

LIHEAP Home Energy Notebook

For Fiscal Year 2013



**U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
Administration for Children and Families
Office of Community Services
Division of Energy Assistance
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List of Acronyms and Abbreviations

ACF	HHS' Administration for Children and Families
ACS	American Community Survey
ASEC	CPS Annual Social and Economic Supplement
Btu	British Thermal Unit
CDD	Cooling Degree Day
CPI	Consumer Price Index
CPS	Current Population Survey
DEA	OCS' Division of Energy Assistance
DOE	U.S. Department of Energy
EIA	DOE's Energy Information Administration
EMEUE	EIA's Office of Energy Markets and End Use
FY	Fiscal Year
GPRA	Government Performances and Results Act of 1993 (Public Law 103-62)
HDD	Heating Degree Day
HHS	U.S. Department of Health and Human Services
LIHEAP	Low Income Home Energy Assistance Program
LIEAP	Low Income Energy Assistance Program
MMBtus	Million British Thermal Units
NC	No cases in sample
NOAA	National Oceanographic and Atmospheric Administration
OCS	ACF's Office of Community Services
RECS	Residential Energy Consumption Survey

Executive Summary

The Low Income Home Energy Assistance Program (LIHEAP) is authorized by Title XXVI of the Omnibus Budget Reconciliation Act of 1981 (OBRA), Public Law 97-35, as amended. The Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services (HHS) administers LIHEAP at the Federal level.

In 1994, Congress amended the purpose of LIHEAP to clarify that LIHEAP is “to assist low income households, particularly those with the lowest income, that pay a high proportion of household income for home energy, primarily in meeting their immediate home energy needs.” (The Human Services Amendments of 1994, Public Law 103-252, Sec. 2602(a) as amended.) The Energy Policy Act of 2005 (Public Law 109-58) reauthorized LIHEAP through Fiscal Year (FY) 2007 without substantive changes. LIHEAP's reauthorization is currently pending.

The *LIHEAP Home Energy Notebook* focuses on the home energy mission of LIHEAP by providing LIHEAP grantees with the latest national and regional data on home energy consumption, expenditures, and burden; low income home energy trends; and the LIHEAP performance measurement system. This summary highlights information presented in the *Notebook*.

Home energy data

The primary information source for the data on residential energy is the 2009 Residential Energy Consumption Survey (RECS), which is administered by the Department of Energy's (DOE's) Energy Information Administration (EIA). The RECS covers all residential housing units that are primary residences in the United States and contains data for consumption and expenditures for calendar year 2009. All FY 2013 residential energy consumption and expenditures figures for this report have been derived from the 2009 RECS data that were adjusted to reflect FY 2013 weather and fuel prices.

Residential energy data

In FY 2013, average residential energy expenditures for all households were \$2,058, and the mean individual energy burden was 8.2 percent of income.¹ Low income households had average energy expenditures of \$1,768, more than 14 percent lower than the average for all households.² The mean individual energy burden for low income households was 17.7 percent, over twice the mean individual energy burden of all households. LIHEAP recipient households had average residential energy expenditures of \$1,989, about 13 percent higher than the average for all low income households. The mean individual energy burden for LIHEAP recipients was 18.1 percent, 9.9 percentage points higher than the mean individual energy burden for all households and 0.4 percentage points higher than the mean individual energy burden for low income households.

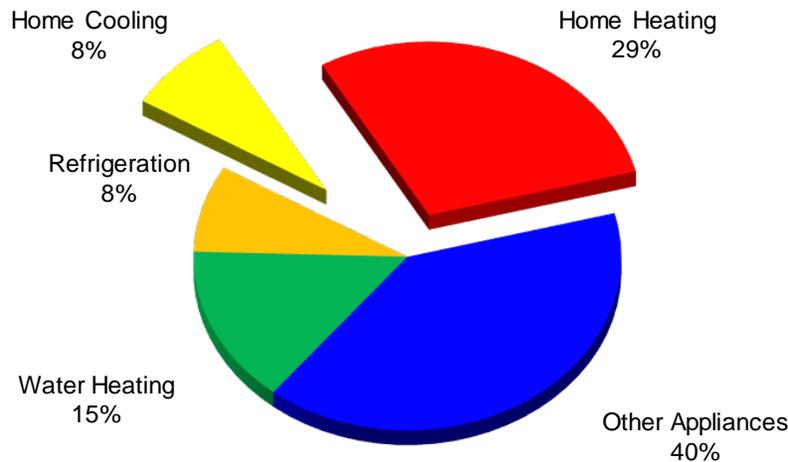
LIHEAP assists households with only that portion of residential energy costs that goes for home energy, i.e., home heating and home cooling. As shown in Figure 1, home heating and home cooling

¹ The mean is the sum of all values divided by the number of values. The mean is also referred to as the average. See Appendix A for a discussion of the computation of energy burden statistics.

² Unless otherwise indicated, “low income” refers to households with income at or below the Federal maximum LIHEAP eligibility standard (i.e., the greater of 150 percent of HHS Poverty Guidelines and 60 percent of State median income). The terms “low income” and “LIHEAP income eligible” are, unless otherwise indicated, equivalent in the Executive Summary. “Non-low income” refers to those households with incomes above the Federal maximum LIHEAP eligibility standard.

represented about 37 percent of residential energy expenditures for low income households in FY 2013. Refrigerators and freezers represented about 8 percent of residential energy expenditures, water heating represented about 15 percent of residential energy expenditures, and other appliances represented about 40 percent of residential energy expenditures.

Figure 1. Percent of U.S. residential energy expenditures by low income households, by end use, FY 2013



Home heating data

The three most common heating fuels in 2009, the most recent year for which household heating fuel usage data are available, were natural gas (49 percent), electricity (34 percent), and fuel oil (6 percent). Over the last decade, the share of households using electricity as a main heating fuel has increased significantly, while the share using fuel oil has declined. There were only small deviations from this pattern in main heating fuel choice by income group.

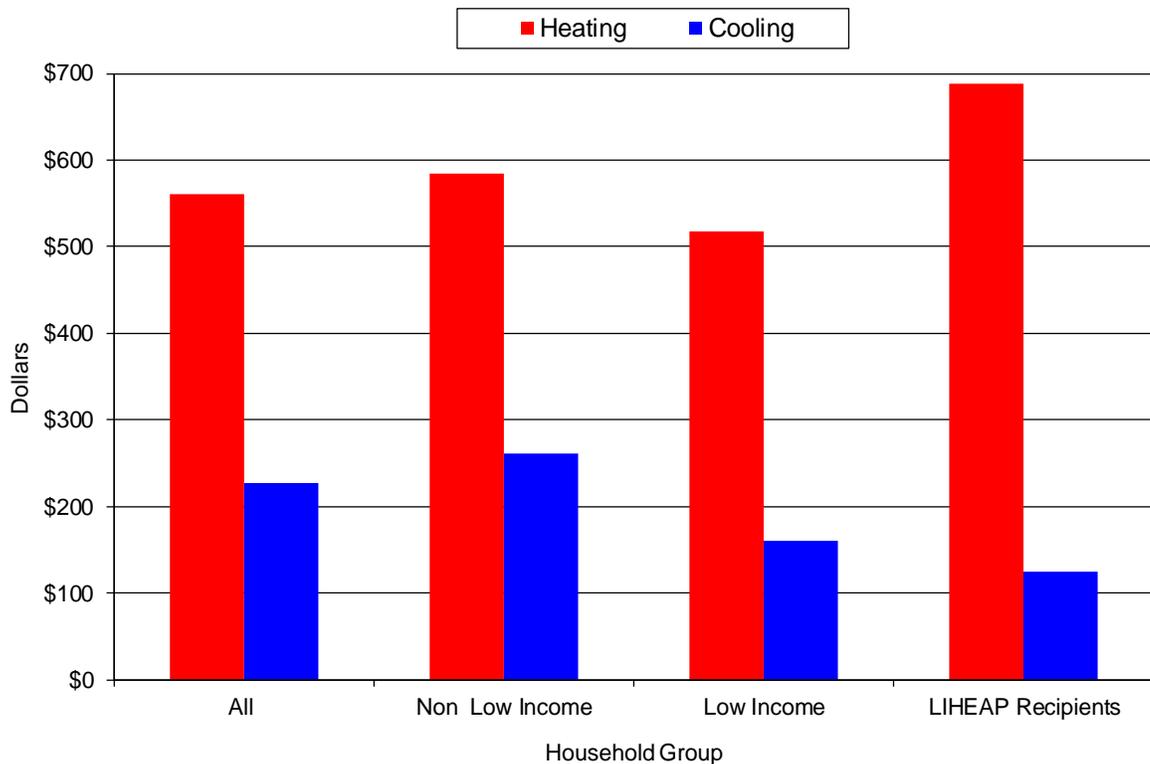
In FY 2013, as shown in Figures 2 and 3, average home heating expenditures for all households were \$561, and the mean individual home heating burden was 2.8 percent. Low income households had average home heating expenditures of \$518; this average was about 8 percent lower than that for all households. The mean individual home heating burden for low income households was 6.5 percent, over twice as much as the mean individual home heating burden for all households. The average home heating expenditures for LIHEAP recipient households was \$688, about 33 percent higher than the average for low income households and about 23 percent higher than the average for all households. Mean individual home heating burden for LIHEAP recipient households was 7.6 percent, more than two and a half times the average for all households, and more than 1 percentage point higher than that for low income households. Average home heating expenditures (and consumption) for LIHEAP recipient households were greater than that for all low income households because LIHEAP heating assistance recipient households tend to live in colder climate regions.

Home cooling data

In 2009, nearly 93 percent of all households cooled their homes using one of the methods recorded by the RECS.³ Low income and LIHEAP recipient households were less likely to cool their homes than were non-low income households; 89.1 percent of low income households and 88.6 percent of LIHEAP recipient households cooled their homes using one of these methods.

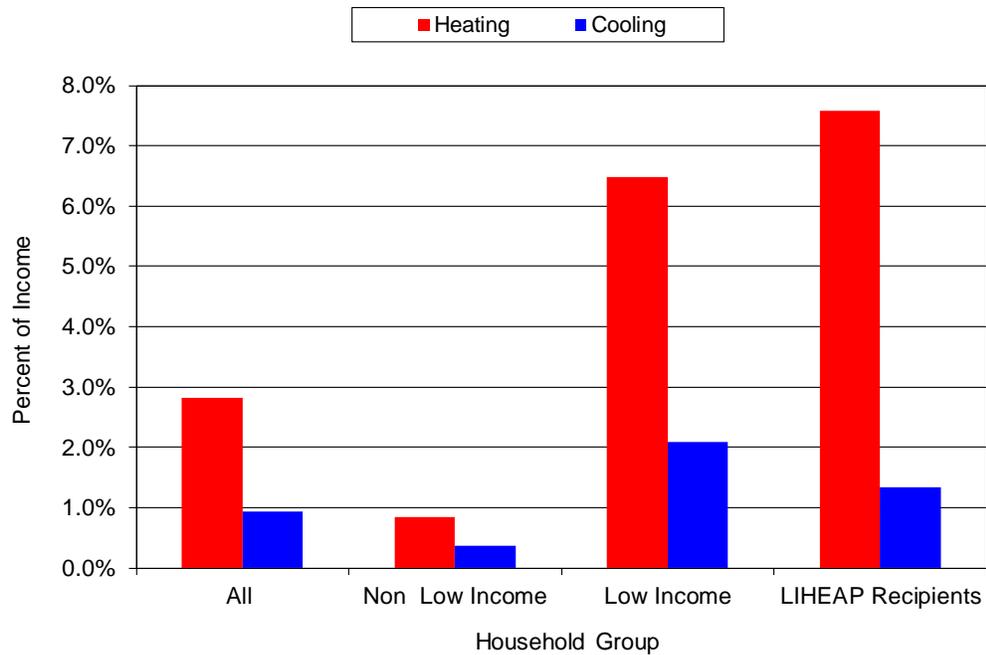
As Figures 2 and 3 show, in FY 2013, for households that cooled, average home cooling expenditures for all households were \$227, and the mean individual home cooling burden was 0.9 percent. Low income households had average home cooling expenditures of \$161; this average was about 29 percent lower than that for all households. The mean individual home cooling burden for low income households was 2.1 percent, more than twice as much as the mean individual home cooling burden for all households. Average home cooling expenditures for LIHEAP recipient households were \$125, about 22 percent lower than the average for low income households and almost 45 percent lower than the average for all households. The mean individual home cooling burden for LIHEAP recipient households was 1.3 percent, about 44 percent higher than the mean individual home cooling burden for all households.

Figure 2. Mean home heating and home cooling expenditures by all households, non-low income households, low income households, and LIHEAP recipient households, FY 2013



³ The 2009 RECS records cooling methods such as central or room air-conditioning as well as non air-conditioning cooling devices (e.g., ceiling fans and evaporative coolers). The 2009 RECS excludes several types of cooling, such as table and window fans.

Figure 3. Mean individual burden of heating and cooling expenditures for all households, non-low income households, low income households, and LIHEAP recipient households, FY 2013



Low income home energy trends

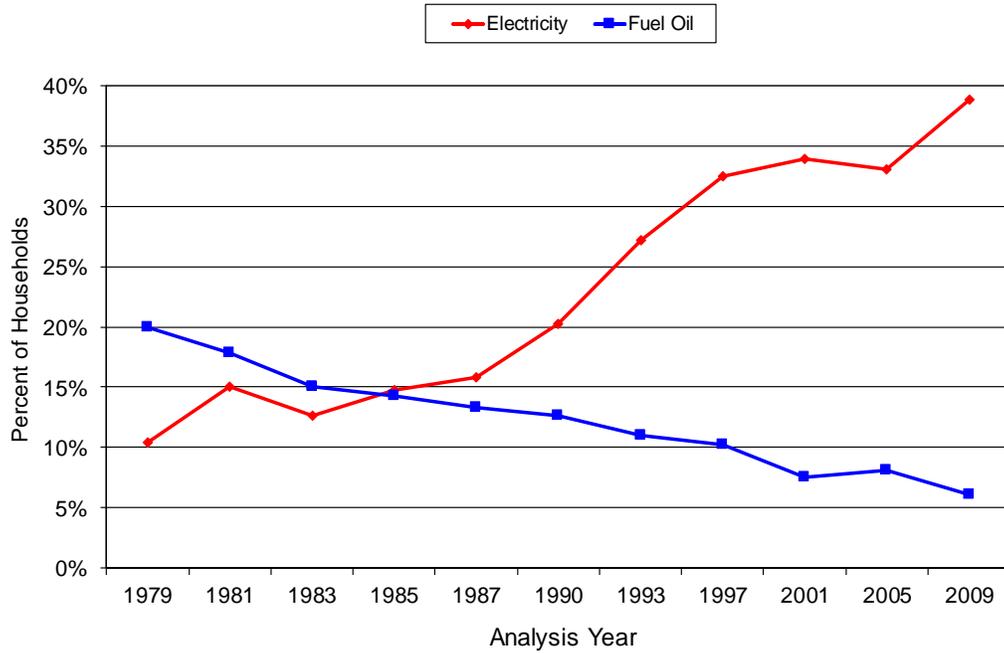
This section presents data on home energy trends for low income households from 1979 through 2009 or FY 2013, depending upon the latest year of availability.⁴ Statistics are derived from a series of national residential energy consumption surveys (including the RECS) and from HHS’ administrative statistics. The analyses show significant shifts since 1979 in the types and amounts of energy used by low income households.

Home heating and cooling trends

Figure 4 demonstrates that the share of low income households that used electricity as their main heating fuel increased from about 10 percent in 1979 to 34 percent in 2001, dropped slightly to 33 percent in 2005, and increased to almost 39 percent in 2009. In contrast, the share of low income households that used fuel oil as their main heating fuel steadily declined from 20 percent in 1979 to 6 percent in 2009. Natural gas remained the dominant type of space heating fuel used over the 30-year period.

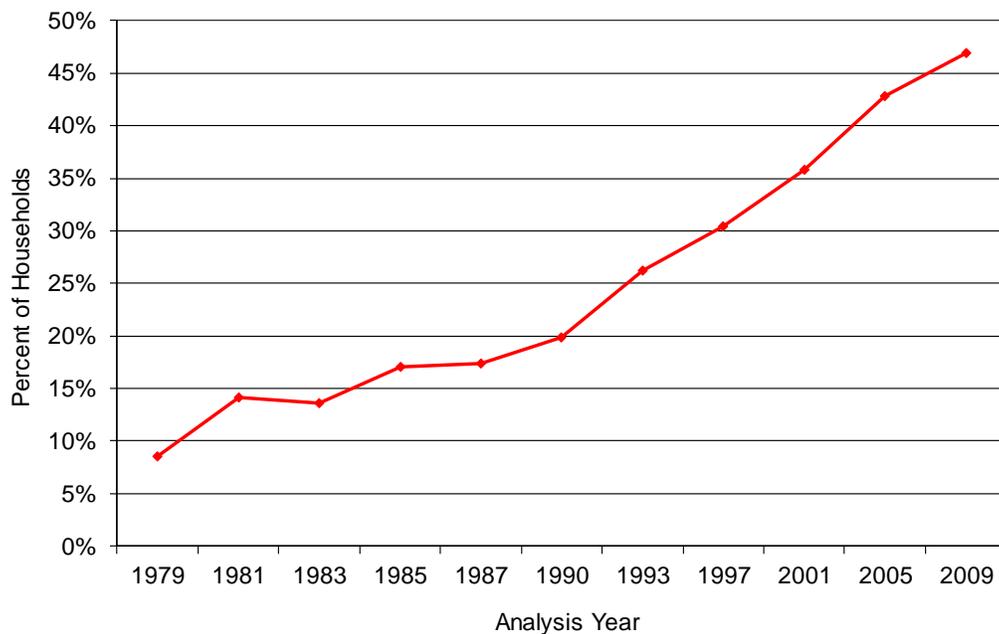
⁴In this section, low income households are defined as those households with incomes at or below 150 percent of HHS Poverty Guidelines.

Figure 4. Percent of low income households using electricity and fuel oil as main heating fuels, 1979 to 2009



As shown in Figure 5, the most important change in home cooling on the part of low income households has been in the percentage of households with central air-conditioning. The share of low income households who use central air-conditioning increased from 8.5 percent in 1979 to almost 47 percent in 2009.

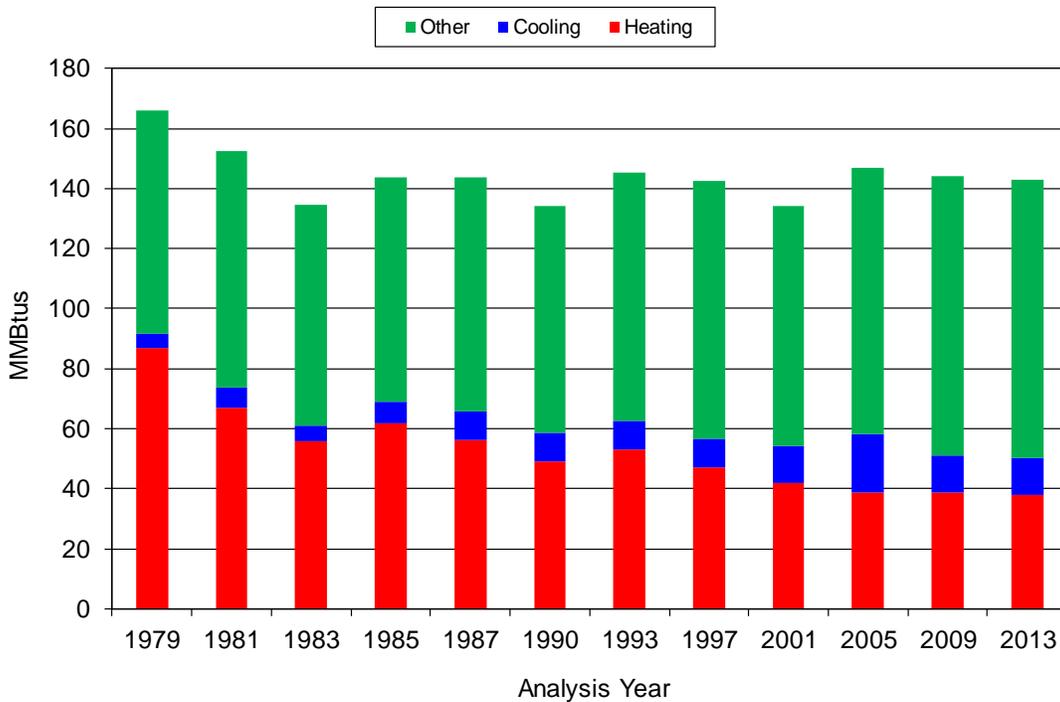
Figure 5. Percent of low income households using central air-conditioning, 1979 to 2009



Trends in mean residential consumption, expenditures, and energy burden

Low income households substantially decreased their mean residential energy consumption between 1979 and 1983, as shown in Figure 6. This suggests a significant increase in efficiency resulting from conservation measures or actions. From 1983 to 1990, mean residential energy consumption fluctuated from year to year, corresponding to expected changes in heating and cooling consumption because of changes in heating and cooling degree days. For 1993 through 2005, there appears to have been an increase in the use of energy for purposes other than home heating and home cooling. Between 2005 and 2009, the decrease in home cooling was slightly offset by higher consumption for purposes other than home cooling or heating. Between 2009 and FY 2013, the use of energy for home heating, home cooling, and for other purposes, appears to have remained fairly stable with only home heating decreasing slightly in FY 2013.

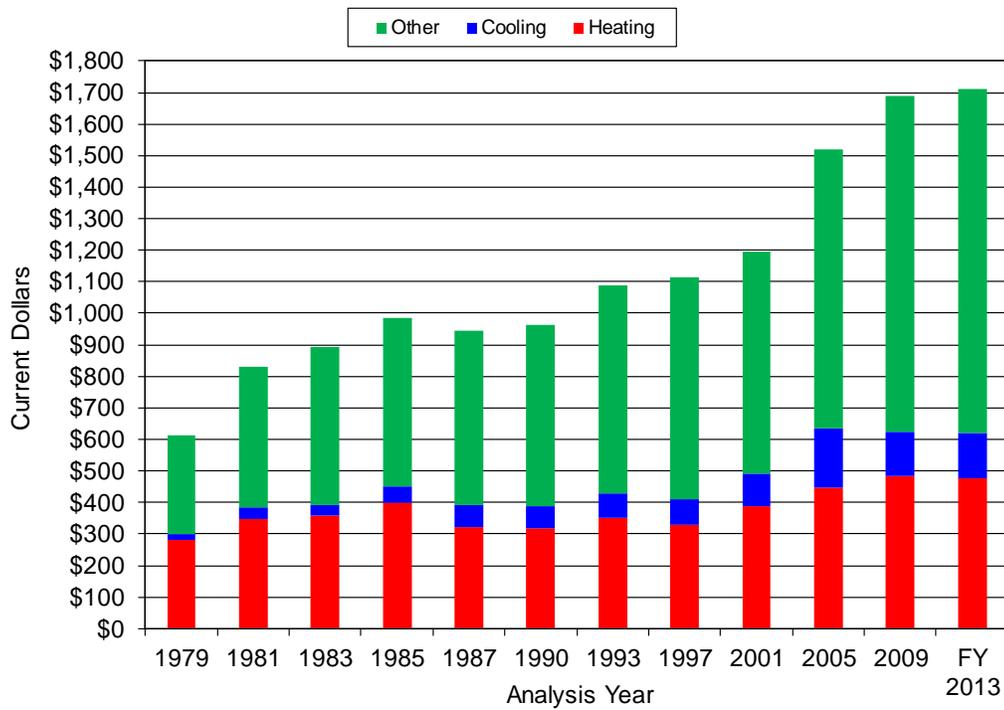
Figure 6. Mean residential energy consumption (in MMBtus) per low income household, 1979 to FY 2013^{1/}



^{1/} A British Thermal Unit (Btu) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MMBtus, MmBTUs or mmBTUs refer to values in millions of Btus.

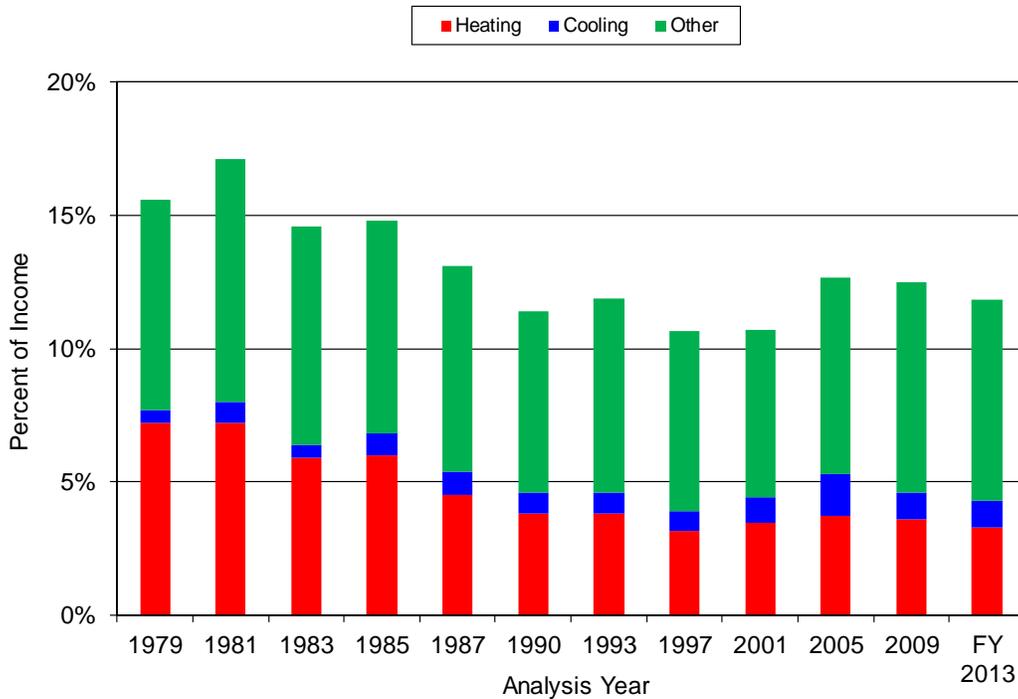
Mean residential energy expenditures increased rapidly between 1979 and 1985 because of fuel price increases, as shown in Figure 7. From 1987 through 1997, these expenditures rose moderately; however from 2001 through 2009, mean expenditures on heating increased steadily as the result of fuel price increases and colder winter weather. Between 2005 and FY 2013, mean expenditures for home heating fluctuated, again due to higher fuel prices and changing weather. Mean expenditures on uses other than home heating or home cooling rose continuously from 1979 to FY 2013. Mean expenditures on cooling rose from 1979 to 2005. In 2009, expenditures on cooling decreased relative to 2005 but expenditures on heating and for other purposes increased. Between 2009 and FY 2013, expenditures on home energy remained relatively stable with a slight decrease in home heating expenditures offset by an increase in home cooling and expenditures for other purposes.

Figure 7. Mean residential energy expenditures for low income households, 1979 to FY 2013



As Figure 8 shows, the mean group home energy burden (i.e., burden associated with home heating and home cooling) declined from 7.7 percent in 1979 to 4.3 percent in FY 2013; this represented a decline of 3.4 percentage points.⁵ The decline in mean group residential energy burden from 1979 to FY 2013 was 3.8 percentage points (from 15.6 percent to 11.8 percent). Most of the decline in residential energy burden is associated with a decline in home energy burden rather than a decline in the burden associated with energy use for other purposes (i.e., water heating, appliances, and refrigeration).

Figure 8. Mean group residential energy burden by end use for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013



Analysis of fuel price and energy efficiency trends

Trends in energy consumption and expenditures are dependent on factors such as energy prices, weather, and energy efficiency. Fuel prices outpaced the Consumer Price Index (CPI) from 1979 through 1983, as shown in Figure 9 on the next page. While the CPI increased about 37 percent, the composite average of fuel prices (a weighted average of electric, natural gas, and fuel oil prices) increased by about 81 percent between 1979 and 1983. From 1985 through 1993, fuel prices rose at a slower rate than did the CPI (i.e., at a slower rate than the cost of other goods). From 1997 to through 2013 however, fuel prices rose at a higher rate than did the prices of other goods. In 2005, the composite energy price index was 321 while the CPI was 269. The impact of energy prices on energy expenditures resulted in low income household energy expenditures surging upward until 1985 even though energy consumption for these households declined over the same period. The 19 percent

⁵ Mean group burden is defined in Appendix A.

growth in composite fuel prices from 1985 to 1997 explains why residential energy expenditures per low income household rose slightly during that period. In 2001, fuel prices increased by 17 percent over 1997 prices; 2005 fuel prices increased by 24 percent over 2001 prices; and 2009 fuel prices increased by nearly 15 percent over 2005 prices. In FY 2013, fuel prices increased again. FY 2013 fuel prices were over 7 percent higher than 2009 fuel prices. The increases in fuel prices from 2005 through FY 2013 contributed to the rise in expenditures during that period.

Figure 9. Shifts in composite energy price index and Consumer Price Index (CPI), 1979 to FY 2013

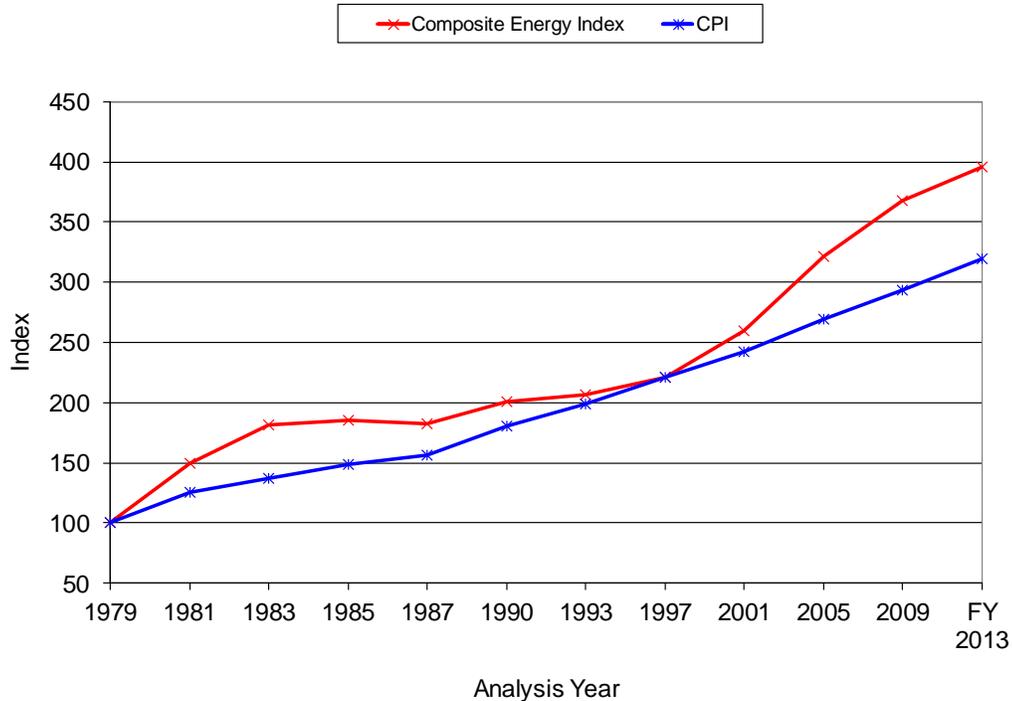
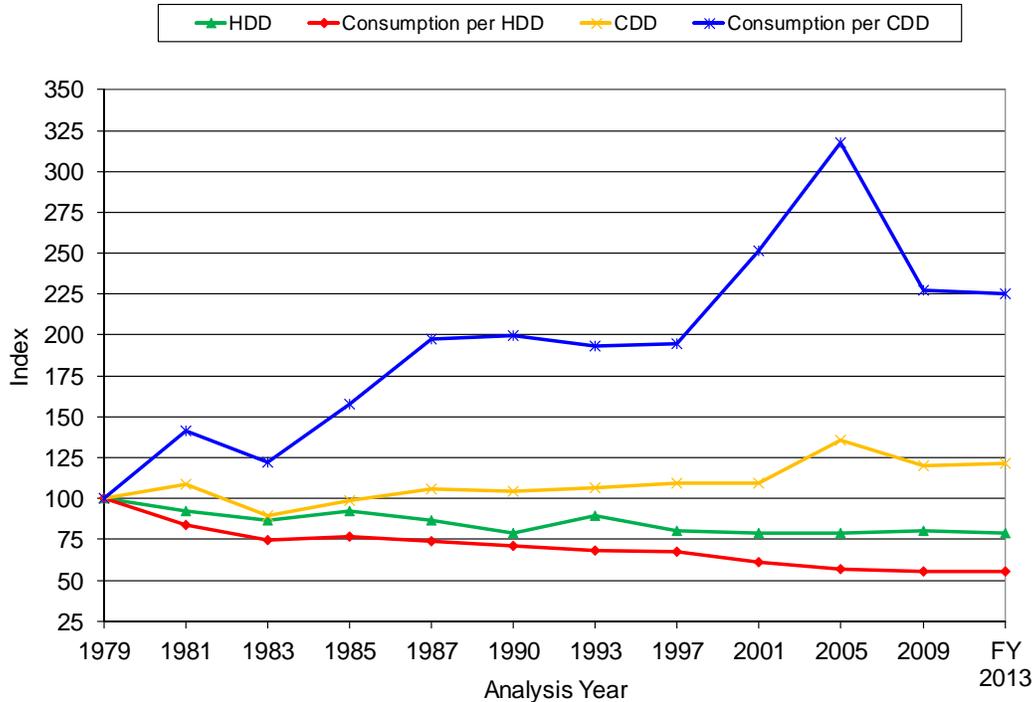


Figure 10 shows on the next page average energy consumption for heating and cooling compared to heating and cooling degree days from 1979 to FY 2013 for low income households. As shown, heating consumption per heating degree day generally declined from 1979 to FY 2013 probably at least in large part due to energy conservation efforts. In contrast, cooling consumption per cooling degree day rose through FY 2013, with a spike around 2001 and 2005, because of a large increase in the availability of air-conditioning to low income households.⁶ Only 37 percent of low income households had air-conditioning equipment in 1979, but by 2005 the number had risen to 80 percent, followed by a slight decrease in 2009 to 77 percent.

⁶Air-conditioning equipment includes central air conditioners and window or wall units, ceiling fans, and evaporative coolers. The availability of all household appliances increased for low income households over this period due to the overall increase in the wealth of the nation and to the decrease in the cost of older technologies.

Figure 10. Index of heating degree days (HDD), average heating consumption for low income households per HDD, cooling degree days (CDD), and average cooling consumption for low income households per CDD, 1979 to FY 2013



The mean group home energy burden for low income households has remained considerably higher than the burden for all households. In 1979, the mean group home energy burden was 7.7 percent for low income households, while the mean group home energy burden for all households was 1.9 percent. In FY 2013, the mean group home energy burden for all households was 1.1 percent, while the mean group home energy burden for low income households was 4.3 percent. Again, this is nearly four times higher than that for all households.

Trends in LIHEAP

Between 1981 and FY 2013, as shown in Figure 11, the number of income eligible households has risen 98 percent, during which time Federal fuel assistance funds have increased by 66 percent.⁷ Also during this period, the percentage of income eligible households receiving heating and/or winter crisis assistance has declined from 36 percent in 1981 to 16 percent in FY 2013 – though this figure has remained reasonably steady since 1997.⁸ Before adjusting for inflation, average winter crisis and heating benefits per household increased until 1985, fell in 1987, stayed in the same range through 1997, increased significantly in 2001, dropped by over 16 percent in 2005, rose by nearly 66 percent in 2009, and then decreased by about 28 percent FY 2013. Cooling benefits per household actually fell until 1985 and increased sharply from 1993 through 2001, and then fell by over 6 percent in 2005, rose nearly 77 percent in 2009, and then decreased by 21 percent in FY 2013. After adjusting for

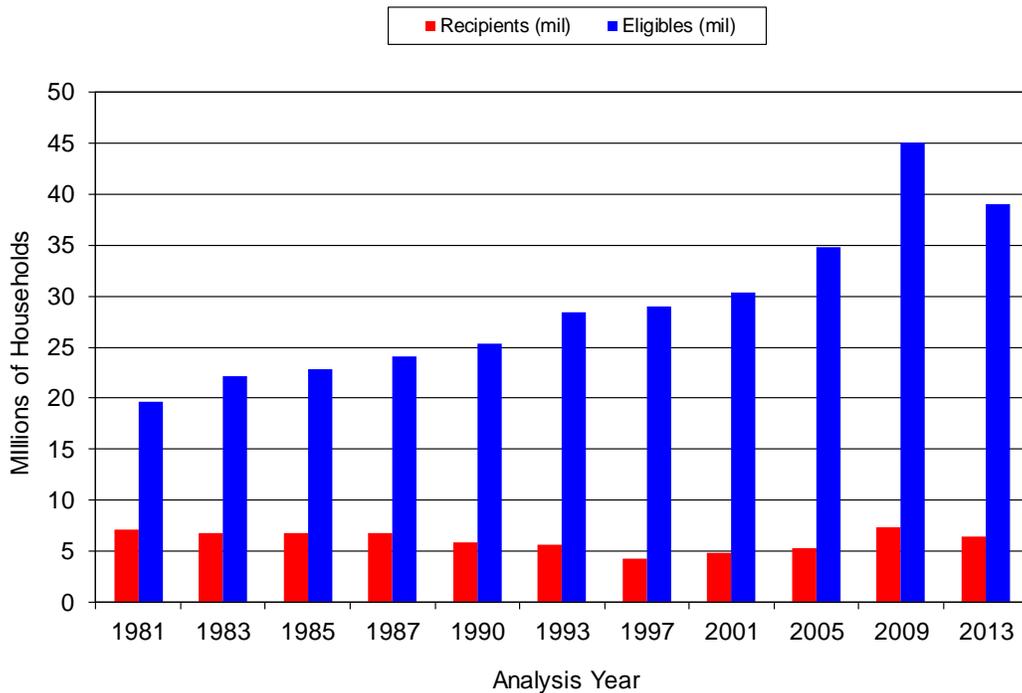
⁷ Income eligible household estimates do not include those households with incomes greater than the statutory income standards but who may still qualify for LIHEAP benefits because they are categorically eligible for LIHEAP under section 8624 (b)(2)(A) of the LIHEAP statute.

⁸ Note that The FY 1981 estimate of income eligible households are not directly comparable to those of the other years because the income eligibility guidelines for the FY 1981 program differed from those of other years.

inflation, the mean value of combined Federal heating and winter crisis benefits fell (in 1981 dollars) from \$213 in 1981 to \$139 in FY 2013. Cooling benefits decreased (in 1981 dollars) from \$129 in 1981 to \$105 in FY 2013.

The percentage of the total home heating bill for LIEAP/LIHEAP income eligible households covered by LIEAP/LIHEAP heating and winter crisis benefits decreased from 23 percent in 1981 to 12 percent in FY 2013. The decrease resulted from the combination of higher home heating bills, a slightly smaller per-household amount of assistance benefits, and a rise in the size of income eligible population.

Figure 11. Number of LIEAP/LIHEAP income eligible and heating and/or winter crisis assistance recipient households, FY 1981 to FY 2013



The mean group home heating burden for LIEAP/LIHEAP assisted households is substantially reduced because of the LIHEAP benefits, but even with the assistance, it has historically been about twice the burden of all households.

Federal LIHEAP targeting performance

The Government Performance and Results Act of 1993 (GPRA) focuses on program results to provide Congress with objective information on the achievement of statutory objectives or program goals. The resulting performance data are to be used in making decisions on budget and appropriation levels.

ACF's budget justification for Congress, which contains the LIHEAP performance plan, takes into account the fact that the Federal government does not provide LIHEAP assistance to the public. Instead, the Federal government provides funds to States, Federal or State-recognized Indian Tribes and Tribal Organizations, and Insular Areas to administer LIHEAP at the local level. The LIHEAP performance plan also takes into account the fact that LIHEAP is a block grant whereby LIHEAP grantees have broad flexibility to design their programs, within very broad Federal guidelines, to meet the needs of their citizens.

LIHEAP program goals and performance goals

In FY 2013, 16 percent of federally income eligible households received assistance with their heating costs. Given that limitation, the LIHEAP statute requires LIHEAP grantees to provide, in a timely manner, that the highest level of assistance will be furnished to those households that have the lowest incomes and the highest energy costs or needs in relation to income, taking into account family size. The LIHEAP statute identifies two groups of low income households as having the highest needs:

- *Vulnerable Households*: Vulnerable households are those with at least one member that is a young child, an individual with disabilities, or a frail older individual.
- *High Burden Households*: High burden households are those with the lowest incomes and highest home energy costs.

Based on the national LIHEAP program goals, ACF has focused its annual performance goals and measurement on targeting income eligible vulnerable households. In addition, ACF has established an annual efficiency goal for LIHEAP. Subject to the availability of data, ACF also is interested in the performance of LIHEAP with respect to targeting households with the highest home energy burden.

Targeting Index performance measures

Performance goals must be measurable in order to determine if the goals are being achieved. ACF has developed a set of performance measures (i.e., targeting indexes) that show the extent to which LIHEAP meets its performance goals. These measures, which are presented below, show LIHEAP's performance in targeting vulnerable and high-burden households:

- The *reciprocity targeting index* quantifies targeting with respect to receipt of LIHEAP benefits.
- The *benefit targeting index* quantifies targeting with respect to the level of LIHEAP benefits.
- The *burden reduction targeting index* quantifies targeting with respect to the burden reduction resulting from LIHEAP benefits.

The development of these indexes facilitates tracking of reciprocity, benefit, and burden reduction performance for vulnerable and high burden households. Using these indexes, ACF established the following LIHEAP performance measures

- Increase the reciprocity targeting index score of LIHEAP households having at least one member 60 years or older.
- Maintain the reciprocity targeting index score of LIHEAP households having at least one member five years or younger.

There are no annual measures for the benefit targeting or burden reduction targeting indexes because the data that enter into these indexes are not available annually.

Outcome performance measures

ACF seeks to improve the way in which it measures LIHEAP's performance. The indicators that ACF uses to measure LIHEAP's performance, the young child and elderly reciprocity targeting

indexes, serve only as proxies for LIHEAP's outcomes. ACF intended these proxies to be replaced by more outcome-focused measures.

In June 2008, ACF established the LIHEAP Performance Measures Planning Work Group, consisting of State LIHEAP Directors and ACF staff. The Work Group drafted a set of potential LIHEAP performance measures that could be useful to both the States and ACF.

In April 2010, ACF established a follow-up group, the LIHEAP Performance Measures Implementation Work Group, consisting of State LIHEAP Directors and ACF staff. The Work Group will be active through at least 2014 in overseeing the selection and implementation of the first Work Group's proposed LIHEAP outcome measures.

Performance measurement research

ACF has funded several studies to develop a better understanding of LIHEAP targeting performance measurement. Two of these studies recommended that ACF consider making changes in the performance measurement plan for LIHEAP.

- Validation Study – The performance measurement validation study examined the available data sources for estimating the targeting indexes required by the performance measurement plan for LIHEAP and identified the data sources that furnished the most reliable data.⁹
- Energy Burden Study – The energy burden evaluation study used the 2001 RECS LIHEAP Supplement to measure the baseline performance of LIHEAP in serving high burden households and to examine the competing demands associated with targeting vulnerable and high burden households.¹⁰

ACF has implemented the recommendations from the Validation Study. Additional resources would be required to implement the recommendations from the Energy Burden Study.

Performance measurement statistics

HHS' *Fiscal Year 2015 Annual Performance Report and Performance Plan* furnished measurements of targeting performance. The performance report showed the LIHEAP targets and performance results for FY 2013.

LIHEAP Energy Insecurity Study

The 2009 Residential Energy Consumption Survey (RECS) is a national survey that collected energy-related data for occupied housing units and households. The Office of Community Services (OCS) in the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) funded a special set of questions for households responding to the 2009 RECS. Those questions collected information on residential and home energy-related problems and measured the extent to which households reported that participation in LIHEAP helped to ameliorate those problems.¹¹ For the FY 2008 Home Energy Notebook, a study was commissioned by OCS to explore

⁹ *LIHEAP Targeting Performance Measurement Statistics: GPRA Validation of Estimation Procedures*, September 2004, Report prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

¹⁰ *LIHEAP Energy Burden Evaluation Study*, July 2005, Report prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

¹¹ Unless otherwise indicated, "low income" refers to households with income at or below the Federal maximum LIHEAP eligibility standard (i.e., the greater of 150 percent of HHS Poverty Guidelines and 60 percent of State median income).

energy insecurity indicated by low income households in the 2005 RECS.¹² OCS commissioned an update to the previous study that compares energy insecurity reported by low income households in the 2009 RECS with energy insecurity reported by low income households in the 2005 RECS.

Prior to 2005, RECS questions on energy affordability issues were limited to heating service disconnections and electric service disconnections. The 2005 RECS and 2009 RECS included a set of questions that documented the different types of energy affordability problems that low income households face. This study finds that the energy insecurity questions administered in the 2009 RECS and 2005 RECS offer a much more comprehensive understanding of the energy problems faced by low income households than did the more limited set of questions included in prior RECS. Findings from this the analysis focus on the *Levels and Type of Energy Insecurity* and *Factors Related to Energy Insecurity*.

Levels and Types of Energy Insecurity

The study estimated the rate at which low income households face various types of energy problems and examined survey respondent reports on the extent to which energy assistance restores home heating and cooling for households experiencing service interruptions.

- *Heating and Cooling Service Interruptions* – In 2009, about 4.9 percent of low income households were unable to use their main source of heat because of energy bill payment problems. The time series of RECS data shows that the space heating interruption rates in 2005 and 2009, respectively, were the highest and third highest measured since the question was added to the RECS in 1984.
- *Role of Energy Assistance in Restoring Service* – Adding questions on whether energy assistance was successful in helping to restore heating and air conditioning provides the ability to document one important outcome indicator for LIHEAP.
- *Financial Energy Insecurity* – The inclusion of questions that document financial energy insecurity for low income households provides a much better understanding of the extent to which energy costs affect low income households; the statistics from the 2009 RECS show that almost 47 percent of low income households face financial energy insecurity and that about 16 percent of those households face financial energy insecurity “almost every month.”
- *Health and Safety Energy Insecurity* – The inclusion of questions that document health and safety energy insecurity for low income households provides additional information on the other ways that energy affordability problems can affect low income households. These questions in the 2009 RECS focused on the need for medical attention resulting from keeping the home at an unsafe or unhealthy temperature, and on home fires resulting from the use of alternate heating or lighting sources. In the 2009 RECS, about 16 percent of all low income households reported keeping their homes at an unsafe or unhealthy temperature during the year. Combined, about 3 percent of all low income households reported that a household member needed medical attention in 2009 because the home was kept too cold (2.7 percent) or too hot (0.3 percent), and household members in need of medical attention for these reasons were more likely to be young children than elderly individuals. In addition, about 0.4 percent of all low income households reported that a home fire occurred in 2009 as a result of using an alternate source of heating or lighting.

¹² LIHEAP Special Study of the 2005 Residential Energy Consumption Survey – Dimensions of Energy Insecurity for Low Income Households, February 2010, prepared by APPRISE Incorporated under contract #DE-AM01-04EI41006.

Factors Related to Energy Insecurity

The study included an analysis of the factors associated with energy problems; including income, energy burden, geographic region and other demographic and housing factors.

- *Poverty Level* – It is clear from the analysis that poverty level is associated with all types of energy insecurity. When developing benefit assignment procedures, States might be able to increase the effectiveness of LIHEAP if they group households by poverty level.
- *Energy Burden* – Residential energy burden is associated with energy insecurity. States might be able to increase the effectiveness of their LIHEAP programs by using actual residential energy bills to help set benefit levels.
- *Vulnerable Groups* – It is important for States to consider all types of energy insecurity in setting benefits. While low income elderly households have lower rates of service interruptions and financial energy insecurity, of the differences between elderly households and young child or other households are less pronounced for health and safety energy insecurity. Since it is harder to directly observe health and safety energy insecurity, local LIHEAP intake offices may need to conduct more extensive outreach to identify such households.

Conclusion

This study furnishes important information regarding the performance of LIHEAP, as well as the types of information that could be collected to assess the energy needs of low income households. The analysis suggests that the questions added to the 2005 RECS and continued in the 2009 RECS represent an important contribution to the ability to document and understand the energy needs of low income households. In general, the analysis shows it is appropriate to target LIHEAP to the households with the lowest poverty levels and highest residential energy burdens to maximize the effectiveness of LIHEAP.

I. Introduction

The Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services (HHS) administers at the Federal level the Low Income Home Energy Assistance Program (LIHEAP). ACF awards annual LIHEAP block grants to assist eligible low income households in meeting their home energy costs. ACF issues such grants to the 50 States and the District of Columbia, certain Indian Tribes and Tribal organizations, and certain U.S. insular areas.

In 1994, Congress amended the purpose of LIHEAP to clarify that LIHEAP is “to assist low-income households, particularly those with the lowest incomes, that pay a high proportion of household income for home energy, primarily in meeting their immediate home energy needs” (The Human Services Amendments of 1994, P.L. 103-252, Sec. 302). Congress further indicated that LIHEAP grantees need to reassess their LIHEAP benefit structures to ensure that they are actually targeting those low income households that have the highest energy costs or needs. The Energy Policy Act of 2005 (P.L. 109-58) reauthorized LIHEAP through FY 2007 without substantive changes. LIHEAP’s reauthorization is currently pending.

For LIHEAP grantees to reassess their LIHEAP benefit structures, they need performance statistics on LIHEAP applicants and eligible households. In addition, they need technical assistance in how to make use of the performance statistics in planning and implementing changes to their programs.

Purpose of Notebook

ACF furnishes information and technical assistance to LIHEAP grantees. As part of that mission, ACF funded the development of this *Notebook* to assist LIHEAP grantees in meeting the requirements established by the 1994 amendments.

The *LIHEAP Home Energy Notebook* focuses on the home energy mission of LIHEAP by providing LIHEAP grantees with the latest national and regional data on home energy consumption, expenditures, and burden; low income home energy trends; and the LIHEAP performance measurement system.

The FY 2013 home energy data presented in this *Notebook* were derived from existing data sources and analytic procedures. These include the following:

- For household-level data on home energy: the national Residential Energy Consumption Surveys (RECS) for 2009, which is administered by the Department of Energy (DOE), Energy Information Administration (EIA).
- For household-level data on income: the national Current Population Survey’s (CPS’s) Annual Social and Economic Supplement (ASEC), which is administered by the Department of Commerce, Bureau of the Census (Census).
- For national and State-level data on residential energy prices: EIA’s publication *Monthly Energy Review* for electricity and natural gas; EIA website for liquefied petroleum gas (LPG); and the Bureau of Labor Statistics (BLS) Consumer Price Index for fuel oil/kerosene.
- Other publicly available sources of data such as weather data from the Department of Commerce, National Oceanographic and Atmospheric Administration (NOAA).

- End use disaggregation procedures developed by EIA's Office of Energy Markets and End Use (EMEU).
- Data on States' expenditure of funds by component and numbers of households served by type: Office of Community Services Division of Energy Assistance's (DEA's) administrative data from the *LIHEAP Household Report--Federal Fiscal Year 2013* and the *LIHEAP Grantee Survey for Federal Fiscal Year (FFY) 2013*.

Organization of Notebook

The remaining sections in this *Notebook* are organized as follows.

- Section II – Home energy data. This section presents national energy statistics and analyses for FY 2013. Tabulations are presented for all, low income, non-low income, and LIHEAP recipient households. Statistics are developed for residential energy consumption, home heating, and home cooling. Statistics include estimates of home energy consumption, expenditures, and energy burden.
- Section III – Low income home energy trends. This section furnishes data and analyses on low income home energy trends for the period from 1979 to FY 2013. Subsections include trends in consumption, expenditures, and burden; analysis of energy price and energy efficiency trends; trends in LIHEAP; and analysis of LIHEAP benefits.
- Section IV –Federal LIHEAP targeting performance. This section describes ACF's approach to LIHEAP performance measurement. It describes the performance measurement procedures and furnishes baseline data on targeting performance for LIHEAP.
- Section V – Special study of the RECS.
- Appendix A documents the procedures used to prepare the FY 2013 energy statistics; these include projecting changes in energy consumption and expenditures, disaggregating energy consumption and expenditures into end use components, and computing energy burden statistics. Appendix A also includes detailed tabulations on residential energy use, expenditures, and burden at the national and regional level by main heating fuel for all, low income, non-low income, and LIHEAP recipient households.
- Appendix B furnishes averages of State-level estimates of the numbers of households that are income eligible for LIHEAP at both the Federal and State income standards. These averages are presented by vulnerability and income group.

II. Home Energy Data

Section II presents home energy consumption and expenditure data. The primary data source for this section is the 2009 RECS, which has energy consumption and expenditures data for calendar year 2009. For this *Notebook*, the 2009 space heating and cooling consumption and expenditures have been adjusted to reflect FY 2013 weather and fuel prices, as described in Appendix A.

National data on total residential energy, home heating, and home cooling are presented below. Regional variations in the national data are included in Appendix A. Home energy trend data are presented in section III.

Residential energy data

Tables 2-1a to 2-1d, on the next page, presents data on average annual residential energy consumption, expenditures, and burden by fuel type for all, non-low income, low income, and LIHEAP recipient households.¹³ In FY 2013, average residential energy consumption for all households was 88.9 million British Thermal Units (MMBtus) and average expenditures were \$2,058. The mean individual residential energy burden for all households was 8.2 percent of income.

Low income households had average residential energy consumption of 77.2 MMBtus (13 percent less than all households) and average energy expenditures of \$1,768 (14 percent less than all households). Their mean individual residential energy burden was 17.7 percent, over twice that for all households and over five times that for non-low income households.

Average residential energy expenditures for LIHEAP recipient households were \$1,989, about 13 percent higher than that for all low income households. The mean individual residential energy burden was 18.1 percent, 0.4 percentage points higher than that for low income households.

Households consume residential energy for a variety of uses that include space heating, water heating, space cooling (air-conditioning or circulation), refrigeration, and other appliances. Table 2-2 furnishes data on the percentage of the residential energy bill that is attributable to each of these five end uses. By statute, LIHEAP targets assistance to home energy expenditures, i.e., to home heating and home cooling expenditures. In FY 2013, home heating was 29 percent of the residential energy bill for low income households, and home cooling made up 8 percent.

¹³Comparisons are made among the four income groups of all, non-low income, low income, and LIHEAP recipient households. All households represent the total number of households in the U.S. Non-low income households represent those households with annual incomes above the LIHEAP income maximum of the greater of 150 percent of HHS Poverty Guidelines and 60 percent of State median income. Low income households represent those households with annual incomes at or under the LIHEAP income maximum of the greater of 150 percent of HHS Poverty Guidelines and 60 percent of State median income. LIHEAP recipient households represent those low income households that received Federal fuel assistance.

Table 2-1a. Residential energy: Average annual household consumption, expenditures, and burden by all households, by main heating fuel type, United States, FY 2013^{1/} (See also Tables A-3a – A-3c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	88.9	\$2,058	8.2%	3.7%	2.9%
Natural gas	108.3	\$1,986	7.3%	3.3%	2.8%
Electricity	59.8	\$1,816	8.8%	3.8%	2.5%
Fuel oil	116.2	\$3,696	11.9%	5.9%	5.2%
Kerosene	64.9	\$2,189	15.2%	10.0%	3.1%
LPG^{6/}	109.5	\$2,992	10.3%	5.8%	4.2%

Table 2-1b. Residential energy: Average annual household consumption, expenditures, and burden by non-low income households, by main heating fuel type, United States, FY 2013^{1/} (See also Tables A-3a – A-3c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	95.1	\$2,214	3.1%	2.7%	2.3%
Natural gas	112.6	\$2,100	2.8%	2.5%	2.2%
Electricity	65.0	\$1,987	3.1%	2.7%	2.1%
Fuel oil	123.9	\$3,991	4.8%	4.4%	4.2%
Kerosene	70.8	\$2,451	4.8%	4.1%	2.6%
LPG^{6/}	116.5	\$3,173	4.9%	4.5%	3.3%

Table 2-1c. Residential energy: Average annual household consumption, expenditures, and burden by low income households, by main heating fuel type, United States, FY 2013^{1/} (See also Tables A-3a – A-3c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	77.3	\$1,768	17.7%	8.5%	9.3%
Natural gas	98.9	\$1,740	16.8%	8.1%	9.2%
Electricity	51.3	\$1,540	18.0%	8.1%	8.1%
Fuel oil	102.0	\$3,154	24.8%	14.7%	16.6%
Kerosene	62.6	\$2,083	19.4%	12.1%	11.0%
LPG^{6/}	95.1	\$2,620	21.5%	12.9%	13.8%

Table 2-1d. Residential energy: Average annual household consumption, expenditures, and burden by LIHEAP recipient households, by main heating fuel type, United States, FY 2013^{1/}
(See also Tables A-3a – A-3c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	90.2	\$1,989	18.1%	9.2%	12.0%
Natural gas	109.0	\$1,853	17.1%	8.0%	11.2%
Electricity	55.2	\$1,574	17.1%	8.4%	9.5%
Fuel oil	109.8	\$3,393	22.3%	14.1%	20.5%
Kerosene	81.3*	\$2,815*	18.0%	14.0%	17.0%
LPG^{6/}	97.2	\$2,739	25.3%	16.2%	16.6%

^{1/}Data are derived from the 2009 RECS, adjusted to reflect FY 2013 heating degree days, cooling degree days, and fuel prices. Data represent residential energy used from October 2012 through September 2013.

^{2/}A British Thermal Unit (Btu) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MMBtus, MmBTUs or mmBTUs refer to values in millions of Btus.

^{3/}Mean individual burden is calculated by taking the mean, or average, of individual energy burdens, as calculated from FY 2013 adjusted RECS data. See Appendix A for information on calculation of energy burden.

^{4/}Median individual burden is calculated by taking the median of individual energy burdens, as calculated from FY 2013 adjusted RECS data.

^{5/}Mean group energy burden has been calculated by (1) calculating average residential energy expenditures from the 2009 RECS for each group of households; (2) adjusting those figures for FY 2013; and (3) dividing the adjusted figures by the average income for each group of households from the 2013 CPS ASEC.

^{6/}Liquefied petroleum gas (LPG) refers to any fuel gas supplied to a residence in liquid compressed form, such as propane or butane.

* = This figure should be viewed with caution because of the small number of sample cases.

Residential energy expenditures of low income households are distributed in roughly the same way as those of all households. However, LIHEAP recipients spent a higher proportion of their annual residential expenditures for space heating and a lower proportion for space cooling than did other groups. LIHEAP recipient households spent 34 percent of their annual residential expenditures for space heating, 5 percentage points more than did the average low income household. LIHEAP recipient households spent 6 percent for space cooling, 75 percent of the proportion spent by low income households.

Table 2-2. Residential energy: Percent of residential energy expenditures for each of the major end uses by all, non-low income, low income, and LIHEAP recipient households, United States, FY 2013^{1/}

End Use	All households	Non-low income households	Low income households	LIHEAP recipient households
Space heating	27%	26%	29%	34%
Space cooling	10%	11%	8%	6%
Water heating	13%	13%	15%	14%
Refrigeration	8%	8%	8%	8%
Appliances	42%	42%	40%	38%
All uses	100%	100%	100%	100%

^{1/}Data are derived from the 2009 RECS. Percentages may not add to 100 percent due to rounding.

Home heating data

This section presents data on main heating fuel type, home heating consumption, home heating expenditures, and home heating burden.

Main heating fuel type

Table 2-3 shows that, in 2009, about half of the households in each income group used natural gas as their main heating fuel. Non-low income households used natural gas at the highest rate among household groups, 51.4 percent. More than 30 percent of households in each group, except LIHEAP recipient households, used electricity as their main heating fuel. Low income households used electricity at the highest rate among household groups, 36.7 percent, and LIHEAP recipient households used electricity at the lowest rate among household groups, 29.3 percent. LIHEAP recipient households tended to use fuel oil and kerosene more frequently than did households in other groups.

Table 2-3. Home heating: Percent of households using major types of heating fuels by all, non-low income, low income, and LIHEAP recipient households, United States, 2009^{1/} (See also Table A-4, Appendix A)

Heating fuel	All households	Non-low income households	Low income households	LIHEAP recipient households
Natural gas	49.0%	51.4%	44.4%	49.2%
Electricity	33.6%	31.9%	36.7%	29.3%
Fuel oil	6.1%	6.1%	6.1%	11.3%
Kerosene	0.4%	0.2%	0.9%	1.1%
LPG	4.9%	5.1%	4.6%	5.0%
Other ^{2/}	2.9%	2.9%	3.0%	2.7%

^{1/}Data are derived from the 2009 RECS. Percentages may not add to 100 percent due to rounding.

^{2/}Households using wood, coal, and other minor fuels are categorized together under "Other."

Non-low income households increased their use of electricity for home heating from 29.2 percent in April 2005 to 31.9 percent in 2009.¹⁴ Low income households increased their use of electricity as the main heat source from 31.8 percent in April 2005 to 36.7 percent in 2009. LIHEAP recipient households' use of electricity as their main heat source rose from 19.0 percent in April 2005 to 29.3 percent in 2009.

Home heating consumption, expenditures, and burden

Average annual home heating consumption, expenditures, and burden by fuel type for all, non-low income, low income, and LIHEAP recipient households are presented in Tables 2-4a to 2-4d. In FY 2013, average home heating consumption for all households was 36.4 MMBtus, average expenditures were \$561, and mean individual home heating burden was 2.8 percent.

Low income households had average home heating consumption of 32.5 MMBtus (11 percent less than the average for all households) and average home heating expenditures of \$517 (8 percent less than the average for all households). The mean individual home heating burden for low income households was 6.5 percent, over twice as much as the average home heating burden for all households and more than seven times the average home heating burden for non-low income households.

¹⁴Findings from the 2009 RECS, Energy Information Administration, U.S. Department of Energy.

Average home heating consumption for LIHEAP recipient households was 42.6 MMBtus (17 percent higher than the average for all households), and average home heating expenditures were \$688 (about 23 percent higher than the average for all households). Mean individual home heating burden for LIHEAP households was 7.6 percent, 1.1 percentage points higher than the average for low income households and over twice the average for all households. Average home heating consumption for LIHEAP recipient households was 31 percent greater than that for all low income households, because LIHEAP heating assistance recipient households tend to live in colder climate regions.

Table 2-4a. Home heating: Average annual household consumption, expenditures, and burden by all households, by fuel type, United States, FY 2013^{1/} (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	36.4	\$561	2.8%	0.9%	0.8%
Natural gas	51.9	\$539	2.6%	0.9%	0.8%
Electricity	10.9	\$334	2.3%	0.7%	0.5%
Fuel oil	70.6	\$1,881	7.4%	3.0%	2.6%
Kerosene	34.0	\$999	8.3%	3.9%	1.4%
LPG ^{6/}	52.7	\$1,204	5.1%	2.3%	1.7%

Table 2-4b. Home heating: Average annual household consumption, expenditures, and burden by non-low income households, by fuel type, United States, FY 2013^{1/} (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	38.5	\$584	0.9%	0.6%	0.6%
Natural gas	52.6	\$542	0.8%	0.6%	0.6%
Electricity	11.5	\$346	0.6%	0.4%	0.4%
Fuel oil	74.7	\$1,992	2.5%	2.0%	2.1%
Kerosene	34.3	\$962	1.8%	1.5%	1.0%
LPG ^{6/}	55.3	\$1,264	2.0%	1.7%	1.3%

Table 2-4c. Home heating: Average annual household consumption, expenditures, and burden by low income households, by fuel type, United States, FY 2013^{1/} (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	32.5	\$518	6.5%	2.1%	2.7%
Natural gas	50.3	\$532	6.6%	2.4%	2.8%
Electricity	10.0	\$314	5.0%	1.7%	1.7%
Fuel oil	62.9	\$1,678	16.4%	8.2%	8.8%
Kerosene	33.9	\$1,014	10.9%	6.8%	5.3%
LPG ^{6/}	47.3	\$1,080	11.3%	5.4%	5.7%

Table 2-4d. Home heating: Average annual household consumption, expenditures, and burden by LIHEAP recipient households, by fuel type, United States, FY 2013^{1/} (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All fuels	42.6	\$688	7.6%	2.9%	4.2%
Natural gas	57.9	\$617	7.8%	2.6%	3.7%
Electricity	11.4	\$354	5.2%	2.2%	2.1%
Fuel oil	66.8	\$1,801	13.7%	7.9%	10.9%
Kerosene	41.9*	\$1,240*	8.4%	5.5%	7.5%
LPG^{6/}	49.3	\$1,146	11.2%	7.3%	6.9%

^{1/}Data are derived from the 2009 RECS, adjusted to reflect FY 2013 heating degree days and fuel prices. Data represent home energy used from October 2012 through September 2013.

^{2/}A British Thermal Unit (Btu) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MMBtus, MmBTUs or mmBTUs refer to values in millions of Btus.

^{3/}Mean individual burden is calculated by taking the mean, or average, of individual heating energy burdens, as calculated from FY 2013 adjusted RECS data. See Appendix A for information on energy burden calculation.

^{4/}Median individual burden is calculated by taking the median of individual heating energy burdens, as calculated from FY 2013 adjusted RECS data.

^{5/}Mean group heating energy burden is calculated by (1) computing average home heating energy expenditures from the 2009 RECS for each group of households; (2) adjusting those figures for FY 2013; and (3) dividing the adjusted figures by the average income for each group of households from the 2013 CPS ASEC.

^{6/}Liquefied petroleum gas (LPG) refers to any fuel gas supplied to a residence in liquid compressed form, such as propane or butane.

* = This figure should be viewed with caution because of the small number of sample cases.

Home cooling data

This section presents data on home cooling type, home cooling consumption, home cooling expenditures, and home cooling burden.

Cooling type

As shown in Table 2-5, about 93 percent of households in 2009 cooled their homes in ways recorded by the 2009 RECS (i.e. with air-conditioners or with non air-conditioning cooling devices such as ceiling fans and evaporative coolers). Low income households were less likely to cool their homes than were non-low income households.

Table 2-5. Home cooling: Percent of households with home cooling by all, non-low income, low income, and LIHEAP recipient households, United States, 2009^{1/} (See also Table A-7, Appendix A)

Presence of Cooling	All Households	Non-low income households	Low income households	LIHEAP recipient households
Cooling ^{2/}	92.5%	94.3%	89.1%	88.6%
None ^{3/}	7.5%	5.7%	10.9%	11.4%

^{1/}Data are derived from the 2009 RECS.

^{2/}Represents households that cool with central or room air-conditioning as well as non air-conditioning cooling devices (e.g., ceiling fans and evaporative coolers).

^{3/}Represents households that do not cool or cool in ways other than those recorded by the 2009 RECS (e.g., the use of table and window fans).

Home cooling consumption, expenditures, and burden

Average annual home cooling consumption, expenditures, and burden for all, non-low income, low income, and LIHEAP recipient households that cooled are presented in Table 2-6. In FY 2013, average home cooling consumption for all households that cooled was 6.1 MMBtus, average expenditures were \$227, and mean individual home cooling burden was 0.9 percent.

For low income households that cooled, average home cooling energy consumption was 4.4 MMBtus (about 28 percent less than the average for all households) and average home cooling expenditures were \$161 (about 29 percent less than the average for all households). The mean individual home cooling burden for low income households was 2.1 percent, more than twice the average home cooling burden of all households and five times that of non-low income households.

For households that cooled, average home cooling consumption for LIHEAP recipient households was 3.4 MMBtus (about 44 percent less than all households and 23 percent less than low income households), and average home cooling expenditures were \$125 (about 45 percent less than all households). Mean individual home cooling burden for LIHEAP recipient households was 1.3 percent, 44 percent higher than the average for all households.

Table 2-6. Home cooling: Average annual household consumption, expenditures, and percent of income by all, non-low income, low income and LIHEAP recipient households that cooled, by fuel type, United States, FY 2013^{1/} (See also Table A-7, Appendix A)

Household group	Fuel consumption (MMBtus) ^{2/}	Fuel expenditures	Mean individual burden ^{3/}	Median individual burden ^{4/}	Mean group burden ^{5/}
All households	6.1	\$227	0.9%	0.3%	0.3%
Non-low income households	7.0	\$260	0.4%	0.2%	0.3%
Low income households	4.4	\$161	2.1%	0.5%	0.8%
LIHEAP recipient households	3.4	\$125	1.3%	0.4%	0.8%

^{1/}Data are derived from the 2009 RECS, adjusted to reflect FY 2013 cooling degree days and fuel prices. Data represent residential energy used from October 2012 through September 2013.

^{2/}A British Thermal Unit (Btu) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MMBtus, MmBTUs or mmBTUs refer to values in millions of Btus.

^{3/}Mean individual burden is calculated by taking the mean, or average, of individual cooling energy burdens, as calculated from FY 2013 adjusted RECS data. See Appendix A for information on energy burden calculation.

^{4/}Median individual burden is calculated by taking the median of individual cooling energy burdens, as calculated from FY 2013 adjusted RECS data.

^{5/} Mean group cooling energy burden is calculated by (1) computing average home cooling energy expenditures from the 2009 RECS for each group of households; (2) adjusting those figures for FY 2013; and (3) dividing the adjusted figures by the average income for each group of households from the 2013 CPS ASEC.

III. Low Income Home Energy Trends

Important shifts in energy prices and consumption have occurred since the 1973 oil embargo. As a result, the energy expenditures and energy burdens of low income households have changed significantly.

In the *LIHEAP Report to Congress for FY 1989*, Appendix K presented the results of a national study of residential energy consumption, expenditures, and burden for low income households from 1973 to 1989. Selected tables from that study were updated and published as a regular appendix in annual LIHEAP reports to Congress for FY 1991 through FY 1996. Beginning with the FY 1997-FY 1999 report, the tables are only published in the annual *LIHEAP Home Energy Notebook*. The tables present data for low income households and, for comparison purposes, include statistics on all households. Beginning with 1979, the year before HHS' first energy assistance program was enacted, trend data are furnished on the following:

- Home energy consumption, expenditures, and burden.
- Factors affecting consumption, expenditures, and burden.
- The impact of LIHEAP assistance on net home energy expenditures.

A number of special terms are used throughout this section. Table 3-1 on the next page defines these special terms. One such term is “low income,” which is defined as having income at or below 150 percent of HHS poverty guidelines. Because of limitations on the availability of data, this definition is more restrictive than that used in other parts of the *Notebook*. In those sections, “low income” refers to LIHEAP income eligible households, which are households that would be income-eligible for LIHEAP if their States set the income-eligibility guidelines at the Federal maximum (the greater of 150 percent of HHS poverty guidelines or 60 percent of State median income). Based on estimates from the 2013 CPS ASEC, the definition based solely on 150 percent of HHS poverty guidelines excludes 11.3 million households of the 39 million households that meet the definition of LIHEAP income eligible households. Therefore, differences in FY 2013 home energy data reported in this section and that reported in other parts of this *Notebook* are the result of the difference in the definition of “low income.”¹⁵ Unless indicated otherwise, the energy data in this section are based on ten national residential energy surveys of occupied residential housing units and their fuel suppliers. Table 3-2 identifies the surveys used, the date on which household interviews began, the time period in which residential energy bills were collected from fuel suppliers, the time frame for household income, and the number of households included in the survey.

For each survey, a national sample of residential housing units was selected, and interviewers attempted personal contacts with the householder. For those housing units where an authorization form was completed, the household's fuel supplier was contacted and asked to supply fuel costs and consumption data.

The collection of income data is not a primary focus of the residential energy surveys. Income statistics from the CPS ASEC are used to improve income data.

¹⁵As noted in Table 3-2, the data files used in this study include surveys from 1979 and 1981. The variable that designates LIHEAP income eligibility was not coded for those data files.

Table 3-1. Definition of special terms

Term	Definition
Billing data	Energy cost and consumption data furnished by the household's fuel supplier.
Composite price	The weighted average price of electricity, natural gas, and fuel oil used for residential purposes.
Real dollar expenditures	Costs adjusted for changes in the price of a market basket of consumer goods between two years (i.e., adjusted for inflation or deflation).
Cooling degree days	Daily cooling degree days are computed by subtracting a base temperature (65 degrees Fahrenheit) from a day's mean temperature when it exceeds 65 degrees Fahrenheit. If the mean temperature on a day is 70, the number of cooling degree days experienced on that day is 5 (70 minus 65). In this <i>Notebook</i> , we refer to annual cooling degree days, or the sum of all cooling degree days experienced during a year.
(Nominal) Dollar expenditures	Actual costs as reported in the year of the energy survey (unadjusted for inflation or deflation). Unless noted otherwise all dollar expenditures are unadjusted.
Energy burden	The share or percentage of annual household income that is used to pay annual energy bills. ^{1/}
Energy end uses	The specific use of energy in the home for home heating, home cooling or ventilation, water heating, and appliances.
Fuel assistance	LIHEAP heating, cooling, and crisis assistance.
Heating degree days	Daily heating degree days are computed by subtracting the mean temperature for a day, when that temperature falls below 65 degrees Fahrenheit, from a base temperature (65 degrees Fahrenheit). For example, if the mean temperature on a day is 60 and the base temperature is 65, the number of heating degree days experienced on that day is 5 (65 minus 60). In this <i>Notebook</i> , we refer to annual heating degree days, or the sum of all heating degree days experienced during a year.
Home energy expenditures	Expenditures for home space heating and home space cooling.
LIHEAP burden offset	The reduction in mean group home heating burden as a result of LIHEAP benefits
LIHEAP coverage rate	The percentage of the aggregate home energy bills for low income households that is covered by LIHEAP fuel assistance.
LIHEAP income eligible households	Households with incomes at or below the Federal maximum LIHEAP income standard – at or below the greater of 150 percent of HHS poverty guidelines or 60 percent of State median income.
LIHEAP participation rate	The percentage of LIHEAP income eligible households that receive fuel assistance.
LIHEAP recipient households	Households that indicated receiving home heating, cooling, or energy crisis benefits during the 12 months prior to a particular household survey.
Low income households	Households with incomes at or below 150 percent of HHS poverty guidelines.
Mean	The mean is the sum of all values divided by the number of values, or what is commonly called the average
Median	The median is the value at the midpoint in the distribution of values
MMBtus	A British Thermal Unit (Btu) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MMBtus refers to millions of Btus. An average household uses about 100 MMBtus per year.
Residential energy expenditures	Fuel expenditures for all residential uses, including home heating, home cooling or ventilation, water heating, refrigeration, clothes drying, etc.

^{1/}Three different energy burden statistics are used in this section: mean group burden, mean individual burden, and median individual burden. The definitions of these statistics are presented on page 15.

Table 3-2 presents information on the series of surveys that were used to prepare this *Notebook*. The reader should note that the in-home interview dates lag behind the analysis year for the years 1979 through 1985. In those years, the energy supplier survey included data from the year following the in-home interview. In all cases, the analysis year coincides with the end of the energy consumption history.

Table 3-2. Data used for the study of low income home energy trends

Analysis Year ^{1/}	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2013
Survey ^{2/}	NIECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS	RECS
Interview date ^{3/}	9/78	9/80	9/82	9/84	9/87	9/90	10/93	5/97	5/01	8/05	2/10	^{4/}
Billing data ^{5/}	4/78 to 3/79	4/80 to 3/81	4/82 to 3/83	4/84 to 3/85	1/87 to 12/87	1/90 to 12/90	1/93 to 12/93	1/97 to 12/97	1/01 to 12/01	1/05 to 12/05	1/09 to 12/09	1/09 to 12/09
Income data ^{6/}	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2013
Sample size	4,081	6,051	4,724	5,682	6,229	5,095	7,111	5,900	5,318	4,382	12,083	12,083

- ^{1/}Represents the year that includes the last month for which billing data were collected from fuel suppliers.
- ^{2/}Surveys include the National Interim Energy Consumption Survey (NIECS) and the RECS.
- ^{3/}Month and year in which household interviews began.
- ^{4/}Data projected from the 2009 RECS using changes in weather and prices. See Appendix A for the procedure used to calculate the projections.
- ^{5/}Time period in which residential energy bills were collected from fuel suppliers.
- ^{6/}Mean income computed using calendar year data from the CPS ASEC.

Trends in energy use, consumption, expenditures, and burden

Since 1979, there have been important changes in the fuels used by households, the amount of energy consumed for specific residential end uses (i.e., home heating, water heating, home cooling, and for other appliances), total residential energy expenditures, and the burden that residential energy expenditures represent for low income households. This section presents data that illustrate these changes.

Figures 3-1 and 3-2, on the next page, furnish information on the fuel choices by low income households. Figure 3-1 shows that low income households have increased their use of electricity as a main heating fuel, from 10.4 percent in 1979 to 38.9 percent in 2009, while they have reduced their use of fuel oil or kerosene as a main heating fuel, from 20.0 percent in 1979 to 6.0 percent in 2009.¹⁶ In addition, the use of wood or coal as a main heating fuel (included under “Other”) peaked in 1985, declined substantially through 2001, almost doubled by 2005, and fell to 3.1 percent in 2009.

Figure 3-2 shows that low income households increased their use of central air-conditioning systems from 8.5 percent in 1979 to 46.9 percent in 2009.¹⁷ The proportion of low income households with no air-conditioning fell from 62.8 percent in 1979 to 22.7 percent in 2009. Other things being equal, increased use of air-conditioning equipment among low income households can be expected to increase home cooling expenditures.

¹⁶For all households, the share using electricity as their main heating fuel grew from 15.8 percent in 1979 to 33.6 percent in 2009, and the share using fuel oil or kerosene as their main heat fell from 22.1 percent to 6.5 percent.

¹⁷For all households, the share using electric central air-conditioning grew from 23 percent in 1979 to 61 percent in 2009.

Figure 3-1. Main heating fuel for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to 2009

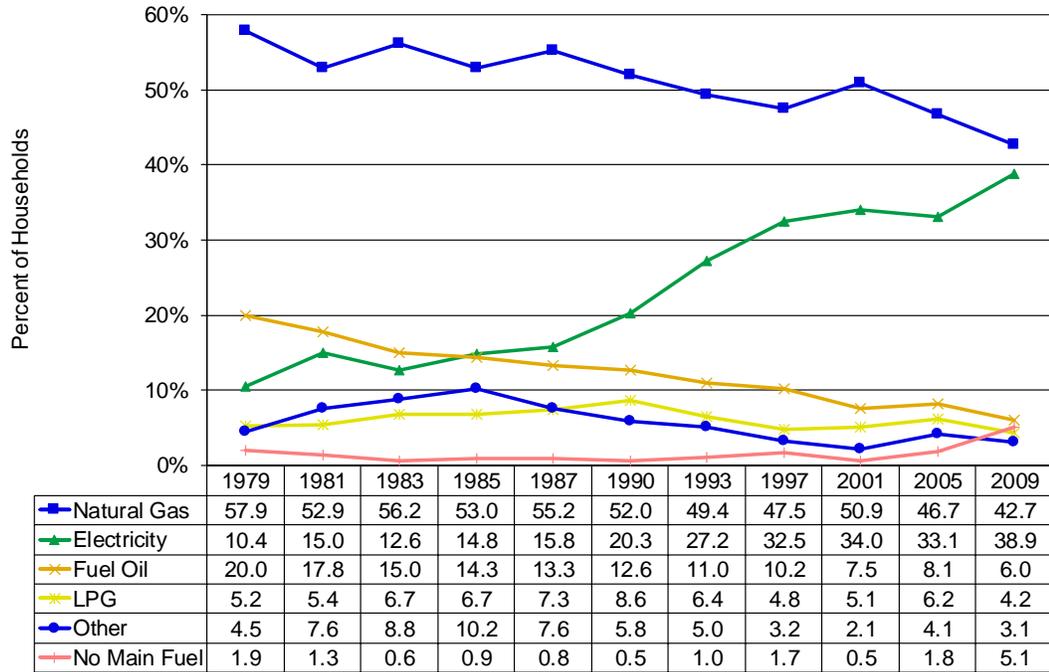
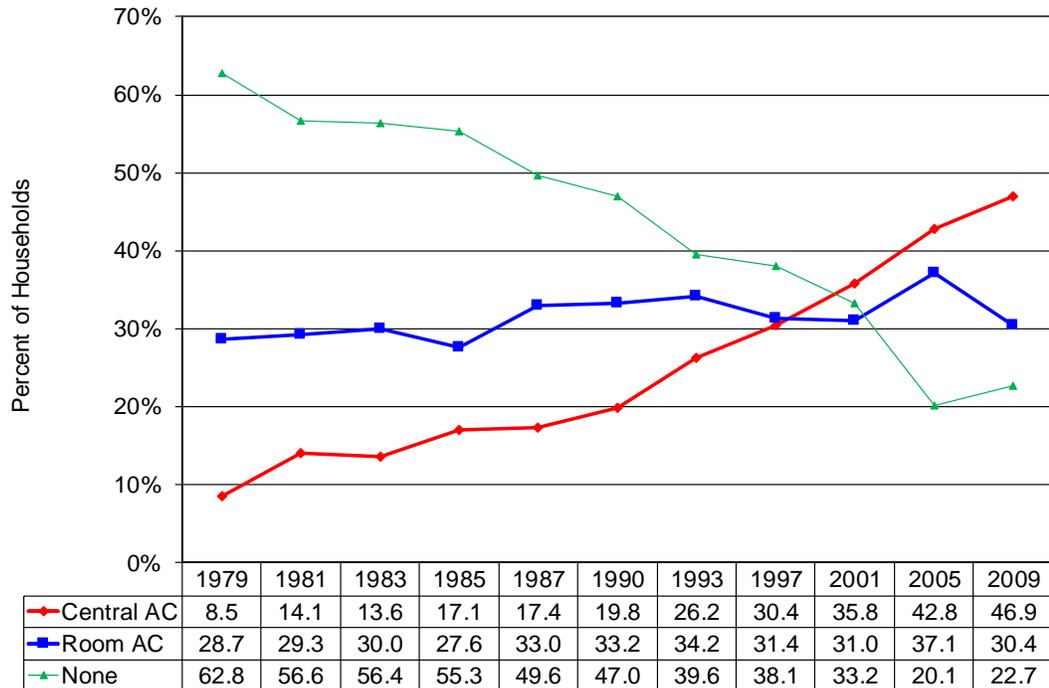


Figure 3-2. Air-conditioning type for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to 2009



Figures 3-3 and 3-4 furnish information on the trends in mean residential energy consumption and expenditures for low income households from 1979 to FY 2013. Figure 3-3 shows that low income households substantially reduced their residential energy consumption between 1979 and 1983. This suggests a significant increase in efficiency resulting from conservation measures or actions. Examination of the components of residential energy consumption indicates that the reduction was the result of reductions in home heating consumption. From 1983 to 1990, mean residential energy consumption fluctuated from year to year, corresponding to expected changes in heating and cooling consumption that resulted from changes in heating and cooling degree days.¹⁸ For 1993 through 1997, there appears to have been a significant increase in the use of energy for purposes other than home heating and home cooling. In 2001, the use of energy for purposes other than heating and cooling dropped but then increased until 2009 and stayed at the same level through FY 2013.

Figure 3-3. Mean residential energy consumption per household in MMBtus by end use for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013

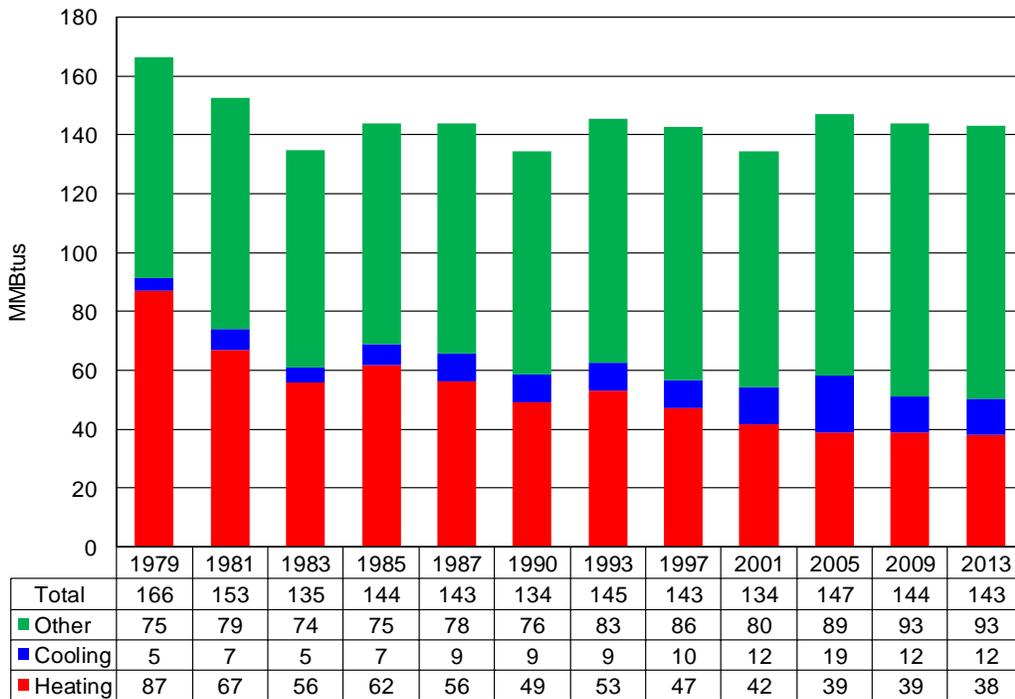
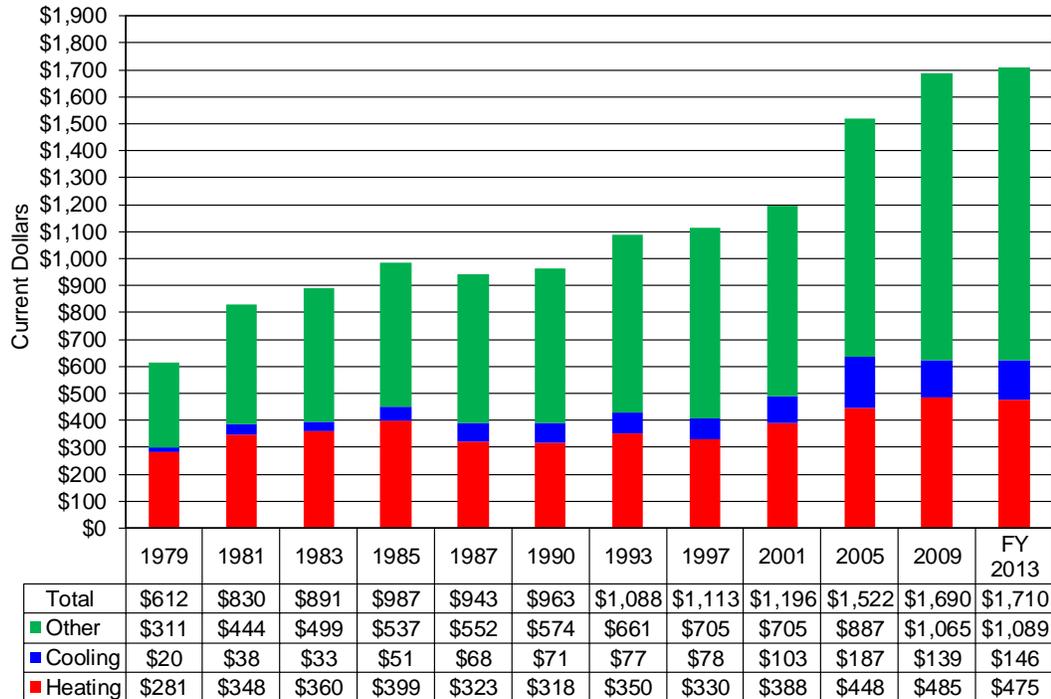


Figure 3-4, on the next page, shows that mean residential energy expenditures for low income households increased rapidly from 1979 to 1985; the increases were the result of fuel price increases. Examination of the components of energy expenditures indicates that the greatest increases were in home cooling and other residential expenditures, while increases in home heating expenditures were more moderate until a spike in 2009. Mean residential energy expenditures increased at a moderate rate from \$943 in 1987 to \$1,196 in 2001. From 2001 to 2005, mean residential energy expenditures increased by 27 percent to \$1,522, and from 2005 to 2009, mean residential energy expenditures increased by 11 percent to \$1,690. In FY 2013, mean residential energy expenditures were \$1,710, slightly more than in 2009. Mean home heating expenditures fell from \$399 in 1985 to \$318 in 1990,

¹⁸The numbers presented in this table are not directly comparable to the statistics that appear in Appendix A. In this figure, electricity Btus have been adjusted to be comparable to Btus for other fuels. This adjustment procedure is used to account for Btus lost in the generation and transmission of electricity to the housing unit and to thereby furnish a better picture of changes in energy efficiency over time.

then rose and fell moderately until 1997. Home heating expenditures saw an 18 percent increase in 2001 over 1997, a 15 percent increase in 2005 over 2001, and about an 8 percent increase in 2009 over 2005. In FY 2013, home heating expenditures saw a 2 percent decrease relative to 2009, likely a result of a warmer winter. Mean home cooling expenditures rose continuously from \$51 in 1985 to \$187 in 2005. In 2009, mean home cooling expenditures fell to \$139 followed by an increase to \$146 in FY 2013.

Figure 3-4. Mean residential energy expenditures by end use for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013



The next series of Figures, 3-5 through 3-7, furnishes information on energy burden for low income households.¹⁹ Three different energy burden summary statistics are presented in the three figures: mean group energy burden, mean individual energy burden, and median individual energy burden. Each of the statistics offers somewhat different information and gives somewhat different results. All three are valid from a statistical perspective. The statistics are defined as follows.

- *Mean Group Burden:* Computed as the ratio between mean energy expenditures and mean income for a given set of households, such as low income households. Energy expenditures are computed from RECS and income is derived from the CPS ASEC.
- *Mean Individual Burden:* Computed by finding, using the RECS data, the energy burden for each individual household in a given set (such as low income households) and then taking the mean of these energy burdens for all households in that set.
- *Median Individual Burden:* Computed by finding, using the RECS data, the energy burden for each individual household in a given set (such as low income households) and finding the

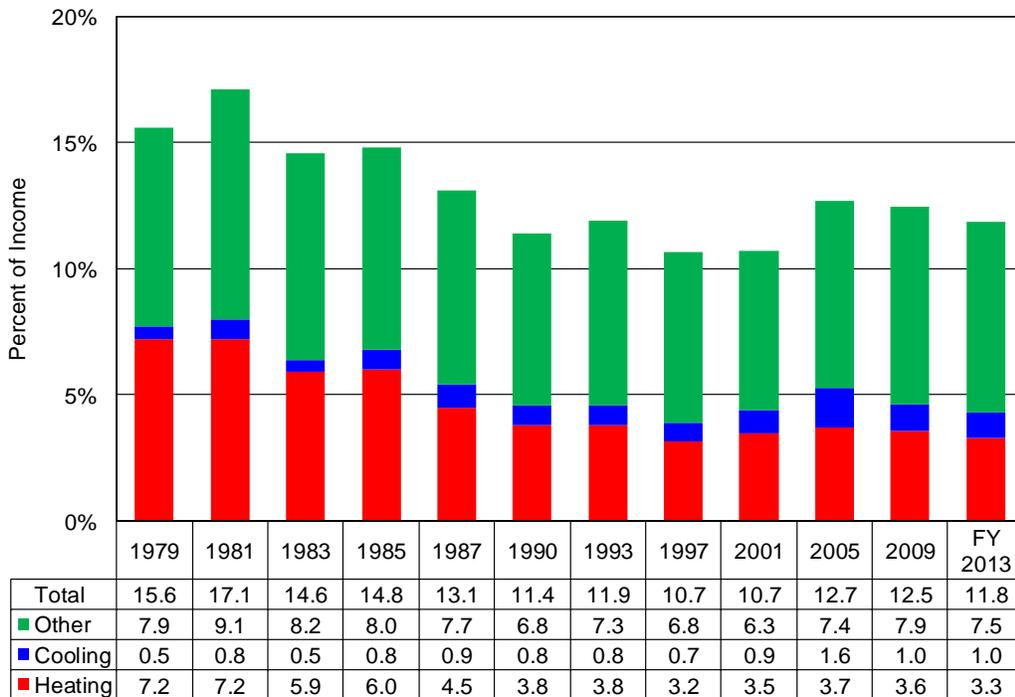
¹⁹These figures present gross burden statistics; they do not present net burden statistics, which account for the reduction in burden attributable to the receipt of LIHEAP benefits. Figure 3-26 compares gross burden and net burden for LIHEAP recipient households.

median, or middle point, of the distribution of these household-level energy burdens in the set.

Mean group burden is the burden statistic that has been used in the series of *LIHEAP Annual Reports to Congress*. Recent technical research has furnished additional insights on the range of alternative burden summary statistics.²⁰

Figure 3-5 shows the time series for mean group energy burdens by end use for low income households. Mean group home energy burden, the sum of mean heating and cooling burden from Figure 3-5, grew from 7.7 percent of income in 1979 to 8.0 percent in 1981, and then fell considerably after 1981 to 3.9 percent in 1997. From 1981 through 1997 mean group home energy burden declined because mean home energy expenditures for low income households fell, while mean incomes for low income households rose. Mean group home energy burden rose to 4.4 percent in 2001, 5.3 percent in 2005, and fell to 4.6 in 2009 followed by 4.3 percent in FY 2013. Mean group home energy burden for FY 2013 was about 2 percent lower than in 2001, about 19 percent lower than in 2005, about 6.5 percent lower than in 2009, and about 46 percent below the level in 1981.

Figure 3-5. Mean group residential energy burden by end use for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013



Figures 3-6 and 3-7 show how the mean individual and median individual energy burden statistics compare to the group energy burden statistics. Figure 3-6 shows the trends in residential energy burden for low income households, and Figure 3-7 shows the trends in home energy burden for low income households. In 2009, the mean individual residential energy burden was 23.6 percent, significantly higher than the median individual burden of 11.7 percent and the mean group burden of 12.5 percent. For FY 2013, median individual residential energy burden was 28 percent lower than the peak in 1981, mean group residential energy burden was about 31 percent lower than the 1981 peak, and the mean individual residential energy burden of 22.4 percent was about 5 percent lower

²⁰ See Appendix A for additional information on the interpretation of alternative burden statistics.

than the peak in 2009. In 2009, the mean individual home energy burden was 11.7 percent, the median individual home energy burden was 4.4 percent, and the mean group home energy burden was 4.6 percent. For all three summary statistics the lowest home energy burden occurred in 1997. The highest home energy burden for the individual median and group mean occurred in 1981 while the highest individual mean occurred in 2009.

Figure 3-6. Comparison of mean group, mean individual, and median individual residential energy burden for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013

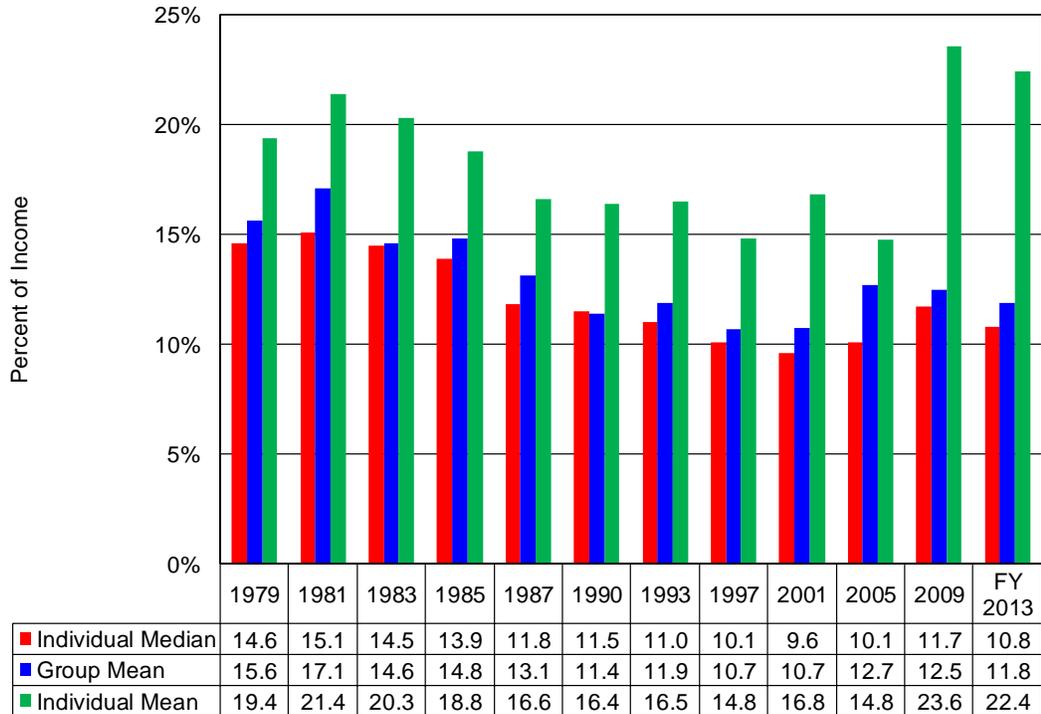
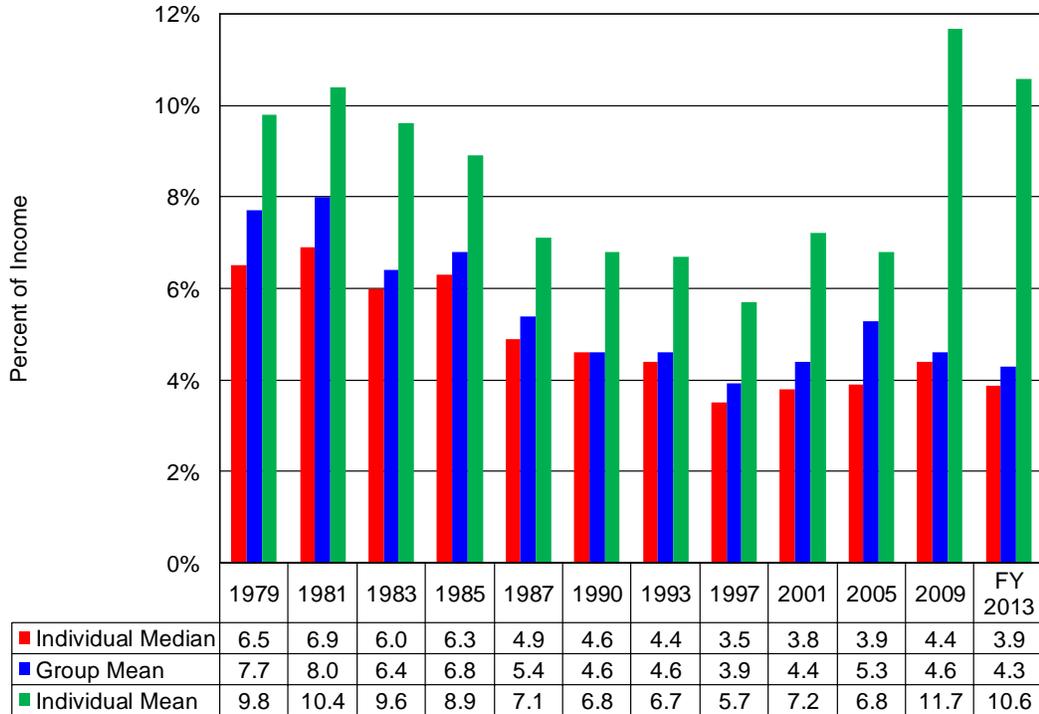


Figure 3-7. Comparison of mean group, mean individual, and median individual home energy burden for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013



Figures 3-8 and 3-9, on the next page, present information on the number and percent of low income households that had home energy burdens that exceeded specified levels. The levels are reference points and do not represent any judgment regarding an “affordable” level of energy burden.

As shown in Figure 3-8, the number of low income households with home energy burdens exceeding 10 percent of income grew from 5.0 million in 1979 to 7.1 million in 1985, an increase of 42 percent. The number of low income households with home energy burdens exceeding 5 percent of income grew by 62 percent from 1979 to 1985. These increases were primarily the result of growth in the total number of low income households. As Figure 3-9 shows, the percentage of low income households with home energy burdens exceeding 5 percent remained quite stable from 1979 through 1985. However, the percentage of low income households with home energy burdens exceeding 10 percent dropped by 17 percent over that same period.

For the period 1985 through 1997, however, both the number and percentage of low income households exceeding specified levels fell significantly from previous levels. For these years, both a reduction in home energy expenditures and increased incomes caused burden to decrease for low income households. In 2001, both the number and percent of households exceeding the specified levels rose. From 2001 to FY 2013, both the percent of households exceeding the specified levels, and the number of households exceeding the specified levels increased through 2009 and decreased in FY 2013. The number of low income households with home energy burdens exceeding 10 percent of income in FY 2013 was about 14 percent less than the 1985 level yet about 22 percent more than the 1979 level.

Figure 3-8. Number of low income households (in millions) spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2013

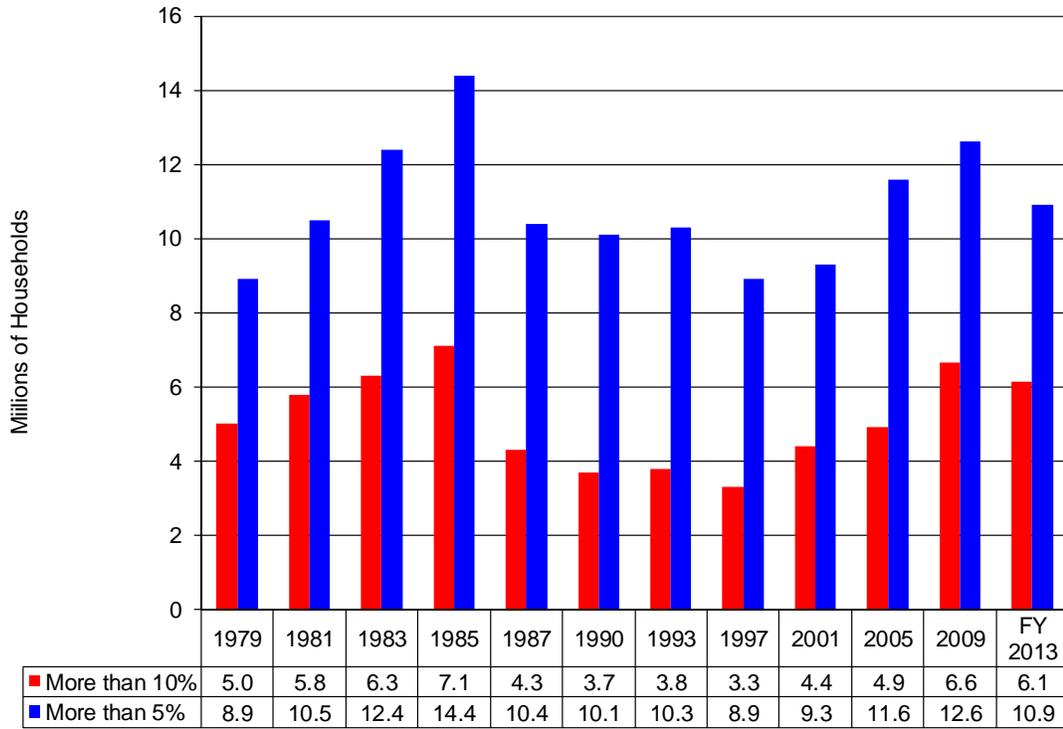


Figure 3-9. Percent of low income households spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2013

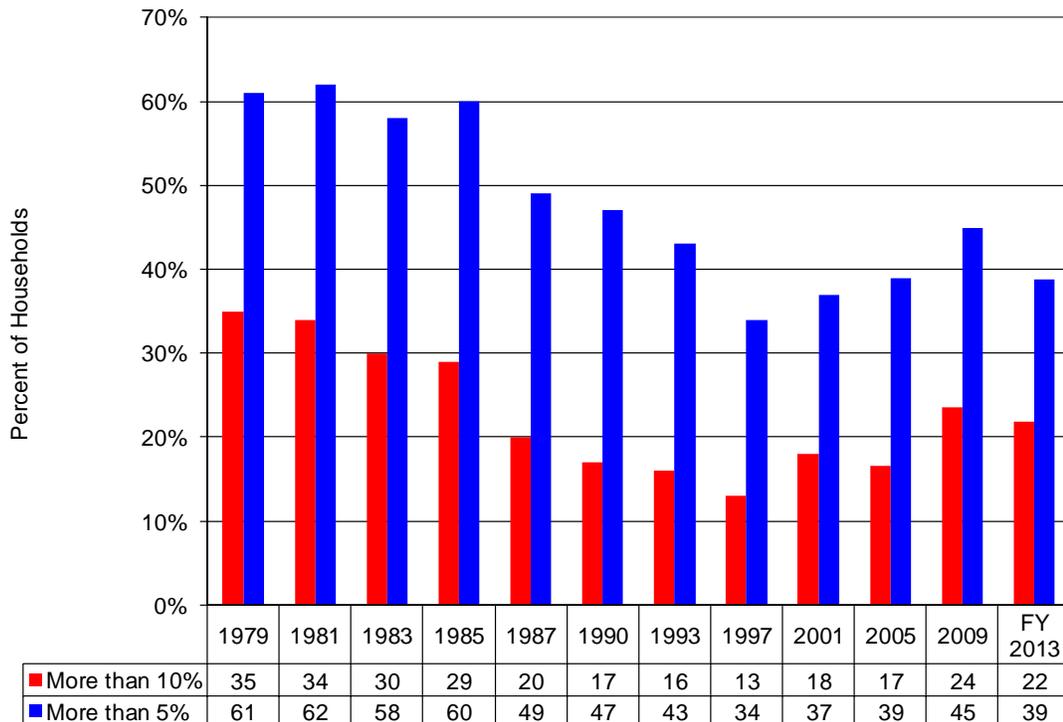


Figure 3-10 shows the total assistance funding that would be required to reduce the home energy burden for all low income households to 10 percent of income and 5 percent of income.²¹ The amount required for a reduction in the home energy burden of low income households to 5 percent of income was \$2.2 billion in 1979, \$4.6 billion by 1985, \$3.3 billion in 2001, \$5.5 billion in 2005, \$5.7 billion in 2009, and \$5.4 billion in FY 2013. The number of households with home energy burdens exceeding 5 percent of income fell between 1985 and 1997. The total dollars of assistance funding required to reduce the home energy burden of low income households to 5 percent also fell through 1997. From 1997 to 2005, increased expenditures caused the number of low income households exceeding the percent of income reference points to rise. Accordingly, the total dollars of assistance funding required to reduce the home energy burden to 5 percent also rose substantially. In FY 2013, the number of low income households exceeding the percent of income reference points and their average home energy expenditures decreased slightly, compared to 2009. Therefore, total dollars of assistance funding required to reduce home energy burdens fell slightly as well.

Figure 3-10. Total fuel assistance dollars (in billions) needed to reduce low income household spending on home energy to 5 percent and 10 percent of income, 1979 to FY 2013

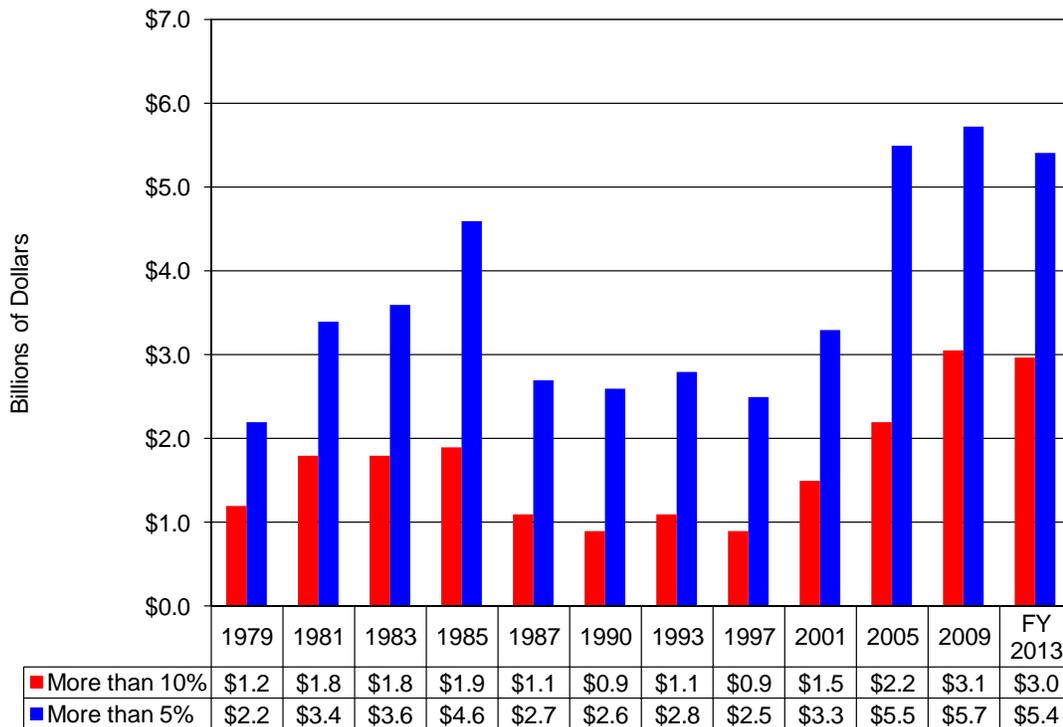


Figure 3-11 on the next page furnishes statistics on the number of low income households that had residential energy expenditures that exceeded specified levels. Figure 3-12 furnishes statistics on total fuel assistance dollars needed to reduce residential energy burden to specified levels. Figure 3-11 shows that the number of households spending over 15 and 25 percent of their income on residential energy followed a pattern similar to that observed in Figure 3-8. The largest number of low income households exceeding 15 percent of income spent on residential energy occurred in 1985, followed by 2009 and 1983, respectively. While the number of low income households exceeding 15 percent of

²¹ This is calculated first by finding the amount of funds for each low income household that would be required to reduce its home energy burden to the specified percent of income. This amount is the difference between the household's actual home energy burden and the specified home energy burden (the dollar amount of the specified percent of household income). Then the household amounts are aggregated to produce the total assistance funding that is needed for all low income households.

income was lower in FY 2013 than during the peak years, it was higher than at any time since the peak years. The largest number of low income households exceeding 25 percent of income spent on residential energy occurred in 2009, followed by FY 2013. Figure 3-12 demonstrates that the funding assistance required to reduce spending on residential energy by all low income households to the specified percentages reached its highest level in 2009, followed by FY 2013.

Figure 3-11. Number of low income households (in millions) spending over 15 percent and 25 percent of income on residential energy, 1979 to FY 2013

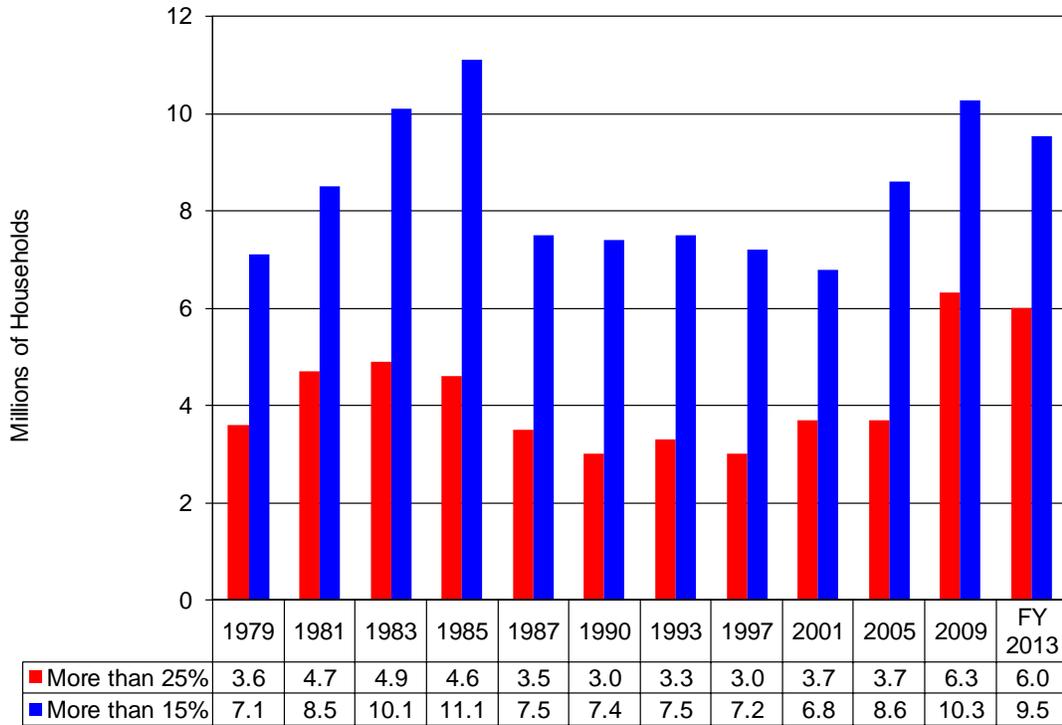


Figure 3-12. Total fuel assistance dollars (in billions) needed to reduce low income household spending on residential energy to 15 percent and 25 percent of income, 1979 to FY 2013

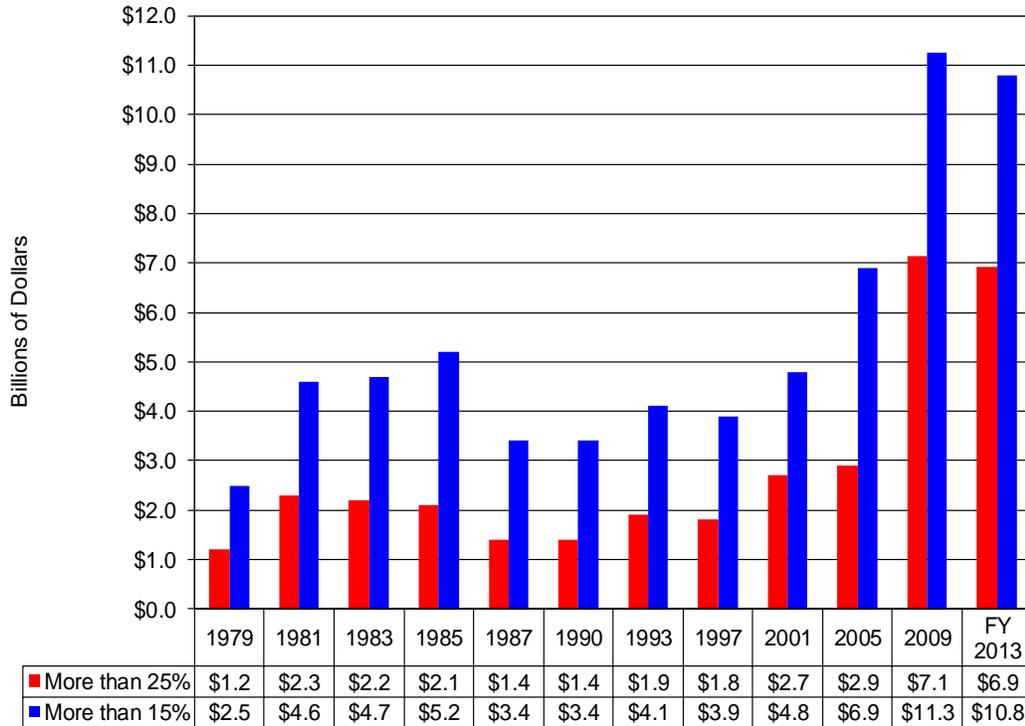


Figure 3-13 shows how the aggregated residential energy bill for all low income households has changed from 1979 to FY 2013. In 1979, the aggregated home energy bill (heating costs plus cooling costs) for low income households was \$4.5 billion. By FY 2013, the aggregated home energy bill had grown to about \$17.3 billion. This growth results from both the increase in average home energy bills and growth in the size of the low income population.

Figure 3-13 also shows that in 1979, home energy costs accounted for about half of the total low income residential energy bill. In FY 2013, home energy costs accounted for about 36.5 percent of the total low income residential energy bill.

Figure 3-13. Aggregated residential energy expenditures (in billions of dollars) by end use for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013

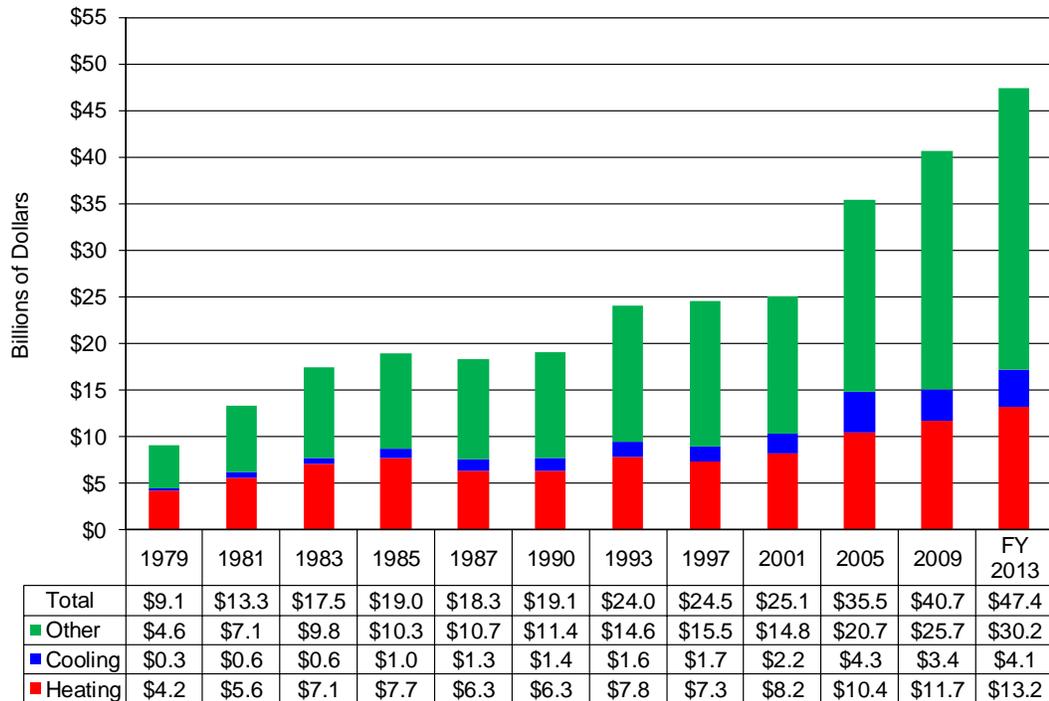
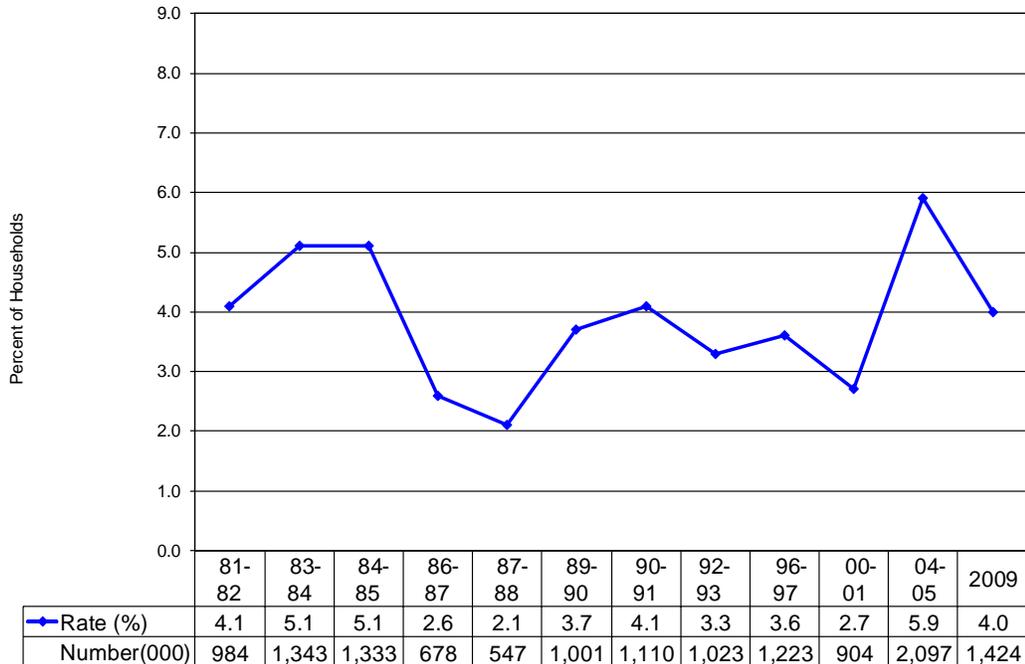


Figure 3-14, on the next page, demonstrates the impact of the inability to afford home energy on LIHEAP income eligible households. It shows the number of LIHEAP income eligible households that reported that they were unable to use their main source of heat for a period of two hours or more during the heating season because they were unable to pay for their main heating fuel. In 1981-82, 984 thousand LIHEAP income eligible households (4.1 percent of LIHEAP income eligible households) had heat interruptions during the heating season. The number and percentage grew to 1.34 million (5.1 percent) in 1983-84 and then fell consistently to 547 thousand (2.1 percent) in 1987-1988. In 1989-90 there was a sharp increase to 1.0 million (3.7 percent). This higher level of heat interruptions was sustained in 1990-91 when 1.1 million (4.1 percent) LIHEAP income eligible households had heat interruptions and in 1992-93 when 1.0 million (3.3 percent) LIHEAP income eligible households had heat interruptions. The number and percentage increased to 1.2 million (3.6 percent) in 1996-97. In 2000-01, the number and percentage of LIHEAP income eligible households with heat interruptions decreased to 904 thousand (2.7 percent). The number and percentage increased substantially to 2.1 million (5.9 percent) in 2004-2005. In 2009, 1.4 million (4.0 percent) LIHEAP income eligible households had heat interruptions due to bill-payment related problems for the household's main heating fuel.²²

²² Data for 2009 exclude those households heating with other fuels that were unable to use their heating equipment because the electric company disconnected service for nonpayment and electricity was needed to run the heating equipment.

Figure 3-14. Percentage of LIHEAP income eligible households with heat interruptions of two hours or more caused by an inability to pay for energy to run the household's main heating system, 1981-82 heating season to calendar year 2009²³



Analysis of energy price and energy efficiency trends

A number of factors underlie the energy consumption and expenditures trends. Three of the most important factors are fuel prices, weather, and energy efficiency. Figures 3-15, 3-16, and 3-17 furnish information on trends in these factors.

Figure 3-15, on the next page, furnishes an index of average fuel prices compared to an index of inflation that is based upon the Consumer Price Index (CPI). The fuel price index shows the percentage change from 1979 to FY 2013. For example, the CPI-based inflation index grew from 100 in 1979 to 125 in 1981, indicating a 25 percent increase in consumer prices. Figure 3-15 shows that fuel prices outpaced the overall level of inflation from 1979 through 1983. The CPI increased by 37 percent during that period, while the composite average of fuel prices increased by 81 percent. From 1983 through 1997, the increase in the composite average of fuel prices moderated somewhat and generally grew more slowly than the CPI. However, from 1997 to 2005, the pattern was reversed; the composite average fuel price index grew by over 45 percent while the CPI grew by only 22 percent. The rapid growth of prices from 1979 through 1983 explains why residential energy expenditures per low income household rose so rapidly (Figure 3-4) while consumption was declining (Figure 3-3). The moderate growth in fuel prices from 1985 to 1997 (19 percent) explains why residential energy

²³The 2009 RECS collected information on heating interruptions for calendar year 2009, not for the heating season. Data for 2004-2005 heating season and 2009 refer to heat interruptions of any length. Data for the 1981-82 heating season refer to heat interruptions of one day or more. Data for 2009 exclude those households heating with other fuels that were unable to use their heating equipment because the electric company disconnected service for nonpayment and electricity was needed to run the heating equipment. Between 10 and 15 percent of heat interruptions for LIHEAP income eligible households last at least 2 hours but less than 24 hours. The procedures for analyzing heat interruption data have changed since the issuance of the *LIHEAP Report to Congress for FY 1993*. The heat interruption rates for 1983-84 through 1987-88 are slightly higher with this new analysis.

expenditures per low income household rose slightly during that period. In 2009, fuel prices increased by 15 percent over 2005 prices. The increase in fuel prices explains why expenditures also rose. In FY 2013, fuel prices increased by more than 7 percent over 2009 prices and once more contributed to an increase in expenditures.

Figure 3-15. Index of dollar prices for fuel oil, natural gas, electricity, and a composite compared to the Consumer Price Index (CPI), 1979 to FY 2013

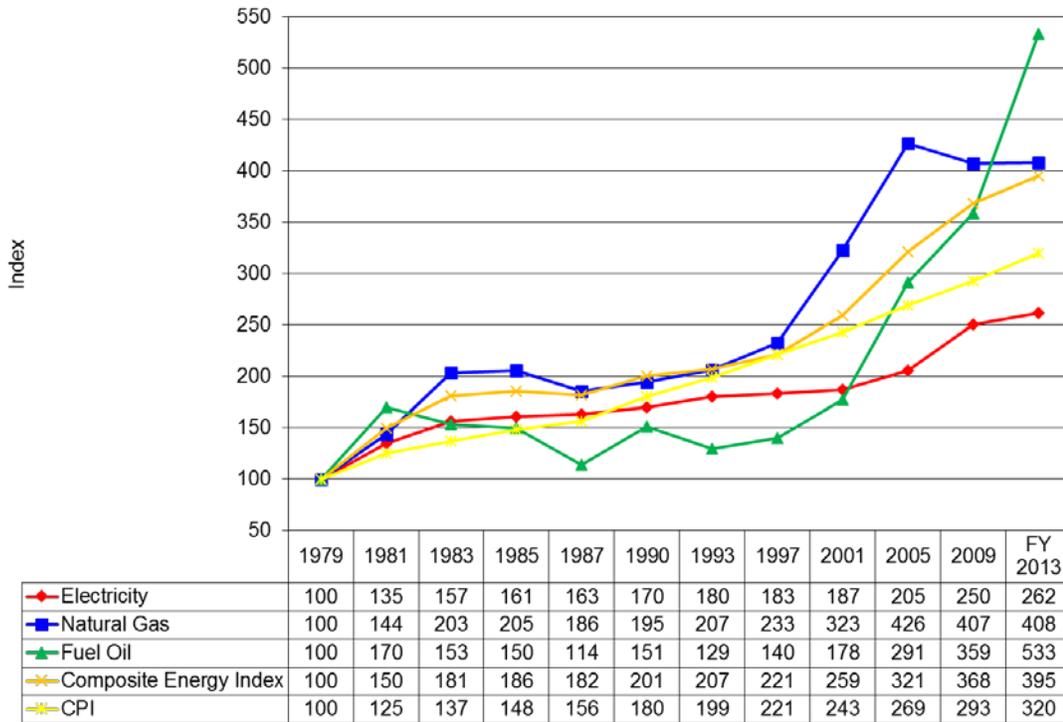


Figure 3-16 demonstrates how changes in heating energy consumption among low income households from 1979 to FY 2013 compared to changes in heating degree days for the same period. From 1979 to 1983, home heating consumption fell more rapidly than did heating degree days, suggesting a significant increase in efficiency as a result of conservation measures or actions. Consumption per heating degree day dropped rapidly for that period. From 1983 to 1997, there was only a moderate reduction in consumption per heating degree day. Thus, heating consumption fluctuations appear to be primarily a result of the changes in the weather for those years. From 1997 to 2005, home heating consumption again fell more rapidly than did heating degree days, suggesting a moderate increase in efficiency as a result of conservation measures or actions. This was perhaps driven by the high fuel prices experienced in 2001 and 2005. From 2005 to 2009, there was a slight reduction in consumption per heating degree day. The consumption per heating degree day was the same in FY 2013 as in 2009.

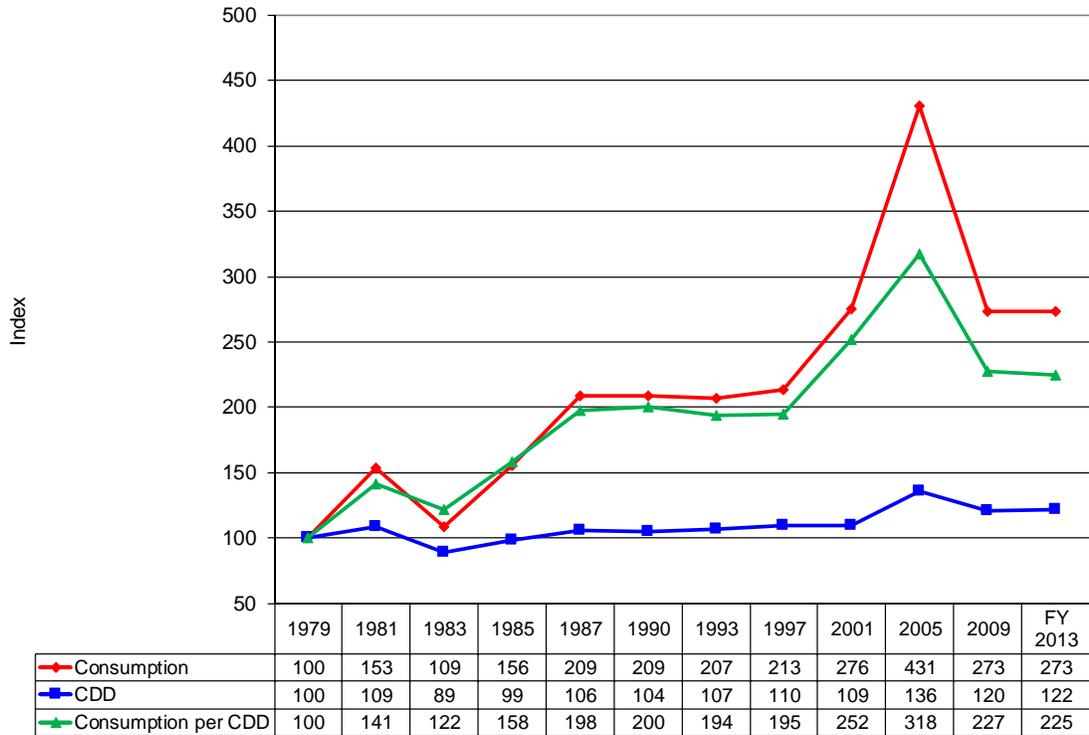
Figure 3-16. Index of heating consumption, heating degree days, and heating consumption per heating degree day for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013



Figure 3-17 shows that home cooling consumption trends among low income households are somewhat more complex than are home heating consumption trends. In FY 2013, mean home cooling consumption was much higher than it was in 1979, even though households experienced relatively smaller increase in cooling degree days. Thus, mean consumption per cooling degree day increased substantially from 1979 to FY 2013, making it appear as though there was a reduction in efficiency. However, the primary cause of the increase in mean home cooling consumption was the large increase in the availability of air-conditioning among low income households.²⁴ As shown in Figure 3-2, only 37 percent of low income households had air-conditioning in 1979, while in 2009, 77 percent of low income households had air-conditioning. Because of this fundamental change in the number of households that use air-conditioning, it is very difficult to assess either changes in efficiency from 1979 to FY 2013 or year-to-year changes in consumption in response to changes in cooling degree days.

²⁴Air-conditioning equipment includes central air conditioners and window or wall units, ceiling fans, and evaporative coolers. The availability of all household appliances increased for low income households over this period due to the overall increase in the wealth of the nation and the decrease in the cost of older technologies.

Figure 3-17. Index of cooling consumption, cooling degree days, and cooling consumption per cooling degree day for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013



Figures 3-18 and 3-19, on the next page, show that the mean group energy burden for low income households is substantially higher than that for all households. In FY 2013, the mean group home energy burden for all households was 1.1 percent, and that for low income households was 4.3 percent. In FY 2013, the mean group residential burden was 2.9 percent for all households and 11.8 percent for low income households. Over time, the gap between the burden for low income and all households has fluctuated somewhat. Figure 3-18 shows that in 1979, the mean group home energy burden for low income households was just over 4 times that of all households, while in 1993, the mean group burden for low income households was close to 3.5 times that of all households. However in FY 2013, the mean group burden for low income households was again nearly 4 times that of all households.

Figure 3-18. Mean group home energy burden for all households and for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013

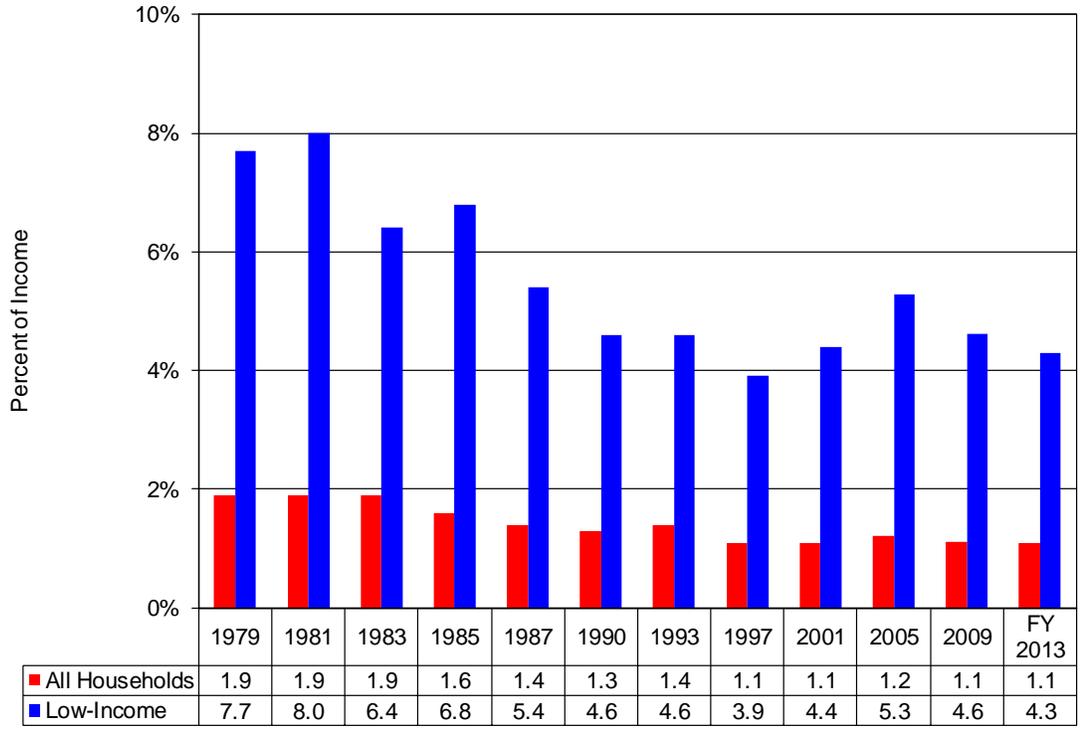
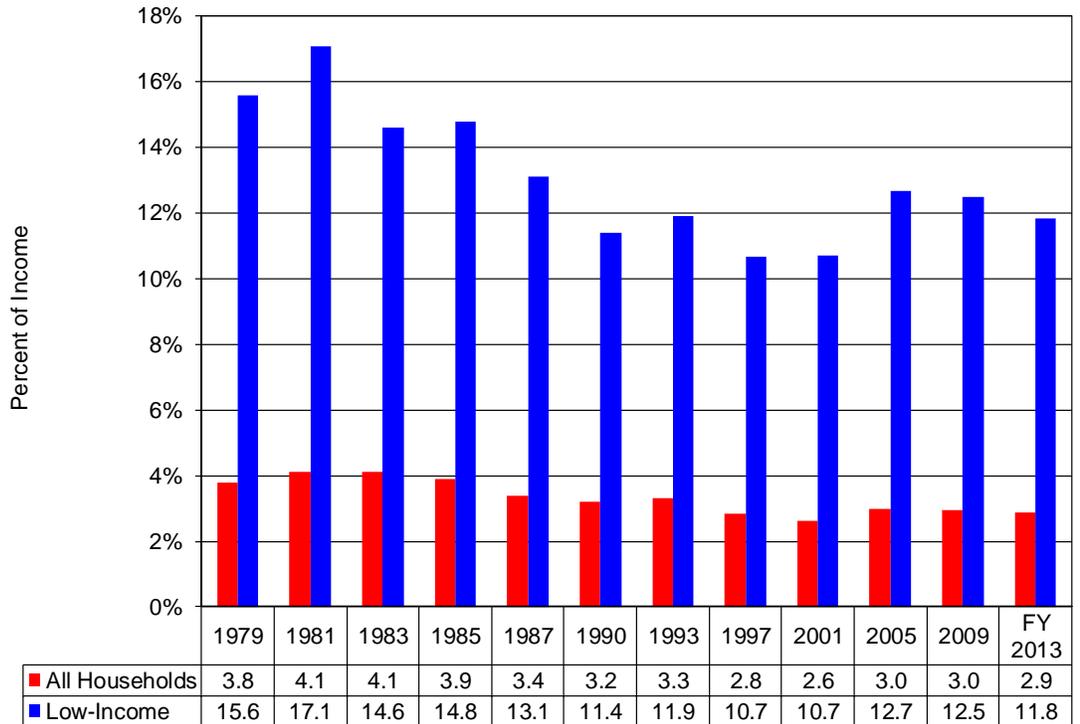


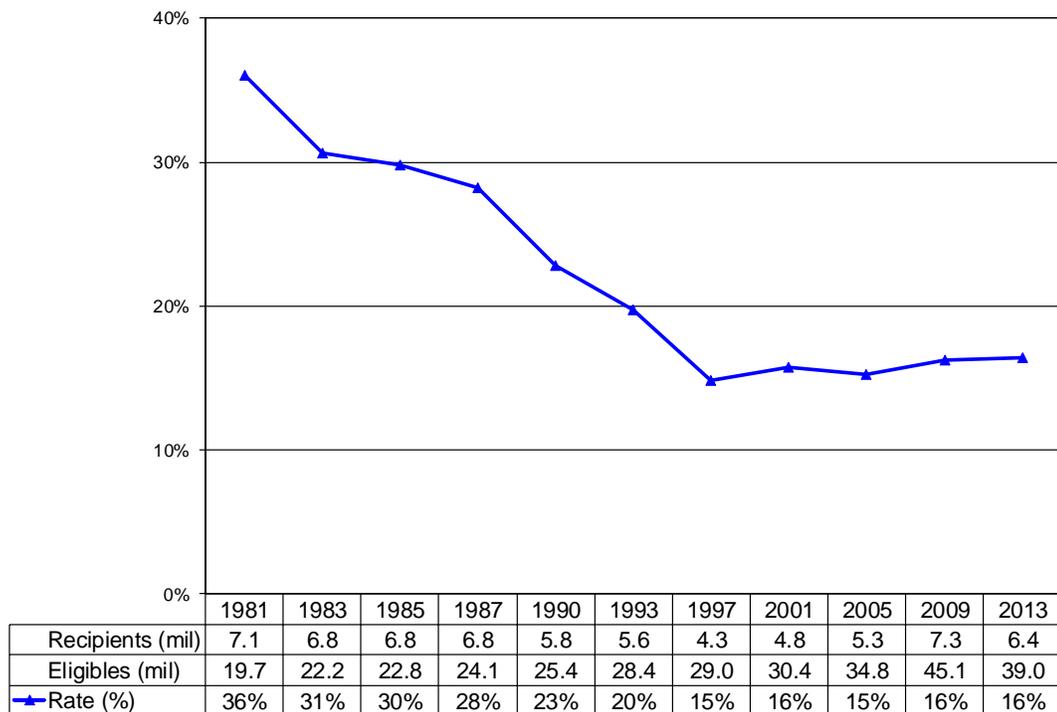
Figure 3-19. Mean group residential energy burden for all households and for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2013



Trends in LIHEAP

Figures 3-20 through 3-24 furnish information on trends for HHS' energy assistance programs from FY 1981 through FY 2013. Figure 3-20 shows that the percentage of LIHEAP income eligible households that have received heating and/or winter crisis assistance had fallen steadily until 1997 but remained steady at about 16 percent since then. In FY 1981, 36 percent of eligible households received heating and/or winter crisis assistance benefits; this number fell to 15 percent in 1997. In FY 2013, 16 percent of LIHEAP income eligible households received those benefits.²⁵ Figure 3-21, on the next page, furnishes statistics on the count of recipients by benefit type.

Figure 3-20. Percentage of LIEAP/LIHEAP Federally income eligible households receiving LIEAP/LIHEAP heating and/or winter crisis assistance, FY 1981 to FY 2013

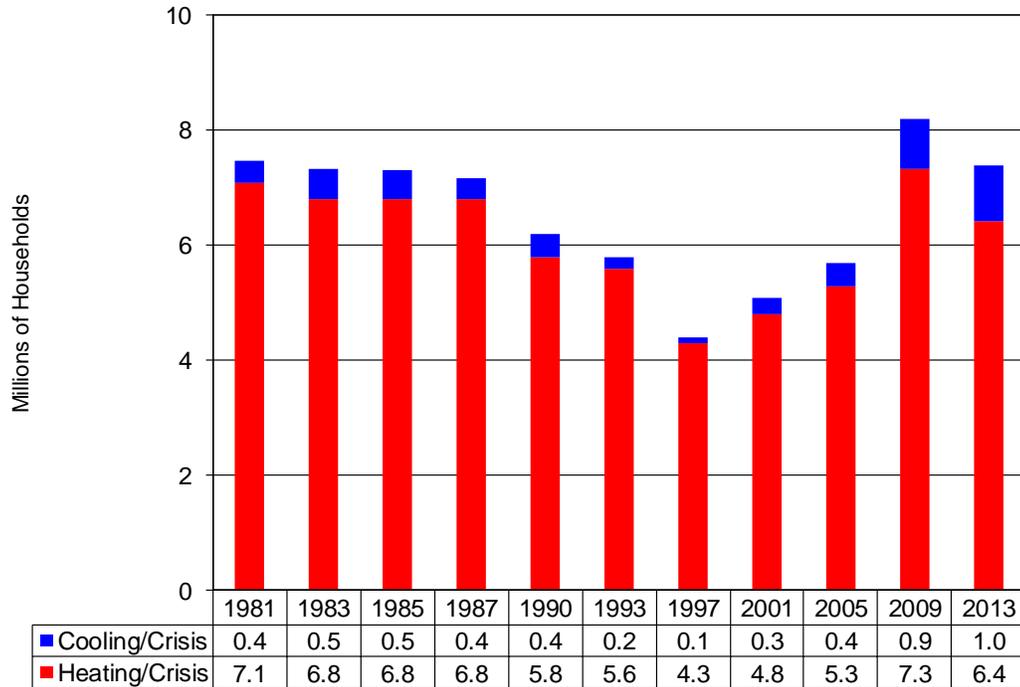


SOURCE: HHS Administrative Data — such data for FY 2013 are preliminary; thus the actual figures may differ.

NOTE: The FY 1981 and FY 2009 estimates of income eligible households are not directly comparable to those of the other years because the income eligibility guidelines for the FY 1981 and FY 2009 programs differed from those of other years.

²⁵Note that the Federal income eligibility guidelines for the FY 1981 Low Income Energy Assistance Program (LIEAP) were different from the LIHEAP programs in other years included in the table.

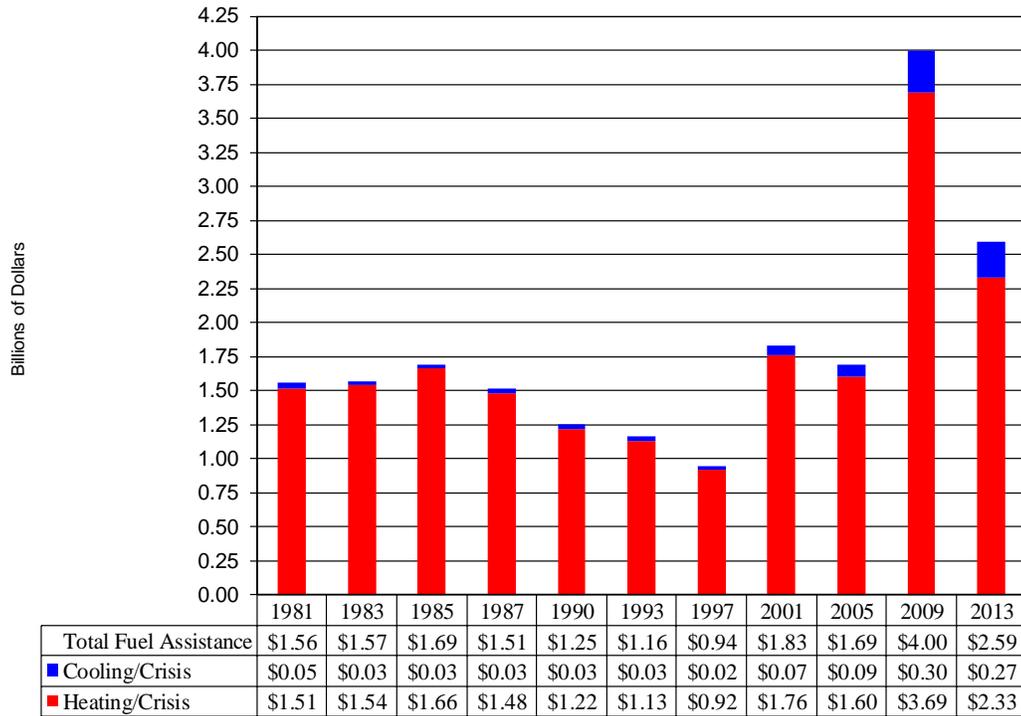
Figure 3-21. Number of households receiving LIHEAP/LIHEAP heating and/or winter crisis assistance or cooling and/or summer crisis assistance, FY 1981 to FY 2013



NOTE: Cooling assistance/summer crisis figures cannot be added to heating assistance/winter crisis figures to generate total assistance + crisis figures for each year because households can receive more than one type of assistance.
 SOURCE: HHS Administrative Data — such data for FY 2013 are preliminary; thus the actual figures may differ.

Figure 3-22, on the following page, shows that the total funds used for fuel assistance benefits have fluctuated over time. For the years shown, funding was highest in FY 2009, when \$4.0 billion dollars were used for heating and cooling assistance benefits, and lowest in FY 1997 when \$0.94 billion dollars were used for assistance benefits.

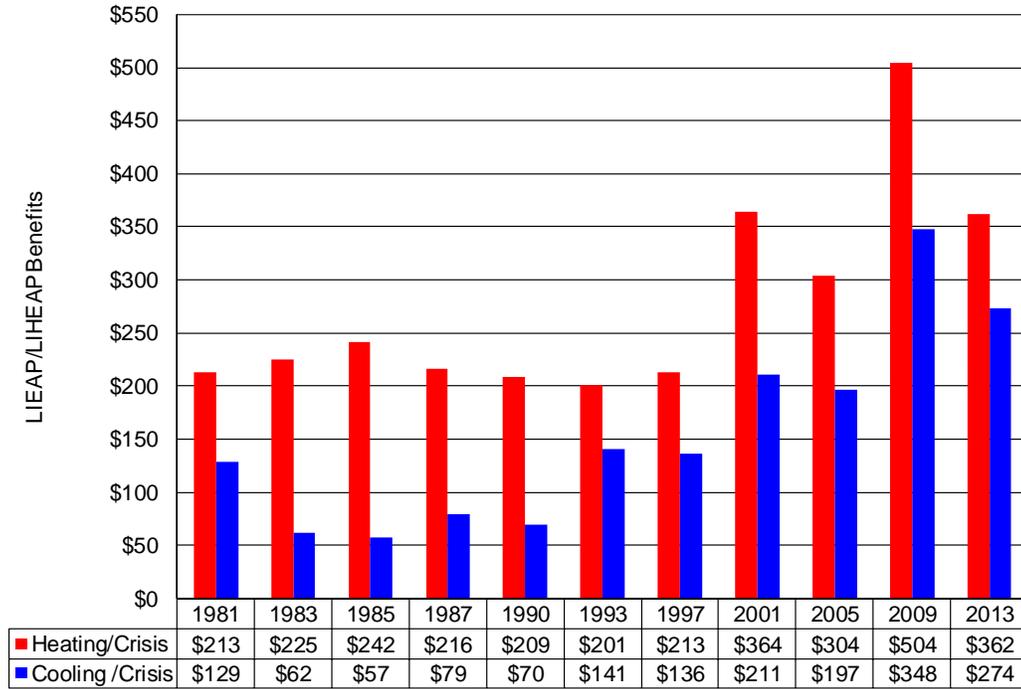
Figure 3-22. Funds used for LIEAP/LIHEAP fuel assistance, FY 1981 to FY 2013



SOURCE: HHS Administrative Data — such data for FY 2013 are preliminary; thus the actual figures may differ.

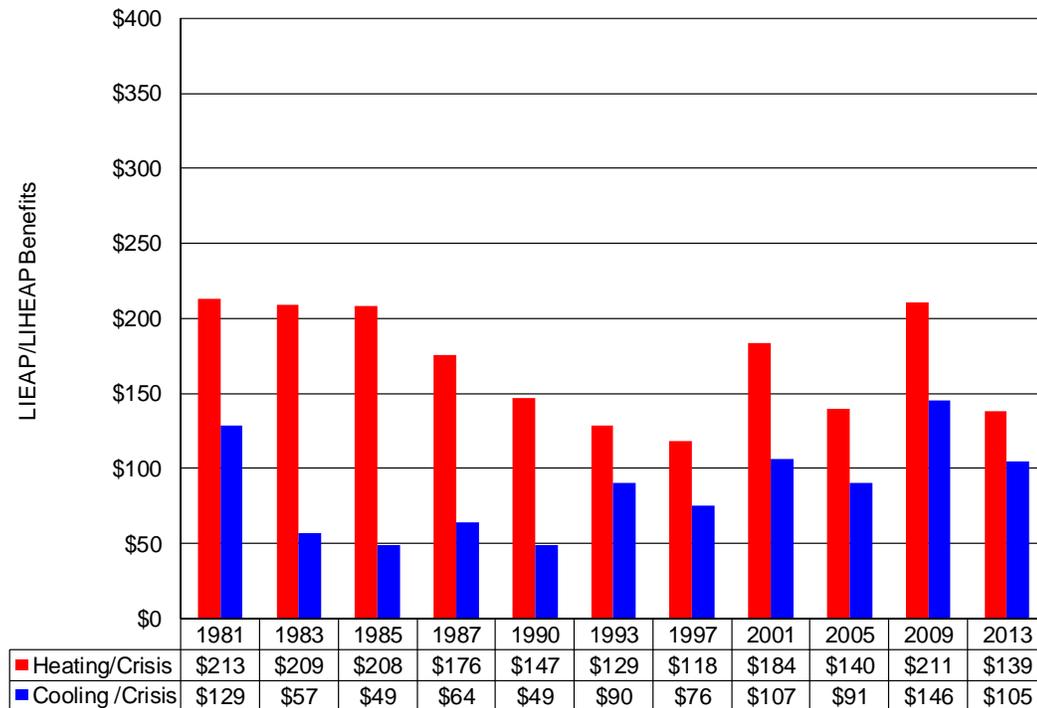
Figure 3-23 on the following page shows that, for the years shown, mean heating/winter crisis benefits were \$213 in FY 1981, grew to \$242 in FY 1985, fell back to \$213 in 1997, rose to \$364 in FY 2001, dropped to \$304 in FY 2005, and then rose substantially to \$504 in FY 2009 until falling to \$362 in FY 2013. Figure 3-24 shows that, after adjusting for inflation, the mean value of benefits has fallen substantially, with a fluctuating resurgence beginning in FY 2001. The mean value of heating and/or winter crisis benefits, in 1981 dollars, fell from \$213 in FY 1981 to \$140 in FY 2005. In FY 2009, mean heating benefits increased considerably to \$211 but decreased to \$139 in FY 2013. With the exception of FY 1981, mean cooling benefits ranged, in 1981 dollars, from \$49 to \$90 through FY 1997, then rose to \$107 in FY 2001, then fell to \$91 in FY 2005. In FY 2009, mean cooling benefits increased substantially to \$146, only to fall again to \$105 in FY 2013. In FY 1993, one State made program changes that significantly increased the mean benefit and decreased the total number of recipients.

Figure 3-23. Mean combined LIEAP/LIHEAP heating and/or winter crisis benefits and mean cooling and/or summer crisis benefits, in nominal dollars, FY 1981 to FY 2013



SOURCE: HHS Administrative Data — such data for FY 2013 are preliminary; thus the actual figures may differ.

Figure 3-24. Mean combined LIEAP/LIHEAP heating and/or winter crisis benefits and mean cooling benefits, in real 1981 dollars, FY 1981 to FY 2013



SOURCE: HHS Administrative Data — such data for FY 2013 are preliminary; thus the actual figures may differ.

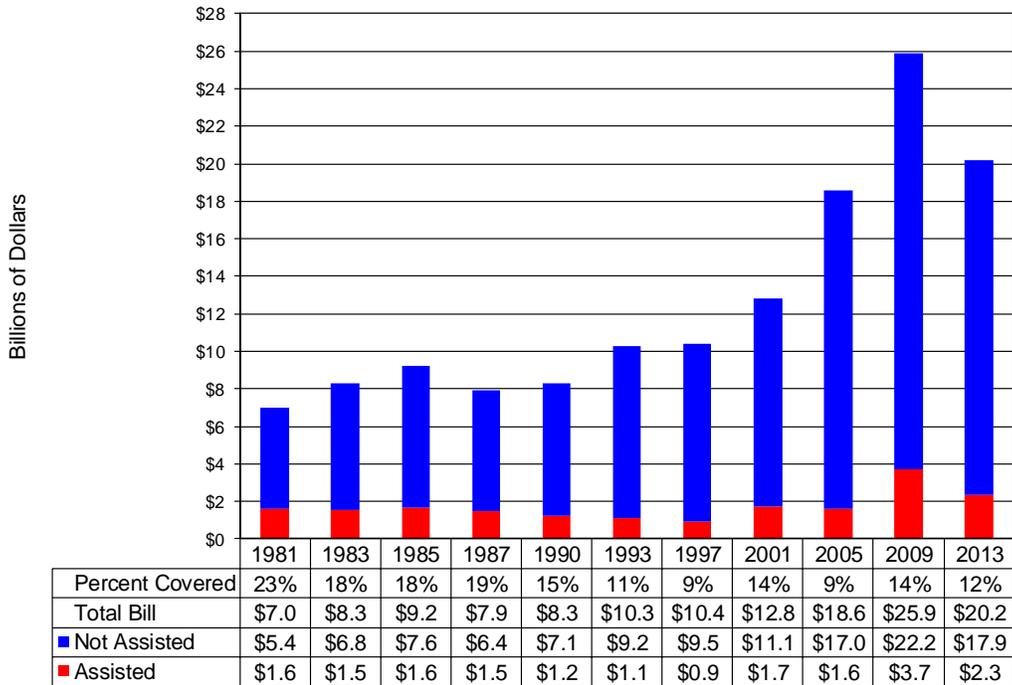
Analysis of LIHEAP benefits

The impact of LIHEAP heating benefits can be examined in at least two ways. Figure 3-25 shows the share of the aggregated total of low income home heating costs covered by LIHEAP heating and winter crisis benefits (LIHEAP heating coverage). Figure 3-26, on the next page, shows the reduction in mean group home heating burden as a result of LIHEAP benefits (LIHEAP burden offset).

Figure 3-25 shows that the LIHEAP heating coverage rate fell from 23 percent in FY 1981 to 12 percent in FY 2013. An increase in the size of the total bill and an increase in the number of households that are income eligible for assistance benefits in FY 2013 caused this reduction.

Figure 3-26 shows that the net effect of LIHEAP has been to lower recipient group home heating burdens to levels that are much closer to the levels of the average household. In FY 1981, the gross mean group home heating burden for LIHEAP recipient households was 8.5 percent, while the net mean group home heating burden (with home heating expenditures taken after deducting LIHEAP benefits) was 2.9 percent. In FY 2013, the gross mean group home heating burden for LIHEAP recipients was 3.7 percent, while the net mean group home heating burden was 1.7 percent. It is interesting to note that, while the gross mean group home heating burden for LIHEAP recipients fell from 8.5 percent in FY 1981 to 4.0 percent in FY 1997, decreases in mean LIHEAP benefits in relation to household income caused the net mean group home heating burden to range between 1.3 and 2.2 times as high as the gross mean group home heating burden for all households except for FY 2005 when that ratio was more than 3 to 1. In FY 2001, significant increases in the mean heating benefit caused the net mean group home heating burden for LIHEAP recipients to fall to 1.7 percent, however it remained twice as high as the mean group burden for all households. In FY 2005, the mean heating benefit decreased by 16 percent, and net mean group home heating burden almost doubled, increasing by 94 percent. The changes in net mean group heating burden resulted from the combination of mean heating benefit decrease and much higher fuel prices in FY 2005. In FY 2009, the net mean group home heating burden for LIHEAP recipients decreased to 1.0 percent, and in FY 2013 it increased to 1.7 percent.

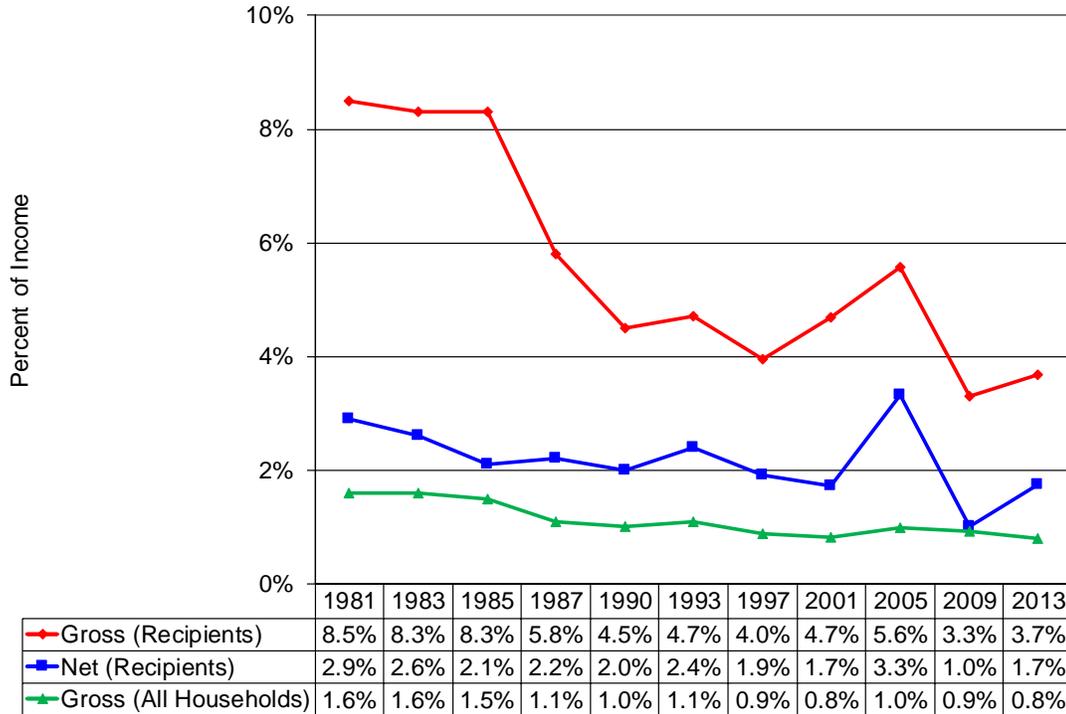
Figure 3-25. Amount and percentage of total home heating billed amounts for LIEAP/LIHEAP income eligible households covered by LIEAP/LIHEAP heating and winter crisis benefits, FY 1981 to FY 2013



SOURCE: Assistance number from HHS data and heating bill estimates from RECS — HHS data for FY 2013 are preliminary; thus the actual figures may differ.

NOTE: The FY 1981 and FY 2009 estimates of income eligible households are not directly comparable to those of the other years because the income eligibility guidelines for the FY 1981 and FY 2009 programs differed from those of other years.

Figure 3-26. Mean group home heating burden for all households and LIEAP/LIHEAP heating and winter crisis recipient households, FY 1981 to FY 2013



SOURCE: Mean burden uses heating expenditures from RECS and income from CPS ASEC.
 Net Burden = (Mean Expenditures - Mean Benefit) / Mean Income

IV. Federal LIHEAP Targeting Performance

The Government Performance and Results Act of 1993 (GPRA), as amended, focuses on program results to provide Congress with objective information on the achievement of statutory objectives or program goals. The resulting performance data are to be used in making decisions on budget and appropriation levels.

ACF's budget justification for Congress, which contains the LIHEAP performance plan takes into account the fact that the Federal government does not provide LIHEAP assistance to the public. Instead, the Federal government provides funds to States, certain Federal- or State-recognized Indian Tribes and Tribal Organizations, and Insular Areas to administer LIHEAP at the local level. The LIHEAP performance plan also takes into account the fact that LIHEAP is a block grant whereby LIHEAP grantees have broad flexibility to design their programs, within very broad Federal guidelines, to meet the needs of their citizens.

This section of the *Notebook* describes ACF's approach to LIHEAP performance measurement and discusses the findings from ACF-funded research on performance measurement for LIHEAP, including:

- LIHEAP Performance Plan – Review of national LIHEAP program goals, national LIHEAP performance goals, and LIHEAP performance measures.
- Performance Measurement Research – Discussion of the findings from a study to assess the validity of performance measurement estimation procedures and from an evaluation of the performance of LIHEAP with respect to serving the lowest-income households with the highest energy burdens.
- LIHEAP Performance Statistics – Statistics that document the performance of LIHEAP in serving low income vulnerable and high burden households.

LIHEAP program goals and performance goals

LIHEAP is not an entitlement program. Therefore, the program's grantees are unable to serve all of the households that are income eligible under the Federal maximum income eligibility standard. In FY 2013, 16 percent of income eligible households received heating and/or winter crisis assistance. Given that limitation, the LIHEAP statute requires LIHEAP grantees to provide, in a timely manner, that the highest level of assistance will be furnished to those households that have the lowest incomes and the highest energy costs or needs in relation to income, taking into account family size. The LIHEAP statute identifies two groups of low income households as having the highest home energy needs:

- *Vulnerable Households*: Vulnerable households are those with at least one member that is a young child, an individual with disabilities, or a frail older individual. The statute does not define the terms "young children," "individuals with disabilities," and "frail older individuals." The primary concern is that such households face serious health risks if they do not have adequate heating or cooling in their homes. Health risks can include death from hypothermia or hyperthermia, and increased susceptibility to other health conditions such as stroke and heart attacks.
- *High Burden Households*: High burden households are those with the lowest incomes and highest home energy costs. The primary concern is that such households will face safety

risks in trying to heat or cool their homes if they cannot pay their heating or cooling bills. Safety risks can include the use of makeshift heating sources or inoperative/faulty heating or cooling equipment that can lead to indoor fires, sickness, or asphyxiation.

The authorizing legislation requires States to design outreach procedures that target LIHEAP reciprocity to income eligible vulnerable and high burden households, and to design benefit computation procedures that target higher LIHEAP benefits to higher burden households.

Based on the authorizing legislation, LIHEAP's goal is to provide LIHEAP assistance to vulnerable households and high-energy burden households whose health and/or safety are endangered by living in homes without sufficient heating or cooling.

Based on the national LIHEAP program goals, ACF has focused its annual performance goals on targeting the availability of LIHEAP heating assistance to vulnerable low income households. Subject to the availability of data, ACF also is interested in the performance of LIHEAP with respect to targeting benefits to the highest-burden households.

Targeting index performance measures

Performance goals must be measurable in order to determine if the goals are being achieved. ACF has developed a set of developmental performance measures (i.e., targeting indexes) that show the extent to which LIHEAP meets its performance goals. These measures, which are presented below, show LIHEAP's performance in targeting vulnerable and high-burden households:

- The **reciprocity targeting index** quantifies reciprocity targeting performance. The index is computed for a specific group of households by dividing the percent of LIHEAP recipient households that are members of the target group by the percent of all income eligible households that are members of the target group and then multiplying the result by 100. For example, if 25 percent of LIHEAP recipients are high burden households and 20 percent of all income eligible households are high burden, the reciprocity targeting index for high burden households is 125 (100 times 25 divided by 20).

An index greater than 100 indicates that the target group's incidence in the LIHEAP recipient population is higher than that group's incidence in the income eligible population. An index less than 100 indicates that the target group's incidence in the LIHEAP-recipient population is lower than that group's incidence in the income eligible population.

- The **benefit targeting index** quantifies benefit targeting performance. The index is computed by dividing the mean LIHEAP benefit for a target group of recipients by the mean LIHEAP benefit for all recipient households and then multiplying the result by 100. For example, if high burden household recipients have a mean benefit of \$250 and the mean benefit for all households is \$200, the benefit targeting index is 125 (100 times \$250 divided by \$200).

An index greater than 100 indicates that the target group is, on average, receiving more benefits than the overall recipient population. An index less than 100 indicates that the target group is, on average, receiving fewer benefits than the overall recipient population.

- The **burden reduction targeting index** quantifies burden reduction targeting performance. The index is computed by dividing the percent reduction in the median individual energy burden due to LIHEAP for a specified group of recipients by the percent reduction in the

median individual energy burden due to LIHEAP for all recipients and then multiplying the result by 100.²⁶ For example, if high burden recipients have their median individual energy burden reduced by 25 percent (e.g., from 8 percent of income to 6 percent of income) and all recipient households have their median individual energy burden reduced by 20 percent (e.g., from 5 percent of income to 4 percent of income), the burden reduction targeting index is 125 (100 times 25 divided by 20).

An index greater than 100 indicates that the specified group experiences, on average, a greater median individual energy burden reduction than the overall recipient population. An index less than 100 indicates that the specified group experiences, on average, a smaller median individual energy burden reduction than the overall recipient population.

The development of these indexes facilitates tracking of reciprocity, benefit, and burden reduction performance for vulnerable and high burden households.

- The reciprocity performance data allow for outreach initiatives to improve reciprocity targeting performance.
- The benefit and burden reduction performance data facilitate analysis of how different kinds of benefit determination procedures lead to different levels of benefit and burden reduction targeting performance.

The benefit targeting index and the burden reduction targeting index are both useful measures, but they measure different aspects of benefit targeting.

- The benefit targeting index requires fewer data elements; it is a simple measure of how benefits for a particular group of recipient households compare to benefits for all recipient households.
- The burden reduction index is more comprehensive; it accounts for differences in both energy costs and benefit levels for the group of recipient households compared to energy costs and benefit levels for all recipient households.

The baseline data serve as a starting point against which the degree of change in LIHEAP targeting can be measured, analyzed, and attributed to Federal performance enhancement initiatives. The baseline data also provide a roadmap from which ACF can set realistic reciprocity performance targets (a quantitative statement of the degree of desired change) for those parts of the country in which targeting performance can be improved.

ACF's annual LIHEAP performance measures are:

- Increase the reciprocity targeting index score of LIHEAP households having at least one member 60 years or older.
- Maintain the reciprocity targeting index score of LIHEAP households having at least one member five years or younger.

²⁶In general, the mean (or average) is preferred to the median (or midpoint), as it is more informative. The mean, which is commonly called the average, is the sum of all values divided by the number of values. The median is the value at the midpoint in the distribution of values. LIHEAP benefit reciprocity variables are not highly skewed (or distorted); therefore, mean benefits are used to compute the benefit targeting index. Energy burden variables, however, are highly skewed; thus the median energy burden, which is less affected by extreme values, is used to calculate the burden reduction index.

There are no annual measures for the benefit targeting or burden reduction targeting indexes because the data that enter into these indexes are not available annually. The baseline value for the burden reduction targeting index was computed for 2001 using the Residential Energy Consumption Survey (RECS) LIHEAP Supplement. However, this index can be updated only as often as the RECS occurs, which is generally every four years. The last update to this index came from the 2009 RECS data.

Outcome performance measures

ACF seeks to improve the way in which it measures LIHEAP's performance. LIHEAP supports Objective B of HHS' Goal 3: Promote economic and social well-being for individuals, families, and communities. However, the indicators that ACF uses to measure LIHEAP's performance, the young child and elderly reciprocity targeting indexes, serve only as proxies for LIHEAP's outcomes. ACF intended these proxies to be replaced by more outcome-focused measures.

In June 2008, ACF established the LIHEAP Performance Measures Planning Work Group, consisting of State LIHEAP Directors and ACF staff. The Work Group developed a logic model which identifies the long-term goal of LIHEAP as providing LIHEAP recipients with continuous, safe, and affordable home energy service. The Work Group completed its work in January 2010 when it drafted a set of over 36 potential LIHEAP performance measures that could be useful to both the States and ACF. These draft measures are grouped into one of four tiers by type of LIHEAP assistance. Performance measures in tiers 1-3 are to be State-reported based on each State's ability to collect increasingly complex data. Tier 4 data are to be collected at the federal level.

In April 2010, ACF established a follow-up group, the LIHEAP Performance Measures Implementation Work Group, consisting of State LIHEAP Directors and ACF staff. The Work Group works with stakeholders to evaluate grantees' ability to collect and report on newly established measures and also establishes definitions relating to the new measures. Thus far, the Work Group engaged in the following activities:

- In summer 2010, the Work Group administered to States a LIHEAP performance measures needs assessment.
- In fall 2010, the Work Group analyzed and reported on the results of the needs assessment, developed objectives for implementing the proposed performance measures, and began creating the tools and resources to allow State grantees to measure LIHEAP program performance.

The Work Group will be active at least through 2014 and will oversee the selection and implementation of four new, developmental annual performance measures. These four measures include: 1) the benefit targeting index for high-burden LIHEAP recipient households; 2) the burden reduction targeting index for high-burden LIHEAP recipient households; 3) the number of LIHEAP recipient households for which LIHEAP restored home energy service; and 4) the number of LIHEAP recipient households for which LIHEAP prevented loss of home energy service.

Performance measurement research

ACF has funded several studies to develop a better understanding of LIHEAP targeting performance measurement. Two of these studies recommended that ACF consider making changes in the performance measurement plan for LIHEAP.

- Validation Study – The performance measurement validation study examined the available data sources for estimating the targeting indexes required by the performance measurement plan for LIHEAP and identified the data sources that furnished the most reliable data.²⁷
- Energy Burden Study – The energy burden evaluation study used the 2001 RECS LIHEAP Supplement to measure the baseline performance of LIHEAP in serving high burden households and to examine the competing demands associated with targeting vulnerable and high burden households.²⁸

Performance measurement data sources

The ACF performance measurement plan for LIHEAP requires the development of reciprocity targeting indexes for elderly households (i.e., households having at least one member age 60 years or older), young child households (i.e., households having at least one member age 5 years or younger), and high burden households (i.e., households having an energy burden that exceeds an energy burden threshold). Data elements needed to compute the reciprocity targeting indexes are:

- The target group's income eligible population – The number of elderly, young child, and high burden households that are income eligible for LIHEAP.
- Target group recipients – The number of elderly, young child, and high burden households that are LIHEAP heating recipients.
- The income eligible population – The number of all LIHEAP income eligible households.
- LIHEAP heating recipients – The number of all LIHEAP heating assistance recipients.

The performance measurement validation study and the energy burden study identified the most reliable data sources for the required data elements. The studies found that a number of different data sources were needed to furnish the most reliable data for the computation of targeting indexes, including:

- The income eligible population – According to the Census Bureau, the CPS ASEC furnishes the most reliable national estimates of the number of income eligible households.²⁹
- Income eligible vulnerable households – The CPS ASEC furnishes the most reliable estimates of the number of income eligible vulnerable households (i.e., elderly households and young child households).
- LIHEAP heating recipients – The annual State *LIHEAP Household Reports* furnished by State LIHEAP administrators to ACF furnish the most reliable estimates of the number of heating assistance recipient households.
- Vulnerable household heating recipients – The annual State *LIHEAP Household Reports* furnished by State LIHEAP administrators to ACF furnish the most reliable estimates of the number of vulnerable heating assistance recipient households.

²⁷ *LIHEAP Targeting Performance Measurement Statistics: GPRA Validation of Estimation Procedures*, September 2004, prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D.

<http://www.acf.hhs.gov/programs/ocs/resource/gpra-validation-of-estimation-procedures-2004>

²⁸ *LIHEAP Energy Burden Evaluation Study*, July 2005, prepared by APPRISE Incorporated under PSC Order No. 043Y00471301D. <http://www.acf.hhs.gov/programs/ocs/resource/liheap-energy-burden-evaluation-study>

²⁹ "Guidance about Income Sources." U.S. Census Bureau. Housing and Household Economics Statistics Division. November 1, 2011. <http://www.census.gov/hhes/www/income/method/guidance/index.html>.

- Income eligible high burden households – The RECS furnishes the most reliable estimates of the number of income eligible high burden households.
- High burden heating recipients – The RECS LIHEAP Supplement furnishes the most reliable estimates of the number of high burden recipient households.

The following data sources are used in reporting on LIHEAP targeting performance for this Notebook:

- CPS ASEC – The CPS ASEC is a national household sample survey that is conducted monthly by the Bureau of the Census. The CPS ASEC includes data that allow one to characterize household demographic characteristics. The CPS ASEC is the best source of annual national data for estimating the number of income eligible households and the number of income eligible vulnerable households. The CPS ASEC data needed to prepare performance statistics for FY 2013 were available in October 2013.
- State annual LIHEAP Household Report – The preliminary LIHEAP Household Reports for FY 2013 were due from the States by September 1, 2013, when the States' LIHEAP block grant applications for FY 2014 were due. ACF set a goal for the States to submit their final LIHEAP Household Report for FY 2013 by December 2013. Each LIHEAP Household Report needs to be received, reviewed, processed, and compared against data from each State's Federal LIHEAP Grantee Survey for FY 2013 that was conducted in January 2014. The data on the number of LIHEAP households assisted in FY 2013 will be included in the *LIHEAP Report to Congress* for FY 2013.
- The RECS – The EIA's RECS is a national household sample survey that is conducted once every four years. The most recent survey for which the necessary data is available was conducted in 2009. The RECS data were used in 2001 for baseline measurement of targeting performance for high energy burden households and can track longer-term changes in performance over time (2001 to 2009). However, the RECS currently cannot furnish annual updates on LIHEAP targeting performance for high energy burden households.

Targeting performance for high burden households

With the available data, the annual reporting of LIHEAP reciprocity targeting index scores includes updates for vulnerable households but not for high energy burden households. To develop a better understanding of the value of targeting performance data for high energy burden households, ACF commissioned the *LIHEAP Energy Burden Evaluation Study* (2005). The purposes of that study included:

- Targeting – Measure the extent to which LIHEAP is serving the lowest income households that have the highest energy burdens.
- Performance goals – Assessment of the importance of the performance goal of increasing the percent of LIHEAP recipient households having the lowest incomes and the highest energy costs.
- Measurement – Identification of procedures that can be used to measure performance of LIHEAP with respect to the goal of increasing the percentage, among LIHEAP recipient households, of those households with the lowest incomes and the highest energy costs (i.e. high energy burden households).

The study furnished the following information to ACF with respect to targeting of high energy burden households.³⁰

- Targeting – The study found that, for FY 2001, the reciprocity targeting index for high home energy burden households was 170, indicating that households with a high home energy burden were served at a significantly higher rate than were other income-eligible households. The study furnished a baseline statistic from which changes in targeting to high energy burden households can be compared.
- Performance goals – The study demonstrated that it is important to include a goal of targeting high energy burden households in the performance plan for LIHEAP. The LIHEAP statute gives equal status to the goals of targeting vulnerable households and high energy burden households. Performance goals that are limited to targeting of elderly and young child households encourage LIHEAP grantees to give preference to low burden vulnerable households over high burden households that do not have a vulnerable household member.
- Measurement – The study identified options for collecting annual data on high energy burden recipient households.

In addition, the *LIHEAP Energy Burden Evaluation Study (2005)* examined two other performance indicators – the benefit targeting index and the burden reduction targeting index. The study furnished baseline measures for these indicators and discussed the value and challenges of including those benefit and burden reduction targeting indicators in the performance plan for LIHEAP. These indexes were updated for FY 2005 and FY 2010 using the 2005 and 2009 RECS.

Performance measurement statistics

Table 4-1 shows the LIHEAP reciprocity targeting performance measures from FY 2003 through FY 2013. The first column in the table restates the performance goal. The second column shows performance targets (to be reached), and the third column shows the targeting index scores that were achieved. FY 2003 was the baseline year for both measures.

For measure 1A, the baseline targeting index score of 79 indicates that income eligible elderly households were not being effectively targeted within the income eligible population of elderly households in FY 2003. The FY 2004 through FY 2011 targeting index scores fluctuated between 73 and 79. In FY 2012, the targeting index for households with elderly increased to 83, exceeding both the target and the baseline targeting index score. In FY 2013, the targeting index for households with elderly members increased to 84, exceeding the baseline targeting index score but falling short of the fiscal year target of 85.

For measure 1B, the baseline targeting index score of 122 for households with a young child indicates that such households were being effectively targeted within the income eligible population of

³⁰ The study developed an operational definition of “high burden,” though the statute offers no such definition. The study’s definition is used here. This study defined high energy burden as the “energy share” of severe housing (shelter) burden. Severe housing burden is considered by some researchers to be 50% of income. (See Cushing N. Dolbeare. 2001. “Housing Affordability: Challenge and Context.” *Cityscape: A Journal of Policy Development and Research*, (5)2:111-130. A Publication of the U.S. Department of Housing and Urban Development, Office of Policy Development and Research.) The median total residential energy costs for households at or below 150 percent of the HHS’ Poverty Guidelines are 21.8 percent of housing costs. This study defined a residential energy burden of 10.9 percent of income as a high burden, moderate energy burden as costs at or above 6.5 percent of income but less than 10.9 percent of income, and low energy burden as costs less than 6.5 percent of income. Heating and cooling expenditures comprise 39.3 percent of total residential energy expenditures for all households. Therefore, high home energy burden is defined for purposes of this study as heating and cooling costs that exceed 4.3 percent of income. Moderate home energy burden is defined as heating and cooling costs above 2.6 percent of income but less than 4.3 percent of income.

households with young children in FY 2003. The FY 2004 through FY 2011 targeting index scores fluctuated between 110 and 122. However, in FY 2012, the targeting index for households with a young child decreased to 114, which is lower than the target for FY 2012 and the baseline targeting index score. In FY 2013, the targeting index for households with a young child increased to 117, exceeding the fiscal year target of 116 but falling short of the baseline targeting index score.

Table 4-1a. LIHEAP reciprocity targeting performance measure 1A: Increase the reciprocity targeting index score of LIHEAP households having at least one member 60 years or older (reported for FY 2003 – FY 2013)

Fiscal Year	Target	Result
FY 13	85	84
FY 12	80	83
FY 11	75	78
FY 10	78	74
FY 09	96	76
FY 08	96	76
FY 07	94	78
FY 06	92	77
FY 05	84	79
FY 04	82	78
FY 03	Baseline	79

Table 4-1b. LIHEAP reciprocity targeting performance measure 1A: Increase the reciprocity targeting index score of LIHEAP households having at least one member five years or younger (reported for FY 2003 – FY 2013)

Fiscal Year	Target	Result
FY 13	116	117
FY 12	124	114
FY 11	110	122
FY 10	110	118
FY 09	122	117
FY 08	122	110
FY 07	122	110
FY 06	122	112
FY 05	122	113
FY 04	122	115
FY 03	Baseline	122

SOURCE: HHS Administrative Data — such data for FY 2013 are preliminary; thus the actual figures may differ.

As noted above, the *LIHEAP Energy Burden Evaluation Study* developed baseline statistics on high energy burden household targeting. That study recommended that measurement of targeting to high energy burden households is important since LIHEAP’s statutory mandate is to serve the households “with the lowest incomes, that pay a high proportion of household income for home energy, primarily in meeting their immediate home energy needs.”

Table 4-2 shows the national and regional reciprocity targeting indexes for high home energy burden households for FY 2001, FY 2005, and FY 2010. The 2001 RECS, the 2001 RECS LIHEAP Supplement, the 2005 RECS, and the 2009 RECS were used to develop these statistics. These statistics demonstrate that, except for the Northeast region in FY 2005 and FY 2010, LIHEAP was targeting high burden households.³¹ However, FY 2010 targeting index scores indicate a significant decrease in targeting high burden households compared to the FY 2001 baseline scores.

Table 4-2. LIHEAP reciprocity targeting index of high burden households by region for FY 2001 from the 2001 RECS and the 2001 RECS LIHEAP Supplement, for FY 2005 from the 2005 RECS, and for FY 2010 from the 2009 RECS.

Region	FY 2001	FY 2005	FY 2010
Northeast	163	99	92
Midwest	132	116	112
South	155	119	101
West	293	184	112
United States	170	122	112

The energy burden evaluation study also furnished estimates of the benefit and burden reduction targeting indexes for FY 2001. These indexes were updated for FY 2005 and FY 2010 using the 2005 and 2009 RECS data. Benefit and burden reduction targeting are not part of the performance plan for LIHEAP. However, the study concluded that those indexes were consistent with the statutory mandate to furnish the highest benefits “to those households which have the lowest incomes and the highest energy costs or needs in relation to income.”

Table 4-3 shows national and regional benefit targeting indexes and Table 4-4 shows national and regional burden reduction targeting indexes. In FY 2001, at the national level and in all regions, high burden households received slightly higher average benefits than did households that did not have high burdens. The benefit targeting index scores for FY 2001 and FY 2010 were similar to one another and they were slightly higher at the national level and in most regions than those in FY 2005. However, Table 4-4 shows that at the national level and in all regions, high burden households experienced lower burden reductions than did households that did not have a high burden. From FY 2001 to FY 2005, burden reduction index scores decreased for all regions. From FY 2005 to FY 2010, burden reduction index scores increased for all regions but not to the level of FY 2001 baseline scores.

³¹ The RECS LIHEAP Supplement was first introduced into the RECS in 2001. Because the design was experimental, no variance models were developed for the data file. As a result, it is difficult to develop a precise estimate of variances for statistics developed from the RECS LIHEAP Supplement. Preliminary analysis indicates that the FY 2001 targeting indexes in Table 4-2 are statistically different from 100 while the FY 2001 targeting indexes shown in Tables 4-3 and 4-4 are not statistically different from 100. Therefore, the null hypothesis that high burden households and households that are not high burden are served at the same rate can be rejected, while the null hypothesis that LIHEAP benefits and burden reduction are the same for high burden households and households that are not high burden cannot be rejected. The FY 2005 and FY 2010 targeting indexes in Table 4-2 and 4-4 are statistically different from 100 at the national level but not at the regional level, while the targeting indexes shown in Tables 4-3 are not statistically different from 100 at either regional or national level.

Table 4-3. LIHEAP benefit targeting index of high burden households by region for FY 2001 from the 2001 RECS and the 2001 RECS LIHEAP Supplement, for FY 2005 from the 2005 RECS, and for FY 2010 from the 2009 RECS

Region	FY 2001	FY 2005	FY 2010
Northeast	103	104	105
Midwest	108	104	107
South	110	81	102
West	124	119	109
United States	109	101	108

Table 4-4. LIHEAP burden reduction targeting of high burden households by region for FY 2001 from the 2001 RECS and the 2001 RECS LIHEAP Supplement, for FY 2005 from the 2005 RECS, and for FY 2010 from the 2009 RECS

Region	FY 2001	FY 2005	FY 2010
Northeast	96	74	93
Midwest	93	70	90
South	98	84	89
West	86	60	68
United States	94	71	82

Uses of LIHEAP performance data

Performance targeting index data can be useful for both LIHEAP grantees and ACF, as described below.

LIHEAP grantee use of targeting indexes

Individual LIHEAP grantees can use the reciprocity targeting indexes to examine the effectiveness of their outreach to households with vulnerable members.³²

- In absolute terms, if a given group has a reciprocity targeting index over 100, then that group's incidence in the LIHEAP-recipient population is higher than that group's incidence in the income eligible population.
- In relative terms, if a given group has a higher reciprocity targeting index than another group, then the given group has been targeted relative to the other group. For example, if the index for elderly households is 90 and the index for non-vulnerable households is 75, then elderly households are targeted at a higher rate than non-vulnerable households are.

Individual LIHEAP grantees can use the benefit and burden reduction targeting indexes to examine the effectiveness of their benefit determination procedures in serving households with vulnerable members and households with high energy burdens.³³

³² LIHEAP grantees have the ability to create these reciprocity targeting indexes using recipient counts from the State Household Reports and the estimated income eligibility counts provided in Appendix B of this report. For FY 2006 and 2007, ACF released information on the rankings of the States in terms of reciprocity targeting indexes. ACF has recently funded a study that classified States' targeting performance in FY 2007 through FY 2010 in five broad categories.

³³ LIHEAP grantees have the benefit data needed to create benefit targeting indexes. If they calculate household energy burdens for their recipients, LIHEAP grantees can also create burden reduction indexes.

- In absolute terms, if a given group has a benefit or burden reduction targeting index greater than 100, then that group has a higher average benefit (benefit targeting index) or experiences a greater median burden reduction (burden reduction index) than the recipient population has or experiences. If a group has a benefit or burden reduction targeting index less than 100, then that group has a lower average benefit (benefit targeting index) or experiences a smaller median burden reduction (burden reduction index) than the recipient population has or experiences.
- In relative terms, if a given group has a higher benefit or burden reduction targeting index than another group, then the given group has been targeted relative to the other group. For example, if the benefit targeting index for elderly households is 90 and the benefit targeting index for non-vulnerable households is 75, then elderly households have higher average benefits than non-vulnerable households. Likewise, if the burden reduction targeting index for elderly households is 90 and the burden reduction targeting index for non-vulnerable households is 75, then elderly households have greater percentage reduction in median energy burden.

Grantees can use the targeting measures to gauge their current targeting performance and to track changes in targeting performance over time.

ACF's use of targeting indexes

ACF is using national targeting indexes to examine the targeting performance of LIHEAP and to measure changes in performance over time. In so doing, ACF found that the national reciprocity targeting indexes indicate that elderly households face difficulty in enrolling in LIHEAP as compared to young child households. A review of the literature indicates that other federal social programs also have limited success in serving eligible elderly households, especially in comparison to households with young children. Program participation barriers appear to be most significant when elderly households have not made previous use of public assistance programs. For this reason, ACF is an active federal partner with the National Center for Outreach and Benefit Enrollment that is funded by the Administration on Aging. LIHEAP is one of five federal benefit programs for which the Center is seeking to develop innovative ways to increase enrollment of the elderly.

ACF is continuing to examine the reliability and validity of targeting indexes in making the following comparisons:

- ACF can compare reciprocity targeting measures among groups of households and identify which groups are not effectively targeted by LIHEAP. For example, if the national LIHEAP reciprocity targeting index for elderly households is 85 and the national LIHEAP reciprocity targeting index for households with young children is 110, then households with young children are targeted at a higher level than are elderly households. ACF might conclude from these statistics that a greater share of the technical assistance efforts should be allocated to increasing targeting to elderly households.
- ACF can compare reciprocity targeting measures among areas of the country to assess which areas are in greatest need of technical assistance and to determine the type of technical assistance that is required. For example, if the reciprocity targeting index for elderly households in the New England Census Division is 75, while the reciprocity indexes for elderly households in all other divisions are over 100, then elderly households are targeted at a lower level in New England than in other parts of the country. ACF might conclude from these statistics that a greater share of the technical assistance efforts should be allocated to increasing targeting to elderly households among one or more grantees in New England.

- ACF can compare national targeting measures over time to measure changes in targeting performance. For example, if the targeting indicator for elderly households was 75 in one fiscal year and was 85 in a later fiscal year, then it would demonstrate that LIHEAP targeted elderly households at a higher level over time.

Targeting performance measurement issues

As presented above, targeting indexes are statistical tools that allow ACF to examine targeting across groups of households, across regions of the country, and over time. It is reasonable to expect that the greatest increases in targeting performance can be realized by supporting the targeting efforts for those areas of the country that are currently serving targeted households at the lowest rate.

A major challenge in executing the LIHEAP performance plan is in finding an effective way to gather the data that enter into vulnerable and high burden targeting indexes in a timely way. ACF has found the timeliness of such collection to be challenging, e.g., the LIHEAP Household Report's early deadlines. In addition, the RECS' relative infrequency presents an ongoing challenge.

For FY 2011, ACF required States to report for the first time on the LIHEAP Household Report an unduplicated count of households receiving all types of LIHEAP benefits. This data is to allow ACF to indicate the targeting of all types of LIHEAP benefits, rather than just the targeting of heating benefits. However, there were a number of States that still were not able to report these unduplicated counts for FY 2013. ACF are working with such States to have a system in place to report these data.

V. LIHEAP Energy Insecurity Study

The 2009 Residential Energy Consumption Survey (RECS) is a national survey that collected energy-related data for occupied housing units and households. The Office of Community Services (OCS) in the Administration for Children and Families (ACF) of the U.S. Department of Health and Human Services (HHS) funded a special set of questions for households responding to the 2009 RECS. Those questions collected information on residential and home energy-related problems and measured the extent to which households reported that participation in LIHEAP helped to ameliorate those problems.³⁴ For the FY 2008 Home Energy Notebook, a study was commissioned by OCS to explore energy insecurity indicated by low income households in the 2005 RECS.³⁵ This Section of the Notebook is an update to the previous study and compares energy insecurity reported by low income households in the 2009 RECS with energy insecurity reported by low income households in the 2005 RECS.

Study Goals

The RECS is a household energy survey that was first conducted in 1978 and has been periodically conducted since that time; the most recent survey was conducted in 2009. For most of the RECS surveys, HHS provided funding to improve the information available on low income home energy issues, including supplemental samples of low income households and LIHEAP-recipient households to increase the precision of survey estimates, and special questions related to LIHEAP reciprocity and the energy-related problems faced by low income households. For the 2009 RECS, HHS funding was used to obtain administrative data on LIHEAP reciprocity and benefits for survey respondents and to administer a set of questions on energy-related problems.

In the 2005 and 2009 RECS, the questions on energy-related problems faced by low income households were based on a series of questions developed by Roger Colton of Fisher, Sheehan, and Colton. Colton originally developed the questions and the Home Energy Insecurity Scale in 2003 for OCS as a tool to describe the home energy status of LIHEAP income-eligible households.³⁶ Since that time, the questions and the Scale have been used in a number of studies, including the RECS. For the 2009 RECS, there were subtle as well as substantive variations designed to improve the energy insecurity questions and reduce respondent burden. This included the addition of new questions and the exclusion of certain questions asked in the 2005 RECS. The complete set of energy insecurity questions in the 2005 RECS and the 2009 RECS are available in the survey instruments (Form EIA-457-A) provided on the website of the Energy Information Administration.³⁷

The purpose of the previous study commissioned by OCS was to conduct an exploratory analysis of the 2005 RECS data to develop a better understanding of the performance of the survey questions and

³⁴ Unless otherwise indicated, “low income” refers to households with income at or below the Federal maximum LIHEAP eligibility standard (i.e., the greater of 150 percent of HHS Poverty Guidelines and 60 percent of State median income).

³⁵ *LIHEAP Special Study of the 2005 Residential Energy Consumption Survey – Dimensions of Energy Insecurity for Low Income Households*, February 2010, prepared by APPRISE Incorporated under contract #DE-AM01-04EI41006.

³⁶ Colton, R. (2003). “Measuring the Outcomes of Low-Income Energy Assistance Programs through a Home Energy Insecurity Scale.” A publication prepared for: LIHEAP Committee on Managing for Results. U.S. Department of Health and Human Services. Administration for Children and Families. Office of Community Services, Division of Energy Assistance.

³⁷ In the 2009 RECS, the energy insecurity questions were asked in Section M of Form EIA-457-A (http://www.eia.gov/survey/form/eia_457/form.pdf). In the 2005 RECS, the energy insecurity questions were asked in Section K of Form EIA-457-A (http://www.eia.gov/survey/form/eia_457/2005%20RECS%20457-A%20Household%20Survey.pdf).

to develop new information on the energy insecurity³⁸ of low income households. The current study updates those findings, including:

- Levels and Types of Energy Insecurity – Estimation of the rate at which low income households face various types of energy problems and examination of survey respondent reports on the extent to which energy assistance restores home heating and cooling for households experiencing service interruptions.
- Factors Related to Energy Insecurity – An analysis of the factors associated with energy problems including poverty level, energy burden, geographic region and other demographic and housing factors.

The previous study of the 2005 RECS also assessed performance of the Home Energy Insecurity Scale in measuring the impacts of energy costs on low income households compared to other energy insecurity measures used in the past. The current study does not update the assessment of the Home Energy Insecurity Scale because not all of the questions required to assess the Scale were included in the 2009 RECS.

Levels and Types of Energy Insecurity

Prior to 2005, RECS questions on energy affordability were limited to heating and electric service disconnections. However, low income households can experience other problems as result of having high energy bills. For example, in order to make their home energy bill affordable, a household might have to keep its home at a temperature that is unhealthy, particularly for young children or elderly individuals. The 2005 and the 2009 RECS included questions that documented the different types of energy affordability problems that low income households face.

Space Heating Disruptions

One problem that some low income households face when they are unable to pay their energy bills is that they go without energy service and are unable to heat their homes with their main heating equipment when heat is needed. Questions on space heating disruptions have been asked on RECS surveys since 1982. While the format of the questions has changed somewhat over time, there is a consistent series of information on heating service disruptions from 1982 through 2009. In the 2009 RECS, the following space heating disruption questions were asked:

Asked of households that reported using electricity

M-4: In 2009 was your electricity ever disconnected because you were unable to pay your home energy bill?

M-4a: During which of the following months did your household lose the use of your electricity because the service was disconnected?

M-4b: While your electricity was disconnected, was there a time when you wanted to use your main source of heat but were unable to?³⁹

³⁸ In the literature, energy insecurity is defined as the “lack of consistent access to enough of the kinds of energy needed for a healthy and safe life in the geographic area where a household is located.” (Cook et al., A Brief Indicator of Energy Security: Associations with Food Security, Child Health, and Child Development in US Infants and Toddlers. *Pediatrics*; Oct 2008, 122; e867-e875.)

M-4b1: Did receiving energy assistance help you to restore heating to your home?

Asked of households that reported using natural gas

M-5: In 2009 was your natural gas service ever disconnected because you were unable to pay your home energy bill?

M-5a: During which of the following months did your household lose the use of your natural gas because the service was disconnected?

M-5b: While your natural gas service was disconnected, was there a time when you wanted to use your main source of heat but were unable to?

M-5b1: Did receiving energy assistance help you to restore heating to your home?

Asked of households that reported using delivered fuels

M-5: In 2009 did your fuel oil, kerosene, propane, or wood ever run out because you were unable to pay for a home energy delivery?

M-5a: During which of the following months did your household lose the use of your fuel oil, kerosene, propane, or wood because delivery was disconnected?

M-5b: When you ran out of your fuel oil, kerosene, propane, or wood was there a time when you wanted to use your main source of heat but were unable to?

M-5b1: Did receiving energy assistance help you to restore heating to your home?

Asked of households that reported heating their home

M-7: In 2009 were you unable to use your main heating equipment because it was broken?

M-7a: Was your heating equipment fixed or replaced in 2009?

M-7b: Did receiving home energy assistance help you to fix or replace your heating equipment?

One important element of these questions is that they refer to the household's main sources of heat. For example, if a household's main source of heat is a gas warm air furnace, they might be unable to use that furnace because it was broken, because the gas company disconnected their service for nonpayment, or because the electric company disconnected service for nonpayment and electricity was needed to run the gas furnace.

Disruption of a household's main source of heat does not necessarily mean that the household is completely without heat. Data from the 2001 RECS show that during 35 percent of heat interruptions, low income households were able to heat their home in some other way. However, a space heating disruption does imply that the household is having significant energy affordability problems.

³⁹ In the 2009 RECS, this question was only asked of households whose main heating source was electricity. The analogous question asked in the 2005 RECS was asked of all households, regardless of the type of main heating fuel. As a result, responses to these questions are not directly comparable between the 2009 RECS and 2005 RECS. Methods of approximation were used to construct the statistic related to this question in the 2009 RECS listed in Table 5-1a and 5-1b.

On the other hand, a household may have other energy affordability problems even though the household does not have a space heating disruption. In many jurisdictions, utility companies are prohibited from disconnecting energy service during the winter heating season (typically from November 1 to April 1). In these jurisdictions, utility service disconnections do not necessarily result in space heating disruptions during heating season.

Table 5-1a presents data from the 2009 RECS on space heating disruptions for low income households. The table shows the number and percent of low income households that experienced each type of space heating disruption. Table 5-1a shows that about 509 thousand low income households experienced space heating disruptions in 2009 due to an inability to pay for bulk fuel delivery; about 937 thousand low income households because of an inability to pay for electric service; and about 554 thousand low income households because of an inability to pay for natural gas service. In addition, about 933 thousand low income households experienced space heating disruptions because of an inability to pay for the repair or replacement of a broken heating system.

Table 5-1a. Inability to use the main source of heat when heat is needed, low income households, 2009

Reason for Space Heating Disruption	Number of Low Income Households with Space Heating Disruption	Percent of All Low Income Households
Inability to pay for the repair of broken heating system ⁴⁰	932,843	2.6%
Inability to pay for bulk fuel delivery ⁴¹	508,646	1.4%
Inability to pay for electric service ⁴²	937,171	2.7%
Electric main heat	360,937	1.0%
Other main heat ⁴³	576,234	1.6%
Inability to pay for natural gas service	554,342	1.6%
Disruption due to any reason	2,526,372	7.1%

Source: 2009 RECS

Table 5-1b shows that low income households using delivered fuel (fuel oil, kerosene, propane, or wood) main heat experienced space heating disruptions at a higher rate in 2009 than in 2005 due to the inability to pay for bulk fuel delivery, whereas low income households using natural gas main heat experienced space heating disruptions at the same rate in 2009 as in 2005 due to the inability to pay for natural gas service. In 2009, fuel oil prices were higher relative to those in 2005, whereas natural gas prices were lower relative to those in 2005.⁴⁴ The statistics showing space heating disruptions due to the inability to pay for the repair of a broken heating system and the inability to pay

⁴⁰ For the 2009 RECS, the inability to use the main source of heat when heating is needed because of the inability to pay for the repair of a broken heating system was constructed counting any low income households whose heating equipment was broken and not fixed in 2009, or who fixed broken heating equipment in 2009 as a result of receiving energy assistance.

⁴¹ Delivered fuels include fuel oil, kerosene, propane, and wood.

⁴² For the 2009 RECS, the inability to use the main source of heat when heating is needed because of the inability to pay for electric service was constructed by counting any low income households who heated with a non-electric heating source (gas or bulk fuel for delivery) whose electricity was disconnected between November – March due to nonpayment for electric service, plus any low income households who used electricity for heating and answered affirmatively that they could not use their main heating source at some point in 2009 because of an inability to pay for electric service.

⁴³ “Other” main heat includes gas main heat and delivered fuel (fuel oil, kerosene, propane, and wood) main heat.

⁴⁴ See Figure 3-15 for a discussion of national energy price trends between 1979 and FY 2013, including calendar years 2005 and 2009.

for electric service are not comparable between the 2009 RECS and 2005 RECS because of the methods used to construct the statistics from the questions asked in the 2009 RECS.

Table 5-1b. Inability to use the main source of heat when heat is needed, low income households, comparison of 2009 RECS and 2005 RECS⁴⁵

Reason for Space Heating Disruption	Percent of All Low Income Households, 2009 RECS	Percent of All Low Income Households, 2005 RECS
Inability to pay for repair of broken heating system	2.6%	4.4%
Inability to pay for bulk fuel delivery	1.4%	0.8%
Inability to pay for electric service	2.7%	4.7%
Electric main heat	1.0%	N/A
Other main heat	1.6%	N/A
Inability to pay for natural gas service	1.6%	1.7%
Disruption due to any reason	7.1%	9.1%

Source: 2009 RECS and 2005 RECS

Table 5-2 furnishes data from the series of RECS surveys regarding the number of low income households that have reported bill payment-related space heating disruptions over time. These statistics show that bill payment space heating disruptions in 2009 decreased by about one percentage point from payment space heating disruptions during the winter of 2004-2005, but was still the third highest of any year since the question was first asked in the 1984 RECS.⁴⁶

Table 5-2. Inability to use the main source of heat because of bill payment problems, percent of all low income households, selected years⁴⁷

Reason for Space Heating Disruption	1983-84	1987-88	1990-91	1996-97	2000-01	2004-05	2009
Payment disruptions	5.1%	2.1%	4.1%	3.6%	2.7%	5.9%	4.9%

Source: FY 2008 Home Energy Notebook and 2009 RECS

Air Conditioning Disruptions

Another problem that some low income households face when they are unable to pay their energy bills is that they go without energy service and are unable to cool their homes with their air conditioning equipment when cooling is needed.⁴⁸ Questions on air conditioning disruptions were included in RECS for the first time in the 2005 survey and included again the in 2009 RECS.

In the 2009 RECS, the following air conditioning disruption questions were asked:

Asked of households that reported using electricity

⁴⁵ In the 2009 RECS, the questions asked of respondents pertained to calendar year 2009. In the 2005 RECS, the questions asked of respondents pertained to the previous 12 months.

⁴⁶ Some of the previous RECS surveys have also collected information on equipment related interruptions. The historical data on this type of interruptions were not readily available for this study.

⁴⁷ In the 2009 RECS, the questions asked of respondents pertained to calendar year 2009. In the 2005 RECS and previous years listed, the questions asked of respondents pertained to the previous 12 months.

⁴⁸ Note that the data does not provide information on the total number of shutoffs (e.g. autumn shutoffs in moratoria States when cooling is not needed) for the entire year.

M-4: In 2009 was your electricity ever disconnected because you were unable to pay your home energy bill?

M-4c: While your electricity was disconnected, was there a time when you wanted to use your air conditioner but were unable to?

M-4c1: Did receiving home energy assistance help you to restore cooling to your home?

Asked of households that reported using central air conditioning equipment

M-8: In 2009 were you unable to use your central air conditioner because it was broken?

M-9a: Was your central air conditioning unit fixed or replaced in 2009?

M-9b: Did receiving home energy assistance help you to fix or replace your central air conditioning?

Asked of households that reported using room air conditioning equipment

M-9: In 2009 were you unable to use any room air conditioning unit because it was broken?

M-9a: Was your room air conditioning unit fixed or replaced in 2009?

M-9b: Did receiving home energy assistance help you to fix or replace your room air conditioning?

One important element of these questions is that they refer to the household's air conditioning equipment. Disruption of a household's air conditioning equipment does not necessarily mean that the household is completely without the ability to keep their home cool. Households can keep their home cooler than the outside temperature by using active cooling strategies at night when it is cool outside (e.g., using window fans) and by using passive cooling strategies during the day (i.e., closing shades on the south and west sides of the homes). However, an air conditioning disruption does imply that the household is having significant energy affordability problems.

In the 2009 RECS, respondents were asked questions M-8 and M-9 regarding whether or not their central or window/wall unit air conditioners had broken during the year. These questions differed from the question asked of respondents in the 2005 RECS, which asked whether or not there was a time during the past 12 months in which the respondent wanted to use their air conditioner but could not because the air conditioner was broken and they were unable to pay for its repair or replacement. In order to construct a statistic comparable to the responses to the 2005 RECS, an approximation was made using responses to questions M-8 and M-9 from the 2009 RECS and shown in Table 5-3a.

In addition, question M-4 in the 2009 RECS were only asked of respondents who reported using central and/or window/wall unit air conditioning equipment. Since households can employ active cooling strategies other than central and/or window/wall unit air conditioning equipment to cool their homes, and these alternative active cooling strategies typically require use of electricity (e.g., using window fans), an approximation using responses to any electric service disconnection by month was made to construct a statistic to supplement the questions asked of respondents who reported using central and/or window/wall unit air conditioning equipment.

Table 5-3a presents data from the 2009 RECS on air conditioning disruptions for low income households. The table shows the number and percent of low income households that experienced disruption in using air conditioning due to an inability to pay for the repair or replacement of broken

air conditioning equipment or the inability to pay for electric service. Table 5-3a shows that about 626 thousand low income households experienced an air conditioning disruption because they could not pay for the repair or replacement of broken equipment, and about 748 thousand low income households experienced a cooling disruption because they could not afford to pay their electric bill. Overall, nearly 1.3 million low income households experienced a disruption in their ability to cool their homes due to payment issues.

Table 5-3a. Inability to use air conditioning when cooling is needed, low income households, 2009

Reason for Air Conditioning Disruption	Number of Low Income Households with Air Conditioning Disruption	Percent of All Low Income Households
Inability to pay for the repair of broken air conditioner ⁴⁹	625,527	1.8%
Inability to pay for electric service ⁵⁰	747,852	2.1%
AC Users – AC Disruption ⁵¹	258,125	0.7%
AC Users – Other Summer Disruption ⁵²	365,036	1.0%
Non-AC Users – Other Summer Disruption ⁵³	124,691	0.4%
Disruption due to any reason	1,289,555	3.6%

Source: 2009 RECS

Table 5-3b shows that results from the 2009 RECS are very different from the 2005 RECS. However, since the questions were asked in different ways, it is unclear whether there was a reduction in air conditioning disruptions or just a difference in measurement.⁵⁴ Table 5-3b shows a decrease in the percent of low income households experiencing air conditioning disruptions in 2009 due to the inability to pay for the repair of broken air conditioning equipment, decreasing from 4.0% in 2005 to 1.8% in 2009. The percent of low income households that used air conditioning and experienced an air conditioning disruption due to an inability to pay for electric service was five times less in 2009 than in 2005, decreasing from 3.5% in 2005 to 0.7% in 2009. In addition, the 2009 RECS asked

⁴⁹ For the 2009 RECS, the inability to use air conditioning when cooling is needed because of the inability to pay for the repair of a broken air conditioner was constructed by counting any low income households whose air conditioning equipment (any kind) was broken and not fixed in 2009, or who fixed broken air conditioning equipment (any kind) in 2009 as a result of receiving energy assistance.

⁵⁰ For the 2009 RECS, the inability to use air conditioning when cooling is needed because of the inability to pay for electric service was constructed by counting any low income households whose electricity was disconnected between June – August due to nonpayment for electric service, plus any low income household who used electricity for air conditioning equipment and answered affirmatively that they could not use their air conditioner at some point in 2009 because of an inability to pay for electric service.

⁵¹ Includes households that used electricity for air conditioning equipment (central AC and/or window/wall unit AC) who reported that they could not use their air conditioner at some point in 2009 because of an inability to pay for electric service.

⁵² Includes households that used electricity for air conditioning equipment (central AC and/or window/wall unit AC) and reported that their electricity was disconnected between June – August due to nonpayment for electric service, but reported that they did not experience a disruption in their use of air conditioning equipment.

⁵³ Includes households that used electricity and reported that their electricity was disconnected between June – August due to nonpayment for electric service, but did not use air conditioning equipment (central AC and/or window/wall unit AC). This count also includes households that reported they did not use electricity for air conditioning equipment, but answered affirmatively that they could not use their air conditioner at some point in 2009 because of an inability to pay for electric service.

⁵⁴ One relevant difference between the 2009 RECS and the 2005 RECS is the fielding dates of the household surveys. The household survey for the 2009 RECS was first fielded in February 2010 and asked respondents about calendar year 2009, whereas the household survey for the 2005 RECS was first fielded in July 2005 and asked respondents about the previous 12 months. The difference in fielding dates may introduce bias among respondents answering questions that are more recent to their present circumstances.

questions allowing for the examination of potential disruptions to non-air conditioning cooling methods (e.g., ceiling fans). It is estimated that an additional 1.4% of low income households in 2009 experienced other summer cooling disruptions.

Table 5-3b. Inability to use air conditioning when cooling is needed, low income households, comparison of 2009 RECS and 2005 RECS

Reason for Air Conditioning Disruption	Percent of All Low Income Households, 2009 RECS	Percent of All Low Income Households, 2005 RECS
Inability to pay for the repair of broken air conditioner	1.8%	4.0%
Inability to pay for electric service	2.1%	3.5%
AC Users – AC Disruption	0.7%	3.5%
AC Users – Other Summer Disruption	1.0%	N/A
Non-AC Users – Other Summer Disruption	0.4%	N/A
Disruption due to any reason	3.6%	7.0%

Source: 2009 RECS and 2005 RECS

Self-Reports on Impacts of Energy Assistance

The 2009 RECS included questions on the role of energy assistance in restoring energy service for households experiencing heating or cooling disruptions. The households that experienced heating or cooling interruptions in 2009 and reported on the survey that they received energy assistance were asked questions to assess the role of energy assistance in restoring the service for these households. These questions, and the households of whom the questions were asked, are indicated in the question modules enumerated above.

Table 5-4a presents information on the percent of all low income households for which energy assistance restored home heating in 2009. The table shows that energy assistance restored home heating for 35 percent of all low income households that had a heating interruption because of the inability to pay for natural gas service. Fifteen percent of all low income households that had a heating interruption because of the inability to pay for bulk fuel delivery had their heating restored by energy assistance.

Table 5-4a. Heating interruptions: The role of energy assistance in restoring service, low income households, 2009

Reason for Heating Interruption	Number of Low Income Households with Interruption	Number of Low Income Households Energy Assistance Restored Heating	Percent of All Low Income Households Energy Assistance Restored Heating
Inability to pay for the repair of broken heating system	932,843	41,804*	4%
Inability to pay for bulk fuel delivery	508,646	75,111*	15%
Inability to pay for electric service ⁵⁵	937,171	N/A	N/A
Electric main heat	360,937	39,692*	11%
Other main heat	576,234	N/A	N/A
Inability to pay for natural gas service	554,342	192,993*	35%

Source: 2009 RECS

* Small sample size

Table 5-4b compares data on the role of energy assistance in restoring heating service for low income households as reported in the 2009 RECS and the 2005 RECS. In 2009, energy assistance was reported to play larger role than it did in 2005 in restoring heating service to low income households who were unable to pay for natural gas service; energy assistance was reported to help restore natural gas heating service for 35% of low income households in 2009 compared to 20% in 2005. In contrast, energy assistance was reported to play less of a role in 2009 than it did in 2005 in restoring heating service to low income households who were unable to pay for bulk fuel deliveries; energy assistance was reported to help restore delivered fuel heating service for 15% of low income households in 2009 compared to 35% in 2005. The statistics showing the role of energy assistance in restoring heating service due to the inability to pay for the repair of a broken heating system and the inability to pay for electric service are not comparable between the 2009 RECS and 2005 RECS because of the methods used to construct the statistics from the questions asked in the 2009 RECS.

⁵⁵ The question on the role of energy assistance in restoring service in the 2009 RECS was asked only of households using electricity for heating and who reported an inability to use their main heating source because they were unable to pay for electric service. As a result, the responses reported by low income households to this question are only applicable to electric heat households and not more broadly to all households that heated and experienced an electric service disruption. In contrast, the question in the 2005 RECS was asked of all households that heated and reported an electric service disruption due to the inability to pay their electric bill, regardless of the type of heating fuel used.

Table 5-4b. Heating interruptions: The role of energy assistance in restoring service, low income households, comparison of 2009 RECS and 2005 RECS

Reason for Heating Interruption	Percent of All Low Income Households Energy Assistance Restored Heating, 2009 RECS	Percent of All Low Income Households Energy Assistance Restored Heating, 2005 RECS
Inability to pay for the repair of broken heating system	4%	11%
Inability to pay for bulk fuel delivery	15%	35%
Inability to pay for electric service	N/A	19%
Electric main heat	11%	N/A
Other main heat	N/A	N/A
Inability to pay for natural gas service	35%	20%

Source: 2009 RECS and 2005 RECS

Table 5-5a presents information on the percent of all low income households for which energy assistance restored home cooling in 2009. No respondents to the 2009 RECS reported that energy assistance helped restore home cooling service to low income households whose air conditioning equipment was broken in 2009. However, energy assistance did help restore air conditioning service to 21% of low income households that experienced a disruption to their air conditioning ability because of an inability to pay for their electric service.

Table 5-5a. Cooling interruptions: The role of energy assistance in restoring service, low income households, 2009

Reason for Home Cooling Interruption	Number of Low Income Households with Interruption	Number of Low Income Households Energy Assistance Restored Cooling	Percent of All Low Income Households Energy Assistance Restored Cooling
Inability to pay for the repair of broken air conditioner	625,527	0	0%
Inability to pay for electric service	747,852	N/A	N/A
AC Users – AC Disruption	258,125	53,262*	21%
AC Users – Other Summer Disruption	365,036	N/A	N/A
Non-AC Users – Other Summer Disruption	124,691	N/A	N/A

Source: 2009 RECS

* Small sample size

Table 5-5b compares data on the role of energy assistance in restoring cooling service for low income households as reported in the 2009 RECS and the 2005 RECS. While no respondents to the 2009 RECS reported that energy assistance helped to restore home cooling service to low income households whose air conditioning equipment was broken in 2009, less than one percent of low income households responding to the 2005 RECS reported that energy assistance helped to restore home cooling service for the same reason, indicating that it is relatively rare for energy assistance to help low income households repair broken air conditioning equipment. However, energy assistance helped a greater percentage of low income households pay their electric bills and restore air conditioning service in 2009 (21%) than in 2005 (16%). The methods used to estimate the number of low income households experiencing other types of cooling disruptions due to the inability to pay for

electric service during the summer months from the 2009 RECS do not allow for a statistic to be constructed estimating the role of energy assistance in restoring non-air conditioning cooling service.

Table 5-5b. Cooling interruptions: The role of energy assistance in restoring service, low income households, comparison of 2009 RECS and 2005 RECS

Reason for Home Cooling Interruption	Percent of All Low Income Households Energy Assistance Restored Cooling, 2009 RECS	Percent of All Low Income Households Energy Assistance Restored Cooling, 2005 RECS
Inability to pay for the repair of broken air conditioner	0%	<1%
Inability to pay for electric service	N/A	16%
AC Users – AC Disruption	21%	16%
AC Users – Other Summer Disruption	N/A	N/A
Non-AC Users – Other Summer Disruption	N/A	N/A

Source: 2009 RECS and 2005 RECS

Any Service Disruptions

In the 2005 RECS, questions on electric service disruptions were expanded to include detail on the time of year in which electric service was disrupted. This approach was expanded in the 2009 RECS to include detail on the time of year in which natural gas service disruptions and delivered fuel service disruptions occurred, as well as any service disruptions (heating versus non-heating disruptions). Table 5-6a presents data on any service disruptions due to bill payment issues by main heating fuel. Table 5-6b relates any service disruptions to disruptions to heating service due to bill payment issues by main heating fuel.

Table 5-6a shows that about 12 percent of low income households using delivered main heating fuels (fuel oil, kerosene, propane, or wood) experienced a disruption to bulk fuel delivery at some point in 2009, whereas only 5 percent of low income households using natural gas main heat, and 6 percent of low income households using electric main heat, experienced disruptions to their natural gas service or electric service due to bill payment issues, respectively. In addition, nearly 6 percent of low income households using natural gas main heat or delivered main heating fuels experienced a disruption to their electric service at some point in 2009.

Table 5-6a. Service disruptions due to bill nonpayment by main heating fuel, low income households, 2009 RECS

Fuel Use	Number of Low Income Households Using Main Heating Fuel	Number of Low Income Households with Fuel Disruption	Percent of Low Income Households with Fuel Disruption by Main Heating Fuel
Electric Main Heat – Any Electric Disruption ⁵⁶	13,119,232	812,587	6.2%
Gas Main Heat – Any Gas Disruption ⁵⁷	15,600,394	788,410	5.1%
Delivered Fuel Main Heat – Any Delivered Fuel Disruption ⁵⁸	4,908,823	600,970	12.2%
Electric for Gas or Delivered Fuel Main Heat – Any Electric Disruption ⁵⁹	20,509,216	1,173,673	5.7%

Source: 2009 RECS

Table 5-6b shows that disruptions to bulk fuel deliveries were more likely to result in a disruption to heating service for low income households using delivered main heating fuels than a disruption to natural gas service or electric service was to resulting in a heating disruption for low income households using those types of main heating fuels. Nearly 85 percent of bulk fuel delivery disruptions resulted in heating fuel disruptions for low income households using delivered main heating fuels, whereas only 70 percent of natural gas disruptions, and 44 percent of electric service disruptions, resulted in heating fuel disruptions for low income households using natural gas main heat or electric main heat, respectively. In addition, it is estimated that about 49 percent of electric service disruptions experienced by low income households using natural gas main heat or delivered main heating fuels resulted in heating disruptions because of an inability to use heating equipment. This estimate is not directly comparable to the other statistics in Table 5-6b because of the methods used to construct it from the questions asked in the 2009 RECS.

⁵⁶ Includes all low income households using electric main heat who experienced a disruption to their electric service in 2009 due to the inability to pay their electric bill.

⁵⁷ Includes all low income households using natural gas main heat who experienced a disruption to their natural gas service in 2009 due to the inability to pay the natural gas bill.

⁵⁸ Includes all low income households using delivered fuel (fuel oil, kerosene, propane, or wood) main heat who experienced a disruption to their bulk fuel delivery in 2009 due to the inability to pay for their bulk fuel delivery.

⁵⁹ Includes all low income households using natural gas main heat or delivered fuel (fuel oil, kerosene, propane, or wood) main heat who experienced a disruption to their electric service in 2009 due to the inability to pay their electric bill.

Table 5-6b. Heating service disruptions out of any service disruptions due to bill nonpayment by main heating fuel, low income households, 2009 RECS

Fuel Use	Number of Low Income Households with Fuel Disruption	Number of Low Income Households for whom Fuel Disruption was a Heating Disruption	Percent of Low Income Households for whom Fuel Disruption was a Heating Disruption
Electric Main Heat –Electric Heating Disruption ⁶⁰	812,587	360,937	44.4%
Gas Main Heat –Gas Heating Disruption ⁶¹	788,410	554,342	70.3%
Delivered Fuel Main Heat – Delivered Fuel Heating Disruption ⁶²	600,970	508,646	84.6%
Electric for Gas or Delivered Fuel Main Heat – Heating Disruption due to Electric Disruption ⁶³	1,173,673	576,234	49.1%

Source: 2009 RECS

Table 5-7 provides a closer examination of electric service disruptions due to bill payment issues. About 2.8 percent of electric main heat low income households experienced a heating disruption due to an inability to pay their electric bill. In addition, an estimated 2.8 percent of non-electric main heat low income households experienced heating disruptions in 2009 because of an inability to pay their electric bill during the winter months. While these statistics are not directly comparable because of the methods used to construct the estimates for non-electric main heat low income households from the 2009 RECS, they provide a more comprehensive picture of heating disruptions due to electric service payment issues.

Table 5-7 also provides information on cooling disruptions among low income households. About 1 percent of low income households that used air conditioning equipment in 2009 experienced a disruption to their ability to air condition because they were unable to pay their electric bill. In addition, an estimated 1.3 percent of low income households that used air conditioning equipment in 2009, but did not experience a disruption to that equipment, experienced a disruption to other methods of cooling due to electric service disconnection during the summer months. Further, an estimated 1.5 percent of low income households that did not use air conditioning equipment in 2009 experienced a disruption to other methods of cooling due to electric service disconnection during the summer months. While these statistics are not directly comparable because of the methods used to construct the estimates for other summer cooling disruptions, they provide a more comprehensive picture of cooling disruptions due to electric service payment issues.

⁶⁰ Includes all low income households using electric main heat who experienced a disruption to their electric service in 2009 due to the inability to pay their electric bill.

⁶¹ Includes all low income households using natural gas main heat who experienced a disruption to their natural gas service in 2009 due to the inability to pay the natural gas bill.

⁶² Includes all low income households using delivered fuel (fuel oil, kerosene, propane, or wood) main heat who experienced a disruption to their bulk fuel delivery in 2009 due to the inability to pay for their bulk fuel delivery.

⁶³ Includes all low income households using natural gas main heat or delivered fuel (fuel oil, kerosene, propane, or wood) main heat who experienced a disruption to their electric service in 2009 due to the inability to pay their electric bill.

Table 5-7. Electric service disruptions due to bill nonpayment by electric use, low income households, 2009 RECS

Electric Use/Type of Electric Disruption	Number of Low Income Households with Electric Disruption	Number of Low Income Households in Electric Use Category	Percent of Low Income Households in Electric Use Category with Electric Disruption
Electric Heat – Heating Disruption ⁶⁴	360,937	13,119,232	2.8%
Non-Electric Heat – Winter Disruption ⁶⁵	576,234	20,509,216	2.8%
Electric AC User – AC Disruption ⁶⁶	258,125	27,060,007	1.0%
Electric AC User – Other Summer Disruption ⁶⁷	365,036	27,060,007	1.3%
Electric Non-AC – Other Summer Disruption ⁶⁸	124,691	8,275,182	1.5%

Source: 2009 RECS

Financial Dimensions of Energy Insecurity

The 2009 RECS also asked low income survey respondents questions related to the financial dimension of energy insecurity. The survey questions included:

M-1: Some households may have faced challenges in paying home energy bills. The following questions ask about challenges your household may have had paying home energy bills or maintaining heating and cooling equipment. When thinking about these questions, include all of your experiences in 2009, even in homes different from the one you live in now.

M-1a: In 2009 how often did your household reduce or forgo expenses for basic household necessities, such as medicine or food, due to your home energy bill?

M-1c: In 2009 how often did your household pay an amount less than what you owed on your home energy bill, because you were unable to afford the whole home energy bill?

M-1d: When home energy bills are not paid on time, it is common for energy utilities and suppliers to send late notices. If the bill is very late, they will send a disconnect, shut-off, or non-delivery notice. How often you receive a disconnect, shut-off, or non-delivery notice?

⁶⁴ Includes all low income households using electric main heat who reported a disruption to their main heating equipment in 2009 due to the inability to pay their electric bill.

⁶⁵ Includes all low income households using natural gas or delivered fuel (fuel oil, kerosene, propane, or wood) main heat who experienced a disruption to their electric service between June and August 2009 due to the inability to pay for their electric bill.

⁶⁶ Includes all low income households who used an air conditioner (central and/or window/wall unit) in 2009 and who reported they were unable to use their air conditioner due to an inability to pay their electric bill.

⁶⁷ Includes all low income households who use an air conditioner (central and/or window/wall unit) in 2009 and experienced a disruption to their electric service between June and August 2009 due to the inability to pay for their electric bill, but did not report that they were unable to use their air conditioner due to an inability to pay their electric bill.

⁶⁸ Includes all low income households who did not use an air conditioner (central and/or window/wall unit) in 2009 but experienced a disruption to their electric service between June and August 2009.

M-1e: In order to pay your home energy bill, how often did you need to use a payday loan, a tax refund, anticipation loan, a car title loan, or another type of short-term, high-interest loan?

Table 5-8a presents data from the 2009 RECS on the financial elements of energy insecurity for low income households, and Table 5-8b presents data from the 2005 RECS. For each type of financial insecurity, the tables show the percent of low income households that experienced that type of financial energy insecurity. In 2009, over 30 percent of low income households reported that they reduced spending for basic necessities, skipped paying their energy bills, or faced service termination threats at least once during the year, whereas only about 10 percent of low income households reported having to borrow money to pay their energy bills.

In 2009, nearly half of all low income households reported experiencing at least one type of financial energy insecurity at least once during the year. When combining responses to individual types of financial energy insecurity into “any financial insecurity”, in 2009, low income households were more likely to report that at least one type of financial energy insecurity was experienced almost every month (16.3%) or some months (19.7%) than just one or two months of the year (10.8%), indicating that financial energy insecurity is a persistent issue for low income households.

Table 5-8b shows that a greater percentage of low income households reported having to reduce spending for basic necessities at some point in 2005 than in 2009 (47.0% compared to 33.3%), but less low income households reported facing service termination threats at some point in 2005 than in 2009 (20.8% compared to 30.2%). Overall, nearly 60 percent of low income households faced “any financial insecurity” at some point in 2005. However, this statistic for “any financial insecurity” based on the 2005 RECS is not directly comparable to the 2009 RECS because respondents in the 2005 RECS were asked an additional financial energy insecurity question regarding worrying about their ability to pay their energy bills.

Table 5-8a. Financial Energy Insecurity, low income households, 2009

Dimension	Almost Every Month	Some Months	1 or 2 Months	Never
Worry about ability to pay bill ⁶⁹	N/A	N/A	N/A	N/A
Reduce spending for basic necessities	10.1%	16.8%	6.5%	66.7%
Borrow to pay bill ⁷⁰	0.8%	3.8%	5.0%	90.5%
Skip paying bill	9.1%	15.4%	8.3%	67.3%
Service termination threat	5.4%	10.8%	14.0%	69.8%
Any financial insecurity ⁷¹	16.3%	19.7%	10.8%	53.2%

Source: 2009 RECS

⁶⁹ In the 2005 RECS, respondents were asked: “Did you worry that you wouldn’t be able to pay your home energy bill?” This question was not asked in the 2009 RECS.

⁷⁰ In the 2009 RECS, the financial energy insecurity question regarding borrowing money to pay the home energy bill was substantively different from the question asked in the 2005 RECS. In the 2009 RECS, respondents were asked if they had used a payday loan, tax refund, anticipation loan, car title loan, or another type of short-term, high-interest rate loan in order to pay their energy bill. In the 2005 RECS, respondents were asked if they had borrowed money from a friend or relative to pay their energy bill. Caution should be used when comparing these statistics between the 2009 RECS and 2005 RECS.

⁷¹ “Any financial insecurity” was constructed using responses to each of the financial energy insecurity questions asked in the RECS. Because respondents to the 2009 RECS were not asked whether they worried about their ability to pay their energy bills, caution should be used when comparing “Any financial insecurity” between the 2009 RECS and 2005 RECS.

Table 5-8b. Financial Energy Insecurity, low income households, 2005

Dimension	Almost Every Month	Some Months	1 or 2 Months	Never
Worry about ability to pay bill	14.9%	23.6%	7.4%	54.1%
Reduce spending for basic necessities	17.0%	23.3%	6.7%	53.0%
Borrow to pay bill	3.9%	11.6%	7.2%	77.3%
Skip paying bill	3.9%	13.0%	9.4%	73.7%
Service termination threat	2.7%	8.7%	9.5%	79.2%
Any financial insecurity	23.6%	25.4%	8.9%	42.2%

Source: 2005 RECS

It is clear from the 2009 RECS that the heating and cooling disruption statistics understate the level of energy insecurity among low income households. While Table 5-2 shows that about 5 percent of low income households experience space heating disruptions due to nonpayment issues, Table 5-8a shows that almost one-third of low income households reduce spending for basic necessities, skip paying their bills, or face threats of service termination.

Health and Safety Dimensions of Energy Insecurity

The 2009 RECS also asked low income survey respondents about the health and safety dimensions of energy insecurity. The survey question asked was:

M-1: Some households may have faced challenges in paying home energy bills. The following questions ask about challenges your household may have had paying home energy bills or maintaining heating and cooling equipment. When thinking about these questions, include all of your experiences in 2009, even in homes different from the one you live in now.

M-1b: In 2009 how often did your household keep your home at a temperature that you felt was unsafe or unhealthy?

Table 5-9a presents data from the 2009 RECS and 2005 RECS on the health and safety elements of energy insecurity for low income households. The tables show the percent of low income households indicating how often they experienced the type of energy insecurity. Table 5-9a shows that about 16 percent of low income households kept their homes at an unsafe or unhealthy temperature at least once during 2009, compared to about 8 percent in 2005. Additional questions related to health and safety elements of energy insecurity were asked of low income households in the 2005 RECS, but not in the 2009 RECS.

Table 5-9a. Health and Safety Energy Insecurity, low income households, 2009 RECS and 2005 RECS⁷²

Dimension: Kept home at unsafe or unhealthy temperature	Percent of All Low Income Households, 2009 RECS	Percent of All Low Income Households, 2005 RECS
Almost Every Month	4.1%	1.8%
Some Months	8.3%	4.1%
1 or 2 Months	3.6%	2.5%
Never	83.9%	91.6%

Source: 2009 RECS and 2005 RECS

In the 2009 RECS, respondents were asked additional health and safety questions related to need for medical attention and home fires related to conditions of energy insecurity. Table 5-9b and Table 5-9c present statistics on medical attention needed by low income household members because the home was kept either too cold or too hot, and Table 5-9d presents statistics on home fires resulting from the use of alternate heating or lighting sources by low income households.

Table 5-9b shows that at individuals in nearly one million low income households, or 2.7% of all low income households, needed medical attention in 2009 because the home was kept too cold. Among low income households with vulnerable household members (young children or elderly individuals), the incidence rate of young children needing medical attention in 2009 because the home was kept too cold was nearly three times as high as the incidence rate for elderly household members.

Table 5-9b. Medical Attention Needed Resulting from Energy Health and Safety Issues, low income households, 2009 RECS

Reason Individual in Household Needed Medical Attention	Low Income Households Experiencing Health and Safety Issue ^{73/}	Number of Low Income Households	Percent of All Low Income Households Experiencing Health and Safety Issue
Home was kept too cold	966,327	35,335,188	2.7%
- Elderly individual needed medical	182,070	12,403,073 ⁷⁴	1.5%
- Young child needed medical attention	320,817	7,461,435 ⁷⁵	4.3%
- Other individual needed medical attention	463,439	16,040,222 ⁷⁶	2.9%

Source: 2009 RECS

⁷² Additional health and safety insecurity scale questions were asked of respondents in the 2005 RECS. The following questions were asked: 1) “Did you close off part of your home because you could not afford to heat or cool it?” 2) “Did you leave your home for part of the day because it was too hot or too cold?” 3) “Did you use your kitchen stove or oven to provide heat?” In 2005, about 13.4% of low income households closed off part of the home because they could not afford to heat or cool it at least once during the year; 8.8% of low income households left the home for part of the day because it was too hot or too cold at least once during the year; and 10.1% of low income households used the kitchen stove or oven to provide heat at least once during the year. Overall, about 26.0% of low income households in 2005 experienced any type of health or safety insecurity at least once during the year.

⁷³ This question was only asked of respondents in the 2009 RECS who reported having kept their home at an unsafe or unhealthy temperature during at least 1 or 2 months of the year.

⁷⁴ Number of low income households with elderly member present (ages 60+).

⁷⁵ Number of low income households with young child members present (ages 5 or younger).

⁷⁶ Number of low income households with neither elderly members (ages 60+) nor young child members (ages 5 or younger) present.

Table 5-9c shows that the incidence of individuals in need of medical attention among low income households was less prevalent because the home was kept too hot than when it was kept too cold. Individuals in about one hundred thousand low income households, or 0.3% of all low income households, needed medical attention in 2009 because the home was kept too cold. Among low income households with vulnerable household members, a similar pattern to Table 5-9b is observed; the incidence rate of young children needing medical attention in 2009 because the home was kept too hot was nearly eight times as high as the incidence rate for elderly household members. Overall, over 1 million low income households, or about 2.9 percent of all low income households, reported that at least one household member needed medical attention in 2009 because the home was kept either too hot or too cold.

Table 5-9c. Medical Attention Needed Resulting from Energy Health and Safety Issues, low income households, 2009 RECS

Reason Individual in Household Needed Medical Attention	Low Income Households Experiencing Health and Safety Issue	Number of Low Income Households	Percent of All Low Income Households Experiencing Health and Safety Issue
Home was kept too hot	102,786	35,335,188	0.3%
- Elderly individual needed medical	5,344*	12,403,073	<0.1%
- Young child needed medical attention	25,498*	7,461,435	0.3%
- Other individual needed medical attention	71,944*	16,040,222	0.4%

Source: 2009 RECS

* Small sample size

Table 5-9d shows that nearly one hundred thousand low income households experienced a fire in their home in 2009 as a result of using an alternate heating source, such as an electric or kerosene space heater, kitchen over or store, fireplace, or outdoor grill. In addition, nearly forty thousand low income households experienced a fire in their home in 2009 as a result of using an alternate source of lighting, such as candles or kerosene lanterns. While the overall incidence rate in 2009 for either cause of fire was only 0.4 percent of all low income households, the damages caused by household fires are still noteworthy due to the costs incurred. No household members were reported to need medical assistance as a result of a household fire caused by use of alternate heating or lighting sources among low income household respondents to the 2009 RECS.

Table 5-9d. Fires in Homes Resulting from Energy Health and Safety Issues, low income households, 2009 RECS

Reason Fire Started in Home	Low Income Households Experiencing Health and Safety Issue	Percent of All Low Income Households Experiencing Health and Safety Issue
Using an alternate heating source ⁷⁷	96,149	0.3%
Using an alternate lighting source ⁷⁸	39,442	0.1%
Using either an alternate heating or lighting source	135,591	0.4%

Source: 2009 RECS

⁷⁷ This question was asked of low income households who reported using an alternate source of heating, such as an electric or kerosene space heater, kitchen stove or oven, fireplace, or an outdoor grill in 2009.

⁷⁸ This question was asked of low income households who reported having their electric service disconnected in 2009 because of an inability to pay their electric bill.

Summary of Findings on the Incidence of Energy Insecurity

The exploratory analysis of the energy insecurity data from the 2009 RECS found that the series of questions furnish updated information for OCS compared to the data from the 2005 RECS; the data on different types of energy insecurity (heating disruptions, air conditioning disruptions, financial energy problems, and health and safety energy problems) and the intensity measures of energy problems (almost every month, some months, one or two months, or never) serve to broaden the understanding of energy affordability problems. Key findings from the study of the 2009 RECS include:

- Incidence – The data show that nearly one half of low income households faced some type of energy insecurity during 2009.
- Overlap – Some households faced only one type of problem; but more than one-third of low income households experienced multiple problems during the year.
- Intensity – The intensity of any dimension of energy insecurity was directly related to the number of types of energy insecurity faced by a low income household.

While it still seems important to track the rate at which households experience heating system and/or air conditioning service disruptions, these data demonstrate the broader relationships among energy bills and impacts faced by low income households.

Factors Related to Energy Insecurity

The exploratory study of the 2005 RECS examined how energy-related problems varied geographically and demographically, including:

- Census Region – Northeast, Midwest, South, and West.
- HHS Poverty guidelines – At or below 100% of the poverty guidelines, above 100% and at or below 150%, and above 150% but at or below 60% of State median income.
- Vulnerability Group – Elderly households, young child households, and other households.
- Residential Energy Burden Group – High burden, moderate burden, and low burden.

The exploratory study of the 2005 RECS found that the factors most associated with differences in the incidence rates for energy-related problems were Census Region, Poverty Level, Vulnerability Group, and Residential Energy Burden Group. Accordingly, the current study of the 2009 RECS examines these factors.

Energy Insecurity by Census Region

Previous research has found that the South and West Census regions have higher rates of heating and cooling interruptions than the Northeast and Midwest regions.⁷⁹ Table 5-10a shows that data from the 2009 RECS is consistent with earlier findings; low income households in the South and West Census

⁷⁹ It was hypothesized that the differences in heating and cooling interruptions were due to the existence of winter and summer moratoria in Northeast and Midwest Census regions.

region experience service interruptions at a higher rate than low income households in the Northeast and Midwest.⁸⁰

Table 5-10a is not directly comparable to Table 5-10b because of the methods used to construct the statistics from the questions asked in the 2009 RECS. However, Table 5-10a and Table 5-10b suggests that, except for the Northeast Census region, the incidence rates of any service interruptions were lower in each Census region in 2009 than in 2005. In particular, the incidence rate of any service interruptions in the West Census region dropped substantially from 14.1% in 2005 to 8.2% in 2009.

Table 5-10a. Type of service interruptions, low income households by Census region, 2009

Type of Interruption	Northeast Census Region	Midwest Census Region	South Census Region	West Census Region	U.S.
Heating Interruption (households with heating equipment)	6.8%	5.7%	9.1%	6.4%	7.3%
Cooling Interruption (households with air conditioning equipment)	0.5%	3.5%	6.2%	3.9%	4.2%
Any Interruption (all households)	7.2%	6.9%	12.1%	8.2%	9.2%

Source: 2009 RECS

Table 5-10b. Type of service interruptions, low income households by Census region, 2005

Type of Interruption	Northeast Census Region	Midwest Census Region	South Census Region	West Census Region	U.S.
Heating Interruption (households with heating equipment)	6.9%	6.5%	10.3%	13.4%	9.2%
Cooling Interruption (households with air conditioning equipment)	2.9%	6.2%	12.7%	9.3%	8.7%
Any Interruption (all households)	7.1%	8.8%	14.7%	14.1%	11.6%

Source: 2005 RECS

With the information available from the 2009 RECS and 2005 RECS, it is possible to examine other dimensions of energy insecurity for low income households. Table 5-11a and Table 5-11b present information on one dimension of financial energy insecurity: reducing expenses for household necessities because of the cost of residential energy. Table 5-12a and Table 5-12b present information on one dimension of health and safety energy insecurity: keeping the home at an unsafe or unhealthy temperature because of the cost of residential energy.

Table 5-11a shows that, based on the 2009 RECS, slightly less than one-third of low income households in the Northeast, Midwest, and West Census regions reported that they had to reduce spending for household necessities because of the cost of residential energy, whereas nearly 40 percent reported this in the South Census region. This differs from Table 5-11b, in which about one half of low income households in the Midwest, South, and West Census regions, and about 40 percent of low income households in the Northeast Census region, reported that they had to reduce spending for household necessities based on the 2005 RECS. The results from the 2009 RECS in Table 5-11a

⁸⁰ The differences reported in the 2009 RECS between the South Census region and other Census regions in Table 5-10a are statistically significant at the 90% confidence level. The differences reported in the 2009 RECS between the West and Northeast Census Regions, and West and Midwest Census Regions, are not statistically significant at the 90% confidence level.

are similar to the analysis of any service interruptions listed in Table 5-10a where the South Census region had a higher rate of any service interruption than the other Census regions.⁸¹

Table 5-11a. Reduced expenses for household necessities due to not having enough money to pay the energy bill, low income households by Census region, 2009

Frequency	Northeast Census Region	Midwest Census Region	South Census Region	West Census Region	U.S.
Almost Every Month	10.0%	11.5%	10.5%	7.8%	10.1%
Some Months	14.2%	13.7%	20.6%	15.5%	16.8%
1 or 2 Months	6.5%	6.2%	7.1%	6.0%	6.5%
Never / No	69.3%	68.7%	61.9%	70.8%	66.7%

Source: 2009 RECS

Table 5-11b. Reduced expenses for household necessities due to not having enough money to pay the energy bill, low income households by Census region, 2005

Frequency	Northeast Census Region	Midwest Census Region	South Census Region	West Census Region	U.S.
Almost Every Month	12.4%	15.7%	20%	18.1%	17.0%
Some Months	20.5%	27.3%	22.9%	22.0%	23.3%
1 or 2 Months	6.1%	6.3%	6.7%	8.0%	6.7%
Never / No	61.0%	50.7%	50.5%	51.8%	53.0%

Source: 2005 RECS

Table 5-12a shows that, based on the 2009 RECS, low income households in the South Census region were more likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy; 21.2 percent of low income households in the South reported unhealthy or unsafe temperatures, whereas less than 15 percent of low income households in the Northeast, Midwest, and West Census regions reported that problem.⁸²

Despite lower incidence rates than the South Census region, low income households in each Census region in the 2009 RECS reported higher incidence levels of keeping their homes at unhealthy or unsafe temperatures than they did in the 2005 RECS. Table 5-12b shows that about half as many low income households in the Northeast, South, and West Census regions reported that they had to keep their home at a temperature that they felt was unsafe or unhealthy in 2005 than they did in 2009; the difference was less pronounced in the Midwest Census region.

⁸¹ The differences between the overall incidence rate in the South Census region and the other Census regions listed in Table 5-11a based on the 2009 RECS are statistically significant at the 90% confidence level.

⁸² The differences between the overall incidence rate in the South Census region and the other Census regions listed in Table 5-12a based on the 2009 RECS are statistically significant at the 90% confidence level.

Table 5-12a. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, low income households by Census region, 2009

Frequency	Northeast Census Region	Midwest Census Region	South Census Region	West Census Region	U.S.
Almost Every Month	5.1%	4.7%	3.8%	3.3%	4.1%
Some Months	6.7%	4.3%	12.1%	7.1%	8.3%
1 or 2 Months	1.5%	1.9%	5.3%	4.5%	3.6%
Never / No	86.7%	89.1%	78.8%	85.1%	83.9%

Source: 2009 RECS

Table 5-12b. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, low income households by Census region, 2005

Frequency	Northeast Census Region	Midwest Census Region	South Census Region	West Census Region	U.S.
Almost Every Month	1.3%	1.0%	2.8%	1.5%	1.8%
Some Months	2.6%	4.0%	4.9%	4.2%	4.1%
1 or 2 Months	1.8%	3.5%	2.5%	2.0%	2.5%
Never / No	94.3%	91.5%	89.9%	92.3%	91.6%

Source: 2005 RECS

Energy Insecurity by Poverty Guidelines

Previous research has found that households with income at or below 100% of the HHS poverty guidelines have higher rates of heating and cooling interruptions than households with higher incomes. Table 5-13a shows that, based on the 2009 RECS, low income households with incomes at or below 100 percent of poverty experience service disruptions at a higher rate than low income households with incomes above 100 percent of poverty.⁸³

Table 5-13a is not directly comparable to Table 5-13b because of the methods used to construct the statistics from the questions asked in the 2009 RECS. However, Table 5-13a suggests that the overall incidence rates based on the 2009 RECS are lower for each poverty group than those listed in Table 5-13b, but that the same trend among poverty groups was seen for the 2005 RECS. Low income households with incomes at or below 100 percent of poverty experienced higher incidence rates of any service interruptions than low income households with incomes above 100 percent of poverty.

⁸³ The differences in the overall incidence rates between low income households with incomes at or below 100 percent of poverty and low income households with incomes above 100 percent of poverty listed in Table 5-13a based on the 2009 RECS are statistically significant at the 90% confidence level.

Table 5-13a. Type of service interruption, low income households by poverty guidelines, 2009

Type of Interruption	<=100% Poverty Guidelines	>100%-150% Poverty Guidelines	>150% Poverty Guidelines
Heating Interruption (households with heating equipment)	10.1%	5.9%	4.5%
Cooling Interruption (households with air conditioning equipment)	5.5%	5.0%	1.4%
Any Interruption (all households)	11.8%	9.0%	5.4%

Source: 2009 RECS

Table 5-13b. Type of service interruption, low income households by poverty guidelines, 2005

Type of Interruption	<=100% Poverty Guidelines	>100%-150% Poverty Guidelines	>150% Poverty Guidelines
Heating Interruption (households with heating equipment)	12.9%	7.0%	5.5%
Cooling Interruption (households with air conditioning equipment)	10.1%	8.6%	6.1%
Any Interruption (all households)	14.5%	10.0%	8.3%

Source: 2005 RECS

Table 5-14a shows that, based on the 2009 RECS, 37.6 percent of low households with income at or below 100 percent of poverty reduced spending for household necessities at some point during the year, compared to 24.4 percent of low households with income above 150 percent of poverty.⁸⁴ The difference between low income households at or below 100 percent of poverty and those between 100 percent and 150 percent of poverty is negligible. While Table 5-14a does show that the lowest income households have the highest rate of financial energy insecurity, it also shows that a significant share of low income households with income above 150 percent of the HHS poverty guidelines reported that they reduced spending on household necessities because of the cost of residential energy.

Data from the 2005 RECS are provided in Table 5-14b, which demonstrates a similar pattern to the 2009 RECS among low income households at different poverty levels. However, the incidence levels of low income households reducing expenses for household necessities in the 2005 RECS were higher for each poverty group than reported by low income households in the 2009 RECS.

⁸⁴ This difference in the overall incidence rates of low income households with incomes at or below 100 percent of poverty and low income households with incomes at or above 150 percent of poverty listed in Table 5-14a based on the 2009 RECS is statistically significant at the 90% confidence level.

Table 5-14a. Reduced expenses for household necessities due to not having enough money to pay the energy bill, low income households, 2009

Type of Interruption	<=100% Poverty Guidelines	>100%-150% Poverty Guidelines	>150% Poverty Guidelines
Almost Every Month	13.4%	9.4%	5.5%
Some Months	18.3%	18.4%	12.6%
1 or 2 Months	5.9%	7.6%	6.4%
Never / No	62.4%	64.6%	75.6%

Source: 2009 RECS

Table 5-14b. Reduced expenses for household necessities due to not having enough money to pay the energy bill, low income households, 2005

Type of Interruption	<=100% Poverty Guidelines	>100%-150% Poverty Guidelines	>150% Poverty Guidelines
Almost Every Month	22.4%	14.1%	11.2%
Some Months	22.3%	26.2%	20.8%
1 or 2 Months	8.0%	5.6%	6.0%
Never / No	47.3%	54.2%	62.1%

Source: 2005 RECS

Table 5-15a shows that, based on the 2009 RECS, low income households with income at or below the HHS poverty guidelines were more likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy; 20.4 percent of households with income at or below the poverty level reported that, while 9.9 percent of the households with income above 150 percent of the poverty level reported that.⁸⁵ Table 5-15b demonstrates that a similar pattern was found among low income households in the 2005 RECS. However, the incidence rates among low income households in each poverty group were about half as high in the 2005 RECS as they were in the 2009 RECS.

Table 5-15a. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, low income households, 2009

Type of Interruption	<=100% Poverty Guidelines	>100%-150% Poverty Guidelines	>150% Poverty Guidelines
Almost Every Month	5.7%	3.2%	2.7%
Some Months	10.7%	8.5%	4.2%
1 or 2 Months	4.0%	3.7%	3.0%
Never / No	79.6%	84.5%	90.1%

Source: 2009 RECS

⁸⁵ The differences in the overall incidence rates of low income households with incomes at or below 100 percent of poverty and low income households with incomes above 100 percent of poverty listed in Table 5-15a based on the 2009 RECS are statistically significant at the 90% confidence level.

Table 5-15b. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, low income households, 2005

Type of Interruption	<=100% Poverty Guidelines	>100%-150% Poverty Guidelines	>150% Poverty Guidelines
Almost Every Month	2.9%	0.6%	1.3%
Some Months	5.4%	4.3%	1.2%
1 or 2 Months	3.8%	1.3%	2.0%
Never / No	87.9%	93.7%	95.6%

Source: 2005 RECS

Energy Insecurity by Vulnerability Group

Previous research has found that elderly households have lower rates of heating and cooling interruptions than other types of households. Table 5-16a shows that data from the 2009 RECS are consistent with earlier findings; elderly households with incomes at or below 100 percent of the HHS poverty guidelines have a lower rate of any service interruptions than young child and other low income households with incomes at or below 100 percent of the HHS poverty guidelines.⁸⁶ In 2009, 7.6 percent of elderly households with incomes at or below 100 percent of the HHS poverty guidelines had either heating and/or cooling service interruptions, whereas 17.0 percent of young child households and 11.6 percent other low income households with incomes at or below 100 percent of the HHS poverty guidelines experienced any service interruptions.

Table 5-16a is not directly comparable to Table 5-16b because of the methods used to construct the statistics from the questions asked in the 2009 RECS. However, compared to the incidence rates from the 2005 RECS listed in Table 5-16b, Table 5-13a suggests that young child households with incomes at or below 100 percent of the HHS poverty guidelines reported an increase in the incidence rate of any service interruption based on the 2009 RECS, whereas elderly households and other households reported decreases based on the 2009 RECS.

Table 5-16a. Type of service interruption by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2009

Type of Interruption	Young Child Households	Elderly Households	Other Households
Heating Interruption (households with heating equipment)	14.9%	4.7%	10.6%
Cooling Interruption (households with air conditioning equipment)	7.7%	4.7%	5.4%
Any Interruption (all households)	17.0%	7.6%	11.6%

Source: 2009 RECS

⁸⁶ These differences in the overall incidence rates listed in Table 5-16a based on the 2009 RECS are statistically significant at the 90% confidence level.

Table 5-16b. Type of service interruption by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2005

Type of Interruption	Young Child Households	Elderly Households	Other Households
Heating Interruption (households with heating equipment)	12.6%	9.2%	16.2%
Cooling Interruption (households with air conditioning equipment)	12.2%	7.5%	11.2%
Any Interruption (all households)	14.3%	10.5%	18.0%

Source: 2005 RECS

Table 5-17a shows that, based on the 2009 RECS, 25.4 percent of elderly households with income at or below 100 percent of poverty reduced spending for household necessities at some point during the year, compared to 52.9 percent of young child households and 36.4 percent of other households with incomes at or below 100 percent of poverty.⁸⁷ For elderly and other households with incomes at or below 100 percent of poverty, the incidence rate of reducing expenditures for household necessities due to inability to pay energy bills changed in the 2009 RECS compared to the 2005 RECS, but has remained high for young child households with incomes at or below 100 percent of poverty, as demonstrated in Table 5-17b.

Table 5-17a. Reduced expenses for household necessities due to not having enough money to pay the energy bill, by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2009

Type of Interruption	Young Child Households	Elderly Households	Other Households
Almost Every Month	18.1%	9.4%	13.4%
Some Months	26.0%	12.2%	17.5%
1 or 2 Months	8.9%	3.7%	5.6%
Never / No	47.1%	74.6%	63.6%

Source: 2009 RECS

Table 5-17b. Reduced expenses for household necessities due to not having enough money to pay the energy bill, by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2005

Type of Interruption	Young Child Households	Elderly Households	Other Households
Almost Every Month	18.9%	20.3%	26.0%
Some Months	24.0%	21.1%	22.4%
1 or 2 Months	12.9%	6.1%	6.9%
Never / No	44.2%	52.5%	44.7%

Source: 2005 RECS

⁸⁷ These differences in the overall incidence rates listed in Table 5-17a based on the 2009 RECS are statistically significant at the 90% confidence level.

Table 5-18a shows that, based on the 2009 RECS, elderly households with incomes at or below 100 percent of poverty were less likely than young child households or other households to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy, a reversal of the pattern demonstrated in Table 5-18b from the 2005 RECS. In 2009, 16 percent of elderly households with incomes at or below 100 percent of poverty reported keeping their homes at an unhealthy or unsafe temperature at some point during the year, compared to 27.2 percent of low income households and 19.6 percent of other households.⁸⁸

Table 5-18b shows that, based on the 2005 RECS, elderly households with income at or below the HHS poverty guidelines were more likely to report that they had to keep their home at a temperature that they felt was unsafe or unhealthy; 14.5 percent of elderly households reported that, while 9.3 percent of young child households and 11.6 percent of other households reported that.⁸⁹

Table 5-18a. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2009

Type of Interruption	Young Child Households	Elderly Households	Other Households
Almost Every Month	9.6%	4.4%	4.9%
Some Months	13.8%	9.5%	9.7%
1 or 2 Months	3.9%	2.1%	5.1%
Never / No	72.8%	84.0%	80.4%

Source: 2009 RECS

Table 5-18b. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, by vulnerability group, households with income at or below 100% of HHS poverty guidelines, 2005

Type of Interruption	Young Child Households	Elderly Households	Other Households
Almost Every Month	1.6%	5.6%	1.4%
Some Months	4.4%	5.2%	6.2%
1 or 2 Months	3.2%	3.8%	4.0%
Never / No	90.7%	85.5%	88.4%

Source: 2005 RECS

Energy Insecurity by Energy Burden Group

Previous research has found that households with the highest residential energy burdens⁹⁰ have higher rates of heating and cooling interruptions than other types of households.⁹¹ Table 5-19a shows that

⁸⁸ These differences in the overall incidence rates listed in Table 5-18a based on the 2009 RECS are statistically significant at the 90% confidence level.

⁸⁹ These differences in the overall incidence rates listed in Table 5-18b based on the 2005 RECS are not statistically significant at the 90% confidence level.

⁹⁰ This study defines high energy burden as the “energy share” of severe housing (shelter) burden. Severe housing burden is considered by some researchers to be 50% of income. (See Cushing N. Dolbeare. 2001. “Housing Affordability: Challenge and Context.” *Cityscape: A Journal of Policy Development and Research*, (5)2:111-130. A Publication of the U.S. Department of Housing and Urban Development, Office of Policy Development and Research.) The median total residential energy costs for households at or below 150 percent of the HHS Poverty Guidelines are 21.8 percent of housing costs. To be consistent with the study of the 2005 RECS, this study of the 2009 RECS defines high residential energy

data from the 2009 RECS are consistent with earlier findings; households with high residential energy burden have a higher rate of interruptions than moderate burden and low burden households.⁹² However, that is not to say that lower burden households do not experience service interruptions; in 2009, 8.2 percent of moderate burden households and 6.4 percent of low burden households had heating and/or cooling service interruptions. However, they experienced those interruptions at a lower rate than the high burden households.

Table 5-19a is not directly comparable to Table 5-19b because of the methods used to construct the statistics from the questions asked in the 2009 RECS. However, Table 5-19b also confirms the previous research using the 2005 RECS; households with high residential energy burden have a higher rate of interruptions than moderate burden and low burden households.

Table 5-19a. Type of service interruption by energy burden group, low income households, 2009

Type of Interruption	High Residential Energy Burden	Moderate Residential Energy Burden	Low Residential Energy Burden
Heating Interruption (households with heating equipment)	9.4%	7.2%	4.5%
Cooling Interruption (households with air conditioning equipment)	5.6%	2.8%	3.5%
Any Interruption (all households)	11.8%	8.2%	6.4%

Source: 2009 RECS

Table 5-19b. Type of service interruption by energy burden group, low income households, 2005

Type of Interruption	High Residential Energy Burden	Moderate Residential Energy Burden	Low Residential Energy Burden
Heating Interruption (households with heating equipment)	12.7%	7.4%	7.2%
Cooling Interruption (households with air conditioning equipment)	9.7%	8.7%	7.4%
Any Interruption (all households)	14.2%	10.7%	9.5%

Source: 2005 RECS

Table 5-20a shows that, in the 2009 RECS, high energy burden low income households have a higher incidence for reduced spending for household necessities at some point during the year than moderate

burden as costs at or above 10.9 percent of income, moderate residential energy burden as costs at or above 6.5 percent of income but less than 10.9 percent of income, and low residential energy burden as costs less than 6.5 percent of income.

For more information, the reader can refer to “LIHEAP Energy Burden Evaluation Study,” available on OCS’ LIHEAP website at: www.acf.hhs.gov/programs/ocs/liheap/program_stats/study-July_05.doc.

⁹¹ By comparison, in the 2005 RECS, there was no relationship when home energy burden is used instead of residential energy burden. Section V of the FY 2008 Home Energy Notebook does not present results from the 2005 RECS using home energy burden; accordingly, results are not presented here for the current study.

⁹² The differences between high energy burden – low income households and low energy burden – low income households for heating interruptions, cooling interruptions, and any interruptions listed in Table 5-19a based on the 2009 RECS are statistically significant at the 90% confidence level.

or low energy burden low income households; 38.5 percent of high burden households a reported reducing spending for household necessities at some point during the year, compared to 29.1 percent of moderate burden and 29.8 percent of low burden low income households.⁹³ In contrast, Table 5-20b shows that, based on the 2005 RECS, there was no statistically significant difference in the incidence of reducing expenses for household necessities due to inability to pay energy bills among high and moderate burden low income households.

Table 5-20a. Reduced expenses for household necessities due to not having enough money to pay the energy bill, low income households, 2009

Type of Interruption	High Residential Energy Burden	Moderate Residential Energy Burden	Low Residential Energy Burden
Almost Every Month	14.5%	7.3%	6.3%
Some Months	17.8%	16.1%	15.9%
1 or 2 Months	6.3%	5.7%	7.7%
Never / No	61.5%	70.9%	70.2%

Source: 2009 RECS

Table 5-20b. Reduced expenses for household necessities due to not having enough money to pay the energy bill, low income households, 2005

Type of Interruption	High Residential Energy Burden	Moderate Residential Energy Burden	Low Residential Energy Burden
Almost Every Month	20.7%	18.4%	11.5%
Some Months	25.2%	22.1%	22.3%
1 or 2 Months	5.2%	8.5%	6.7%
Never / No	48.9%	51.0%	59.6%

Source: 2005 RECS

Table 5-21a shows that high energy burden households have a higher incidence for reporting that they had to keep their home at a temperature that they felt was unhealthy or unsafe at some point during the year than moderate or low energy burden low income households; 19.6 percent of high burden low income households reported that, compared to 14.5 percent of moderate burden and 12.4 percent of low burden low income households.⁹⁴ Compared to Table 5-21b, which presents results from the 2005 RECS, low income households of all levels of energy burden experienced a higher incidence rate of keeping their homes at an unhealthy or unsafe temperature in 2009 than they did in 2005.

Table 5-21a. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, low income households, 2009

Type of Interruption	High Residential Energy Burden	Moderate Residential Energy Burden	Low Residential Energy Burden
Almost Every Month	5.9%	2.3%	3.4%
Some Months	10.3%	7.4%	6.2%

⁹³ The differences in overall incidence rates between high residential energy burden low income households and other low income households listed in Table 5-20a based on the 2009 RECS are statistically significant at the 90% confidence level.

⁹⁴ The differences in overall incidence rates between high residential energy burden low income households and other low income households listed in Table 5-21a based on the 2009 RECS are statistically significant at the 90% confidence level.

Type of Interruption	High Residential Energy Burden	Moderate Residential Energy Burden	Low Residential Energy Burden
1 or 2 Months	3.5%	4.9%	2.8%
Never / No	80.4%	85.5%	87.6%

Source: 2009 RECS

Table 5-21b. Kept home at unsafe/unhealthy temperature due to not having enough money to pay the energy bill, low income households, 2005

Type of Interruption	High Residential Energy Burden	Moderate Residential Energy Burden	Low Residential Energy Burden
Almost Every Month	2.3%	1.5%	1.5%
Some Months	5.4%	4.5%	2.2%
1 or 2 Months	3.0%	3.0%	1.5%
Never / No	89.3%	91.1%	94.8%

Source: 2005 RECS

Study Implications

Prior to 2005, RECS questions on energy affordability issues were limited to heating service disconnections and electric service disconnections. The 2005 RECS and 2009 RECS included a set of questions that documented the different types of energy affordability problems that low income households face. This study updates a previous analysis of the 2005 RECS using 2009 RECS data to develop information on the energy insecurity of low income households, including:

- **Levels and Types of Energy Insecurity** – The study estimated the rate at which low income households face various types of energy problems and examined survey respondent reports on the extent to which energy assistance restores home heating and cooling for households experiencing service interruptions.
- **Factors Related to Energy Insecurity** – The study included an analysis of the factors associated with energy problems; including income, energy burden, geographic region and other demographic and housing factors.

This study furnishes important information regarding the performance of LIHEAP, as well as the types of information that could be collected to assess the energy needs of low income households.

Types and Levels of Energy Insecurity

The study finds that the energy insecurity questions administered in the 2009 RECS and 2005 RECS offer a much more comprehensive understanding of the energy problems faced by low income households than did the more limited set of questions included in prior RECS. Findings from the analysis include:

- *Heating and Cooling Service Interruptions* - Tracking the levels of home heating and cooling service interruptions continues to be an important purpose of the RECS. The time series of RECS data shows that the space heating interruption rates in 2005 and 2009, respectively, were the highest and third highest measured since the question was added to the RECS in 1984.

- *Role of Energy Assistance in Restoring Service* – Adding questions on whether energy assistance was successful in helping to restore heating and air conditioning provides the ability to document one important outcome indicator for LIHEAP.
- *Financial Energy Insecurity* – The inclusion of questions that document financial energy insecurity for low income households provides a much better understanding of the extent to which energy costs affect low income households; the statistics from the 2009 RECS show that almost 47 percent of low income households face financial energy insecurity and that about 16 percent of those households face financial energy insecurity “almost every month.”
- *Health and Safety Energy Insecurity* – The inclusion of questions that document health and safety energy insecurity for low income households gives additional information on the other ways that energy affordability problems can affect low income households. In the 2009 RECS, the number of health and safety energy insecurity questions was reduced from four to one, making the 2005 RECS a more comprehensive source for this information. Overall, in the 2005 RECS, about one-fourth of low income households experienced health and safety energy insecurity. Moreover, about 90 percent of the low income households that reported health and safety energy insecurity in the 2005 RECS did not report heating or air conditioning interruptions, indicating that the questions from previous RECS on interruptions alone were not capturing the entire set of risks faced by low income households because of energy affordability problems. This information is supplemented by additional health and safety questions asked in the 2009 RECS regarding the need for medical attention resulting from keeping the home at unsafe and unhealthy temperatures and household fires caused by the inability to adequately heat or light the home. About 3 percent of all low income households reported that household members needed medical assistance because the home was kept at an unsafe or unhealthy temperature (too hot or too cold) in 2009; household members in need of medical attention were more likely to be young children than elderly individuals. In addition, while the incidence rate of household fires resulting from the use of alternate heating and lighting sources in 2009 was low (about 0.4 percent of all low income households), this still represents a noteworthy issue due to the cost of such events.

The analysis suggests that the questions added to the 2005 RECS and continued in the 2009 RECS represent an important contribution to the ability to document and understand the energy needs of low income households.

Factors Related to Energy Insecurity

The study finds that there are certain factors that are associated with energy insecurity. These findings suggest that States may be able to increase the effectiveness of LIHEAP by considering these factors when they target households for LIHEAP outreach and when they set LIHEAP benefit levels. Relevant findings from the analysis include:

- *Poverty Level* – It is clear from the analysis that poverty level is associated with all types of energy insecurity. When developing benefit assignment procedures, States might be able to increase the effectiveness of LIHEAP if they group households by poverty level.
- *Energy Burden* – Residential energy burden is associated with energy insecurity. States might be able to increase the effectiveness of their LIHEAP programs by using actual residential energy bills to help set benefit levels.
- *Vulnerable Groups* – It is important for States to consider all types of energy insecurity in setting benefits. While low income elderly households have lower rates of service interruptions and financial energy insecurity, of the differences between elderly households

and young child or other households are less pronounced for health and safety energy insecurity. Since it is harder to directly observe health and safety energy insecurity, local LIHEAP intake offices may need to conduct more extensive outreach to identify such households.

In general, the analysis shows it is appropriate to target LIHEAP to the households with the lowest poverty levels and highest residential energy burdens to maximize the effectiveness of LIHEAP.

Appendix A: Home Energy Estimates

Appendix A provides information on how estimates of home energy data were derived from the 2009 Residential Energy Consumption Survey (RECS) and updated for FY 2013. The following topics are covered in this Appendix.

- Description of RECS.
- Strengths and limitations of RECS data.
- National and regional average home energy consumption and expenditures.
- Energy burden.

Description of RECS

The RECS is a national household sample survey that provides information on residential energy use. It has been conducted by the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) since 1978. It is designed to provide reliable data at the national and Census regional levels. The RECS includes information on energy consumption and expenditures, household demographics, housing characteristics, weatherization/conservation practices, home appliances, and type of heating and cooling equipment. Currently, this survey is conducted every four years.

The survey consists of three parts:

- EIA interviews households for information about which fuels are used, how fuels are used, energy-using appliances, structural features, energy-efficiency measures taken, demographic characteristics of the household, heating interruptions, and receipt of energy assistance.
- EIA interviews rental agents for households whose rent includes some portion of their energy bill. This information augments information from those households that may not be knowledgeable about the fuels used for space heating or water heating.
- After obtaining permission from respondents, EIA mails questionnaires to their energy suppliers to collect the actual billing data on energy consumption and expenditures. This fuel supplier survey eliminates the inaccuracy of self-reported data. When a household does not consent or when fuel consumption records are unusable or nonexistent, regression analysis is used to impute missing data.⁹⁵

The 2009 RECS is the thirteenth survey in the series of surveys.⁹⁶ For the 2009 RECS, 12,083 households were interviewed, including 724 verified LIHEAP recipient households. For the tabulations in this *Notebook*, 2009 RECS consumption and expenditure data were updated using price and weather data to represent consumption and expenditures for FY 2013.

⁹⁵Regression analysis is a statistical tool for evaluating the relationship of one or more independent variables to a single continuous dependent variable. Formulas developed from regression analysis are used to predict the value of the dependent variable under varying conditions of the independent variable(s).

⁹⁶More information about the RECS sample design, see Energy Information Administration, *Sample Design for the Residential Energy Consumption Survey*, DOE/EIA-0555 (94)/1, Washington, DC, August 1994. The data collected from the 2009 RECS are available from the EIA website: *RECS Survey Data*, Energy Information Administration, <http://www.eia.gov/consumption/residential/data/2009/>

Strengths and limitations of RECS data

The RECS provides the most recent, comprehensive data on home energy consumption and expenditures. The strengths of using RECS to derive home energy estimates are as follows.

- RECS uses a representative national household sample, providing statistically reliable estimates for all, non-low income, and low income households.
- The 2009 RECS included an oversample of LIHEAP recipient households that is representative of the population of LIHEAP heating and cooling assistance recipients.
- The RECS includes usage data for all residential fuels.
- Energy suppliers provide information on actual residential energy consumption and expenditures of RECS sample households in order to eliminate the inaccuracy of self-reported data.
- Regression analyses of RECS data provide estimates of the amounts of fuels going to various end uses, including home heating and cooling.

While the updated 2009 RECS data provide the most current and comprehensive data on residential energy use by low income households, several significant limitations must be addressed:⁹⁷

- The 2009 RECS data for calendar year 2009 were updated to FY 2013 (October 1, 2012 to September 30, 2013), using procedures that adjust the 2009 data to reflect the weather and fuel prices for FY 2013. These procedures are comparable to those used for the FY 1986 - FY 2012 annual LIHEAP Reports to Congress. However, the reader should exercise caution in comparing the data in this *Notebook* with data in annual LIHEAP Reports to Congress prior to FY 1986, in which consumption and expenditure data were estimated from the RECS year (April 1 to March 31).
- For some variables, disaggregation of data into subgroups at the regional level results in estimates made from a small number of sample cases. This is particularly true of the LIHEAP recipient households and the fuel oil, liquefied petroleum gas and kerosene heating subgroups. This affects the reliability of the estimates.
- The household is a basic reporting unit for RECS and LIHEAP. RECS defines a household as all individuals living in a housing unit, whether related or not, who (1) share a common direct access entry to the unit from outside the building or from a hallway, and (2) do not normally eat their meals with members of other units in the building. A household does not include temporary visitors or household members away at college or in the military. LIHEAP defines a household as one or more individuals living together as an economic unit who purchase energy in common or make undesignated payments for energy in their rent. Some variation in the count of households, particularly those containing renters or boarders, may result from the difference in definitions.
- The Current Population Survey Annual Social and Economic Supplement (CPS ASEC), conducted by the Bureau of the Census, provides, at national and regional levels, data on total household income as a specific dollar amount. CPS's larger sample size and method of collecting income data result in more accurate income data than RECS income data.

⁹⁷Information about the quality of RECS data is available from the EIA website: *RECS Methodology*, Energy Information Administration, <http://www.eia.gov/consumption/residential/data/2009/index.cfm?view=methodology>.

Therefore, the 2013 CPS ASEC is used to develop estimates of the number of low income households. In addition, mean income statistics from the CPS ASEC are used in the calculation of group energy burden for this *Notebook*.⁹⁸

- Households were classified in the 2009 RECS as eligible or ineligible for LIHEAP based on whether their income was above or below the maximum statutory income eligibility criteria (the greater of 150 percent of HHS poverty guidelines or 60 percent of State median income). These estimates do not include households whose incomes may have exceeded the statutory income standards but who received LIHEAP benefits because they (1) were categorically eligible for LIHEAP under section 8624 (b)(2)(A) of the LIHEAP statute; (2) became income-ineligible for LIHEAP at the time of the survey; or (3) were deemed eligible for LIHEAP based on incorrectly-reported income. However, the tabulations of LIHEAP households also include survey respondents who were identified as LIHEAP recipients from State LIHEAP administrative data but who reported incomes higher than the maximum statutory income in the RECS survey.

Average home energy consumption and expenditures

Average heating and cooling consumption and expenditure estimates for FY 2013 were calculated at national and regional levels for all, non-low income, low income, and LIHEAP recipient households, for various fuels. The heating and cooling estimates were updated for each 2009 RECS sample case using FY 2013 heating degree days, cooling degree days, and price inflators applied to the original expenditure data, as well as the multiple regression formula developed from the 2009 RECS. Home energy consumption and expenditure data were developed by aggregating and averaging home heating and cooling estimates for the sample cases that represented all, non-low income, low income, and LIHEAP recipient households.

Tables A-2 through A-3c display national and regional consumption and expenditure data for residential energy (including energy used for space heating, water heating, space cooling, and appliances). Tables A-4 through A-6c display national and regional usage, consumption, and expenditure data for home heating. Table A-7 displays national and regional usage, consumption, and expenditure data for home cooling. Analysis and discussion of home energy consumption and expenditures appear in Section II of this *Notebook*.

Energy burden

Energy burden is an important statistic for policymakers who are considering the need for energy assistance. Energy burden can be defined broadly as the burden placed on household incomes by the cost of residential energy. However, there are different ways to compute energy burden and different interpretations of the energy burden statistics. The purpose of this section is to examine alternative energy burden statistics and discuss the interpretation of each.⁹⁹

Different “measures of central tendency” can be used to describe energy burden. The most commonly used measures are the mean and the median. As previously noted, the mean or average is computed as the sum of all values divided by the number of values. The median is computed as the value that is at the center of the distribution of values (i.e., 50 percent of the values are greater than the median and 50 percent are less).

⁹⁸ Note that household-level energy and income data from RECS are used to calculate mean and median individual energy burden.

⁹⁹ More detailed information is available in the Division of Energy Assistance's (DEA's) technical report, *Characterizing the Impact of Energy Expenditures on Low Income Households: An Analysis of Alternative Energy Burden Statistics*, (November, 1994).

Computational procedures

There are two ways to compute mean energy burden for households.¹⁰⁰ The first is the “mean individual” approach, and the second is the “mean group” approach. While these approaches appear to be similar, they give quite different values.

Using the “mean individual burden” approach, energy burden is computed as follows.

1. First, the ratio of energy expenditures to annual income for each household in a specified population is computed
2. Then, the mean of these energy burden ratios is computed for the population.¹⁰¹ For example, consider the situation where there are four households with energy burdens of 4, 5, 7, and 8 percent
3. The mean of these energy burdens is calculated by adding the percentages (24 percentage points) and dividing by the number of households (four households), resulting in a mean individual burden of 6 percent.

Using the “mean group burden” approach, energy burden is computed as follows.

1. First, total annual energy expenditures for households and total annual income for households in a specified population are computed
2. Then, the ratio of total energy expenditures to total income is computed for the specified population. For example, consider the situation where a group consists of four households that have a total income of \$100,000 and a total energy bill of \$4,000
3. Dividing the \$4,000 in total energy bills by \$100,000 in total income results in a mean group burden of 4 percent.

According to the 2009 RECS, the mean residential energy burden for all LIHEAP Federally eligible households, in 2009, using the first approach was 18.7 percent and using the second approach was 9.6 percent. The disparity between the two statistics is because the lowest income households spend a greater share of their income on residential energy than do higher income households.¹⁰² If the relationship between income and residential energy expenditures is linear (i.e., a 10 percent increase in income is associated with a 10 percent increase in residential energy expenditures), the two statistics would be equal. However, since a number of low income households spend a large share of their income on energy, the relationship between income and residential energy expenditures is not linear (i.e., a 10 percent increase in income is associated with a considerably smaller increase in energy expenditures). Therefore, there is a substantial difference between the two statistics.

In the discussion of computational procedures, the “mean individual burden” was examined. It is also possible to look at the “median individual burden.” As noted above for LIHEAP income eligible households, the mean residential energy burden computed as the “mean individual burden” was 18.7 percent. The median of the distribution of residential energy burdens from the 2009 RECS survey

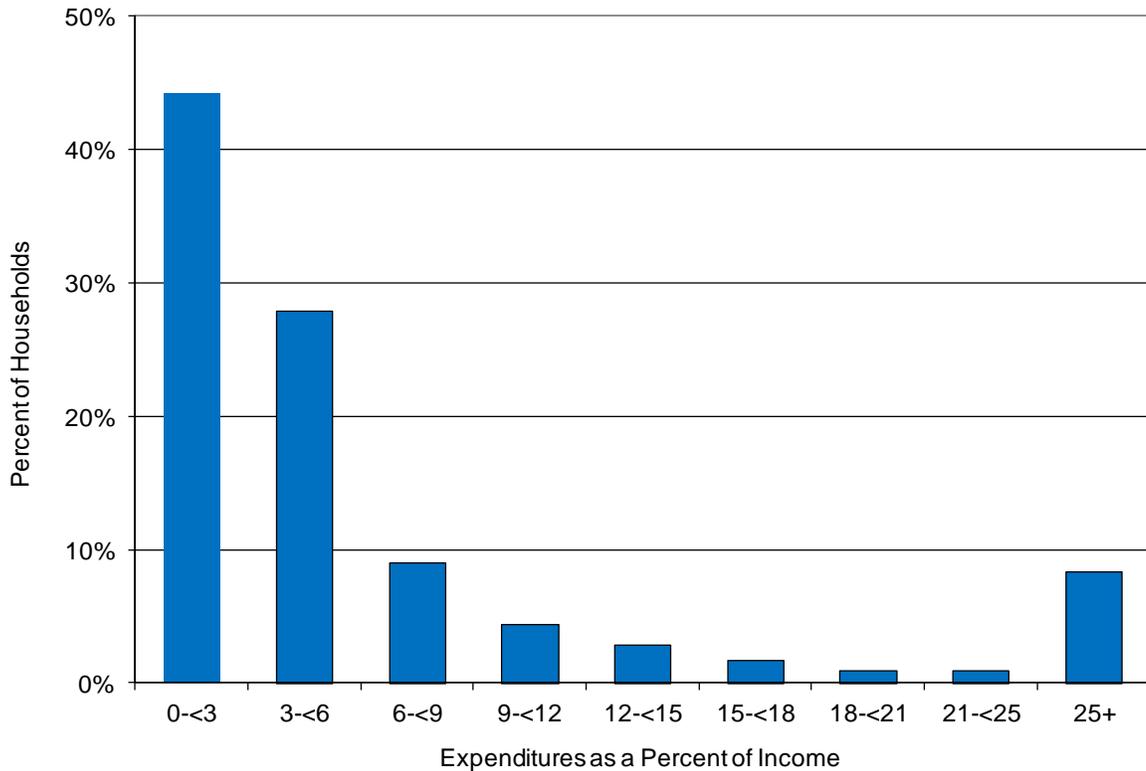
¹⁰⁰The mean is the sum of all values divided by the number of values. The mean is also referred to as the average.

¹⁰¹For some households, residential energy expenditures appear to exceed income. Elderly households living on their savings are an example of such households. In calculating mean individual burden, the energy burden figures for such households have been limited to 100 percent.

¹⁰²For example, 2009 RECS households with incomes of \$10,000 or less had average residential energy expenditures of \$1,556, while those with incomes between \$20,000 - \$35,000 had average residential energy expenditures of \$1,714. Thus, households which had more than twice as much income spent only 10 percent more on energy.

was 9.2 percent. The disparity between these two statistics is the result of the skewed distribution of energy burden ratios. Figure A-1 demonstrates a skewed distribution of LIHEAP income eligible households by home energy burden.

Figure A-1. Distribution of LIHEAP income eligible households by home energy burden, 2009



Data files

The data files used to make estimates of energy burden also have some impact on the statistic. The RECS data file is the only reliable source of national information on energy expenditures. However, the income reported on the RECS is known to be deficient in several ways. First, it is generally true that income is underreported on household surveys. Second, the RECS collects income data less precisely through the use of income intervals. Finally, the CPS ASEC collects income more precisely by asking a series of detailed questions on income than the RECS does and also has a larger sample size than the RECS.

The RECS, which categorizes more households as income eligible for LIHEAP than the CPS ASEC, thus categorizes too many households as income eligible for LIHEAP. Based on the 2009 RECS, in calendar year 2009, 39.7 million households were estimated to be LIHEAP income eligible households. Based on the 2010 CPS ASEC, the estimate of LIHEAP income eligible households for calendar year 2009 was 37.1 million households. Since some households that were not LIHEAP income eligible were categorized by RECS as LIHEAP income eligible, the RECS overestimated the average energy expenditures for LIHEAP income eligible households.¹⁰³

¹⁰³The estimates of average energy burden may be overstated since RECS, like other surveys, understates income. Comparisons between the estimates of the number of LIHEAP income eligible households from the 1990 RECS and the March 1991 CPS suggest that the probable range of the overestimate in mean group energy burden is from 5-10 percent.

Data interpretations

The statistic used to describe energy burden depends on the question being asked. Each statistic offers some data on energy burden while not telling the whole story by itself.

The key difference between “mean individual burden” and “mean group burden” is that the first statistic focuses on the experience of individual households and the second on the experience of a group of households. The “mean individual burden” furnishes more information on how individual households are affected by energy burden (i.e., it computes a mean by using each household's burden). The “mean group burden” furnishes more information on group burden (i.e., it computes the share of all income earned by LIHEAP income eligible households that goes to pay for energy). Both statistics are useful, though the individual burden statistic puts more emphasis on the experience of individual households, and the group burden puts more emphasis on the share of group income that is used for energy.

The key difference between the “mean individual burden” and the “median individual burden” is that the first statistic furnishes information on all LIHEAP income eligible households at the expense of overstating what is happening to the “average” LIHEAP income eligible household. The second statistic furnishes information on the “average” LIHEAP income eligible household at the expense of disregarding what is happening to households at either end of the distribution.

The best way to furnish information on energy burden is to use all available statistics. For example, it would be informative to show the “mean individual burden,” the “median individual burden,” and the “distribution of individual energy burdens,” for all LIHEAP income eligible households, to indicate how individual households are affected by energy costs. In addition, it would be useful to show the “mean group burden” to indicate what share of income is going to pay energy bills for the group as a whole.

However, when doing an analysis of energy burden among several groups of households, it is very difficult to present the entire spectrum of available statistics. Thus, we usually limit the analysis to a comparison of one statistic between groups. In general, if only one statistic is used, either the “mean individual burden” or the “mean group burden” is preferred, since a mean is a more complete statistic than is a median. The choice between the two means is dictated by which of the following types of analysis is being conducted.

- If funding levels are being examined, the group burden is probably more useful. This statistic furnishes information on the size of the energy bill of LIHEAP income eligible households and the portion of income for this group that is spent on energy. Using this statistic allows direct examination of the relationship between the total energy bill and total LIHEAP funding.
- If targeting decisions are being examined, the mean or median individual burden is probably more useful. These statistics furnish information on the distribution of burdens among households in a group. Using these statistics helps to target those groups where a significant number of households have high energy burdens.

All three energy burden statistics are presented in this *Notebook's* tables to fully inform the reader. Beginning with the *FY 1992 LIHEAP Report to Congress*, the mean individual energy burden and mean group burden statistics have been furnished in the reports. Previous reports to Congress presented only the mean group burden. The text of this *Notebook* references mean group burden to maintain consistency with the previous reports to Congress.

Projecting energy consumption and expenditures

Projections were developed using microsimulation techniques that adjusted consumption and energy expenditures for changes in weather and prices. Consumption amounts for each household were adjusted for changes in heating and cooling degree days. Projected expenditures for each household were estimated as a function of projected consumption changes and actual changes in fuel prices. In order to make these projections, it was assumed that households did not change their energy use behavior (that is, their tendency to seek a specific indoor temperature) as a result of weather, price, or other changes.

Consumption projections utilized end use consumption estimates that were developed with the 2009 RECS data. These estimates were based on models for each fuel, using households that had actual (not imputed) consumption records for the fuel. The models used nonlinear estimation techniques to estimate parameters that described the relationship of consumption to end uses, housing characteristics, weather, and demographics.

To develop consumption projections, heating and cooling end use estimates for Calendar Year 2009 were adjusted for weather differences between 2009 and Fiscal Year 2013. The following equation was applied to each household in the microsimulation data file.

$$\text{FY 2013 Projected Btus} = (2009 \text{ estimated heat use} * \text{HDD change}) + (2009 \text{ estimated cooling use} * \text{CDD change}) + (2009 \text{ estimated water heat use} + 2009 \text{ estimated appliance use})$$

Expenditure projections were a function of projected changes in consumption and actual changes in prices. The following equations were used.

$$\text{Preliminary Expenditures} = 2009 \text{ Expenditures} * (\text{FY 2013 Projected Usage} / 2009 \text{ Actual Usage})$$

$$\text{Final Expenditures} = \text{Preliminary Expenditures} * \text{Price Change}^{104}$$

Table A-1 shows the national price factors that were used. The price factors show the actual change in the average price of a fuel from calendar year 2009 to FY 2013. For example, electricity prices increased by 4.9 percent from 2009 to FY 2013.

Table A-1. National price factors for FY 2013

Fuel	Price Factors for FY 2013 Projections
Electricity	1.0486
Natural gas	0.8571
Fuel oil / kerosene	1.5113
Liquefied petroleum gas (LPG)	1.0320

¹⁰⁴Price factors were developed using price data obtained from the Energy Information Administration for electricity, natural gas, and LPG, and the BLS Consumer Price Index for fuel oil. Consumption data were obtained from the Energy Information Administration for all fuels. Electricity price data used for calculating price factors are from the *Monthly Energy Review*, December 2013, and electricity consumption data is from the *Electric Power Monthly*, December 2013. Natural gas price and consumption data used for calculating price factors are from the *Monthly Energy Review*, March 2014. Fuel oil/kerosene price data for calculating prices factors are from the U.S. City Average, Fuel Oil #2, Consumer Price Index of the Bureau of Labor Statistics, Series ID APU000072511. LPG price data were obtained from the Energy Information Administration website (<http://www.eia.doe.gov>). Fuel oil/kerosene and LPG consumption data are from the *Monthly Energy Review*, March 2014.

Expenditure data were adjusted using national price factors for FY 2013. Earlier *Notebooks* used State-level price factor data. For FY 1993/1994, State-level data did not vary much from the national average for electricity and natural gas. For electricity, price changes varied between 0.3 percent and 1.2 percent; the national average was 0.8 percent. For natural gas, price changes varied between 1.7 percent and 2.8 percent; the national average was 2 percent. Expenditure projections using national price data do not appear to be significantly different from those obtained using State price data.

Table A-2. Residential energy: Average consumption per household, by all fuels and specified fuels, by all, non-low income, low income and LIHEAP recipient households, by Census region, FY 2013^{1/}

Census Region	All Fuels ^{2/} (MMBtus) ^{3/}	Natural Gas (MMBtus)	Electricity (MMBtus)	Fuel Oil (MMBtus)	Kerosene (MMBtus)	LPG (MMBtus)
US - All households	88.9	108.3	59.8	116.2	64.9	109.5
US - Non-low income households	95.1	112.6	65.0	123.9	70.8	116.5
US - Low income households ^{4/}	77.3	98.9	51.3	102.0	62.6	95.1
US - LIHEAP recipient households ^{5/}	90.2	109.0	55.2	109.8	81.3*	97.2
Northeast - All households	106.2	115.5	50.7	117.7	69.0	112.9
Northeast - Non-low income households	113.2	121.9	55.9	126.3	75.0	121.6
Northeast - Low income households	93.6	104.7	42.3	101.0	66.3	89.4
Northeast - LIHEAP recipient households	97.6	103.3	45.2	110.9	84.4*	92.6*
Midwest - All households	111.8	124.2	66.4	108.6	NC	125.4
Midwest - Non-low income households	118.0	128.8	76.1	110.7	NC	128.8
Midwest - Low income households	100.5	115.3	52.5	106.8	NC	117.7
Midwest - LIHEAP recipient households	105.5	119.0	58.7	95.1*	NC	102.6
South - All households	75.3	102.3	60.5	109.1	59.2	93.8
South - Non-low income households	81.6	109.2	64.8	111.6	67.6*	103.5
South - Low income households	63.6	86.8	53.0	104.0	57.1*	77.0
South - LIHEAP recipient households	74.8	110.0	58.8	113.3*	62.9*	102.6*
West - All households	73.6	87.5	56.0	112.6	51.9*	102.2
West - Non-low income households	79.7	90.8	62.1	111.9	51.4*	107.2
West - Low income households	61.3	77.5	48.0	114.5*	52.6*	92.4
West - LIHEAP recipient households	66.8	90.8	45.4	113.8*	NC	59.6*

^{1/}Developed from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2013 for heating and cooling degree days.

^{2/}Weighted average of natural gas, electricity, fuel oil, kerosene, and liquefied petroleum gas consumption. RECS consumption data are not collected for other fuels.

^{3/}A British Thermal Unit (Btu) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MMBtus refer to values in millions of Btus.

^{4/}Households with income at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{5/} Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in the 2009 RECS household sample.

Table A-3a. Residential energy: Average annual expenditures, by amount (dollars) and mean group burden (percent of income), for all, non-low income, low income, and LIHEAP recipient households, by Census region and main heating fuel, FY 2013

Census Region	All Fuels ^{1/}	All Fuels ^{2/}	Natural Gas Heat	Natural Gas Heat	Electric Heat	Electric Heat	Fuel Oil Heat	Fuel Oil Heat	Kerosene Heat	Kerosene Heat	LPG Heat	LPG Heat
US - All households	\$2,058	2.9%	\$1,986	2.8%	\$1,816	2.5%	\$3,696	5.2%	\$2,189	3.1%	\$2,992	4.2%
US - Non-low income households	\$2,214	2.3%	\$2,100	2.2%	\$1,987	2.1%	\$3,991	4.2%	\$2,451	2.6%	\$3,173	3.3%
US - Low income households ^{3/}	\$1,768	9.3%	\$1,740	9.2%	\$1,540	8.1%	\$3,154	16.6%	\$2,083	11.0%	\$2,620	13.8%
US - LIHEAP recipient households ^{4/}	\$1,989	12.0%	\$1,853	11.2%	\$1,574	9.5%	\$3,393	20.5%	\$2,815*	17.0%	\$2,739	16.6%
Northeast - All households	\$2,762	3.6%	\$2,389	3.1%	\$1,837	2.4%	\$3,798	4.9%	\$2,369	3.1%	\$3,673	4.8%
Northeast - Non-low income households	\$2,997	2.8%	\$2,564	2.4%	\$2,008	1.9%	\$4,112	3.8%	\$2,682	2.5%	\$3,934	3.6%
Northeast - Low income households	\$2,344	11.1%	\$2,090	9.9%	\$1,557	7.4%	\$3,188	15.1%	\$2,232	10.6%	\$2,972	14.1%
Northeast - LIHEAP recipient households	\$2,435	14.1%	\$2,034	11.7%	\$1,536	8.9%	\$3,428	19.8%	\$2,939*	17.0%	\$2,917*	16.8%
Midwest - All households	\$1,956	2.8%	\$1,894	2.7%	\$1,596	2.3%	\$2,980	4.3%	NC	NC	\$3,111	4.5%
Midwest - Non-low income households	\$2,062	2.3%	\$1,983	2.2%	\$1,757	1.9%	\$3,059	3.3%	NC	NC	\$3,201	3.5%
Midwest - Low income households	\$1,764	9.3%	\$1,723	9.0%	\$1,365	7.2%	\$2,915	15.3%	NC	NC	\$2,908	15.3%
Midwest - LIHEAP recipient households	\$1,843	11.5%	\$1,732	10.8%	\$1,474	9.2%	\$2,746*	17.2%	NC	NC	\$2,667	16.7%
06 South - All households	\$2,059	3.1%	\$2,165	3.3%	\$1,956	3.0%	\$3,402	5.1%	\$1,905	2.9%	\$2,709	4.1%
South - Non-low income households	\$2,230	2.5%	\$2,340	2.7%	\$2,112	2.4%	\$3,541	4.0%	\$1,976*	2.2%	\$2,916	3.3%
South - Low income households	\$1,743	10.0%	\$1,773	10.2%	\$1,683	9.7%	\$3,109	17.9%	\$1,887*	10.9%	\$2,353	13.6%
South - LIHEAP recipient households	\$1,902	13.9%	\$2,081	15.2%	\$1,727	12.6%	\$3,791*	27.7%	\$2,070*	15.1%	\$3,316*	24.3%
West - All households	\$1,575	2.0%	\$1,612	2.1%	\$1,471	1.9%	\$3,233	4.2%	\$1,758*	2.3%	\$2,726	3.5%
West - Non-low income households	\$1,713	1.7%	\$1,711	1.7%	\$1,654	1.6%	\$3,208	3.1%	\$1,986*	1.9%	\$2,910	2.8%
West - Low income households	\$1,298	6.5%	\$1,319	6.6%	\$1,226	6.2%	\$3,305*	16.7%	\$1,516*	7.6%	\$2,367	11.9%
West - LIHEAP recipient households	\$1,231	6.4%	\$1,335	6.9%	\$1,120	5.8%	\$2,686*	14.0%	NC	NC	\$1,521*	7.9%

^{1/}Estimates are derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2009 RECS data have been adjusted for heating degree days, cooling degree days, and fuel price estimates for FY 2013. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered and billed costs for natural gas and electricity. RECS expenditure data are not collected for other fuels.

^{2/}Represents the percent of household's income used for residential energy expenditures. National and regional mean incomes are calculated from the 2013 CPS ASEC, which reports income for calendar year 2012. Mean group residential burden is computed as mean group energy expenditures (from RECS) divided by mean group income (from CPS ASEC). See text in Appendix A for a discussion of energy burden.

^{3/}Households with annual incomes at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{4/} Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in the 2009 RECS household sample.

Table A-3b. Residential energy: Average annual expenditures, by amount (dollars) and mean individual burden (percent of income), for all, non-low income, low income, and LIHEAP recipient households, by Census region and main heating fuel, FY 2013

Census Region	All Fuels ^{1f}	All Fuels ^{2f}	Natural Gas Heat	Natural Gas Heat	Electric Heat	Electric Heat	Fuel Oil Heat	Fuel Oil Heat	Kerosene Heat	Kerosene Heat	LPG Heat	LPG Heat
US - All households	\$2,058	8.2%	\$1,986	7.3%	\$1,816	8.8%	\$3,696	11.9%	\$2,189	15.2%	\$2,992	10.3%
US - Non-low income households	\$2,214	3.1%	\$2,100	2.8%	\$1,987	3.1%	\$3,991	4.8%	\$2,451	4.8%	\$3,173	4.9%
US - Low income households ^{3f}	\$1,768	17.7%	\$1,740	16.8%	\$1,540	18.0%	\$3,154	24.8%	\$2,083	19.4%	\$2,620	21.5%
US - LIHEAP recipient households ^{4f}	\$1,989	18.1%	\$1,853	17.1%	\$1,574	17.1%	\$3,393	22.3%	\$2,815*	18.0%	\$2,739	25.3%
Northeast - All households	\$2,762	9.5%	\$2,389	8.0%	\$1,837	9.7%	\$3,798	12.0%	\$2,369	18.2%	\$3,673	9.2%
Northeast - Non-low income households	\$2,997	3.6%	\$2,564	3.1%	\$2,008	2.6%	\$4,112	4.9%	\$2,682	5.0%	\$3,934	4.7%
Northeast - Low income households	\$2,344	20.0%	\$2,090	16.4%	\$1,557	21.1%	\$3,188	25.7%	\$2,232	23.9%	\$2,972	21.0%
Northeast - LIHEAP recipient households	\$2,435	17.9%	\$2,034	15.0%	\$1,536	17.4%	\$3,428	23.4%	\$2,939*	19.6%	\$2,917*	19.4%
Midwest - All households	\$1,956	8.3%	\$1,894	7.9%	\$1,596	8.9%	\$2,980	14.8%	NC	NC	\$3,111	9.5%
Midwest - Non-low income households	\$2,062	3.1%	\$1,983	2.9%	\$1,757	2.7%	\$3,059	5.2%	NC	NC	\$3,201	4.5%
Midwest - Low income households	\$1,764	17.9%	\$1,723	17.5%	\$1,365	17.9%	\$2,915	22.7%	NC	NC	\$2,908	21.0%
Midwest - LIHEAP recipient households	\$1,843	20.5%	\$1,732	20.0%	\$1,474	19.4%	\$2,746*	18.7%	NC	NC	\$2,667	22.6%
South - All households	\$2,059	9.2%	\$2,165	8.6%	\$1,956	9.5%	\$3,402	7.6%	\$1,905	11.2%	\$2,709	11.4%
South - Non-low income households	\$2,230	3.4%	\$2,340	3.2%	\$2,112	3.4%	\$3,541	4.1%	\$1,976*	5.5%	\$2,916	5.6%
South - Low income households	\$1,743	19.8%	\$1,773	20.6%	\$1,683	20.1%	\$3,109	14.9%	\$1,887*	12.7%	\$2,353	21.4%
South - LIHEAP recipient households	\$1,902	19.5%	\$2,081	19.6%	\$1,727	18.6%	\$3,791*	15.3%	\$2,070*	8.4%	\$3,316*	55.8%
West - All households	\$1,575	5.4%	\$1,612	4.5%	\$1,471	6.0%	\$3,233	15.5%	\$1,758*	5.4%	\$2,726	10.8%
West - Non-low income households	\$1,713	2.3%	\$1,711	2.2%	\$1,654	2.3%	\$3,208	4.9%	\$1,986*	2.0%	\$2,910	4.5%
West - Low income households	\$1,298	11.7%	\$1,319	11.5%	\$1,226	10.9%	\$3,305*	45.6%	\$1,516*	9.0%	\$2,367	23.3%
West - LIHEAP recipient households	\$1,231	9.7%	\$1,335	10.8%	\$1,120	8.7%	\$2,686*	10.9%	NC	NC	\$1,521*	18.3%

^{1f}Estimates are derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2009 RECS data have been adjusted for heating degree days, cooling degree days, and fuel price estimates for FY 2013. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered and billed costs for natural gas and electricity. RECS expenditure data are not collected for other fuels.

^{2f}Represents the percent of household income used for residential energy expenditures. For individual households, FY 2013 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (CPI) and FY 2013 energy expenditures are estimated by adjusting energy expenditures reported in the 2009 RECS for changes in weather and energy prices. FY 2013 residential energy burden for each household is computed as estimated FY 2013 residential energy expenditures divided by estimated FY 2013 annual income. Mean individual residential burden is computed by computing the mean of the individual values. See text in Appendix A for a discussion of energy burden.

^{3f}Households with annual incomes at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{4f}Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in 2009 RECS household sample.

Table A-3c. Residential energy: Average annual expenditures, by amount (dollars) and median individual burden (percent of income), for all, non-low income, low income, and LIHEAP recipient households, by Census region and main heating fuel, FY 2013

Census Region	All Fuels ^{1/}	All Fuels ^{2/}	Natural Gas Heat	Natural Gas Heat	Electric Heat	Electric Heat	Fuel Oil Heat	Fuel Oil Heat	Kerosene Heat	Kerosene Heat	LPG Heat	LPG Heat
US - All households	\$2,058	3.7%	\$1,986	3.3%	\$1,816	3.8%	\$3,696	5.9%	\$2,189	10.0%	\$2,992	5.8%
US - Non-low income households	\$2,214	2.7%	\$2,100	2.5%	\$1,987	2.7%	\$3,991	4.4%	\$2,451	4.1%	\$3,173	4.5%
US - Low income households ^{3/}	\$1,768	8.5%	\$1,740	8.1%	\$1,540	8.1%	\$3,154	14.7%	\$2,083	12.1%	\$2,620	12.9%
US - LIHEAP recipient households ^{4/}	\$1,989	9.2%	\$1,853	8.0%	\$1,574	8.4%	\$3,393	14.1%	\$2,815*	14.0%	\$2,739	16.2%
Northeast - All households	\$2,762	4.5%	\$2,389	3.8%	\$1,837	3.5%	\$3,798	5.9%	\$2,369	10.3%	\$3,673	4.9%
Northeast - Non-low income households	\$2,997	3.1%	\$2,564	2.6%	\$2,008	2.2%	\$4,112	4.4%	\$2,682	3.9%	\$3,934	4.1%
Northeast - Low income households	\$2,344	10.4%	\$2,090	9.1%	\$1,557	7.6%	\$3,188	15.2%	\$2,232	13.3%	\$2,972	10.1%
Northeast - LIHEAP recipient households	\$2,435	10.0%	\$2,034	7.8%	\$1,536	5.8%	\$3,428	15.5%	\$2,939*	14.0%	\$2,917*	11.0%
Midwest - All households	\$1,956	3.7%	\$1,894	3.5%	\$1,596	3.4%	\$2,980	8.3%	NC	NC	\$3,111	5.1%
Midwest - Non-low income households	\$2,062	2.7%	\$1,983	2.6%	\$1,757	2.4%	\$3,059	5.2%	NC	NC	\$3,201	4.1%
Midwest - Low income households	\$1,764	8.5%	\$1,723	8.2%	\$1,365	6.7%	\$2,915	12.5%	NC	NC	\$2,908	15.0%
Midwest - LIHEAP recipient households	\$1,843	8.9%	\$1,732	8.4%	\$1,474	8.5%	\$2,746*	8.3%	NC	NC	\$2,667	16.2%
South - All households	\$2,059	4.2%	\$2,165	3.7%	\$1,956	4.2%	\$3,402	5.5%	\$1,905	9.3%	\$2,709	6.7%
South - Non-low income households	\$2,230	3.0%	\$2,340	2.8%	\$2,112	3.0%	\$3,541	4.0%	\$1,976*	4.5%	\$2,916	5.4%
South - Low income households	\$1,743	9.4%	\$1,773	10.1%	\$1,683	8.8%	\$3,109	9.8%	\$1,887*	10.1%	\$2,353	13.2%
South - LIHEAP recipient households	\$1,902	9.5%	\$2,081	11.6%	\$1,727	8.6%	\$3,791*	7.2%	\$2,070*	8.4%	\$3,316*	15.8%
West - All households	\$1,575	2.5%	\$1,612	2.3%	\$1,471	2.8%	\$3,233	5.6%	\$1,758*	2.3%	\$2,726	6.5%
West - Non-low income households	\$1,713	1.9%	\$1,711	1.9%	\$1,654	1.9%	\$3,208	4.2%	\$1,986*	2.3%	\$2,910	4.1%
West - Low income households	\$1,298	5.4%	\$1,319	5.4%	\$1,226	5.5%	\$3,305*	62.2%	\$1,516*	10.0%	\$2,367	9.7%
West - LIHEAP recipient households	\$1,231	6.1%	\$1,335	5.8%	\$1,120	5.5%	\$2,686*	10.9%	NC	NC	\$1,521*	9.8%

^{1/}Estimates are derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2009 RECS data have been adjusted for heating degree days, cooling degree days, and fuel price estimates for FY 2013. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered and billed costs for natural gas and electricity. RECS expenditure data are not collected for other fuels.

^{2/}Represents the percent of household income used for residential energy expenditures. For individual households, FY 2013 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (CPI) and FY 2013 energy expenditures are estimated by adjusting energy expenditures reported in the 2009 RECS for changes in weather and energy prices. FY 2013 residential energy burden for each household is computed as estimated FY 2013 residential energy expenditures divided by estimated FY 2013 annual income. Median individual residential burden is computed by computing the median of the individual values.

^{3/}Households with annual incomes at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{4/}Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in the 2009 RECS household sample.

Table A-4. Home heating: Percent of households using major types of heating fuels, by all, non-low income, low income, and LIHEAP recipient households, by Census region and main heating fuel type, 2009^{1/}

Census Region	Natural Gas ^{2/}	Electricity	Fuel Oil	Kerosene	LPG	Other ^{3/}
US - All households	49.0%	33.6%	6.1%	0.4%	4.9%	2.9%
US - Non-low income households	51.4%	31.9%	6.1%	0.2%	5.1%	2.9%
US - Low income households ^{4/}	44.4%	36.7%	6.1%	0.9%	4.6%	3.0%
US - LIHEAP recipient households ^{5/}	49.2%	29.3%	11.3%	1.1%	5.0%	2.7%
Northeast - All households	51.9%	11.5%	27.5%	1.5%	3.6%	3.9%
Northeast - Non-low income households	51.1%	11.2%	28.4%	0.7%	4.1%	4.5%
Northeast - Low income households	53.4%	12.2%	26.0%	2.9%	2.7%	2.7%
Northeast - LIHEAP recipient households	53.0%	10.3%	28.4%	2.9%	4.1%	1.3%
Midwest - All households	69.0%	17.6%	1.8%	NC	8.2%	3.2%
Midwest - Non-low income households	70.4%	16.1%	1.3%	NC	8.8%	3.2%
Midwest - Low income households	66.4%	20.3%	2.9%	NC	7.0%	3.0%
Midwest - LIHEAP recipient households	66.4%	17.0%	3.2%	NC	9.8%	3.6%
South - All households	31.7%	57.4%	1.4%	0.4%	4.5%	2.1%
South - Non-low income households	33.8%	56.4%	1.5%	0.1%	4.4%	1.8%
South - Low income households	27.9%	59.3%	1.3%	0.8%	4.7%	2.7%
South - LIHEAP recipient households	28.0%	62.0%	2.9%	0.6%	2.2%	3.1%
West - All households	54.8%	28.3%	0.5%	0.1%	3.3%	3.2%
West - Non-low income households	61.5%	24.2%	0.6%	0.1%	3.3%	3.0%
West - Low income households	41.2%	36.4%	0.4%	0.2%	3.4%	3.8%
West - LIHEAP recipient households	45.9%	37.7%	0.8%	NC	2.8%	3.8%

^{1/}Data derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. Represents main heating fuel used in 2009.

^{2/}The sum of percentages across fuel types may not equal 100%, due to rounding.

^{3/}This category includes households using wood, coal, and other minor fuels as a main heating source and households reporting no main fuel.

^{4/}Households with income at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{5/} Includes verified LIHEAP recipient households from the 2009 RECS.

NC = No cases in the 2009 RECS household sample.

Table A-5. Home heating: Average consumption per household, by all fuels and specified fuels, by all, non-low income, low income and LIHEAP recipient households, by Census region, FY 2013^{1/}

Census Region	All Fuels ^{2/} (MMBtus) ^{3/}	Natural Gas (MMBtus)	Electricity (MMBtus)	Fuel Oil (MMBtus)	Kerosene (MMBtus)	LPG (MMBtus)
US - All households	36.4	51.9	10.9	70.6	34.0	52.7
US - Non-low income households	38.5	52.6	11.5	74.7	34.3	55.3
US - Low income households ^{4/}	32.5	50.3	10.0	62.9	33.9	47.3
US - LIHEAP recipient households ^{5/}	42.6	57.9	11.4	66.8	41.9*	49.3
Northeast - All households	56.9	61.9	13.9	72.3	39.7	55.7
Northeast - Non-low income households	59.3	63.2	15.1	76.8	41.3	57.6
Northeast - Low income households	52.7	59.6	12.0	63.7	39.0	50.6
Northeast - LIHEAP recipient households	55.1	58.1	10.8	69.0	47.1*	51.3*
Midwest - All households	56.1	66.9	16.3	64.4	NC	66.9
Midwest - Non-low income households	58.5	68.5	18.2	64.4	NC	67.7
Midwest - Low income households	51.9	63.8	13.6	64.3	NC	65.2
Midwest - LIHEAP recipient households	54.8	67.9	14.7	51.7*	NC	52.1
South - All households	20.6	38.4	9.9	61.6	24.3	36.8
South - Non-low income households	22.3	40.2	10.3	65.1	22.4*	41.1
South - Low income households	17.5	34.5	9.2	54.4	24.7*	29.4
South - LIHEAP recipient households	22.0	43.8	11.3	57.4*	10.7*	42.4*
West - All households	25.6	37.4	10.1	56.3	24.3*	50.4
West - Non-low income households	28.5	38.5	10.3	57.7	15.5*	51.2
West - Low income households	19.8	34.1	9.7	52.4*	33.6*	48.6
West - LIHEAP recipient households	24.4	42.3	9.0	64.5*	NC	28.9*

^{1/}Developed from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2013 for heating degree days.

^{2/}Weighted average of natural gas, electricity, fuel oil, kerosene, and liquefied petroleum gas space heating consumption. Consumption data are not collected for other fuels.

^{3/}A British Thermal Unit (Btu) is the amount of energy necessary to raise the temperature of one pound of water one degree Fahrenheit. MMBtus refer to values in millions of Btus.

^{4/}Households with income at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{5/} Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in the 2009 RECS household sample.

Table A-6a. Home heating: Average annual expenditures by amount and mean group burden, by all, non-low income, low income, and LIHEAP recipient households, by Census region and main heating fuel type, FY 2013

Census Region	All Fuels ^{1/}	All Fuels ^{2/}	Natural Gas Heat	Natural Gas Heat	Electric Heat	Electric Heat	Fuel Oil Heat	Fuel Oil Heat	Kerosene Heat	Kerosene Heat	LPG Heat	LPG Heat
US - All households	\$561	0.8%	\$539	0.8%	\$334	0.5%	\$1,881	2.6%	\$999	1.4%	\$1,204	1.7%
US - Non-low income households	\$584	0.6%	\$542	0.6%	\$346	0.4%	\$1,992	2.1%	\$962	1.0%	\$1,264	1.3%
US - Low income households ^{3/}	\$518	2.7%	\$532	2.8%	\$314	1.7%	\$1,678	8.8%	\$1,014	5.3%	\$1,080	5.7%
US - LIHEAP recipient households ^{4/}	\$688	4.2%	\$617	3.7%	\$354	2.1%	\$1,801	10.9%	\$1,240*	7.5%	\$1,146	6.9%
Northeast - All households	\$1,090	1.4%	\$784	1.0%	\$547	0.7%	\$1,934	2.5%	\$1,145	1.5%	\$1,534	2.0%
Northeast - Non-low income households	\$1,148	1.1%	\$803	0.7%	\$572	0.5%	\$2,048	1.9%	\$1,185	1.1%	\$1,563	1.4%
Northeast - Low income households	\$988	4.7%	\$751	3.6%	\$506	2.4%	\$1,713	8.1%	\$1,127	5.4%	\$1,457	6.9%
Northeast - LIHEAP recipient households	\$1,055	6.1%	\$718	4.1%	\$426	2.5%	\$1,858	10.7%	\$1,388*	8.0%	\$1,425*	8.2%
Midwest - All households	\$648	0.9%	\$612	0.9%	\$434	0.6%	\$1,578	2.3%	NC	NC	\$1,377	2.0%
Midwest - Non-low income households	\$664	0.7%	\$620	0.7%	\$461	0.5%	\$1,593	1.7%	NC	NC	\$1,399	1.5%
Midwest - Low income households	\$621	3.3%	\$597	3.1%	\$395	2.1%	\$1,566	8.2%	NC	NC	\$1,327	7.0%
Midwest - LIHEAP recipient households	\$652	4.1%	\$642	4.0%	\$423	2.6%	\$1,246*	7.8%	NC	NC	\$1,087	6.8%
South - All households	\$388	0.6%	\$441	0.7%	\$308	0.5%	\$1,706	2.6%	\$756	1.1%	\$927	1.4%
South - Non-low income households	\$408	0.5%	\$458	0.5%	\$317	0.4%	\$1,793	2.0%	\$538*	0.6%	\$1,019	1.2%
South - Low income households	\$352	2.0%	\$404	2.3%	\$292	1.7%	\$1,523	8.8%	\$811*	4.7%	\$769	4.4%
South - LIHEAP recipient households	\$428	3.1%	\$493	3.6%	\$343	2.5%	\$1,772*	13.0%	\$346*	2.5%	\$1,053*	7.7%
West - All households	\$321	0.4%	\$343	0.4%	\$285	0.4%	\$1,491	1.9%	\$710*	0.9%	\$1,099	1.4%
West - Non-low income households	\$343	0.3%	\$354	0.3%	\$295	0.3%	\$1,523	1.5%	\$443*	0.4%	\$1,141	1.1%
West - Low income households	\$275	1.4%	\$311	1.6%	\$273	1.4%	\$1,399*	7.1%	\$996*	5.0%	\$1,016	5.1%
West - LIHEAP recipient households	\$303	1.6%	\$363	1.9%	\$265	1.4%	\$1,589*	8.3%	NC	NC	\$622*	3.2%

^{1/}Expenditures shown in this table are derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2009 RECS data have been adjusted for heating degree days and fuel price estimates for FY 2013. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered, and billed costs for natural gas and electricity used. RECS expenditure data are not collected for other fuels.

^{2/}Represents the percent of household income used for home heating energy expenditures. National and regional mean incomes are calculated from the 2013 CPS ASEC, which reports income for calendar year 2012. Mean group home heating burden is computed as mean group energy expenditures (from RECS) divided by mean group income (from CPS ASEC). See Appendix A for a discussion of energy burden.

^{3/}Households with annual incomes at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{4/}Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in the 2009 RECS household sample.

Table A-6b. Home heating: Average annual expenditures by amount and mean individual burden, by all, non-low income, low income, and LIHEAP recipient households, by Census region and main heating fuel type, FY 2013

Census Region	All Fuels ^{1/}	All Fuels ^{2/}	Natural Gas Heat	Natural Gas Heat	Electric Heat	Electric Heat	Fuel Oil Heat	Fuel Oil Heat	Kerosene Heat	Kerosene Heat	LPG Heat	LPG Heat
US - All households	\$561	2.8%	\$539	2.6%	\$334	2.3%	\$1,881	7.4%	\$999	8.3%	\$1,204	5.1%
US - Non-low income households	\$584	0.9%	\$542	0.8%	\$346	0.6%	\$1,992	2.5%	\$962	1.8%	\$1,264	2.0%
US - Low income households ^{3/}	\$518	6.5%	\$532	6.6%	\$314	5.0%	\$1,678	16.4%	\$1,014	10.9%	\$1,080	11.3%
US - LIHEAP recipient households ^{4/}	\$688	7.6%	\$617	7.8%	\$354	5.2%	\$1,801	13.7%	\$1,240*	8.4%	\$1,146	11.2%
Northeast - All households	\$1,090	4.7%	\$784	3.5%	\$547	3.9%	\$1,934	7.5%	\$1,145	10.6%	\$1,534	5.0%
Northeast - Non-low income households	\$1,148	1.5%	\$803	1.0%	\$572	0.8%	\$2,048	2.5%	\$1,185	2.1%	\$1,563	2.0%
Northeast - Low income households	\$988	10.6%	\$751	7.8%	\$506	9.0%	\$1,713	17.2%	\$1,127	14.3%	\$1,457	12.9%
Northeast - LIHEAP recipient households	\$1,055	9.4%	\$718	7.7%	\$426	5.0%	\$1,858	14.6%	\$1,388*	9.5%	\$1,425*	9.1%
Midwest - All households	\$648	3.6%	\$612	3.4%	\$434	3.8%	\$1,578	9.0%	NC	NC	\$1,377	5.0%
Midwest - Non-low income households	\$664	1.0%	\$620	1.0%	\$461	0.7%	\$1,593	2.8%	NC	NC	\$1,399	2.1%
Midwest - Low income households	\$621	8.2%	\$597	8.0%	\$395	8.2%	\$1,566	14.0%	NC	NC	\$1,327	11.6%
Midwest - LIHEAP recipient households	\$652	9.2%	\$642	9.5%	\$423	8.5%	\$1,246*	9.4%	NC	NC	\$1,087	11.6%
South - All households	\$388	2.2%	\$441	2.4%	\$308	2.0%	\$1,706	4.0%	\$756	4.8%	\$927	4.5%
South - Non-low income households	\$408	0.7%	\$458	0.7%	\$317	0.5%	\$1,793	2.1%	\$538*	1.5%	\$1,019	2.0%
South - Low income households	\$352	5.1%	\$404	6.2%	\$292	4.7%	\$1,523	8.0%	\$811*	5.6%	\$769	8.7%
South - LIHEAP recipient households	\$428	5.8%	\$493	7.3%	\$343	5.0%	\$1,772*	7.9%	\$346*	1.4%	\$1,053*	16.5%
West - All households	\$321	1.4%	\$343	1.2%	\$285	1.5%	\$1,491	11.1%	\$710*	3.0%	\$1,099	6.7%
West - Non-low income households	\$343	0.5%	\$354	0.5%	\$295	0.4%	\$1,523	2.3%	\$443*	0.5%	\$1,141	1.8%
West - Low income households	\$275	3.3%	\$311	3.3%	\$273	2.9%	\$1,399*	36.0%	\$996*	5.6%	\$1,016	16.2%
West - LIHEAP recipient households	\$303	2.4%	\$363	2.8%	\$265	2.3%	\$1,589*	6.4%	NC	NC	\$622*	7.4%

^{1/}Expenditures shown in this table are derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2009 RECS data have been adjusted for heating degree days and fuel price estimates for FY 2013. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered, and billed costs for natural gas and electricity used. RECS expenditure data are not collected for other fuels.

^{2/}Represents the percent of household income used for home heating energy expenditures. For individual households, FY 2013 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (CPI) and FY 2013 energy expenditures are estimated by adjusting energy expenditures reported in the 2009 RECS for changes in weather and energy prices. FY 2013 home heating energy burden for each household is computed by computing the mean of the individual values. See text in Appendix A for a discussion of energy burden.

^{3/}Households with annual incomes at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{4/}Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in the 2009 RECS household sample.

Table A-6c. Home heating: Average annual expenditures by amount and median individual burden, by all, non-low income, low income, and LIHEAP recipient households, by Census region and main heating fuel type, FY 2013

Census Region	All Fuels ^{1/}	All Fuels ^{2/}	Natural Gas Heat	Natural Gas Heat	Electric Heat	Electric Heat	Fuel Oil Heat	Fuel Oil Heat	Kerosene Heat	Kerosene Heat	LPG Heat	LPG Heat
US - All households	\$561	0.9%	\$539	0.9%	\$334	0.7%	\$1,881	3.0%	\$999	3.9%	\$1,204	2.3%
US - Non-low income households	\$584	0.6%	\$542	0.6%	\$346	0.4%	\$1,992	2.0%	\$962	1.5%	\$1,264	1.7%
US - Low income households ^{3/}	\$518	2.1%	\$532	2.4%	\$314	1.7%	\$1,678	8.2%	\$1,014	6.8%	\$1,080	5.4%
US - LIHEAP recipient households ^{4/}	\$688	2.9%	\$617	2.6%	\$354	2.2%	\$1,801	7.9%	\$1,240*	5.5%	\$1,146	7.3%
Northeast - All households	\$1,090	1.6%	\$784	1.2%	\$547	1.2%	\$1,934	2.9%	\$1,145	4.9%	\$1,534	2.0%
Northeast - Non-low income households	\$1,148	1.1%	\$803	0.9%	\$572	0.6%	\$2,048	2.0%	\$1,185	2.0%	\$1,563	1.5%
Northeast - Low income households	\$988	4.1%	\$751	3.2%	\$506	2.7%	\$1,713	8.9%	\$1,127	6.8%	\$1,457	5.0%
Northeast - LIHEAP recipient households	\$1,055	4.3%	\$718	2.5%	\$426	2.0%	\$1,858	9.5%	\$1,388*	5.5%	\$1,425	6.7%
Midwest - All households	\$648	1.1%	\$612	1.1%	\$434	1.0%	\$1,578	4.9%	NC	NC	\$1,377	2.6%
Midwest - Non-low income households	\$664	0.8%	\$620	0.8%	\$461	0.6%	\$1,593	3.0%	NC	NC	\$1,399	1.8%
Midwest - Low income households	\$621	2.8%	\$597	2.8%	\$395	2.2%	\$1,566	7.7%	NC	NC	\$1,327	7.3%
Midwest - LIHEAP recipient households	\$652	3.2%	\$642	3.2%	\$423	2.6%	\$1,246*	4.3%	NC	NC	\$1,087	7.3%
South - All households	\$388	0.7%	\$441	0.7%	\$308	0.6%	\$1,706	2.4%	\$756	2.1%	\$927	2.2%
South - Non-low income households	\$408	0.5%	\$458	0.5%	\$317	0.4%	\$1,793	1.9%	\$538*	1.5%	\$1,019	1.7%
South - Low income households	\$352	1.8%	\$404	2.1%	\$292	1.6%	\$1,523	4.8%	\$811*	3.9%	\$769	4.3%
South - LIHEAP recipient households	\$428	2.4%	\$493	2.8%	\$343	2.2%	\$1,772*	3.4%	\$346*	1.4%	\$1,053	9.9%
West - All households	\$321	0.4%	\$343	0.5%	\$285	0.6%	\$1,491	2.4%	\$710*	0.7%	\$1,099	2.1%
West - Non-low income households	\$343	0.3%	\$354	0.4%	\$295	0.3%	\$1,523	2.2%	\$443*	0.7%	\$1,141	1.5%
West - Low income households	\$275	0.9%	\$311	1.2%	\$273	1.2%	\$1,399*	30.3%	\$996*	8.1%	\$1,016	4.4%
West - LIHEAP recipient households	\$303	1.6%	\$363	1.9%	\$265	1.6%	\$1,589*	6.4%	NC	NC	\$622*	4.0%

^{1/} Expenditures shown in this table are derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2009 RECS data have been adjusted for heating degree days and fuel price estimates for FY 2013. Expenditures represent the costs for fuel oil, kerosene, and LPG delivered, and billed costs for natural gas and electricity used. RECS expenditure data are not collected for other fuels.

^{2/} Represents the percent of household income used for home heating energy expenditures. For individual households, FY 2013 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (CPI) and FY 2013 energy expenditures are estimated by adjusting energy expenditures reported in the 2009 RECS for changes in weather and energy prices. FY 2013 home heating energy burden for each household is computed by computing the median of the individual values. See text in Appendix A for a discussion of energy burden.

^{3/} Households with annual incomes at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{4/} Includes verified LIHEAP recipient households from the 2009 RECS.

* = This figure should be viewed with caution because of the small number of sample cases.

NC = No cases in the 2009 RECS household sample.

Table A-7. Home cooling: Percent of households that cool, average annual consumption per household, average annual expenditures per household, mean group burden, mean individual burden, and median individual burden for households that cooled, by all, non-low income, low income, and LIHEAP recipient households, by Census region, FY 2013

Census Region	Percent that cool ^{1/}	Consumption ^{2/} (in MMBtus)	Expenditures ^{2/}	Mean group burden ^{3/}	Mean individual burden ^{3/}	Median individual burden ^{3/}
US - All households	92.5%	6.1	\$227	0.3%	0.9%	0.3%
US - Non-low income households	94.3%	7.0	\$260	0.3%	0.4%	0.2%
US - Low income households ^{4/}	89.1%	4.4	\$161	0.8%	2.1%	0.5%
US - LIHEAP recipient households ^{5/}	88.6%	3.4	\$125	0.8%	1.3%	0.4%
Northeast - All households	89.0%	2.6	\$130	0.2%	0.5%	0.2%
Northeast - Non-low income households	93.4%	2.9	\$146	0.1%	0.2%	0.1%
Northeast - Low income households	81.1%	1.9	\$98	0.5%	1.1%	0.3%
Northeast - LIHEAP recipient households	79.9%	2.2	\$108	0.6%	0.9%	0.3%
Midwest - All households	95.0%	3.4	\$108	0.2%	0.4%	0.2%
Midwest - Non-low income households	97.1%	3.9	\$123	0.1%	0.2%	0.1%
Midwest - Low income households	91.3%	2.5	\$80	0.4%	1.0%	0.3%
Midwest - LIHEAP recipient households	91.2%	2.2	\$70	0.4%	0.9%	0.2%
South - All households	98.7%	10.2	\$365	0.6%	1.6%	0.6%
South - Non-low income households	99.4%	11.8	\$425	0.5%	0.6%	0.5%
South - Low income households	97.3%	7.1	\$251	1.4%	3.5%	1.1%
South - LIHEAP recipient households	99.5%	6.0	\$201	1.5%	2.3%	0.8%
West - All households	82.2%	4.5	\$176	0.2%	0.6%	0.1%
West - Non-low income households	83.7%	5.1	\$201	0.2%	0.3%	0.1%
West - Low income households	79.3%	3.3	\$124	0.6%	1.2%	0.3%
West - LIHEAP recipient households	81.8%	3.0	\$103	0.5%	0.8%	0.3%

^{1/}Cooling includes central and room air-conditioning, as well as non-air-conditioning cooling devices (e.g., ceiling fans, evaporative coolers). Excludes households that do not cool or cool in ways other than those recorded by the 2009 RECS (e.g., table and window fans.)

^{2/}Consumption and expenditures are derived from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy. The 2009 RECS data have been adjusted for cooling degree days and electricity price estimates for FY 2013. Expenditures represent billed costs for electricity used.

^{3/}Represents the percent of household income used for home cooling energy expenditures. See text in Appendix A for definitions of different energy burden statistics.

^{4/}Households with annual incomes at or below the maximum in section 2605(b)(2)(B) of Public Law 97-35.

^{5/}Includes verified LIHEAP recipient households from the 2009 RECS.

Appendix B: Income Eligible Household Estimates

ACF encourages LIHEAP grantees to use performance measurement systems to manage LIHEAP programs. ACF has developed targeting performance indicators to support measurement of LIHEAP targeting at the grantee level. For a number of years, ACF has furnished State grantees with State level estimates of the number of LIHEAP income eligible households, including the number of vulnerable households and the number of households by poverty level. State grantees can use these estimates with their own data on LIHEAP recipient characteristics to compute reciprocity targeting performance statistics.

State-level estimates of the number of income eligible households for FY 2013 were developed using the American Community Survey (ACS). The Census Bureau recommends the use of the ACS for the State-level income and poverty analysis.¹⁰⁵ ACF also uses the estimates from the ACS and household recipient data from the States' *LIHEAP Household Report* to develop State-level targeting indexes.

The 2010-2012 ACS three-year Public Use Microdata Sample (PUMS) data are used to develop more precise estimates of the number of income eligible households than those that would have been obtained using the 2012 single-year ACS PUMS data.¹⁰⁶

The Federal maximum LIHEAP income standard is the greater of 60 percent of State median income or 150 percent of HHS Poverty Guidelines.

Tables B-1 and B-2 show estimates of the number of LIHEAP income eligible households by vulnerability group,¹⁰⁷ derived from the 2010-2012 ACS, using the using the Federal Maximum Income Standard and the State Income Standards, respectively. The State Income Standards are the income levels that the States set to define LIHEAP income eligibility. These Standards may vary by LIHEAP component; however, they must fall between 110 percent of HHS Poverty Guidelines and the Federal Maximum Income Standard.

Similarly, Tables B-3 through B-4 show estimates of the number of LIHEAP income eligible households by poverty group, derived from the 2010-2012 ACS, using the using the Federal Maximum Income Standard and the FY 2013 State Income Standards, respectively.

¹⁰⁵ For an explanation, and to better understand the differences between the ACS and CPS ASEC, please visit "Guidance about Income Sources" at www.census.gov/hhes/www/income/method/guidance/index.html.

¹⁰⁶ The Census Bureau recommends data estimates from the three-year ACS instead of the one-year ACS when precision of the estimates are of primary importance. See http://www.census.gov/acs/www/guidance_for_data_users/estimates/.

¹⁰⁷ The Census Bureau changed the questions on disability in ACS in 2008. Since the new questions were not comparable to those in previous years, the reader should exercise caution in comparing the estimates of households with disabled individuals with those in previous *Notebooks*.

LIHEAP Home Energy Notebook for FY 2013: Appendix B: Income Eligible Household Estimates

Table B-1. State-level estimates of the number of LIHEAP income eligible households using the Federal maximum LIHEAP income standard by vulnerability category^{1/2/4/}

(Three-Year ACS 2010-2012)

State	Total number of LIHEAP eligible households ^{3/}	LIHEAP eligible households with at least one person 60+ years	LIHEAP eligible households with at least one child less than 6 yrs. old	LIHEAP eligible households with at least one person with a disability ^{5/}	LIHEAP eligible households with no vulnerable members
Alabama	606,739	221,989	111,079	282,488	159,065
Alaska	65,436	19,197	16,770	24,463	20,062
Arizona	724,592	249,805	157,146	236,815	238,389
Arkansas	339,850	118,934	67,653	154,967	89,216
California	3,980,034	1,379,961	900,629	1,292,054	1,327,129
Colorado	583,552	184,662	115,822	183,238	210,348
Connecticut	447,461	186,006	72,693	158,709	134,953
Delaware	99,462	39,795	17,651	35,749	29,445
District of Columbia	63,967	22,385	9,712	24,587	21,218
Florida	2,208,205	921,016	357,522	770,276	689,353
Georgia	1,150,442	371,149	249,024	414,922	379,664
Hawaii	128,521	54,092	24,800	41,866	39,166
Idaho	162,831	52,585	37,762	58,580	49,335
Illinois	1,516,472	556,362	288,915	507,773	503,625
Indiana	752,121	252,067	150,713	285,556	234,476
Iowa	350,942	136,105	62,243	126,694	107,353
Kansas	320,744	109,776	66,470	119,060	100,174
Kentucky	556,865	203,099	100,477	277,148	133,869
Louisiana	583,017	209,736	110,907	254,135	167,368
Maine	165,044	67,299	22,470	78,348	40,835
Maryland	651,176	255,491	119,308	222,776	205,956
Massachusetts	866,450	374,152	123,573	345,907	244,706
Michigan	1,245,264	440,763	217,544	502,422	379,499
Minnesota	629,724	238,303	112,071	218,755	200,014
Mississippi	365,469	127,853	76,417	172,986	95,494
Missouri	744,678	269,374	135,150	307,353	216,085
Montana	117,179	42,558	20,322	44,193	37,822
Nebraska	199,086	70,126	38,207	68,317	66,266
Nevada	289,056	95,449	66,521	89,001	97,264
New Hampshire	149,810	64,094	20,094	59,862	42,148
New Jersey	1,039,928	436,806	180,386	347,115	322,094
New Mexico	217,112	74,621	48,336	83,020	65,178
New York	2,388,600	951,854	418,641	859,739	729,199
North Carolina	1,194,554	418,911	239,654	469,760	362,177
North Dakota	78,236	30,014	11,233	25,698	28,708
Ohio	1,465,375	539,286	264,048	592,793	422,093
Oklahoma	424,035	146,890	91,712	181,464	115,403
Oregon	476,570	169,985	87,689	181,620	147,526
Pennsylvania	1,583,906	678,581	236,282	658,414	428,754
Rhode Island	145,574	60,918	21,404	62,290	39,589
South Carolina	565,644	206,903	111,758	230,278	162,867
South Dakota	87,778	34,294	15,724	32,305	26,799
Tennessee	769,260	279,941	142,369	336,888	213,509
Texas	2,613,751	810,430	669,930	917,602	835,730
Utah	234,542	63,059	68,365	66,121	78,455
Vermont	70,284	29,154	10,469	30,091	18,580
Virginia	873,869	334,990	159,185	321,260	273,504
Washington	774,679	267,887	153,309	277,321	247,678
West Virginia	230,662	95,171	32,750	119,651	53,004
Wisconsin	697,396	264,632	119,111	248,813	218,498
Wyoming	60,509	22,695	11,328	20,635	18,711
All States	36,056,453	13,251,205	6,963,348	13,421,878	11,068,353

^{1/}State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

^{2/}The greater of 60 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines.

^{3/}The three-year ACS estimate of the total number of all U.S. households is 115,241,629.

^{4/}A household can be counted under more than one vulnerability category.

^{5/}The Census Bureau changed the questions on disability in ACS in 2008. The definition above includes individuals aged 15 years and older with any of the six difficulty types (hearing, vision, cognitive, ambulatory, self-care, and independent living) reported in ACS and individuals ages 15 through 64 who received Supplemental Security Income in the past year, and non-widowed individuals ages 19 through 61 who received Social Security income in the past year. The reader should exercise caution in comparing these estimates with those in previous Notebooks.

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Table B-2. State-level estimates of the number of LIHEAP income eligible households using State LIHEAP income standards by vulnerability category^{1/ 2/ 4/}

(Three-Year ACS 2010-2012)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	Total number of LIHEAP eligible households ^{2/}	LIHEAP eligible households with at least one person 60+ years	LIHEAP eligible households with at least one child less than 6 yrs. old	LIHEAP eligible households with at least one person with a disability ^{3/}	LIHEAP eligible households with no vulnerable members
Alabama	150%	523,087	181,884	100,632	246,660	136,084
Alaska	150%	50,994	13,934	13,951	19,580	15,105
Arizona	173% ^{6/7/}	724,550	249,805	157,112	236,815	238,381
Arkansas	148% ^{7/}	335,321	118,400	64,898	153,118	88,506
California	203% ^{7/}	3,977,333	1,378,987	898,369	1,291,041	1,326,992
Colorado	150%	373,797	108,011	81,920	124,981	129,973
Connecticut	150% ^{8/}	285,690	124,700	56,597	118,807	61,014
Delaware	200%	87,083	33,410	16,816	31,261	25,549
District of Columbia	200% ^{7/}	63,967	22,385	9,712	24,587	21,218
Florida	150%	1,729,176	687,686	304,106	615,009	534,953
Georgia	175% ^{7/}	1,149,752	371,039	248,411	414,571	379,638
Hawaii	150%	88,012	36,364	18,860	30,915	24,239
Idaho	150%	142,338	43,953	34,664	51,818	42,895
Illinois	150%	983,628	320,583	208,771	341,635	325,515
Indiana	150%	562,530	168,738	125,682	219,867	172,431
Iowa	150%	241,290	86,685	47,512	90,914	72,147
Kansas	130%	185,646	53,278	43,593	72,454	57,327
Kentucky	130%	407,123	132,552	81,992	207,333	96,837
Louisiana	174% ^{7/}	582,270	209,592	110,250	253,721	167,323
Maine	150% ^{9/}	137,669	59,585	19,480	68,590	29,486
Maryland	175%	375,318	145,118	73,393	144,841	106,207
Massachusetts	261% ^{7/}	866,450	374,152	123,573	345,907	244,706
Michigan	110%	607,768	156,223	132,226	255,201	189,759
Minnesota	186% ^{7/}	507,997	192,269	91,009	186,950	153,573
Mississippi	223% ^{7/}	359,204	126,864	73,257	170,571	94,084
Missouri	135%	491,991	159,294	98,481	212,195	138,598
Montana	175% ^{10/}	117,179	42,558	20,322	44,193	37,822
Nebraska	116%	99,496	29,948	21,305	36,242	33,331
Nevada	150%	211,041	64,977	52,859	68,514	68,705
New Hampshire	200%	120,382	51,308	15,527	50,549	32,957
New Jersey	200%	733,465	298,320	139,502	261,124	212,718
New Mexico	150%	215,903	73,973	48,336	82,599	64,802
New York	214% ^{11/}	2,388,600	951,854	418,641	859,739	729,199
North Carolina	130%	783,576	247,272	176,135	318,021	230,312
North Dakota	204% ^{7/}	78,194	30,014	11,191	25,698	28,708
Ohio	189% ^{7/}	1,465,125	539,286	263,807	592,793	422,084
Oklahoma	110%	241,290	70,006	59,419	105,031	65,019
Oregon	185% ^{7/}	476,252	169,935	87,379	181,455	147,526
Pennsylvania	150%	1,029,796	397,643	172,510	451,032	272,452
Rhode Island	229% ^{7/}	145,574	60,918	21,404	62,290	39,589
South Carolina	150%	480,004	168,950	100,144	198,366	136,282
South Dakota	175% ^{12/}	81,446	31,537	15,569	30,509	24,020
Tennessee	150%	659,205	227,629	129,455	293,690	181,183
Texas	125%	1,738,702	491,909	489,324	620,223	541,167
Utah	150%	173,734	41,263	53,217	49,792	59,143
Vermont	185%	61,661	24,914	9,746	27,489	15,747
Virginia	130%	424,991	146,469	85,439	170,590	126,185
Washington	125%	380,040	112,003	84,336	146,658	116,719
West Virginia	130%	178,160	66,554	27,979	93,879	41,527
Wisconsin	203% ^{7/}	697,196	264,578	118,947	248,688	218,498
Wyoming	193% ^{7/}	60,498	22,695	11,328	20,635	18,700
All States	Not applicable	28,881,494	10,182,004	5,869,088	10,969,141	8,736,935

^{1/} State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

^{2/} State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard and can be different for different components of LIHEAP assistance. The table shows the estimates of LIHEAP income eligible households for heating assistance. The State maximum LIHEAP income standards for a family of four were obtained from ACF's LIHEAP grantee survey.

^{3/} The three-year ACS average estimate of the total number of all U.S. households is 115,241,629.

^{4/} A household can be counted under more than one vulnerability category.

^{5/} The Census Bureau changed the questions on disability in ACS in 2008. The definition above includes individuals aged 15 years and older with any of the six difficulty types (hearing, vision, cognitive, ambulatory, self-care, and independent living) reported in ACS and individuals ages 15 through 64 who received Supplemental Security Income in the past year, and non-widowed individuals ages 19 through 61 who received Social Security income in the past year. The reader should exercise caution in comparing these estimates with those in previous Notebooks.

^{6/} The state guideline is 60% SMI for households with 1-8 members and 150% of HHS Poverty Guidelines for households with 9 or more members.

^{7/} These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.

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⁸⁷The State income guideline is 200% of HHS Poverty Guidelines for households with young children, elderly, disabled members.

⁸⁹The State income guideline is 150% of HHS Poverty Guidelines or 60% of the State median income, whichever is less. Eligibility for households with incomes between 150% and 170% FPG is limited to those households with a vulnerable member who is susceptible to hypothermia, such as elderly persons or persons under two years of age.

¹⁰The State income guideline is 150% of HHS Poverty Guidelines for households with 8 or more members and 60% of the State median income otherwise.

¹¹The State can use a State income guideline of 150% of HHS Poverty Guidelines if it is greater than 60% of the State median income.

¹²The State uses 175% of HHS Poverty Guidelines for households with 1-6 members, 60% of the State median income for households with 7 members, and 150% of HHS Poverty Guidelines with 8 members.

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Table B-3. State-level estimates of the number of LIHEAP income eligible households using the Federal maximum LIHEAP income standard categorized by income as a percentage of HHS poverty guidelines^{1/2/}

(Three-Year ACS 2010-2012)

State	Total number of LIHEAP eligible households ^{3/}	Number of LIHEAP eligible households at or below poverty guidelines	Number of LIHEAP eligible households >100%-125% poverty guidelines	Number of LIHEAP eligible households >125%-150% poverty guidelines	Number of LIHEAP eligible households over 150% poverty guidelines
Alabama	606,739	312,506	106,388	104,193	83,652
Alaska	65,436	28,736	11,129	11,129	14,442
Arizona	724,592	329,327	116,961	122,461	155,843
Arkansas	339,850	187,435	74,046	71,347	7,022
California	3,980,034	1,578,894	581,479	575,263	1,244,398
Colorado	583,552	211,937	79,947	81,913	209,755
Connecticut	447,461	126,047	43,877	47,530	230,007
Delaware	99,462	32,650	11,821	13,946	41,045
District of Columbia	63,967	36,839	8,477	7,940	10,711
Florida	2,208,205	973,567	369,312	386,297	479,029
Georgia	1,150,442	552,161	181,422	179,131	237,728
Hawaii	128,521	53,803	17,402	16,807	40,509
Idaho	162,831	73,731	31,476	37,131	20,493
Illinois	1,516,472	573,383	196,505	213,740	532,844
Indiana	752,121	317,545	117,013	127,972	189,591
Iowa	350,942	129,474	52,278	59,538	109,652
Kansas	320,744	125,341	52,233	51,676	91,494
Kentucky	556,865	290,238	100,511	93,997	72,119
Louisiana	583,017	291,094	98,802	97,103	96,018
Maine	165,044	69,356	28,686	28,130	38,872
Maryland	651,176	180,568	60,678	67,050	342,880
Massachusetts	866,450	272,408	94,569	96,542	402,931
Michigan	1,245,264	534,928	179,379	182,913	348,044
Minnesota	629,724	204,180	77,831	82,970	264,743
Mississippi	365,469	216,043	75,028	69,317	5,081
Missouri	744,678	320,301	120,342	122,191	181,844
Montana	117,179	47,485	20,762	24,066	24,866
Nebraska	199,086	76,871	35,457	34,234	52,524
Nevada	289,056	119,467	45,056	46,518	78,015
New Hampshire	149,810	39,366	17,180	19,049	74,215
New Jersey	1,039,928	288,870	108,397	109,870	532,791
New Mexico	217,112	129,173	43,320	43,410	1,209
New York	2,388,600	962,189	303,321	308,235	814,855
North Carolina	1,194,554	543,703	204,790	202,384	243,677
North Dakota	78,236	30,661	10,878	12,083	24,614
Ohio	1,465,375	626,499	215,816	221,147	401,913
Oklahoma	424,035	209,137	81,224	84,758	48,916
Oregon	476,570	194,544	73,593	75,711	132,722
Pennsylvania	1,583,906	578,002	222,456	229,338	554,110
Rhode Island	145,574	51,237	18,568	18,575	57,194
South Carolina	565,644	279,177	101,218	99,609	85,640
South Dakota	87,778	36,632	15,402	16,026	19,718
Tennessee	769,260	380,659	137,341	141,205	110,055
Texas	2,613,751	1,285,458	453,244	453,632	421,417
Utah	234,542	94,799	37,376	41,559	60,808
Vermont	70,284	23,179	11,862	11,232	24,011
Virginia	873,869	298,159	106,150	116,201	353,359
Washington	774,679	280,506	99,534	103,680	290,959
West Virginia	230,662	123,182	46,446	46,456	14,578
Wisconsin	697,396	244,636	97,825	107,075	247,860
Wyoming	60,509	19,954	8,501	10,237	21,817
All States	36,056,453	14,986,037	5,403,309	5,524,517	10,142,590

^{1/}State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

^{2/}The greater of 60 percent of State median income estimates or 150 percent of the HHS Poverty Guidelines.

^{3/}The three-year ACS estimate of the total number of all U.S. households is 115,241,629.

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Table B-4. State-level estimates of the number of LIHEAP income eligible households using the State maximum LIHEAP income standards categorized by income as a percentage of HHS poverty guidelines^{1/ 2/}

(Three-Year ACS 2010-2012)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	Total number of LIHEAP eligible households ^{2/}	Number of LIHEAP eligible households at or below poverty guidelines	Number of LIHEAP eligible households >100%-125% poverty guidelines	Number of LIHEAP eligible households >125%-150% poverty guidelines	Number of LIHEAP eligible households over 150% poverty guidelines
Alabama	150%	523,087	312,506	106,388	104,193	0
Alaska	150%	50,994	28,736	11,129	11,129	0
Arizona	173% ^{4/5/}	724,550	329,327	116,961	122,419	155,843
Arkansas	148% ^{5/}	335,321	187,435	73,753	67,111	7,022
California	203% ^{5/}	3,977,333	1,578,894	581,175	572,866	1,244,398
Colorado	150%	373,797	211,937	79,947	81,913	0
Connecticut	150% ^{6/}	285,690	126,047	43,877	47,530	68,236
Delaware	200%	87,083	32,650	11,821	13,946	28,666
District of Columbia	200% ^{5/}	63,967	36,839	8,477	7,940	10,711
Florida	150%	1,729,176	973,567	369,312	386,297	0
Georgia	175% ^{5/}	1,149,752	552,161	181,398	178,465	237,728
Hawaii	150%	88,012	53,803	17,402	16,807	0
Idaho	150%	142,338	73,731	31,476	37,131	0
Illinois	150%	983,628	573,383	196,505	213,740	0
Indiana	150%	562,530	317,545	117,013	127,972	0
Iowa	150%	241,290	129,474	52,278	59,538	0
Kansas	130%	185,646	125,341	52,233	8,072	0
Kentucky	130%	407,123	290,238	100,511	16,374	0
Louisiana	174% ^{5/}	582,270	291,094	98,775	96,383	96,018
Maine	150% ^{7/}	137,669	69,356	28,686	28,130	11,497
Maryland	175%	375,318	180,568	60,678	67,050	67,022
Massachusetts	261% ^{5/}	866,450	272,408	94,569	96,542	402,931
Michigan	110%	607,768	534,928	72,840	0	0
Minnesota	186% ^{5/}	507,997	204,180	77,831	82,649	143,337
Mississippi	223% ^{5/}	359,204	216,043	74,565	63,515	5,081
Missouri	135%	491,991	320,301	120,342	51,348	0
Montana	175% ^{8/}	117,179	47,485	20,762	24,066	24,866
Nebraska	116%	99,496	76,871	22,625	0	0
Nevada	150%	211,041	119,467	45,056	46,518	0
New Hampshire	200%	120,382	39,366	17,180	19,049	44,787
New Jersey	200%	733,465	288,870	108,397	109,870	226,328
New Mexico	150%	215,903	129,173	43,320	43,410	0
New York	214% ^{9/}	2,388,600	962,189	303,321	308,235	814,855
North Carolina	130%	783,576	543,703	204,790	35,083	0
North Dakota	204% ^{5/}	78,194	30,661	10,878	12,041	24,614
Ohio	189% ^{5/}	1,465,125	626,499	215,776	220,937	401,913
Oklahoma	110%	241,290	209,137	32,153	0	0
Oregon	185% ^{5/}	476,252	194,544	73,593	75,393	132,722
Pennsylvania	150%	1,029,796	578,002	222,456	229,338	0
Rhode Island	229% ^{5/}	145,574	51,237	18,568	18,575	57,194
South Carolina	150%	480,004	279,177	101,218	99,609	0
South Dakota	175% ^{10/}	81,446	36,632	15,402	16,026	13,386
Tennessee	150%	659,205	380,659	137,341	141,205	0
Texas	125%	1,738,702	1,285,458	453,244	0	0
Utah	150%	173,734	94,799	37,376	41,559	0
Vermont	185%	61,661	23,179	11,862	11,232	15,388
Virginia	130%	424,991	298,159	106,150	20,682	0
Washington	125%	380,040	280,506	99,534	0	0
West Virginia	130%	178,160	123,182	46,446	8,532	0
Wisconsin	203% ^{5/}	697,196	244,636	97,825	106,875	247,860
Wyoming	193% ^{5/}	60,498	19,954	8,501	10,226	21,817
All States	Not applicable	28,881,494	14,986,037	5,233,716	4,157,521	4,504,220

^{1/} State estimates are subject to sampling error, and may not sum to U.S. total due to rounding.

^{2/} State income guidelines can vary from 110 percent of the HHS Poverty Guidelines up to the Federal maximum LIHEAP income standard and can be different for different components of LIHEAP assistance. The table shows the estimates of LIHEAP income eligible households for heating assistance. The State maximum LIHEAP income standards for a family of four were obtained from ACF's LIHEAP grantee survey.

^{3/} The three-year ACS estimate of the total number of all U.S. households is 115,241,629.

^{4/} The state guideline is 60% SMI for households with 1-8 members and 150% of HHS Poverty Guidelines for households with 9 or more members.

^{5/} These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.

^{6/} The State income guideline is 200% of HHS Poverty Guidelines for households with young children, elderly, disabled members.

^{7/} The State income guideline is 150% of HHS Poverty Guidelines or 60% of the State median income, whichever is less. Eligibility for households with incomes between 150% and 170% FPG is limited to those households with a vulnerable member who is susceptible to hypothermia, such as elderly persons or persons under two years of age.

^{8/} The State income guideline is 150% of HHS Poverty Guidelines for households with 8 or more members and 60% of the State median income otherwise.

^{9/} The State can use a State income guideline of 150% of HHS Poverty Guidelines if it is greater than 60% of the State median income.

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¹⁰The State uses 175% of HHS Poverty Guidelines for households with 1-6 members, 60% of the State median income for households with 7 members, and 150% of HHS Poverty Guidelines with 8 members.