LIHEAP Home Energy Notebook

For Fiscal Year 2012

U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
Administration for Children and Families
Office of Community Services
Division of Energy Assistance
March 2015

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March 2015

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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
EMEU	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).[1] 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 2012 residential energy consumption and expenditures figures for this report have been derived from the 2009 RECS data that were adjusted to reflect FY 2012 weather and fuel prices.

Residential energy data

In FY 2012, average residential energy expenditures for all households were $2,013, and the mean individual energy burden was 8.1 percent of income.[2] Low income households had average energy expenditures of $1,716, almost 15 percent lower than the average for all households.[3] The mean individual energy burden for low income households was 17.5 percent, over twice the mean individual energy burden of all households. LIHEAP recipient households had average residential energy expenditures of $1,906, about 11 percent higher than the average for all low income households. The mean individual energy burden for LIHEAP recipients was 17.8 percent, 9.7 percentage points higher than the mean individual energy burden for all households and 0.3 percentage points higher than the mean individual energy burden for low income households.

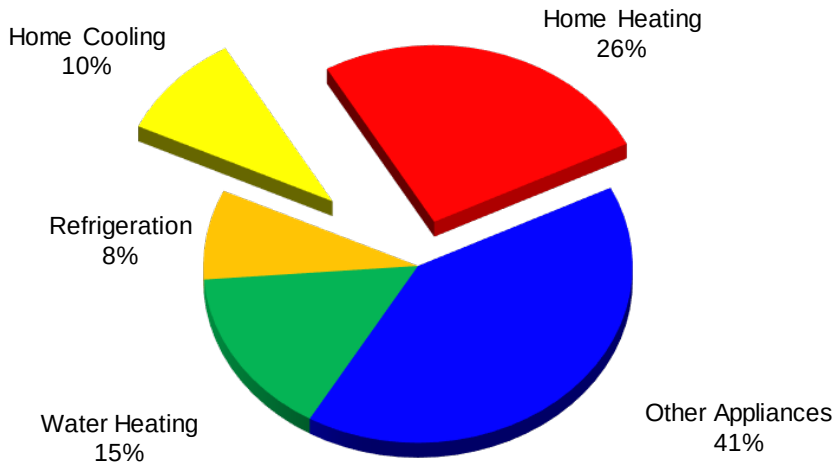
[1] The FY 2012 *Notebook* is the first to use the 2009 RECS data. The FY 2011 *Notebook* used projections from the 2005 RECS, which had a different sample frame and different procedure than the 2009 RECS. The reader should exercise caution in comparing the results for FY 2012 to those for FY 2011, as some of the observed changes may be due to the changes in the base survey used.

[2] 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.

[3] 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.

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 represented about 36 percent of residential energy expenditures for low income households in FY 2012. 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 41 percent of residential energy expenditures.

Figure 1. Percent of U.S. residential energy expenditures by low income households, by end use, FY 2012



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.

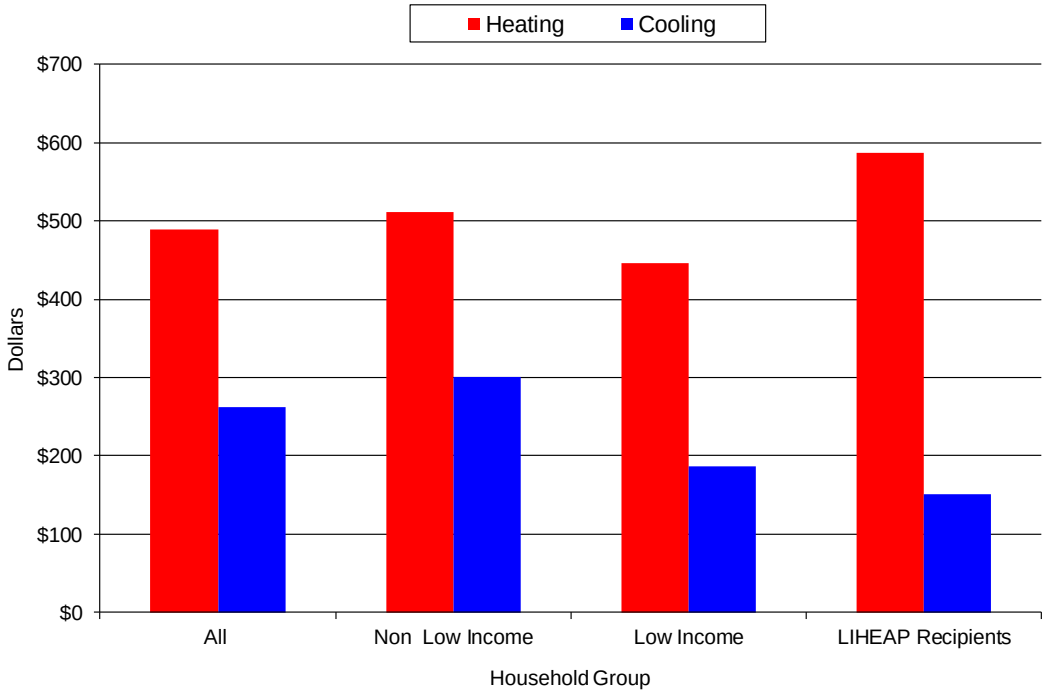
In FY 2012, as shown in Figures 2 and 3, average home heating expenditures for all households were $489, and the mean individual home heating burden was 2.5 percent. Low income households had average home heating expenditures of $447; this average was about 9 percent lower than that for all households. The mean individual home heating burden for low income households was 5.7 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 $587, about 31 percent higher than the average for low income households and about 20 percent higher than the average for all households. Mean individual home heating burden for LIHEAP recipient households was 6.7 percent, more than two and a half times the average for all households, and 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.[4] 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.

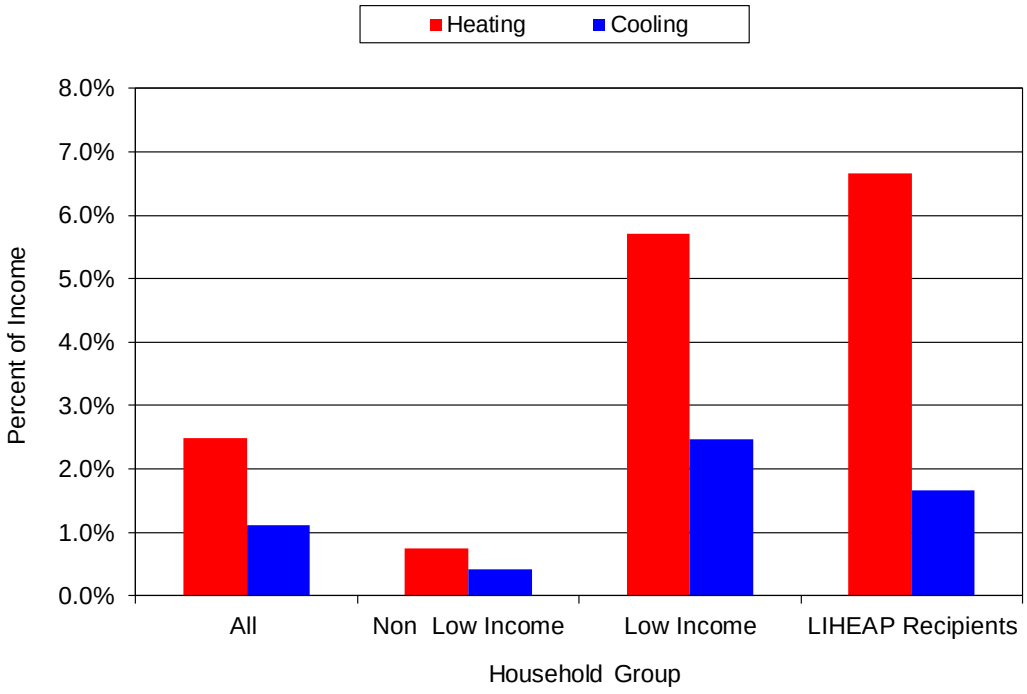
As Figures 2 and 3 show, in FY 2012, for households that cooled, average home cooling expenditures for all households were $262, and the mean individual home cooling burden was 1.1 percent. Low income households had average home cooling expenditures of $187; this average was about 29 percent lower than that for all households. The mean individual home cooling burden for low income households was 2.5 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 $151, about 19 percent lower than the average for low income households and almost 42 percent lower than the average for all households. The mean individual home cooling burden for LIHEAP recipient households was 1.7 percent, about 55 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 2012



[4] 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 2012



Low income home energy trends

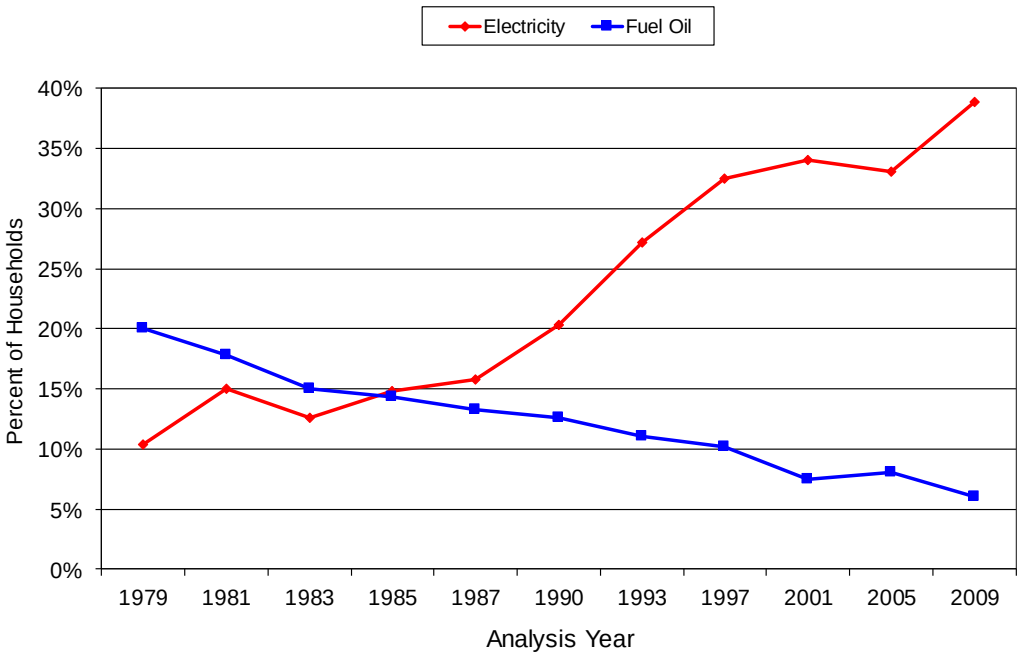
This section presents data on home energy trends for low income households from 1979 through 2009 or FY 2012, depending upon the latest year of availability.[5] Statistics are derived from a series of national residential energy consumption surveys (including the RECS) and from HHS' administrative statistics. 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 6.2 percent in 2009. Natural gas remained the dominant type of space heating fuel used over the 30-year period.

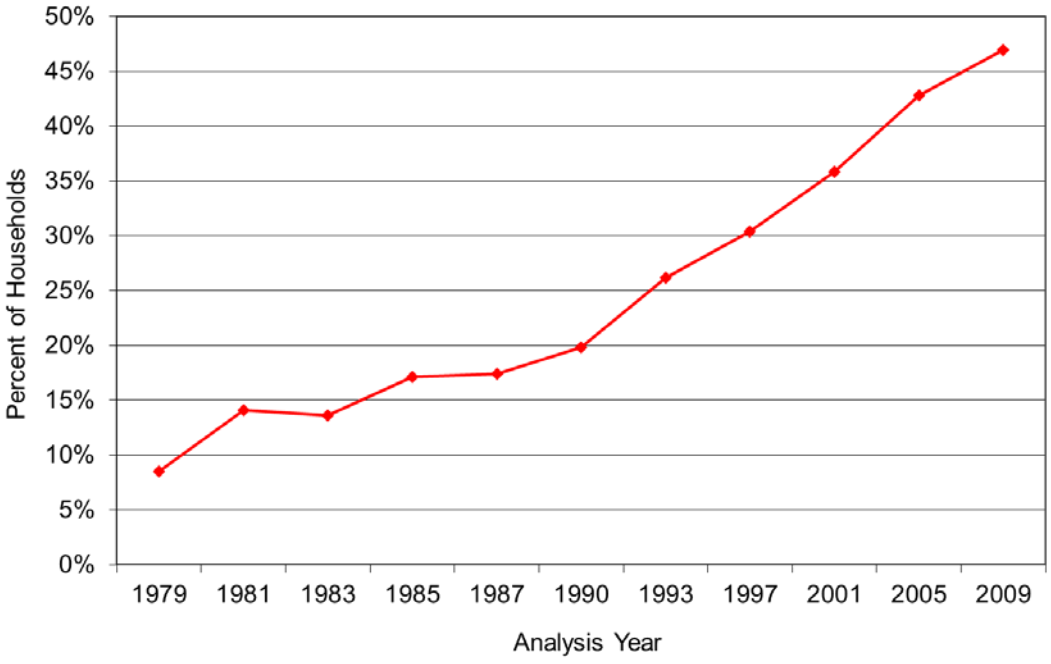
[5]In this section, low income households are defined as those households with incomes at or below 150 percent of HHS Poverty Guidelines.

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.

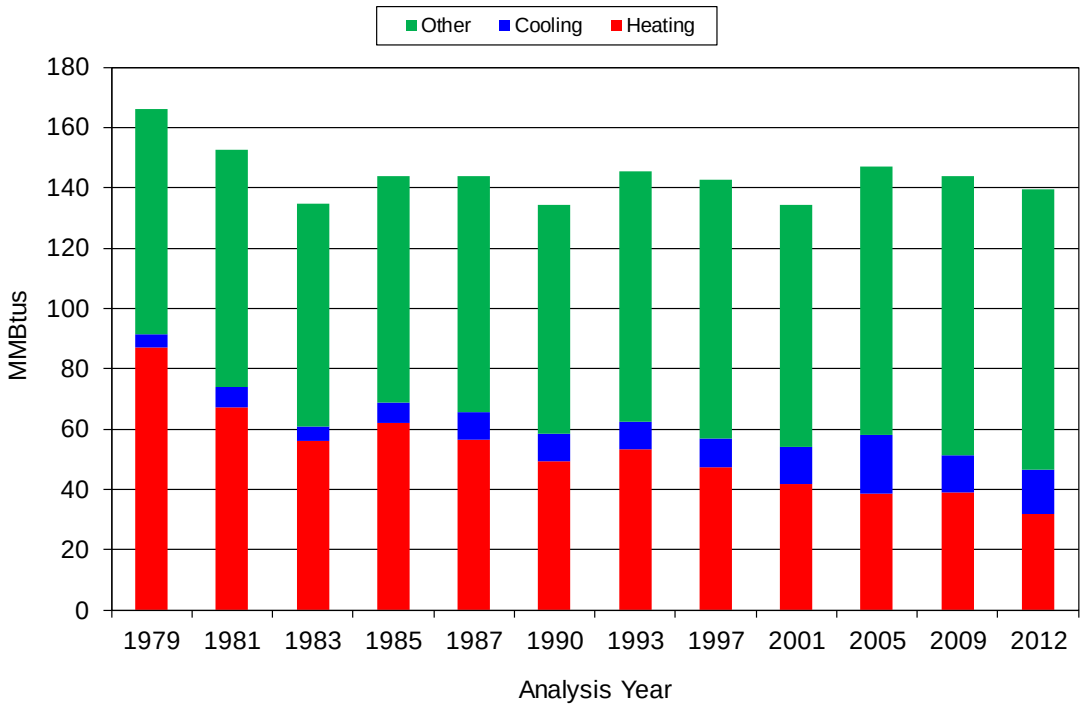
Figure 5. Percent of low income households using central air-conditioning, 1979 to 2009



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 in home cooling was slightly offset by higher consumption for purposes other than home cooling or heating. Between 2009 and FY 2012, the use of energy for home heating, home cooling, and for other purposes, appears to have remained fairly stable with home heating decreasing slightly and home cooling increase slightly in FY 2012.

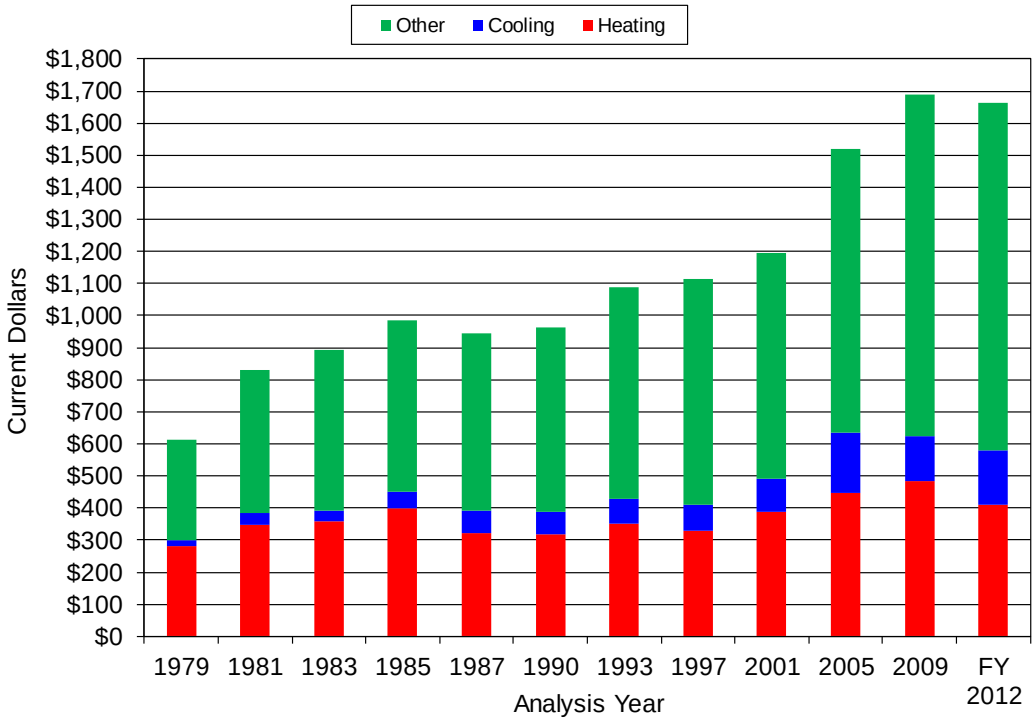
Figure 6. Mean residential energy consumption (in MMBtus) per low income household, 1979 to FY 2012[1/]



[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 2012, 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 2012. Mean expenditures on cooling rose from 1979 to 2005. In 2009, expenditures on home cooling decreased relative to 2005 but expenditures on home heating and for other purposes increased. Between 2009 and FY 2012, expenditures on home energy remained relatively stable but the expenditures on components shifted. In FY 2012, the decrease in home heating expenditures was partially offset by increases in home cooling expenditures and expenditures for other purposes.

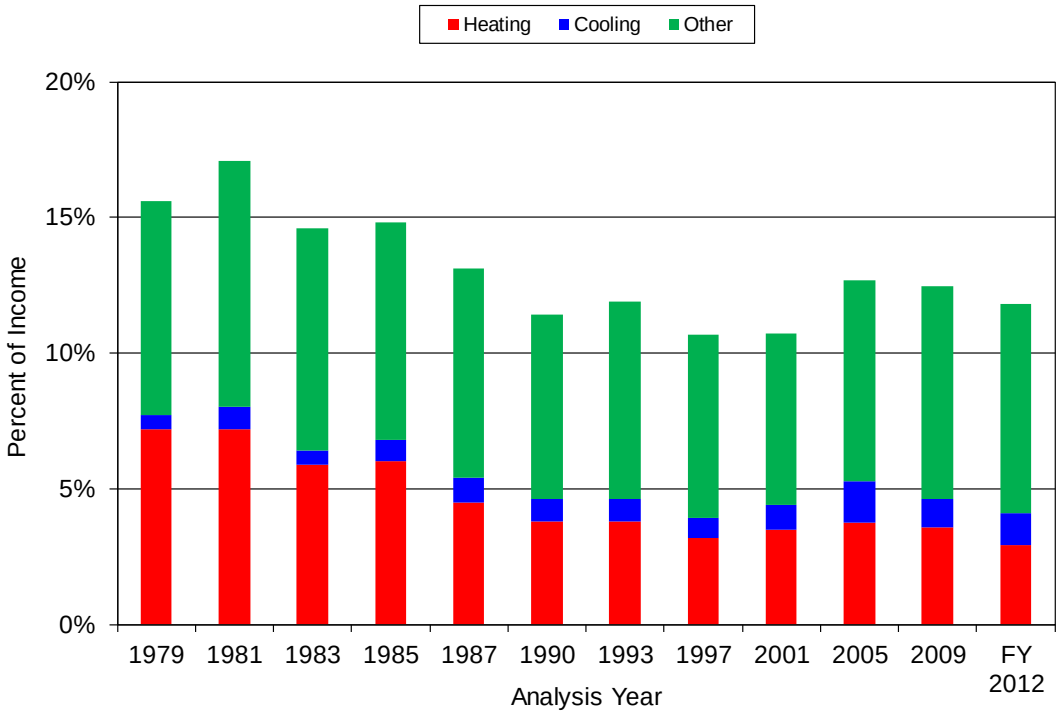
Figure 7. Mean residential energy expenditures for low income households, 1979 to FY 2012



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 4.1 percent in FY 2012; this represented a decline of 3.6 percentage points.[6] The decline in mean group residential energy burden from 1979 to FY 2012 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).

[6] Mean group burden is defined in Appendix A.

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 2012



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 2012 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 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 17 percent over 1997 prices and in 2005, fuel prices increased by another 24 percent over 2001 prices. In FY 2012, fuel prices increased again. FY 2012 fuel prices were over 25 percent higher than 2005 fuel prices. The increases in fuel prices from 2005 through FY 2012 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 2012

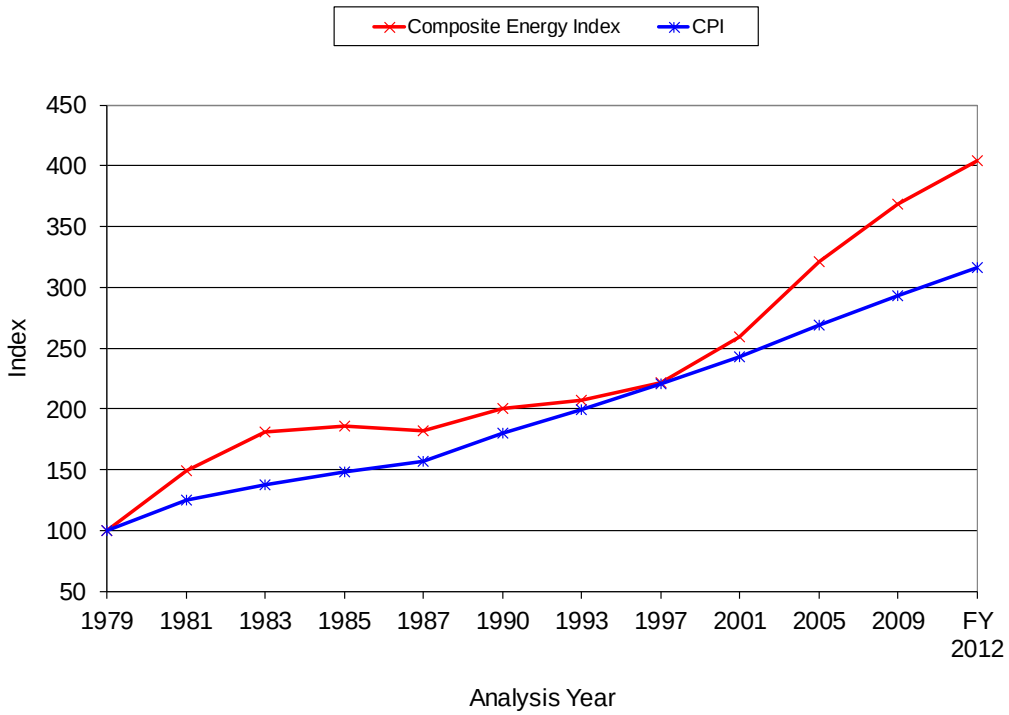
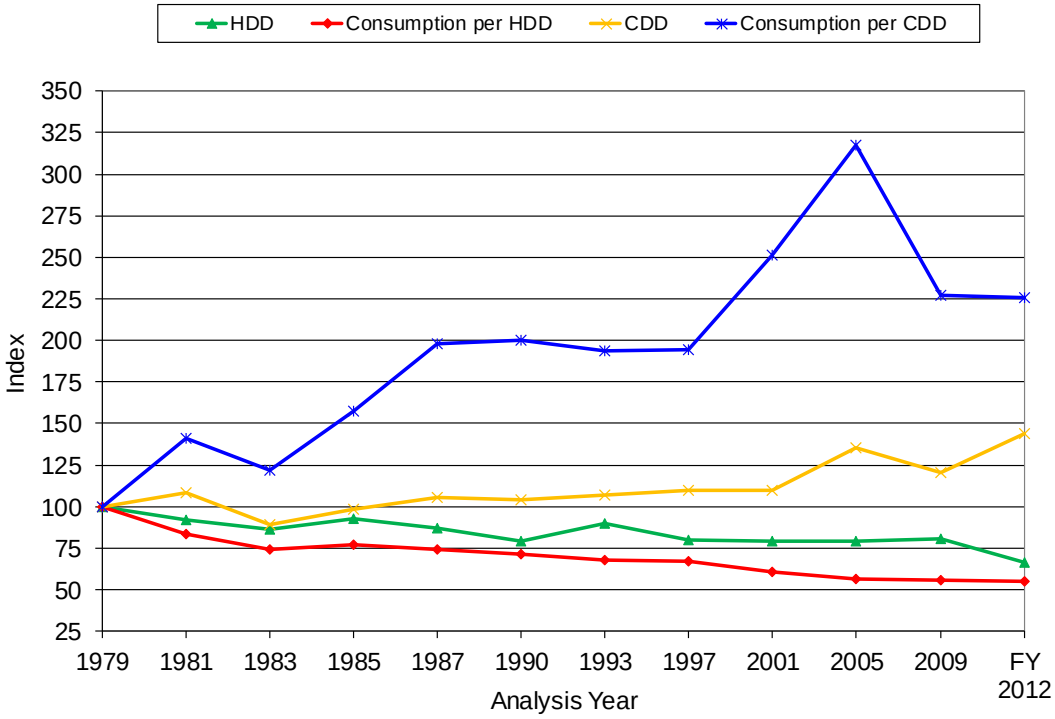


Figure 10 shows on the next page average energy consumption for heating and cooling compared to heating and cooling degree days from 1979 to FY 2012 for low income households. As shown, heating consumption per heating degree day generally declined from 1979 to FY 2012 probably at least in large part due to energy conservation efforts. In contrast, cooling consumption per cooling degree day rose through FY 2012, with a spike around 2001 and 2005, because of a large increase in the availability of air-conditioning to low income households.[7] Only 37 percent of low income households had air-conditioning equipment in 1979, but by 2005 the number had risen to 80 percent.

[7]Air-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 2012



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 2012, the mean group home energy burden for all households was 1.0 percent, while the mean group home energy burden for low income households was 4.1 percent. Again, this is over four times higher than that for all households.

Trends in LIHEAP

Between 1981 and FY 2012, as shown in Figure 11, the number of income eligible households has risen by about 102 percent, during which time Federal fuel assistance funds have increased by about 81 percent.[8] 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 17 percent in FY 2012 – though this figure has remained reasonably steady since 1997.[9] 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 24 percent FY 2012. 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 24 percent in FY 2012.

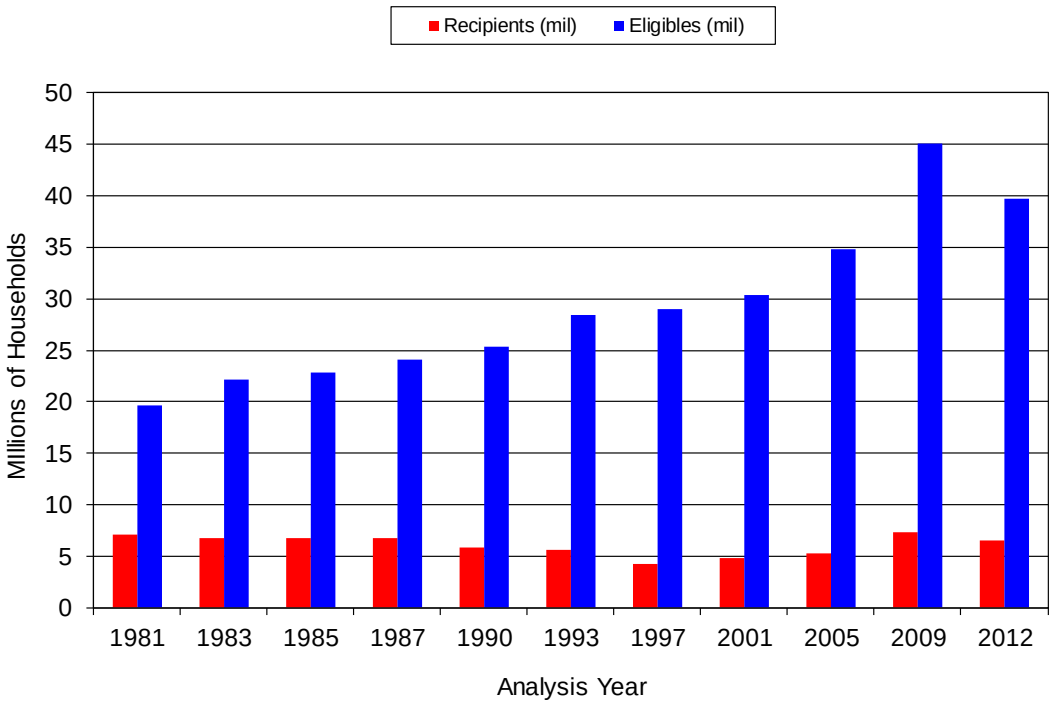
[8] Income eligible household estimates do not include those households with incomes greater than the statutory income standards but who may still qualify for LIHEAP benefits because they are categorically eligible for LIHEAP under section 8624 (b)(2)(A) of the LIHEAP statute.

[9] 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.

After adjusting for inflation, the mean value of combined Federal heating and winter crisis benefits fell (in 1981 dollars) from $213 in 1981 to $149 in FY 2012. Cooling benefits decreased (in 1981 dollars) from $129 in 1981 to $102 in FY 2012.

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 14 percent in FY 2012. 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 2012



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 2012, 17 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 *recipiency 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 recipiency, benefit, and burden reduction performance for vulnerable and high burden households. Using these indexes, ACF established the following LIHEAP performance measures

- Increase the recipiency targeting index score of LIHEAP households having at least one member 60 years or older.

- Maintain the recipiency 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 recipiency 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. [10]

- 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. [11]

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 2014 Annual Performance Report and Performance Plan* furnished measurements of targeting performance. The performance report showed the LIHEAP targets and performance results for FY 2012.

Low Income Energy Needs – 2001 to 2009

The national Residential Energy Consumption Survey (RECS) is used by the Office of Community Services Division of Energy Assistance (OCS/DEA) to document the energy needs of low income households. The 2009 RECS published in 2012. The purpose of this study is to compare the findings from the 2009 RECS to those from the 2001 RECS and the 2005 RECS to furnish information on how the energy needs of low income households changed over the decade. This special study goes beyond the presentation of the low income home energy trends presented in Section III of the *Notebook* to identify the sources of change in low income energy needs.

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

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

Summary of Findings

This study examined the changes in the energy needs of low income households during the period from 2001 to 2009 using the series of RECS surveys (2001, 2005, and 2009) and the matching series of CPS-ASEC surveys (2002, 2006, and 2010). The key findings from the study in terms of the indicators of need included:

- Mean Expenditures - Mean residential expenditures (adjusted for inflation) increased by about 10 percent from 2001 to 2009 while mean home energy expenditures declined by 2 percent.
- Mean Energy Burden - Mean residential energy burden increased by 4.2 percentage points from 2001 to 2009 and mean home energy burden increased by 2.7 percentage points.
- Aggregate Low Income Energy Bill - The aggregate low income residential energy bill increased by 28 percent from 2001 to 2009 and the aggregate low income home energy bill increase by 13 percent.
- Energy Burden Thresholds - The number of low income households with energy bills above threshold values that are tracked by OCS increased by more than 25 percent from 2001 to 2009.

The analysis developed information that helps to explain the source of these changes in energy needs for low income households.

- Mean Expenditures - The primary reason for the increase in mean expenditures was that energy prices increased by more than the CPI during the period from 2001 to 2009.
- Mean Energy Burden - Mean energy burden increased by more than median energy burden because the distribution of energy burden changed; low income households using higher cost fuels (e.g., fuel oil) experienced a much higher energy burden in 2009 than they did in 2001.
- Aggregate Low Income Energy Bill - The aggregate low income energy bill increased because the number of low income households increase by 17 percent and the mean expenditures per household increased by 10 percent.
- Energy Burden Thresholds - The number of low income households with energy bills above the certain threshold values increased because the number of low income households grew and the price of certain fuels (fuel oil and propane) increased by substantially more than the CPI.

LIHEAP Policy Implications

The analysis shows that during the period from 2001 to 2009 there were regional changes in mean energy expenditures and the aggregate low income energy. The LIHEAP funding allocation formula directly addresses the regional changes in the number of low income households and the regional prices of energy, subject to certain hold harmless provisions. Each year, the allocation formula makes use of information on the number of low income households using each main heating fuel in each state (source: American Community Survey - ACS) and the energy expenditures in each state (source: State Energy Data System - SEDS) to estimate the low income home energy bill for each state.

The analysis shows that during the period from 2001 to 2009 there were changes in the relative energy burdens of low income households by main heating fuel. 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 income and the higher energy costs or needs in relation to income, taking into account family size. To the extent that LIHEAP grantees have implemented their programs according to that mandate, the relative changes in energy burden for low income households by fuel type would be addressed.

Overall LIHEAP funding is not linked to the energy needs of low income households. However, Table 3-22 of the *LIHEAP Home Energy Notebook for FY 2012* shows that funds used for LIHEAP fuel assistance increased from $1.8 billion in 2001 to $4.0 billion in 2009. In 2001, the LIHEAP program offered fuel assistance that covered about 10 percent of low income home energy bill, while in 2009 LIHEAP program fuel assistance covered about 17 percent.

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 2012 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 2012* and the *LIHEAP Grantee Survey for Federal Fiscal Year (FFY) 2012*.

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 2012. 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 2012. 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 2012 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.[12] For this *Notebook*, the 2009 space heating and cooling consumption and expenditures have been adjusted to reflect FY 2012 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 2012, average residential energy consumption for all households was 84.2 million British Thermal Units (MMBtus) and average expenditures were $2,013. The mean individual residential energy burden for all households was 8.1 percent of income.

Low income households had average residential energy consumption of 72.8 MMBtus (13.5 percent less than all households) and average energy expenditures of $1,716 (14.8 percent less than all households). Their mean individual residential energy burden was 17.5 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 $1,906, almost 11 percent higher than that for all low income households. The mean individual residential energy burden was 17.8 percent, 0.3 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 2012, home heating was 26 percent of the residential energy bill for low income households, and home cooling made up 10 percent.

[12] The FY 2012 *Notebook* is the first to use the 2009 RECS data. The FY 2011 *Notebook* used projections from the 2005 RECS, which had a different sample frame and different procedure than the 2009 RECS. The reader should exercise caution in comparing the results for FY 2012 to those for FY 2011, as some of the observed changes may be due to the changes in the base survey used.

[13] Comparisons 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 2012[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	84.2	$2,013	8.1%	3.7%	2.9%
Natural gas	101.2	$1,948	7.2%	3.3%	2.8%
Electricity	59.2	$1,786	8.7%	3.8%	2.6%
Fuel oil	105.9	$3,381	11.1%	5.6%	4.9%
Kerosene	60.1	$2,028	14.4%	9.5%	2.9%
LPG[6/]	102.1	$3,059	10.6%	6.0%	4.4%

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 2012[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	90.3	$2,173	3.1%	2.7%	2.3%
Natural gas	105.6	$2,068	2.8%	2.5%	2.2%
Electricity	64.5	$1,961	3.1%	2.6%	2.1%
Fuel oil	113.3	$3,665	4.5%	4.0%	3.9%
Kerosene	66.4	$2,336	4.6%	3.9%	2.5%
LPG[6/]	108.9	$3,254	5.0%	4.6%	3.4%

Table 2-1c. Residential energy: Average annual household consumption, expenditures, and burden by low income households, by main heating fuel type, United States, FY 2012[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	72.8	$1,716	17.5%	8.4%	9.0%
Natural gas	91.6	$1,691	16.6%	8.0%	8.8%
Electricity	50.6	$1,503	17.8%	7.9%	7.9%
Fuel oil	92.3	$2,857	23.4%	13.4%	14.9%
Kerosene	57.6	$1,905	18.4%	10.8%	10.0%
LPG[6/]	87.9	$2,657	21.9%	13.2%	13.9%

Table 2-1d. Residential energy: Average annual household consumption, expenditures, and burden by LIHEAP recipient households, by main heating fuel type, United States, FY 2012[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	83.9	$1,906	17.8%	9.0%	11.7%
Natural gas	100.0	$1,790	17.0%	7.8%	11.0%
Electricity	54.0	$1,523	16.9%	8.1%	9.3%
Fuel oil	99.9	$3,081	20.9%	13.1%	18.9%
Kerosene	75.7*	$2,607*	16.9%	13.3%	16.0%
LPG[6/]	89.2	$2,747	25.8%	16.5%	16.8%

[1/]Data are derived from the 2009 RECS, adjusted to reflect FY 2012 heating degree days, cooling degree days, and fuel prices. Data represent residential energy used from October 2011 through September 2012.
[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 2012 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 2012 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 2012; and (3) dividing the adjusted figures by the average income for each group of households from the 2012 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 30 percent of their annual residential expenditures for space heating, 4 percentage points more than did the average low income household. LIHEAP recipient households spent 7 percent for space cooling, 70 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 2012[1/]

End Use	All households	Non-low income households	Low income households	LIHEAP recipient households
Space heating	24%	24%	26%	30%
Space cooling	12%	13%	10%	7%
Water heating	14%	13%	15%	15%
Refrigeration	8%	8%	8%	8%
Appliances	42%	43%	41%	40%
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 households groups, 51.4 percent, followed by LIHEAP recipient households at 49.2 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 households 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 2012, average home heating consumption for all households was 30.7 MMBtus, average expenditures were $489, and mean individual home heating burden was 2.5 percent.

Low income households had average home heating consumption of 27.3 MMBtus (11.1 percent less than the average for all households) and average home heating expenditures of $447 (8.6 percent less than the average for all households). The mean individual home heating burden for low income households was 5.7 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.

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

Average home heating consumption for LIHEAP recipient households was 35.5 MMBtus (15.6 percent higher than the average for all households), and average home heating expenditures were $587 (20 percent higher than the average for all households). Mean individual home heating burden for LIHEAP households was 6.7 percent, 1 percentage point 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 30 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 2012[1/] (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumpton (MMBtus)[2/]	Fuel expenditures	Mean individual burden[3/]	Median individual burden[4/]	Mean group burden[5/]
All fuels	30.7	$489	2.5%	0.8%	0.7%
Natural gas	43.7	$471	2.3%	0.8%	0.7%
Electricity	9.2	$281	1.9%	0.6%	0.4%
Fuel oil	59.8	$1,558	6.4%	2.5%	2.2%
Kerosene	28.8	$831	7.0%	3.1%	1.2%
LPG[6/]	43.8	$1,191	5.0%	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 2012[1/] (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumpton (MMBtus)[2/]	Fuel expenditures	Mean individual burden[3/]	Median individual burden[4/]	Mean group burden[5/]
All fuels	32.5	$512	0.8%	0.5%	0.5%
Natural gas	44.4	$475	0.7%	0.5%	0.5%
Electricity	9.7	$293	0.5%	0.4%	0.3%
Fuel oil	63.6	$1,659	2.1%	1.7%	1.8%
Kerosene	29.5	$830	1.5%	1.2%	0.9%
LPG[6/]	46.1	$1,254	2.0%	1.6%	1.3%

Table 2-4c. Home heating: Average annual household consumption, expenditures, and burden by low income households, by fuel type, United States, FY 2012[1/] (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumpton (MMBtus)[2/]	Fuel expenditures	Mean individual burden[3/]	Median individual burden[4/]	Mean group burden[5/]
All fuels	27.3	$447	5.7%	1.9%	2.3%
Natural gas	42.1	$462	5.9%	2.1%	2.4%
Electricity	8.5	$263	4.3%	1.4%	1.4%
Fuel oil	52.8	$1,374	14.3%	6.8%	7.2%
Kerosene	28.6	$832	9.2%	5.4%	4.3%
LPG[6/]	39.1	$1,061	11.3%	5.3%	5.5%

Table 2-4d. Home heating: Average annual household consumption, expenditures, and burden by LIHEAP recipient households, by fuel type, United States, FY 2012[1/] (See also Tables A-5, A-6a, A-6b, and A-6c, Appendix A)

Main heating fuel	Fuel consumpton (MMBtus)[2/]	Fuel expenditures	Mean individual burden[3/]	Median individual burden[4/]	Mean group burden[5/]
All fuels	35.5	$587	6.7%	2.4%	3.6%
Natural gas	48.3	$533	6.9%	2.3%	3.3%
Electricity	9.5	$291	4.3%	1.8%	1.8%
Fuel oil	56.3	$1,481	11.8%	6.7%	9.1%
Kerosene	35.9*	$1,036*	7.2%	4.7%	6.4%
LPG[6/]	40.3	$1,115	11.1%	7.4%	6.8%

[1/]Data are derived from the 2009 RECS, adjusted to reflect FY 2012 heating degree days and fuel prices. Data represent home energy used from October 2011 through September 2012.

[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 2012 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 2012 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 2012; and (3) dividing the adjusted figures by the average income for each group of households from the 2012 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 2012, average home cooling consumption for households that cooled was 7.3 MMBtus, average expenditures were $262, and mean individual home cooling burden was 1.1 percent.

For households that cooled, low income households had average home cooling energy consumption of 5.3 MMBtus (about 27 percent less than the average for all households) and average home cooling expenditures of $187 (about 29 percent less than the average for all households). The mean individual home cooling burden for low income households was 2.5 percent, more than twice the average home cooling burden of all households and more than six times that of non-low income households.

For households that cooled, average home cooling consumption for LIHEAP recipient households was 4.3 MMBtus (about 41 percent less than all households and 19 percent less than low income households), and average home cooling expenditures were $151 (about 42 percent less than all households). Mean individual home cooling burden for LIHEAP recipient households was 1.7 percent, 54 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 2012[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	7.3	$262	1.1%	0.3%	0.4%
Non-low income households	8.3	$300	0.4%	0.2%	0.3%
Low income households	5.3	$187	2.5%	0.6%	1.0%
LIHEAP recipient households	4.3	$151	1.7%	0.5%	0.9%

[1/]Data are derived from the 2009 RECS, adjusted to reflect FY 2012 cooling degree days and fuel prices. Data represent residential energy used from October 2011 through September 2012.

[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 2012 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 2012 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 2012; and (3) dividing the adjusted figures by the average income for each group of households from the 2012 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 2012 CPS ASEC, the definition based solely on 150 percent of HHS poverty guidelines excludes 12.4 million households of the 39.6 million households that meet the definition of LIHEAP income eligible households. Therefore, differences in FY 2012 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.

[15]As 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 *Notebook*, 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 *Notebook*, 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 2012
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	2012
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

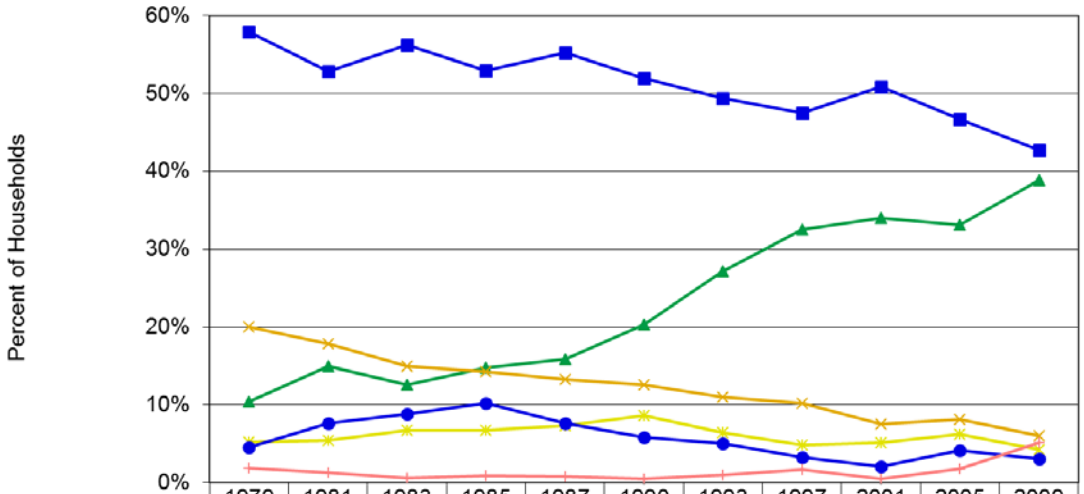
Since 1979, there have been important changes in the fuels used by households, the amount of energy consumed for specific residential end uses (i.e., home heating, water heating, home cooling, and for other appliances), total residential energy expenditures, and the burden that residential energy expenditures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

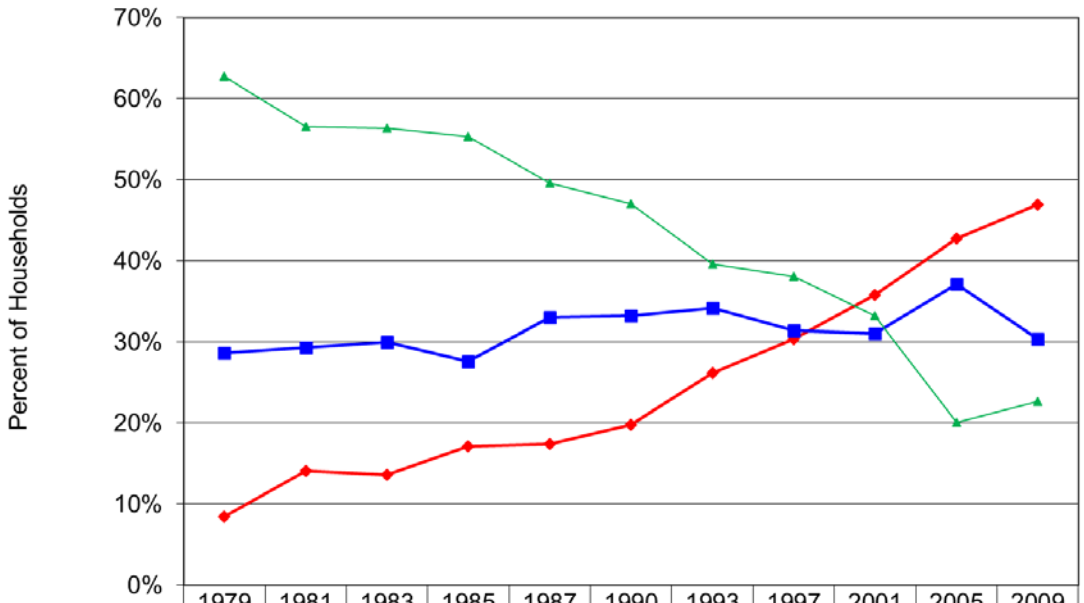
[16]For all households, the share using electricity as their main heating fuel grew from 15.8 percent in 1979 to 33.6 percent in 2009, and the share using fuel oil or kerosene as their main heat fell from 22.1 percent to 6.5 percent.
[17]For all households, the share using electric central air-conditioning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



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009
Natural Gas	57.9	52.9	56.2	53.0	55.2	52.0	49.4	47.5	50.9	46.7	42.7
Electricity	10.4	15.0	12.6	14.8	15.8	20.3	27.2	32.5	34.0	33.1	38.9
Fuel Oil	20.0	17.8	15.0	14.3	13.3	12.6	11.0	10.2	7.5	8.1	6.0
LPG	5.2	5.4	6.7	6.7	7.3	8.6	6.4	4.8	5.1	6.2	4.2
Other	4.5	7.6	8.8	10.2	7.6	5.8	5.0	3.2	2.1	4.1	3.1
No Main Fuel	1.9	1.3	0.6	0.9	0.8	0.5	1.0	1.7	0.5	1.8	5.1

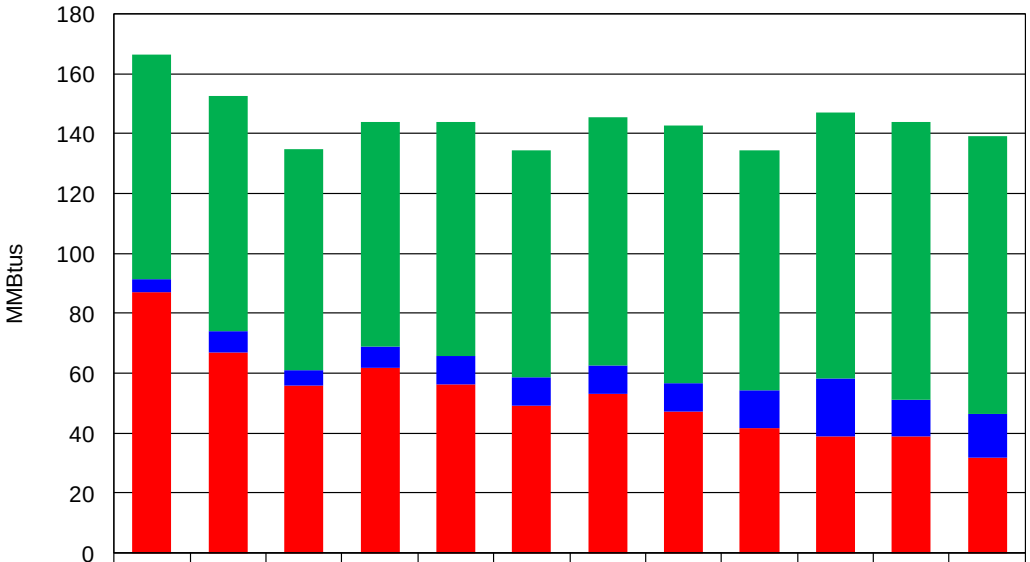
Figure 3-2. Air-conditioning type for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to 2009



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009
Central AC	8.5	14.1	13.6	17.1	17.4	19.8	26.2	30.4	35.8	42.8	46.9
Room AC	28.7	29.3	30.0	27.6	33.0	33.2	34.2	31.4	31.0	37.1	30.4
None	62.8	56.6	56.4	55.3	49.6	47.0	39.6	38.1	33.2	20.1	22.7

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 2012. 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 2012.

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 2012



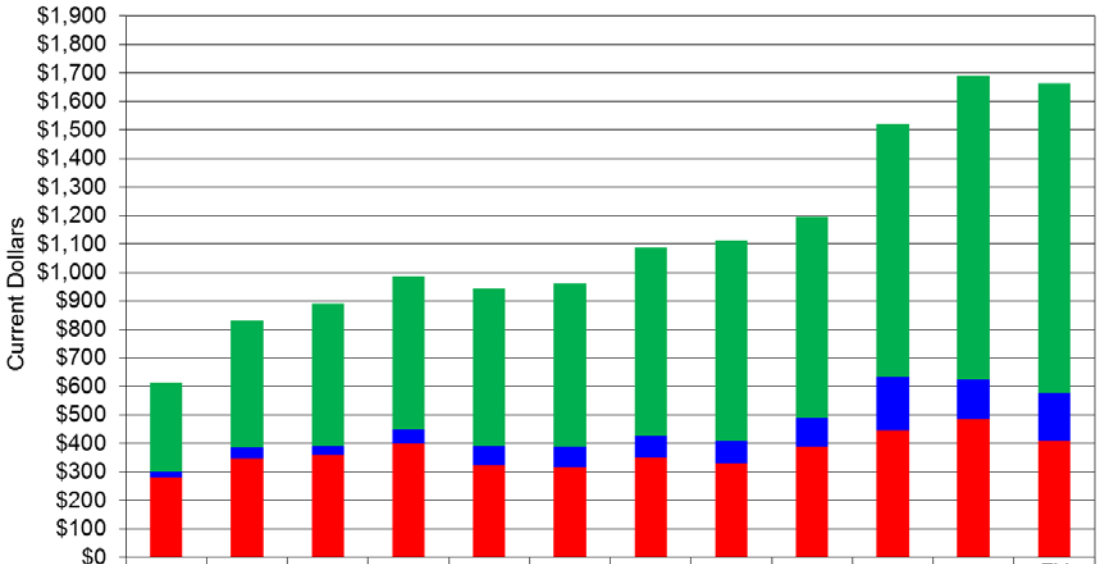
	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Total	166	153	135	144	143	134	145	143	134	147	144	139
Other	75	79	74	75	78	76	83	86	80	89	93	93
Cooling	5	7	5	7	9	9	9	10	12	19	12	15
Heating	87	67	56	62	56	49	53	47	42	39	39	32

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 2012, mean residential energy expenditures decreased by about 1.6 percent to $1,663. Mean home heating expenditures fell from $399 in 1985 to $318 in

[18]The 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.

1990, 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 2012, home heating expenditures saw a 16 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 $170 in FY 2012.

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 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Total	$612	$830	$891	$987	$943	$963	$1,088	$1,113	$1,196	$1,522	$1,690	$1,663
Other	$311	$444	$499	$537	$552	$574	$661	$705	$705	$887	$1,065	$1,084
Cooling	$20	$38	$33	$51	$68	$71	$77	$78	$103	$187	$139	$170
Heating	$281	$348	$360	$399	$323	$318	$350	$330	$388	$448	$485	$409

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

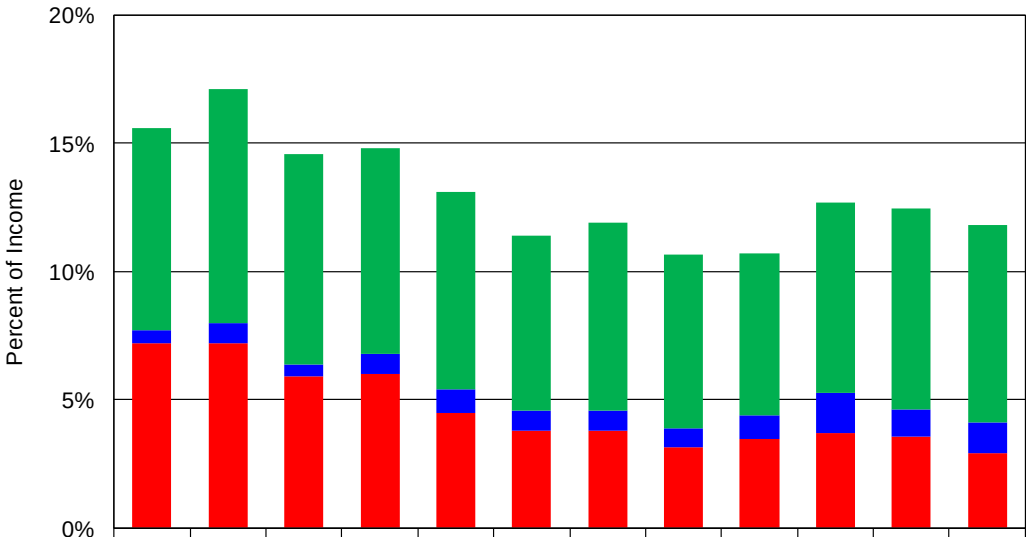
[19]These figures present gross burden statistics; they do not present net burden statistics, which account for the reduction in burden attributable to the receipt of LIHEAP benefits. Figure 3-26 compares gross burden and net burden for LIHEAP recipient households.

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 percent in 2009 followed by 4.1 percent in FY 2012. Mean group home energy burden for FY 2012 was about 7 percent lower than in 2001, 23 percent lower than in 2005, 11 percent lower than in 2009, and about 49 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 2012



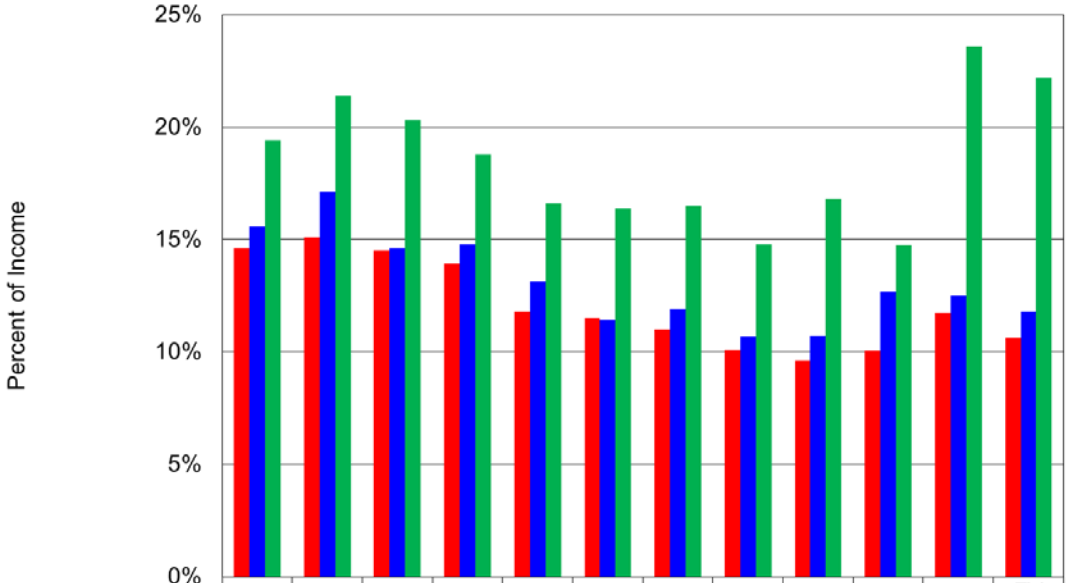
	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Total	15.6	17.1	14.6	14.8	13.1	11.4	11.9	10.7	10.7	12.7	12.5	11.8
Other	7.9	9.1	8.2	8.0	7.7	6.8	7.3	6.8	6.3	7.4	7.9	7.7
Cooling	0.5	0.8	0.5	0.8	0.9	0.8	0.8	0.7	0.9	1.6	1.0	1.2
Heating	7.2	7.2	5.9	6.0	4.5	3.8	3.8	3.2	3.5	3.7	3.6	2.9

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 2012, median individual residential energy burden was 30 percent lower and mean group residential energy burden was 31 percent lower than the 1981 peak, and mean individual residential energy burden was about 6 percent lower than the peak in 2009. In 2009, the mean

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

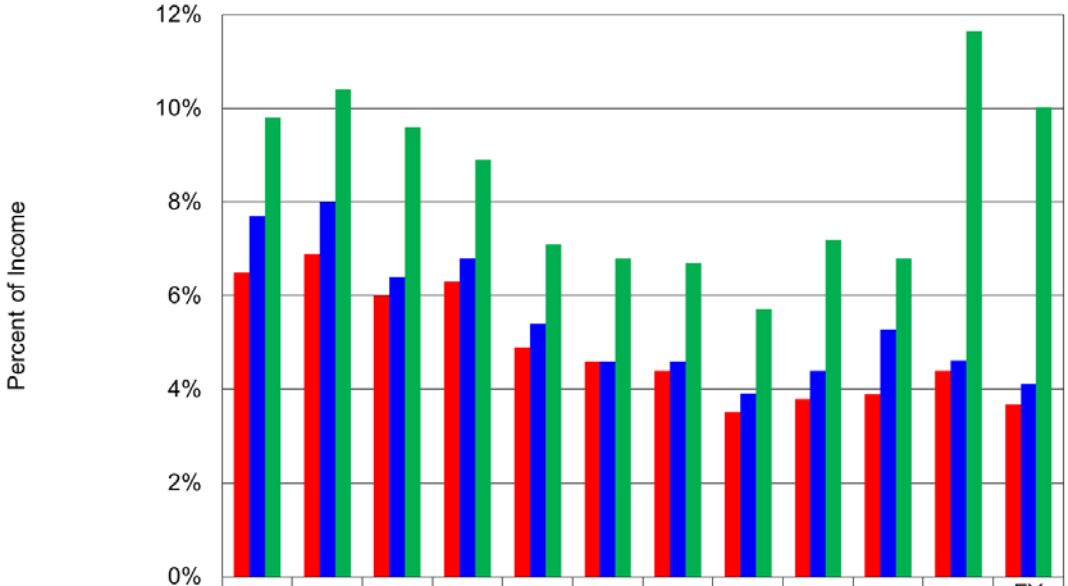
individual home energy burden was 11.7 percent, the median individual burden was 4.4 percent, and the mean group burden was 4.6 percent. For all three summary statistics the lowest home energy burden occurred in 1997. The highest home energy burden for the individual and group mean occurred in 1981 while 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 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Individual Median	14.6	15.1	14.5	13.9	11.8	11.5	11.0	10.1	9.6	10.1	11.7	10.6
Group Mean	15.6	17.1	14.6	14.8	13.1	11.4	11.9	10.7	10.7	12.7	12.5	11.8
Individual Mean	19.4	21.4	20.3	18.8	16.6	16.4	16.5	14.8	16.8	14.8	23.6	22.2

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 2012



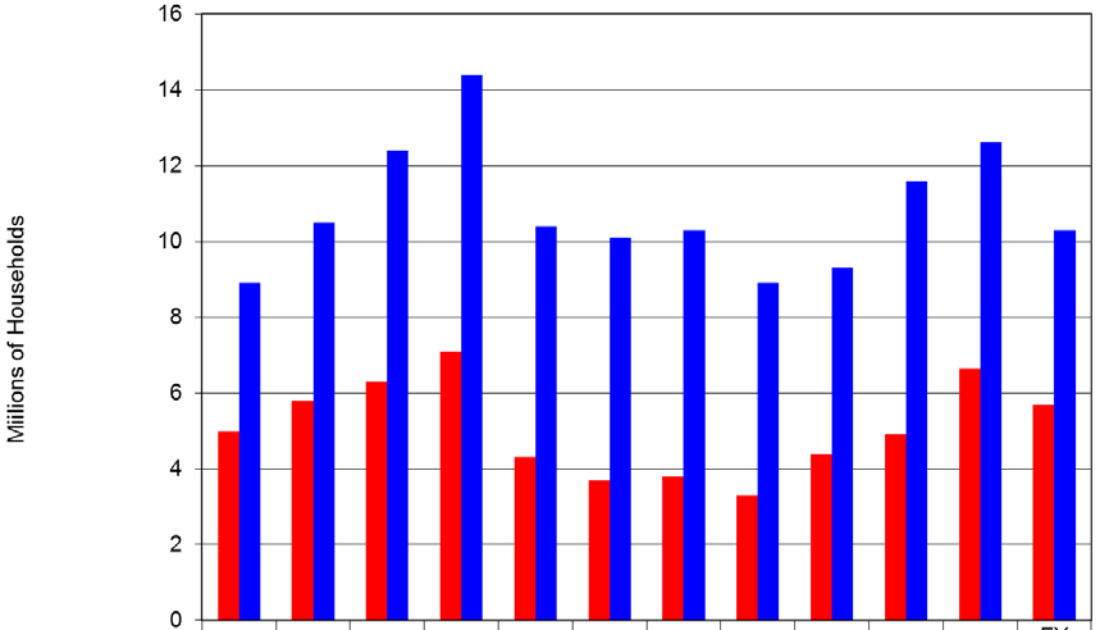
	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Individual Median	6.5	6.9	6.0	6.3	4.9	4.6	4.4	3.5	3.8	3.9	4.4	3.7
Group Mean	7.7	8.0	6.4	6.8	5.4	4.6	4.6	3.9	4.4	5.3	4.6	4.1
Individual Mean	9.8	10.4	9.6	8.9	7.1	6.8	6.7	5.7	7.2	6.8	11.7	10.0

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.

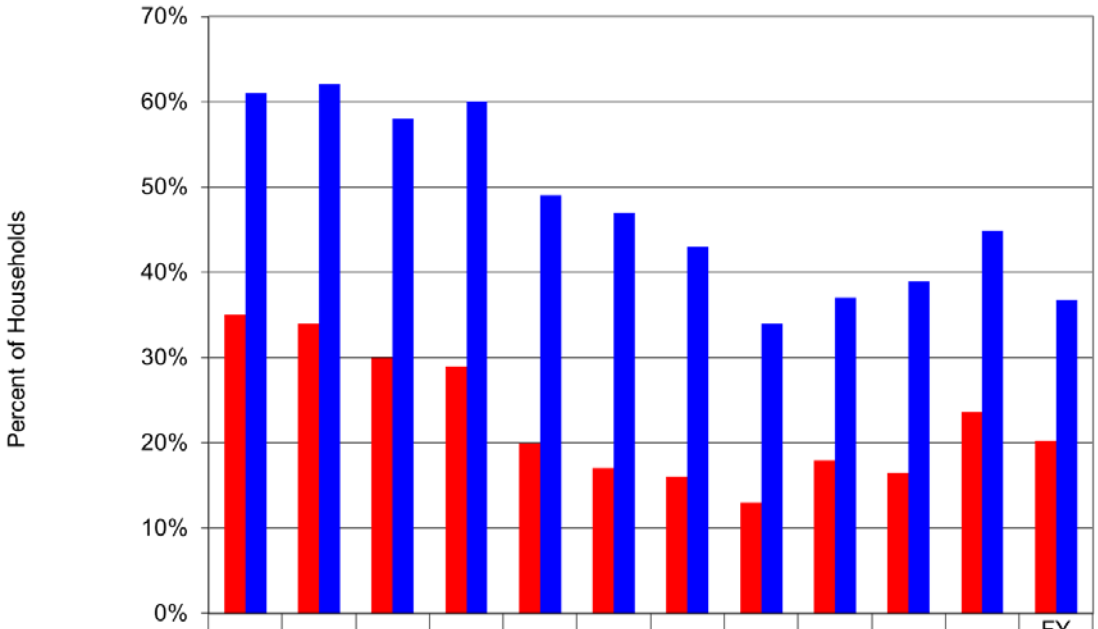
For the period 1985 through 1997, however, both the number and percentage of low income households exceeding specified levels fell significantly from previous levels. For these years, both a reduction in home energy expenditures and increased incomes caused burden to decrease for low income households. In 2001, both the number and percent of households exceeding the specified levels rose. From 2001 to FY 2012, 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 2012. The number of low income households with home energy burdens exceeding 10 percent of income in FY 2012 was almost 20 percent less than the 1985 level yet 14 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 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
More than 10%	5.0	5.8	6.3	7.1	4.3	3.7	3.8	3.3	4.4	4.9	6.6	5.7
More than 5%	8.9	10.5	12.4	14.4	10.4	10.1	10.3	8.9	9.3	11.6	12.6	10.3

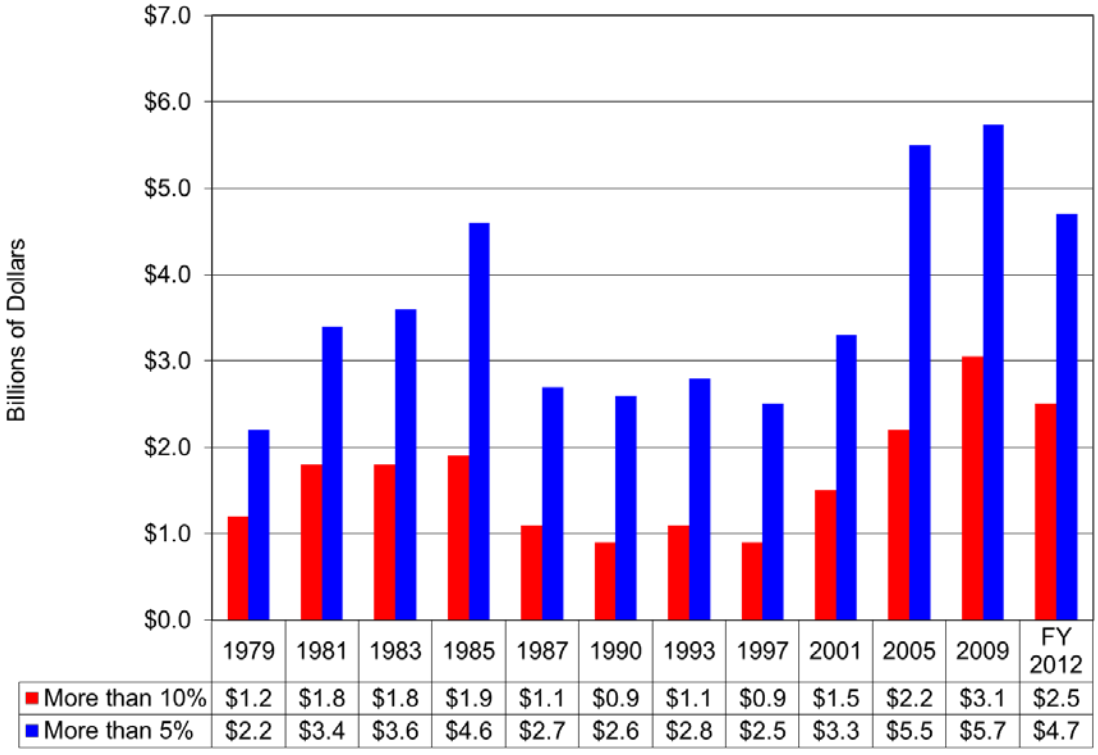
Figure 3-9. Percent of low income households spending over 5 percent and 10 percent of income on home energy, 1979 to FY 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
More than 10%	35	34	30	29	20	17	16	13	18	17	24	20
More than 5%	61	62	58	60	49	47	43	34	37	39	45	37

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 $4.7 billion in FY 2012. 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 2012, the number of low income households exceeding the percent of income reference points and their average 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 2012



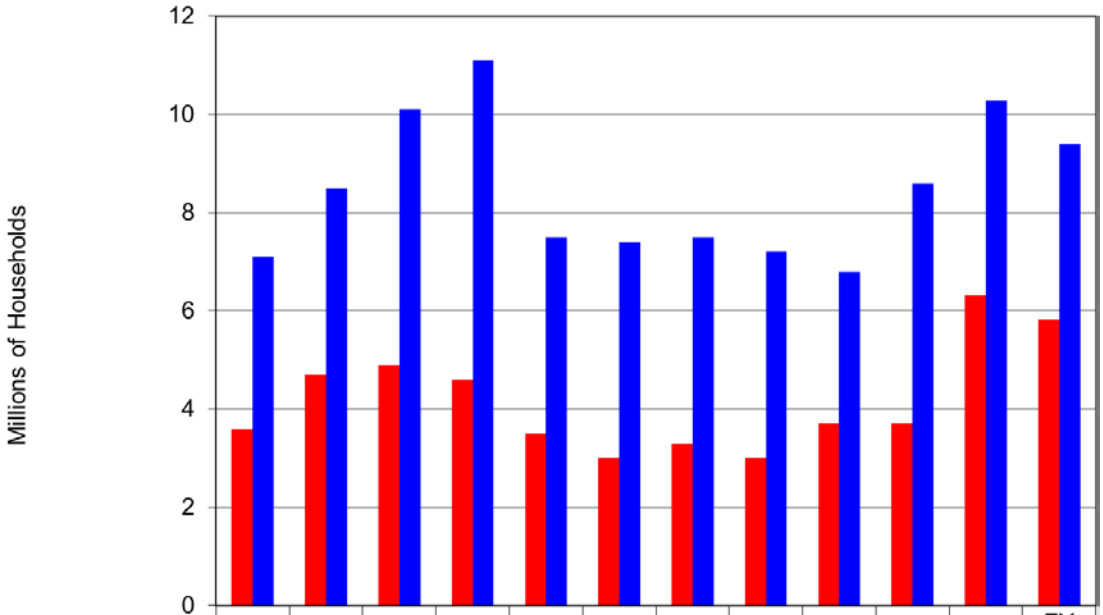
	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
More than 10%	$1.2	$1.8	$1.8	$1.9	$1.1	$0.9	$1.1	$0.9	$1.5	$2.2	$3.1	$2.5
More than 5%	$2.2	$3.4	$3.6	$4.6	$2.7	$2.6	$2.8	$2.5	$3.3	$5.5	$5.7	$4.7

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.

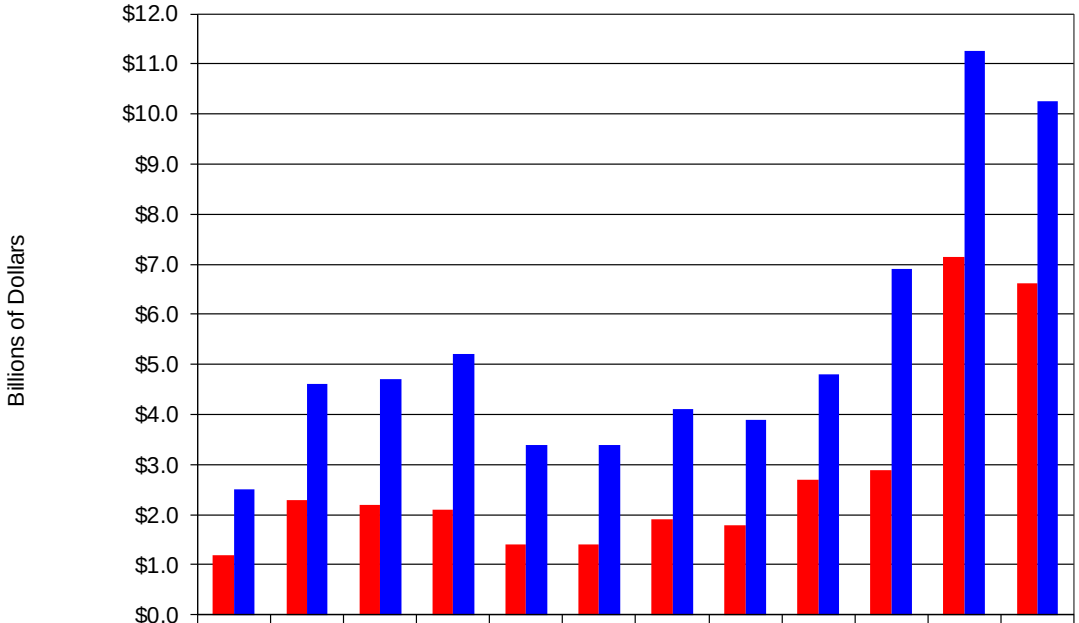
income was lower in FY 2012 than during the peak years, it was higher than at any time since the peak years. The largest number of low income households exceeding 25 percent of income spent on residential energy occurred in 2009, followed by FY 2012. Figure 3-12 demonstrates that the funding assistance required to reduce spending on residential energy by all low income households to the specified percentages reached its highest level in FY 2009, followed by FY 2012.

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 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
More than 25%	3.6	4.7	4.9	4.6	3.5	3.0	3.3	3.0	3.7	3.7	6.3	5.8
More than 15%	7.1	8.5	10.1	11.1	7.5	7.4	7.5	7.2	6.8	8.6	10.3	9.4

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 2012

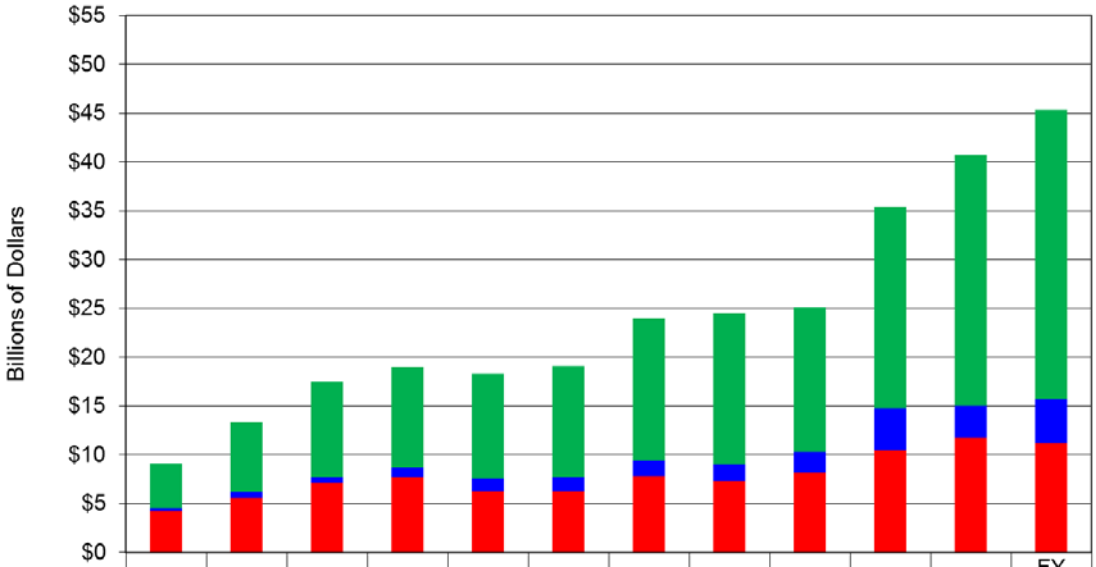


	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
More than 25%	$1.2	$2.3	$2.2	$2.1	$1.4	$1.4	$1.9	$1.8	$2.7	$2.9	$7.1	$6.6
More than 15%	$2.5	$4.6	$4.7	$5.2	$3.4	$3.4	$4.1	$3.9	$4.8	$6.9	$11.3	$10.3

Figure 3-13 shows how the aggregated residential energy bill for all low income households has changed from 1979 to FY 2012. In 1979, the aggregated home energy bill (heating costs plus cooling costs) for low income households was $4.5 billion. By FY 2012, the aggregated home energy bill had grown to $15.8 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 2012, home energy costs accounted for 34.9 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 2012

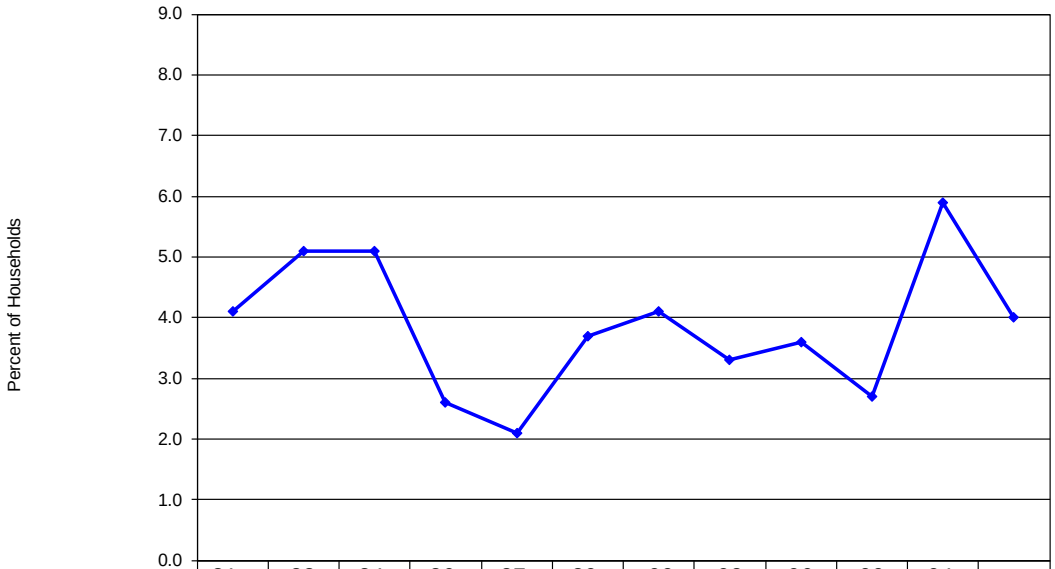


	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Total	$9.1	$13.3	$17.5	$19.0	$18.3	$19.1	$24.0	$24.5	$25.1	$35.5	$40.7	$45.3
Other	$4.6	$7.1	$9.8	$10.3	$10.7	$11.4	$14.6	$15.5	$14.8	$20.7	$25.7	$29.6
Cooling	$0.3	$0.6	$0.6	$1.0	$1.3	$1.4	$1.6	$1.7	$2.2	$4.3	$3.4	$4.6
Heating	$4.2	$5.6	$7.1	$7.7	$6.3	$6.3	$7.8	$7.3	$8.2	$10.4	$11.7	$11.2

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 2009[23]



	81-82	83-84	84-85	86-87	87-88	89-90	90-91	92-93	96-97	00-01	04-05	2009
Rate (%)	4.1	5.1	5.1	2.6	2.1	3.7	4.1	3.3	3.6	2.7	5.9	4.0
Number(000)	984	1,343	1,333	678	547	1,001	1,110	1,023	1,223	904	2,097	1,424

Analysis of energy price and energy efficiency trends

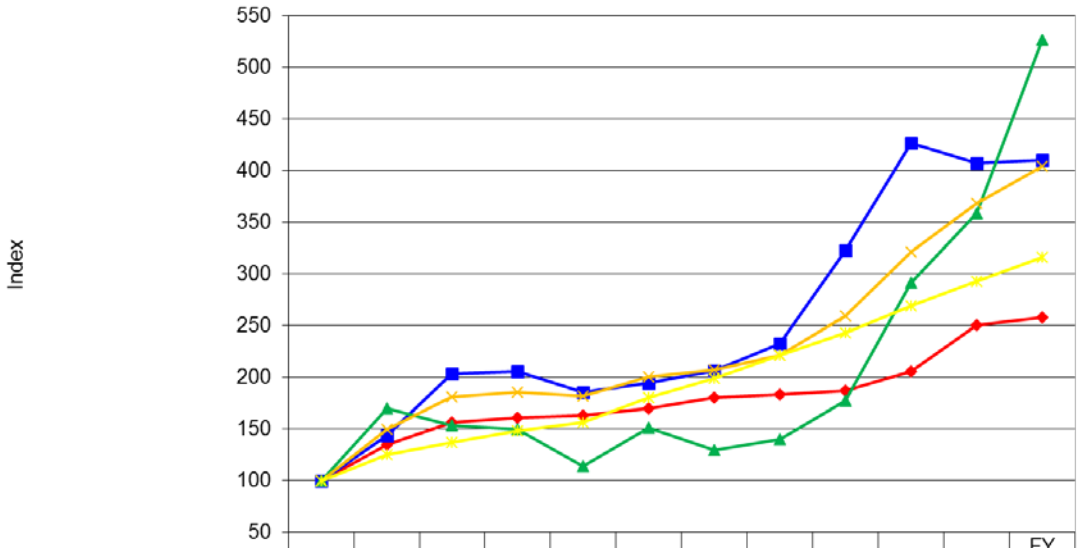
A number of factors underlie the energy consumption and expenditures trends. Three of the most important factors are fuel prices, weather, and energy efficiency. Figures 3-15, 3-16, and 3-17 furnish information on trends in these factors.

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 2012. 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 expenditures per low income household rose slightly during that period. In 2005, fuel prices

[23]The 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.

increased by 45 percent over 1997 prices. In 2009, fuel prices increased by 15 percent over 2005 prices. The increase in fuel prices explains why expenditures also rose. In FY 2012, fuel prices increased by nearly 10 percent over 2009 prices and once more contributed to an increase in expenditures.

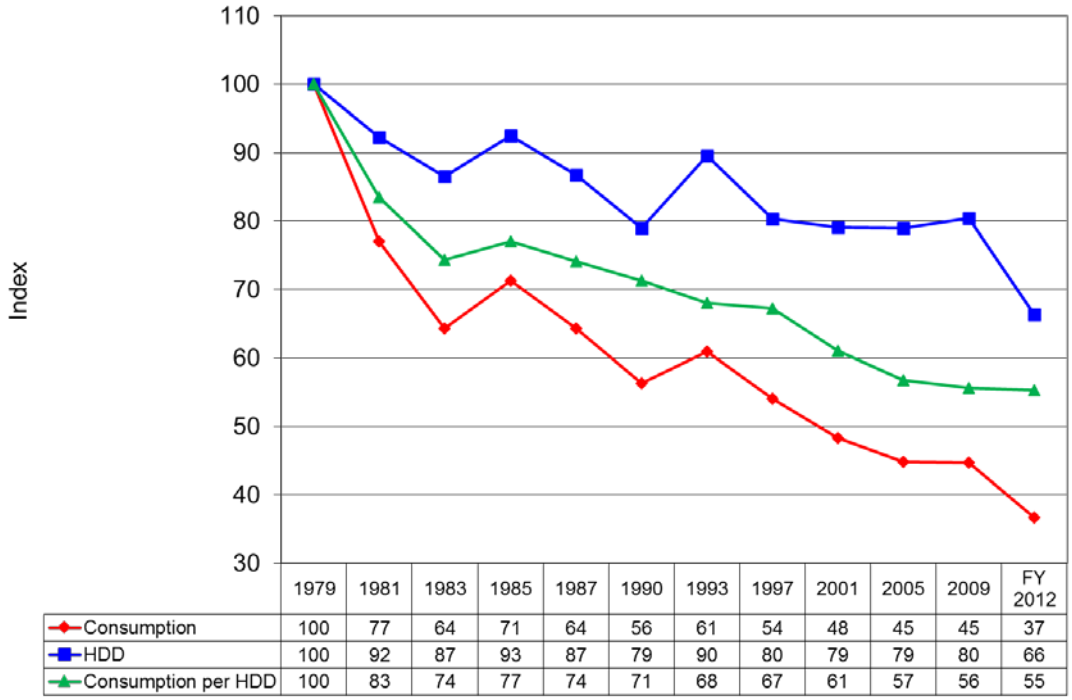
Figure 3-15. Index of dollar prices for fuel oil, natural gas, electricity, and a composite compared to the Consumer Price Index (CPI), 1979 to FY 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Electricity	100	135	157	161	163	170	180	183	187	205	250	258
Natural Gas	100	144	203	205	186	195	207	233	323	426	407	410
Fuel Oil	100	170	153	150	114	151	129	140	178	291	359	526
Composite Energy Index	100	150	181	186	182	201	207	221	259	321	368	404
CPI	100	125	137	148	156	180	199	221	243	269	293	316

Figure 3-16 demonstrates how changes in heating energy consumption among low income households from 1979 to FY 2012 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 very slight reduction in consumption per heating degree day, followed by another slight reduction from 2009 to FY 2012.

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 2012

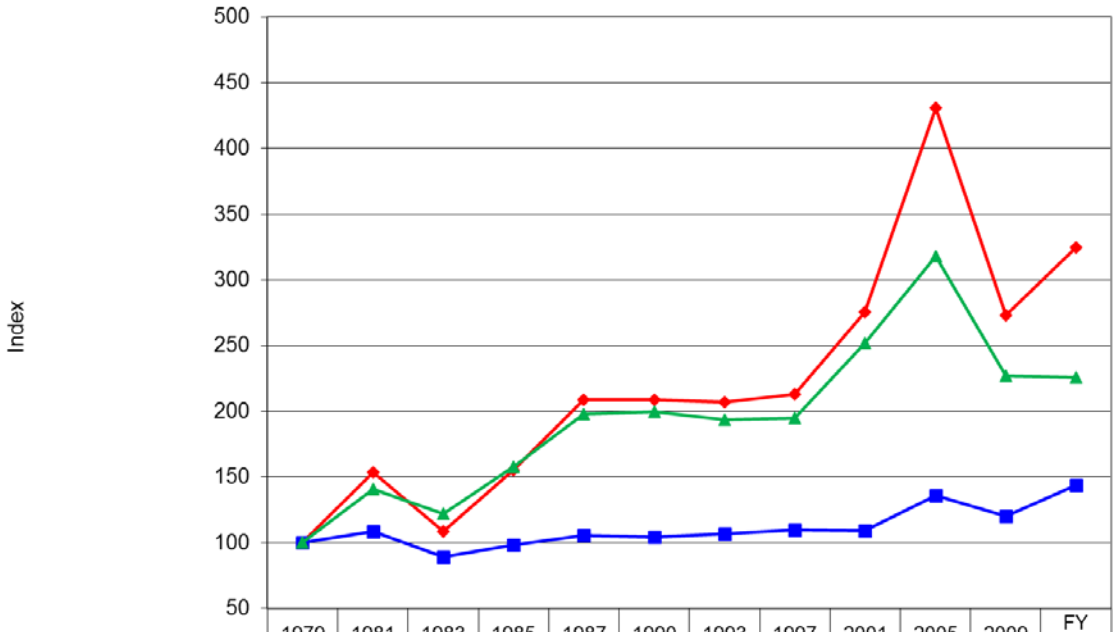


	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Consumption	100	77	64	71	64	56	61	54	48	45	45	37
HDD	100	92	87	93	87	79	90	80	79	79	80	66
Consumption per HDD	100	83	74	77	74	71	68	67	61	57	56	55

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 2012, 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 2012, 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 2012 or year-to-year changes in consumption in response to changes in cooling degree days.

[24]Air-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.

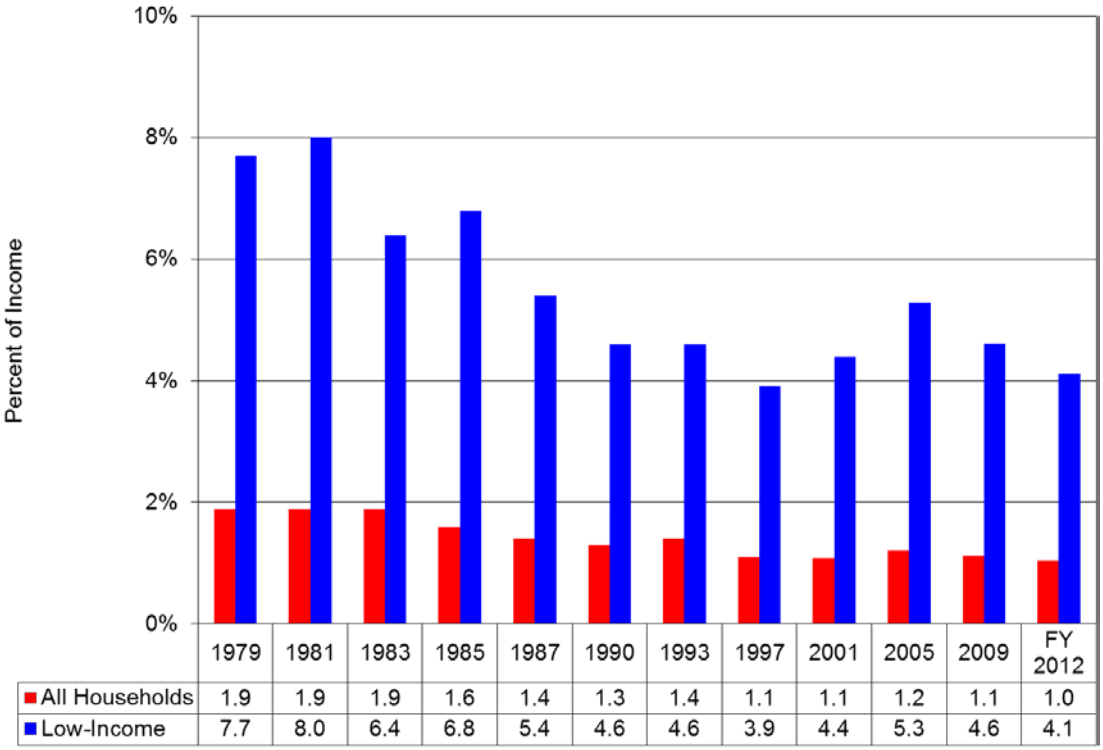
Figure 3-17. Index of cooling consumption, cooling degree days, and cooling consumption per cooling degree day for households with incomes at or below 150 percent of HHS poverty guidelines, 1979 to FY 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
Consumption	100	153	109	156	209	209	207	213	276	431	273	324
CDD	100	109	89	99	106	104	107	110	109	136	120	144
Consumption per CDD	100	141	122	158	198	200	194	195	252	318	227	226

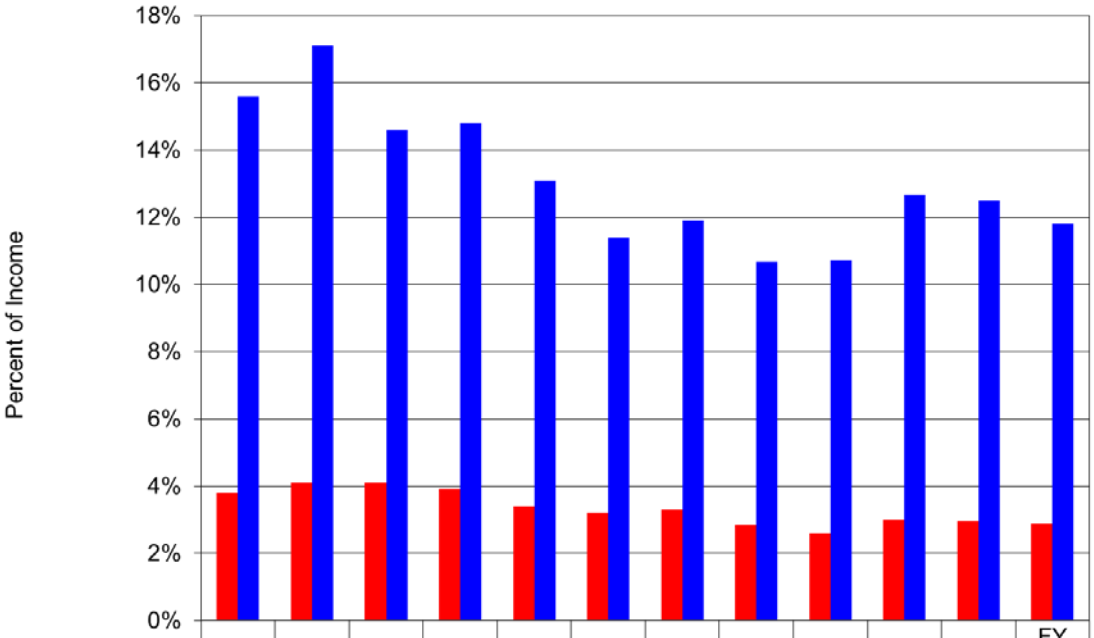
Figures 3-18 and 3-19, on the next page, show that the mean group energy burden for low income households is substantially higher than that for all households. In FY 2012, the mean group home energy burden for all households was 1.0 percent, and that for low income households was 4.1 percent. In FY 2012, 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 2012, the mean group burden for low income households was again over 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 2012



	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
All Households	1.9	1.9	1.9	1.6	1.4	1.3	1.4	1.1	1.1	1.2	1.1	1.0
Low-Income	7.7	8.0	6.4	6.8	5.4	4.6	4.6	3.9	4.4	5.3	4.6	4.1

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 2012

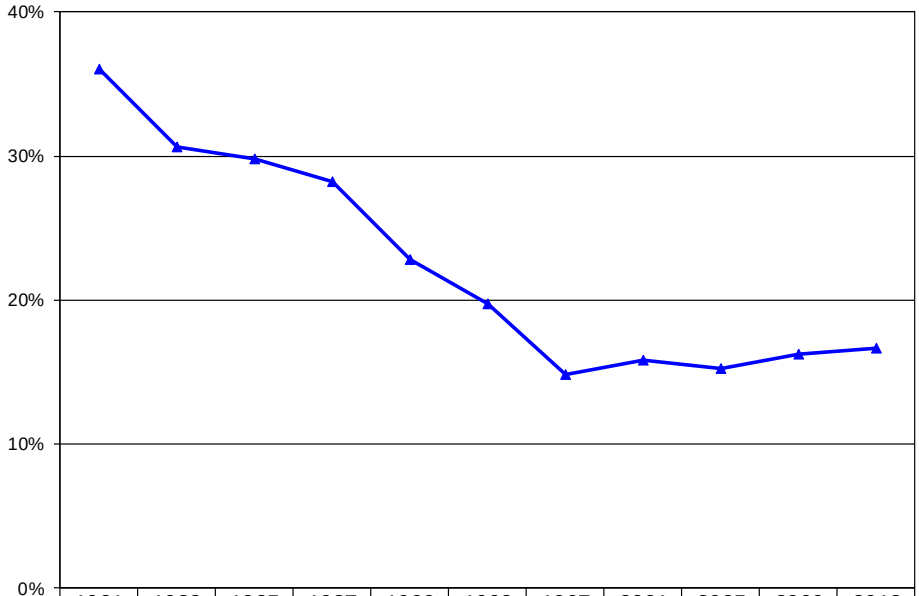


	1979	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	FY 2012
All Households	3.8	4.1	4.1	3.9	3.4	3.2	3.3	2.8	2.6	3.0	3.0	2.9
Low-Income	15.6	17.1	14.6	14.8	13.1	11.4	11.9	10.7	10.7	12.7	12.5	11.8

Trends in LIHEAP

Figures 3-20 through 3-24 furnish information on trends for HHS' energy assistance programs from FY 1981 through FY 2012. 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 2012, 17 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 2012

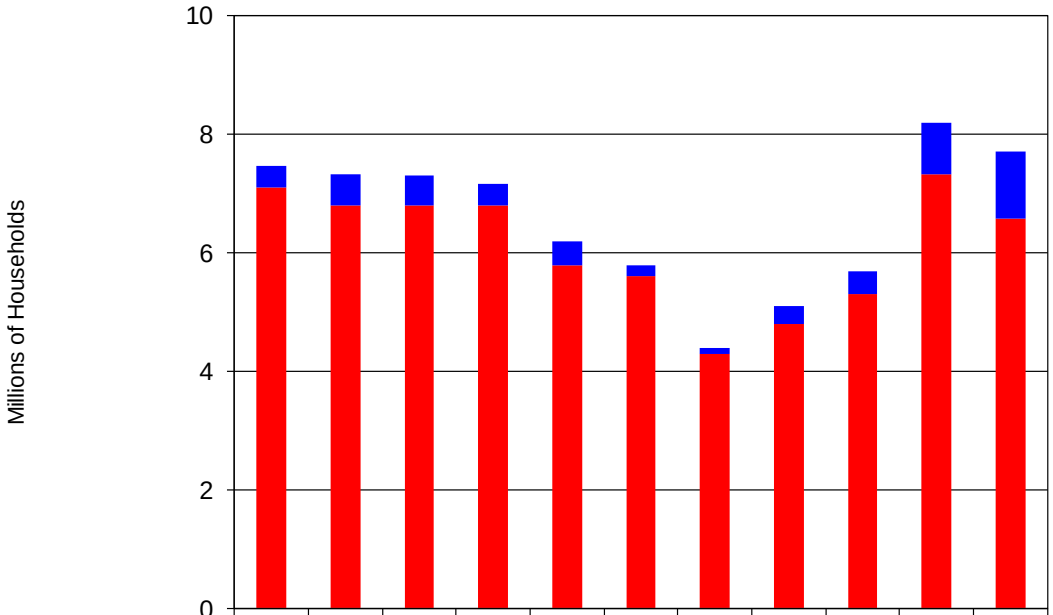


	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Recipients (mil)	7.1	6.8	6.8	6.8	5.8	5.6	4.3	4.8	5.3	7.3	6.6
Eligibles (mil)	19.7	22.2	22.8	24.1	25.4	28.4	29.0	30.4	34.8	45.1	39.7
Rate (%)	36%	31%	30%	28%	23%	20%	15%	16%	15%	16%	17%

SOURCE: Eligible households from CPS ASEC and recipient households from HHS Administrative Data — HHS data for FY 2012 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.

[25] Note 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 LIEAP/LIHEAP heating and/or winter crisis assistance or cooling and/or summer crisis assistance, FY 1981 to FY 2012

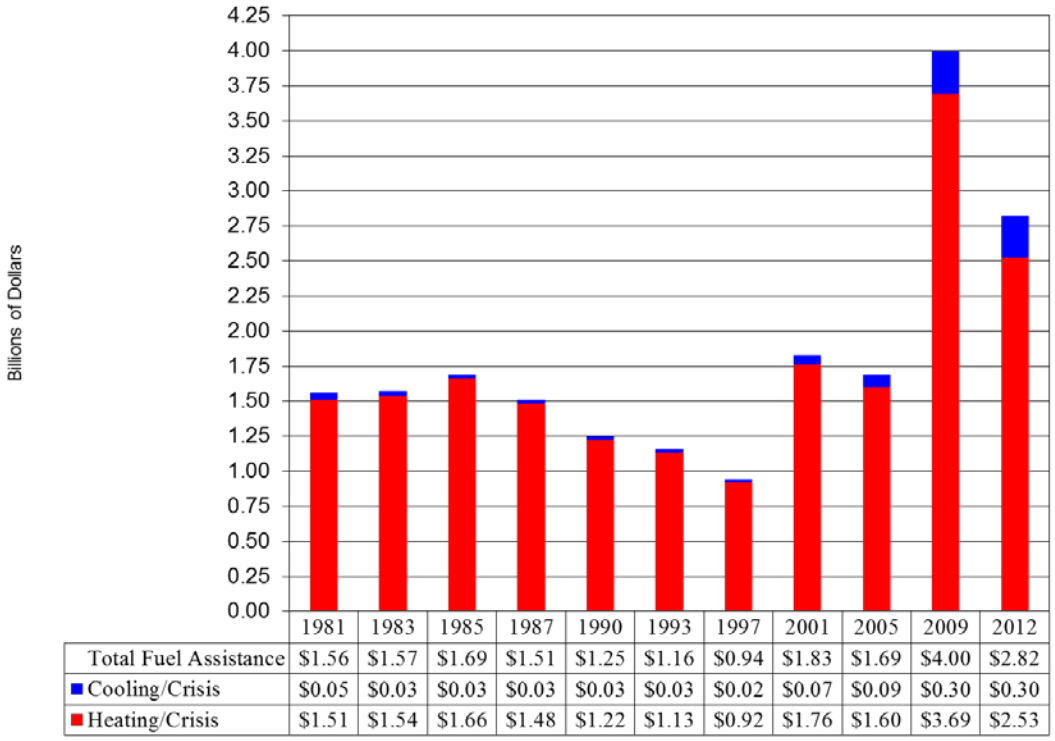


	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Cooling/Crisis	0.4	0.5	0.5	0.4	0.4	0.2	0.1	0.3	0.4	0.9	1.1
Heating/Crisis	7.1	6.8	6.8	6.8	5.8	5.6	4.3	4.8	5.3	7.3	6.6

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 2012 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 2012

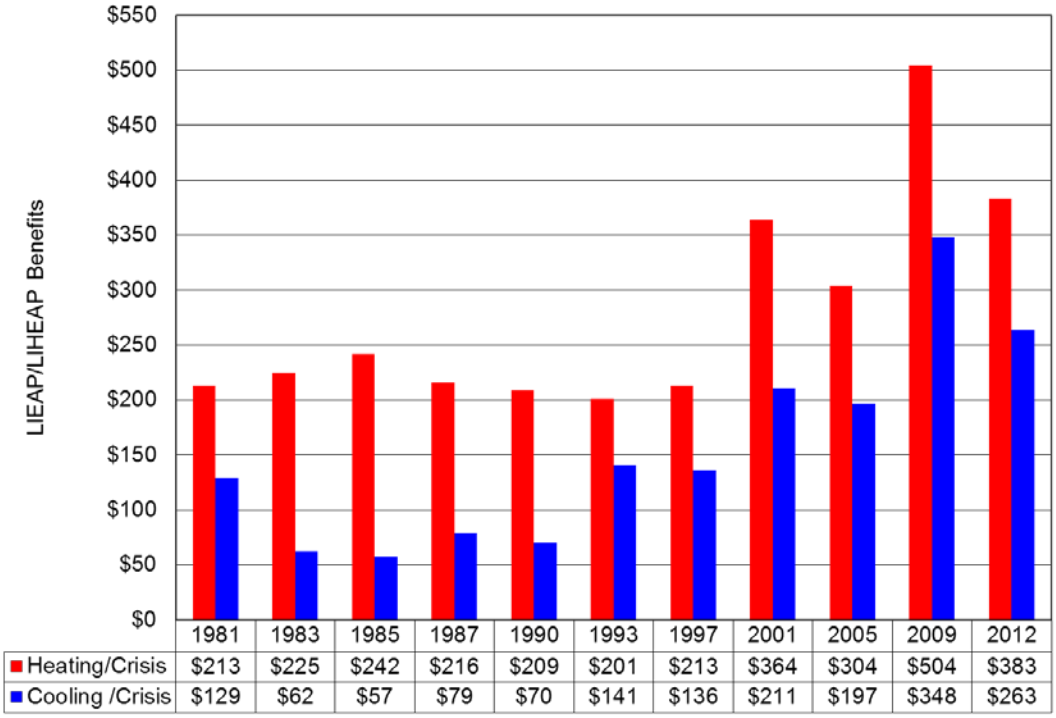


	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Total Fuel Assistance	$1.56	$1.57	$1.69	$1.51	$1.25	$1.16	$0.94	$1.83	$1.69	$4.00	$2.82
Cooling/Crisis	$0.05	$0.03	$0.03	$0.03	$0.03	$0.03	$0.02	$0.07	$0.09	$0.30	$0.30
Heating/Crisis	$1.51	$1.54	$1.66	$1.48	$1.22	$1.13	$0.92	$1.76	$1.60	$3.69	$2.53

SOURCE: HHS Administrative Data — such data for FY 2012 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 $383 in FY 2012. 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 $149 in FY 2012. 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 $102 in FY 2012. In FY 1993, one State made program changes that significantly increased the mean benefit and decreased the total number of recipients.

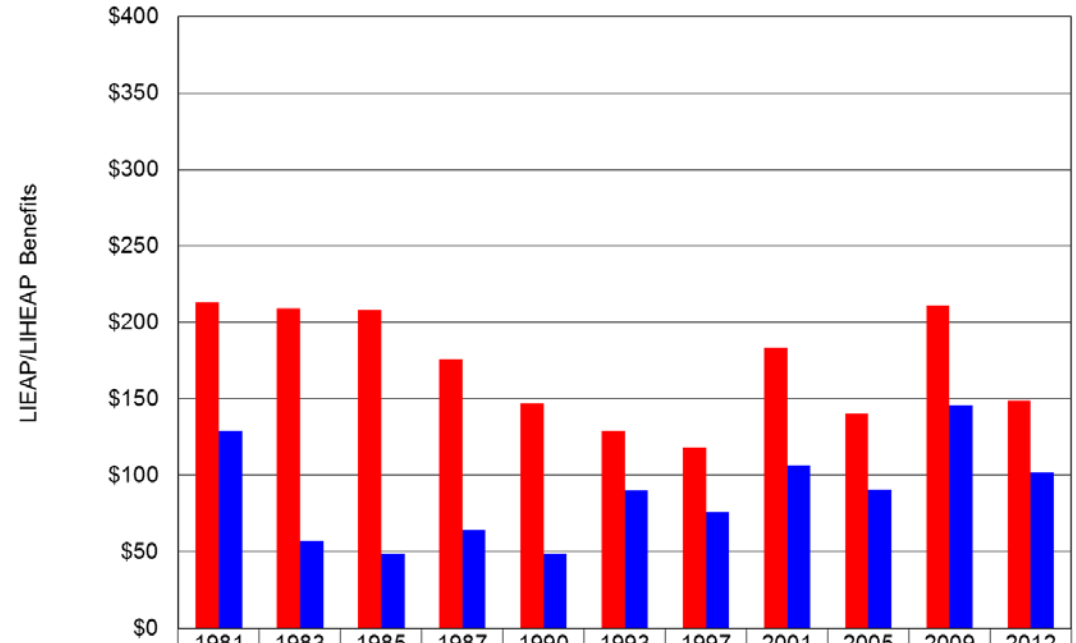
Figure 3-23. Mean combined LIEAP/LIHEAP heating and/or winter crisis benefits and mean cooling and/or summer crisis benefits, in nominal dollars, FY 1981 to FY 2012



	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Heating/Crisis	$213	$225	$242	$216	$209	$201	$213	$364	$304	$504	$383
Cooling /Crisis	$129	$62	$57	$79	$70	$141	$136	$211	$197	$348	$263

SOURCE: HHS Administrative Data — such data for FY 2012 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 2012



	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Heating/Crisis	$213	$209	$208	$176	$147	$129	$118	$184	$140	$211	$149
Cooling /Crisis	$129	$57	$49	$64	$49	$90	$76	$107	$91	$146	$102

SOURCE: HHS Administrative Data — such data for FY 2012 are preliminary; thus the actual figures may differ.

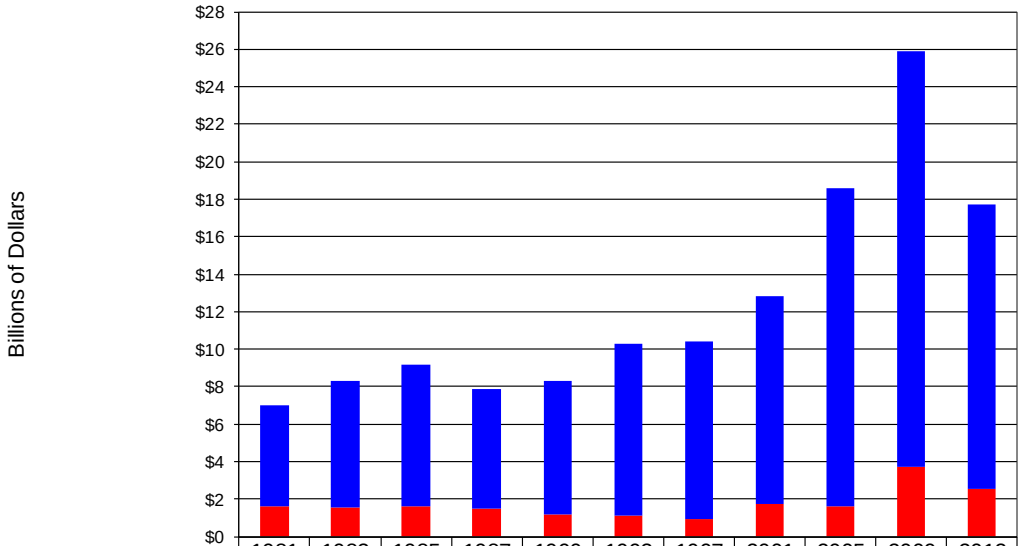
Analysis of LIHEAP benefits

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 14 percent in FY 2012. 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 2012 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 LIEAP 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 2012, the gross mean group home heating burden for LIHEAP recipients was 3.6 percent, while the net mean group home heating burden was 1.3 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 2012 it increased to 1.3 percent.

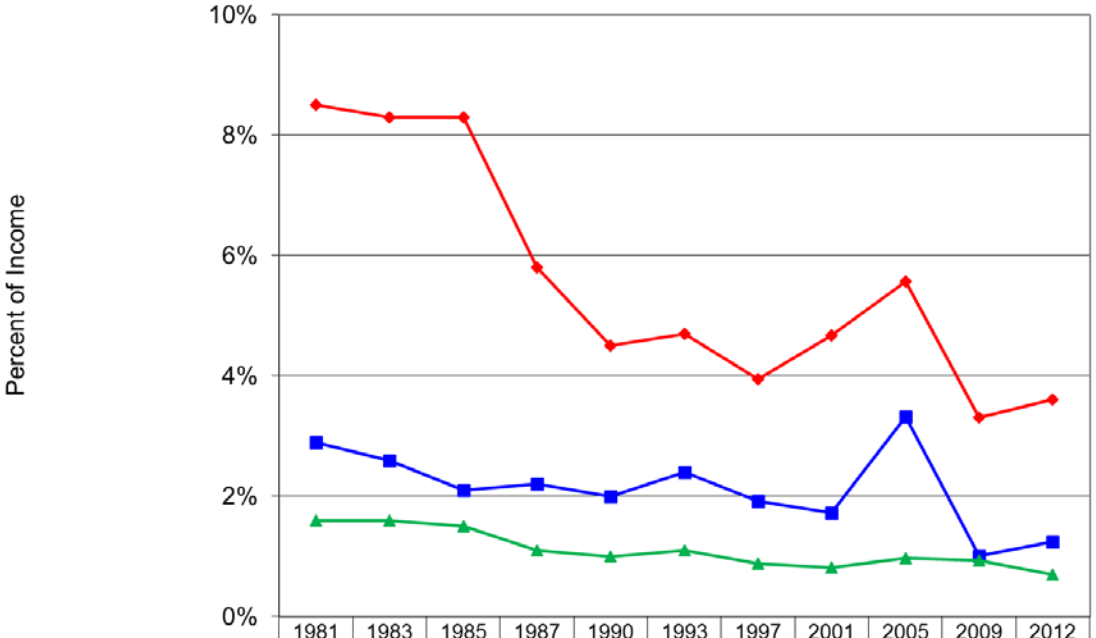
Figure 3-25. Amount and percentage of total home heating billed amounts for LIEAP/LIHEAP income eligible households covered by LIEAP/LIHEAP heating and winter crisis benefits, FY 1981 to FY 2012



	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Percent Covered	23%	18%	18%	19%	15%	11%	9%	14%	9%	14%	14%
Total Bill	$7.0	$8.3	$9.2	$7.9	$8.3	$10.3	$10.4	$12.8	$18.6	$25.9	$17.7
Not Assisted	$5.4	$6.8	$7.6	$6.4	$7.1	$9.2	$9.5	$11.1	$17.0	$22.2	$15.2
Assisted	$1.6	$1.5	$1.6	$1.5	$1.2	$1.1	$0.9	$1.7	$1.6	$3.7	$2.5

SOURCE: Assistance number from HHS data and heating bill estimates from RECS — HHS data for FY 2012 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 2012



	1981	1983	1985	1987	1990	1993	1997	2001	2005	2009	2012
Gross (Recipients)	8.5%	8.3%	8.3%	5.8%	4.5%	4.7%	4.0%	4.7%	5.6%	3.3%	3.6%
Net (Recipients)	2.9%	2.6%	2.1%	2.2%	2.0%	2.4%	1.9%	1.7%	3.3%	1.0%	1.3%
Gross (All Households)	1.6%	1.6%	1.5%	1.1%	1.0%	1.1%	0.9%	0.8%	1.0%	0.9%	0.7%

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 2012, 17 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 recipiency 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 **recipiency targeting index** quantifies recipiency 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 recipiency 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 recipiency, benefit, and burden reduction performance for vulnerable and high burden households.

- The recipiency performance data allow for outreach initiatives to improve recipiency 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 recipiency 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 recipiency targeting index score of LIHEAP households having at least one member 60 years or older.

- Maintain the recipiency targeting index score of LIHEAP households having at least one member five years or younger.

[26] In 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 recipiency 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 recipiency 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 recipiency 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 recipiency 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.

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[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 2012 were available in November 2012.

- State annual LIHEAP Household Report – The preliminary LIHEAP Household Reports for FY 2012 were due from the States by September 1, 2012, when the States' LIHEAP block grant applications for FY 2013 were due. ACF set a goal for the States to submit their final LIHEAP Household Report for FY 2012 by December 2012. Each LIHEAP Household Report needs to be received, reviewed, processed, and compared against data from each State's Federal LIHEAP Grantee Survey for FY 2012 that was conducted in February 2013. The data on the number of LIHEAP households assisted in FY 2012 will be included in the *LIHEAP Report to Congress* for FY 2012.

- 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 recipiency 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 recipiency 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 recipiency targeting performance measures from FY 2003 through FY 2012. 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.

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 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

[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.

young child decreased to 114, which exceeded the target but was lower than the baseline targeting index score.

Table 4-1a. LIHEAP recipiency targeting performance measure 1A: Increase the recipiency targeting index score of LIHEAP households having at least one member 60 years or older (reported for FY 2003 – FY 2012)

Fiscal Year	Target	Result
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 recipiency targeting performance measure 1A: Increase the recipiency targeting index score of LIHEAP households having at least one member five years or younger (reported for FY 2003 – FY 2012)

Fiscal Year	Target	Result
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 2012 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 recipiency 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 recipiency 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.

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

[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.

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 recipiency targeting indexes to examine the effectiveness of their outreach to households with vulnerable members.[32]

- In absolute terms, if a given group has a recipiency 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 recipiency 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]

- 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

[32] LIHEAP grantees have the ability to create these recipiency 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 recipiency 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.

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 recipiency 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 recipiency targeting measures among groups of households and identify which groups are not effectively targeted by LIHEAP. For example, if the national LIHEAP recipiency targeting index for elderly households is 85 and the national LIHEAP recipiency 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 recipiency 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 recipiency targeting index for elderly households in the New England Census Division is 75, while the recipiency 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 could not report these unduplicated counts for FY 2011 and FY 2012. ACF are working with such States to have a system in place to report these data.

V. Low Income Energy Needs – 2001 to 2009

The national Residential Energy Consumption Survey (RECS) is used by the Office of Community Services Division of Energy Assistance (OCS/DEA) to document the energy needs of low income households at the national and regional levels. The 2009 RECS data was published in 2012. The purpose of this study is to compare the findings from the 2009 RECS to those from the 2001 RECS and the 2005 RECS to furnish information on how the energy needs of low income households changed over the decade.

Introduction

The *LIHEAP Home Energy Notebook* furnishes current year statistics on the energy needs of low income households. In addition, Section III of the *Notebook* documents the low income home energy trends from 1981 to the current year. This special study goes beyond the presentation of those statistics to identify the sources of change in low income energy needs.

The analysis first uses the 2001 RECS, the 2005 RECS, and the 2009 RECs to furnish estimates of low income energy needs, including:

- Household Level Indicators - Changes in energy expenditures and energy burden.
- Population Level Indicators - Changes in total expenditures for all low income households and in the number of low income households that exceed certain burden thresholds.

The analysis then examines a number of different factors to assess the sources of change in low income energy needs, including:

- Household Factors - These factors include changes in the demographics of households, the housing units occupied by those households, and the geographic areas in which the households live, particularly with respect to weather and the need for heating and cooling services.
- Energy Usage - The changes in the way that households use energy in terms of the choice of heating fuels, the penetration of air conditioning, and other residential energy usage.
- Energy Prices - The relative change in the prices of different types of energy and compared to the changes in other consumer prices.

Finally, the analysis compares the changes in the energy needs of low income households to the energy assistance benefits made available by the LIHEAP program

Data Sources and Data Analysis Procedures

This research uses a number of data sources to develop the statistics presented in this report.

- RECS - The study uses the 2001 RECS, 2005 RECS, and the 2009 RECS microdata files to develop statistics for low income households on energy usage, energy expenditures, and energy burden.
- CPS-ASEC - The study uses the Current Population Survey Annual Statistical and Economic Supplement (CPS-ASEC) to develop demographic statistics for low income households. The

2002 CPS-ASEC furnishes information for 2001, the 2006 CPS-ASEC furnishes information for 2005, and the 2010 CPS-ASEC furnishes information for 2009.

- Energy Price Data - Information on energy prices were obtained from the Energy Information Administration.

- Consumer Prices - The Consumer Price Index (CPI-U) from the Bureau of Labor Statistics (BLS) was used to adjust expenditures and income for changes in prices.

- Weather Data - Calendar year and long-term (30-year) heating and cooling degree days were included in the RECS data files for each survey respondent. The original source of those data was the National Climatic Data Center (NCDC) at the National Oceanographic and Atmospheric Administration (NOAA).

These data sources furnish statistically reliable information on energy consumption and expenditures, and on household demographics, for the nation and for Census Regions. The CPI data was used to adjust dollar values for energy expenditures and income for 2001, 2005, and 2009 to FY 2012. The weather data was used to adjust energy usage and energy expenditures from each RECS year to the long-term average.

Energy Indicators for Low Income Households

From the perspective of individual households, energy expenditures and energy burden are the most relevant indicators to the households' budget. Tables 5-1 through 5-4 present these individual household statistics.

- Residential Energy Expenditures - Table 5-1 shows mean residential energy expenditures (i.e., expenditures for home heating, cooling, water heating, and other appliances).

- Home Energy Expenditures - Table 5-2 shows mean home energy expenditures (i.e., expenditures for home heating and cooling only).

- Residential Energy Burden - Table 5-3 shows the mean and median residential energy burden (i.e., all residential uses).

- Home Energy Burden - Table 5-4 shows the mean and median home energy burden (i.e., heating and cooling only).

Table 5-1 shows that mean residential energy expenditures for low income households increased by about 10 percent between 2001 and 2009. The Northeast Census Region had the largest increase of 20 percent. The Midwest Census Region had the smallest increase of 2 percent.[34] It is important to note that the statistics presented in Table 5-1 and the tables that follow are inflation adjusted to FY 2012 dollars, and have been adjusted to account for year-to-year differences in heating degree days and cooling degree days.

[34] Since these statistics are adjusted for long term heating degree days and cooling degree days, and are inflation adjusted to FY 2012, they will not match any other published statistics on low income energy expenditures.

Table 5-1. Mean residential energy expenditures per low income household by Census Region for 2001, 2005, and 2009

Census Region	2001	2005	2009	Percent Change 2001 to 2009
Northeast	$1,990	$2,260	$2,389	20%
Midwest	$1,883	$1,866	$1,917	2%
South	$1,693	$1,769	$1,831	8%
West	$1,214	$1,398	$1,368	13%
Total	$1,689	$1,826	$1,859	10%

Source: 2001, 2005, and 2009 RECS adjusted to match long-term heating and cooling degree days and FY 2012 prices.

Table 5-2 shows that average home energy expenditures for low income households decreased by about 2 percent between 2001 and 2009. There was a 6 percent increase from 2001 to 2005, followed by an 8 percent decline from 2005 to 2009. The Northeast Census Region had an increase of 20 percent. The Midwest Census Region had a decrease of 14 percent.

Table 5-2. Mean home energy expenditures per low income household by Census Region for 2001, 2005, and 2009

Census Region	2001	2005	2009	Percent Change 2001 to 2009
Northeast	$889	$1,069	$1,064	20%
Midwest	$919	$863	$791	-14%
South	$710	$706	$646	-9%
West	$388	$414	$397	2%
Total	$721	$766	$707	-2%

Source: 2001, 2005, and 2009 RECS adjusted to match long-term heating and cooling degree days and FY 2012 prices.

Table 5-3 shows that the mean individual residential energy burden increased from 14.5 percent of income in 2001 to 18.7 percent in 2009, and that the median increased from 8.4 percent to 9.3 percent. The relatively small change in the median (+0.9 percentage points) compared to the larger change in the mean (+4.2 percentage points) is an indication that the distribution of energy burden changed and that more households had a high burden. The Midwest Census Region had the largest percentage point increase in the mean burden and the Northeast Census Region has the largest percentage point increase in the median burden.

Table 5-3. Individual mean and median residential energy burden for low income households by Census Region for 2001, 2005, and 2009

Census Region	2001 Mean	2005 Mean	2009 Mean	2001 Median	2005 Median	2009 Median
Northeast	18.1%	14.9%	20.6%	9.7%	10.1%	11.2%
Midwest	14.1%	12.5%	19.4%	8.8%	9.7%	9.6%
South	15.8%	13.9%	20.8%	9.5%	9.2%	10.1%
West	9.3%	9.3%	12.5%	5.5%	6.0%	6.1%
Total	14.5%	12.9%	18.7%	8.4%	8.8%	9.3%

Source: 2001, 2005, and 2009 RECS adjusted to match long-term heating and cooling degree days and FY 2012 prices.

Table 5-4 shows that the mean individual home energy burden increased from 6.4 percent of income in 2001 to 9.1 percent in 2009, but that the median remained constant at 3.4 percent. The mean value increased in all Census Regions, while the median value increased in the Northeast Census Region and declined somewhat in the South Census Region.

Table 5-4. Individual mean and median home energy burden for low income households by Census Region for 2001, 2005, and 2009

Census Region	2001 Mean	2005 Mean	2009 Mean	2001 Median	2005 Median	2009 Median
Northeast	8.7%	7.9%	11.6%	4.2%	4.7%	5.0%
Midwest	6.9%	6.3%	10.4%	3.9%	4.1%	3.9%
South	6.8%	6.1%	9.6%	3.9%	3.5%	3.6%
West	3.1%	2.7%	4.6%	1.6%	1.6%	1.6%
Total	6.4%	5.9%	9.1%	3.4%	3.4%	3.4%

Source: 2001, 2005, and 2009 RECS adjusted to match long-term heating and cooling degree days and FY 2012 prices.

Table 5-1 showed that mean residential energy expenditures for low income households increased by 10 percent. However, over that same time period, the number of low income households also grew by about 17 percent. Table 5-5 shows that the combined outcome of the increase in the number of low income households and in the average expenditures resulted in a 28 percent increase in the aggregate low income residential energy bill. The increase was the largest in the West Census Region where the total bill grew by 43 percent.

Table 5-5. Aggregate residential energy expenditures for low income households by Census Region for 2001, 2005, and 2009 (in millions of dollars)

Census Region	2001	2005	2009	Percent Change 2001 to 2009
Northeast	$12,503	$14,713	$16,862	35%
Midwest	$13,006	$14,286	$15,324	18%
South	$19,321	$21,364	$23,851	23%
West	$7,414	$9,832	$10,599	43%
Total (in millions)	$52,244	$60,195	$66,636	28%

Source: 2001, 2005, and 2009 RECS adjusted to match long-term heating and cooling degree days and FY 2012 prices.

Table 5-2 showed that mean home energy expenditures for low income households decreased by 2 percent. However, over that same time period, the number of low income households outpaced the decline in mean home energy expenditures. Table 5-6 shows that the combined outcome of the increase in the number of low income households and in the decrease in average expenditures resulted in a 13 percent increase in the aggregate low income home energy bill. The increase was the largest in the Northeast Census Region where the total bill grew by 34 percent.

Table 5-6. Aggregate home energy expenditures for low income households by Census Region for 2001, 2005, and 2009 (in millions of dollars)

Census Region	2001	2005	2009	Percent Change 2001 to 2009
Northeast	$5,586	$6,959	$7,510	34%
Midwest	$6,348	$6,607	$6,323	0%
South	$8,103	$8,526	$8,415	4%
West	$2,370	$2,912	$3,076	30%
Total (in millions)	$22,407	$25,004	$25,324	13%

Source: 2001, 2005, and 2009 RECS adjusted to match long-term heating and cooling degree days and FY 2012 prices.

Another important indicator of the energy needs of low income households is the share of households that exceed certain energy burden targets. The LIHEAP Energy Insecurity Study, published in the *LIHEAP Home Energy Notebook for FY 2008*, showed that higher energy burdens are associated with higher energy insecurity for low income households. Table 5-7 shows that the number of low income households exceeding the energy burden thresholds increased substantially between 2001 and 2009. The largest increase was for households spending over 25 percent of their income on residential energy; the number grew by 57 percent from 3.7 million households to 5.8 million households. Similarly, the number of households with home energy burden over 10 percent of income grew by 43 percent, from 4.4 million in 2001 to 6.3 million in 2009.

Table 5-7. Number of low income households (in millions) with energy burdens exceeding thresholds for 2001, 2005, and 2009

Threshold	2001	2005	2009	Percent Change 2001 to 2009
Residential Energy Burden Over 15%	6.8	8.6	9.5	40%
Residential Energy Burden Over 25%	3.7	3.7	5.8	57%
Home Energy Burden Over 5%	9.3	11.6	11.6	25%
Home Energy Burden Over 10%	4.4	4.9	6.3	43%

Source: 2001, 2005, and 2009 RECS adjusted to match long-term heating and cooling degree days.

Tables 5-1 through 5-7 generally demonstrate an increase in the energy needs for the population of low income households between 2001 and 2009. There were increases in mean residential energy expenditures, mean and median residential energy burden, and the aggregate residential energy bill for low income households. There was a small decline in mean home energy expenditures for low income households, and no change in the median home energy burden. However, there was an increase in the mean home energy burden and the aggregate home energy bill for low income households. Finally, there were significant increases in the number of low income households whose residential energy and home energy bills exceeded certain burden thresholds.

Sources of Change in Low Income Energy Needs

Household Factors

There are a number of household-level factors that can affect both average and aggregate expenditure and burden statistics, including:

- Demographic Factors - Changes in household size, age, and income.
- Housing Unit Factors - Changes in housing unit type, housing unit size, and home ownership.
- Geographic Factors - Changes in the location of households, particularly with respect to expected heating degree days and cooling degree days.

While it might be expected that many of these factor could change significantly over a decade, the analysis finds only relatively small changes.

Table 5-8 shows the change in demographic factors that might affect energy usage and energy burden. The number of members in a household can affect the demand for water heating and other appliances. During the period from 2001 to 2009, there was very little change in household size. One population targeted by LIHEAP is elderly households. The statistics show that share of low income households that are elderly declined between 2001 and 2009. Finally, changes in income can be expected to affect energy burden. The table shows that there was a small increase in inflation-adjusted median income from 2001 to 2009. Overall, it does not appear that these changes would have a major impact on energy expenditures and energy burden for low income households.

Table 5-8. Demographic factors for low income households for 2001, 2005, and 2009

Statistics	2001	2005	2009	Percent Change 2001 to 2009
Mean Household Size	2.4	2.4	2.5	4%
Median Household Size	2.0	2.0	2.0	0%
Head of Household is 65+	33%	31%	29%	-12%
At Least One Person 65+ in Home	35%	34%	32%	-9%
Median Income (inflation adjusted)	$17,555	$17,501	$18,072	3%

Source: 2002, 2006, and 2010 CPS-ASEC.

Table 5-9 shows the change in housing unit factors that might affect energy usage and energy burden. The type of housing unit occupied by a household can affect the amount of energy used; single family homes have the highest average energy usage per home and apartments in large multifamily buildings (5+ units) have the lowest average energy usage per home. During the period from 2001 to 2009, there was no change in the share of low income households in single family homes and only a small increase in the share of low income households in apartments in large multifamily buildings. In a finding consistent with that, there was almost no change in the average amount of space heated by low income households. There also was no difference in the percent of low income households that were homeowners between 2001 and 2009. Overall, it does not appear that these changes would have a major impact on energy expenditures and energy burden for low income households.

Table 5-9. Housing factors for low income households for 2001, 2005, and 2009

Statistics	2001	2005	2009	Percent Change 2001 to 2009
Percent Single Family[1/]	55%	55%	55%	0%
Percent Large Multifamily[1/]	25%	25%	26%	4%
Percent Renter[2/]	52%	48%	52%	0%
Mean Heated Square Footage[2/]	1,201	1,179	1,183	-1%
Median Heated Square Footage[2/]	1,014	980	998	-2%

[1/] Source: 2002, 2006, and 2010 CPS-ASEC.
[2/] Source: 2001, 2005, and 2009 RECS.

Table 5-10 shows the change in the number of low income households by Census Region and Table 5-11 shows the change in the percent of low income households. The West Census Region had the largest increase in the number of households while the South Census Region had the smallest. The shift of population to the West Census Region, with the lowest mean energy expenditures (Table 5-1), would be expected, on average, to reduce the energy needs of low income households.

Table 5-10. Number of low income households (in millions) by Census Region for 2001, 2005, and 2009

Census Region	2001	2005	2009	Percent Change 2001 to 2009
Northeast	6,283	6,510	7,058	12%
Midwest	6,907	7,656	7,994	16%
South	11,412	12,077	13,026	14%
West	6,107	7,034	7,749	27%
Total (in millions)	30,709	33,276	35,826	17%

Source: 2002, 2006, and 2010 CPS-ASEC.

Table 5-11. Percent of low income households by Census Region for 2001, 2005, and 2009

Census Region	2001	2005	2009	Percent Change 2001 to 2009
Northeast	20%	20%	20%	0%
Midwest	22%	23%	22%	0%
South	37%	36%	36%	-3%
West	20%	21%	22%	10%
Total	100%	100%	100%	

Source: 2002, 2006, and 2010 CPS-ASEC.

The household factors examined in this section show that there are only two factors that would be expected to have a significant impact on the energy needs of low income households. First, the increase in the population of low income households from 30.7 million to 35.8 million represents a 17 percent increase in the low income population. At the same time, a small movement of households to the West Census Region would be expected to result in a small decrease in energy needs. However, the population increase is more significant than the population shift and is consistent with the 28 percent increase in aggregate residential energy expenditures (see Table 5-5) and the 13 percent increase in aggregate home energy expenditures (see Table 5-6).

Energy Usage Factors

There are a number of energy usage factors that can affect both average and aggregate expenditure and burden statistics, including:

- Main Heating Fuel - Changes in the type of fuel used for home heating.
- Air Conditioning - Changes in equipment used for home cooling.
- Energy Usage - Changes in total energy usage and in the distribution of energy usage by end use (i.e., home heating, home cooling, water heating, and appliances).

During the period from 2001 to 2009, there were a number of changes in terms of these factors. Those changes have had some impact on low income expenditures and burden.

Table 5-12 shows the change in main heating fuel. During the period from 2001 to 2009, there was a large reduction in the share of low income households using natural gas as their main heating fuel, and an increase in the number of homes using electricity.

Table 5-12. Main heating fuel for low income households for 2001, 2005, and 2009

Main Heating Fuel	2001	2005	2009	Percent Point Change 2001 to 2009
Natural Gas	53%	48%	44%	-9%
Electricity	31%	32%	37%	+6%
Fuel Oil	7%	8%	6%	-1%
Propane	5%	5%	5%	0%
Other/No Heating Fuel	4%	7%	8%	+4%

Source: 2001, 2005, and 2009 RECS.

Table 5-13 shows the change in the use of air conditioning equipment. During the period from 2001 to 2009, there was a large increase in the share of low income households using central air conditioning equipment to cool their homes. It is expected that could increase the energy used for air conditioning and energy expenditures for low income households.

Table 5-13. Air conditioning equipment for low income households for 2001, 2005, and 2009

Air Conditioning Equipment	2001	2005	2009	Percent Point Change 2001 to 2009
Central Air Conditioning	38%	43%	48%	+10%
Other Air Conditioning	44%	35%	41%	-3%
No Air Conditioning	18%	21%	11%	-7%

Source: 2001, 2005, and 2009 RECS.

Table 5-14 presents information on energy usage for natural gas main heat households. During the period from 2001 to 2009, there was a reduction in the amount of natural gas used by such households and an increase in the amount of electricity used. Total energy use increased by about 3 percent. That is consistent with the increase in air conditioning observed in Table 5-13.

Table 5-14. Energy usage (mean MMBtus) per low income household with natural gas heat in 2001, 2005, and 2009

Fuel	2001	2005	2009	Percent Change 2001 to 2009
Natural Gas (MMBtus)	77.0	76.2	73.5	-5%
Electricity (MMBtus)	80.0	83.5	88.7	+11%
Total Residential Usage (MMBtus)	157.0	159.7	162.2	+3%
Total Home Energy Usage (MMBtus)	63.1	62.5	56.6	-10%

Source: 2001, 2005, and 2009 RECS. Electric Btus multiplied by 3.34 as recommended by EPA for comparison of electricity with fossil fuel.

Table 5-15 furnishes statistics on the end use shares for low income households. During the period from 2001 to 2009, the share of energy used for space heating declined by 6 percentage points and the share of energy used for appliances increased by 5 percentage points. The share of energy used for air conditioning only increased by 1 percentage point. That means that home energy consumption (home heating and home cooling) declined from 41 percent of usage in 2001 to 36 percent of usage in 2009.

Table 5-15. Percent of energy usage by end use for low income households for 2001, 2005, and 2009

End Use	2001	2005	2009	Percent Point Change 2001 to 2009
Space Heating	33%	27%	27%	-6%
Space Cooling	8%	12%	9%	+1%
Water Heating	15%	16%	15%	+0%
Appliances	44%	45%	49%	+5%
Total Uses	100%	100%	100%	0%

Source: 2001, 2005, and 2009 RECS. Electric Btu multiplied by 3.34 as recommended by EPA for comparison of electricity with fossil fuel. The change in total residential usage and total home energy usage is given as a percentage change.

Table 5-16 furnishes statistics on low income energy usage by Census Region. During the period from 2001 to 2009, mean energy usage increased in the Northeast and West Census Regions (6 percent and 8 percent, respectively), while there were small reductions (1 percent) in the mean usage in the Midwest and South Census Regions.

Table 5-16. Energy usage (mean MMBtus) by Census Region for low income households for 2001, 2005, and 2009

Census Region	2001	2005	2009	Percent Change 2001 to 2009
Northeast	140.5	155.8	148.7	+6%
Midwest	179.4	177.2	177.3	-1%
South	168.4	167.0	166.1	-1%
West	117.4	130.1	126.7	+8%
National	153.9	160.2	157.2	+2%

Source: 2001, 2005, and 2009 RECS. Electric Btu multiplied by 3.34 as recommended by EPA for comparison of electricity with fossil fuel.

The energy factors examined in this section show that there are some changes in energy usage that might affect energy expenditures. First, there was a small increase in energy usage of about 2 percent. Second, there was a shift in energy usage to consumption of electricity because of an increase in the share of households using electricity for their main heat, an increase in the share of households that used air conditioning equipment, and the increase in usage for appliances. Finally, there were increases in the usage of energy in the Northeast and West Census Regions. All of these factors could have an impact on mean energy expenditures and burden for low income households.

Energy Price Factors

There are a two ways to look at the impact of energy prices on low income households. First, it is useful to examine how the national average prices for individual fuels changed relative to other consumer prices over the period from 2001 to 2009. That will furnish some indication of potential changes in expenditures. However, the analysis also has shown that there were important changes in the type of the fuels used by low income households, and in the energy end uses. Second, to examine how energy prices changed in a more comprehensive way, it is useful to examine the inflation-adjusted price per Btu for low income households.

Table 5-17 shows the how the price of each fuel changed compared to the changes in the CPI-U. The composite energy index shows that energy prices increased by 42 percent during the period from 2001 to 2009, while consumer price changed by 21 percent. The percent change for each fuel exceeded the percent change in consumer prices. However, the largest changes was in the price of fuel oil that doubled over the period from 2001 to 2009.

Table 5-17. Energy price indices and the CPI-U for 2001, 2005, and 2009

Prince Index (1979 = 100)	**2001**	**2005**	**2009**	**Percent Change 2001 to 2009**
Electricity	187	205	250	34%
Natural Gas	323	426	407	26%
Fuel Oil	178	291	357	101%
Composite Energy Index	259	321	368	42%
CPI	243	269	293	21%

Source: 2001, 2005, and 2009 EIA Annual Energy Review.

Table 5-18 furnishes statistics on the inflation-adjusted price per MMBtu paid by low income households for energy by Census Region. In 2001, the average price per MMBtu was highest for low income households in the Northeast Census Region. During the period from 2001 to 2009, the average price per MMBtu increased the most for low income households in the Northeast (13 percent), but also increased substantially for low income households in the South Census Region.

Table 5-18. Inflation-adjusted energy price per MMBtu by Census Region for low income households for 2001, 2005, and 2009

Census Region	**2001**	**2005**	**2009**	**Percent Change 2001 to 2009**
Northeast	$14.16	$14.51	$16.07	13%
Midwest	$10.50	$10.53	$10.82	3%
South	$10.05	$10.59	$11.02	10%
West	$10.34	$10.75	$10.80	4%
National	$10.97	$11.40	$11.83	8%

Source: 2001, 2005, and 2009 RECS. Electric Btu multiplied by 3.34 as recommended by EPA for comparison of electricity with fossil fuel.

Table 5-1 showed that mean energy expenditures (adjusted for inflation) for low income households increased by 10 percent from 2001 to 2009. That appears to be the result of a small increase in energy usage (Table 5-16) and a large increase in energy prices (Table 5-18)

Summary of Findings

This study examined the changes in the energy needs of low income households during the period from 2001 to 2009 using the series of RECS surveys (2001, 2005, and 2009) and the matching series of CPS-ASEC surveys (2002, 2006, and 2010). The key findings from the study in terms of the indicators of need included:

- Mean Expenditures - Mean residential expenditures (adjusted for inflation) increased by about 10 percent while mean home energy expenditures declined by 2 percent.
- Mean Energy Burden - Mean residential energy burden increased by 4.2 percentage points and mean home energy burden increased by 2.7 percentage points.
- Aggregate Low Income Energy Bill - The aggregate low income residential energy bill increased by 28 percent and the aggregate low income home energy bill increase by 13 percent.
- Energy Burden Thresholds - The number of low income households with energy bills above threshold values that are tracked by OCS increased by more than 25 percent.

The analysis developed information that helps to explain the source of these changes in energy needs for low income households.

- Mean Expenditures - The primary reason for the increase in mean expenditures was that energy prices increased by more than the CPI during the period from 2001 to 2009.
- Mean Energy Burden - Mean energy burden increased by more than median energy burden because the distribution of energy burden changed; low income households using higher cost fuels (e.g., fuel oil) experienced a much higher energy burden in 2009 than they did in 2001.
- Aggregate Low Income Energy Bill - The aggregate low income energy bill increased because the number of low income households increase by 17 percent and the mean expenditures per household increased by 10 percent.
- Energy Burden Thresholds - The number of low income households with energy bills above the certain threshold values increased because the number of low income households grew and the price of certain fuels (fuel oil and propane) increased by substantially more than the CPI.

LIHEAP Policy Implications

The analysis shows that during the period from 2001 to 2009 there were regional changes in mean energy expenditures and the aggregate low income energy. The LIHEAP funding allocation formula directly addresses the regional changes in the number of low income households and the regional prices of energy, subject to certain hold harmless provisions. Each year, the allocation formula makes use of information on the number of low income households using each main heating fuel in each

state (source: American Community Survey - ACS) and the energy expenditures in each state (source: State Energy Data System - SEDS) to estimate the low income home energy bill for each state.

The analysis shows that during the period from 2001 to 2009 there were changes in the relative energy burdens of low income households by main heating fuel. 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 income and the higher energy costs or needs in relation to income, taking into account family size. To the extent that LIHEAP grantees have implemented their programs according to that mandate, the relative changes in energy burden for low income households by fuel type would be addressed.

Overall LIHEAP funding is not linked to the energy needs of low income households. However, Figure 3-22 of the *LIHEAP Home Energy Notebook for FY 2012* shows that funds used for LIHEAP fuel assistance increased from $1.8 billion in 2001 to $4.0 billion in 2009. In 2001, the LIHEAP program offered fuel assistance that covered about 10 percent of low income home energy bill, while in 2009 LIHEAP program fuel assistance covered about 17 percent.

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 2012. 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.[35]

The 2009 RECS is the thirteenth survey in the series of surveys.[36] 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 2012.

[35]Regression 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).

[36]More 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:[37]

- The 2009 RECS data for calendar year 2009 were updated to FY 2012 (October 1, 2011 to September 30, 2012), using procedures that adjust the 2009 data to reflect the weather and fuel prices for FY 2012. These procedures are comparable to those used for the FY 1986 - FY 2011 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 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.

[37]Information 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 2012 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*.[38]

- 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 2012 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 2012 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.[39]

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).

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

[39] 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.[40] 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.[41] 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.[42] 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

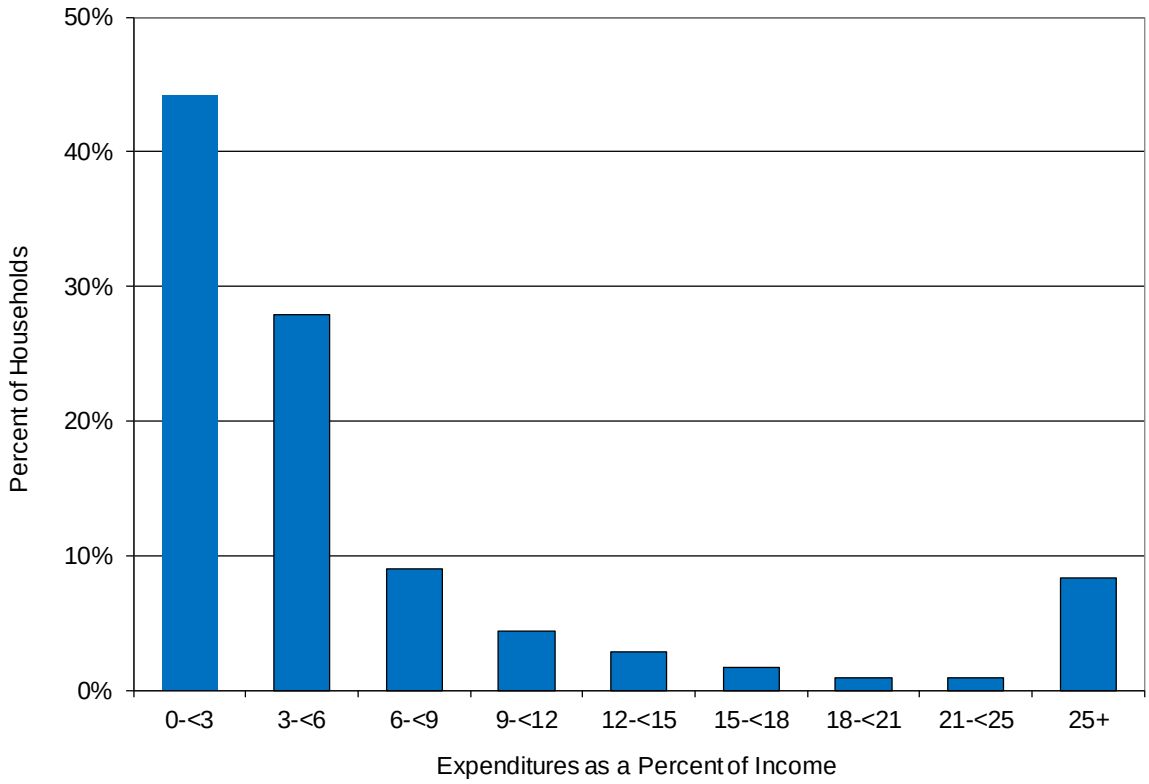
[40]The mean is the sum of all values divided by the number of values. The mean is also referred to as the average.

[41]For 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.

[42]For 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.[43]

[43]The 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 2012. The following equation was applied to each household in the microsimulation data file.

FY 2012 Projected Btus = (2009 estimated heat use * HDD change) +
(2009 estimated cooling use * CDD change) +
(2009 estimated water heat use + 2009 estimated appliance use)

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

Preliminary Expenditures = 2009 Expenditures *
(FY 2012 Projected Usage/2009 Actual Usage)

Final Expenditures = Preliminary Expenditures * Price Change[44]

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 2012. For example, electricity prices increased by 3.2 percent from 2009 to FY 2012.

Table A-1. National price factors for FY 2012

Fuel	Price Factors for FY 2012 Projections
Electricity	1.0316
Natural gas	0.8917
Fuel oil / kerosene	1.4735
Liquefied petroleum gas (LPG)	1.2340

[44]Price 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*, April 2013, and electricity consumption data is from the *Electric Power Monthly*, March 2013. Natural gas price and consumption data used for calculating price factors are from the *Monthly Energy Review*, April 2013. 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*, April 2013

Expenditure data were adjusted using national price factors for FY 2012. 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 2012[1/]

Census Region	All Fuels[2/] (MMBtus)[3/]	Natural Gas (MMBtus)	Electricity (MMBtus)	Fuel Oil (MMBtus)	Kerosene (MMBtus)	LPG (MMBtus)
US - All households	84.2	101.2	59.2	105.9	60.1	102.1
US - Non-low income households	90.3	105.6	64.5	113.3	66.4	108.9
US - Low income households[4/]	72.8	91.6	50.6	92.3	57.6	87.9
US - LIHEAP recipient households[5/]	83.9	100.0	54.0	99.9	75.7*	89.2
Northeast - All households	97.6	105.7	49.1	107.1	63.5	105.6
Northeast - Non-low income households	104.4	111.9	54.2	115.2	69.8	114.4
Northeast - Low income households	85.4	95.3	40.7	91.3	60.7	81.8
Northeast - LIHEAP recipient households	89.1	94.0	43.8	100.5	78.1*	85.0*
Midwest - All households	102.5	112.9	64.6	96.7	NC	114.1
Midwest - Non-low income households	108.5	117.4	74.1	98.7	NC	117.7
Midwest - Low income households	91.7	104.3	50.9	95.1	NC	105.9
Midwest - LIHEAP recipient households	96.3	107.5	56.8	85.5*	NC	93.7
South - All households	73.3	97.9	60.1	100.6	55.1	88.7
South - Non-low income households	79.6	104.8	64.5	103.1	64.0*	97.9
South - Low income households	61.7	82.4	52.4	95.4	52.8*	72.8
South - LIHEAP recipient households	72.0	103.9	57.6	106.8*	60.8*	95.2*
West - All households	72.4	85.4	56.0	112.6	50.5*	98.8
West - Non-low income households	78.4	88.7	62.2	112.1	50.5*	104.2
West - Low income households	60.3	75.5	47.9	114.2*	50.5*	88.3
West - LIHEAP recipient households	65.6	88.2	45.4	114.8*	NC	57.1*

[1/] Developed from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2012 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 2012

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	$2,013	2.9%	$1,948	2.8%	$1,786	2.6%	$3,381	4.9%	$2,028	2.9%	$3,059	4.4%
US - Non-low income households	$2,173	2.3%	$2,068	2.2%	$1,961	2.1%	$3,665	3.9%	$2,336	2.5%	$3,254	3.4%
US - Low income households[3/]	$1,716	9.0%	$1,691	8.8%	$1,503	7.9%	$2,857	14.9%	$1,905	10.0%	$2,657	13.9%
US - LIHEAP recipient households[4/]	$1,906	11.7%	$1,790	11.0%	$1,523	9.3%	$3,081	18.9%	$2,607*	16.0%	$2,747	16.8%
Northeast - All households	$2,620	3.4%	$2,306	3.0%	$1,758	2.3%	$3,472	4.6%	$2,198	2.9%	$3,783	5.0%
Northeast - Non-low income households	$2,853	2.7%	$2,482	2.3%	$1,931	1.8%	$3,774	3.5%	$2,554	2.4%	$4,064	3.8%
Northeast - Low income households	$2,207	10.3%	$2,006	9.4%	$1,475	6.9%	$2,887	13.5%	$2,041	9.6%	$3,031	14.2%
Northeast - LIHEAP recipient households	$2,287	13.3%	$1,954	11.3%	$1,465	8.5%	$3,103	18.0%	$2,713*	15.7%	$2,947*	17.1%
Midwest - All households	$1,903	2.9%	$1,835	2.8%	$1,537	2.3%	$2,655	4.0%	NC	NC	$3,143	4.7%
Midwest - Non-low income households	$2,015	2.3%	$1,929	2.2%	$1,700	1.9%	$2,736	3.1%	NC	NC	$3,244	3.6%
Midwest - Low income households	$1,698	8.9%	$1,656	8.7%	$1,303	6.8%	$2,589	13.6%	NC	NC	$2,912	15.2%
Midwest - LIHEAP recipient households	$1,774	11.0%	$1,656	10.3%	$1,402	8.7%	$2,477*	15.3%	NC	NC	$2,668	16.5%
South - All households	$2,038	3.1%	$2,156	3.3%	$1,930	2.9%	$3,138	4.8%	$1,744	2.7%	$2,745	4.2%
South - Non-low income households	$2,217	2.5%	$2,337	2.6%	$2,092	2.4%	$3,272	3.7%	$1,867*	2.1%	$2,966	3.4%
South - Low income households	$1,711	9.8%	$1,750	10.0%	$1,646	9.4%	$2,857	16.4%	$1,713*	9.8%	$2,365	13.5%
South - LIHEAP recipient households	$1,852	14.3%	$2,050	15.8%	$1,674	12.9%	$3,562*	27.4%	$1,970*	15.2%	$3,259*	25.1%
West - All households	$1,579	2.1%	$1,610	2.2%	$1,464	2.0%	$3,187	4.3%	$1,709*	2.3%	$2,913	3.9%
West - Non-low income households	$1,718	1.7%	$1,709	1.7%	$1,647	1.6%	$3,161	3.2%	$1,933*	1.9%	$3,111	3.1%
West - Low income households	$1,300	6.4%	$1,315	6.5%	$1,218	6.0%	$3,258*	16.1%	$1,470*	7.3%	$2,526	12.5%
West - LIHEAP recipient households	$1,230	6.6%	$1,334	7.2%	$1,111	6.0%	$2,652*	14.2%	NC	NC	$1,601*	8.6%

[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 2012. 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 2012 CPS ASEC, which reports income for calendar year 2011. 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 2012

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	$2,013	8.1%	$1,948	7.2%	$1,786	8.7%	$3,381	11.1%	$2,028	14.4%	$3,059	10.6%
US - Non-low income households	$2,173	3.1%	$2,068	2.8%	$1,961	3.1%	$3,665	4.5%	$2,336	4.6%	$3,254	5.0%
US - Low income households[3/]	$1,716	17.5%	$1,691	16.6%	$1,503	17.8%	$2,857	23.4%	$1,905	18.4%	$2,657	21.9%
US - LIHEAP recipient households[4/]	$1,906	17.8%	$1,790	17.0%	$1,523	16.9%	$3,081	20.9%	$2,607*	16.9%	$2,747	25.8%
Northeast - All households	$2,620	9.2%	$2,306	7.8%	$1,758	9.4%	$3,472	11.2%	$2,198	17.3%	$3,783	9.4%
Northeast - Non-low income households	$2,853	3.5%	$2,482	3.0%	$1,931	2.6%	$3,774	4.5%	$2,554	4.8%	$4,064	4.9%
Northeast - Low income households	$2,207	19.3%	$2,006	16.1%	$1,475	20.6%	$2,887	24.3%	$2,041	22.8%	$3,031	21.5%
Northeast - LIHEAP recipient households	$2,287	17.3%	$1,954	14.7%	$1,465	17.1%	$3,103	21.9%	$2,713*	18.4%	$2,947*	19.9%
Midwest - All households	$1,903	8.2%	$1,835	7.7%	$1,537	8.7%	$2,655	13.7%	NC	NC	$3,143	9.7%
Midwest - Non-low income households	$2,015	3.0%	$1,929	2.9%	$1,700	2.6%	$2,736	4.7%	NC	NC	$3,244	4.6%
Midwest - Low income households	$1,698	17.6%	$1,656	17.1%	$1,303	17.5%	$2,589	21.0%	NC	NC	$2,912	21.3%
Midwest - LIHEAP recipient households	$1,774	20.2%	$1,656	19.7%	$1,402	18.9%	$2,477*	16.8%	NC	NC	$2,668	23.0%
South - All households	$2,038	9.2%	$2,156	8.6%	$1,930	9.4%	$3,138	7.0%	$1,744	10.3%	$2,745	11.6%
South - Non-low income households	$2,217	3.4%	$2,337	3.2%	$2,092	3.4%	$3,272	3.8%	$1,867*	5.2%	$2,966	5.8%
South - Low income households	$1,711	19.8%	$1,750	20.6%	$1,646	20.0%	$2,857	13.7%	$1,713*	11.7%	$2,365	21.6%
South - LIHEAP recipient households	$1,852	19.3%	$2,050	19.6%	$1,674	18.4%	$3,562*	14.5%	$1,970*	8.1%	$3,259*	55.8%
West - All households	$1,579	5.5%	$1,610	4.5%	$1,464	6.0%	$3,187	15.6%	$1,709*	5.4%	$2,913	11.4%
West - Non-low income households	$1,718	2.3%	$1,709	2.2%	$1,647	2.3%	$3,161	4.9%	$1,933*	2.0%	$3,111	4.8%
West - Low income households	$1,300	11.8%	$1,315	11.6%	$1,218	11.0%	$3,258*	45.7%	$1,470*	9.0%	$2,526	24.2%
West - LIHEAP recipient households	$1,230	9.8%	$1,334	11.0%	$1,111	8.8%	$2,652*	10.9%	NC	NC	$1,601*	19.4%

[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 2012. 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 2012 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (C

residential energy burden for each household is computed as estimated FY 2012 residential energy expenditures divided by estimated FY 2012 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.

[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 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 2012

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	$2,013	3.7%	$1,948	3.3%	$1,786	3.8%	$3,381	5.6%	$2,028	9.5%	$3,059	6.0%
US - Non-low income households	$2,173	2.7%	$2,068	2.5%	$1,961	2.6%	$3,665	4.0%	$2,336	3.9%	$3,254	4.6%
US - Low income households[3/]	$1,716	8.4%	$1,691	8.0%	$1,503	7.9%	$2,857	13.4%	$1,905	10.8%	$2,657	13.2%
US - LIHEAP recipient households[4/]	$1,906	9.0%	$1,790	7.8%	$1,523	8.1%	$3,081	13.1%	$2,607*	13.3%	$2,747	16.5%
Northeast - All households	$2,620	4.3%	$2,306	3.8%	$1,758	3.3%	$3,472	5.5%	$2,198	9.6%	$3,783	5.3%
Northeast - Non-low income households	$2,853	3.0%	$2,482	2.6%	$1,931	2.2%	$3,774	4.1%	$2,554	3.8%	$4,064	4.3%
Northeast - Low income households	$2,207	9.9%	$2,006	9.1%	$1,475	7.5%	$2,887	13.4%	$2,041	11.8%	$3,031	10.8%
Northeast - LIHEAP recipient households	$2,287	9.9%	$1,954	7.7%	$1,465	5.6%	$3,103	13.7%	$2,713*	13.3%	$2,947*	11.3%
Midwest - All households	$1,903	3.6%	$1,835	3.5%	$1,537	3.3%	$2,655	7.5%	NC	NC	$3,143	5.2%
Midwest - Non-low income households	$2,015	2.6%	$1,929	2.6%	$1,700	2.3%	$2,736	4.8%	NC	NC	$3,244	4.2%
Midwest - Low income households	$1,698	8.3%	$1,656	8.0%	$1,303	6.4%	$2,589	11.7%	NC	NC	$2,912	15.3%
Midwest - LIHEAP recipient households	$1,774	8.7%	$1,656	8.1%	$1,402	8.2%	$2,477*	7.5%	NC	NC	$2,668	16.5%
South - All households	$2,038	4.2%	$2,156	3.8%	$1,930	4.2%	$3,138	5.0%	$1,744	9.5%	$2,745	7.0%
South - Non-low income households	$2,217	3.0%	$2,337	2.9%	$2,092	3.0%	$3,272	3.5%	$1,867*	4.3%	$2,966	5.3%
South - Low income households	$1,711	9.3%	$1,750	10.1%	$1,646	8.8%	$2,857	8.5%	$1,713*	9.7%	$2,365	13.2%
South - LIHEAP recipient households	$1,852	9.6%	$2,050	11.6%	$1,674	8.4%	$3,562*	6.8%	$1,970*	8.1%	$3,259*	15.7%
West - All households	$1,579	2.5%	$1,610	2.3%	$1,464	2.8%	$3,187	5.6%	$1,709*	2.2%	$2,913	7.1%
West - Non-low income households	$1,718	2.0%	$1,709	1.9%	$1,647	2.0%	$3,161	4.2%	$1,933*	2.2%	$3,111	4.4%
West - Low income households	$1,300	5.5%	$1,315	5.5%	$1,218	5.7%	$3,258*	62.5%	$1,470*	9.4%	$2,526	10.8%
West - LIHEAP recipient households	$1,230	6.2%	$1,334	5.9%	$1,111	5.5%	$2,652*	10.9%	NC	NC	$1,601*	10.6%

[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 2012. 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 2012 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (CPI) and FY 2012 energy expenditures are estimated by adjusting energy expenditures reported in the 2009 RECS for changes in weather and energy prices. FY 2012 residential energy burden for each household is computed as estimated FY 2012 residential energy expenditures divided by estimated FY 2012 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 2012[1/]

Census Region	All Fuels[2/] (MMBtus)[3/]	Natural Gas (MMBtus)	Electricity (MMBtus)	Fuel Oil (MMBtus)	Kerosene (MMBtus)	LPG (MMBtus)
US - All households	30.7	43.7	9.2	59.8	28.8	43.8
US - Non-low income households	32.5	44.4	9.7	63.6	29.5	46.1
US - Low income households[4/]	27.3	42.1	8.5	52.8	28.6	39.1
US - LIHEAP recipient households[5/]	35.5	48.3	9.5	56.3	35.9*	40.3
Northeast - All households	47.8	51.6	11.8	61.3	33.9	47.5
Northeast - Non-low income households	49.8	52.6	12.8	65.3	35.7	49.4
Northeast - Low income households	44.2	49.8	10.1	53.7	33.2	42.6
Northeast - LIHEAP recipient households	46.1	48.3	9.1	58.2	40.5*	43.2*
Midwest - All households	45.5	54.2	13.2	51.8	NC	53.8
Midwest - Non-low income households	47.3	55.5	14.7	51.7	NC	54.5
Midwest - Low income households	42.1	51.9	11.0	51.8	NC	52.2
Midwest - LIHEAP recipient households	44.8	55.7	11.8	41.5*	NC	41.8
South - All households	17.1	32.1	8.1	52.4	19.6	29.9
South - Non-low income households	18.5	33.6	8.4	55.9	18.3*	33.4
South - Low income households	14.4	28.7	7.5	45.2	19.9*	23.9
South - LIHEAP recipient households	18.0	35.8	9.1	50.1*	8.4*	34.2*
West - All households	24.1	34.9	9.8	56.3	22.7*	46.7
West - Non-low income households	26.8	36.0	10.1	57.8	14.5*	48.0
West - Low income households	18.6	31.8	9.4	52.0*	31.4*	44.2
West - LIHEAP recipient households	22.8	39.3	8.8	65.5*	NC	26.2*

[1/]Developed from the 2009 Residential Energy Consumption Survey (RECS), Energy Information Administration, U.S. Department of Energy, and adjusted for FY 2012 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 2012

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	$489	0.7%	$471	0.7%	$281	0.4%	$1,558	2.2%	$831	1.2%	$1,191	1.7%
US - Non-low income households	$512	0.5%	$475	0.5%	$293	0.3%	$1,659	1.8%	$830	0.9%	$1,254	1.3%
US - Low income households[3/]	$447	2.3%	$462	2.4%	$263	1.4%	$1,374	7.2%	$832	4.3%	$1,061	5.5%
US - LIHEAP recipient households[4/]	$587	3.6%	$533	3.3%	$291	1.8%	$1,481	9.1%	$1,036*	6.4%	$1,115	6.8%
Northeast - All households	$930	1.2%	$679	0.9%	$462	0.6%	$1,601	2.1%	$963	1.3%	$1,556	2.0%
Northeast - Non-low income households	$982	0.9%	$695	0.6%	$485	0.5%	$1,702	1.6%	$1,029	1.0%	$1,592	1.5%
Northeast - Low income households	$839	3.9%	$652	3.1%	$424	2.0%	$1,407	6.6%	$935	4.4%	$1,460	6.8%
Northeast - LIHEAP recipient households	$894	5.2%	$620	3.6%	$354	2.1%	$1,525	8.9%	$1,164*	6.8%	$1,427*	8.3%
Midwest - All households	$556	0.8%	$516	0.8%	$348	0.5%	$1,250	1.9%	NC	NC	$1,321	2.0%
Midwest - Non-low income households	$571	0.6%	$522	0.6%	$371	0.4%	$1,272	1.4%	NC	NC	$1,344	1.5%
Midwest - Low income households	$529	2.8%	$505	2.6%	$316	1.7%	$1,231	6.4%	NC	NC	$1,269	6.6%
Midwest - LIHEAP recipient households	$560	3.5%	$547	3.4%	$337	2.1%	$978*	6.1%	NC	NC	$1,035	6.4%
South - All households	$331	0.5%	$381	0.6%	$253	0.4%	$1,418	2.2%	$596	0.9%	$890	1.4%
South - Non-low income households	$350	0.4%	$396	0.4%	$263	0.3%	$1,505	1.7%	$435*	0.5%	$980	1.1%
South - Low income households	$296	1.7%	$348	2.0%	$236	1.4%	$1,236	7.1%	$636*	3.6%	$735	4.2%
South - LIHEAP recipient households	$356	2.7%	$418	3.2%	$274	2.1%	$1,516*	11.7%	$264*	2.0%	$1,001*	7.7%
West - All households	$317	0.4%	$336	0.5%	$274	0.4%	$1,459	2.0%	$647*	0.9%	$1,218	1.6%
West - Non-low income households	$341	0.3%	$347	0.3%	$284	0.3%	$1,490	1.5%	$403*	0.4%	$1,275	1.3%
West - Low income households	$271	1.3%	$304	1.5%	$261	1.3%	$1,372*	6.8%	$907*	4.5%	$1,106	5.5%
West - LIHEAP recipient households	$295	1.6%	$353	1.9%	$254	1.4%	$1,574*	8.5%	NC	NC	$669*	3.6%

[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 2012. 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 2012 CPS ASEC, which reports income for calendar year 2011. 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 2012

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	$489	2.5%	$471	2.3%	$281	1.9%	$1,558	6.4%	$831	7.0%	$1,191	5.0%
US - Non-low income households	$512	0.8%	$475	0.7%	$293	0.5%	$1,659	2.1%	$830	1.5%	$1,254	2.0%
US - Low income households[3/]	$447	5.7%	$462	5.9%	$263	4.3%	$1,374	14.3%	$832	9.2%	$1,061	11.3%
US - LIHEAP recipient households[4/]	$587	6.7%	$533	6.9%	$291	4.3%	$1,481	11.8%	$1,036*	7.2%	$1,115	11.1%
Northeast - All households	$930	4.2%	$679	3.1%	$462	3.3%	$1,601	6.5%	$963	8.9%	$1,556	5.0%
Northeast - Non-low income households	$982	1.3%	$695	0.9%	$485	0.7%	$1,702	2.1%	$1,029	1.8%	$1,592	2.1%
Northeast - Low income households	$839	9.3%	$652	6.9%	$424	7.7%	$1,407	15.1%	$935	12.0%	$1,460	13.1%
Northeast - LIHEAP recipient households	$894	8.3%	$620	6.9%	$354	4.2%	$1,525	12.7%	$1,164*	8.2%	$1,427*	9.3%
Midwest - All households	$556	3.1%	$516	2.9%	$348	3.2%	$1,250	7.3%	NC	NC	$1,321	4.9%
Midwest - Non-low income households	$571	0.9%	$522	0.8%	$371	0.6%	$1,272	2.3%	NC	NC	$1,344	2.1%
Midwest - Low income households	$529	7.1%	$505	6.9%	$316	6.9%	$1,231	11.3%	NC	NC	$1,269	11.2%
Midwest - LIHEAP recipient households	$560	8.1%	$547	8.3%	$337	7.1%	$978*	7.3%	NC	NC	$1,035	11.3%
South - All households	$331	1.9%	$381	2.1%	$253	1.7%	$1,418	3.3%	$596	3.8%	$890	4.3%
South - Non-low income households	$350	0.6%	$396	0.6%	$263	0.5%	$1,505	1.8%	$435*	1.2%	$980	2.0%
South - Low income households	$296	4.3%	$348	5.4%	$236	3.8%	$1,236	6.6%	$636*	4.5%	$735	8.4%
South - LIHEAP recipient households	$356	4.9%	$418	6.5%	$274	4.1%	$1,516*	6.9%	$264*	1.1%	$1,001*	15.8%
West - All households	$317	1.4%	$336	1.2%	$274	1.5%	$1,459	11.1%	$647*	2.8%	$1,218	7.1%
West - Non-low income households	$341	0.5%	$347	0.5%	$284	0.4%	$1,490	2.3%	$403*	0.5%	$1,275	2.1%
West - Low income households	$271	3.3%	$304	3.3%	$261	2.9%	$1,372*	35.9%	$907*	5.2%	$1,106	17.1%
West - LIHEAP recipient households	$295	2.4%	$353	2.8%	$254	2.2%	$1,574*	6.5%	NC	NC	$669*	8.1%

[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 2012. 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 2012 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (CPI) and FY 2012 energy expenditures are estimated by adjusting energy expenditures reported in the 2009 RECS for changes in weather and energy prices. FY 2012 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 2012

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	$489	0.8%	$471	0.8%	$281	0.6%	$1,558	2.5%	$831	3.1%	$1,191	2.3%
US - Non-low income households	$512	0.5%	$475	0.5%	$293	0.4%	$1,659	1.7%	$830	1.2%	$1,254	1.6%
US - Low income households[3/]	$447	1.9%	$462	2.1%	$263	1.4%	$1,374	6.8%	$832	5.4%	$1,061	5.3%
US - LIHEAP recipient households[4/]	$587	2.4%	$533	2.3%	$291	1.8%	$1,481	6.7%	$1,036*	4.7%	$1,115	7.4%
Northeast - All households	$930	1.4%	$679	1.1%	$462	1.0%	$1,601	2.5%	$963	4.0%	$1,556	2.1%
Northeast - Non-low income households	$982	0.9%	$695	0.8%	$485	0.5%	$1,702	1.7%	$1,029	1.6%	$1,592	1.5%
Northeast - Low income households	$839	3.6%	$652	2.8%	$424	2.3%	$1,407	7.3%	$935	5.9%	$1,460	5.2%
Northeast - LIHEAP recipient households	$894	3.7%	$620	2.1%	$354	1.7%	$1,525	7.9%	$1,164*	4.7%	$1,427*	6.7%
Midwest - All households	$556	1.0%	$516	1.0%	$348	0.8%	$1,250	4.1%	NC	NC	$1,321	2.5%
Midwest - Non-low income households	$571	0.7%	$522	0.7%	$371	0.5%	$1,272	2.4%	NC	NC	$1,344	1.7%
Midwest - Low income households	$529	2.4%	$505	2.4%	$316	1.7%	$1,231	6.2%	NC	NC	$1,269	7.0%
Midwest - LIHEAP recipient households	$560	2.8%	$547	2.8%	$337	2.0%	$978*	3.5%	NC	NC	$1,035	7.4%
South - All households	$331	0.6%	$381	0.7%	$253	0.5%	$1,418	2.1%	$596	1.7%	$890	2.1%
South - Non-low income households	$350	0.4%	$396	0.4%	$263	0.3%	$1,505	1.6%	$435*	1.2%	$980	1.6%
South - Low income households	$296	1.5%	$348	1.9%	$236	1.3%	$1,236	4.0%	$636*	3.1%	$735	4.2%
South - LIHEAP recipient households	$356	2.0%	$418	2.4%	$274	1.8%	$1,516*	3.0%	$264*	1.1%	$1,001*	9.7%
West - All households	$317	0.4%	$336	0.5%	$274	0.5%	$1,459	2.4%	$647*	0.7%	$1,218	2.3%
West - Non-low income households	$341	0.3%	$347	0.4%	$284	0.3%	$1,490	2.2%	$403*	0.7%	$1,275	1.6%
West - Low income households	$271	0.9%	$304	1.1%	$261	1.2%	$1,372*	30.0%	$907*	7.5%	$1,106	5.0%
West - LIHEAP recipient households	$295	1.5%	$353	1.8%	$254	1.5%	$1,574*	6.5%	NC	NC	$669*	4.4%

[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 2012. 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 2012 income is estimated by inflating income reported in the 2009 RECS by the consumer price index (CPI) and FY 2012 energy expenditures are estimated by adjusting energy expenditures reported in the 2009 RECS for changes in weather and energy prices. FY 2012 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 2012

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%	7.3	$262	0.4%	1.1%	0.3%
US - Non-low income households	94.3%	8.3	$300	0.3%	0.4%	0.2%
US - Low income households[4/]	89.1%	5.3	$187	1.0%	2.5%	0.6%
US - LIHEAP recipient households[5/]	88.6%	4.3	$151	0.9%	1.7%	0.5%
Northeast - All households	89.0%	3.1	$155	0.2%	0.6%	0.2%
Northeast - Non-low income households	93.4%	3.5	$174	0.2%	0.2%	0.1%
Northeast - Low income households	81.1%	2.4	$117	0.5%	1.3%	0.4%
Northeast - LIHEAP recipient households	79.9%	2.8	$131	0.8%	1.1%	0.4%
Midwest - All households	95.0%	4.9	$152	0.2%	0.6%	0.2%
Midwest - Non-low income households	97.1%	5.5	$173	0.2%	0.2%	0.2%
Midwest - Low income households	91.3%	3.5	$112	0.6%	1.4%	0.4%
Midwest - LIHEAP recipient households	91.2%	3.1	$98	0.6%	1.2%	0.3%
South - All households	98.7%	11.7	$411	0.6%	1.9%	0.7%
South - Non-low income households	99.4%	13.6	$479	0.5%	0.7%	0.5%
South - Low income households	97.3%	8.3	$285	1.6%	4.1%	1.3%
South - LIHEAP recipient households	99.5%	7.2	$234	1.8%	2.8%	1.0%
West - All households	82.2%	4.9	$187	0.3%	0.6%	0.1%
West - Non-low income households	83.7%	5.6	$214	0.2%	0.3%	0.1%
West - Low income households	79.3%	3.5	$130	0.6%	1.3%	0.3%
West - LIHEAP recipient households	81.8%	3.3	$111	0.6%	0.9%	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 2012. 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 recipiency targeting performance statistics.

State-level estimates of the number of income eligible households for FY 2012 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.[45] 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 2009-2011 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 2011 single-year ACS PUMS data.[46]

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,[47] derived from the 2009-2011 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 2009-2011 ACS, using the using the Federal Maximum Income Standard and the FY2012 State Income Standards, respectively.

[45] 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.

[46] 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/.

[47] 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*.

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 2009-2011)

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	618,693	226,267	112,312	287,301	164,892
Alaska	62,060	17,522	16,158	23,447	18,725
Arizona	729,566	247,941	162,626	231,585	241,569
Arkansas	343,888	122,079	71,439	154,785	89,501
California	3,972,995	1,365,365	915,693	1,269,068	1,324,081
Colorado	579,321	183,475	116,121	176,548	212,574
Connecticut	446,544	185,881	74,089	156,269	135,339
Delaware	101,632	41,279	18,622	36,734	29,342
District of Columbia	64,182	22,526	9,567	24,248	22,281
Florida	2,256,727	941,603	364,288	777,269	717,273
Georgia	1,161,262	373,861	251,043	408,601	390,835
Hawaii	133,230	54,001	25,354	42,272	43,431
Idaho	169,526	52,854	42,379	57,382	52,864
Illinois	1,532,107	559,363	299,121	503,954	514,674
Indiana	769,995	258,016	156,972	290,192	240,463
Iowa	352,806	135,839	64,941	122,702	110,272
Kansas	330,807	113,700	67,761	121,452	104,677
Kentucky	568,737	206,947	104,944	278,582	139,692
Louisiana	569,823	205,600	108,825	242,278	166,721
Maine	168,263	70,043	22,869	79,948	41,544
Maryland	645,736	247,943	120,340	216,901	209,006
Massachusetts	851,512	366,332	124,528	335,996	239,582
Michigan	1,302,893	461,065	230,467	508,148	405,201
Minnesota	650,339	244,047	117,182	216,566	212,094
Mississippi	365,603	128,448	75,395	169,053	97,415
Missouri	738,106	266,150	140,526	299,426	214,044
Montana	115,278	41,526	22,008	43,239	36,903
Nebraska	210,290	74,010	41,205	70,606	69,669
Nevada	285,780	96,222	63,256	83,924	98,330
New Hampshire	155,378	66,263	20,525	59,885	46,642
New Jersey	1,044,279	440,102	180,869	342,486	324,838
New Mexico	210,699	72,106	47,979	78,917	63,111
New York	2,387,114	948,350	416,341	845,589	745,946
North Carolina	1,196,872	410,222	243,118	459,769	372,108
North Dakota	78,937	30,174	12,087	25,755	28,874
Ohio	1,496,769	548,034	269,643	593,618	443,002
Oklahoma	420,055	143,052	91,872	178,930	116,891
Oregon	471,988	165,112	86,507	177,035	151,194
Pennsylvania	1,605,457	691,557	241,429	656,236	437,117
Rhode Island	142,459	58,952	22,559	60,383	39,483
South Carolina	573,531	208,043	114,673	228,993	169,231
South Dakota	89,994	34,112	17,825	31,774	27,825
Tennessee	784,319	286,646	146,543	340,408	220,595
Texas	2,621,495	802,767	681,340	903,544	847,910
Utah	233,516	61,638	68,594	65,933	78,840
Vermont	68,505	27,877	9,853	30,103	18,912
Virginia	865,843	327,868	157,526	315,526	275,207
Washington	769,625	259,592	153,613	275,526	249,129
West Virginia	232,736	93,675	33,157	119,058	56,401
Wisconsin	715,648	267,366	127,043	243,058	232,173
Wyoming	61,996	22,903	11,802	22,003	18,960
All States	36,324,916	13,276,316	7,094,929	13,283,005	11,307,383

[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 114,931,847.
[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*.

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 2009-2011)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	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	150%	512,661	177,176	98,344	242,980	133,800
Alaska	150%	47,914	12,340	13,881	18,515	13,466
Arizona	186%[6/]	729,149	247,866	162,282	231,321	241,544
Arkansas	150%	325,523	112,323	70,497	146,613	84,566
California	214%[6/]	3,971,409	1,364,748	914,246	1,268,456	1,324,037
Colorado	150%	360,369	104,402	78,985	116,625	129,425
Connecticut	150%[7/]	274,954	120,279	54,894	113,156	59,661
Delaware	200%	83,935	32,948	16,339	30,974	23,842
District of Columbia	187%[6/]	64,182	22,526	9,567	24,248	22,281
Florida	150%	1,646,709	649,928	288,541	582,517	517,477
Georgia	185%[6/]	1,160,974	373,737	250,829	408,442	390,835
Hawaii	150%	84,111	33,947	18,272	28,970	24,406
Idaho	150%	138,722	41,060	35,935	47,528	43,491
Illinois	150%	948,134	306,134	207,415	324,011	316,736
Indiana	150%	540,986	160,719	125,389	210,592	164,716
Iowa	150%	237,318	84,447	47,314	86,321	73,225
Kansas	130%	181,049	53,501	42,517	70,203	55,624
Kentucky	130%	400,949	129,077	81,688	200,350	97,939
Louisiana	176%[6/]	569,213	205,508	108,304	242,036	166,681
Maine	170%[6/8/]	123,619	47,881	17,569	60,375	30,218
Maryland	175%	360,751	137,186	72,061	136,221	104,031
Massachusetts	269%[6/]	851,512	366,332	124,528	335,996	239,582
Michigan	110%	580,475	145,949	129,097	237,106	184,362
Minnesota	193%[6/]	524,581	197,550	95,531	183,546	164,142
Mississippi	150%[6/]	364,492	128,217	74,434	168,614	97,320
Missouri	135%	474,172	153,126	97,824	201,475	134,289
Montana	177%[6/9/]	115,209	41,526	21,939	43,233	36,903
Nebraska	116%	157,559	53,025	32,836	55,670	50,758
Nevada	110%	124,544	34,596	32,871	37,540	41,524
New Hampshire	200%	112,388	46,981	15,270	45,882	32,443
New Jersey	200%	705,977	290,120	135,409	248,813	202,401
New Mexico	150%	206,415	69,605	47,897	77,405	61,783
New York	220% [6/10/]	2,387,114	948,350	416,341	845,589	745,946
North Carolina	130%	757,187	236,144	171,374	302,250	226,001
North Dakota	199%[6/]	78,937	30,174	12,087	25,755	28,874
Ohio	200%	1,453,926	521,561	269,391	578,927	429,660
Oklahoma	110%	234,676	66,783	58,554	101,896	65,047
Oregon	194%[6/]	471,819	165,082	86,346	176,945	151,194
Pennsylvania	150%	997,892	387,736	167,348	435,980	265,698
Rhode Island	235%[6/]	142,459	58,952	22,559	60,383	39,483
South Carolina	150%	468,830	163,190	100,060	190,613	135,058
South Dakota	200%	89,994	34,112	17,825	31,774	27,825
Tennessee	150%	646,298	223,130	128,743	285,742	179,268
Texas	125%	1,690,525	467,667	486,797	591,292	532,115
Utah	150%	169,050	40,055	51,240	48,424	57,974
Vermont	185%	59,611	23,686	9,245	27,217	15,876
Virginia	130%	408,843	140,880	82,155	163,433	122,879
Washington	125%	362,774	103,193	80,467	140,670	112,614
West Virginia	130%	173,651	62,556	28,037	89,503	42,621
Wisconsin	209%[6/]	715,636	267,366	127,031	243,058	232,173
Wyoming	204%[6/]	61,996	22,903	11,802	22,003	18,960
All States	Not applicable	28,351,173	9,908,280	5,849,907	10,587,188	8,692,774

[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 114,931,847.
[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/] These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.

[7/] The State income guideline is 200% of HHS Poverty Guidelines for households with young children, elderly, disabled members.
[8/] 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
[9/] The State income guideline is 150% of HHS Poverty Guidelines for households with 7 or more members and 60% of the State median income otherwise.
[10/] 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.

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 2009-2011)

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	618,693	302,251	104,726	105,684	106,032
Alaska	62,060	25,832	10,948	11,134	14,146
Arizona	729,566	314,785	110,898	118,128	185,755
Arkansas	343,888	182,008	73,438	70,077	18,365
California	3,972,995	1,456,611	578,737	565,343	1,372,304
Colorado	579,321	205,366	78,070	76,933	218,952
Connecticut	446,544	120,330	40,396	45,372	240,446
Delaware	101,632	30,566	12,108	13,012	45,946
District of Columbia	64,182	37,821	8,078	7,635	10,648
Florida	2,256,727	922,570	355,284	368,855	610,018
Georgia	1,161,262	518,808	178,132	175,516	288,806
Hawaii	133,230	51,398	16,083	16,630	49,119
Idaho	169,526	71,255	30,286	37,181	30,804
Illinois	1,532,107	548,267	193,288	206,579	583,973
Indiana	769,995	302,809	111,720	126,457	229,009
Iowa	352,806	122,780	55,659	58,879	115,488
Kansas	330,807	119,948	51,719	50,141	108,999
Kentucky	568,737	283,349	98,062	93,421	93,905
Louisiana	569,823	278,298	94,141	94,198	103,186
Maine	168,263	65,032	29,452	29,168	44,611
Maryland	645,736	174,274	58,257	63,436	349,769
Massachusetts	851,512	260,565	93,419	91,979	405,549
Michigan	1,302,893	513,031	177,166	180,248	432,448
Minnesota	650,339	201,609	76,758	83,295	288,677
Mississippi	365,603	209,809	72,160	67,448	16,186
Missouri	738,106	309,982	116,246	118,734	193,144
Montana	115,278	45,258	20,086	23,231	26,703
Nebraska	210,290	75,377	34,126	34,653	66,134
Nevada	285,780	109,861	42,217	45,240	88,462
New Hampshire	155,378	38,240	16,730	18,574	81,834
New Jersey	1,044,279	272,102	104,966	110,230	556,981
New Mexico	210,699	121,941	42,129	42,345	4,284
New York	2,387,114	928,164	297,513	309,225	852,212
North Carolina	1,196,872	524,110	196,631	200,946	275,185
North Dakota	78,937	29,838	11,437	11,785	25,877
Ohio	1,496,769	611,366	204,708	216,671	464,024
Oklahoma	420,055	205,840	79,752	83,317	51,146
Oregon	471,988	184,518	71,454	75,778	140,238
Pennsylvania	1,605,457	557,160	220,863	219,869	607,565
Rhode Island	142,459	49,539	18,023	17,857	57,040
South Carolina	573,531	274,762	98,588	95,480	104,701
South Dakota	89,994	37,248	15,865	14,916	21,965
Tennessee	784,319	372,198	136,106	137,994	138,021
Texas	2,621,495	1,245,294	445,231	444,798	486,172
Utah	233,516	91,520	36,322	41,208	64,466
Vermont	68,505	22,676	11,050	11,144	23,635
Virginia	865,843	284,760	103,180	110,199	367,704
Washington	769,625	267,560	95,214	103,880	302,971
West Virginia	232,736	119,907	45,594	45,615	21,620
Wisconsin	715,648	240,795	95,722	101,748	277,383
Wyoming	61,996	18,761	8,331	9,118	25,786
All States	36,324,916	14,358,149	5,277,069	5,401,304	11,288,394

[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 114,931,847.

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 2009-2011)

State	State Income Guidelines for 4-Person Household as % of HHS Poverty Guidelines	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	150%	512,661	302,251	104,726	105,684	0
Alaska	150%	47,914	25,832	10,948	11,134	0
Arizona	186%[4/]	729,149	314,785	110,821	117,788	185,755
Arkansas	150%	325,523	182,008	73,438	70,077	0
California	214%[4/]	3,971,409	1,456,611	578,644	563,850	1,372,304
Colorado	150%	360,369	205,366	78,070	76,933	0
Connecticut	150%[5/]	274,954	120,330	40,396	45,372	68,856
Delaware	200%	83,935	30,566	12,108	13,012	28,249
District of Columbia	187%[4/]	64,182	37,821	8,078	7,635	10,648
Florida	150%	1,646,709	922,570	355,284	368,855	0
Georgia	185%[4/]	1,160,974	518,808	178,064	175,296	288,806
Hawaii	150%	84,111	51,398	16,083	16,630	0
Idaho	150%	138,722	71,255	30,286	37,181	0
Illinois	150%	948,134	548,267	193,288	206,579	0
Indiana	150%	540,986	302,809	111,720	126,457	0
Iowa	150%	237,318	122,780	55,659	58,879	0
Kansas	130%	181,049	119,948	51,719	9,382	0
Kentucky	130%	400,949	283,349	98,062	19,538	0
Louisiana	176%[4/]	569,213	278,298	94,141	93,588	103,186
Maine	170%[4/7/]	123,619	65,032	29,452	29,135	0
Maryland	175%	360,751	174,274	58,257	63,436	64,784
Massachusetts	269%[4/]	851,512	260,565	93,419	91,979	405,549
Michigan	110%	580,475	513,031	67,444		0
Minnesota	193%[4/]	524,581	201,609	76,758	83,109	163,105
Mississippi	150%[4/]	364,492	209,809	71,954	66,543	16,186
Missouri	135%	474,172	309,982	116,246	47,944	0
Montana	177%[4/6/]	115,209	45,258	20,086	23,231	26,634
Nebraska	116%	157,559	75,377	34,126	34,653	13,403
Nevada	110%	124,544	109,861	14,683	0	0
New Hampshire	200%	112,388	38,240	16,730	18,574	38,844
New Jersey	200%	705,977	272,102	104,966	110,230	218,679
New Mexico	150%	206,415	121,941	42,129	42,345	0
New York	220% [4/8/]	2,387,114	928,164	297,513	309,225	852,212
North Carolina	130%	757,187	524,110	196,631	36,446	0
North Dakota	199%[4/]	78,937	29,838	11,437	11,785	25,877
Ohio	200%	1,453,926	611,366	204,708	216,671	421,181
Oklahoma	110%	234,676	205,840	28,836	0	0
Oregon	194%[4/]	471,819	184,518	71,454	75,609	140,238
Pennsylvania	150%	997,892	557,160	220,863	219,869	0
Rhode Island	235%[4/]	142,459	49,539	18,023	17,857	57,040
South Carolina	150%	468,830	274,762	98,588	95,480	0
South Dakota	200%	89,994	37,248	15,865	14,916	21,965
Tennessee	150%	646,298	372,198	136,106	137,994	0
Texas	125%	1,690,525	1,245,294	445,231	0	0
Utah	150%	169,050	91,520	36,322	41,208	0
Vermont	185%	59,611	22,676	11,050	11,144	14,741
Virginia	130%	408,843	284,760	103,180	20,903	0
Washington	125%	362,774	267,560	95,214	0	0
West Virginia	130%	173,651	119,907	45,594	8,150	0
Wisconsin	209%[4/]	715,636	240,795	95,722	101,736	277,383
Wyoming	204%[4/]	61,996	18,761	8,331	9,118	25,786
All States	Not applicable	28,351,173	14,358,149	5,088,453	4,063,160	4,841,411

[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 114,931,847.
[4/] These States use a percent of State median income. The figures reported are the conversion to a percent of the HHS Poverty Guidelines.
[5/] The State income guideline is 200% of HHS Poverty Guidelines for households with young children, elderly, disabled members.
[6/] The State income guideline is 150% of HHS Poverty Guidelines for households with 7 or more members and 60% of the State median income otherwise.
[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
[8/] 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