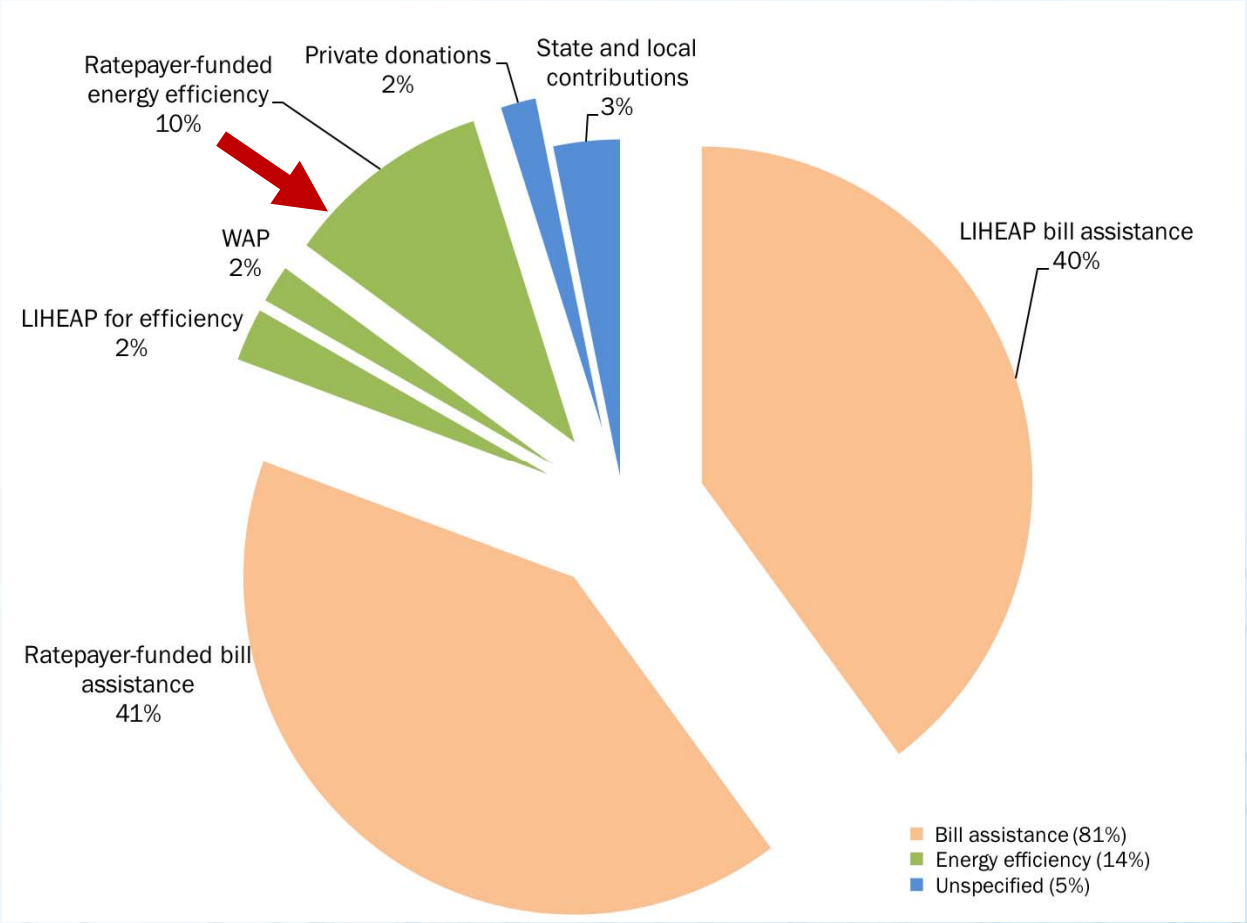
- Lower annual household energy expenditures, but higher cost per square foot

	Low-income households	All residential households
Annual energy expenditure	$1,690	$2,134
Energy cost/sq. ft.	$1.23	$0.98

Source: EIA 2009

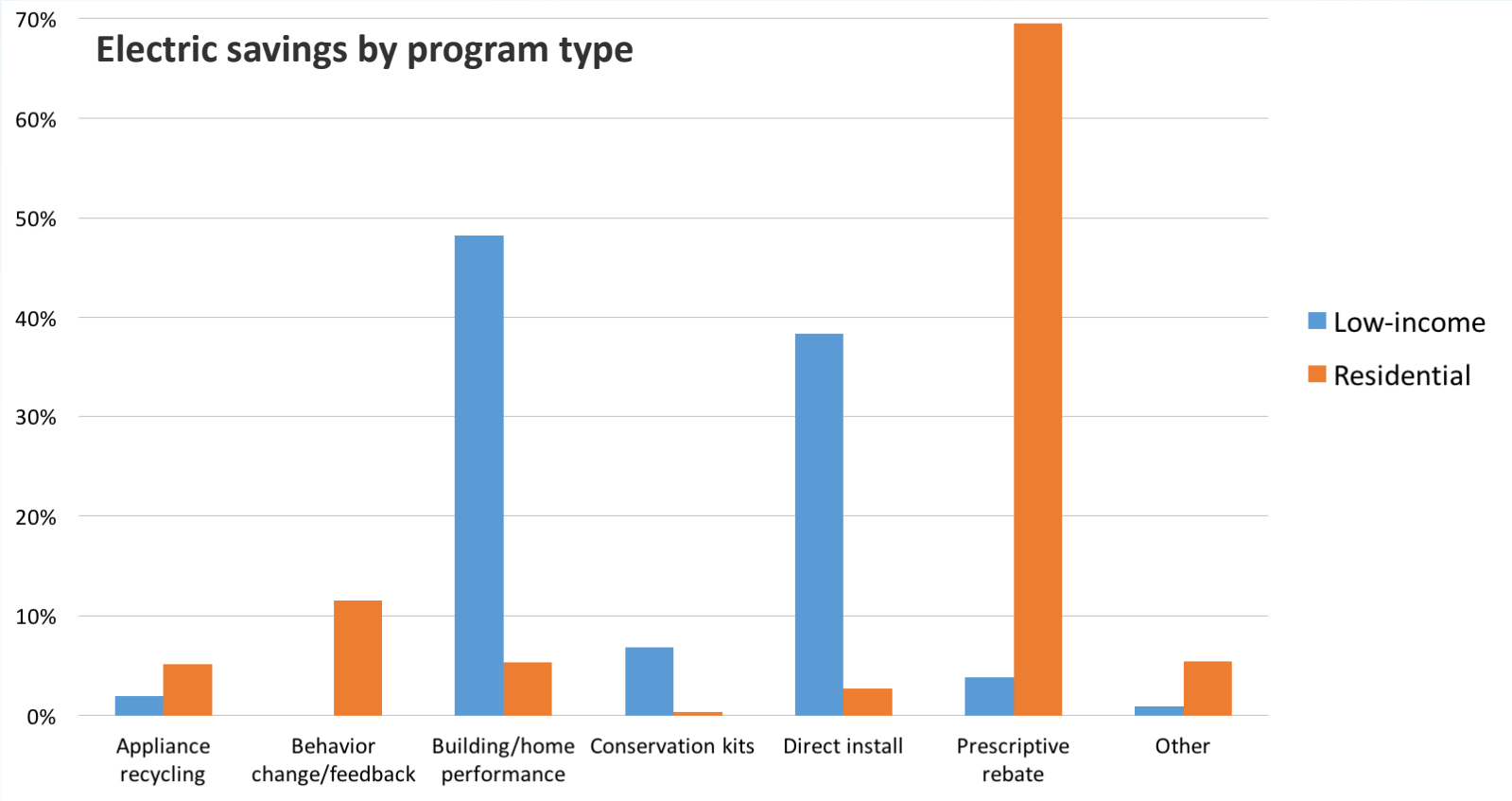
- Older, less efficient appliances (fewer ENERGY STAR models)
- More electric space heating and water heating

Low-income energy efficiency and energy affordability landscape



Source: LIHEAP Clearinghouse 2016

Ratepayer funded energy efficiency programs



2014 electricity savings by program type for low-income programs compared to all residential programs. Savings are post-program reported savings from compiled state filings on program performance. *Source:* E Source 2015.

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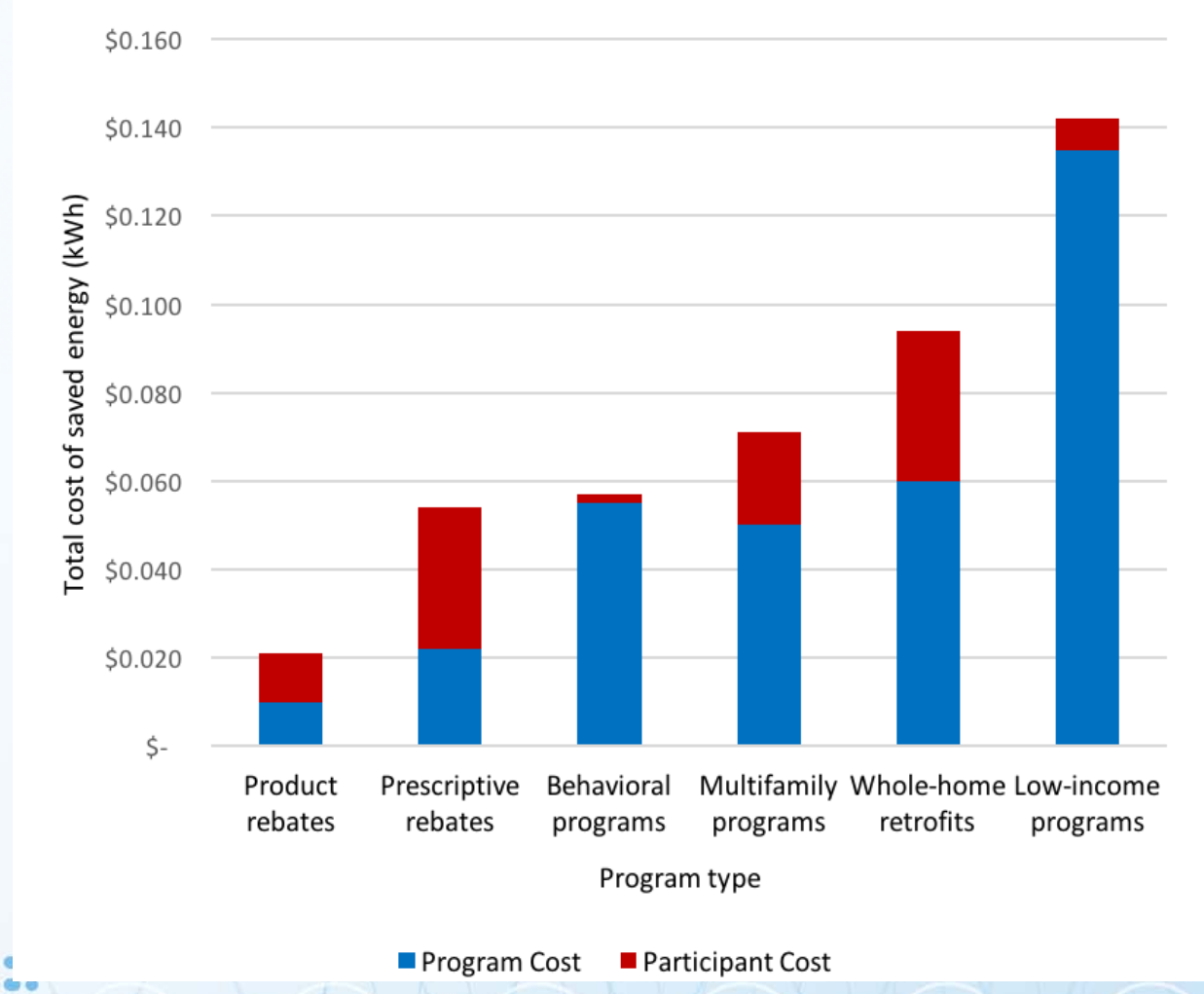
Cost of saved energy for residential programs

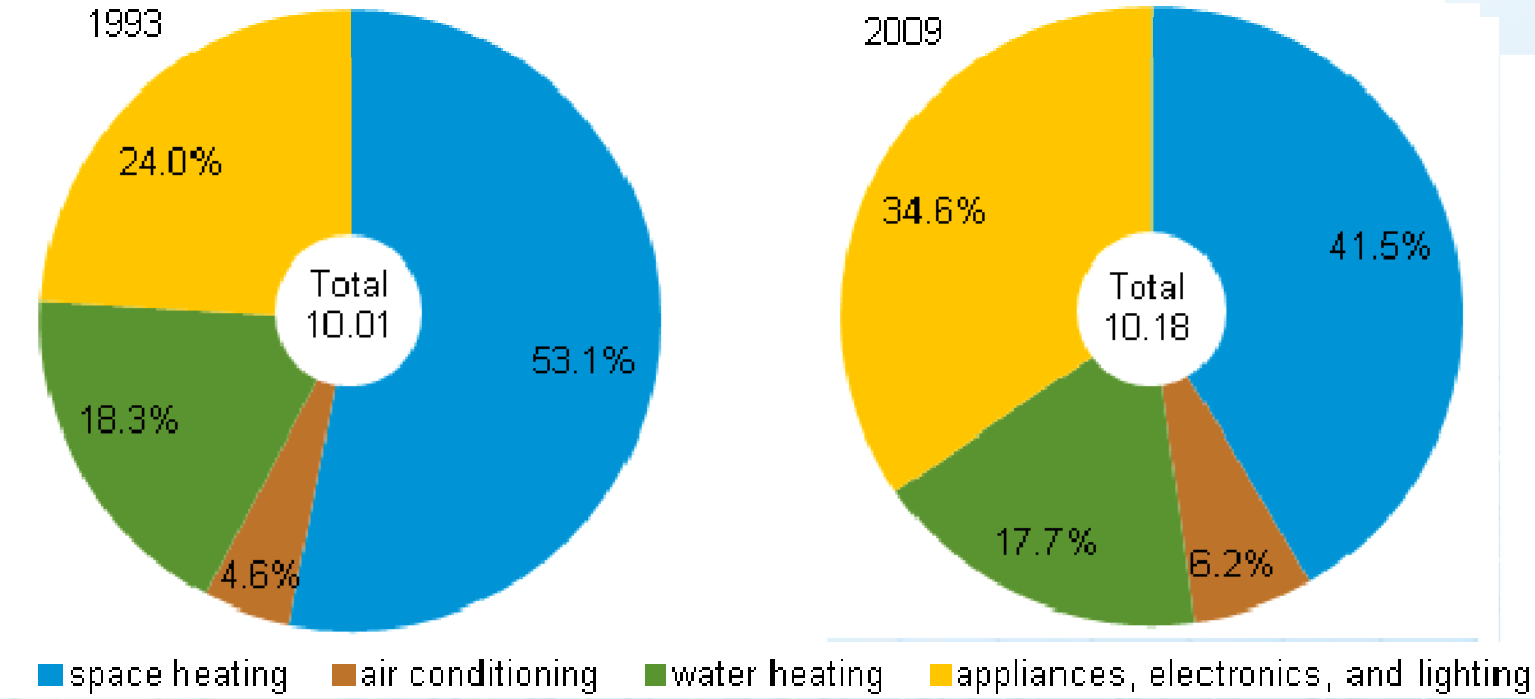


Source: Hoffman et al. 2015.

Best practices for building low-income energy efficiency programs

1. Offer a range of eligible measures
2. Coordinate with other organizations
3. Use a portfolio approach
4. Address health, safety, and building integrity issues
5. Incorporate customer education
6. Develop dual-fuel/fuel-blind programs
7. Coordinate efficiency and bill payment assistance
8. Increase electric savings through high efficiency products and equipment

Offer a range of eligible measures tailored to regional building stock and energy use characteristics



Source: EIA 2013

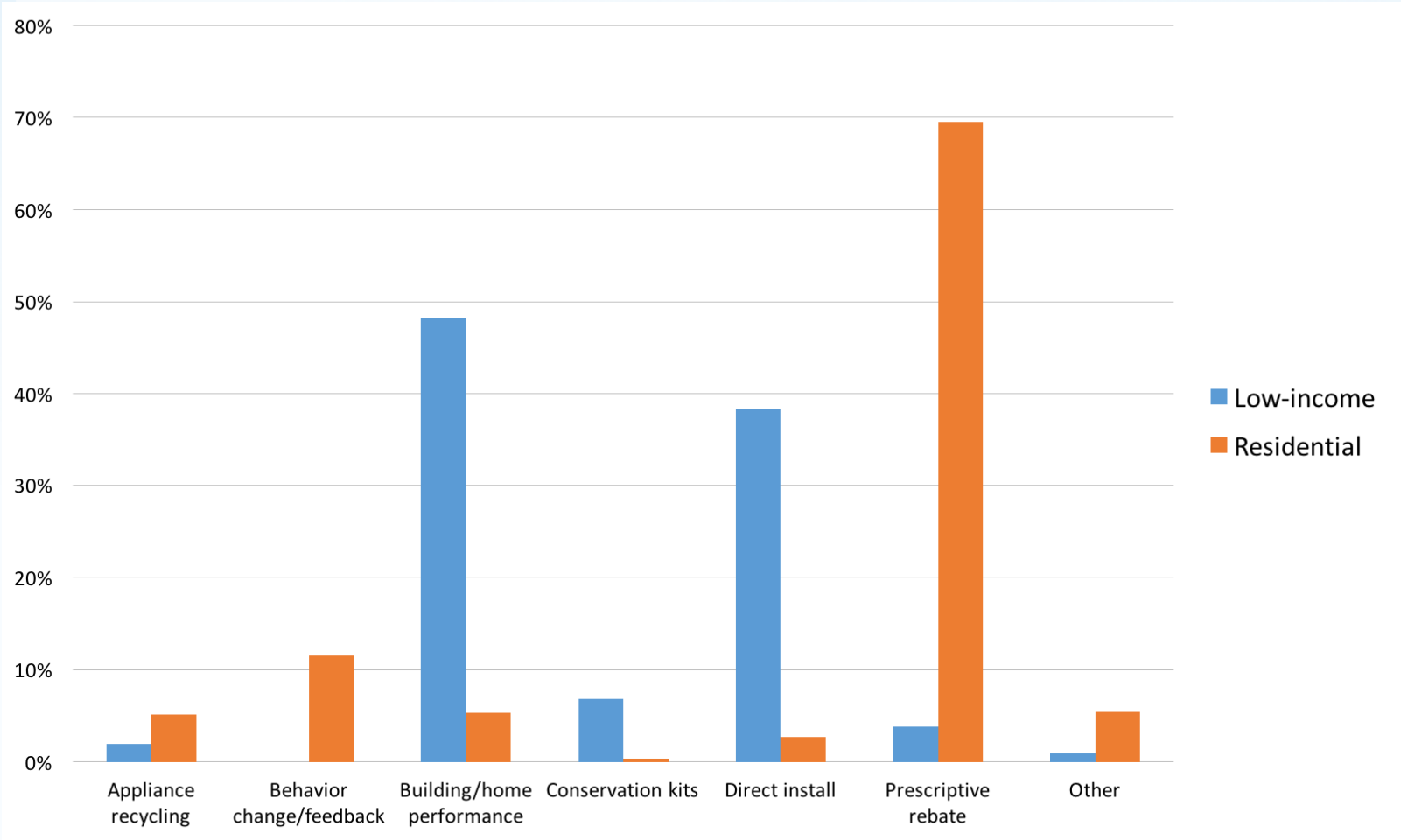
Coordinate with other organizations serving low-income households

- Align programs with existing state and federally funded weatherization efforts
- Add-on measures
- Deliver measures through innovative channels
  - Efficient light bulbs distributed through food banks, community events, mobile food markets
  - Coordination with Women Infants and Children (WIC) program for refrigerator replacement at Efficiency Vermont

Have a plan to address health, safety, and building integrity issues

- For minor improvements: health and safety budget
- For major improvements: connect households with resources for repairs to be completed
- Coordinate with local housing rehab organizations

Revisiting electric savings by program type



2014 electricity savings by program type for low-income programs compared to all residential programs. Savings are post-program reported savings from compiled state filings on program performance. *Source:* E Source 2015.

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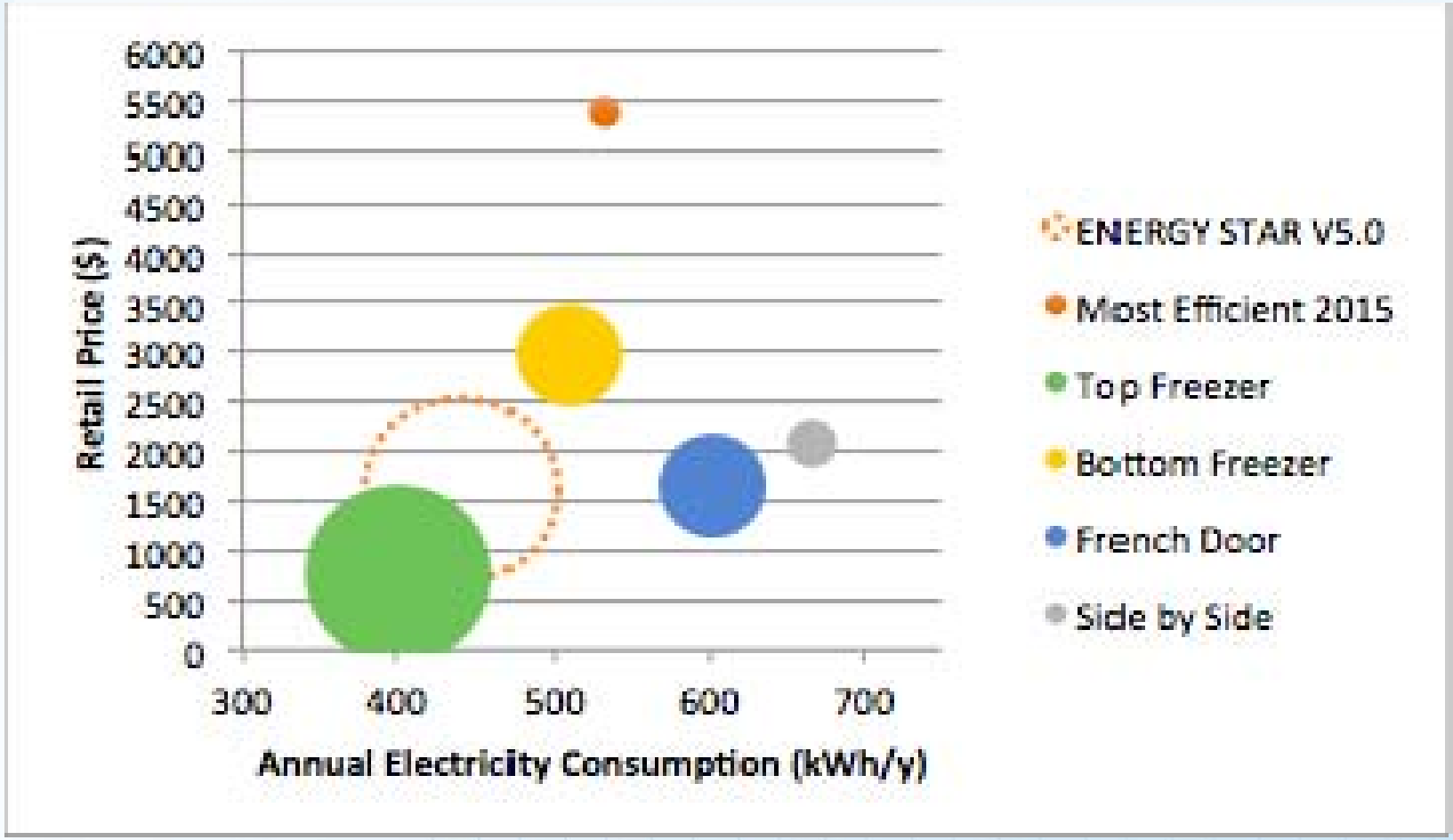
Opportunities for improving appliance efficiency

- Older, less efficient major appliances
- Residential product programs not reaching low-income households (Frank and Nowak 2015)
- Design appliance programs to address the specific needs of low-income customers
  - Tailoring eligible product lists
  - Emphasize highest efficiency products at moderate price points

Refrigerator retail price and electricity use



Source: Arquit-Niederberger and Frank 2015

High efficiency product opportunities

Measure	Existing appliance energy use (kWh)	Replacement appliance energy use (kWh)	Annual electric savings (kWh)	Annual customer cost savings
Ultra-efficient refrigerator	1,180	356	824	$99
Ultra-efficient clothes washer	500	200	300	$36
Heat pump water heater	2,876	1,440	1,436	$172
Ductless split heat pump	6,000	2,400	3,600	$432

Annual cost savings estimates based on energy cost of $0.12/kWh. *Source:* York et al. 2015.

Strategies for product programs

- Incorporate into existing weatherization efforts as an “add-on”
- Integrate into home repair and upgrade projects of other organizations
  - E.g. Consumers Energy of Michigan
- Equipment rental/leasing options
  - E.g. Green Mountain Power

Conclusions

- Integrate low-income energy efficiency into CPP compliance plans
- Increase savings through smart partnerships with other organizations serving low income households
- Increase product efficiency

Thank you!

Link to full report:

http://aceee.org/research-report/a1601

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Leveraging the Clean Power Plan

- EPA's Clean Power Plan (CPP) sets state limits for CO_2 emissions from existing power plants
- EE is a least-cost strategy for compliance
- Creates an opportunity for states to focus attention on multiple benefits of low-income EE investments
- States can establish long-term strategies to benefit communities most in need while complying with CPP

Capturing Low-Income EE for Compliance

- Significant investment opportunity for low-income EE throughout CPP compliance period
- Outreach to stakeholders

  State regulators, utilities, Housing Finance Agencies, Public Housing Authorities, other affordable housing entities
- Low-income program types

  Utility-run programs

  Weatherization Assistance Program (WAP)

  Energy Savings Performance Contracts (ESPC)

CPP Compliance Approaches

- Low-income EE can be used with any compliance approach a state chooses

Rate-based:

- Low-income EE installed on or after Jan. 1, 2013 that is still achieving savings in 2022 can earn emission rate credits (ERCs)
- States can issue ERCs to low-income EE providers that generate, measure, and verify reductions

Mass-based:

- Any reductions during compliance period can count
- States can directly allocate a portion of allowances to low-income EE providers, who can sell them to EGU owners
- States can auction allowances and divert revenue to low-income EE providers

Clean Energy Incentive Program (CEIP)

- Voluntary early action program for 2020-2021
- Participating states receive matching allowances or credits from EPA for
  - Wind and solar energy (1-to-1)
  - EE implemented in low-income communities (2-to-1)
- Pool of federal allowances/credits equal to 300 million short tons of CO_2
- Expecting additional program guidance from EPA

Key Takeaways

- State regulators and affordable housing community can work together to create sense of permanence for low-income EE programs and investments
- CPP creates momentum to improve existing programs and opens the door for additional funding
- Opportunity for states to establish long-term strategies to benefit communities most in need
- Details for how to get involved in state compliance planning: *CPP Primer for the Affordable Housing Community* energyefficiencyforall.org/sites/default/files/CPPBrief.pdf

ACEEE Resources

Building Better Energy Efficiency Programs for Low-Income Households
aceee.org/research-report/a1601

Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities
aceee.org/research-report/u1602

Forthcoming Best Practices in Developing Low-income Energy Efficiency Programs and Considerations for CPP Compliance

Clean Power Plan Opportunities for Energy Efficiency in Affordable Housing: A Primer for the Affordable Housing Community
energyefficiencyforall.org/sites/default/files/CPPBrief.pdf

Clean Power Plan Resources Page
aceee.org/topics/clean-power-plan

Upcoming Webinar

Complying with the Clean Power Plan: An Opportunity for the Industrial Sector

Thursday, May 19th,1:00 – 2:00pm EDT

Register:
attendee.gotowebinar.com/register/1917026384082411778

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Questions?

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