

More Savings for More Residents: Progress in Multifamily Housing Energy Efficiency

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Executive Summary

In 2013, the American Council for an Energy-Efficient Economy (ACEEE) released a study of the nation's largest multifamily home markets and the customer-funded utility energy efficiency programs that serve them. Using a combination of housing, utility, and policy data, ACEEE analyzed the potential to create or expand these programs in metropolitan markets. Researchers concluded that while the necessary conditions existed for new or expanded programs in most metro areas, the multifamily housing market as a whole was relatively underserved compared with single-family and commercial buildings. The following report compares 2014 and 2015 data with 2011 information used for the previous ACEEE study to determine how multifamily markets and energy efficiency programs have changed.

BACKGROUND

Electric and natural gas utilities administer energy efficiency programs that provide residential and business customers with incentives and no-cost products or services to improve the energy efficiency of their buildings. Although these programs have historically not targeted multifamily properties, this market offers tremendous opportunities for energy savings. Nearly 21 million – one in six – households live in apartments and condominiums, and multifamily energy efficiency has the potential to result in \$3.4 billion in savings per year. Freddie Mac projects that the share of households living in multifamily buildings will grow in the coming years.¹ Efficiency programs have often faced challenges in engaging these customers. These include split incentives, resource constraints, lack of information, and marketing hurdles. Many utility programs have overcome these barriers and are achieving substantial energy savings while providing numerous benefits to the communities they serve.

METHODOLOGY

Our report analyzes the 51 metropolitan statistical areas (MSAs) with the most multifamily households. We define multifamily households as those living in buildings with five or more housing units. We characterize each housing market with data detailing the number of units, occupants, utility billing, heating fuel, and building age. We also include the number of multifamily units in federally subsidized buildings, whose owners are obligated to keep rents affordable for low-income households. Our report then examines the energy efficiency policies, regulation, and spending that affect the multifamily programs serving each metro area. We describe multifamily programs in terms of their service offerings, annual spending, and whether they target affordable housing properties.

RESULTS

Our research reveals that the number of multifamily households has grown in almost all metro areas, but many apartments and condominiums in use today were constructed before 1980 and still represent the bulk of multifamily housing. Buildings constructed before 1980 tend to be less energy efficient because they predate the adoption of energy code standards,

¹ Freddie Mac. 2016 *Multifamily Housing Outlook*. Washington, DC: Freddie Mac, 2016. www.freddiemac.com/multifamily/pdf/freddieMac_mf_outlook_2016.pdf.

and these buildings are often the most in need of energy efficiency upgrades. Roughly half of the MSAs included in this report contain mostly apartments and condominiums built before 1980. Metro areas along the Pacific and Atlantic coasts have the highest share of these older buildings. While these markets have grown very little in the years since ACEEE's 2013 report, several smaller markets in the interior of the country have seen substantial growth. This is especially true for the Southeast, where many new apartments and condominiums have been constructed since 2000.

The bulk of the nation's multifamily housing stock is composed of rental apartments. In most of these, utility costs are billed to the renters rather than included in the rent. Apartment buildings are also much more likely than single-family homes to use electricity for heating. However Northeast and mid-Atlantic apartments are more likely to use natural gas than those in other regions. Very few multifamily buildings rely on fuel oil for heating.

Energy efficiency programs designed specifically to serve multifamily owners and residents have grown since our 2013 review. Both utility regulators and local government policies have been important factors in this expansion. State regulators set the terms and incentives for efficiency programs to operate. Several local governments now require multifamily buildings to benchmark their energy use against similar properties. This can often motivate owners to upgrade their buildings and seek out efficiency program products and services.

Available data reveal that, since our last report, utilities and related program administrators have increased annual spending on multifamily programs by at least \$180 million nationwide since 2011, but expenditures remain low in many metro areas. Thirty-eight of the 51 MSAs we reviewed now have a dedicated multifamily program, compared with 30 MSAs in our 2013 report. There are new programs in 22 of these metro areas. Several programs have also expanded their services. Twenty-five MSAs now have comprehensive retrofit options in addition to direct installation of basic energy efficiency measures, up from 16 MSAs in 2011.

Our results show that affordable housing units occupy a considerable portion of the multifamily buildings in all metro areas. Therefore there is an increased need to serve this market sector with tailored energy efficiency programs. Owners of these buildings often face unique challenges that owners of market-rate multifamily housing do not. Additionally, low-income renters are likely to encounter higher energy costs because they often live in less energy-efficient units. Programs serving this market sector are growing, albeit gradually. We found only 15 MSAs with multifamily programs specifically targeting these properties. National actors such as ACEEE and Energy Efficiency for All (EEFA) continue to increase research and other forms of assistance to support these programs.

ACEEE's 2013 review revealed that the multifamily market had been largely underserved by energy efficiency programs because program administrators were unable to adequately meet the needs of building owners and managers. In this updated review, ACEEE finds that many utilities, regulators, and community stakeholders have effectively collaborated to address these unmet needs through new or expanded programs. The energy efficiency of multifamily buildings has greatly improved in a short time. ACEEE's research and ongoing work with efficiency programs suggest these buildings will continue to increase their energy savings. This will allow multifamily households to reap the benefits of improved building

efficiency, including reduced energy use, lower energy costs, greater comfort, and healthier indoor environments.

As with our 2013 review, however, we find that opportunities for improvement remain. Several metro areas are still without multifamily programs, efficiency spending on the sector remains low in many MSAs, many metro areas do not have access to comprehensive whole-building programs, and the affordable housing sector remains underserved.

Introduction

Utility sector customer-funded energy efficiency programs provide many incentives and no-cost products or services to property owners and businesses that improve the energy use of their buildings.¹ These programs serve a diverse array of participants from the residential, commercial, and industrial sectors of the American economy. However energy efficiency programs tend to miss the tremendous energy savings that exist in residential multifamily buildings.

In 2013, the American Council for an Energy-Efficient Economy (ACEEE) released a report entitled *Scaling Up Multifamily Energy Efficiency Programs: A Metropolitan Area Assessment* (Johnson and Mackres 2013). The report analyzed the potential for expanding multifamily energy efficiency programs in metropolitan statistical areas (MSAs) with the most multifamily households. We assessed each MSA's potential for new or expanded multifamily efficiency programs using a combination of housing, utility program, and state policy data. The report concluded that the multifamily market remained relatively underserved by utility energy efficiency programs even though the housing and policy environments of many MSAs were favorable for new or expanded programs. The report found that more than half of the largest multifamily markets had efficiency programs open to multifamily customers, but many of these programs were not specifically designed to target multifamily properties. Furthermore, very few multifamily programs structured incentives to encourage whole-building energy savings.

This report updates the 2013 ACEEE assessment of multifamily energy efficiency programs in large multifamily markets. We assess how energy efficiency programs that specifically target multifamily properties have evolved in the 51 MSAs with the largest numbers of multifamily households. We also examine the current trends in each metro area's multifamily housing market along with the state and local policies affecting multifamily program development. Our goal is to help readers understand the trends that characterize the nation's multifamily housing markets and the energy efficiency programs that serve them.

Methodology

We conducted this research using the same data sources used in ACEEE's 2013 report characterizing the largest multifamily housing markets. We have identified the 51 MSAs with the largest numbers of households living in multifamily buildings, which we define in this report as buildings containing five or more units.² This definition of a multifamily

¹ Our report focuses on utility sector customer-funded energy efficiency programs that operate with the goal of permanently reducing customer energy consumption. These programs can be administered by utilities, government agencies, or third-party organizations. Throughout this report, we use the terms *utility energy efficiency program*, *utility multifamily energy efficiency program*, *energy efficiency program*, *efficiency program*, or *multifamily program* as shorthand to refer to utility sector customer-funded energy efficiency programs.

² While 51 MSAs is a somewhat arbitrary number, we have collected data on only these areas to focus on a manageable set of metropolitan areas for our research. Our analysis of multifamily energy efficiency programs focuses on MSAs with the largest number of multifamily households because multifamily households are mostly found in urban areas. The total number of multifamily households was used to select the 51 largest multifamily

building is consistent with ACEEE's 2013 report. Our report analyzes each metro area along three dimensions: multifamily housing market characteristics, the state and local policy context, and utility sector customer-funded programs. We also compare recent data with data presented in the original ACEEE report whenever possible.³

HOUSING MARKET DATA

To characterize the multifamily housing market for each metro area, we use data from the 2014 American Community Survey (ACS) one-year estimates and 2015 data from the National Housing Preservation Database (Census Bureau 2015; PAHRC and NLIHC 2016).⁴ We have used ACS data to describe the number, occupants, utility billing, heating fuel, and age of multifamily units. Our research also uses data from the National Housing Preservation Database (NHPD) to characterize the prevalence of federally subsidized multifamily units in each market. The NHPD provides the number of housing units in buildings that either receive federal subsidies for low-income household rental assistance or have been financed through low-income housing tax credits and have some obligation to maintain affordable rents for low-income households.⁵

POLICY CONTEXT

This report uses results from ACEEE's *State Energy Efficiency Scorecard* to examine the association between state policies and successful energy efficiency programs (Berg et al. 2016). We have used policy and program scoring metrics from the "Utility and Public Benefits Programs and Policies" chapter to assess the policy environment for multifamily programs. This report also uses data from the Institute for Market Transformation (IMT) to document the states and principal cities of MSAs that require multifamily building owners to report and benchmark their buildings' energy use against that of similar properties (IMT 2016).

markets analyzed in this report because we wanted to capture only the number of *occupied* multifamily building units in an MSA. Household data do this; multifamily unit data include both occupied and vacant housing.

³ The original 2013 ACEEE multifamily assessment utilized estimates from the US Census Bureau's American Community Survey (ACS) for housing data covering 2009–2011 (what the Census Bureau refers to as three-year estimates). Because the US Census Bureau no longer provides ACS estimates covering three-year intervals, we cannot provide recent data comparable to that used in the original report. Therefore we have provided ACS data for 2011 using estimates covering only that year (one-year estimates).

⁴ At the time of our research, complete 2015 ACS one-year estimates were not available for inclusion in this report.

⁵ Government and energy efficiency programs have many different definitions for what qualifies a household as low-income and thus eligible for low-income subsidies and incentives. These definitions vary not only between programs but also across different regions of the country. For the purposes of this report, we broadly consider low-income households to be those that have a substantially lower income than the area median income (AMI) of the MSA in which they reside. Programs that have an "affordable housing" or "low-income" target typically target buildings with households that have an income below a certain percentage of AMI (e.g., 60% of AMI or 80% of AMI). These households face high cost burdens for essential living expenses relative to their household income.

UTILITY CUSTOMER–FUNDED ENERGY EFFICIENCY PROGRAMS

We have used annual state public utility commission filings, data from the US Energy Information Administration (EIA), and correspondence with several program administrators to describe multifamily energy efficiency programs (EIA 2012, 2016a, 2016b). Our report includes program descriptions and data only for the year 2015.⁶ We have also identified utilities that provide aggregate whole-building energy use data for multifamily buildings using information obtained from the US Department of Energy’s (DOE’s) ENERGY STAR® program (DOE 2016). For the purposes of this report, we consider only those energy efficiency programs that specifically target multifamily customers and track both program spending and energy savings for multifamily buildings. We also document several emerging programs that target multifamily customers but either do not yet track specific data on these participants or are very limited in scale. Unlike the previous ACEEE assessment, this report does not include residential or commercial programs for which multifamily programs are eligible but not targeted. ACEEE research conducted since the 2013 assessment has documented that successful multifamily programs target only apartment and condominium customers (Johnson 2013). Absent such specific programs, multifamily participation in more general residential and commercial customer programs tends to be limited.

Multifamily Housing Markets

The 2013 ACEEE assessment of multifamily energy efficiency programs sought to identify communities in the United States that would realize the greatest energy savings through the targeting of multifamily properties. We have chosen MSAs as the geographic unit of analysis since most multifamily housing is concentrated in urban locations and because states are served by multiple utilities that do not always provide service to large multifamily markets (Johnson and Mackres 2013). We have used this same approach to draw comparisons between recent data and results published in ACEEE’s previous study.

OVERVIEW OF THE MULTIFAMILY MARKET

Nearly 21 million American households live in multifamily buildings. These account for almost 18% of all households in the United States. Table 1 details the number of American households that occupy single-family and multifamily buildings.

⁶ Some utilities report data for the 2015 calendar year; others report data for their 2015 fiscal year.

Table 1. Nationwide housing market

	Number of households (millions)	Percentage
Single-family	80.4	68.6%
Small multifamily (2–4 units)	9.3	8%
Medium multifamily (5–49 units)	14.9	12.7%
Large multifamily (50 or more units)	5.8	5%
Total multifamily (5+ units)	20.7	17.7%

Percentages do not total 100 because figures do not include mobile homes, boats, etc.

Source: American Community Survey one-year estimate for 2014.

Table 2 shows the metro areas with the largest number of multifamily households in 2014, ranked from largest to smallest. The table also shows the share of the housing market that these households occupy and the share of multifamily households that are occupied by renters. Additionally, table 2 provides data indicating how each multifamily market has changed compared with 2011.

Table 2. Metropolitan areas with the largest multifamily housing markets

Rank	Metropolitan area	2014 multifamily households	Households: percentage multifamily	Multifamily: percentage renter occupied	2011 multifamily households	Percentage change in multifamily households
1	New York-Newark-Jersey City, NY-NJ-PA	2,684,179	38%	82%	2,523,899	6.4%
2	Los Angeles-Long Beach-Anaheim, CA	1,341,314	31%	90%	1,321,899	1.5%
3	Chicago-Naperville-Elgin, IL-IN-WI	829,382	24%	75%	803,245	3.3%
4	Miami-Fort Lauderdale-West Palm Beach, FL	700,613	34%	65%	664,950	5.4%
5	Washington-Arlington-Alexandria, DC-VA-MD-WV	628,886	29%	82%	595,073	5.7%
6	Dallas-Fort Worth-Arlington, TX	577,578	24%	97%	525,254	10.0%
7	Houston-The Woodlands-Sugar Land, TX	559,121	25%	96%	481,309	16.2%
8	San Francisco-Oakland-Hayward, CA	465,155	28%	88%	435,551	6.8%
9	Boston-Cambridge-Newton, MA-NH	415,342	23%	80%	406,062	2.3%
10	Atlanta-Sandy Springs-Roswell, GA	382,430	19%	92%	363,760	5.1%
11	Seattle-Tacoma-Bellevue, WA	365,766	26%	87%	342,717	6.7%
12	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	339,616	15%	87%	339,890	-0.1%
13	San Diego-Carlsbad, CA	305,747	28%	88%	294,677	3.8%
14	Phoenix-Mesa-Scottsdale, AZ	287,460	18%	93%	266,171	8.0%
15	Minneapolis-St. Paul-Bloomington, MN-WI	281,624	21%	88%	276,344	1.9%
16	Denver-Aurora-Lakewood, CO	272,906	26%	86%	266,466	2.4%
17	Detroit-Warren-Dearborn, MI	247,195	15%	93%	232,762	6.2%
18	Tampa-St. Petersburg-Clearwater, FL	234,283	20%	80%	213,387	9.8%
19	Baltimore-Columbia-Towson, MD	206,705	20%	85%	205,655	0.5%
20	Portland-Vancouver-Hillsboro, OR-WA	191,794	21%	92%	179,712	6.7%
21	Austin-Round Rock, TX	175,815	25%	96%	165,432	6.3%
22	Riverside-San Bernardino-Ontario, CA	170,840	13%	95%	163,822	4.3%
23	Las Vegas-Henderson-Paradise, NV	165,667	23%	93%	163,314	1.4%

Rank	Metropolitan area	2014 multifamily households	Households: percentage multifamily	Multifamily: percentage renter occupied	2011 multifamily households	Percentage change in multifamily households
24	Orlando-Kissimmee-Sanford, FL	164,694	21%	90%	153,710	7.1%
25	San Jose-Sunnyvale-Santa Clara, CA	159,316	25%	91%	158,286	0.7%
26	Cleveland-Elyria, OH	148,491	18%	93%	147,493	0.7%
27	Cincinnati, OH-KY-IN	146,953	18%	89%	127,374	15.4%
28	San Antonio-New Braunfels, TX	142,752	18%	97%	137,858	3.6%
29	Charlotte-Concord-Gastonia, NC-SC	139,285	16%	92%	109,343	27.4%
30	St. Louis, MO-IL	136,773	12%	89%	132,117	3.5%
31	Milwaukee-Waukesha-West Allis, WI	135,581	22%	88%	129,996	4.3%
32	Columbus, OH	133,501	17%	96%	129,620	3.0%
33	Sacramento-Roseville-Arden-Arcade, CA	132,992	17%	97%	129,924	2.4%
34	Pittsburgh, PA	118,955	12%	93%	124,807	-4.7%
35	Kansas City, MO-KS	118,426	15%	96%	114,946	3.0%
36	Indianapolis-Carmel-Anderson, IN	116,489	16%	97%	103,167	12.9%
37	Nashville-Davidson-Murfreesboro-Franklin, TN	114,359	17%	94%	101,304	12.9%
38	Virginia Beach-Norfolk-Newport News, VA-NC	113,605	18%	93%	100,585	12.9%
39	Urban Honolulu, HI	107,739	35%	63%	104,405	3.2%
40	Providence-Warwick, RI-MA	103,673	17%	90%	101,130	2.5%
41	Jacksonville, FL	93,981	18%	88%	87,049	8.0%
42	Hartford-West Hartford-East Hartford, CT	85,837	18%	86%	83,523	2.8%
43	Raleigh, NC	79,189	17%	95%	73,678	7.5%
44	Louisville/Jefferson County, KY-IN	76,602	16%	91%	68,819	11.3%
45	Richmond, VA	74,795	16%	94%	75,355	-0.7%
46	Salt Lake City, UT	70,849	19%	87%	68,483	3.5%
47	Memphis, TN-MS-AR	68,149	14%	96%	74,438	-8.4%

Rank	Metropolitan area	2014 multifamily households	Households: percentage multifamily	Multifamily: percentage renter occupied	2011 multifamily households	Percentage change in multifamily households
48	Oklahoma City, OK	67,254	13%	98%	65,574	2.6%
49	Omaha-Council Bluffs, NE-IA	67,191	19%	97%	63,572	5.7%
50	Tucson, AZ	65,578	17%	95%	60,770	7.9%
51	New Orleans-Metairie, LA	65,411	14%	91%	60,310	8.5%

Source: ACS one-year estimate for 2014

Most of the 51 largest multifamily markets have grown since 2011. Medium-size and smaller multifamily markets are experiencing the most growth in multifamily households. The metropolitan areas surrounding Charlotte, Houston, Cincinnati, Virginia Beach, Indianapolis, Nashville, Louisville, and Dallas have all seen at least 10% growth in multifamily households between 2011 and 2014. Of these metro areas, only Houston and Dallas are among the 10 largest multifamily markets.

RENTERS AND OWNERS IN MULTIFAMILY HOUSING

Multifamily buildings can include either renter-occupied apartments or owner-occupied condominiums. Rentals comprise 88% of all occupied multifamily housing units (Census Bureau 2015). This share of the multifamily market is expected to grow in the coming years. Home ownership has become more difficult for many Americans as household incomes have fallen and mortgage credit has tightened. Rental apartments have increased their share of the housing market because these units offer residents the prospect of less financial risk and more freedom to move in response to shifts in the housing or labor markets (Joint Center for Housing Studies of Harvard University 2015). Until these trends are reversed, we can expect continued growth in the number of occupied rental apartments across the country.

America's largest multifamily markets are overwhelmingly composed of rental properties. As can be seen in table 2, more than half of the metro areas analyzed for this study have at least 90% of multifamily units occupied by renters. No market has less than 63% renter-occupied apartments and condominiums. Multifamily programs will need to continue to design programs and develop marketing strategies that effectively address the challenges associated with rental properties.

MASTER-METERED BUILDINGS

Owners of master-metered buildings pay for all tenant utility costs, and therefore these owners are likely to understand the financial benefits of retrofitting a multifamily building to improve energy efficiency.⁸ However master-metered buildings are not common in most markets. While the ACS does not provide data on the inclusion of utility costs with rent by building type, these data are available for rental households. These provide an estimate of the percentage of multifamily rental households with utility costs included in rent, as renters occupy most multifamily homes and homeowners occupy most single-family homes.⁹ Table 3 provides a list of metro areas with the most renting households whose rent includes utility costs.

⁸ The US Census Bureau (2015) considers utility costs to include expenses incurred for water, sewer, and energy consumption.

⁹ Per 2014 ACS one-year estimates, homeowners live in 81% of occupied single-family homes while renters live in 88% of occupied multifamily homes.

Table 3. Metropolitan area renting households with utilities included in rent

Metropolitan area	Percentage of households with utilities included in rent
Urban Honolulu	26%
Portland-Vancouver-Hillsboro	21%
Washington-Arlington-Alexandria	20%
Providence-Warwick	19%
Boston-Cambridge-Newton	18%
New York-Newark-Jersey City	17%
Pittsburgh	15%
Omaha-Council Bluffs	13%
Minneapolis-St. Paul-Bloomington	13%
Cleveland-Elyria	12%
Louisville/Jefferson County	12%
Philadelphia-Camden-Wilmington	12%
Tucson	12%

Data represent only renting households that do not pay for any utilities in addition to rent. *Source:* ACS one-year estimate for 2014.

Most renters do not have utilities included in rent. Honolulu, Portland, and Washington, DC, have the largest shares of renters with utility costs included in rent. At least one out of every five renting households in these areas has utility costs included in rent.

HEATING FUEL TRENDS

Single-family households drive heating fuel trends in housing markets because they account for two out of every three households in the United States, but often there is a difference in the heating fuel used by those who rent apartments and those who own homes. Multifamily efficiency programs have the potential to achieve greater savings when they target the fuel type used most by multifamily households. As with data covering inclusion of utility costs with rent, the ACS does not provide heating fuel data by building type, but heating fuel data are available for renter-occupied units. These data provide an estimate of the heating fuels used in multifamily homes. Table 4 shows the share of renting households that use electricity, natural gas, and fuel oil in each large multifamily market.

Table 4. Metropolitan area share of renting households using electricity, natural gas, and fuel oil for heating

Metropolitan area	Electricity	Natural gas	Fuel oil
Tampa-St. Petersburg-Clearwater	97%	2%	0%
Jacksonville	96%	2%	0%
Orlando-Kissimmee-Sanford	94%	4%	0%
Miami-Fort Lauderdale-Pompano Beach	94%	2%	0%
Dallas-Fort Worth-Arlington	81%	17%	0%
Phoenix-Mesa-Glendale	80%	18%	0%
Nashville-Davidson-Murfreesboro-Franklin	80%	18%	0%
San Antonio-New Braunfels	80%	19%	0%
Houston-Sugar Land-Baytown	79%	20%	0%
Raleigh-Cary	78%	18%	0%
New Orleans-Metairie	78%	21%	0%
Seattle-Tacoma-Bellevue	77%	18%	1%
Portland-Vancouver-Hillsboro	71%	23%	1%
Virginia Beach-Norfolk-Newport News	70%	27%	2%
Austin-Round Rock-San Marcos	68%	29%	0%
Richmond	67%	27%	3%
Charlotte-Gastonia-Rock Hill	67%	29%	1%
Tucson	60%	36%	0%
Oklahoma City	58%	39%	0%
Memphis	58%	39%	0%
Atlanta-Sandy Springs-Marietta	56%	41%	0%
Washington-Arlington-Alexandria	52%	43%	2%
Las Vegas-Paradise	52%	46%	0%
Cincinnati-Middletown	50%	44%	1%
Indianapolis-Carmel	49%	47%	1%
Louisville/Jefferson County	47%	49%	0%
San Jose-Sunnyvale-Santa Clara	46%	49%	0%
Baltimore-Towson	45%	48%	4%
St. Louis	44%	52%	0%
San Diego-Carlsbad-San Marcos	44%	47%	0%
Sacramento-Roseville-Arden-Arcade	43%	52%	0%
Kansas City	40%	56%	0%
Columbus	38%	58%	1%

Metropolitan area	Electricity	Natural gas	Fuel oil
San Francisco-Oakland-Fremont	36%	58%	0%
Denver-Aurora-Broomfield	35%	61%	0%
Omaha-Council Bluffs	34%	62%	0%
Philadelphia-Camden-Wilmington	34%	55%	8%
Los Angeles-Long Beach-Santa Ana	32%	57%	0%
Urban Honolulu	31%	3%	0%
Riverside-San Bernardino-Ontario	30%	64%	0%
Hartford-West Hartford-East Hartford	29%	45%	21%
Minneapolis-St. Paul-Bloomington	29%	63%	1%
Pittsburgh	28%	65%	4%
Boston-Cambridge-Quincy	27%	53%	14%
Milwaukee-Waukesha-West Allis	26%	69%	1%
Cleveland-Elyria-Mentor	23%	71%	1%
Chicago-Joliet-Naperville	20%	76%	0%
Providence-Warwick	17%	63%	15%
Salt Lake City	16%	81%	0%
Detroit-Warren-Livonia	15%	81%	0%
New York-Newark-Jersey City	15%	60%	21%

Source: ACS one-year estimate for 2014

Apartment buildings located in the Southeast, Pacific Northwest, and Southwest (excluding California) are more likely to heat their buildings with electricity than natural gas.

Multifamily markets in other regions tend to use natural gas to heat apartments. While fuel oil is a common heating fuel for single-family homes throughout the Northeast, it is used to heat a smaller share of apartment buildings in this region.

BUILDING AGE

Building energy codes have encouraged energy efficiency in building design and construction across the United States (Livingston et al. 2014). While many older buildings can be energy efficient with proper care and maintenance, the first building energy codes that set a minimum threshold for energy efficiency were adopted in 1978 (Benningfield Group 2009). For this reason, building age can provide efficiency program managers with a rough approximation of building energy consumption. Building age is not an entirely accurate predictor of energy efficiency because we do not know how many older buildings have been renovated. Thus the building age data presented here should be used in combination with other local building stock characteristics to design and target multifamily programs. New construction and existing multifamily buildings will often require different energy efficiency program services and offerings.

The overwhelming majority of multifamily buildings in all metro areas were built before 2000. Most markets contain a large share of apartments and condominiums built before 1980. Table 5 shows that the metro areas with the highest percentage of multifamily buildings built before 1980 are located along or near the Pacific and Atlantic coasts.

Table 5. Metropolitan areas with the most multifamily units built 1979 or earlier

Metropolitan area	Percentage built 1979 or earlier
New York-Newark-Jersey City	79%
Cleveland-Elyria	73%
Providence-Warwick	72%
Pittsburgh	68%
Chicago-Naperville-Elgin	66%
Urban Honolulu	65%
Boston-Cambridge-Newton	65%
Los Angeles-Long Beach-Anaheim	64%
Hartford-West Hartford-East Hartford	64%
San Francisco-Oakland-Hayward	64%
Philadelphia-Camden-Wilmington	63%

Multifamily percentage is the portion of units in buildings with five or more units.

Source: ACS one-year estimate for 2014.

All metro areas would benefit from programs targeting existing multifamily buildings. However there are some MSAs with more new multifamily units coming on the market. Energy efficiency programs that support developers in the planning and construction phases could be appropriate in some of these areas, but only when other factors such as the stringency of adopted local energy codes are weighed.

Since the recent recession, newly constructed multifamily units have been on the rise. Data from the *2016 Multifamily Housing Outlook* published by Freddie Mac (2016, 1-7) indicate that more than 300,000 multifamily units were constructed in 2015. This is the most in a single year since 1989. This growth is expected to continue over the coming years. The most recent Building Permits Survey released by the US Census Bureau (2016) found that 454,500 permits for new multifamily buildings were filed in 2015 – a 19% increase from 2014.

Table 6 shows that the metro areas with the highest percentage of multifamily buildings built in 2000 or later are in the interior of the country, mostly in either the Southeast or Texas.

Table 6. Metropolitan areas with the most multifamily units built 2000 or later

Metropolitan area	Percentage built 2000 or later
Raleigh	37%
Austin-Round Rock	35%
Jacksonville	33%
San Antonio-New Braunfels	30%
Charlotte-Concord-Gastonia	30%
Atlanta-Sandy Springs-Roswell	29%
Orlando-Kissimmee-Sanford	29%
Houston-The Woodlands-Sugar Land	25%
Dallas-Fort Worth-Arlington	25%
Las Vegas-Henderson-Paradise	25%
Nashville-Davidson-Murfreesboro-Franklin	25%
Memphis	25%
Salt Lake City	25%

Multifamily percentage is the portion of units in buildings with five or more units.

Source: ACS one-year estimate for 2014.

Multifamily Energy Efficiency Programs

A primary finding of ACEEE's 2013 baseline research was that multifamily buildings held great potential for improved energy efficiency. The report concluded that building owners and managers had to upgrade existing buildings and dwelling units to realize this potential. Utility energy efficiency programs are designed to facilitate such changes. ACEEE has documented best practices for the design and delivery of multifamily programs (Johnson 2013) as well as strategies to increase participation in these programs (Johnson 2013; Ross, Jarrett, and York 2016). In this report, we gather data from utility reports, program evaluations, requests to program staff, and other relevant documentation to assess the status of multifamily energy efficiency programs serving customers in our targeted MSAs.

Gathering data for multifamily programs provided in MSAs is difficult for several reasons. These include the following:

- Multiple utilities may serve a single MSA—even serving as dual-fuel utilities (those providing both electricity and natural gas).
- Utility programs typically are available across full service territories, which generally include more customers and areas than a selected MSA. Data typically are not broken down for an MSA within a broader utility service territory.
- Utility energy efficiency programs that reach multifamily buildings may not track or report multifamily program data separately from broader program categories such as residential or commercial retrofits.

- Some multifamily energy efficiency programs serving MSAs are provided by statewide, nonutility program administrators.
- Multifamily data may not be reported consistently across multifamily programs due to different conventions and definitions.

These issues create gaps in program data. Despite this, we have gathered sufficient information to create a snapshot of current multifamily programs serving metropolitan areas.

POLICIES ENABLING ENERGY EFFICIENCY PROGRAMS

Many state public utility commissions and policymakers have required and incentivized electric and natural gas utilities across the country to invest in energy efficiency improvements (Berg et al. 2016, 18). Customers typically fund these investments through either utility rates or statewide public benefit funds. Many states also encourage utilities to promote energy efficiency through performance incentives and mechanisms for recovering revenue lost in projects that increase energy efficiency. State policy decisions on utility rates, public benefit funds, and company incentives all affect the success of multifamily efficiency programs.

Energy efficiency programs in the largest multifamily markets face the challenge of serving apartment and condominium customers in a way that meets the requirements of local and state policies. We have relied principally on data collected for ACEEE's *State Energy Efficiency Scorecard* to analyze the potential of each metro area's state and local policies for encouraging new and expanded energy efficiency programs. We rely primarily on state policy indicators because these policies are the primary drivers of utility energy efficiency investments. State policies can include mandatory savings targets called energy efficiency resource standards (EERS), energy efficiency spending, performance incentives, fixed cost recovery mechanisms, and proscriptions against utilities allowing an opt-out provision for large customers. Table 7 documents state energy efficiency spending for all metro areas and highlights those that have seen a 50% or greater increase in energy efficiency spending since 2011. More-detailed information from ACEEE's *State Energy Efficiency Scorecard*, including scores for each state's regulatory policies can be found in Appendix B.

Table 7. 2016 ACEEE *State Scorecard* statewide utility spending on energy efficiency programs

Metropolitan area	State	Total 2015 state efficiency spending (\$ mil)	50% or greater spending increase from 2011
Los Angeles-Long Beach-Santa Ana	CA	1,715.5	
Riverside-San Bernardino-Ontario	CA	1,715.5	
Sacramento-Roseville-Arden-Arcade	CA	1,715.5	
San Diego-Carlsbad-San Marcos	CA	1,715.5	
San Francisco-Oakland-Fremont	CA	1,715.5	
San Jose-Sunnyvale-Santa Clara	CA	1,715.5	
Boston-Cambridge-Quincy	MA	743.4	

Metropolitan area	State	Total 2015 state efficiency spending (\$ mil)	50% or greater spending increase from 2011
New York-Newark-Jersey City	NY	571.2	
Chicago-Joliet-Naperville	IL	366.1	✓
Baltimore-Towson	MD	292.6	✓
Seattle-Tacoma-Bellevue	WA	278.0	
Detroit-Warren-Livonia	MI	262.6	
Jacksonville	FL	238.6	
Miami-Fort Lauderdale-Pompano Beach	FL	238.6	
Orlando-Kissimmee-Sanford	FL	238.6	
Tampa-St. Petersburg-Clearwater	FL	238.6	
Philadelphia-Camden-Wilmington	PA	229.9	
Pittsburgh	PA	229.9	
Cincinnati-Middletown	OH	215.0	
Cleveland-Elyria-Mentor	OH	215.0	
Columbus	OH	215.0	
Hartford-West Hartford-East Hartford	CT	211.7	✓
Minneapolis-St. Paul-Bloomington	MN	202.2	
Austin-Round Rock-San Marcos	TX	184.6	
Dallas-Fort Worth-Arlington	TX	184.6	
Houston-Sugar Land-Baytown	TX	184.6	
San Antonio-New Braunfels	TX	184.6	
Portland-Vancouver-Hillsboro	OR	164.9	
Indianapolis-Carmel	IN	132.0	✓
Charlotte-Gastonia-Rock Hill	NC	115.9	✓
Raleigh-Cary	NC	115.9	✓
Phoenix-Mesa-Glendale	AZ	108.0	
Tucson	AZ	108.0	
Kansas City	MO	107.2	✓
St. Louis	MO	107.2	✓
Providence-Warwick	RI	103.0	✓
Denver-Aurora-Broomfield	CO	102.7	
Milwaukee-Waukesha-West Allis	WI	99.7	✓
Oklahoma City	OK	83.4	✓
Salt Lake City	UT	80.1	
Las Vegas-Paradise	NV	49.6	

Metropolitan area	State	Total 2015 state efficiency spending (\$ mil)	50% or greater spending increase from 2011
Louisville/Jefferson County	KY	48.1	✓
Memphis	TN	48.0	
Nashville-Davidson-Murfreesboro-Franklin	TN	48.0	
Atlanta-Sandy Springs-Marietta	GA	41.5	✓
Urban Honolulu	HI	33.3	
Washington-Arlington-Alexandria	DC	18.7	✓
New Orleans-Metairie	LA	13.4	✓
Omaha-Council Bluffs	NE	12.9	✓
Richmond	VA	2.9	
Virginia Beach-Norfolk-Newport News	VA	2.9	

States are determined by the location of the MSA's principal city. *Source: 2016 State Energy Efficiency Scorecard.*

A total of 16 metro areas are in states that have increased their spending by at least 50% since 2011. This is not a reflection of where spending is the greatest; it reflects where new opportunities for energy efficiency activity may exist. The states and district with the greatest increases in energy efficiency spending include the District of Columbia, Indiana, Louisiana, Maryland, and North Carolina. Large increases in state spending do not always coincide with strong state utility regulatory policy. States that received the highest scores for public benefit programs and policies in ACEEE's *State Energy Efficiency Scorecard* include Rhode Island, Massachusetts, California, Connecticut, and Minnesota. These states have historically had some of the largest energy efficiency budgets, but they have increased spending by only modest amounts relative to 2011. They score highly on ACEEE's *State Scorecard* because they have adopted policies that address fixed cost recovery, set aggressive energy savings goals, and provide performance incentives for achieving those goals. The result has been that utilities across these states have achieved substantial energy savings from efficiency programs.

While state utility regulatory policy is a principal factor determining the effectiveness of energy efficiency programs, several local municipalities have begun to mandate that building owners benchmark the energy use of their buildings. These cities have passed benchmarking ordinances out of a desire to mitigate climate change, improve property market transactions, and help building owners improve their operations (Dillingham and Badoian-Kriticos 2016, 7). Several of these benchmarking ordinances include disclosure requirements for large multifamily properties (IMT 2016). Ross and York (2014) have found that while benchmarking itself does not improve the energy efficiency of multifamily buildings, the information can encourage building owners to seek out energy efficiency programs. Benchmarking ordinances also encourage utilities to provide whole-building energy performance data to building owners. In the process, utilities can identify potential multifamily program participants.

Using IMT data, we have documented the states and principal cities of MSAs that have passed mandatory multifamily energy benchmarking ordinances (IMT 2016). Table 8 highlights those cities and states.

Table 8. City and state mandatory multifamily energy benchmarking legislation

Metropolitan area	Principal city benchmarking ordinance	State benchmarking legislation
Atlanta-Sandy Springs-Marietta	✓	
Austin-Round Rock-San Marcos	✓	
Boston-Cambridge-Quincy	✓	
Chicago-Joliet-Naperville	✓	
Kansas City	✓	
Los Angeles-Long Beach-Santa Ana		✓
New York-Newark-Jersey City	✓	
Philadelphia-Camden-Wilmington	✓	
Riverside-San Bernardino-Ontario		✓
Sacramento-Roseville-Arden-Arcade		✓
San Diego-Carlsbad-San Marcos		✓
San Francisco-Oakland-Fremont		✓
San Jose-Sunnyvale-Santa Clara		✓
Seattle-Tacoma-Bellevue	✓	
Washington-Arlington-Alexandria	✓	

Source: IMT 2016

The Boston and California metro areas are among those locations with both the highest utility scores from ACEEE's *State Scorecard* and mandatory multifamily benchmarking legislation. Energy efficiency spending in Massachusetts and California has also increased between 2011 and 2015. Washington, DC, has seen the greatest percentage increase in energy efficiency spending and has also passed a mandatory multifamily benchmarking ordinance.¹⁰

GROWTH OF MULTIFAMILY PROGRAMS

Energy efficiency programs designed specifically to serve multifamily building owners and residents have expanded since our 2013 review, which used program data from 2011. Available data for programs serving the 51 metro areas in our study show a total of \$289.7 million spent on multifamily programs in 2015—nearly three times the figure estimated in ACEEE's 2013 report. For MSAs served by at least one multifamily program, total

¹⁰ For more information on energy benchmarking policies, consult Krukowski and Burr 2012 and Houston 2016.

multifamily program spending ranged from \$80,972 (Cincinnati) to \$71.6 million (Boston).¹¹ On average, we found that total spending on multifamily programs accounted for no more than 6% of total energy efficiency spending in these metro areas. While spending on these programs varies greatly across MSAs, there are several areas where multifamily programs are beginning to receive a larger share of overall efficiency funding. Table 9 lists the 10 metro areas where multifamily energy efficiency spending, as a percentage of total energy efficiency spending, is highest. Appendix C provides a full list of multifamily programs along with detailed data describing each metro area's program spending and offerings.

Table 9. Metro areas with the largest share of energy efficiency spending on multifamily programs

Metropolitan area	Utilities or program administrators	2015 spending on multifamily programs	Program spending as a percentage of total EE spending
Austin-Round Rock	Austin Energy	\$2,612,788	15.52%
San Diego-Carlsbad	San Diego Gas & Electric	\$11,460,000	14.41%
Seattle-Tacoma-Bellevue	Seattle City Light, Puget Sound Energy	\$21,161,377	13.57%
Washington-Arlington-Alexandria	DC Sustainable Energy Utility	\$2,428,095	12.99%
Boston-Cambridge-Newton	Eversource, National Grid	\$71,620,939	12.13%
New York-Newark-Jersey City	Con Edison, National Grid, NYSERDA	\$30,050,846	11.25%
Urban Honolulu	Hawaiian Electric	\$600,000	10.09%
Providence-Warwick	National Grid	\$9,821,600	9.53%
Salt Lake City	Questar Gas	\$2,070,713	8.56%
St. Louis	Ameren Missouri	\$4,500,000	7.76%

To help determine whether multifamily spending is equitably allocated, we can also compare multifamily properties' share of energy efficiency spending to their share of total

¹¹ These amounts include programs serving areas outside the MSAs, as data are generally reported utility-wide or even statewide in a few cases. However since multifamily housing is concentrated in metropolitan areas, we expect that the bulk of multifamily program spending is also concentrated in those same MSAs. Data reporting practices do not allow for a more exact tabulation of multifamily program spending specific to these metro areas.

energy use. Although not retrievable at the level of MSAs, data on multifamily energy use are available for multi-state regions.

We used data from EIA (2012, 2016a, 2016b) to calculate electricity and natural gas sales to multifamily buildings and their share of all sales in four US Census Bureau regions.¹² Table 10 summarizes these sales for 2009, the most recent data available. The table also estimates these properties' share of total sales for each region.

Table 10. Multifamily electricity and natural gas sales by US Census Bureau region

Region	Total multifamily sales (MMBTU)	Multifamily share of all sales
Northeast	434,711,070	27%
Midwest	333,032,970	12%
South	327,772,829	6%
West	227,779,372	10%
All regions	1,323,296,241	11%

Source: EIA 2012, 2016a, 2016b

Based on these data, most metro areas' shares of energy efficiency spending on multifamily programs are well below their region's multifamily share of all sales. Multifamily program administrators should consider increasing their spending on cost-effective efficiency offerings so this sector can enjoy efficiency investments in proportion to the energy it purchases.

Continuing with our analysis, the number of multifamily programs and the scope of services they provide have expanded in recent years. A total of 38 of the 51 metro areas now have at least one dedicated multifamily program offered by utilities and related organizations, compared with 30 of the metro areas analyzed in ACEEE's 2013 report. This means that 13 MSAs currently have no specific multifamily programs. Figure 1 identifies MSAs with multifamily programs and the amount of spending on these programs relative to all efficiency spending in these places.

¹² Using data from EIA's 2009 Residential Energy Consumption Survey (RECS), we obtained energy use intensity values for multifamily properties (those with five or more units) in the four US Census Bureau regions. These values were expressed as million BTU per square foot of multifamily building space. We then multiplied these values by RECS estimates of total multifamily square footage for each region. Finally, we compared these values with total electric and natural gas sales to all sectors in each region. The four US Census Bureau regions and the states included in each are as follows: Northeast (ME, NH, VT, MA, RI, CT, NY, NJ, PA), Midwest (OH, MI, IN, IL, WI, MN, ND, SD, NE, KS, IA, MO), South (MD, DC, VA, WV, NC, SC, GA, FL, AL, MS, TN, KY, AR, LA, OK, TX), and West (MT, WY, CO, NM, AZ, UT, ID, NV, CA, OR, WA, HI, AK).

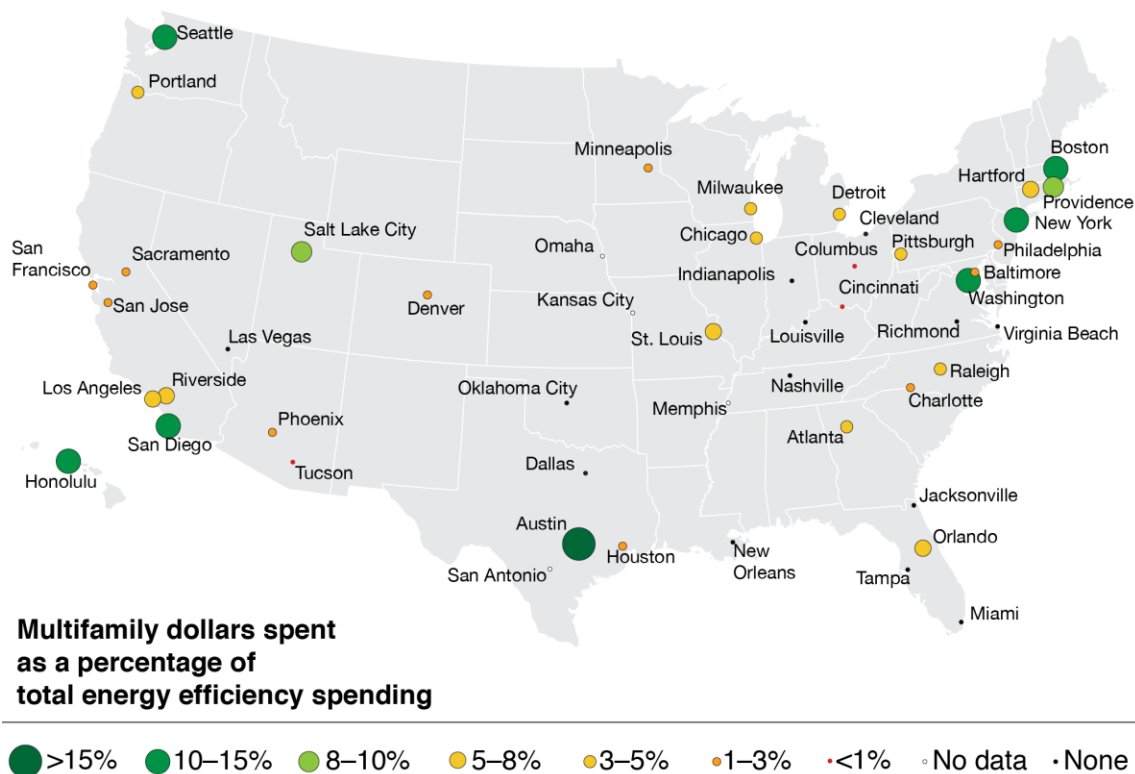


Figure 1. MSAs with multifamily energy efficiency programs and their percentage of total efficiency spending

Many MSAs have more than one program for multifamily housing. Single utilities (or other program administrators) may offer multiple programs. In other metro areas, multiple utilities may provide programs, and some may be jointly administered by the electric utility and the gas utility serving the metro area. We found that 22 MSAs have put new programs in place since 2011, in some cases replacing or augmenting existing programs. Some programs have also expanded their service offerings. We found that eight MSAs with new programs also had multifamily programs that underwent significant expansion or other major modifications since 2011. Four other MSAs have not added programs since 2011 but have restructured their programs in the intervening years. We have included detailed data on these changes in Appendix C.

Multifamily energy efficiency programs typically offer one or more of the following services:

- Direct installation of no-cost and low-cost in-unit energy efficiency measures, such as energy-efficient lightbulbs (CFLs or LEDs), faucet aerators, and low-flow showerheads.
- Financial incentives for purchase and installation of energy-efficient appliances, mechanical equipment, and system improvements. These may be prescriptive or custom incentives (rebates).
- Comprehensive retrofits of buildings, which could include insulation and air sealing of building envelopes, upgrades to hot water and HVAC equipment and systems,

improved building controls, and lighting efficiency improvements to common areas and individual units.

- Low-interest or on-bill financing to provide up-front capital for energy efficiency investments.

Of the 38 MSAs with multifamily programs, 6 are served by programs that provide only direct installation of no-cost/low-cost measures, 5 by programs that provide only prescriptive and/or custom rebates for the purchase and installation of energy-efficient technologies, and 27 by programs that offer both. A total of 25 metro areas have programs that offer comprehensive retrofits for existing buildings, compared with 16 MSAs in 2011. Thirteen MSAs have access to low-interest or on-bill financing. A complete list of services available to each metro area is provided in Appendix C.

These data show that direct installation and financial incentives are the most common services available to multifamily customers. Fewer programs provide comprehensive retrofits. This likely reflects the much higher costs of supporting comprehensive retrofits, even if such projects can yield highly cost-effective energy savings. Figure 2 shows MSAs served by a comprehensive multifamily program.

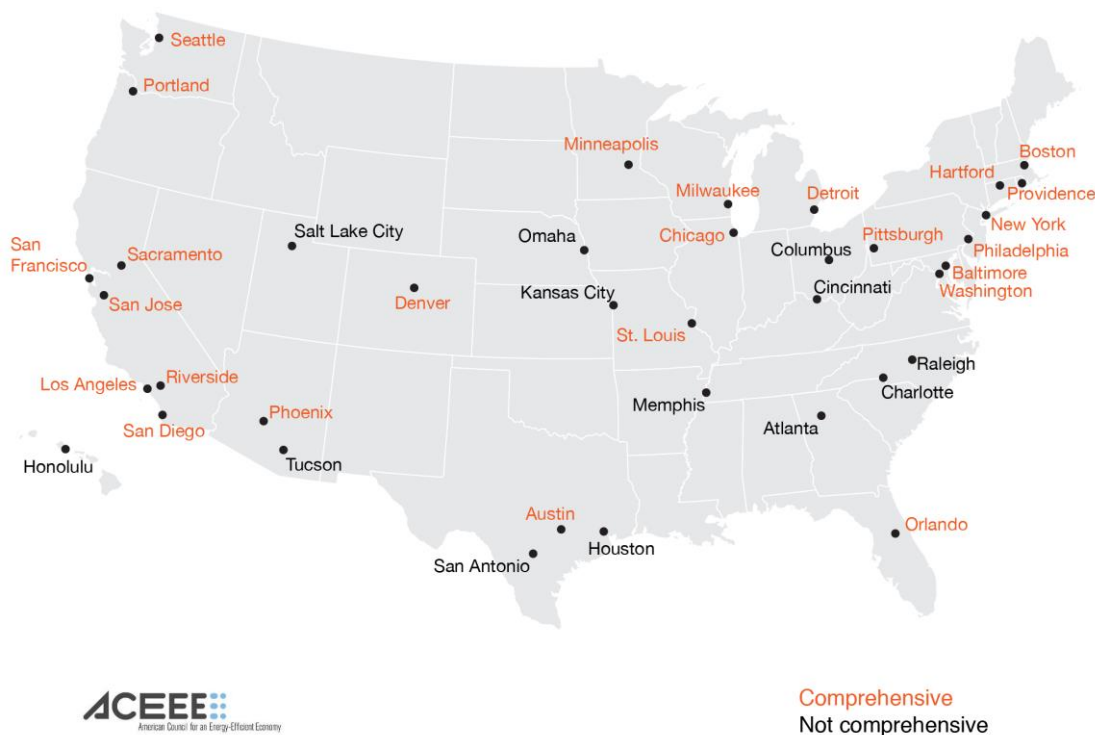


Figure 2. MSAs with comprehensive programs

Direct installation is used in many programs as an entry point to engage both residents and building owners with immediate, low-cost energy efficiency improvements that demonstrate the value of energy-efficient building upgrades. This approach can encourage building owners to take additional steps beyond these measures to achieve deeper, more

comprehensive savings. Of these, comprehensive retrofits provide opportunities for the greatest relative energy savings.

Table 11 summarizes characteristics and availability of programs and services serving the MSAs included in this study.

Table 11. Multifamily energy efficiency programs by MSA

Number of MSAs with:	
One or more multifamily programs	38
No multifamily programs	13
Substantially changed programs	12
Only direct installation services	6
Only rebates or incentives	5
Direct install and incentives	27
Comprehensive retrofits	25
Financing opportunities	13

ADDRESSING CHALLENGES POSED BY MULTIFAMILY PROPERTIES

Many of the multifamily programs analyzed for this report have changed to reflect industry best practices as documented by ACEEE and other, similar organizations in recent years. These best practices have been developed to address the following issues:

- Split incentives
- Lack of information
- Resource constraints
- Program complexity that discourages participation

Numerous studies have found that multifamily rental units pose a split incentive challenge for energy efficiency programs (McKibbin et al. 2012; Johnson 2013; Henderson 2015; Ross, Jarrett, and York 2016). Most apartment building residents pay for their own utilities, and in-unit efficiency upgrades can provide a financial benefit to these residents, but only if they occupy the units long enough to see a return on their investment. Otherwise renters have little incentive to invest in upgrades to an apartment they do not own. Renters are also unlikely to have the authority to upgrade in-unit equipment. On the other hand, multifamily building owners and managers have a long-term interest in lowering the costs associated with their buildings, but they are unlikely to financially benefit in the short term from in-unit upgrades because they typically pay only for the utility cost of common areas.

ACEEE research has documented how multifamily programs address these split incentives through streamlining rebate processes and incentives for both in-unit measures and whole-building retrofits for building owners (Johnson 2013; Ross, Jarrett, and York 2016). Successful multifamily programs will often first offer low-cost or no-cost direct install measures for apartment units and then provide increasing financial incentives for a project

that targets deeper energy savings. Providing escalating incentives for achieving greater building efficiency gives owners a clearer financial motive to participate.

Even if multifamily building owners are incentivized to pursue building upgrades, they must be convinced that they will have a future positive return on their investment or that upgrades will minimize the risk that building expenses will increase. Thus program administrators must be able to consistently provide multifamily owners with reliable information that they can use to make investment decisions. This includes the costs savings and non-energy benefits associated with multifamily energy efficiency. A 2012 ACEEE survey of administrators found that fewer than one-third of programs analyzed participant benefits other than energy savings (Kushler, Nowak, and Witte 2012). Benefits of multifamily energy efficiency can also include “higher property value, reduced maintenance costs, greater levels of comfort, improved appliance and equipment performance and lifespan, and improved health and safety” (Cluett and Amann 2015, 7). Owners, especially those of multifamily affordable housing, who receive this information are more likely to secure project financing from a lender. Multifamily programs may also partner with community organizations to offer on-bill repayment or low-cost financing to help address this challenge.

Many multifamily energy efficiency programs have faced challenges beyond split incentives and communicating the full range of benefits from program participation. Administrators can often struggle to streamline program service offerings. Johnson (2013) and Ross, Jarrett, and York (2016) have documented numerous strategies that address this challenge. Many administrators have responded to customer concerns over complex program bureaucracy by simplifying internal operations and forming a one-stop shop that serves participants. This provides a single point of contact to guide building owners or managers through a program from energy audit to completion. Similarly, programs that coordinate efficiency offerings with those offered by other local electric, gas, and water utilities simplify the process of conducting a comprehensive multifamily building retrofit (Nowak et al. 2014).

PROGRAMS SERVING LOW-INCOME MULTIFAMILY CUSTOMERS

A household’s energy cost burden is the percentage of income that goes toward utility bills. Energy burdens affect how much income a family can devote to food, child care, medical costs, and other basic necessities. Many low-income households living in multifamily buildings, especially renters, face high energy cost burdens. Not only do they pay a higher utility cost per square foot than the average household, but they tend to live in less energy-efficient housing (Drehobl and Ross 2016, 4). Research conducted by Gary Pivo (2014, 566) has shown that over the past decade, the homes of low-income multifamily households have typically had five fewer energy-efficient features than the homes of those with middle and high incomes.¹³ Across the 48 largest US metro areas, the median household energy

¹³ Pivo (2014) examined the prevalence of several energy-efficient appliances in low-income multifamily households. These appliances included natural gas clothes dryers as well as dishwashers, refrigerators, and clothes washers made in the year 2000 or later. The prevalence of these features was analyzed for those households with incomes of less than 50% of regional median income, 50–80% of regional median income, 80–100% of regional median income, and more than 100% of regional median income.

burden for low-income households living in multifamily buildings is 5%, compared with an average of 3.5% across all US cities (Drehobl and Ross 2016).¹⁴

Addressing the energy burdens faced by limited- or low-income households is critical to achieving substantial energy savings and equitable outcomes in the multifamily market. Our findings suggest that there remains a large potential to introduce and implement programs serving low-income multifamily housing. We found a total of only 15 programs among the 51 metro areas that specifically serve income-eligible multifamily customers, located in these MSAs:

- Baltimore-Columbia-Towson
- Boston-Cambridge-Newton
- Denver-Aurora-Lakewood
- Detroit-Warren-Dearborn
- Hartford-West Hartford-East Hartford
- Houston-The Woodlands-Sugar Land
- Kansas City
- Los Angeles-Long Beach-Anaheim
- Minneapolis-St. Paul-Bloomington
- New York-Newark-Jersey City
- Pittsburgh
- Providence-Warwick
- St. Louis
- Urban Honolulu
- Washington-Arlington-Alexandria

In some cases, these are separate programs tailored to this market; in others, a single multifamily program may have different eligibility criteria for nonsubsidized housing and buildings with subsidized rents for low-income households.

Tailored programs for this sector are needed given that building owners, operators, and residents of affordable multifamily buildings face unique barriers to investing in energy efficiency upgrades.¹⁵ Program administrators should consider the unique features of this housing stock when designing efficiency programs.

Freddie Mac (2016, 5) reports that only 10% of recently constructed multifamily rental units have rents that would be considered affordable for most American renters.¹⁶ Therefore many low-income households reside in older buildings (HUD 2013). In the aging

¹⁴ In the report by Drehobl and Ross, low-income multifamily households are considered those that 1) report an annual gross household income at or below 80% of the area median income, and 2) reside in a building with five or more units.

¹⁵ We use the term “affordable multifamily buildings” to refer to both housing that is subsidized through federal and state government programs and housing that is unsubsidized but deemed affordable because of rent levels.

¹⁶ A multifamily unit is considered affordable by most housing agencies if the unit’s rent is no more than 30% of a household’s gross income.

multifamily housing stock, energy efficiency upgrades often compete with other sorely needed capital improvements. As a result, building owners and managers prefer to coordinate energy efficiency upgrades with other major rehabilitation projects (Henderson 2015).

The majority of affordable rental units are unsubsidized and are located in privately owned buildings (Collinson 2011). Many of these units are often in smaller buildings (of fewer than 49 units) and are privately owned (Joint Center for Housing Studies of Harvard University 2015). The small scale of these properties can make acquiring financing for energy efficiency investments difficult. This is another reason why coordinating energy efficiency investments with other projects or at times of refinancing can motivate building owners and managers to participate in energy efficiency programs. To better align periods of recapitalization with the rollout and implementation of a utility program, program administrators should communicate with owners or managers so that they can plan potential energy efficiency projects (Ross, Jarrett, and York, 2016).

A smaller portion of multifamily buildings participate in federal affordable housing programs. Around 72,000 multifamily properties across the country are federally subsidized and are obligated to keep some or all rents affordable for those with low incomes (PAHC and NLIHC 2016). Table 12 shows the number of multifamily housing units in federally subsidized buildings in each of the 51 MSAs and their share of each multifamily market's total units.

Table 12. Number and percentage of metropolitan area multifamily units in buildings with federally subsidized rents

Metropolitan area	Multifamily housing units in federally subsidized buildings	Percentage of multifamily units
Providence-Warwick	46,172	40%
Kansas City	47,286	33%
Memphis	30,104	33%
Pittsburgh	44,947	33%
Louisville/Jefferson County	26,992	31%
Richmond	24,807	29%
St. Louis	45,164	28%
Hartford-West Hartford-East Hartford	25,747	27%
Columbus	39,950	26%
Cleveland-Elyria	44,391	26%
Boston-Cambridge-Newton	115,272	25%
Cincinnati	41,614	25%
Sacramento-Roseville-Arden-Arcade	37,928	24%

Metropolitan area	Multifamily housing units in federally subsidized buildings	Percentage of multifamily units
Indianapolis-Carmel-Anderson	34,766	24%
Detroit-Warren-Dearborn	67,694	23%
Baltimore-Columbia-Towson	52,924	23%
Nashville-Davidson-Murfreesboro-Franklin	28,940	22%
Philadelphia-Camden-Wilmington	85,104	22%
Minneapolis-St. Paul-Bloomington	65,476	21%
Jacksonville	23,691	20%
Virginia Beach-Norfolk-Newport News	25,629	20%
Milwaukee-Waukesha-West Allis	28,618	19%
Atlanta-Sandy Springs-Roswell	89,410	19%
Riverside-San Bernardino-Ontario	37,612	19%
Omaha-Council Bluffs	14,579	19%
New Orleans-Metairie	15,699	19%
Oklahoma City	15,346	18%
Portland-Vancouver-Hillsboro	37,989	18%
Seattle-Tacoma-Bellevue	71,992	18%
Charlotte-Concord-Gastonia	28,134	18%
Orlando-Kissimmee-Sanford	40,274	18%
New York-Newark-Jersey City	513,157	17%
Washington-Arlington-Alexandria	110,514	16%
Raleigh	13,988	15%
Chicago-Naperville-Elgin	146,715	15%
San Francisco-Oakland-Hayward	69,857	14%
Denver-Aurora-Lakewood	34,466	12%
Dallas-Fort Worth-Arlington	75,071	11%
Tampa-St. Petersburg-Clearwater	35,045	11%
Austin-Round Rock	20,514	10%
Urban Honolulu	12,834	10%
Houston-The Woodlands-Sugar Land	62,524	10%
Las Vegas-Henderson-Paradise	20,856	9%
Tucson	7,347	9%
Phoenix-Mesa-Scottsdale	30,573	9%

Metropolitan area	Multifamily housing units in federally subsidized buildings	Percentage of multifamily units
Salt Lake City	14,137	9%
Los Angeles-Long Beach-Anaheim	123,716	9%
Miami-Fort Lauderdale-West Palm Beach	78,014	8%
San Antonio-New Braunfels	25,617	8%
San Jose-Sunnyvale-Santa Clara	27,270	7%
San Diego-Carlsbad	32,037	6%

The NHPD does not provide the total number of low-income housing units that are receiving federal assistance because available data do not clearly specify how many units receive more than one subsidy. Therefore the NHPD provides the total number of units in buildings that contain at least one unit that receives federal assistance. *Source:* 2015 NHPD.

Federally subsidized affordable multifamily buildings face challenges that privately owned buildings do not. All federal programs that give subsidies directly to these multifamily building owners either provide a variable utility cost subsidy or require owners to reduce rents on subsidized units to account for the utility costs paid by tenants. These utility subsidies and rent reductions are referred to as utility allowances. Utility allowances often deter building owners from making energy efficiency upgrades because they cannot easily modify utility allowances or increase tenants' rents to reflect energy cost savings from their investment. While utility allowance calculation methods that account for energy savings from building upgrades do exist, many owners are either unable to use these due to program restrictions or would prefer to use simpler and less costly methods (CHCP and NHLP 2016). Thus the financial benefits of energy upgrades are often seen only in lowered tenant energy bills or reduced subsidy payments, neither of which benefits building owners.

In addition, many building owners and managers operating in this sector have limited time and resources and could use assistance to identify and prioritize potential energy efficiency upgrades. As mentioned above, more programs are providing affordable housing owners with aggregate whole-building energy use data for benchmarking, audits, and other assessments. These assessments help property owners identify which energy efficiency investments will provide the greatest return (Henderson 2015; Chant, Schaaf, and Ast 2016). In order to provide greater assurance, program managers can guarantee the reliability of incentivized measures at a project's outset and conduct reviews after it is completed to verify proper installation (Henderson 2015).

These challenges highlight the need for programs tailored to affordable multifamily housing markets. Although only a limited number of programs currently serve this part of the multifamily housing market, the number is growing, and this is likely to continue given that national organizations such as ACEEE and coalitions such as EEFA are providing an increasing amount of research and other forms of assistance to support them.

Conclusion

Multifamily efficiency programs have a promising future if local and state leaders collaborate to overcome the persistent challenges these programs face. We have seen an increasing number of stakeholders that recognize the importance of better serving multifamily housing markets with energy efficiency programs and services. Diverse stakeholders with a common interest in energy-efficient affordable housing are also collaborating to develop, improve, and expand multifamily programs.

The existing multifamily building stock holds tremendous potential for energy savings, especially as these buildings and their systems continue to age. We also expect that multifamily housing will continue to increase its share of metro area housing markets. While the greatest increases in these units have occurred throughout the Southeast, all but 2 of the 51 largest multifamily markets are expanding. Energy efficiency programs will need to focus on apartment and condominium buildings to achieve desired energy savings across these communities. Program administrators must also be prepared to tackle the challenges of split incentives in both unsubsidized and subsidized properties, as most multifamily households are renters and pay for their own energy costs.

Multifamily programs in Boston and the large metro areas of California are successful in large part due to a series of state and local policies that support the expansion of multifamily energy efficiency. These markets have strong state policies, steady increases in energy efficiency program spending, and local mandatory multifamily benchmarking. Several metro areas lack strong state policies but have either a local multifamily benchmarking ordinance or large increases in energy efficiency spending. These locations also hold promise for the future creation or expansion of multifamily programs. This is especially true for markets such as Charlotte, Raleigh, Indianapolis, and New Orleans. These places have seen large increases in statewide energy efficiency spending and at least 7% growth in multifamily households over the past three years.

ACEEE's 2013 baseline research on multifamily housing revealed that this market had been largely underserved by utility energy efficiency programs due to numerous barriers and challenges facing program administrators. In this updated review and analysis, ACEEE finds that many utilities, regulators, and key stakeholders have responded to these unmet needs by collaborating to create new programs and expand existing ones. Multifamily energy efficiency programs have quickly grown to serve a larger share of their targeted market. ACEEE's research and ongoing work with these programs suggest this picture will continue to improve. An ever-higher number of multifamily households are on track to reap the multiple benefits provided by improved energy efficiency in their buildings.

As with our 2013 review, however, there remains a relatively large untapped potential for multifamily efficiency. On average, we found that total spending on multifamily programs accounted for no more than 6% of total energy efficiency spending in the selected MSAs. By way of comparison, sales of electricity and natural gas to multifamily properties comprised 11% of all sales in 2009. Program administrators in many metro areas should consider increasing spending on multifamily programs as long as cost-effective opportunities are available.

Along with an increase in spending, we also hope to see more comprehensive building retrofits. These programs offer a range of services, technologies, and incentives and are often flexible enough to meet the individual needs of property owners. Comprehensive programs should also be designed to let property owners align energy efficiency projects with other whole-building improvements. This is especially true for the large stock of existing multifamily buildings. In the end, whole-building approaches will have the greatest impact on energy savings and the well-being of these households.

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Appendix A. Housing Market Data

Table A1. Summary of housing statistics by metropolitan area: building size, tenure, and utilities

Metropolitan area	Multifamily households (5+ units)	Households: percentage multifamily (5+ units)	Small multifamily households (2-4 units)	Households: percentage small multifamily	Single-family households	Households: percentage single-family	Multifamily: percentage renter occupied	Percentage of renters with utilities included in rent
Atlanta-Sandy Springs-Marietta	382,430	19.3%	76,283	3.8%	1,464,555	73.9%	92%	4%
Austin-Round Rock-San Marcos	175,815	25.0%	40,935	5.8%	450,264	64.0%	96%	5%
Baltimore-Towson	206,705	20.0%	46,336	4.5%	768,314	74.4%	85%	10%
Boston-Cambridge-Quincy	415,342	23.4%	365,736	20.6%	976,880	54.9%	80%	18%
Charlotte-Gastonia-Rock Hill	139,285	15.8%	33,254	3.8%	650,621	73.7%	92%	4%
Chicago-Joliet-Naperville	829,382	24.1%	460,359	13.4%	2,120,809	61.6%	75%	8%
Cincinnati-Middletown	146,953	17.7%	65,937	8.0%	592,595	71.5%	89%	10%
Cleveland-Elyria-Mentor	148,491	17.5%	73,235	8.6%	618,605	72.9%	93%	12%
Columbus	133,501	17.5%	69,093	9.0%	544,164	71.2%	96%	9%
Dallas-Fort Worth-Arlington	577,578	23.6%	114,532	4.7%	1,662,270	68.0%	97%	9%
Denver-Aurora-Broomfield	272,906	25.9%	43,232	4.1%	718,904	68.2%	86%	10%
Detroit-Warren-Livonia	247,195	14.9%	79,181	4.8%	1,281,213	77.4%	93%	9%
Hartford-West Hartford-East Hartford	85,837	18.4%	68,260	14.6%	310,868	66.5%	86%	11%
Houston-Sugar Land-Baytown	559,121	25.1%	71,677	3.2%	1,491,543	67.0%	96%	7%
Indianapolis-Carmel	116,489	15.6%	39,773	5.3%	571,230	76.7%	97%	8%
Jacksonville	93,981	17.8%	26,099	4.9%	372,345	70.4%	88%	4%
Kansas City	118,426	14.8%	45,754	5.7%	623,881	78.0%	96%	10%
Las Vegas-Paradise	165,667	22.7%	59,778	8.2%	483,185	66.1%	93%	5%
Los Angeles-Long Beach-Santa Ana	1,341,314	31.3%	358,388	8.4%	2,504,329	58.4%	90%	8%

Metropolitan area	Multifamily households (5+ units)	Households: percentage multifamily (5+ units)	Small multifamily households (2-4 units)	Households: percentage small multifamily	Single-family households	Households: percentage single-family	Multifamily: percentage renter occupied	Percentage of renters with utilities included in rent
Louisville/Jefferson County	76,602	15.5%	34,742	7.0%	365,265	73.9%	91%	12%
Memphis	68,149	13.8%	33,788	6.8%	374,577	75.9%	96%	6%
Miami-Fort Lauderdale-Pompano Beach	700,613	34.2%	158,337	7.7%	1,143,900	55.9%	65%	6%
Milwaukee-Waukesha-West Allis	135,581	21.6%	100,925	16.1%	386,379	61.7%	88%	10%
Minneapolis-St. Paul-Bloomington	281,624	21.1%	58,287	4.4%	976,115	73.0%	88%	13%
Nashville-Davidson-Murfreesboro-Franklin	114,359	17.0%	41,886	6.2%	484,676	71.8%	94%	10%
New Orleans-Metairie	65,411	13.8%	60,579	12.8%	330,612	69.6%	91%	7%
New York-Newark-Jersey City	2,684,179	37.5%	1,330,189	18.6%	3,105,764	43.4%	82%	17%
Oklahoma City	67,254	13.5%	23,900	4.8%	381,735	76.4%	98%	8%
Omaha-Council Bluffs	67,191	19.4%	11,302	3.3%	263,683	76.1%	97%	13%
Orlando-Kissimmee-Sanford	164,694	20.6%	41,867	5.2%	544,027	68.0%	90%	4%
Philadelphia-Camden-Wilmington	339,616	15.2%	184,550	8.3%	1,678,288	75.2%	87%	12%
Phoenix-Mesa-Glendale	287,460	18.1%	70,138	4.4%	1,147,053	72.1%	93%	9%
Pittsburgh	118,955	12.0%	73,141	7.4%	765,475	77.2%	93%	15%
Portland-Vancouver-Hillsboro	191,794	21.4%	71,897	8.0%	591,883	66.1%	92%	21%
Providence-Warwick	103,673	16.7%	147,485	23.7%	364,220	58.5%	90%	19%
Raleigh-Cary	79,189	17.3%	18,770	4.1%	326,622	71.4%	95%	6%
Richmond	74,795	15.8%	23,464	5.0%	365,647	77.1%	94%	10%
Riverside-San Bernardino-Ontario	170,840	13.0%	71,997	5.5%	980,264	74.4%	95%	5%
Sacramento-Roseville-Arden-Arcade	132,992	16.7%	50,518	6.3%	590,305	74.0%	97%	5%
Salt Lake City	70,849	18.8%	27,800	7.4%	270,997	71.9%	87%	10%

Metropolitan area	Multifamily households (5+ units)	Households: percentage multifamily (5+ units)	Small multifamily households (2-4 units)	Households: percentage small multifamily	Single-family households	Households: percentage single-family	Multifamily: percentage renter occupied	Percentage of renters with utilities included in rent
San Antonio-New Braunfels	142,752	18.2%	40,347	5.1%	555,676	70.7%	97%	8%
San Diego-Carlsbad-San Marcos	305,747	27.8%	77,274	7.0%	676,447	61.4%	88%	9%
San Francisco-Oakland-Fremont	465,155	27.9%	185,092	11.1%	995,981	59.8%	88%	10%
San Jose-Sunnyvale-Santa Clara	159,316	24.9%	44,997	7.0%	416,967	65.2%	91%	7%
Seattle-Tacoma-Bellevue	365,766	26.0%	91,213	6.5%	900,834	64.1%	87%	9%
St. Louis	136,773	12.5%	91,967	8.4%	832,714	76.0%	89%	8%
Tampa-St. Petersburg-Clearwater	234,283	20.4%	67,283	5.9%	740,390	64.4%	80%	7%
Tucson	65,578	16.8%	19,281	4.9%	265,490	68.1%	95%	12%
Urban Honolulu	107,739	34.9%	21,942	7.1%	179,108	58.0%	63%	26%
Virginia Beach-Norfolk-Newport News	113,605	17.8%	44,156	6.9%	464,813	72.9%	93%	10%
Washington-Arlington-Alexandria	628,886	29.2%	66,196	3.1%	1,444,849	67.1%	82%	20%

Source: ACS one-year estimate for 2014

Table A2. Heating fuel by housing tenure (percentage of households)

Metropolitan area	Utility (electric or gas)		Utility gas		Electricity		Fuel oil	
	Renter occupied	Owner occupied	Renter occupied	Owner occupied	Renter occupied	Owner occupied	Renter occupied	Owner occupied
Atlanta-Sandy Springs-Marietta	97%	95%	41%	66%	56%	28%	0%	0%
Austin-Round Rock-San Marcos	98%	93%	29%	53%	68%	41%	0%	0%
Baltimore-Towson	93%	81%	48%	48%	45%	34%	4%	13%
Boston-Cambridge-Quincy	79%	58%	53%	51%	27%	6%	14%	36%
Charlotte-Gastonia-Rock Hill	96%	93%	29%	53%	67%	40%	1%	1%
Chicago-Joliet-Naperville	96%	98%	76%	92%	20%	6%	0%	0%
Cincinnati-Middletown	94%	89%	44%	60%	50%	29%	1%	4%
Cleveland-Elyria-Mentor	94%	95%	71%	87%	23%	9%	1%	1%
Columbus	96%	90%	58%	74%	38%	16%	1%	1%
Dallas-Fort Worth-Arlington	98%	97%	17%	50%	81%	46%	0%	0%
Denver-Aurora-Broomfield	96%	96%	61%	80%	35%	16%	0%	0%
Detroit-Warren-Livonia	96%	95%	81%	91%	15%	4%	0%	0%
Hartford-West Hartford-East Hartford	74%	41%	45%	34%	29%	7%	21%	50%
Houston-Sugar Land-Baytown	98%	96%	20%	62%	79%	35%	0%	0%
Indianapolis-Carmel	97%	93%	47%	66%	49%	26%	1%	1%
Jacksonville	98%	97%	2%	3%	96%	94%	0%	0%
Kansas City	96%	94%	56%	77%	40%	17%	0%	0%
Las Vegas-Paradise	99%	98%	46%	71%	52%	27%	0%	0%
Los Angeles-Long Beach-Santa Ana	89%	95%	57%	77%	32%	18%	0%	0%
Louisville/Jefferson County	96%	92%	49%	60%	47%	31%	0%	1%

Metropolitan area	Utility (electric or gas)		Utility gas		Electricity		Fuel oil	
	Renter occupied	Owner occupied	Renter occupied	Owner occupied	Renter occupied	Owner occupied	Renter occupied	Owner occupied
Memphis	97%	94%	39%	65%	58%	29%	0%	0%
Miami-Fort Lauderdale-Pompano Beach	96%	96%	2%	3%	94%	93%	0%	0%
Milwaukee-Waukesha-West Allis	95%	94%	69%	86%	26%	8%	1%	3%
Minneapolis-St. Paul-Bloomington	92%	92%	63%	85%	29%	7%	1%	1%
Nashville-Davidson-Murfreesboro-Franklin	98%	94%	18%	44%	80%	51%	0%	0%
New Orleans-Metairie	99%	98%	21%	50%	78%	48%	0%	0%
New York-Newark-Jersey City	74%	72%	60%	66%	15%	6%	21%	24%
Oklahoma City	97%	93%	39%	66%	58%	27%	0%	0%
Omaha-Council Bluffs	96%	93%	62%	75%	34%	18%	0%	0%
Orlando-Kissimmee-Sanford	98%	98%	4%	5%	94%	92%	0%	0%
Philadelphia-Camden-Wilmington	89%	76%	55%	62%	34%	14%	8%	18%
Phoenix-Mesa-Glendale	98%	98%	18%	34%	80%	63%	0%	0%
Pittsburgh	93%	88%	65%	79%	28%	9%	4%	8%
Portland-Vancouver-Hillsboro	94%	90%	23%	59%	71%	32%	1%	3%
Providence-Warwick	81%	53%	63%	48%	17%	5%	15%	41%
Raleigh-Cary	96%	91%	18%	45%	78%	46%	0%	1%
Richmond	94%	87%	27%	29%	67%	58%	3%	7%
Riverside-San Bernardino-Ontario	94%	93%	64%	79%	30%	15%	0%	0%
Sacramento-Roseville-Arden-Arcade	95%	88%	52%	65%	43%	23%	0%	0%
Salt Lake City	98%	98%	81%	93%	16%	5%	0%	0%
San Antonio-New Braunfels	98%	96%	19%	37%	80%	59%	0%	0%

Metropolitan area	Utility (electric or gas)		Utility gas		Electricity		Fuel oil	
	Renter occupied	Owner occupied	Renter occupied	Owner occupied	Renter occupied	Owner occupied	Renter occupied	Owner occupied
San Diego-Carlsbad-San Marcos	91%	91%	47%	69%	44%	22%	0%	0%
San Francisco-Oakland-Fremont	93%	96%	58%	78%	36%	18%	0%	0%
San Jose-Sunnyvale-Santa Clara	95%	96%	49%	78%	46%	18%	0%	0%
Seattle-Tacoma-Bellevue	95%	90%	18%	56%	77%	34%	1%	4%
St. Louis	96%	92%	52%	71%	44%	22%	0%	0%
Tampa-St. Petersburg-Clearwater	98%	98%	2%	5%	97%	93%	0%	0%
Tucson	96%	95%	36%	64%	60%	31%	0%	0%
Urban Honolulu	33%	39%	3%	2%	31%	36%	0%	0%
Virginia Beach-Norfolk-Newport News	96%	92%	27%	46%	70%	46%	2%	4%
Washington-Arlington-Alexandria	95%	90%	43%	55%	52%	35%	2%	5%

Source: ACS one-year estimate for 2014

Table A3. Distribution of multifamily units by building age

Metropolitan area	Units built 2000 or later	Percentage built 2000 or later	Units built 1980– 1999	Percentage built 1980– 1999	Units built 1979 or earlier	Percentage built 1979 or earlier
Atlanta-Sandy Springs-Marietta	112,396	29.4%	165,143	43.2%	104,891	27.4%
Austin-Round Rock-San Marcos	60,811	34.6%	77,403	44.0%	37,601	21.4%
Baltimore-Towson	37,597	18.2%	74,990	36.3%	94,118	45.5%
Boston-Cambridge-Quincy	55,052	13.3%	90,947	21.9%	269,343	64.8%
Charlotte-Gastonia-Rock Hill	41,700	29.9%	65,509	47.0%	32,076	23.0%
Chicago-Joliet-Naperville	115,814	14.0%	170,134	20.5%	543,434	65.5%
Cincinnati-Middletown	19,715	13.4%	49,770	33.9%	77,468	52.7%
Cleveland-Elyria-Mentor	9,498	6.4%	30,877	20.8%	108,116	72.8%
Columbus	28,664	21.5%	51,796	38.8%	53,041	39.7%
Dallas-Fort Worth-Arlington	146,545	25.4%	261,000	45.2%	170,033	29.4%
Denver-Aurora-Broomfield	59,467	21.8%	84,014	30.8%	129,425	47.4%
Detroit-Warren-Livonia	26,344	10.7%	75,644	30.6%	145,207	58.7%
Hartford-West Hartford-East Hartford	5,738	6.7%	25,345	29.5%	54,754	63.8%
Houston-Sugar Land-Baytown	142,133	25.4%	198,936	35.6%	218,052	39.0%
Indianapolis-Carmel	28,044	24.1%	38,505	33.1%	49,940	42.9%
Jacksonville	31,306	33.3%	33,439	35.6%	29,236	31.1%
Kansas City	24,084	20.3%	34,910	29.5%	59,432	50.2%
Las Vegas-Paradise	42,017	25.4%	89,376	53.9%	34,274	20.7%
Los Angeles-Long Beach-Santa Ana	134,066	10.0%	346,112	25.8%	861,136	64.2%
Louisville/Jefferson County	10,615	13.9%	25,163	32.8%	40,824	53.3%
Memphis	16,951	24.9%	20,660	30.3%	30,538	44.8%

Metropolitan area	Units built 2000 or later	Percentage built 2000 or later	Units built 1980– 1999	Percentage built 1980– 1999	Units built 1979 or earlier	Percentage built 1979 or earlier
Miami-Fort Lauderdale-Pompano Beach	105,768	15.1%	240,540	34.3%	354,305	50.6%
Milwaukee-Waukesha-West Allis	18,386	13.6%	40,119	29.6%	77,076	56.8%
Minneapolis-St. Paul-Bloomington	45,677	16.2%	87,519	31.1%	148,428	52.7%
Nashville-Davidson-Murfreesboro-Franklin	28,995	25.4%	42,597	37.2%	42,767	37.4%
New Orleans-Metairie	12,189	18.6%	16,277	24.9%	36,945	56.5%
New York-Newark-Jersey City	248,123	9.2%	315,352	11.7%	2,120,704	79.0%
Oklahoma City	11,612	17.3%	25,801	38.4%	29,841	44.4%
Omaha-Council Bluffs	13,787	20.5%	19,919	29.6%	33,485	49.8%
Orlando-Kissimmee-Sanford	47,261	28.7%	80,338	48.8%	37,095	22.5%
Philadelphia-Camden-Wilmington	42,712	12.6%	83,081	24.5%	213,823	63.0%
Phoenix-Mesa-Glendale	65,528	22.8%	137,657	47.9%	84,275	29.3%
Pittsburgh	9,853	8.3%	28,189	23.7%	80,913	68.0%
Portland-Vancouver-Hillsboro	40,327	21.0%	68,533	35.7%	82,934	43.2%
Providence-Warwick	7,575	7.3%	21,815	21.0%	74,283	71.7%
Raleigh-Cary	29,211	36.9%	37,484	47.3%	12,494	15.8%
Richmond	14,658	19.6%	23,289	31.1%	36,848	49.3%
Riverside-San Bernardino-Ontario	35,787	20.9%	74,886	43.8%	60,167	35.2%
Sacramento-Roseville-Arden-Arcade	24,555	18.5%	48,025	36.1%	60,412	45.4%
Salt Lake City	20,644	15.1%	38,982	28.5%	77,147	56.4%
San Antonio-New Braunfels	17,417	24.6%	25,102	35.4%	28,330	40.0%
San Diego-Carlsbad-San Marcos	43,520	30.5%	53,801	37.7%	45,431	31.8%
San Francisco-Oakland-Fremont	46,868	15.3%	118,708	38.8%	140,171	45.8%

Metropolitan area	Units built 2000 or later	Percentage built 2000 or later	Units built 1980– 1999	Percentage built 1980– 1999	Units built 1979 or earlier	Percentage built 1979 or earlier
San Jose-Sunnyvale-Santa Clara	58,743	12.6%	110,400	23.7%	296,012	63.6%
Seattle-Tacoma-Bellevue	30,638	19.2%	49,184	30.9%	79,494	49.9%
St. Louis	82,377	22.5%	133,046	36.4%	150,343	41.1%
Tampa-St. Petersburg-Clearwater	50,226	21.4%	103,061	44.0%	80,996	34.6%
Tucson	7,667	11.7%	30,595	46.7%	27,316	41.7%
Urban Honolulu	9,426	8.7%	28,297	26.3%	70,016	65.0%
Virginia Beach-Norfolk-Newport News	25,455	22.4%	44,062	38.8%	44,088	38.8%
Washington-Arlington-Alexandria	121,354	19.3%	170,881	27.2%	336,651	53.5%

Source: ACS one-year estimate for 2014

Appendix B. Energy Efficiency Policy and Spending Data

Table B1. 2016 State Scorecard utility scores and statewide spending on energy efficiency programs

Metropolitan area	State	2016 statewide utilities score	Total 2015 efficiency spending (\$ mil)	Total 2011 efficiency spending or budgets (\$ mil)	Change in efficiency spending or budgets 2011–2015
Providence-Warwick	RI	20	103.0	51.8	99%
Boston-Cambridge-Quincy	MA	19.5	743.4	511.5	45%
Los Angeles-Long Beach-Santa Ana	CA	15	1,715.5	1,247.6	38%
Riverside-San Bernardino-Ontario	CA	15	1,715.5	1,247.6	38%
Sacramento-Roseville-Arden-Arcade	CA	15	1,715.5	1,247.6	38%
San Diego-Carlsbad-San Marcos	CA	15	1,715.5	1,247.6	38%
San Francisco-Oakland-Fremont	CA	15	1,715.5	1,247.6	38%
San Jose-Sunnyvale-Santa Clara	CA	15	1,715.5	1,247.6	38%
Hartford-West Hartford-East Hartford	CT	14.5	211.7	128.7	65%
Minneapolis-St. Paul-Bloomington	MN	12.5	202.2	142.0	42%
Urban Honolulu	HI	11.5	33.3	25.1	33%
Portland-Vancouver-Hillsboro	OR	11.5	164.9	124.5	32%
Phoenix-Mesa-Glendale	AZ	10.5	108.0	116.3	–7%
Tucson	AZ	10.5	108.0	116.3	–7%
Detroit-Warren-Livonia	MI	10.5	262.6	194.1	35%
New York-Newark-Jersey City	NY	10.5	571.2	664.9	–14%
Seattle-Tacoma-Bellevue	WA	10.5	278.0	198.5	40%
Baltimore-Towson	MD	9.5	292.6	83.8	249%
Chicago-Joliet-Naperville	IL	8.5	366.1	205.1	78%
Milwaukee-Waukesha-West Allis	WI	8	99.7	58.0	72%

Metropolitan area	State	2016 statewide utilities score	Total 2015 efficiency spending (\$ mil)	Total 2011 efficiency spending or budgets (\$ mil)	Change in efficiency spending or budgets 2011–2015
Denver-Aurora-Broomfield	CO	7.5	102.7	77.3	33%
Salt Lake City	UT	7	80.1	66.6	20%
Cincinnati-Middletown	OH	6.5	215.0	210.0	2%
Cleveland-Elyria-Mentor	OH	6.5	215.0	210.0	2%
Columbus	OH	6.5	215.0	210.0	2%
Washington-Arlington-Alexandria	DC	5.5	18.7	2.2	752%
Indianapolis-Carmel	IN	4	132.0	35.7	270%
Oklahoma City	OK	3.5	83.4	43.9	90%
Philadelphia-Camden-Wilmington	PA	3.5	229.9	251.8	–9%
Pittsburgh	PA	3.5	229.9	251.8	–9%
Louisville/Jefferson County	KY	3	48.1	25.2	91%
Las Vegas-Paradise	NV	3	49.6	35.8	39%
Kansas City	MO	2	107.2	62.9	70%
St. Louis	MO	2	107.2	62.9	70%
Charlotte-Gastonia-Rock Hill	NC	2	115.9	55.3	110%
Raleigh-Cary	NC	2	115.9	55.3	110%
Atlanta-Sandy Springs-Marietta	GA	1.5	41.5	24.1	72%
Omaha-Council Bluffs	NE	1.5	12.9	7.1	82%
Jacksonville	FL	1	238.6	200.2	19%
Miami-Fort Lauderdale-Pompano Beach	FL	1	238.6	200.2	19%
Orlando-Kissimmee-Sanford	FL	1	238.6	200.2	19%
Tampa-St. Petersburg-Clearwater	FL	1	238.6	200.2	19%

Metropolitan area	State	2016 statewide utilities score	Total 2015 efficiency spending (\$ mil)	Total 2011 efficiency spending or budgets (\$ mil)	Change in efficiency spending or budgets 2011–2015
Memphis	TN	1	48.0	44.1	9%
Nashville-Davidson-Murfreesboro-Franklin	TN	1	48.0	44.1	9%
New Orleans-Metairie	LA	0.5	13.4	3.8	253%
Austin-Round Rock-San Marcos	TX	0	184.6	133.3	38%
Dallas-Fort Worth-Arlington	TX	0	184.6	133.3	38%
Houston-Sugar Land-Baytown	TX	0	184.6	133.3	38%
San Antonio-New Braunfels	TX	0	184.6	133.3	38%
Richmond	VA	–0.5	2.9	6.4	–55%
Virginia Beach-Norfolk-Newport News	VA	–0.5	2.9	6.4	–55%

Scores are out of a total of 20 points. States are determined by the location of the MSA's central city. 2011 gas efficiency spending data are not available; 2011 gas efficiency budget data are used instead. *Source:* ACEEE *State Energy Efficiency Scorecard* 2012 and 2016.

Appendix C. Utility Customer–Funded Multifamily Energy Efficiency Program Data

Multifamily program data cover entire utility service territories or states. In most cases these data account for a bigger geographic area than a single MSA. Only in those cases where a utility service territory is essentially coincident with an MSA are the program data specific to that metro area. Most programs do not track and report data at the MSA level. Our data include all multifamily programs available in at least some part of a larger MSA. In instances where the MSA contains counties in more than one state, we have analyzed only those programs serving counties in the state that contains the MSA’s principal city. Not all programs listed would be available throughout an entire MSA.

Table C1. Utility customer–funded multifamily energy efficiency programs by metropolitan area, and changes since 2013

Metropolitan area	Utilities or program administrators	Multifamily programs ^a	Changes from 2013 ACEEE report
Atlanta-Sandy Springs-Roswell ¹	Georgia Power	Home Energy Improvement Program-Multifamily; High Efficiency for New Multifamily Homes; Multifamily and PHA Renovation Rebate Program	Added program for high efficiency heat pump installation
Austin-Round Rock ²	Austin Energy	PowerSaver Program for Multifamily	No major changes
Baltimore-Columbia-Towson ³	Baltimore Gas & Electric	Quick Home Energy Check-Up for Multifamily; Master-Metered MF Quick Home Energy Check-Up Program	Expanded to include comprehensive retrofits
Boston-Cambridge-Newton ⁴	Eversource; National Grid	Multifamily Buildings Program; Low-Income Multifamily Energy Retrofits	No major changes in services available. Large increase in spending/budget.
Charlotte-Concord-Gastonia ⁵	Duke Energy Carolinas	Multifamily Energy Efficiency Program	New program
Chicago-Naperville-Elgin ⁶	ComEd; Nicor Gas; Peoples-North Shore Gas	ComEd Smart Ideas: Multifamily Tenant Area; Business Multifamily; Multifamily Assessments; Multifamily Program	No major changes
Cincinnati ⁷	Duke Energy Ohio	Smart Saver Residential — Multifamily Program	New program
Cleveland-Elyria		No multifamily program	
Columbus ⁸	AEP Ohio	Multifamily Direct Install Program	New program

Metropolitan area	Utilities or program administrators	Multifamily programs ^a	Changes from 2013 ACEEE report
Dallas-Fort Worth-Arlington		No multifamily program	
Denver-Aurora-Lakewood ⁹	Xcel Energy	Affordable Housing Energy Rebate Program; Multifamily Weatherization	New program
Detroit-Warren-Dearborn ¹⁰	Detroit Edison (DTE); Consumers Energy	Multifamily Solutions; Multifamily Common Areas; Low Income Multifamily	No major changes
Hartford-West Hartford-East Hartford ¹¹	Eversource; Connecticut Natural Gas	Multifamily Initiative	Program redesigned
Houston-The Woodlands-Sugar Land ¹²	CenterPoint Energy	Multifamily MTP	Added direct install for affordable housing customers
Indianapolis-Carmel-Anderson		No multifamily program	
Jacksonville		No multifamily program	
Kansas City ¹³	Kansas City Power & Light	Income-Eligible Multifamily	New program (launched in 2016). No data available yet.
Las Vegas-Henderson-Paradise		No multifamily program	
Los Angeles-Long Beach-Anaheim ¹⁴	Los Angeles Department of Water and Power; Southern California Edison; Southern California Gas	Energy Savings Assistance Program; Multifamily Energy Efficiency Rebate Program; Multifamily Energy Efficiency No-Cost Solutions; Multifamily Direct Therm Savings; Multifamily Home Tune-Up	New program for Los Angeles Department of Water and Power
Louisville/Jefferson County		No multifamily program	
Memphis ¹⁵	Memphis Light, Gas and Water	Energy Advantage Apartments	New program
Miami-Fort Lauderdale-West Palm Beach		No multifamily program	

Metropolitan area	Utilities or program administrators	Multifamily programs ^a	Changes from 2013 ACEEE report
Milwaukee-Waukesha-West Allis ¹⁶	Focus on Energy: statewide non-utility program	Multifamily Energy Savings; Multifamily Direct Install	Revised program with increased incentive amounts available
Minneapolis-St. Paul-Bloomington ¹⁷	Xcel Energy and CenterPoint Energy	Multifamily Building Efficiency Program	New joint program introduced in 2015
Nashville-Davidson--Murfreesboro--Franklin		No multifamily program	
New Orleans-Metairie		No multifamily program	
New York-Newark-Jersey City ¹⁸	ConEdison; National Grid; NYSERDA	Equipment Rebates for Multifamily Buildings; Multifamily Energy Efficiency Program; High-Efficiency Gas Multifamily Building Incentives; Multifamily Buildings-Direct Install Program; Low-Income Multifamily Performance Program	No major changes
Oklahoma City		No multifamily program	
Omaha-Council Bluffs ¹⁹	Omaha Public Power District	HVAC Smart for Apartment Buildings	Utility not included in the 2013 ACEEE report
Orlando-Kissimmee-Sanford ²⁰	Orlando Utilities Commission	Multifamily Efficiency Program	New program
Philadelphia-Camden-Wilmington ²¹	PECO Energy	Smart Multifamily Solutions	New program
Phoenix-Mesa-Scottsdale ²²	Arizona Public Service	Multifamily Energy Efficiency Program; Smarter Greener Better Builders and Multifamily Rebates	
Pittsburgh ²³	Duquesne Light; West Penn Power	Multifamily Housing Retrofit Program; WARM Multifamily Program	New program
Portland-Vancouver-Hillsboro ²⁴	Energy Trust of Oregon (statewide non-utility program)	Energy Trust Multifamily Incentives; Energy Trust New Construction--Major Renovation and Tenant Improvements	Restructured programs

Metropolitan area	Utilities or program administrators	Multifamily programs ^a	Changes from 2013 ACEEE report
Providence-Warwick ²⁵	National Grid	Income Eligible Multifamily; EnergyWise Multifamily; Commercial and Industrial Multifamily	Expanded services and eligibility
Raleigh ²⁶	Duke Energy Progress	Residential Multifamily Energy Efficiency Program	New program
Richmond, VA		No multifamily program	
Riverside-San Bernardino-Ontario ²⁷	Riverside Public Utilities; Southern California Edison; Southern California Gas	Multifamily/Mobile Home Direct Install; Multifamily Energy Efficiency Rebate Program; Multifamily Direct Therm Savings; Multifamily Home Tune Up	New program for Riverside Public Utilities
Sacramento--Roseville--Arden-Arcade ²⁸	Sacramento Municipal Utility District; Pacific Gas & Electric	Home Performance Program for Multifamily; Multifamily Express Energy Solutions; Multifamily Upgrade Program; Multifamily Cooling Optimizer Program; Multifamily Efficiency Rebates Program; California New Homes Multifamily Program	Core programs are not new. Added cooling and upgrade programs.
Salt Lake City ²⁹	Questar Gas	Thermwise Weatherization; Thermwise Appliance Rebates; Thermwise Multifamily Builder	Restructured and expanded programs. Thermwise programs are not specifically multifamily, but have clear targeting and tracking of MF properties.
San Antonio-New Braunfels ³⁰	CPS Energy	Multi-Family Energy Efficiency Program	New program
San Diego-Carlsbad ³¹	San Diego Gas & Electric	Multifamily Energy Efficiency Rebate Program; Energy Upgrade California Home Upgrade Program	Significant increase in funding. Added multifamily target to upgrade program.

Metropolitan area	Utilities or program administrators	Multifamily programs ^a	Changes from 2013 ACEEE report
San Francisco-Oakland-Hayward ³²	Pacific Gas & Electric	California New Homes Multifamily Program; Multifamily Energy Efficiency Rebates Program; Multifamily Cooling Optimizer Program; Multifamily Upgrade Program	Core programs are not new. Added cooling and upgrade programs.
San Jose-Sunnyvale-Santa Clara ³³	Pacific Gas & Electric	California New Homes Multifamily Program; Multifamily Energy Efficiency Rebates Program; Multifamily Cooling Optimizer Program; Multifamily Upgrade Program	Core programs are not new. Added cooling and upgrade programs.
Seattle-Tacoma-Bellevue ³⁴	Seattle City Light, Puget Sound Energy	Multifamily New Construction Incentives; Multifamily Retrofit; Energy Savings Upgrades and In-Unit/Apartment Rebates for Multifamily Buildings	Restructured and expanded programs.
St. Louis ³⁵	Ameren Missouri	Community Savers Rebate Program	New program
Tampa-St. Petersburg-Clearwater		No multifamily program	
Tucson ³⁶	Tucson Electric Power	Multifamily Housing Program	Utility not included in the 2013 ACEEE report
Urban Honolulu ³⁷	Hawaiian Electric	Multifamily Pilot Program	New program
Virginia Beach-Norfolk-Newport News		No multifamily program	
Washington-Arlington-Alexandria ³⁸	DC Sustainable Energy Utility	Low-Income Multifamily Initiatives	Restructured programs

^a Demand response programs were excluded from this report's research. *Sources:* ¹ Georgia Power Company 2016; Data request. ² Austin Energy 2016. ³ BGE 2016; data request. ⁴ Mass Saves 2016. ⁵ Duke Energy Carolinas 2016. ⁶ Commonwealth Edison Company 2016; Nicor Gas Company 2016a; Nicor Gas Company 2016b; Peoples Gas and North Shore Gas 2016; data request. ⁷ Duke Energy Ohio 2016; data request. ⁸ AEP Ohio 2016; data request. ⁹ Xcel Energy 2016a. ¹⁰ Consumers Energy 2016; DTE Energy 2016; data request. ¹¹ Connecticut Statewide Energy Efficiency Dashboard 2016; data request. ¹² CenterPoint Energy Houston Electric, LLC 2016; data request. ¹³ Data request. ¹⁴ California Public Utilities Commission 2016; data request. ¹⁵ MLGW 2016; data request. ¹⁶ Focus on Energy 2016; data request. ¹⁷ Centerpoint Energy 2016; Xcel Energy 2016b; data request. ¹⁸ New York Department of Public Service 2016. ¹⁹ OPPD 2016. ²⁰ Data request. ²¹ PECO Energy Company 2015. ²² Arizona Public Service Company 2016. ²³ Duquesne Light Company 2015; FirstEnergy 2015. ²⁴ Data request. ²⁵ National Grid 2016; data request. ²⁶ Duke Energy Progress, LLC 2016. ²⁷ California Public Utilities Commission 2017; Riverside Public Utilities 2015; data request. ²⁸ California Public Utilities Commission 2017; data request. ²⁹ Questar Gas 2016. ³⁰ CPS Energy 2017; data request. ³¹ California Public Utilities Commission 2017. ³² California Public Utilities Commission 2017; data request. ³³ California Public Utilities Commission 2017; data request. ³⁴ Puget Sound Energy 2016; data request. ³⁵ Data request. ³⁶ Tucson Electric Power 2016. ³⁷ Hawaiian Electric Company 2016; data request. ³⁸ Data request.

Table C2. Summary spending and offerings of utility customer-funded multifamily energy efficiency programs

Metropolitan area	Utilities or program administrators	2015 spending ^a	Program spending per residential customer ^b	Program spending as a percentage of total EE spending	Targets low-income	Direct install	Equipment rebates	Comprehensive retrofits	Financing available
Atlanta-Sandy Springs-Roswell ¹	Georgia Power	\$1,326,878	\$0.63	3.33%	No	No	Yes	No	No
Austin-Round Rock ²	Austin Energy	\$2,612,788	\$6.47	15.52%	No	Yes	Yes	Yes	No
Baltimore-Columbia-Towson ³	Baltimore Gas & Electric	\$2,372,591	\$1.47	1.44%	Yes	Yes	Yes	Yes	Yes
Boston-Cambridge-Newton ⁴	Eversource; National Grid	\$71,620,939	\$29.04	12.13%	Yes	Yes	Yes	Yes	Yes
Charlotte-Concord-Gastonia ⁵	Duke Energy Carolinas	\$2,093,039	\$1.27	1.90%	No	Yes	No	No	No
Chicago-Naperville-Elgin ⁶	ComEd; Nicor Gas; Peoples-North Shore Gas	\$8,164,932	\$1.36	4.88%	No	Yes	Yes	Yes	Yes
Cincinnati ⁷	Duke Energy Ohio	\$80,972	\$0.10	0.25%	No	Yes	No	No	No
Cleveland-Elyria		NA	NA	NA					
Columbus ⁸	AEP Ohio	\$590,418	\$0.46	0.96%	No	Yes	No	No	No
Dallas-Fort Worth-Arlington		NA	NA	NA					
Denver-Aurora-Lakewood ⁹	Xcel Energy	\$1,710,980	\$0.70	1.81%	Yes	Yes	Yes	Yes	Yes
Detroit-Warren-Dearborn ¹⁰	DTE; Consumers Energy	\$8,945,466	\$1.46	4.36%	Yes	Yes	Yes	Yes	No
Hartford-West Hartford-East Hartford ¹¹	Eversource; Connecticut Natural Gas	\$16,570,000	\$8.59	1.56%	Yes	Yes	Yes	Yes	Yes

Metropolitan area	Utilities or program administrators	2015 spending ^a	Program spending per residential customer ^b	Program spending as a percentage of total EE spending	Targets low-income	Direct install	Equipment rebates	Comprehensive retrofits	Financing available
Houston-The Woodlands-Sugar Land ¹²	CenterPoint Energy	\$1,108,002	\$0.71	2.96%	Yes	Yes	Yes	No	No
Indianapolis-Carmel-Anderson		NA	NA	NA					
Jacksonville		NA	NA	NA					
Kansas City ¹³	Kansas City Power & Light	NA	NA	NA	Yes	Yes	Yes	No	No
Las Vegas-Henderson-Paradise		NA	NA	NA					
Los Angeles-Long Beach-Anaheim ¹⁴	Los Angeles Department of Water & Power; Southern California Edison; Southern California Gas	\$28,390,667	\$0.04 (LADWP) \$5.57 (SCE) \$0.73 (SCG)	6.31%	Yes	Yes	Yes	Yes	No
Louisville/Jefferson County		NA	NA	NA					
Memphis ¹⁵	Memphis Light, Gas and Water	NA	NA	NA	No	No	Yes	No	No
Miami-Fort Lauderdale-West Palm Beach		NA	NA	NA					
Milwaukee-Waukesha-West Allis ¹⁶	Focus on Energy (statewide non-utility program)	\$2,330,734	\$0.55	3.73%	No	Yes	Yes	Yes	No

Metropolitan area	Utilities or program administrators	2015 spending ^a	Program spending per residential customer ^b	Program spending as a percentage of total EE spending	Targets low-income	Direct install	Equipment rebates	Comprehensive retrofits	Financing available
Minneapolis-St. Paul-Bloomington ¹⁷	Xcel Energy and CenterPoint Energy	\$1,374,113	\$0.60	1.05%	Yes	Yes	Yes	Yes	No
Nashville-Davidson--Murfreesboro--Franklin		NA	NA	NA					
New Orleans-Metairie		NA	NA	NA					
New York-Newark-Jersey City ¹⁸	ConEdison; National Grid; NYSERDA	\$30,050,846	\$2.82	11.25%	Yes	Yes	Yes	Yes	Yes
Oklahoma City		NA	NA	NA					
Omaha-Council Bluffs ¹⁹	Omaha Public Power District	NA	NA	NA	No	No	Yes	No	No
Orlando-Kissimmee-Sanford ²⁰	Orlando Utilities Commission	\$87,453	\$0.45	6.09%	No	No	Yes	Yes	No
Philadelphia-Camden-Wilmington ²¹	PECO Energy	\$2,646,000	\$1.44	1.78%	No	Yes	Yes	Yes	No
Phoenix-Mesa-Scottsdale ²²	Arizona Public Service	\$1,852,755	\$1.77	2.88%	No	Yes	Yes	Yes	Yes
Pittsburgh ²³	Duquesne Light; West Penn Power	\$1,309,000	\$2.50	3.24%	Yes	Yes	Yes	Yes	Yes
Portland-Vancouver-Hillsboro ²⁴	Energy Trust of Oregon (statewide non-utility program)	\$6,292,211	\$3.22	7.19%	No	Yes	Yes	Yes	Yes
Providence-Warwick ²⁵	National Grid	\$9,821,600	\$14.64	9.53%	Yes	Yes	Yes	Yes	Yes

Metropolitan area	Utilities or program administrators	2015 spending ^a	Program spending per residential customer ^b	Program spending as a percentage of total EE spending	Targets low-income	Direct install	Equipment rebates	Comprehensive retrofits	Financing available
Raleigh ²⁶	Duke Energy Progress	\$2,615,745	\$2.36	3.67%	No	Yes	No	No	No
Richmond		NA	NA	NA					
Riverside-San Bernardino-Ontario ²⁷	Riverside Public Utilities; Southern California Edison; Southern California Gas	\$28,488,685	\$1.58 (RPU) \$5.57 (SCE) \$0.73 (SCG)	7.43%	No	Yes	Yes	Yes	No
Sacramento–Roseville–Arden-Arcade ²⁸	Sacramento Municipal Utility District; Pacific Gas & Electric	\$5,950,900	\$2.70 (SMUD) \$0.52 (PGE)	1.71%	No	Yes	Yes	Yes	Yes
Salt Lake City ²⁹	Questar Gas	\$2,070,713	\$2.35	8.56%	No	No	Yes	No	No
San Antonio-New Braunfels ³⁰	CPS Energy	NA	NA	NA	No	Yes	No	No	No
San Diego-Carlsbad ³¹	San Diego Gas & Electric	\$11,460,000	\$3.91	14.41%	No	No	Yes	Yes	No
San Francisco-Oakland-Hayward ³²	Pacific Gas & Electric	\$4,477,900	\$0.52	1.43%	No	Yes	Yes	Yes	Yes
San Jose-Sunnyvale-Santa Clara ³³	Pacific Gas & Electric	\$4,477,900	\$0.52	1.43%	No	Yes	Yes	Yes	Yes

Metropolitan area	Utilities or program administrators	2015 spending ^a	Program spending per residential customer ^b	Program spending as a percentage of total EE spending	Targets low-income	Direct install	Equipment rebates	Comprehensive retrofits	Financing available
Seattle-Tacoma-Bellevue ³⁴	Seattle City Light, Puget Sound Energy	\$21,161,377	\$21.98 (SCL) \$8.05 (PSE)	13.57%	No	Yes	Yes	Yes	No
St. Louis ³⁵	Ameren Missouri	\$4,500,000	\$4.31	7.76%	Yes	Yes	Yes	Yes	No
Tampa-St. Petersburg-Clearwater		NA	NA	NA					
Tucson ³⁶	Tucson Electric Power	\$99,708	\$0.26	0.64%	No	Yes	Yes	No	No
Urban Honolulu ³⁷	Hawaiian Electric	\$600,000	\$2.23	10.09%	Yes	Yes	No	No	No
Virginia Beach-Norfolk-Newport News		NA	NA	NA					
Washington-Arlington-Alexandria ³⁸	DC Sustainable Energy Utility	\$2,428,095	\$6.42	12.99%	Yes	Yes	Yes	Yes	No

^a Whenever possible, we have included actual spending totals for multifamily-specific programs. However there are some instances where only budget totals were available for inclusion in this report. Multifamily spending totals for investor-owned California utilities include all energy efficiency spending tracked for multifamily properties, and this includes some minor spending in programs that do not specifically target multifamily properties. ^b Most metro areas are served by either investor-owned or municipal utilities. Four metro areas are served by both a municipal and investor-owned utility. Because the customer bases of these utilities are substantially different in size, we have provided spending per residential customer numbers for the individual utilities rather than the combined spending per residential customer for all utilities. All customer totals are drawn from the EIA (2016). *Sources:* ¹ Georgia Power Company 2016; data request. ² Austin Energy 2016. ³ BGE 2016; data request. ⁴ Mass Saves 2016. ⁵ Duke Energy Carolinas 2016. ⁶ Commonwealth Edison Company 2016; Nicor Gas Company 2016a; Nicor Gas Company 2016b; Peoples Gas and North Shore Gas 2016; data request. ⁷ Duke Energy Ohio 2016; data request. ⁸ AEP Ohio 2016; EIA 2016a; data request. ⁹ Xcel Energy 2016a. ¹⁰ Consumers Energy 2016; DTE Energy 2016; data request. ¹¹ Connecticut Statewide Energy Efficiency Dashboard 2016; data request. All spending totals are 2016 budget numbers for Energize Connecticut, the state energy efficiency program implementer. Customer totals for 2015 are used because 2016 customer totals were not available at the time this report was published. ¹² CenterPoint Energy Houston Electric, LLC 2016; data request. ¹³ Data request. ¹⁴ California Public Utilities Commission 2017; data request. ¹⁵ MLGW 2016; data request. ¹⁶ Focus on Energy 2016; data request. ¹⁷ Centerpoint Energy 2016; Xcel Energy 2016b; data request. ¹⁸ New York Department of Public Service 2016. ¹⁹ OPPD 2016. ²⁰ Data request. ²¹ PECO Energy Company 2015. ²² Arizona Public Service Company 2016. ²³ Duquesne Light Company 2015; West Penn Power Company 2015. Multifamily spending totals were not available from West Penn Power, and thus all West Penn Power energy efficiency spending has been excluded from our reporting. ²⁴ Data request. ²⁵ National Grid 2016; data request. ²⁶ Duke Energy Progress, LLC 2016. ²⁷ California Public Utilities Commission 2017; Riverside Public Utilities 2015; data request. ²⁸ California Public Utilities Commission 2017; data request. ²⁹ Questar Gas 2016. ³⁰ CPS Energy 2017; data request. ³¹ California Public Utilities Commission 2017. ³² California Public Utilities Commission 2017; data request. ³³ California Public Utilities Commission 2017; data request. ³⁴ Puget Sound Energy 2016; data request. ³⁵ EIA 2016a; data request. ³⁶ Tucson Electric Power 2016. ³⁷ Hawaiian Electric Company 2016; data request. ³⁸ Data request.